

Pursuing the desire for cattle or attacking the followers of heresy:  
A numerical analysis of different factors influencing strategies adopted in large  
group interactions involving  
nomads or holy war

Volume 1 of 2

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## SUMMARY OF THESIS

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This thesis is a numerical analysis of factors which have influenced the strategies adopted in a sample of 120 large group interactions involving nomads or holy war in the period 1250 BCE to 1850 CE in parts of Afro-Eurasia. In the first two chapters, it establishes a basis for the limits of time and space applied to the sample, and places them in their wider context, as well as addressing issues of methodology arising from the use of a quantitative approach. It then draws on material from a range of disciplines to define and exemplify nomadism and holy war, before exploring a range of factors likely to be relevant to the strategies employed. These include matters pertaining to climate, agriculture, population and power, government, culture, religion, economics, warfare, and leadership. The broad pattern of events in each of the regions of the study is outlined, providing a context for the individual cases used in the sample. Issues of model-building are examined, and the database used for analysis, as developed in light of the prior analysis of factors, is presented. Initial analysis shows that the sample interactions are linked to periods of high activity of the El Niño Southern Ocean (ENSO) anomaly. They illustrate the already established pattern of climatically and culturally disadvantaged but militarily strong initiators against advantaged but militarily weaker respondent. Use of cavalry by the initiators is linked to the bioproductivity of their area. The assessments of Manoeuvre and Morale, rather than Material, are the main predictors of their level of advantage. Stepwise regression analysis of the database, supported by stability testing through analysis of random subsamples and bootstrapping, leads to the conclusion that initiator strategy and the outcome can be strongly explained (57% and 75% of variance, respectively) by the variables examined. In aggregate, the climate and geography variables; Holy War; other culture, economic and diplomacy variables and military variables are all of fairly similar significance in explaining the characteristics of the interactions. Analysis of a secondary database suggests that the model may be orientated towards nomad initiators with more aggressive policies which are more rapidly brought to a conclusion.

To Mulan, who broke the mould and went to war for her family and people<sup>1</sup>  
And Major-General Stanley who combined knowledge of history and mathematics<sup>2</sup>

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At home, special thanks are due to my wife Janet, who listened over coffee to more thoughts about Mongols, Turks and Arabs than she ever asked for ... and commented helpfully.

Finally, not forgetting Daniel Cat, who sat amiably with me as I worked, even though his occasional textual interventions on the computer keyboard were quickly deleted.

Any remaining errors and omissions are of course my responsibility.

---

<sup>1</sup>Mulan is the eponymous hero of a tale whose earliest form seems to date back to the struggles of the Northern Wei (China, 385-533 CE). She went to war against the Huns in the place of her father. Later versions referred to different nomad foes. See Kwa, S. and Idema, W.L. (2010) 'Introduction' *Mulan: Five versions of a Classic Chinese Legend with Related Texts* Ed. and Trans. Kwa, S. and Idema, W.L. Indianapolis Hackett Publishing Co. Inc., p.xiv.

<sup>2</sup> The character Major-General Stanley is, we learn from the nineteenth century comic opera *The Pirates of Penzance* (by Gilbert and Sullivan), acquainted with fights historical from Marathon to Waterloo, and also teeming with facts mathematical. He is in fact "a very model of a modern major-general." It seems that he had read the writings of Creasey. See Creasey, E. (1851) *The Fifteen Decisive Battles of the World: From Marathon to Waterloo*. London, Richard Bentley.

## DESIDERATA

*“And lest things which should be remembered perish with time and vanish from the memory of those who come after us, I, seeing so many evils and the whole world, as it were, placed within the grasp of the Evil One, being myself as if among the dead, I, waiting for death, have put into writing all the things that I have witnessed. And lest the writing should perish with the writer and the work fail with the labourer, I leave parchment to continue this work, if perchance any man survive and any of the race of Adam escape this pestilence and carry on the work which I have begun.”* Brother John Clyn (1349)

*“Words and numbers are of equal worth, for, in the cloak of knowledge, one is warp and the other woof. It is no more important to count the sands than it is to name the stars.”*  
Norton Juster (1974) *The Phantom Tollbooth*

*“For men who purpose to enter upon a war or are preparing themselves for any kind of struggle may derive some benefit from a narrative of a similar situation in history, inasmuch as this discloses the final result attained by men of an earlier day in a struggle of the same sort, and foreshadows, at least for those who are most prudent in planning, what outcome present events will probably have.”* Procopius, *History of the Wars*, Book 1, Chapter 1

*“War is a grave affair of state; it is a place of life and death, a road to survival or extinction, a matter to be pondered carefully. Victory belongs to the side that scores most in the temple calculation before battle.”* Sun-Tzu, *The Art of War*

*“Or what king, going out to wage war against another king, will not sit down first and consider whether he is able with ten thousand to oppose the one who comes against him with twenty thousand? If he cannot, then, while the other is still far away, he sends a delegation and asks for the terms of peace.”* Gospel of Luke, 14, 31-32

*“A king is not saved by his great army; a warrior is not delivered by his great strength. The war horse is a vain hope for victory, and by its great might it cannot save.”* Psalm 33, 16-17

*“Sit down before you draw the sword, weigh each article, omit none, and compute the expense of blood as well as treasure which war requires, and the evils which it of necessity brings with it; and then see at the bottom of the account whether after the greatest success, there is likely to be a balance in your favour.”* Desiderius Erasmus (1521), *The Complaint of Peace*

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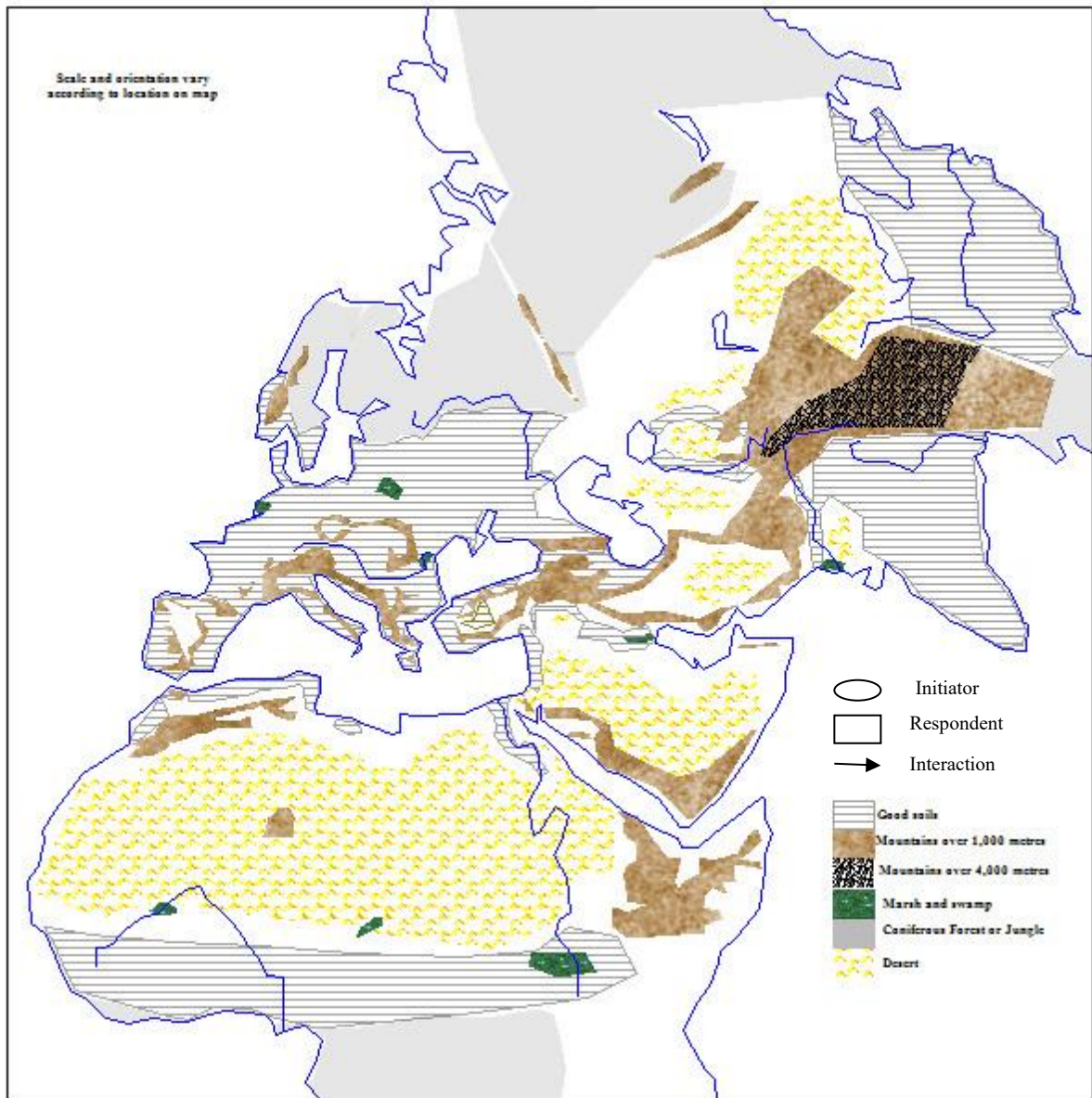
## Glossary

|                     |  |
|---------------------|--|
| BCE                 | Before Common Era  |
| Bootstrapping       | Statistical technique using multiple resampling                      |
| CE                  | Common Era   |
| COW                 | Correlates of War  |
| <i>Dzud</i>         | Period of severe weather with blizzards and extreme cold in Mongolia |
| ENSO                | El Niño Southern Oscillation   |
| FAO                 | Food and Agriculture Organisation                                    |
| Food Unit           | 1 kg grain   |
| Game Theory         | A systematic approach to examination of strategy options             |
| GDP                 | Gross Domestic Product   |
| <i>Ghulam</i>       | Slave soldier in Islamic societies                                   |
| Gini coefficient    | Standard measure of population inequality                            |
| GIPP                | Group Interaction with Polemogenic Potential                         |
| GK                  | Geary-Khamis (dollar): US dollar adjusted to a base PPP.             |
| HPC                 | Hieropolemic Conflict  |
| HPI                 | Hieropolemic Interaction   |
| INSF                | Ideal Notional Sampling Frame  |
| <i>Itqa</i>         | Islamic system for funding soldiers                                  |
| <i>Jihad</i>        | Islamic holy war   |
| <i>Mamluk</i>       | Slave soldier in Islamic society                                     |
| NSC                 | Nomad-Sedentary Conflict   |
| NSI                 | Nomad-Sedentary Interaction  |
| Odds Ratio          | Standard measure for probability comparisons                         |
| PCA                 | Principal Components Analysis  |
| PET                 | Potential Evapo-Transpiration  |
| PPP                 | Purchasing Power Parity  |
| Stepwise regression | Statistical technique for comparing variability of data              |
| SPSS                | Statistical Package for the Social Sciences                          |
| WRG                 | Wargames Research Group  |
| 4-H Index           | 4-H Index of Realm Stress (Civil Strife, War, Famine and Plague)     |
| 3M Index            | Material, Manoeuvre, Morale index                                    |



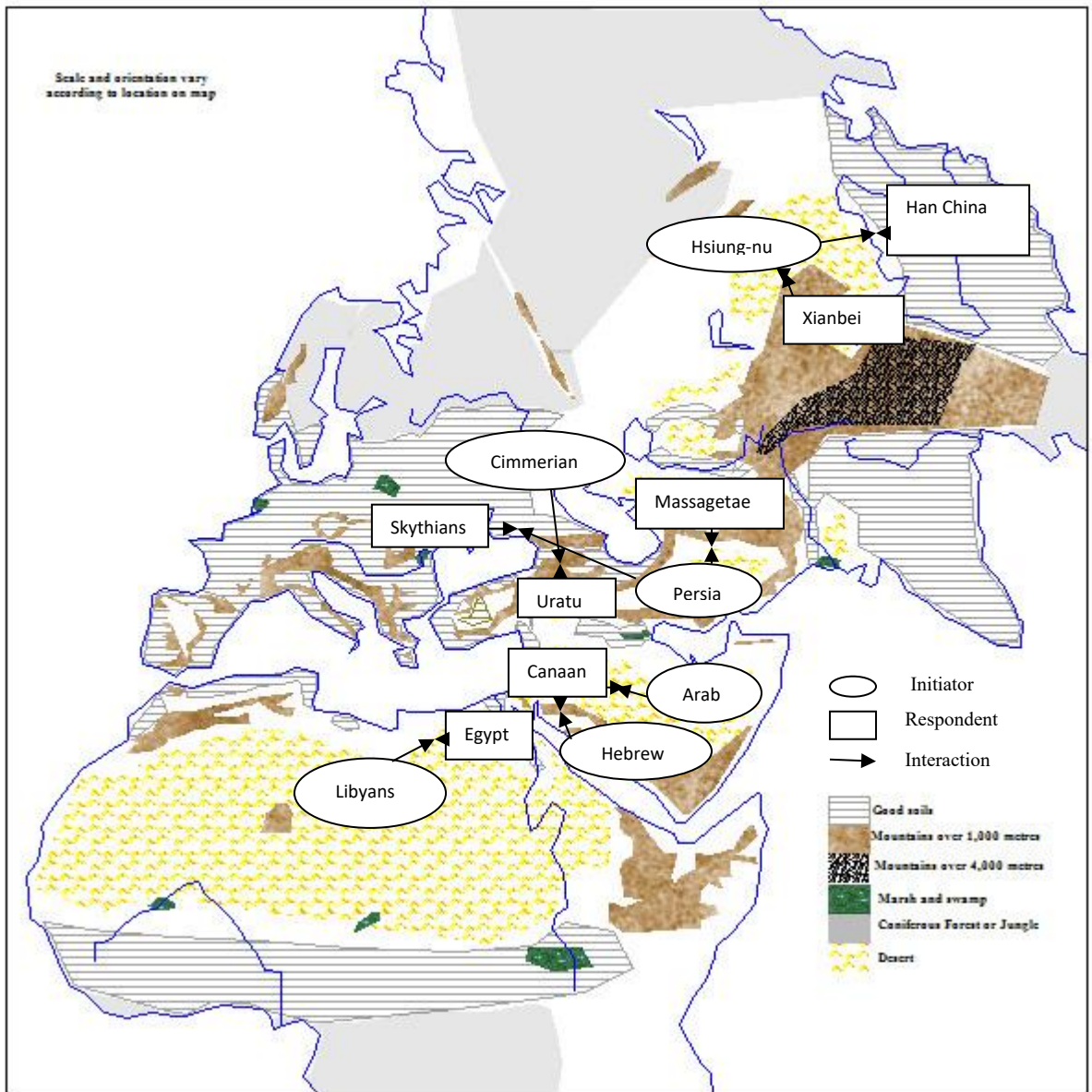
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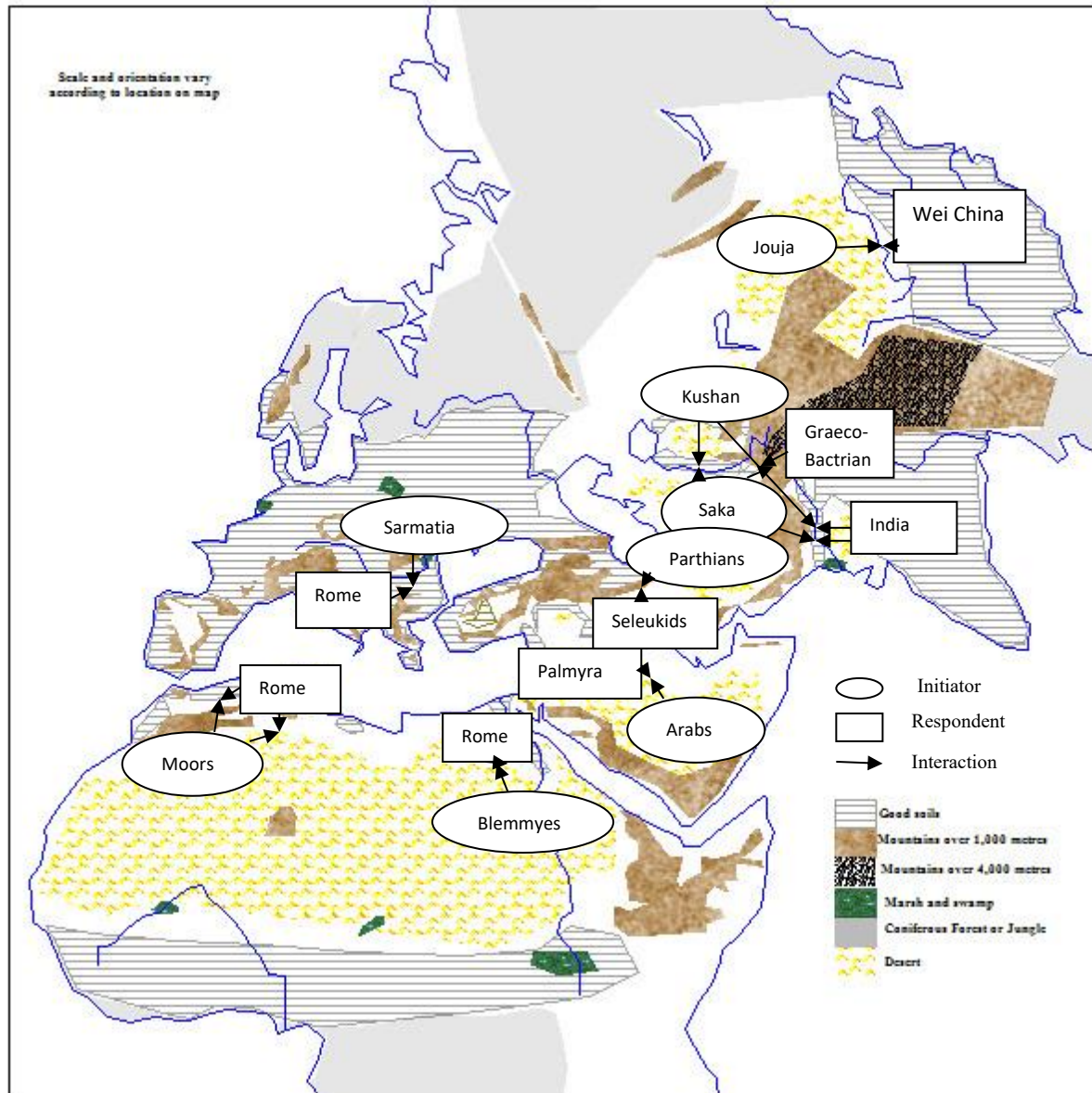




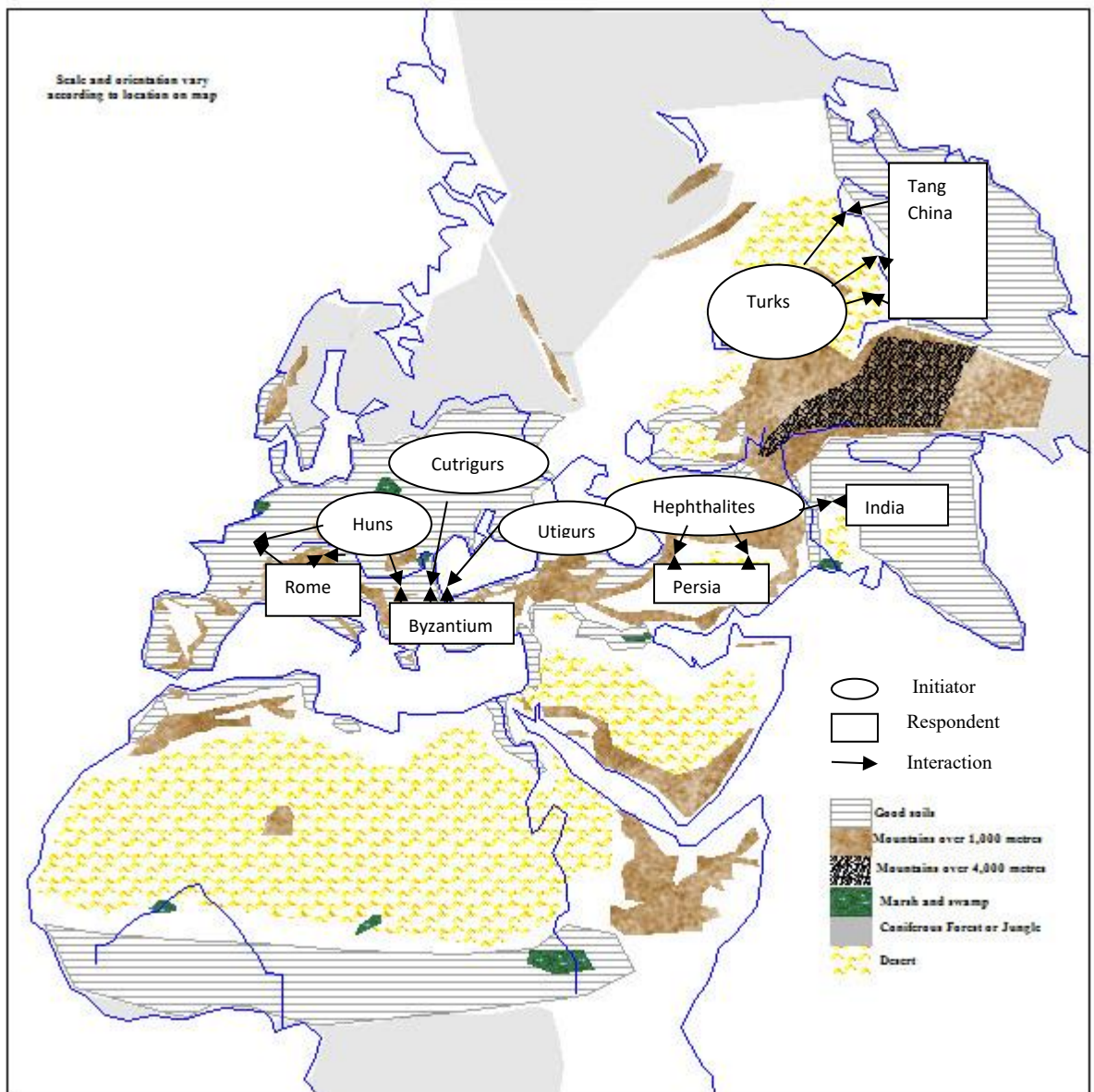
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Map 3 Interactions 150BCE – 400CE

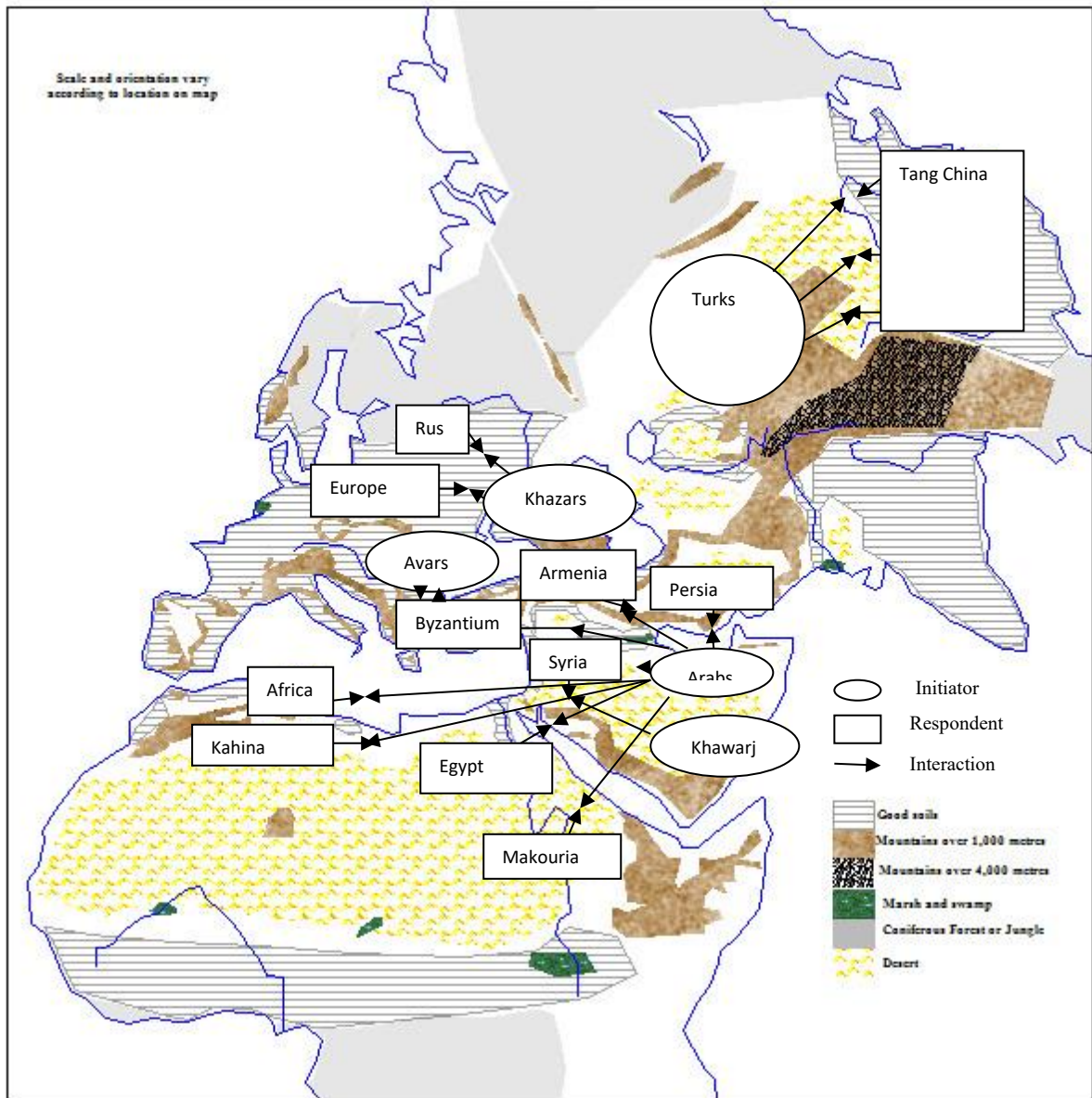


### Map 4 Interactions 400-600

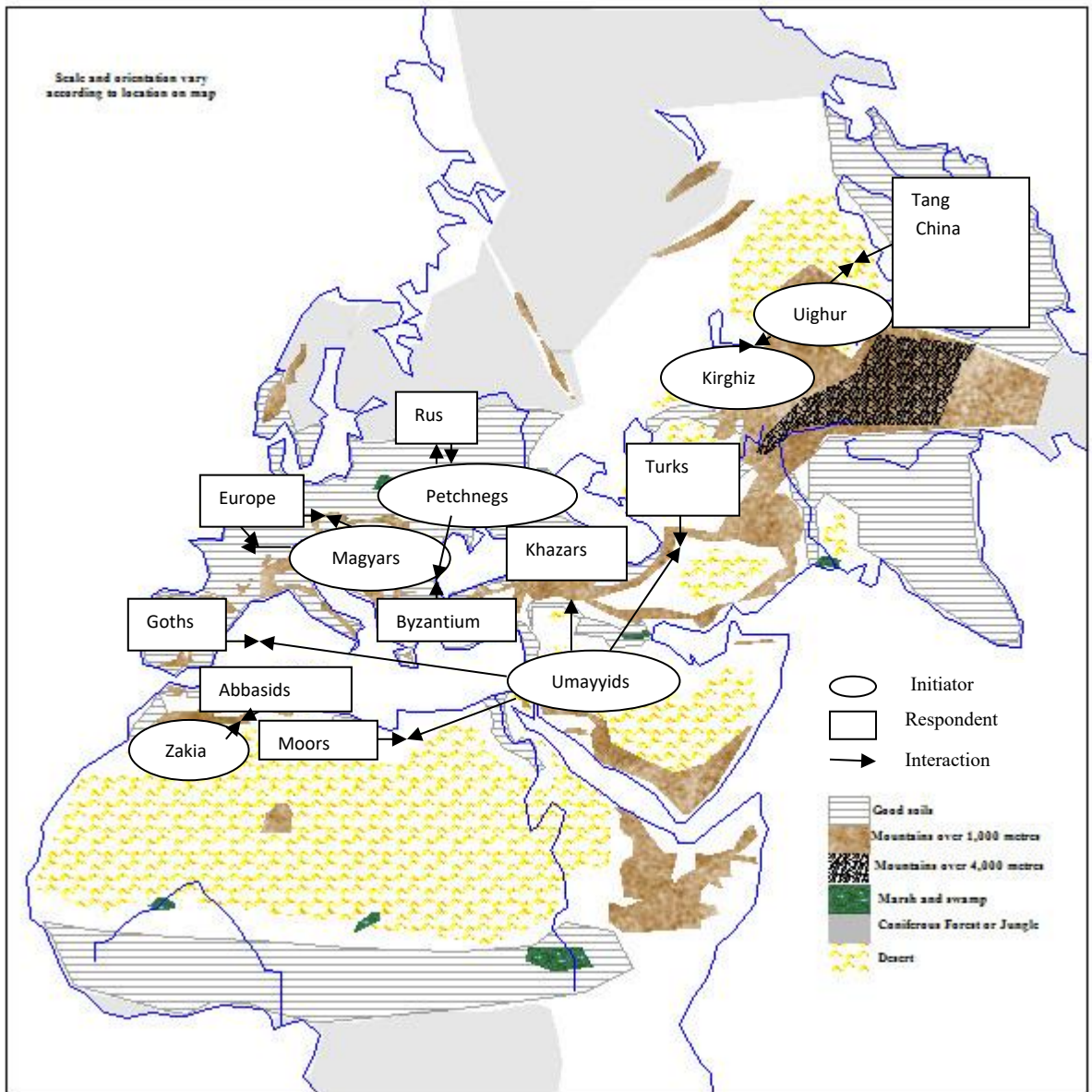




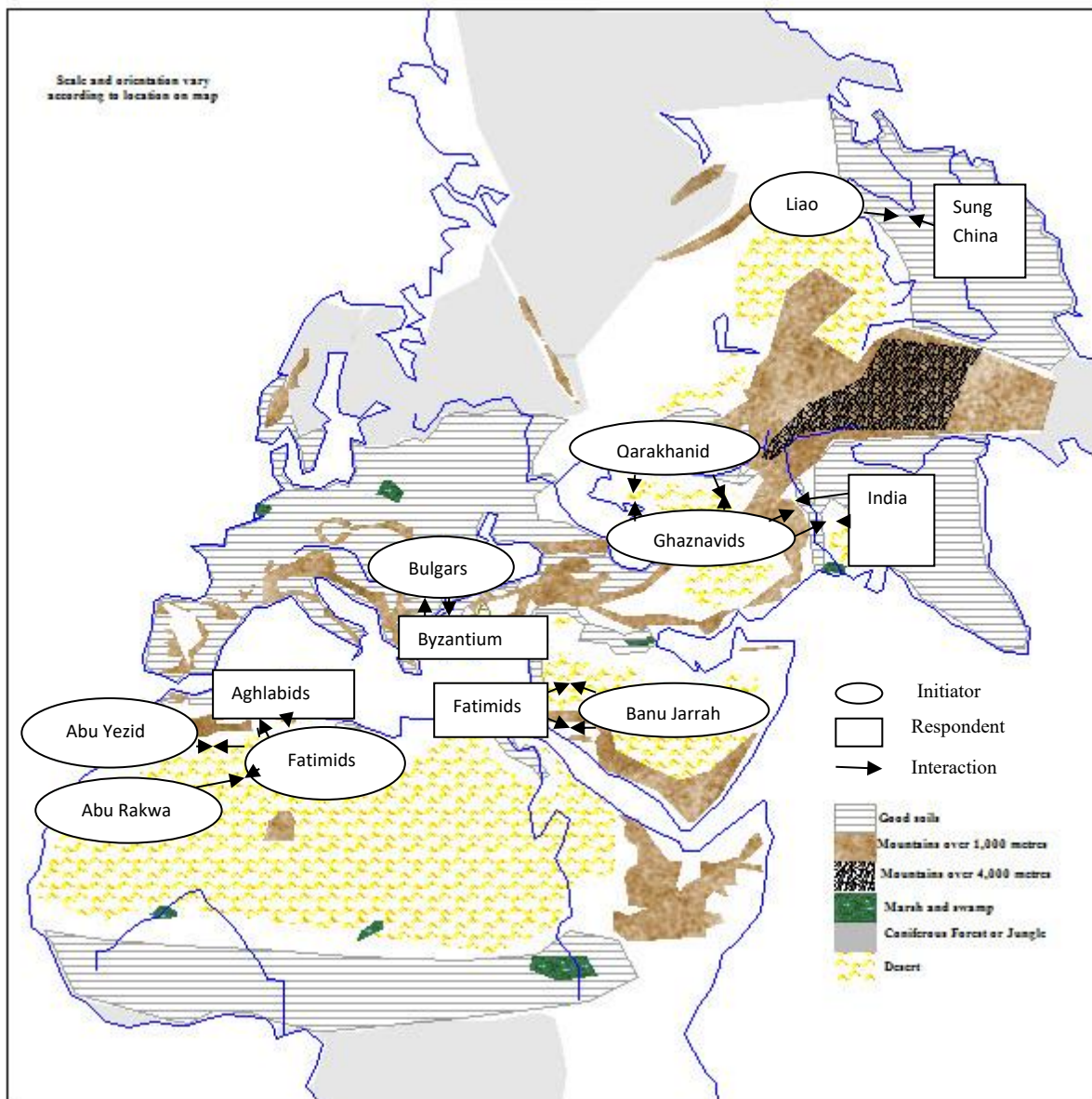
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**Map 6 Interactions 700-900**

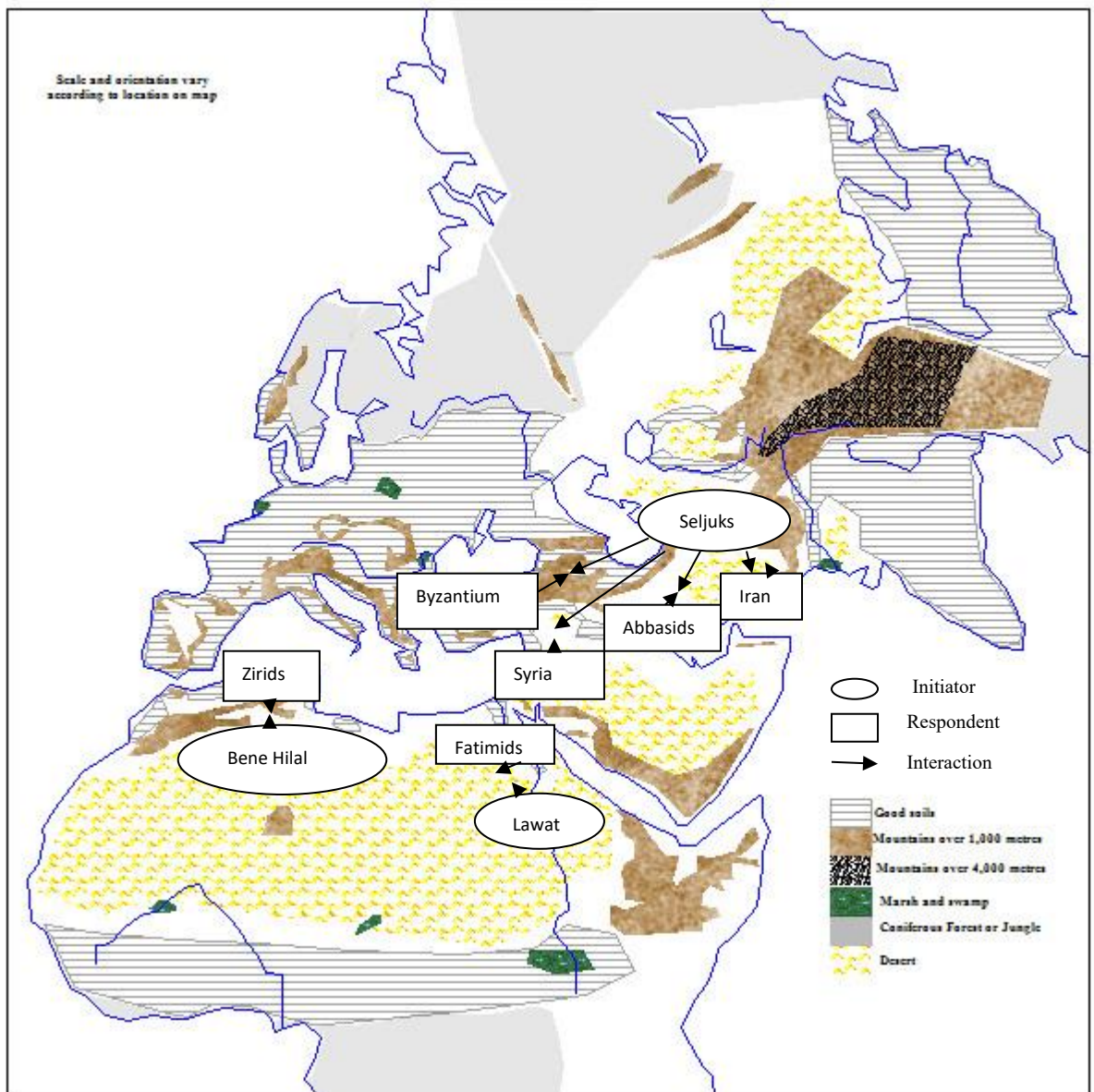


### Map 7 Interactions 900-1025

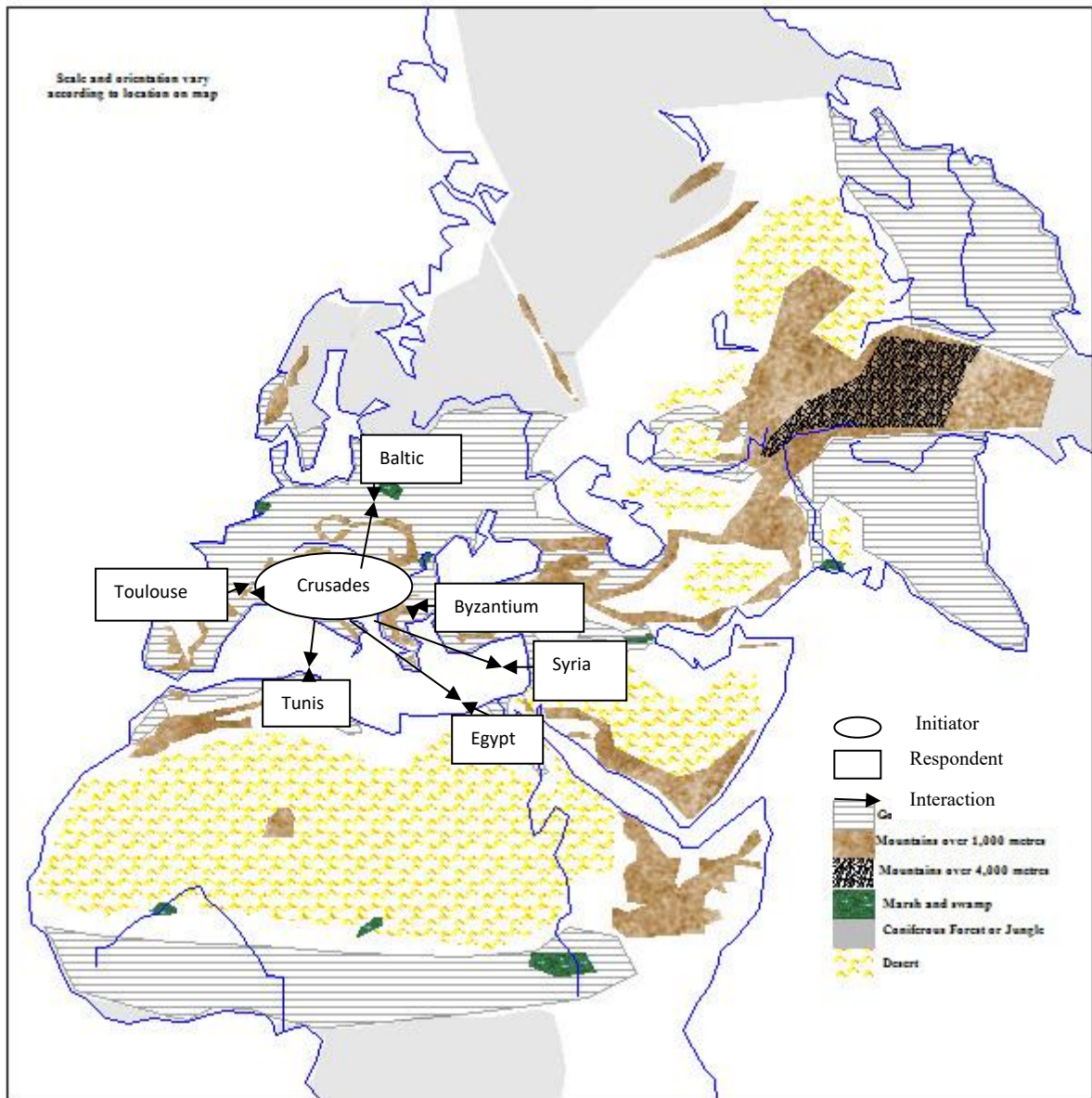




### Map 8 Interactions 1025-1050

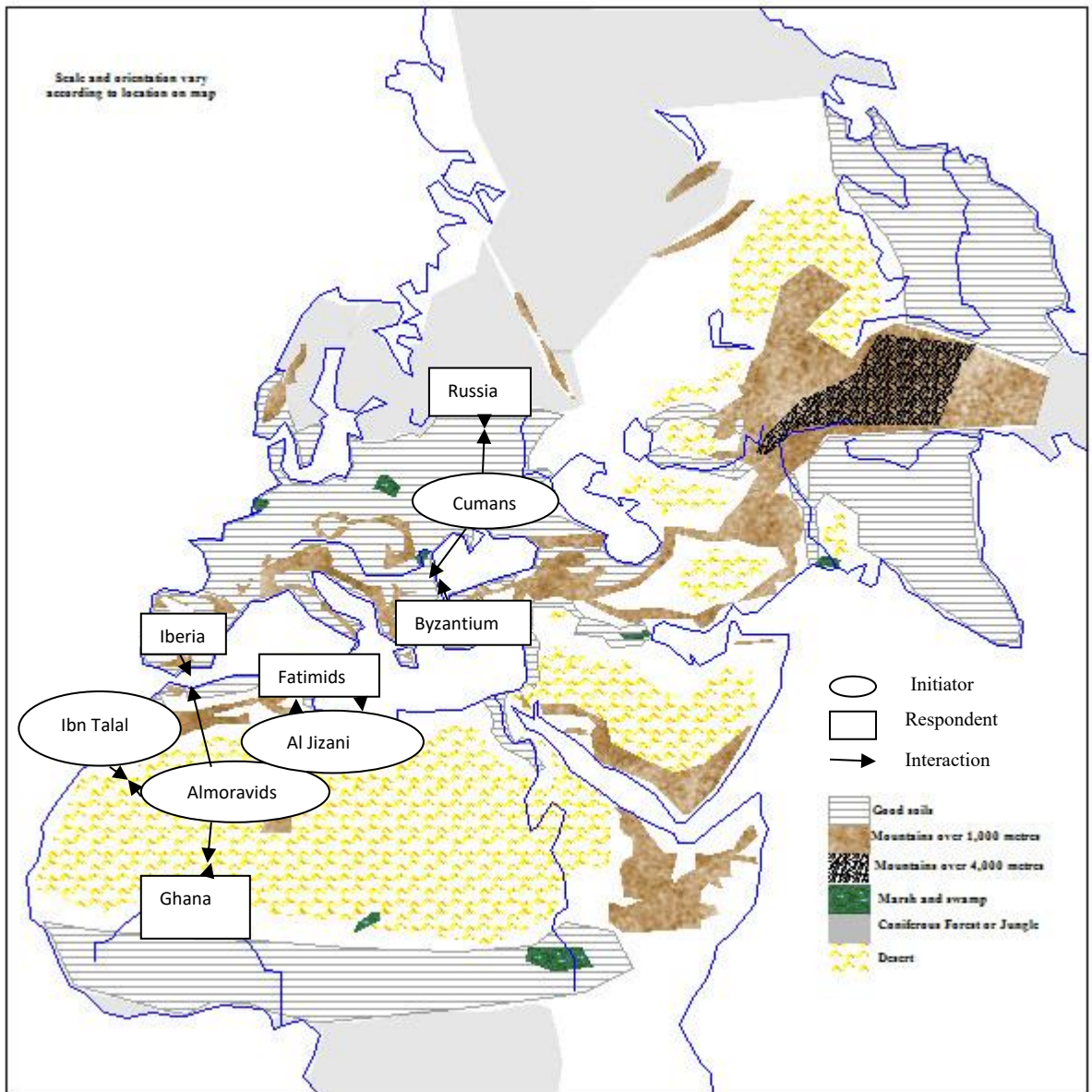


**Map 9 Crusades 1095-1300**

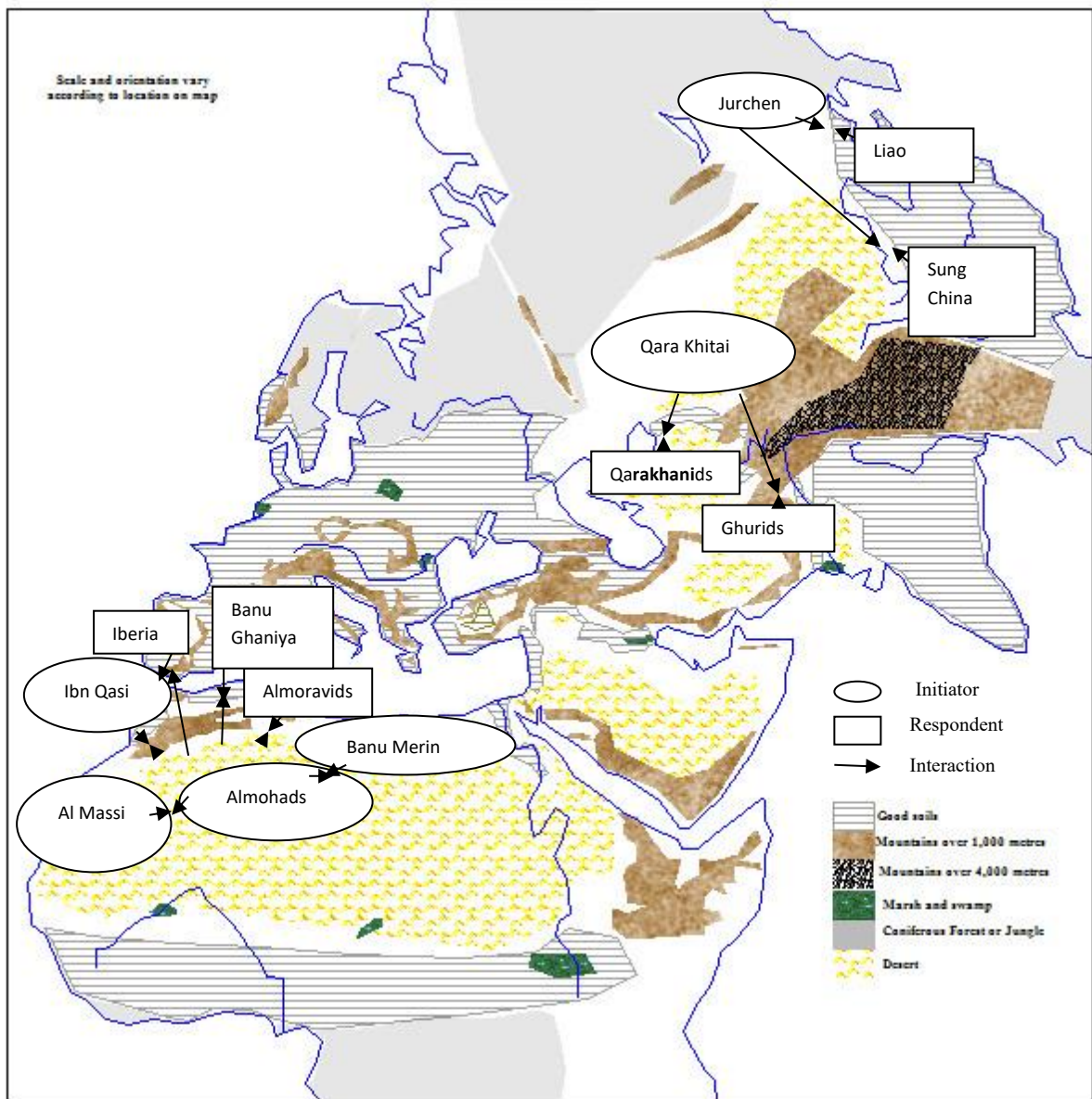




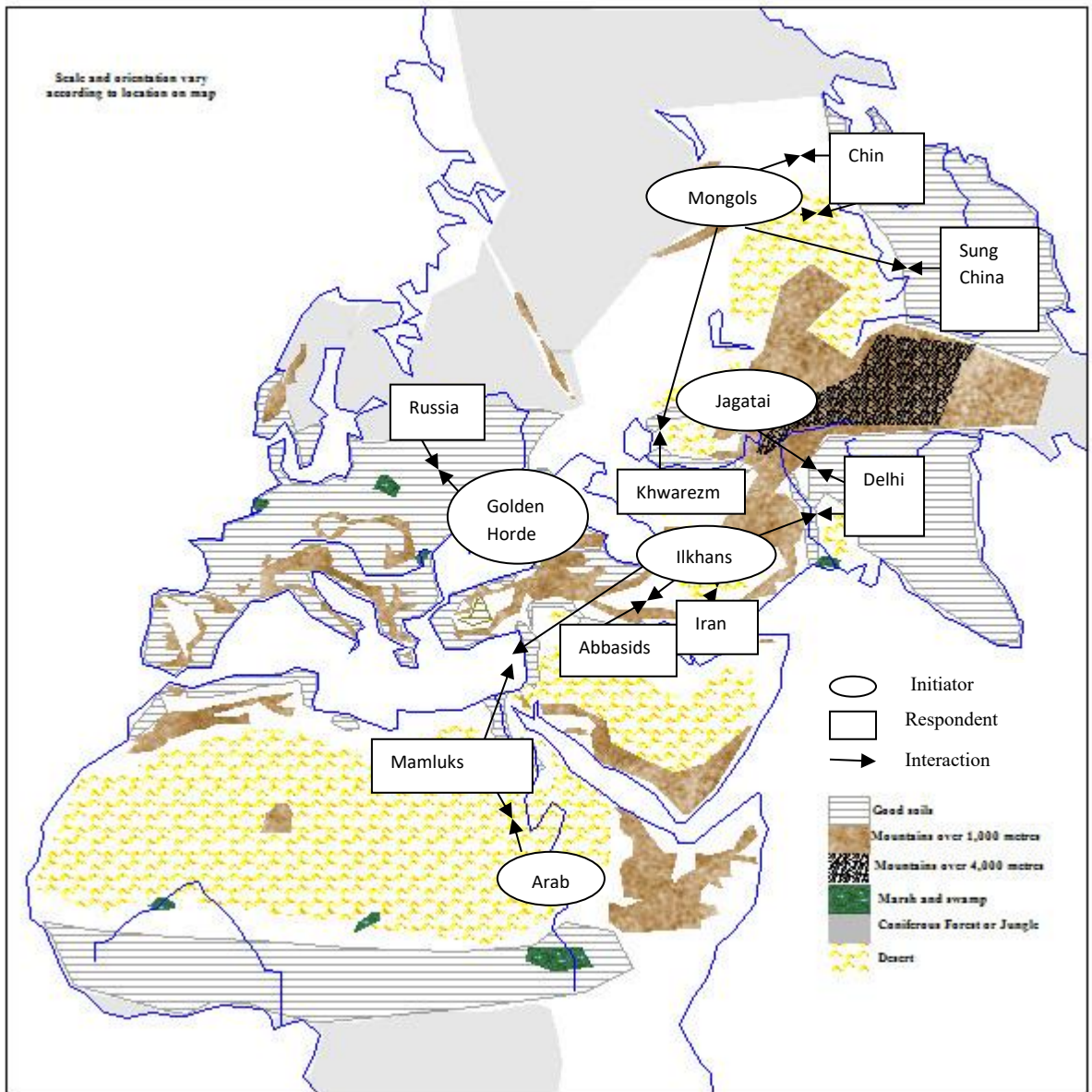
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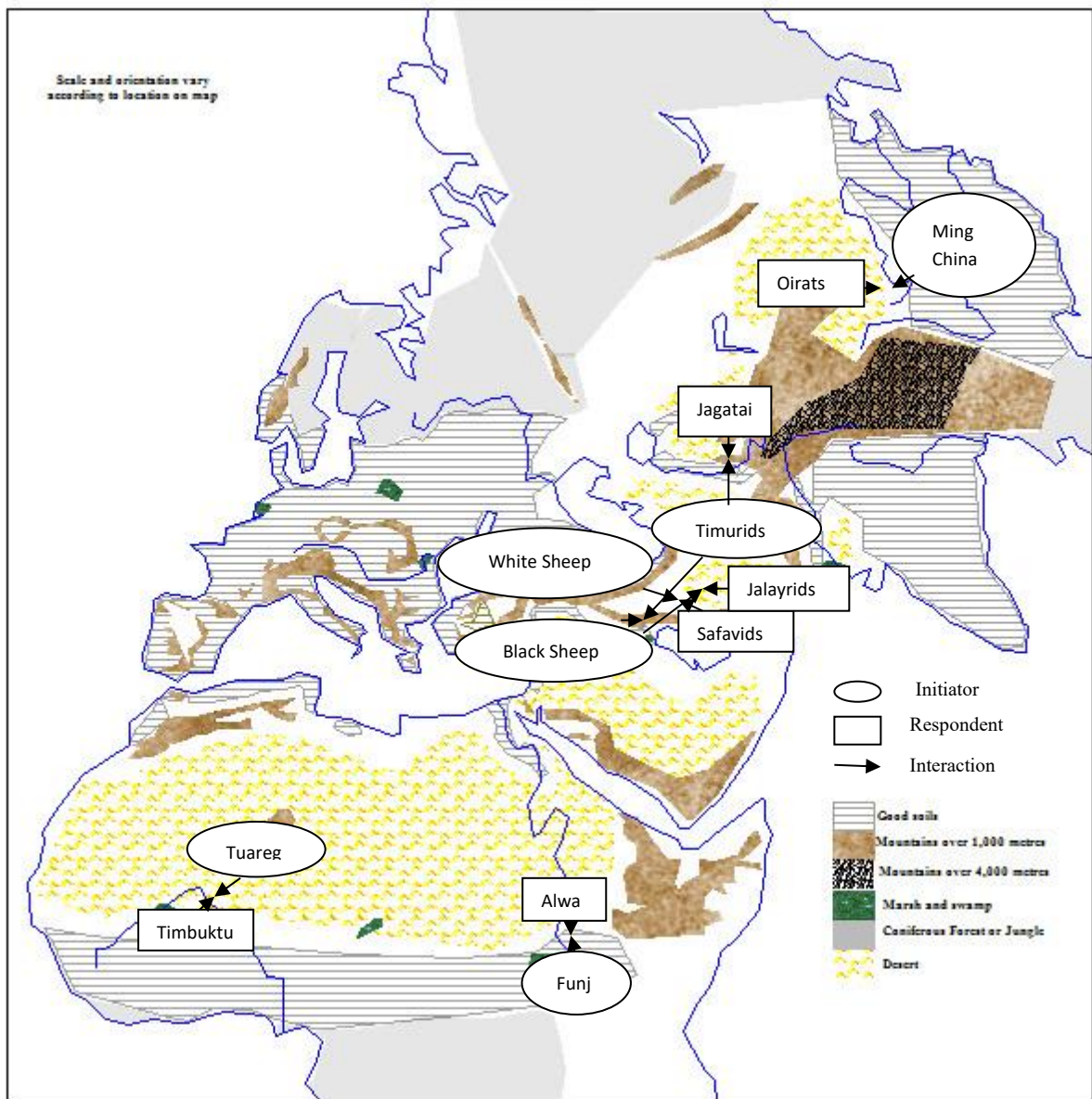


Map 12 Interactions 1200-1300

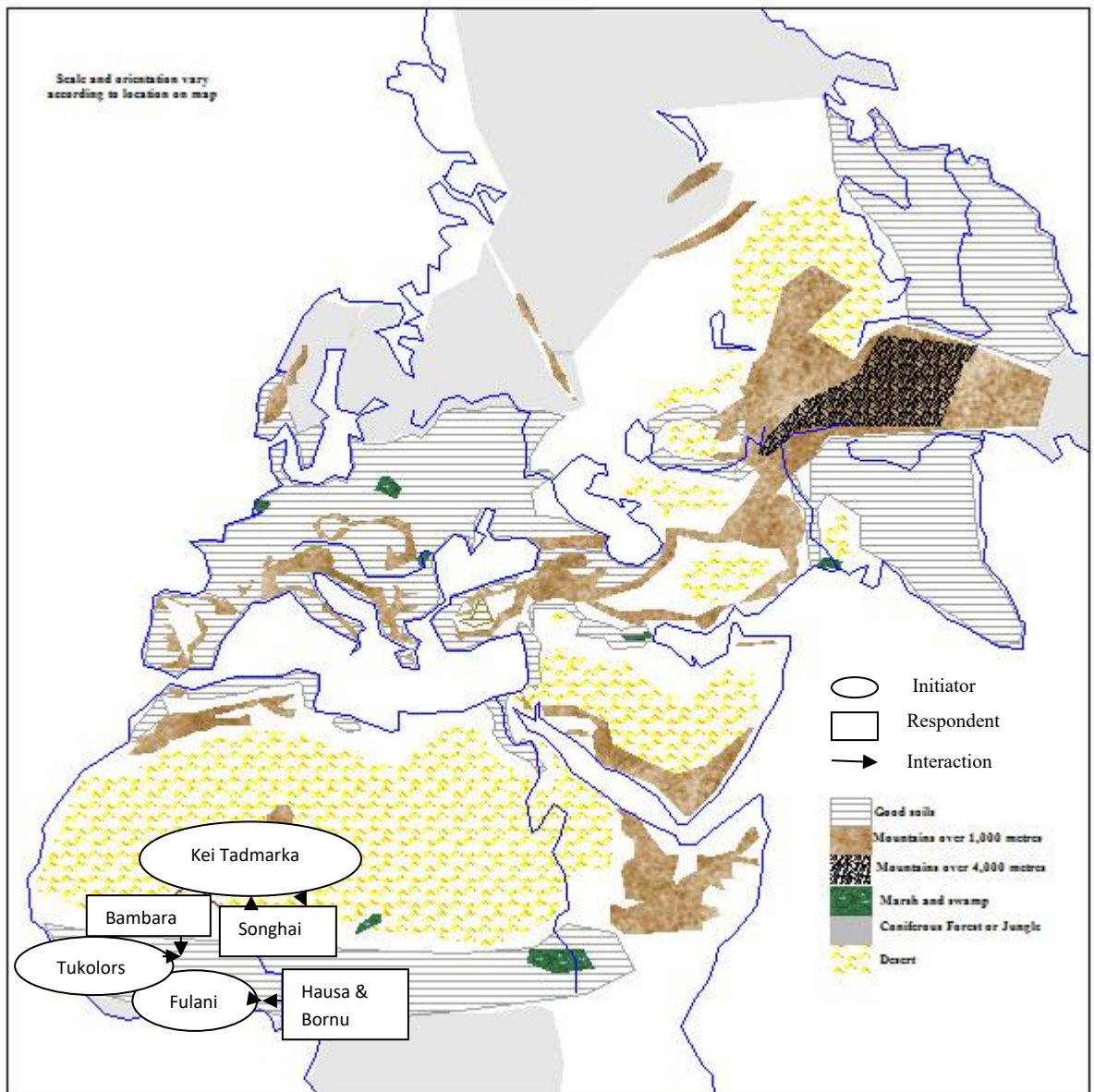




Map 13 Interactions 1300-1500



Map 14 Interactions after 1500





## CHAPTER 1 INTRODUCTION

### 1.1 CONFLICT

This thesis is concerned with the way that cultures handle their interactions, particularly those that potentially involve conflict. Conflicts, clashes of interest, and competition of human groups occurring for a variety of reasons,<sup>1</sup> as the groups interact, are commonplace in history. There are a number of ways that the groups involved may seek to respond to these potential conflicts and clashes. One such response is the use of violence and even war, where war is defined as “*sustained coordinated violence between political organisations*”.<sup>2</sup> On the basis of the definition of politics as “*the authoritative allocation of resources for a society*”, Levy and Thompson suggest that political organisations include states, colonial empires, city states, social and ethnic groups which have organised themselves for civil war and insurgency, chiefdoms, tribes and even hunter-gatherer bands.<sup>3</sup> War is thus widely available to human groups in their many guises as a response to potential or actual conflict. It is not, however, the only possible response. There are, for example, types of violence not regarded as war, being sporadic or unorganised or occurring between groups other than political organisations. In addition, there are also non-violent responses to conflict, including those that foster co-operation and friendship, sometimes intentionally so.

### 1.2 STUDY POPULATION

There are a great many different interactions possible between human groups. Of those most relevant to this thesis, one may be designated ‘Nomad-Sedentary Interactions’, which may develop into ‘Nomad-Sedentary Conflicts’ (NSI and NSC, respectively). Another is the holy war (‘jihad’ for the Muslim, ‘crusade’ for the Christian), which may be designated a ‘Hieropolemic Interaction’, mostly developing as a ‘Hieropolemic Conflict’ (HPI and HPC).<sup>4</sup> Further discussion of these interactions is given in Section 1.4, below, but here it can be noted that both NSIs and HPIs are subsets of what may be described as Group Interactions with Polemogenic Potential (GIPPs).<sup>5</sup> This is the set of group interactions that have the potential to develop into sustained

---

<sup>1</sup> Fear, hostility, greed for property, territory and control of *poleis* are reasons for war proposed by the 14<sup>th</sup> century Arab historian, Ibn Khaldun. See Morpeth, N. (2006) *Thucydides’ War: Accounting for the Faces of Conflict*. Hildesheim: Georg Olms Verlag, p.42.

<sup>2</sup> Levy, J. and Thompson, R. (2011) *The Arc of War: Origins, Escalation and Transformation*. Chicago: University of Chicago Press, pp.5-7.

<sup>3</sup> Easton, D. (1953) *The Political System*. New York: Knopf.

<sup>4</sup> “Hiero” = Holy, “Polemic” = War.

<sup>5</sup> Polemogenic: war-generating.

coordinated violence between the political organisations involved. It excludes only those situations that solely involve individuals and/or non-political organisations, and thus includes the more substantial and consequential situations.

Identifying historical GIPPs is an easy task where the interaction results in war, for the very presence of the phenomenon demonstrates the potential for it. In a situation where no war occurs, the existence of a GIPP is inherently less certain. However, it is reasonable to accept the presence of any identified cause of conflict as a marker for a GIPP, whether it actually results in war or not (see Chapter 2 for further details).

### **1.3 RESEARCH QUESTION**

The broad question of this research is as follows: what influenced the strategies chosen during, and the outcomes of, Group Interactions with Polemogenic Potential (GIPPs) between (1) nomads and sedentary peoples, and (2) in hieropolemic situations, in the period 1250 BCE-1520 CE (or up to 1850 CE in sub-Saharan Africa)?

The specific objectives of the thesis arising from this question are threefold, namely:

- a) to identify and to express in numeric form in a database, the strategic aims and objectives initially adopted by nomads, holy warriors and their opponents in their conflicts;
- b) to identify and to express in the database, a selection of the factors that appear likely to have influenced the choice of those strategic aims and objectives and to quantify the relative significance of these identified factors, jointly and severally, in this choice;
- c) to determine and to express in numeric form the final outcomes of these conflicts and attempt to quantify the relative significance of identified factors, jointly and severally, in bringing about these outcomes.



#### 1.4 TARGETING OF THE STUDY

Human conflict is a plant with many roots, many branches and many fruits, and such complexity makes it difficult to analyse, without “simplification” in one form or another.<sup>6</sup> This vastly extends the potential scope for study since there are so many potential causes for conflict. This project proposes to seek simplification by examining two broad and well-established root causes of conflict, one material (nomadism) and one non-material (religious war), both addressed in greater detail in Chapter 3, with regard to factors that may affect the strategic choices made about the way such conflicts will be conducted and the outcome that results. As a particularly important means of conducting conflicts, warfare offers a number of strategic options such as defence, local conquest or total conquest, but there are further bundles of strategic options available which do not satisfy the above definition of war but may nonetheless be pursued in a context where escalation to war is possible.<sup>7</sup>

At all levels of conflict, there is often failure among observers, commentators and indeed practitioners to achieve agreement over what is significant in terms of pursuing a “successful” outcome. For instance, one view of warfare is succinctly stated by the character of Mr Buck of North Kensington in GK Chesterton’s novel *The Napoleon of Notting Hill*. Mr Buck considered that “*all fighting matters are matters of mere arithmetic*”.<sup>8</sup> In other words, weight of numbers is all that counts, and in a situation where there are no other particular differences between the parties involved, this may well be the case. The original Napoleon, however, took a markedly different approach to matters, stating that “*An army’s effectiveness depends on its size, training, experience and morale, and morale is worth more than any of the other factors combined.*” He further stated that “*There are only two forces in the world, the sword and the spirit. In the long run, the sword will always be conquered by the spirit*”.<sup>9</sup> Napoleon’s acknowledgement of the binary importance of material and non-material factors, regardless of his assessment of their

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<sup>6</sup> Simplification is here the identification and isolation of key explanatory factors, so that the explanation offered is provided by the most important elements. It is not synonymous with ‘simplistic’.

<sup>7</sup> The options available to a group are not fixed. For instance, “Water management requires co-operation among people who might otherwise be in conflict” and some groups may offer their neighbours the opportunity to co-operate with them. The El Shebana of southern Iraq involve local nomad groups in the management of their irrigation system. In other situations, this option may not be offered to local nomads. See Lamberg-Karlovsky, C. C. (2016) 'Irrigation among the Shaykhs and Kings', in Martelloni, S., Lamberg-Karlovsky, C.C. and Tasi, M. (eds.) *Ancient Irrigation Systems of the Aral Sea Area: The History, Origin and Development of Irrigated Agriculture*. Oxford: Oxbow Books, pp. 23-53.

<sup>8</sup> Chesterton, G. (2007) *The Napoleon of Notting Hill*. Teddington: Echo Library, p.63.

<sup>9</sup> Chandler notes the problem of special pleading in the Emperor’s writing and prefers to look to his actions. He also notes that many of Napoleon’s actions were intended to foster the morale of his troops and to disrupt that of the enemy. Chandler, D. G. (1993) *The Campaigns of Napoleon*. London: Weidenfeld & Nicholson Ltd, pp. 135, pp. 155-7.

relative significance, seems to reflect a distinction that may be found in both the reasons for conflict and in the way that they are conducted.

Thus, there are causes for conflict rooted in material concerns. For instance, ever since the Neolithic agricultural revolution, the most efficient way to capture the food energy which is available to the human race (arable farming) has required the population to remain effectively stationary for considerable amounts of time. On the other hand, hunting and herding of animals has been less constrained to immobility. This difference in approaches to the production of the material means of life is also reflected in differences in utility and culture,<sup>10</sup> so that pastoralism and arable farming have been recognised as generating conflicts of interest since the story of Cain and Abel in Genesis, through to twentieth century musicals,<sup>11</sup> with the clash between nomad and sedentary groups such as Huns and Romans or Hsiung-nu and Chinese, as an ongoing theme.<sup>12</sup> When pastoralists and farmers seek to use resources such as land and water at the same time and in the same location for different purposes, for example, crop cultivation or herd transit, conflict is not unlikely. As the medieval writer Rogerius expressed the matter, “*But when the king of the Cumans, with his nobles and commoners, began to roam about Hungary, since they had innumerable herds of cattle, [they] caused serious damage to the pastures, sown lands, gardens, orchards, vineyards and other property of the Hungarians.*”<sup>13</sup>

Not all pastoralists are nomads, however, and the precise definition of the term ‘nomad’ is the subject of scholarly debate. Given the focus in this thesis on nomad interactions with sedentary peoples (NSIs, evolving into NSCs), the matter of definitions is further explored in Chapter 3. There also exists an extensive and long-established literature on the nature and merits of nomadism, its historical impact, and the perception of nomads by sedentary peoples. In the eighteenth century, Gibbon, for instance, as a part of his account of the fall of the Roman empire, gives a description of “*Vagrant tribes of hunters and shepherds whose indolence disdains to cultivate the earth*”<sup>14</sup> (demonstrating quite clearly, by his choice of words, which side

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<sup>10</sup> This is addressed in early written documents such as the Sumerian Disputation of Sheep and Grain (Grain wins). See Barton, G.A. (1918) *Miscellaneous Babylonian Inscriptions*. New Haven, Yale University Press, p.52.

<sup>11</sup> For example, *Oklahoma!*

<sup>12</sup> In Indian politics today, attitudes of groups such as the BJP might be linked to historical interpretations of the origins and religion of cattle-herding nomadic Aryans, together with their relationship with other peoples. See, for example, Staples, J. (2018) 'Appropriating the Cow: Beef and Identity Politics in Contemporary India', in Bhushi, K. (ed.) *Farm to Fingers: The Culture and Politics of Food in Contemporary India*. Cambridge: Cambridge University Press, pp. 58-79.

<sup>13</sup> As quoted in Horváth, A. P. (1989) *Pechnegs, Cumans, Iasians: Steppe Peoples in Medieval Hungary*. Translated by: Wilkinson, T. Budapest: Corvina, p.49.

<sup>14</sup> Gibbon, E. (1910) *The Decline and Fall of the Roman Empire (six volumes)*. London: Everyman's Library, Chap XXVI, Vol 3, p.6.

of the controversy he favours).<sup>15</sup> At an even earlier time, an Aristotelian classification attributes the lowest level of civilisation to pastoralists.<sup>16</sup>

As noted, humanity is, however, proficient in its ability to find cause for conflict, and there are also a great many non-material causes, such as national or personal honour, prestige, a civilising mission or the propagation of a faith. Even in modern times, “the revolution”, liberty and the establishment of the nation, invoked as a justification for war, have provided non-material causes. As with nomad-sedentary conflict, this remains a current origin of conflict. Material and earthly factors such as plunder, land acquisition and politics very often come into play,<sup>17</sup> sometimes with little or no attempt to conceal the fact behind any loftier ideals, as made explicit in a poem of Abdullahi, a nineteenth century Fulani emir, which asserts that “... *He who dies goes to Paradise. He who comes back alive will enjoy the booty.*”<sup>18</sup> The Arab historian Khalifah ibn Khayyat (b.777, d.854) records a comparable encouragement given by the Muslim leader Sinan in India to his troops...: “*Rejoice! You will attain one of two [good] things. Paradise or booty.*”<sup>19</sup> This is further complicated by the way that those dedicated to holy war may find themselves involved in secular conflict by reason of their worldly possessions.<sup>20</sup> Nonetheless, holy war has been practised for over three thousand years,<sup>21</sup> and must characteristically be publicly proclaimed as such (“a private crusade” is something of an oxymoron, and although “jihad” may be often regarded as a personal struggle for perfection, the need for such a struggle is nonetheless publicly proclaimed). Fortuitously, both of the above points mean that assessing the status of a conflict (e.g., whether it constitutes a Holy War or not) is made somewhat easier.

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<sup>15</sup> The distinction between “hunter” and “shepherd” was important. Adam Smith, writing in the same period as Gibbon, notes that shepherds can muster ten times as many men for war as hunters. See Smith, A. (1999) *The Wealth of Nations*. London: Penguin Classics, p. 280.

<sup>16</sup> Shaw, B.D. (1995) “Eaters of flesh, drinkers of milk”: the ancient Mediterranean ideology of the pastoral nomad’, in Shaw, B.D. (ed.) *Ruler, Nomads and Christians in Roman North Africa Variorum*. Aldershot: Ashgate Publishing, pp. 5-31.

<sup>17</sup> Plunder was of sufficient importance to be accorded a mention in 13.3% of a sample of 360 pre-battle speeches in all manner of circumstances, attributed to leaders in the medieval period. See Brooks, R. and Curry, J. (2020) *A Practical Guide to Medieval Warfare: Exploring History through Wargaming*. United Kingdom: History of Wargaming Project, pp. 58-59.

<sup>18</sup> Smaldone, J. (1977) *Warfare in the Sokoto Caliphate: Historical and sociological perspectives*. Cambridge: Cambridge University Press, p.91

<sup>19</sup> Hoyland, R. (2014) *Khalifa ibn Khayyat’s History on the Umayyid Dynasty (660–750)*. Translated by: Wurzel, C. Liverpool: Liverpool University Press, p.66.

<sup>20</sup> See Nicholson, H. (2019) “Holy Warriors, Worldly War, Military Religious Orders and Secular Conflict”. *Journal of Medieval Military History XVII* pp. 61-79.

<sup>21</sup> It is still, of course, an issue. Meral suggests that 33% of countries in 2012 were subject to high levels of religious hostility and cites modern rumours of secret plots to defile community purity resembling medieval myths about Jews (Meral, Z. (2018) *How violence shapes religion: Belief and conflict in the Middle East and Africa*. Cambridge: Cambridge University Press, p.2, p.142).

The existence of multiple potential causes raises the question of how these have interacted with each other and with other factors in determining the objectives and outcomes of conflicts. In some instances, there may be a coincidence between the two basic motives, as when conflict between a nomadic group and a sedentary neighbour involving access to material resources is also motivated by religious differences,<sup>22</sup> but in other instances there may be no meaningful religious motivation. In other instances, clashes between sedentary groups or between nomad and nomad may more strongly relate to religious differences. Given that religious fervour is not something unique to nomads or even perhaps particularly notable among them, crusades and jihads principally involving just sedentary peoples can provide a comparator group to set against the conflicts involving nomads. In the context of the relationship of nomadic peoples with sedentary states, this raises the question of how Nomad-Sedentary Interactions (NSIs) and Hieropolemic Interactions (HPIs) have interacted with each other and with other factors in determining the objectives and outcomes of conflicts.

It is possible to explore the interaction of these two possible (material and non-material) reasons for conflict with each other and with various factors that might be reasonably taken into account by decision-makers as they weighed up their choices, including matters such as the military strength or the wealth of their own people and their neighbours. Because of the diversity of the matters that could reasonably be expected to be considered by such decision-makers, a range of scholarly literatures thus have relevance in identifying these for further study in this thesis. History, geography, ecology, economics, anthropology, sociology and military studies can all provide an input, and hence it would be unhelpful to allow the language, assumptions and methodological practices of any one of these disciplines to assume any sort of hegemony.

Going beyond the broad initial motivation, the key governors in the course of any conflict are the things that the parties choose to attempt to do in their attempt to achieve their ends, i.e., their strategic aims and objectives. Ultimately, the conflict ends in an outcome of some kind, whether this is satisfactory, acceptable or merely tolerable to the parties.<sup>23</sup>

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<sup>22</sup> For example, the current Fulani-sedentary conflict in Nigeria seems to combine both issues. See Cox, B. and Thomas, D. (2018) *Hidden Atrocities: the escalating persecution and displacement of Christians in northern and central Nigeria*, London: Humanitarian Aid Relief Trust. Available at: <https://www.hart-uk.org/news/press-release-12-november-2018/>.

<sup>23</sup> This three-way analysis is formally applicable even when an outcome of genocide results. The dead do not seek to change the outcome of events.

## 1.5 METHODOLOGY & OUTLINE OF CHAPTERS

This study utilises detailed data, concepts and methodologies drawn from a variety of disciplines and sources. These merit documentation but are too extensive to be placed in footnotes whilst being too disruptive of the flow of the main text to be placed there. On the other hand, it is helpful to have the material close at hand, while reading specific chapters. Accordingly, most chapters have an excursus, in which such material is placed. Also included, in a number of instances, are cases, i.e. text boxes that contain examples of the workings used to calculate variables in specific circumstances. There are a number of additional relevant matters that are sufficiently general to merit a more distanced treatment and these are duly placed in appendices. These deal with matters such as: an estimate of comparative purchasing power (purchasing power parity); an estimate of Clausewitzian friction in war; estimating numbers; estimating morale; biases in model emphasis; terminology and regional levels of “civilisation” in the early twentieth century.<sup>24</sup>

This study proposes to use numerical (or quantitative) analysis of a wide range of data, for while qualitative studies provide the framework of understanding, a quantitative analysis can be particularly helpful in addressing issues such as the universality or otherwise of conclusions. Depth and detail are intentionally sacrificed in order to obtain breadth and overview. **Chapter 2** addresses this methodological issue, along with the definition of Group Interactions with Polemogenic Potential (GIPPs); the spatial scope of the study; the periodization of the study (based on issues of climate and warfare); strategic options (choices of courses of action open to the groups); and scaling and clustering (issues of event size and grouping). It also reports on some pilot research work (the author’s M.A. dissertation) which sets a context for the study. The chapter also features an excursus that estimates the total number of GIPPs, both world-wide and in the study period and region.

It is certainly necessary to carefully define the term ‘nomadism’ and to elucidate some of the variations that may be covered by it. Of particular concern is the relationship between nomadic groups and their sedentary neighbours. The term ‘holy war’, with its subsets of Islamic ‘jihad’ and Christian ‘crusade’, also requires definition and example. **Chapter 3** covers these areas and

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<sup>24</sup> The study cited in Appendix 7, referring explicitly to a 1913 assessment of the previous century, is examined as an alternative numerically expressed source of information.

includes an excursus which briefly examines historical circumstances where interactions cease to be tidily nomadic against sedentary.

It has long been argued that human behaviour, including conflict, is influenced or even (controversially) determined by climate, which also influences natural vegetation, soil, water availability and terrain. In the pre-industrial period, agriculture was the primary method of securing a livelihood for the vast majority of populations, with yields affected by climatic and associated factors. **Chapter 4** therefore explores climate as a concern relevant to the main question posed by this thesis, identifying aspects of that are of most potential relevance. Thus, the complexity of world climate is highlighted, noting the particular significance of drought and flooding, and of local geographical factors. Nor does climate does remain constant over time, and the fluctuations of phenomena such as the Southern Ocean Oscillation produce planet-wide variations in weather that have been shown by many scholars as impacting human societies. The nature of agriculture and its relationship to climate is explored in particular, for sedentary agriculturalists and pastoralists have somewhat different relationships with climate and the amount of pasture required to support livestock also varies with climate. The excursus to Chapter 4 proposes measures that may be used to generate data on: climate change, drought, El Niño Southern Oscillation (ENSO), climate and primary production, available water, non-aridity and biocapacity. All are variables that inform the statistical analysis in Chapter 12.

The number of people available to a group is perhaps the primary control on what it can achieve during conflict or in other circumstances, but this ability is tempered by the ability of the group's leaders to tap into the group's power. Government may be limited in its ability to use the power available and culture can also influence the approach of a society to policies (determining what is acceptable or even conceivable). The religion of a group can be expected to influence its view of holy war, as well as impacting on the cohesion and attitudes of a society and culture. The importance of such issues to the origins, course and outcomes of conflict are considered in **Chapter 5**, informing this same chapter's excursus, which proposes measures that can be used to generate data on variables critical to the main analysis presented in Chapters 12 and 13. These include: area, population, and population density; polity power; cultural complexity; Seshat rating;<sup>25</sup> religion rating and holy war.

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<sup>25</sup> The Seshat project seeks to establish a consistent database of important historical and cultural information concerning worldwide regions from the earliest times to the modern period. It has been used for various analyses, e.g. Turchin, P., Currie, T. E., Whitehouse, H., François, P., Feeney, K., Mullins, D., Hoyer, D., Collins, C., Grohmann, S., Savage, P., Mendel-Gleason, G., Turner, E., Dupeyron, A., Cioni, E., Reddish, J., Levine, J., Jordan, G., Brandl, E., Williams, A., Cesaretti, R., Krueger, M., Ceccarelli, A., Figliulo-Rosswurm, J., Tuan, P.-J., Peregrine, P., Marciniak, A.,

The wealth of a group impacts on its ability to achieve its own ends, but also affects the wishes of other groups to access that wealth for themselves. **Chapter 6** explores some of the issues in measuring the economic status of relevant groups through Gross Domestic Product, and the adjustment (Purchasing Power Parity) that must be made to take account of what goods and services may be purchased with available economic resources. Long-term series of Gross Domestic Product estimates at constant prices are identified, but the impact of catastrophic events, may require further short-term adjustments to long-term trend estimates to facilitate later analysis. This chapter's excursus provides a major example of this in estimating taxation decline and devaluation in Iran, following the Mongol invasion. The availability of wealth is not, however, the sole criterion for its use. While an unequal distribution of wealth does not promote social cohesion, it can allow diversion of resources to state purposes, including the conduct of conflict, and a method of estimating inequality is proposed. These variables are later used in Chapter 12.

War has been a widely used means to secure group objectives throughout much of recorded human history. The ability to apply warfare effectively impacts on group decisions and their implementation, making an understanding of the nature of warfare a necessary prelude to understanding the influence of warfare on the course and outcomes of the conflicts under consideration. **Chapter 7** thus highlights key findings from an extensive literature review, not least how the successful implementation of a military strategy requires both a good strategy and effective troops. While numbers contribute to effectiveness, there is by no means a simple linear relationship here, and the structure and objectives of society impact on the way that warfare is conducted. Wars are not solely won by direct violence against humans and there are other approaches to the use of violence. Given the particular circumstances of nomads, there are a number of differences in the way that warfare is conducted by and against them. The excursus in this chapter addresses the numerical assessment of military power and sophistication, tactics, morale and terrain and land use – variables identified as relevant for the Chapter 12 analysis.

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Preiser-Kapeller, J., Kradin, N., Korotayev, A., Palmisano, A., Baker, D., Bidmead, J., Bol, P., Christian, D., Cook, C., Covey, A., Feinman, G., Júlíusson, Á. D., Kristinsson, A., Miksic, J., Mostern, R., Petriem, C., Rudiak-Gould, P., ter Haar, B., Wallace, V., Mair, V., Xie, L., Baines, J., Bridges, E., Manning, J., Lockhart, B., Bogaard, A. and Spencer, C. (2018) 'Quantitative historical analysis uncovers a single dimension of complexity that structures global variation in human social organization', *Proceedings of the National Academy of Science*, 115(2), pp. E144-E151.

The leaders of groups often exercise a notable influence on the choice and pursuit of group objectives. Factors which can affect this influence therefore warrant attention. **Chapter 8** identifies and addresses some of these through a review of relevant literature from multiple disciplines. The competence of a group's leaders is important, but hard to assess independently of the outcome of their actions. The frequency of changes in rulers can be shown to vary meaningfully from society to society, and can cause social stresses that impact on the effectiveness of each society's leadership. A ruler's ability to attain and exercise power may also be affected by attitudes to their gender, both within their group and outside it. The excursus in this chapter examines in more depth the relationship of religion and ethnicity to frequency of reign change and to gender. Reign change, gender and a limited metric for competence are variables available to the Chapter 12 analysis.

A core component of the work undertaken for this thesis has been an extensive review of historical and allied literatures (archaeology, anthropology, and more) in order to identify relevant cases of interactions between groups that are ultimately relevant for inclusion as cases in the analysis presented in Chapters 12 and 13, in pursuit of the study's overall research question. **Chapter 9** provides an overview of such cases for the regions of Mongolia and China; Turkestan and Iran; Central Asia and India; Arabia and the Near East; North Africa and Iberia; Sahara, Sahel and Sudan Belt; the Baltic and Other Crusades; and the Western Steppes, Balkans, Russia and Rest of Europe. In doing so, the chapter indicates the interactions that are selected for inclusion in the database, and highlights important aspects of the background to these interactions, their origins, course and outcomes, as reported in the available secondary literature, complemented by recourse to primary sources, where appropriate. The excursus addresses the specific broad strategic options open to groups and the possible outcomes arising from the interaction of the options chosen.

Given that mathematical and statistical models may provide an appropriate foundation for producing generalised results, and testing their likely validity, **Chapter 10** reviews a selection of relevant models employed in recent studies. The literature provides a number of important insights that inform the analysis in Chapters 12 and 13. For example, it is noted that the factors used in any model, the measures describing the real world that are selected for inclusion, are key to the result, so that it is important that no factor is ruled out on inappropriate grounds. Previous chapters suggest what these factors might be, while the excursuses detail the manner in which they may be quantified for testing. Also discussed is the issue of the impact on a model



of the order in which factors are entered. Not all models examined are statistical, but non-statistical models can also provide helpful insights. The excursus examines data on the incidence of famine and pestilence, with a view to their inclusion in the analysis of Chapter 12.

In **Chapter 11**, the main database used for analysis (GIPP 1) is described, also formally detailing both primary and secondary variables. Primary variables are largely real-world data, with a certain degree of simple processing and interpolation, while secondary variables are the product of statistical processing of an array of primary variables.<sup>26</sup> The GIPP 1 primary variables used in subsequent analysis, together with their reference point (conflict initiator, respondent, both or the overall situation) and their source, are summarised. In order to provide further explanation of their source and computation, directly associated notes are supplied. Where the relevance and theoretical basis underlying the construction of a variable requires more detailed explanation, a reference to the relevant chapter is supplied. Secondary variables are also included in the annotation. A secondary database, GIPP 2, is compiled to allow independent testing of the conclusions derived from GIPP 1. The excursus seeks to establish a method to calculate a force ratio between the two parties in a given interaction, derived from a range of variables, such as population, area, friction and effectiveness. This serves as an additional secondary variable.

The analysis of the GIPP1 database is undertaken in three phases, presented in **Chapters 12 and 13**. The first phase deals with primary variables such as the El Niño Southern Oscillation (ENSO) and characteristics of Initiators and Respondents. In the second phase, secondary variables (and principal components) are analysed with regard to group, region, religion and conflict, and a summary index of material, manoeuvre and morale examined. Some preliminary conclusions are drawn about the circumstances of the GIPPs which are being investigated. Then, in the final phase, the strategies adopted by the GIPPs are investigated. The excursus examines the results of the analysis of the GIPP2 database, which serves as validation of the initial analysis, rather than a major extension of that analysis.

Discussion and conclusions are presented in **Chapter 14**, drawing on material from the previous thirteen chapters, with some reference to the Appendices.

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<sup>26</sup> For example, the Climate secondary variable subsumes the Temperature, Precipitation and Climate Variation primary variables in a single measure.

## 1.6 STUDY PERIOD AND LOCATION

In order to develop a robust model of the factors that influence the strategic choices governing the conduct of conflicts, it is necessary to place conflicts in their broad context, and this context will have changed over time. Bearing in mind that the evidence starts to become more and more tenuous as we move back earlier, there is nonetheless a need to set a reasonable early start date for the study in order to ensure that an adequately large sample of cases (i.e., conflicts) is available.<sup>27</sup> Although the clash of nomad and sedentary groups, and the practice of holy war are both deeply rooted in the past,<sup>28</sup> both have an ongoing relevance. Nomad raids in Darfur and Kenya still occur, for example, and governments still seek to cope with jihad. Such contemporary events are, however, set in a radically different context to those occurring even two centuries previous, and hence an end boundary date is also needed when considering which cases to include in this analysis.

Since the retreat of the ice in the thirteenth millennium BCE, there have been periods of relative climatic stability, and periods of more rapid change. Two delimiting dates for the purpose of this study can be identified as 1250 BCE, associated with a time of notable climatic deterioration,<sup>29</sup> and 1850 CE, which predates a period of rapidly increasing Anthropocene release of greenhouse gases.<sup>30</sup> These climatic dates have some parallels in those for warfare. The critical move towards iron weapons and horse archer cavalry may be centred on 1250 BCE (see Chapter 2). The subsequent development of effective gunpowder field weapons, cannon and musket, followed by industrial warfare,<sup>31</sup> was diffused over a longer period. By 1520 CE, it could be argued that fully effective use of gunpowder field weapons were significant parts of warfare in Europe, North Africa and Asia, but well into the nineteenth century, they were still relatively rare weapons (used as much for intimidation as for inflicting casualties) in the indigenous warfare of

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<sup>27</sup> If, on average, a case suitable for inclusion in the study sample occurs once every thirty years, then over a period of 3,000 years, 100 cases would be available. This sample size would certainly be an acceptable minimum for purposes of statistical analysis, and would be drawn from a period similar to that which is being suggested on climatic and warfare grounds.

<sup>28</sup> By some judgements, 60 per cent of significant battles involved nomads and/or holy war, e.g., Theotokis, G. (2019) *Twenty Battles that shaped Medieval Europe*. Marlborough: Robert Hale.

<sup>29</sup> Brooke, J. (2014) *Climate Change and the Course of Global History: A Rough Journey*. Cambridge: Cambridge University Press, p.301.

<sup>30</sup> Ritchie, H. and Roser, M. (2018) "CO<sub>2</sub> and other Greenhouse Gas Emissions". *Published online at OurWorldInData.org*. Retrieved from: '<https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions>' using Boden, T.A., Marland, G, and Andres, R.J. (2017) "Global, Regional, and National Fossil-Fuel CO<sub>2</sub> Emissions". Available at: doi:10.3334/CDIAC/00001\_V2010.

<sup>31</sup> As remarked by Gibbon, "[the sedentary peoples of Europe] are secure from any future incursions of Barbarians; since before they [the Barbarians] can conquer, they must cease to be barbarians." Gibbon, E. (1910) *The Decline and Fall of the Roman Empire (six volumes)* Chapter XXXVIII, Volume IV, p.125, London: Everyman's Library.

sub-Saharan Africa.<sup>32</sup> Accordingly, the start date for the potential inclusion of conflicts is 1250 BCE, with end dates of 1520 CE in Eurasia and 1850 CE in sub-Saharan Africa. Legitimate alternative dates could no doubt be advanced as start and end points for the study, for these limits are principally suggested in order to set reasonable practical bounds, likely to generate an adequate sample size whilst still allowing some degree of comparability between the cases (see Chapter 2.5 for more details of the basis for the selection of these dates).

Communication between areas is required for interactions to occur, and the extent of the area for study is bounded initially by the ocean. Crossing the ocean requires investment in the construction of ocean-going ships, which requires resources, and the transport of animals by sea is not easy. Another constraint is the presence, particularly in Africa, of dense equatorial forest and/or areas of high disease prevalence such as sleeping sickness which inhibit movement of humans and animals between the northern and southern hemisphere on land. The severe cold and short winter days of the Siberian tundra have inhibited (and continue to inhibit) large-scale human movement and settlement. A belt of more easily traversed land between the equatorial forest and the Siberian tundra extends across AfroEurasia from ocean to ocean, and in that belt, movement and interaction is much easier. Thus, in Egypt, a wealthy king from West Africa on pilgrimage to Mecca might disrupt prices, or a Mamluk sultan might train Turkish *ghulams* for war with the troops of a Mongol empire extending to the Yellow Sea.

The twenty regions used in the study extend from West Africa to the Yellow Sea and are set out in Excursus E1.

### **Excursus E1. COVERAGE AND REGIONS**

Cameron draws attention in her epilogue to a volume of wide-ranging studies of Rome, China, Iran and the steppes, to the nature of the volume as a response to the pressure for wider perspectives in historiography.<sup>33</sup> It is not sufficient to consider states, polities and people in isolation. The steppe nomads of Inner Asia interacted with sedentary peoples from the Yellow Sea to the Black Sea and the Persian Gulf, while desert nomads of Arabia and North Africa (with

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<sup>32</sup> Scaring the enemy or producing loud noises and strange smells to frighten his horses were not trivial contributions to a battle, through it might sometimes be difficult to ensure that it is the *enemy* who was scared (see De Vries, K. (1998) *Medieval Military Technology*, Peterborough, Ontario: Broadview Press, p.147). If the enemy declined to be scared, securing victory through the infliction of casualties by gunpowder weapons required substantial levels of re-equipment and retraining of troops as gunners and bodies of trained musketeers, which had yet to be needed or attained by indigenous peoples in West Africa during the early nineteenth century. Smaldone, *Warfare in the Sokoto Caliphate*.

<sup>33</sup> Cameron, A. (2018) 'Epilogue', in Di Cosmo, N. & Maas, M. (eds.) *Empires and Exchanges in Eurasian Late Antiquity: Rome, China, Iran and the Steppe, ca. 250-750*. Cambridge: Cambridge University Press, pp. 419-430.

or without Islam), interacted with sedentary peoples from Iran and India to Iberia, the Maghreb and West Africa. It is helpful, therefore, to draw case studies from across this wide area, allowing common themes to appear from the data, where they are present.<sup>34</sup>

There are twenty regions considered in this study, identified in Table E1.1, based on groupings drawn from McEvedy and Jones (1985).<sup>35</sup> Figure E1.1 shows the relative locations of the regions involved, and Figure E1.2 provides a map. These regions are intended to draw together areas that are geographically broadly similar, and the geopolitical implications of such similarity, if any, are not addressed.

Modern statistics are very often presented on a state defined basis, although data is sometimes also available on a sub-national provincial basis. Thus, it is helpful, for data collection purposes, if the regions, where possible, can correspond to contemporary states. This, however, needs to be nuanced to reflect the fact that contemporary state boundaries are often no more permanent or relevant to past events (whether these pertain to conflict or otherwise) than any other boundary that may be suggested.

This is reinforced by the way that contemporary state boundaries have frequently not been drawn in a way that conforms to known geological, climatological, ecological or cultural realities. For instance, in Egypt, the modern, mostly geometrical, borders have little relationship to the ancient zones of the 'red' (waterless, poorly vegetated, desert exploited by nomads) lands and the 'black' (irrigated by the Nile, well vegetated) arable lands cultivated by sedentary peoples, whose characteristics have governed life in the area for millennia.

Furthermore, contemporary states may straddle more than one region. Thus, Turkey in Europe is, by this thesis, allocated to the Balkans region, while Turkey in Asia forms the freestanding region of Anatolia. The northern part of Ukraine is naturally wooded and broadly physically similar to neighbouring parts of Belarus and the Russian Federation, while the southern part of Ukraine is naturally steppe grassland, similar to Moldova, parts of Romania and the steppes of Hungary to the westward of Ukraine, and to parts of the Russian Federation as far as the borders of Kazakhstan on the eastward. Morocco, Algeria, Tunisia and Libya all contribute to both the

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<sup>34</sup> To exclude a region from a study ensures that its differences and commonalities with other regions will contribute nothing to the study. It is desirable therefore to have a strong explicit reason for exclusion.

<sup>35</sup> McEvedy, C. and Jones, R. (1985) *Atlas of World Population History*. Harmondsworth: Penguin.

arable and the pastoral regions of North Africa, whilst Morocco, Algeria and Libya also have territory which falls to the Sahara/Sahel region.

Realms and places have changed their names, and chroniclers have used different names to those used by the indigenous peoples. As an example of this effect, Table E1.2 shows the lands, kingdoms and cities mentioned in the fourteenth century Iranian work *Nuzhat-al-Qulub*, allocated to the regions laid out in Table E1.1.<sup>36</sup>The region of 'Iran' includes realms such as Iran (which matches contemporary usage), Qandahar, Kabul, Saghaniyan, Little Armenia, and Circassia(which less clearly match contemporary usage). It is rather less easy to delineate the realms within the region of 'Russia', such as Sclavonia, Badriyah, Sanuriyah, Varang, Ansur, Budah, As, and Rus, although names such as 'Sclavonia', 'Varang' and 'Rus' are evocative of themes significant in the area.

Contemporary state boundaries can hardly be regarded as stable.<sup>37</sup> As a consequence, contemporary state territorial claims and nomenclature tend to offer relatively little assistance in understanding the relationship of the realms and powers of a half millennium or more in the past.

For all these reasons, it is not appropriate to treat the names devised in this thesis for the regions as anything other than broad indicative labels. They are in no way intended as offering endorsement or refutation of any modern state or nationalist claims. The regions labelled as 'China', 'India', 'Iran', 'Russia' and 'Syria' do not correspond in their coverage to current states of similar name, nor is it intended that they should.

It should be borne in mind, however, that states, polities and other groups (ancient or modern) are often little interested in the niceties of geographical regions. For instance, in the course of the tenth century, the Fatimids first established their power on the edge of the Sahara, expanded their realm across the two regions of North Africa, before conquering Egypt and

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<sup>36</sup>Mustaufi, H.-A. (2017) *The Geographical Part of the Nuzhat al Qulub*. Translated by: Le Strange, G. Marston: E. J. W. Gibb Memorial Trust.

<sup>37</sup>For instance, the city of Smolensk, currently in the Russian Federation, was held by Poland in the early 17<sup>th</sup> century CE. The nearest parts of Poland are currently (early 21<sup>st</sup> century CE) about 500 kilometres away to the west, as opposed to only about 200 kilometres during the mid-20<sup>th</sup> century CE. At the present, the nearest international frontier to Smolensk lies just 50 kilometres to the west. This border used to be an internal division within the Soviet Union and was elevated to a state border when the Soviet Union ceased to exist in the late 20<sup>th</sup> century CE. During the bulk of the 19<sup>th</sup> century CE, there was no Polish state in existence, with Polish lands being divided between the Russian empire, the Austrian empire and the kingdom of Prussia (both Austria and Prussia changed their self-designation during the period).

establishing footholds in Yemen (Arabia) and Syria. Their objective was to reach their rival Abbasid caliphs in Mesopotamia (see Chapter 9). For this reason, variables derived from geographical regions, although useful for analytical purposes, should not be regarded as totally precise descriptors of the circumstance of the parties of a GIPP. There is, therefore, little advantage in pursuing an over-precise level of measurement (see Section 2.2). Given that the Fatimids could draw resources from four or five geographical regions, the exact level of resources in each becomes less relevant.

It is also entirely possible for a GIPP to occur within one region. A region may include a variety of terrains and climates. The most extreme example of this is perhaps Egypt, “Gift of the Nile”, where the bulk of the populace live in a severe desert climate, but on fertile well-watered soils beside the River Nile (the ‘black’ lands mentioned above), while a handful of other peoples live in the ‘red’ lands comprising the surrounding Sahara desert (some 90 percent of the area of the region). Similarly, in Central Asia, it is possible to call Khorezm a “gift of the Amu Darya”,<sup>38</sup> and to argue that life in Central Asia cannot be possible without artificial irrigation.<sup>39</sup> Iran and Mesopotamia are also lands of considerable variety, with hills, deserts and plains utilised by different peoples. The intra-regional variation in such circumstances will be lost to the analysis, although this should be considered in future finer-scale work.

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<sup>38</sup> Bolelov, S. (2016) 'Boris Vasilevich Andrianov and the Study of Irrigation in Ancient Khorezm', in Martelloni, S., Lamberg-Karlovsky, C.C. and Tasi, M. (eds.) *Ancient Irrigation Systems of the Aral Sea Area: The History, Origin and Development of Irrigated Agriculture*. Oxford: Oxbow Books, pp. 7-9.

<sup>39</sup> Mantelloni, S. (2016) 'Boris V. Andrianov and the Archaeology of Irrigation', in Martelloni, S., Lamberg-Karlovsky, C.C. and Tasi, M. (eds.) *Ancient Irrigation Systems of the Aral Sea area: The History, Origin and Development of Irrigated Agriculture*. Oxford: Oxbow Books, pp. xxv - xxxii

| Region                 | States   |
|------------------------|--|
| Europe                 | Denmark, Sweden, Norway, Finland, Belgium, Luxemburg, Netherlands, France, Germany, Poland, Czech Republic, Slovakia, Switzerland, Austria, Italy                                    |
| Iberia                 | Spain, Portugal  |
| Balkans                | Former Yugoslavia, Albania, Greece, Bulgaria, Turkey in Europe, Romania (part)   |
| Russia                 | Russia Federation (less Siberia and north of Russia in Europe (north of 60° North)) (part), Belarus (part), Ukraine (part)   |
| Baltic                 | Estonia, Latvia, Lithuania, Belarus (part)   |
| Anatolia               | Turkey in Asia   |
| Syria                  | Palestine, Jordan, Syria and Lebanon   |
| Arabia                 | Gulf, Interior, Yemen, Oman (see McEvedy & Jones for details of states assigned to each category)  |
| Mesopotamia            | Iraq   |
| Iran                   | Iran, Afghanistan, Transcaucasia (Armenia, Georgia, Azerbaijan)  |
| India                  | India (incl. Pakistan, Bangladesh)   |
| China                  | China (less Turkestan, Tibet, Inner Mongolia, Manchuria)   |
| Inner Asia (Pontic)    | Hungary, Moldova, Russian Federation (part), Romania (part), Ukraine (part)  |
| Inner Asia (Turkestan) | Kazakhstan, Uzbekistan, Kirghizstan, Turkmenistan, Tadjkistan, China (Turkestan & Tibet)   |
| Inner Asia (Mongolia)  | Mongolia, China (Inner Mongolia & Manchuria)   |
| Egypt                  | Egypt  |
| North Africa Arable    | Morocco, Algeria (part), Tunisia (part), Libya (part)  |
| North Africa Pastoral  |  |
| Sahel/Sahara           | Mauretania, Mali, Niger, Chad, Algeria (part), Tunisia (part), Libya (part), Morocco (part)  |
| Sudan Belt             | Sudan (incl. South Sudan), Senegal, Gambia, Guinea-Bissau, Guinea, Sierra Leone, Liberia, Ivory Coast, Ghana, Benin, Togo, Nigeria, Burkina Faso, Cameroon, Central African Republic |
| <i>British Isles</i>   | <i>United Kingdom, Republic of Ireland (mostly excluded from analysis as inaccessible to nomad incursion – nomads have a poor record of success with shipborne invasion)</i>         |

**Table E1.1 Regions and modern states**

Based on McEvedy & Jones (1985)

## Case 1 Computation of Regional Population and Area

The twenty-one regions in Table E1.1 are expressed in terms of national states for the most part, but in two instances (Tibet & Turkestan, Inner Mongolia & Manchuria), provinces have been classified differently to their present-day national state (China), requiring sub-national data. Seven regions (Anatolia, Balkans, Russia, Baltic, Inner Asia (Pontic), North Africa Arable, North Africa Pastoral, Sahel/Sahara) include or exclude non-provincial fragments of national states. The sub-national data required for these fragments is not routinely supplied by statistical agencies. Scientific data may, however, be available by grid square, which can be summed by a computer program such as ArcGIS. National population estimates by McEvedy and Jones (1985) for 1 CE, 500 CE, 1000 CE, 1500 CE and 1800 CE are distributed, where necessary, on the basis of assumptions about area and density. Thus, the current national territory of Romania is estimated to have a population of 0.55 million in 1 CE, in an area of 0.24 million square kilometres. If the area is divided equally between the Balkans and the Pontic Steppes, but 75% of the population is allocated to the Balkans, then the estimated population density of the Balkan portion is 3.44 persons per square kilometre, akin to that of Yugoslavia (5.27) and Bulgaria (5.91). The population density of the Pontic Steppes area is 1.15 persons per square kilometre, comparable with Manchuria (1.03) and less than Hungary (2.78). This seems plausible. A similar line of reasoning is followed for other divided states, as need arises

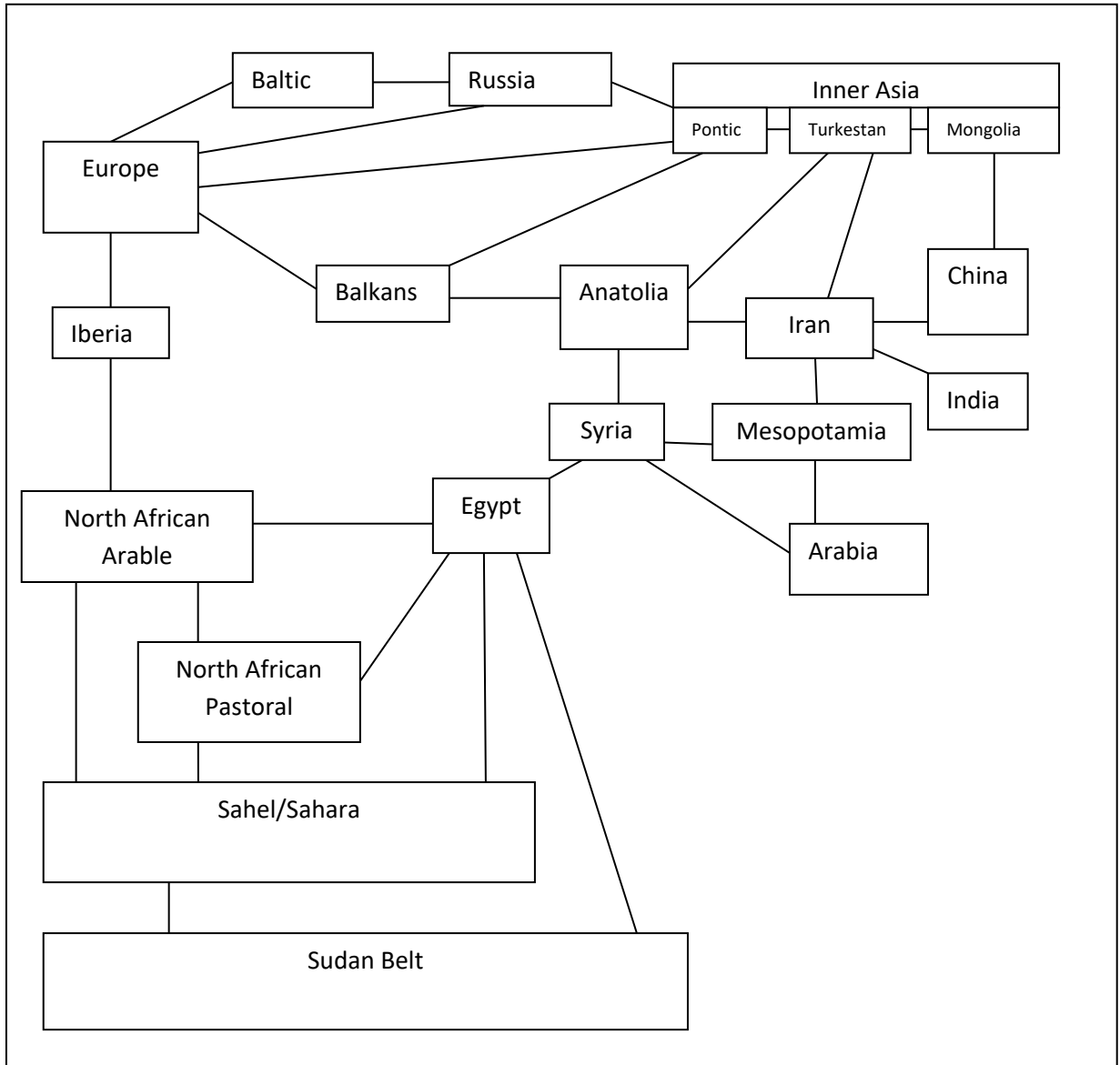
| Region                 | Lands, kingdoms and cities (Chapters XXII & XXIII of Nuzhat-al-Qulub)                               |
|------------------------|---|
| Europe                 | Frank Country   |
| Iberia                 | Andalus, Toledo   |
| Balkans                | Yunan   |
| Russia                 | Sclavonia, Badriyah, Sanuriyah, Varang, Ansur, Budah, As, Rus                                       |
| Baltic                 | Baland  |
| Anatolia               | Frank Country (Byzantium)   |
| Syria                  | Sham, Palestine   |
| Arabia                 | Yaman, Arab Desert, Hijaz, Himyar, Saba   |
| Mesopotamia            | Iraq  |
| Iran                   | Iran, Qandahar, Kabul, Saghaniyan, Little Armenia, Circassia  |
| India                  | Sind, Makran, Hind  |
| China                  | China, Cathay, Machin   |
| Inner Asia (Pontic)    | Dasht-Qipchaq, Saqsin, Bulghar, Maks, Bashqarud, Alan, Sudaq  |
| Inner Asia (Turkestan) | Tibet, Tarsiyan, Uighur, Tangut, Khutan, Khwarazm, Jurjaniyeh, Transoxiana, Kaymak, Farkhar, Khutan |
| Inner Asia (Mongolia)  | Qirghiz, Salanga, Lands of Gog and Magog, Jurjat, Balasaghun, Qaraqurum                             |
| Egypt                  | Said, Coptos, Misr, Qulzum  |
| North Africa Arable    | Ifriqiyah, Country of Abd-al-Mumin, Tripoli of Barbary, Tangiers, Qayruwan                          |
| North Africa Pastoral  | Berber Country  |
| Sahel/Sahara           | Maghrib   |
| Sudan Belt             | Maghrib   |

**Table E1.2 Regions and medieval lands**

Source: Nuzhat-al-Qulub<sup>40</sup>

<sup>40</sup> Mustaufi, H.-A. (2017) *The Geographical Part of the Nuzhat al Qulub*. Translated by: Le Strange, G. Marston: E. J. W. Gibb Memorial Trust.





**Figure E1.1 Schematic Location of Regions**

### Map 15 Regions



## CHAPTER 2 FRAMING, SCOPE AND METHODOLOGY

### 2.1 INTRODUCTION

Given that this study intends to focus on Group Interactions with Polemogenic Potential (GIPPs) that involve nomadism and/or holy war, it is certainly necessary to undertake a literature review that outlines the events and characteristics of these interactions, allowing them to be placed in their context. Initial scrutiny reveals that relevant scholarly literature on these conflicts tends to be widely dispersed across a range of disciplines. Military power is not the only source of success in conflict.<sup>1</sup> Account must also be taken of ideological, economic and political power, and the ability to project such power, together with factors that impinge on these forms of power. The result is that any literature review will be, in practice, an array of reviews addressing about eight or nine different literatures whose overlap in practice may be relatively limited, but all of which are relevant to the subject.<sup>2</sup> Given the broad range of issues addressed by this study, many relevant aspects of relevant literature are therefore better explored in their specific context, in subsequent chapters, rather than in a single review that would threaten to become unwieldy. Relevant factors, as informed by the related literatures, which are therefore detailed in subsequent chapters, include:

|                           |  |
|---------------------------|--|
| Nomadism<br>Chapter 3     | The nature and practice of nomadism forms the basis for identification and analysis of interactions involving nomadism.  |
| Holy War:<br>Chapter 3    | The nature and practice of holy war, which includes but is not exhausted by <i>jihad</i> and crusade, forms the basis for identification and analysis of interactions involving holy war.  |
| Climate:<br>Chapter 4     | It has long been argued, if often in an overly deterministic manner, that human behaviour is influenced, or even determined by climate. This includes interactions with other groups. Climate certainly influences natural vegetation, soil, water availability and terrain, with which human groups must negotiate. |
| Agriculture:<br>Chapter 4 | In the pre-industrial period, agriculture was the primary method of securing a livelihood. Climatic and associated factors have a major effect on the yields that can be obtained.   |
| Power:<br>Chapter 5       | The ability of a group to attain its ends; this can be broadly assessed from its relative extent, the area over which it may be considered to exert significant control.   |

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<sup>1</sup> See Mann, M. (2012) *The Source of Social Power: A history of Power from the Beginning to AD 1760*. (4 vols). Cambridge: Cambridge University Press, also Stein, G. (1999) *Rethinking World Systems: Diasporas Colonies and Interactions in Uruk Mesopotamia*. Tucson: University of Arizona Press.

<sup>2</sup> The absence of scholarly exchange has been noted: "Better communication between archaeologists, historians, and natural scientists has already been suggested [...], and seems to be highly promising for answering one of the most classic historical questions [the fall of Rome]". Marx, W., Haunschild, R., Bornmann, L. (2018) 'Climate and the Decline and Fall of the Western Roman Empire: A Bibliometric View on an Interdisciplinary Approach to Answer a Most Classic Historical Question, *Climate*, 6, p.90.

|                          |   |
|--------------------------|---|
| Population:<br>Chapter 5 | The number of people (given any level of available technology) available to a group is perhaps the primary control on what it can achieve.  |
| Government:<br>Chapter 5 | The opportunities offered by the power of a group are tempered by the ability of the group's leaders to tap into that group's power.  |
| Culture:<br>Chapter 5    | The culture of the group also influences its ability to produce and deploy means (of particular types) to achieve its ends.   |
| Religion:<br>Chapter 5   | The religion of a group can be expected to influence its views of, proclivity toward, and response to holy war.   |
| Economics:<br>Chapter 6  | The wealth of a group impacts on its ability to achieve its own ends, but also affects the wishes of other groups to access that wealth for themselves.   |
| Warfare:<br>Chapter 7    | War is a widely used means to secure group objectives. The ability to use warfare in this way effectively impacts on the decisions made by groups and the ability of groups to implement those decisions. This means that an understanding of the nature of warfare is a necessary prelude to understanding the influence of the warfare. |
| Leadership:<br>Chapter 8 | The leaders of groups exercise a notable influence on the choice and pursuit of group objectives. Factors which can affect this influence warrant attention.  |
| History:<br>Chapter 9    | It is necessary to provide an overview of events in relevant world regions in order to identify cases of interactions relevant to the study.  |

As example of the necessity to consider such a breadth of potential influences, we may take the prolonged conflict (third century BCE to first century CE) between the sedentary Han Chinese and their Hsiung-nu nomad neighbours.<sup>3</sup> Here, it would be appropriate to describe the course of relevant events in this conflict and in explaining them, to consider the climatic and topographical differences of their lands, the tighter organisation, greater population, and greater wealth of sedentary peoples, the differences in culture and lifestyle between nomads and sedentary people, and the military styles used to conduct war. Issues governing holy war might well be ignored in the instance of this particular example (since neither Han nor Hsiung-nu appear to have derived much motivation from religion for the origin, conduct and outcome of conflicts), but it would certainly be relevant in the context of other interactions (e.g. the clash of the nomad-based Berber religious groups, Almohads and Almoravids, in the twelfth century Maghreb).

The rest of this chapter addresses a range of other issues, relevant but more generic, which relate to methodology:

- a) Statistics
- b) Group Interactions with Polemogenic Potential (GIPP)
- c) Spatial Scope
- d) Key Dates (Climate and Warfare)
- e) Strategic options

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<sup>3</sup> This is one of the interactions examined in Chapter 9.2.

- f) Scaling and clustering effects
- g) Preliminary work
- h) Sample Size

## 2.2 STATISTICS

This study proposes to use numerical (or quantitative) data and analysis from a wide range of topics,<sup>4</sup> using various appropriate statistical measures in order to gain insight into the research hypotheses and questions described in Chapter 1. The use of quantitative data in this way is hardly new.<sup>5</sup> M. J. Moroney has stated that “Whoever you are, if your work calls for the interpretation of data, you may be able to do without statistics, but you won’t do so well”.<sup>6</sup> Quantitative and qualitative approaches should not, of course, be set in opposition, since qualitative studies should provide the framework of understanding into which a quantitative analysis may be placed to summarise findings and address issues such as the universality (generalizability) or otherwise of conclusions, when applied over a wider sample of cases. To achieve such a wider sample, depth and detail are intentionally sacrificed in order to obtain breadth and overview, and statistics provides a means to do this. The numerical data collected by past scholars remains a valuable source of information, available for analysis by new methods on the basis of different assumptions, even when the initial conclusions drawn from it are no longer widely accepted.<sup>7</sup> The thesis will also revise the data of others and generate additional data, when appropriate.

Statistical analysis has been used in archaeology to identify ethnic groups,<sup>8</sup> but the approach requires consideration of more cases than is usual in historical studies.<sup>9</sup> This illustrates a possible problem of methodology, concerning the level of detail included in a study. Demands for a high

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<sup>4</sup> Some have been produced by others, but where appropriate, the thesis will generate additional data and analyses.

<sup>5</sup>The use of numerical analysis occurred in the period of the study. The Merton School of Oxford in the early fourteen century used a quantitative approach, as did many of the scholastics (see Kaye, J. (1998) *Economy and Nature in the fourteenth century: Money, Market Exchange and the emergence of Scientific Thought*. Cambridge, Cambridge University Press, p.2). In 1521, Erasmus used balance sheet imagery to convey the unwisdom of war (Cited in Parrott, D. (2020) ‘The Early Modern Period in Europe 1500-1850’ pp.47-64 in Strohn, M. (ed) *Winning Wars: The Enduring Nature and Changing Character of Victory from Antiquity to the 21<sup>st</sup> Century* Oxford, Casemate.

<sup>6</sup> Moroney M.J. (1990) *Facts from Figures*. London, Penguin, p.463.

<sup>7</sup> For example, though the assumptions and conclusions of the geographer Huntington are no longer part of wide scholarly discourse, it is still possible to re-analyse the numerical data that he brought together a hundred years ago with interesting results (e.g. Huntington, E., (1915) *Civilisation and Climate*, New Haven, Yale University Press, pp.148-182. See Appendix 7)

<sup>8</sup> Stadler, P. (2008) ‘Avar Chronology revisited and the question of ethnicity in the Avar Qaganate.’ pp. 47-82 in Curta, F. & Kovalev, R. (ed) *The Other Europe in the Middle Ages Avars, Bulgars, Khazars and Cumans East Central and Eastern European in the Middle Ages Volume 2* Leiden, Brill.

<sup>9</sup> A study of just three or four documents, persons or events, however perceptive, may not be quite so readily generalizable as a study based on thirty or forty sources.

level of very precisely recorded detail can result in more harm than good if they start to cause marked reduction of the number of individual cases that can be examined and included in a statistical sample. The reason for this is that comparison forms the basis of the quantitative approach (as well as for many qualitative approaches). This imposes an absolute requirement for a sample to contain more than one case (to provide at least one comparator) and it is sample size, rather than population size, that is the prime control on the quality of the estimates produced.<sup>10</sup> There are many statistical techniques that allow assessment of the reliability of the results obtained, within the bounds of a study, and the various weaknesses of the data collected about a great many individual cases may very well cancel themselves out overall. The loss of representativeness from a reduced sample, however, is never compensated by enhanced detail and precision in the data recorded. As Moroney has it, "...*crude approximations in the parts of a problem can lead to a quite decent answer, providing that the sacrilege is carried out with all the cunning of the devil himself*".<sup>11</sup> It should also be noted that narrowing the scope of a study also narrows the range of conclusions that may be drawn,<sup>12</sup> and whether the study demonstrates similarity or difference between two groups, this is information that cannot possibly become available if one group has been excluded *a priori* from the study in order to facilitate precision.

This provides the basis for assembling a model of conflicts<sup>13</sup> which depicts circumstances in a simplified but acceptably accurate form.<sup>14</sup> Developing such a model may provide a legitimate basis for assessing the relative significance of material and non-material causes and factors, to the extent that these may be identified. Material causes are, of course, more easily quantified than non-material.<sup>15</sup> Although individual conflicts have been analysed in detail by historians and others, aggregated results in the pre-modern period have not been widely assembled. There is,

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<sup>10</sup> Or more exactly, the square root of the sample size. Quadrupling the sample size halves the statistical error and so doubles the accuracy of the results. This relates to the concept of statistical "power".

<sup>11</sup> Moroney, M. (1990) *Facts from Figures* op. cit. p.460.

<sup>12</sup> This also applies to qualitative studies e.g. in a study of pre-modern warfare, examining Hastings (1066), Manzikert (1071) and Dyrrachium (1081) is probably more productive than looking at Hastings alone. Adding Dyrrachium (48 BCE) adds knowledge of the potentialities of pre-modern warfare that would not be available from the first three.

<sup>13</sup> Normally, the world is too complex for us to comprehend the full level of detail that is available to us, much less the level of detail that could be available. Accordingly, we often represent what is available to use, in a simplified model of reality, concentrating on what is "important", while avoiding something that is "simple, easy to understand and wrong". Chapter 10 addresses the matter in more detail.

<sup>14</sup> There are limits to what can be achieved. We may reasonably suppose that Chingis Khan, like other nomad leaders, valued unity among his sons, for there are stories told on the subject, but quantifying the level of family unity that he secured prior to his war with Khwarizm may prove more difficult.

<sup>15</sup> It has long been known that there are a number of issues involved in ensuring that the numbers used in quantitative analyses are consistent and free of bias. These are more easily resolved where the subject is material. See Ember, C. R., Ross, M. H., Burton, M. M. and Bradley, C. (1991) 'Problems of Measurement in Cross-Cultural Research using Secondary Data', *Behavior Science Research*, 25, pp. 187-216.

however, much valuable literature (mainly qualitative, but sometimes citing quantitative data in support) on each of the conflicts under consideration, together with generalised theoretical analysis of conflict and war more quantitative in nature. The approach of this study is to compile the available numerical data and employ quantitative analytical techniques to complement, rather than to supplant, these established understandings, by identifying numerical commonalities and contrasts from a wide range of individual cases.

It is certainly not appropriate to discount quantitative models of this kind on the philosophical basis that they are in some way deterministic, whether the determinism is perceived as economic or environmental. Quantitative models are fully consistent with a possibilistic approach, of the kind that was expressed by Febvre as "*There are no necessities but everywhere possibilities, and man as a master of these possibilities is the judge of their use.*"<sup>16</sup> In such an approach, external circumstances are seen as offering a range of varying possibilities to which the human response is then adapted. A quantitative model offers a description of the possibilities chosen. An alternative approach, intermediate between determinism and possibilism is probabilism, formulated by Spate as "*although the physical environment does not uniquely determine human actions, it does nonetheless make some responses more likely than others. Human action is represented as not so much a matter of an all-or-nothing choice, or compulsion, but a balance of probabilities.*"<sup>17</sup> This too is compatible with quantitative modelling, as the results highlight the more probable choices.<sup>18</sup> As will be seen from the models presented later in the thesis though the factors identified are statistically significant, there is a very considerable degree of variation remaining unexplained, which must be attributed to other factors.

### **2.3 GROUP INTERACTIONS WITH POLEMOGENIC POTENTIAL (GIPP)**

When human groups interact, potential conflicts, clashes of interest, and competition commonly arise for a variety of reasons.<sup>19</sup> As the seventeenth century philosopher Thomas Hobbes put it, writing in *Leviathan*, "*So that in the nature of man, we find three principal courses*

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<sup>16</sup> Febvre, L "Geographical Introduction to History" (1924, 1996) Transl. Mountford E.G. and Paxton J.H. Routledge Abingdon) p.236.

<sup>17</sup> Spate, O.H.K. (1957) "How determined is possibilism?" *Geographical Studies* 4: 3-12.

<sup>18</sup> As with a card game such as poker where the cards dealt out do set some constraints on what can be achieved by the players, but certainly do not solely determine the outcome. Nonetheless, some outcomes are perhaps more likely than others e.g. in a 'friendly' game with someone called 'Doc' in the saloon of a riverboat.

<sup>19</sup> i.e. groups, not necessarily states. Violent Non-State Actors (VNSAs) are by no means rare. Mallett, A. (2016) 'Muslim Responses to Western Intervention: A Comparative Study of the Crusades and post-2003 Iraq', *Journal of Medieval Military History* XIV, pp. 133-148.

of quarrel. First competition; secondly diffidence; thirdly glory. The first maketh men invade for gain; the second for safety; and the third for reputation.”<sup>20</sup> There are a number of ways that the groups involved may seek to respond to these potential conflicts and clashes for “*It is easy to quarrel with an enemy, but difficult to vanquish him.*”<sup>21</sup> One of these responses is the use of violence and even war, where, as already noted, war is defined as “*sustained coordinated violence between political organisations*”<sup>22</sup> and politics is “*the authoritative allocation of resources for a society*”.<sup>23</sup> This provides a very wide field of relevant groups to study, from colonial empires to hunter-gatherer bands.<sup>24</sup> War has, as history attests, been widely available to human groups as a response to others and as a means of interaction. It is not, however, the only possible response. Violence may arise which is sporadic or unorganised or occurs other than between political organisations (i.e. violence not classed as war). Furthermore, there are also non-violent responses, and responses that foster co-operation and friendship, sometimes intentionally so.

As noted previously, this study proposes to examine Group Interactions with Polemogenic Potential (GIPPs), defined as that set of group interactions which have the potential to develop into sustained coordinated violence between the political organisations involved. It excludes those situations which involve only individuals and/or non-political organisations.<sup>25</sup>

Clearly, identifying GIPPs is an easier task where the interaction has resulted in actual war. The very presence of the phenomenon demonstrates the potential for it. In a situation where no war occurs, the existence of a GIPP is necessarily less certain. However, given that human history includes prolonged and organised violence arising from the tensions of chariot-racing factions (Nika riots of 532 in Constantinople),<sup>26</sup> the alleged loss of a sea captain’s ear (War of Jenkin’s Ear of 1739 between Great Britain and Spain),<sup>27</sup> and the conduct of a football match (Football

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<sup>20</sup> Thomas Hobbes (1651) *Leviathan* quoted in Dawson, D. (2001), *The First Armies*. Cassell p.14. This is referenced in Thomas, N. (2014) *Ancient and Medieval Wargaming* Stroud: The History Press p.3.

<sup>21</sup> Howorth, H. H. (1888) *History of the Mongols from the 9th to the 19th Century: Part III The Mongols of Persia*. London: Longmans, Green and Co, p.339.

<sup>22</sup> This is the definition of war offered by Levy, J. and Thompson, R. (2011) *The Arc of War: Origins, Escalation and Transformation*. Chicago: University of Chicago Press, pp.5-7.

<sup>23</sup> Easton, David. (1953) *The Political System* New York: Knopf.

<sup>24</sup> Levy & Thompson, (2011) *The Arc of War* op. cit. pp.5-7.

<sup>25</sup> Though all organisations may involve some degree of politicization in their structure and operation, this is, for the most part, not their *raison d’etre*. For some organisations, however, it is.

<sup>26</sup> Strictly speaking, the Nika riots resulted from the Blue and Green chariot-racing factions making common cause against a government attempt to clamp down on their ongoing armed conflict on the streets of Constantinople.

<sup>27</sup> Despite the wish of the English government of the time to avoid war with Spain, popular hostility to Spain resulted in a massive reaction over an alleged incident in the Caribbean, forcing England to go to war.



War of 1969 between El Salvador and Honduras),<sup>28</sup> it is difficult to conceive of conflicts, clashes of interest, and competitions so small or even seemingly trivial that they could not potentially develop into a fully fledged war, given the right (or wrong) circumstances. There are also more serious (or less incidental) causes. For instance, the eighteenth century writer Malthus, referring to the classical period, argues that Scythian shepherds, driven by want, moved out of areas where they could obtain insufficient food, provoking wars with sedentary peoples.<sup>29</sup> Such clashes of interest need not, however, necessarily concern material matters, for even while one party is seeking some non-material goal such as asserting national or personal honour, winning prestige, pursuing a “civilising” mission or spreading a faith, it is unlikely to be in the interests of the other party to allow this to be done in any and all ways. Thus, it is reasonable to accept the presence of any identified (e.g. in the secondary literature) potential cause of conflict as a marker for a GIPP, whether or not it actually results in war in a given case.

Thus, this study attempts to explore the interactions of nomadism and holy war as possible factors in the origin, conduct and outcome of conflict. These interactions may be with each other or with other various possible explanatory factors. Such factors are matters which might be taken into account by decision-makers as they weighed up their choices, including issues such as the military strength or the wealth of their own people and their neighbours.<sup>30</sup> Because of the diversity of the matters that could reasonably be expected to be considered by the decision-makers, this again means that a broad range of scholarly literatures have relevance. History, geography, ecology, economics, anthropology, sociology and military studies can all provide insight, and hence it would be unhelpful to allow the language, assumptions and methodological practices of any one of these disciplines to assume some sort of hegemony.

## 2.4 SPATIAL SCOPE

As noted in Excursus E1 (Chapter 1), cases are drawn from twenty regions covering Afro-Eurasia in a belt from the Senegal River through Africa and Asia to the Yellow Sea. Some areas occupied

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<sup>28</sup> Popular feelings over the refereeing of an international football match between the two countries resulted in brief hostilities.

<sup>29</sup> Malthus, T.R. (2008) *An Essay on the Principle of Population* Oxford, Oxford WorldClassics, pp.25,27.

<sup>30</sup> For example, it would be an unwise ruler who lightly engaged in war with a rival capable of deploying an army twice the size of his own. Gospel of Luke, 14, 31-32.

mainly by sedentary groups are included, since the circumstances of such groups can be relevant to GIPPs.

## 2.5 KEY DATES (CLIMATE AND WARFARE)

In order to develop a robust model of what factors influence the strategic choices that govern origin, conduct and outcomes of conflicts, the database used must include the information necessary to place conflicts in their broad context,<sup>31</sup> and this context will have changed over time. One area where this is particularly the case is climate. Since the retreat of the great ice sheets in approximately 12,600 BCE,<sup>32</sup> there are clearly identifiable periods when various but comparatively stable conditions prevailed, separated by shorter times of rapid change and instability. Warfare is another such area, where there have been many technological and tactical changes.

Bearing in mind that evidence starts to become more tenuous as we move into earlier periods, eventually making this kind of study impossible, such a progressive failure of evidence offers no clear cut-off point. It is better to apply a reasoned start date for the study that offers the possibility of a sufficient sample size for analysis. Although the clash of nomad and sedentary, and the practice of holy war are both deeply rooted in the past, it is worth noting that both have an ongoing relevance to the present day. Nomad raids in Darfur and Kenya still occur, for example, and governments seek to cope with *jihad*. These contemporary events, however, are set in a radically different context and hence an end date is also needed to allow for a better level of comparability between cases.<sup>33</sup>

Two benchmarks may thus be identified with regard to climate. In the period 1400-1100 BCE, midpoint 1250 BCE, there began a period of global climate change leading broadly into colder weather and more extreme rainfall (heavier rain in some areas, and concurrently, drought in others), with the heavier rain leading to notable environmental and landscape changes such as wetland formation.<sup>34</sup> Archaeologists working in southern Jordan record an upturn in pollen of

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<sup>31</sup> "Every transaction requires for its accomplishment, a certain time that we call its duration" (Clausewitz, C., Howard, M. and Paret, P. (1984) *On War*. Translated by: Howard, M. & Paret, P. Princeton: Princeton University Press. Book 1, Chapter 1, pp.82) and the duration of the transaction must be related to the greater durations around it.

<sup>32</sup> Brooke, J. (2014) *Climate Change and the Course of Global History: A Rough Journey*. Cambridge: Cambridge University Press, p.131.

<sup>33</sup> As noted below, mechanisation, air reconnaissance and air strikes have introduced major changes in warfare. There have also been relevant changes in social structure.

<sup>34</sup> Brooke, J. (2014) *Climate Change*, op. cit. p.301.

desert plants, and a corresponding decline in pollen of steppic plants across this period 4000-2700 BP (2050-750 BCE, midpoint 1400 BCE).<sup>35</sup> This matches the finding of Jones et al that wetness continued to decline until at least 3000 BP (1050 BCE).<sup>36</sup> These changes pivot roughly around 1250 BCE. A later benchmark is that widespread industrialisation began in the late eighteenth century in Europe and became more marked by the mid-nineteenth century. While the exact extent of the global impact of the attendant release of greenhouse gases at this period remains uncertain, with Abram et al finding evidence of oceanic and northern hemisphere industrial warming as early as the eighteen thirties,<sup>37</sup> for example, it is clear that an end point of 1850 CE pre-dates the worst effects of potentially global-scale anthropogenic climatic impact.<sup>38</sup>

These dates have some parallels in warfare which are not obviously causally linked to climate change. Levy and Thompson,<sup>39</sup> following Gabriel,<sup>40</sup> suggest that there have been three periods of accelerated evolution in warfare. The methods of the first evolution in warfare (developing over the period 4000 – 2000 BCE), led to the use of shock weapons and armour made from bronze, and the use of horses to pull battle chariots was widespread. This tended to give the material advantage in warfare to technically advanced and wealthy societies able to afford the materials and production skills required. From 1500 BCE – 100 CE, there was a second evolution, with a shift to cheaper iron weapons and use of horses as cavalry, i.e. without attaching the horses to what is a purpose-built and somewhat expensive battle vehicle.<sup>41</sup> The development

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<sup>35</sup> el-Rishi, H., Hunt, C., Grattan, J., McLaren, S., Pyatt, B., Duller, G., Gillmore, G. and Philips, P. (2007) 'The past and present landscapes of the Wadi Faynan: geoarchaeological approaches and frameworks', in Barker, G., Gilbertson, D. & Mattingly, D. (eds.) *Archaeology and Desertification: The Wadi Faynan Landscape Survey, Southern Jordan*. Oxford: Council for British Research in the Levant and Oxbow Books pp.59-93.

<sup>36</sup> Jones, M., Djamali, M., Stevens, L., Heyvaert, V., Askari, H., Norolahie, D. and Weeks, L. '2. Mid-Holocene environmental and climatic change in Iran', *Ancient Iran and its neighbours: local developments and long-range interactions in the fourth millennium BC*, Cambridge, (2013): Oxbow Books, pp.30-31.

<sup>37</sup> Abram, N., McGregor, H., Tierney, J., Evans, M., McKay, N., Kaufman, D. and PAGES 2k Consortium (2016) 'Early onset of industrial-era warming across the oceans and continents', *Nature*, (536), pp.411-418.

<sup>38</sup> Although detectable release of carbon dioxide through human activity has occurred since Neolithic times, 1751 may be taken as the start of major industrial use of fossil fuels. Comparison of the increases from start to finish of fifty year periods in carbon dioxide release shows maximum growth in the period 1851-1901:

|           |                  |
|-----------|------------------|
| 1751-1801 | 3 fold increase  |
| 1801-1851 | 7 fold increase  |
| 1851-1901 | 10 fold increase |
| 1901-1951 | 3 fold increase  |

(based on Ritchie, H. and Roser, M. (2018) - "CO<sub>2</sub> and other Greenhouse Gas Emissions". *Published online at OurWorldInData.org*. Retrieved from: '<https://ourworldindata.org/co2-and-other-greenhouse-gas-emissions>' using Boden,T.A., Marland, G, and Andres, R.J. 2017. "Global Regional, and National Fossil-Fuel CO<sub>2</sub> Emissions". Available at: doi:10.3334/CDIAC/00001\_V2010)

<sup>39</sup> Levy & Thompson, (2011) *The Arc of War* op. cit. p.87.

<sup>40</sup> Gabriel, R.A. (2002) *The Great Armies of Antiquity* Westport CT: Praeger

<sup>41</sup> Anthony, D. (2007) *The horse, the wheel and language, How Bronze-Age riders from the Eurasian steppes shaped the Modern World*. Oxford: Princeton University Press, p.405. The cost is about \$GK 12,600 for chariot and two

and diffusion, 1400 – 1000 BCE, of the bronze bit improved control of the horse to a point that permitted militarily effective riding,<sup>42</sup> and a technique for a durable edge on iron implements was developed.<sup>43</sup> Anthony dates the development of horse archer cavalry,<sup>44</sup> which now provide an archetypal image of steppe nomad armies, to 1000-900 BCE. The midpoint of this period of cavalry development is roughly about 1200 BCE.

The cultural catastrophe in the period 1220-1180 BCE, when widespread settlements in the Balkan, Anatolian and Syria regions experienced destruction by fire,<sup>45</sup> also falls during this period. Although attributed to individual factors as diverse as earthquake, migrations, ironworking, drought, system collapse, raiders and developing military techniques, it is likely that the interaction of many of these factors was more responsible than any individual factor alone.<sup>46</sup> It thus seems desirable to use a start date that lies in the more stable time before the collapse, and so 1250 BCE again seems appropriate, lying during the long reign of Ramesses II.<sup>47</sup>

Since about 1500, there has been a third evolution with the progressive introduction of gunpowder in personal weapons,<sup>48</sup> effective artillery, volleyed gunfire, rifled barrels and finally, machine guns. These have been backed yet more recently by mechanisation, air reconnaissance and air strikes, which has progressively introduced another radical change in the way that war is waged. The rate at which such advanced and industrialised techniques of warfare have spread has been by no means uniform through the world,<sup>49</sup> and it is not always possible to set a single worldwide date at which a given technique came into use. This is particularly significant in conflicts where there is a marked difference between the parties in terms of access to such weaponry and techniques (i.e., usually to the advantage of the sedentary and industrialised states). The outcome of conflicts featuring such an asymmetry tends to be assured, unless the

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horse team, derived from the figures of Drews, R. (1993) *The End of the Bronze Age: Changes in Warfare and the catastrophe ca. 1200 B.C.* Princeton New Jersey: Princeton University Press.

<sup>42</sup> Drews, R. (2004) *Early Riders: The beginnings of mounted warfare in Asia and Europe.* Abingdon: Routledge, pp.88-91.

<sup>43</sup> Keegan, J. (2004) *A History of Warfare.* London: Pimlico, pp.238-9.

<sup>44</sup> Anthony, D. (2007) *The horse, the wheel and language,* op. cit. p.223.

<sup>45</sup> Drews, R. (1993) *Early Riders* op. cit. Figure 1

<sup>46</sup> Cline, E. (2014) *1177 BC The Year Civilisation collapsed.* Oxford: Princeton University Press, p.166.

<sup>47</sup> Dates in this period are not exact. According to Hammerton, the dates of Ramesses II were 1300-1225 BCE (mid-point 1262 BCE), but for Cline, the dates are 1279-1212 (mid-point 1245 BCE).

Hammerton (ed), (1929), *The Universal History of the World, Vol 1 Earliest Times to the Egyptian Empire,* London, The Educational Book Co Ltd and Cline (2014) *The Year Civilisation collapsed* op. cit.

<sup>48</sup> The first real investment in portable firearms by a nation is dated after 1501-1504 by Rodríguez Hernández. Rodríguez Hernández, A. J. (2018) 'The Spanish Imperial Wars of the Sixteenth Century', in García Fitz, F. & Monteiro, J.G. (eds.) *War in the Iberian Peninsula, 700-1600.* Abingdon: Routledge, pp.267-300

<sup>49</sup> China concentrated on small firearms while Europe developed artillery, to which its fortifications were particularly vulnerable. Andrade, T. (2015) 'Late Medieval Divergences: Comparative Perspectives on Early Gunpowder Warfare in Europe and China', *Journal of Medieval Military History* XIII, pp. 247-276.

other side can contrive to introduce some countervailing asymmetry (as sometimes has happened)<sup>50</sup>. Conflicts in the late nineteenth century where industrialisation meant that there were clear and massive asymmetries between the parties (e.g. Kitchener's 1898 campaign against the Khalifa in the Sudan), are probably best excluded.<sup>51</sup> This suggests that the cut-off date might most reasonably be set in sub-Saharan Africa at 1850, before the "Scramble for Africa" began to pit machine guns and magazine rifles against bows and spears. These dates more or less parallel those which may be suggested from climatic considerations, namely 1250 BCE and 1850 CE.

In Europe and Asia, however, the end date needs to be set rather earlier, as the impact of modernisation became apparent at an earlier date than in Sub-Saharan Africa. The thirteen years from 1514 to 1526 includes (apart from the start of the Reformation in Europe, with the accompanying social changes leading to modern times), the defeat of the Safavid Persians at Chaldiran (1514) and conquest of the Mamluks (1517) by gunpowder-equipped Ottomans,<sup>52</sup> and the first battle of Panipat (1526) in India,<sup>53</sup> where the Moghul conqueror Babur was victorious at the head of gunpowder-equipped troops. This suggests that an end date of 1520 might be more appropriate in Europe, North Africa and Asia.

## 2.6 STRATEGIC OPTIONS

As noted above, for the purposes of this study, a GIPP is defined as a group interaction where war is a *possible* response to conflict; even though an actual war may not in fact arise (estimates of the total numbers of GIPPs are derived in Excursus E2). These tend to be more substantial and consequential situations. While war offers a number of strategic options such as defence, local conquest or total conquest, there are further bundles of strategic options available which do not satisfy the above definition of war but may nonetheless be pursued as an alternative, in a context where escalation to war is possible.

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<sup>50</sup> For example, in the Vietnam War, the US/South Vietnam had a powerful air force (one asymmetry), but the Viet Cong were fighting a guerrilla war (countervailing asymmetry). The victims of air strikes were often civilians rather than guerillas, and widely circulated press photographs of small girls fleeing in terror from napalm attacks did little to forward US/South Vietnam victory. See Wikipedia entry on Phan Tiki Kim Phuc, June 8 1972, in Trang Bang (accessed 22/02/2020)

<sup>51</sup> When, as Hilaire Belloc has it, "We have the Maxim gun and they do not" (*The Modern Traveller*, 1898), battles are apt to be short, bloody and very predictable in their result. As the French discovered in August 1914, there are limits to what may be achieved by élan and courage alone, in the face of machines.

<sup>52</sup> Agoston, G. (2018) 'Asia Minor and Beyond: The Ottomans 1281-1922) in *The Great Empires of Asia* ed. Masselos, J., London, Thames and Hudson, p.115.

<sup>53</sup> Asher, C. (2018) 'India: The Mughals 1526-1858' in *The Great Empires of Asia* ed. Masselos, J., London, Thames and Hudson, p.167.

For example, sporadic or uncoordinated violence and raiding, particularly if there is an asymmetry in military power, may be tolerated or even encouraged in their own right or as a support to a policy of systematic extortion or trading on unfair terms. On the other hand, moving away from violence of any kind, the group may be willing to pay extra for luxuries such as meat and butter (for the sedentary peoples), or essentials such as iron goods and grain that they cannot produce for themselves (nomads), opening the possibility of trade on fair terms with their neighbours, and leading perhaps to non-competitive alliance and mutual assistance, rather than war. Some groups preferred such interactions. Heuser cites the comment of the late eleventh century Byzantine princess Anna Comnena that “... *peace is the end of all wars. Invariably to prefer war to peace ... is typical of foolish commanders and foolish political leaders, the mark of men who work for the destruction of their own state.*”<sup>54</sup>

Given the Levy-Thompson definition of war, GIPPs are thus interactions of political organisations where sustained coordinated violence is a potential outcome. Inevitably, this definition becomes in practice fuzzy. Much that happens may initially have little clearly defined intentionality, but as one thing leads to another, changes in the dynamics occur. For example, the initial personal interaction of Captain Jenkins with a Spanish coastguard was hardly an expression of the prevailing formal state attitudes to the potential for an Anglo-Spanish war, i.e. the War of Jenkins’ Ear (1739-48).<sup>55</sup>

Furthermore, it is also difficult to set firm bounds on a GIPP, either in time or space. For example, the War of Jenkins’ Ear was an event that itself was only one part of an ongoing Anglo-Spanish relationship, extending over a period of almost three hundred years, which included marriage alliance, trade and co-operation as well as raids, both unofficial and state-sanctioned, and wars. So much (dynasties, roles of religion, basic alliances operating in Europe to name a few) had changed between the Spanish Armada of 1588 and the War of Jenkins’ Ear that the two wars might be regarded as responses to different interactions. In Ireland, Norman lords and Gaelic chiefs interacted with each other and the English crown over a period of more than four hundred years, and this could be (and has been) regarded as one interaction or many, depending on the

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<sup>54</sup> Heuser, B. (2010) *The Evolution of Strategy: Thinking War from Antiquity to the Present*. Cambridge: Cambridge University Press, p.44, citing Comnena, A. (1969) *Alexiad of Anna Comnena*. Translated by: Sewter, R. Harmondsworth: Penguin, p.381.

<sup>55</sup> As noted above, the British government did not initially want war with Spain, but the popular response to the personal atrocity that Captain Jenkins claimed had been inflicted on him by a Spanish coastguard, tapped into a national hostility to Spain that swept the country into war.

viewpoint or frame of reference taken. The conquests of Chaka and his predecessor, Dingiswayo, in establishing the Zulu polity in the early 19<sup>th</sup> century in South Africa were one from the Zulu viewpoint, but many from the viewpoints of the surrounding Bantu tribes, who did not unite with each other to resist the threat as allies.

What was actually happening is also sometimes unclear.<sup>56</sup> It can be difficult to discern the point at which a subsidy to a needy friend or the hire of competent troops from a neighbour changes its emphasis and becomes blackmail paid to a greedy predator. A single payment may be differently described by the parties involved, who have a certain common interest in maintaining “constructive ambiguity” on the point. Such “constructive ambiguities” also have an ongoing practical value in managing internal discourse, e.g. “vigorous police action against bandits” clearly sounds a more attractive approach than “full scale war against the border tribes” although the distinction between the two on the ground may be marginal. Amongst the Berbers of medieval Morocco in the eleventh century CE, Ibn Tumart’s call on his Almohad followers to “*apply yourselves in jihad against the veiled infidels for this is more important than combating the Christians and all the infidels twice or even more*” is in effect a call to conquer the earlier Berber sect, the Almoravids.<sup>57</sup>

## 2.7 SCALING AND CLUSTERING EFFECTS

As already noted, a certain level of judgement is required as to when the nature of the interaction between two groups has changed sufficiently to warrant it being treated as a different interaction. This is, in principle, similar to the judgement that, for example, the three days of fighting at Leipzig in 1813 were parts of a single prolonged battle while Quatre Bras, Ligny and Waterloo in 1815 were three separate battles in a campaign. Neither example is drawing together combats that were associated merely through happenstance.<sup>58</sup>

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<sup>56</sup> It may even, on occasion, be appropriate to invoke Colonel Alfred Burne’s Theory of Inherent Military Probability (i.e. put yourself in the commander’s shoes and decide what you would have done): Corrigan, G., (2014), *A great and glorious adventure: a military history of the Hundred Years War*, London, Atlantic Books, p.7). The problem with this approach is that the scholar’s perceptions of the possible may not match that of the commander.

<sup>57</sup> The “veiled infidel” was Ibn Tumart’s customary way of describing the rival Berber sect of the Almoravids, who were Muslims with different opinions to his own. *Jihad* against them was thus, for Ibn Tumart, much more important than *jihad* against Christians. Fromherz, A. (2013) *The Almohads: The rise of an Islamic Empire*. London: I.B. Tauris, p.84.

<sup>58</sup> For examples of happenstance association, Herodotus records tales that a Greek victory over the Carthaginians in Sicily happened on the same day as the Greek victory over the Persians at the battle of Salamis near Athens, and subsequently, that the battles of Plataea and Mycale were also fought against the Persians on the same day. Even if this is correct, there was no direct connection between the fighting in the battles, or in the planning of the campaigns that led to them. See Herodotus (1965) *The Histories*. Translated by: de Selincourt, A. Harmondsworth: Penguin p.472, p.591.

Even in the most violent societies, violent events are not particularly common,<sup>59</sup> though they tend to occur in clusters (whether spatial or temporal). Some places and environments appear more dangerous than others, and some periods appear more dangerous than others.<sup>60</sup> This pattern tends to apply at all levels of violence from murder to world war. Although large events are important, so too are the smaller events and these tend to be much more frequent. Peoples had to resort to or else to respond to guerrilla war, raids and brigandage, where the practices of larger wars did not always work particularly well.<sup>61</sup> Furthermore, the large events, such as wars and campaigns, can be disaggregated into smaller events such as battles, small battles and skirmishes, with the majority of such events being smaller encounters conducted by leaders who sometimes have a particular view as to how these encounters relate to larger encounters, and sometimes do not.<sup>62</sup> This raises problems with clustering generated by random processes, akin to those outlined by Pink in his comments on patterns.<sup>63</sup> It is not always easy to distinguish between chance groupings and deliberate choices, particularly since the two can merge as commanders and leaders consciously start to respond to unfolding events.<sup>64</sup> It may also be noted that consistent success at one level of a conflict is not necessarily associated with success at another level. It is possible to win every battle and still lose the war. Judgement is also required on this matter.

It is accepted that total accuracy in all such assessments and judgements is unlikely to be achieved in this study. However, although judgment is required, it is possible to draw heavily

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<sup>59</sup> This is not to suggest that the cumulative effect over time may not be severe. A (high) 1% annual homicide rate gives a lifetime chance of better than evens that an individual will die from homicide (Pinker, S. (2011) *The Better Angels of Our Nature*. London: Penguin, p.62). Nonetheless, the chances of that happening on any given day are only 2.75 in 100,000.

<sup>60</sup> In the first two-thirds of 1918, the British Expeditionary Force in France saw heavy action on only 9% of available Army-Days. Quiet sectors of the Western Front in World War I were much safer than active sectors; quiet periods were much safer than 'big pushes', when casualties of 20-40 per cent in one day were possible. Griffith, P, (1996) *Battle Tactics of the Western Front: The British Army's Art of Attack 1916-18* New Haven, Yale University Press, pp.14-16. The odds ratio on death on a 'big push' day is about 4,000 times that for a single day in an environment with 1% annual homicide. These findings are consistent with the dictum that war is 90% tedium and 10% terror.

<sup>61</sup> Goldsworthy, A. (2017) *Pax Romana: War, Peace and Conquest in the Roman World*. London: Weidenfeld & Nicholson. Callwell, C. (1996) *Small Wars: Their Principles and Practice*. 3rd edn. Lincoln: Bison Books University of Nebraska Press.

<sup>62</sup> About 22% of recorded combats in a sample of years during the French Revolutionary/Napoleonic Wars involved 40,000 participants (both sides combined). The remainder involved smaller numbers, with 55% under 20,000. See Table A3.1 in Appendix 3. García Fitz and Monteiro structure the various chapters of their book, so that their contributors all seek to address the conduct of war through small combats, raids and skirmishes; through sieges and through pitched battles García Fitz, F. & Monteiro, J.G. (eds.) (2018) *War in the Iberian Peninsula, 700-1600*. Abingdon: Routledge, p. xix.

<sup>63</sup> Pinker, S (2011) *The Better Angels of our Nature* op. cit. p.245.

<sup>64</sup> Encounter battles can arise where a chance skirmish causes both parties to reinforce the troops already involved, in an escalating combat. Of course, chance skirmishes themselves are more likely to happen in some times and places than in others.



upon the prevailing consensus of the literatures relevant to each case to inform that judgement, and in the relevant chapters / sections, to detail how decisions of judgement were made. The statistical approach is a good approach to uncertainty, and statistical analysis is an appropriate tool for this study. It allows the running of variants of tests in which some of the parameters are adjusted, the variables included in the model are changed or the periods / regions taken are modified in scope. In this way it is possible to see whether the results still hold or are highly sensitive to small changes dependent upon the judgments required above.

## **2.8 PRELIMINARY WORK**

A foundation has been laid by earlier work by Chris Morris, which allows for considerable expansion.<sup>65</sup> An initial database of 46 GIPPs occurring in the period 1250BCE-1850CE has already been assembled. These GIPPs are in compliance with the criteria set out above. This sample is, however, at best, small in total terms and presents a small sampling fraction (< 1%) of the total number of possible relevant GIPPs, as estimated to have occurred in historical reality. There is in existence no comprehensive list of the GIPPs from which an Ideal Notional Sampling Frame (INSF), comprising all interactions for which there are surviving records, could be derived. Furthermore, a sample drawn randomly from such an INSF cannot be truly random, given that the INSF probably forms a non-random selection from all those interactions which have occurred, due to biases in record creation and survival and other factors. The likelihood is that the INSF is biased *vis a vis* the generality of interactions with regard to the location and parties, the size of interaction and methods used to pursue it. Whether this actually makes any difference to the conclusions that may be legitimately drawn, is less clear. The evidence that one actually possesses has some claim to priority over any hypothetical evidence that one might perhaps be able to obtain from a sample drawn from an INSF, if such could be created, and it is certainly of more use than the hypothetical evidence on unrecorded events which, by definition, is, and will remain, unavailable. A further complication is that all the evidence collected has an element of measurement error which may or may not be random in nature.

## **2.9 SAMPLE SIZE AND SELECTION**

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<sup>65</sup>Morris, C. (2016) *"Paradise or Booty": Choices of strategy and their outcome in Ancient and Medieval holy wars and nomad conflicts*. MA Society, Space and Culture, Queen's University of Belfast, unpublished.

An estimate based on a fully random sample of 120 cases would have a 95 per cent probability of the error of the estimate not exceeding +/- 9% on an estimate of 50% (i.e. the true proportion probably lies between 41% and 59%).<sup>66</sup> This level of reliability is about equivalent to that proposed for the estimate of the number of GIPPs (Excursus E.2), and seems broadly acceptable. Accordingly, this suggests that a target sample size of 120 is acceptable for initial analysis (a degree of further expansion of the sample occurs in Section 11.3). The preliminary work (Section 2.8) offers a starting base of nearly fifty cases (38 per cent) already identified.

As noted in Section 2.8, there is no single readily available sampling frame of GIPPs. The estimates in Excursus E.2 of 4,500 migrations, 10,000 wars, and 11,400 GIPPs (+/- 20%) in the area and period of study may be broadly accurate, but these are based on markedly shorter lists of events which have been actually recorded and placed on a list (1,581 migrations, 1,810 wars; see Excursus E.2 for details). Whether those lists are biased with regard to the inclusion or exclusion of interactions involving nomads or holy war is unknown.

The absence of an established sampling frame for research subjects is not uncommon at the outset of a research project. One technique used in social research to overcome this challenge is “snowball” sampling, where the researcher, having identified an initial number of research subjects, taps their knowledge to identify further research subjects who are then approached to participate. Several iterations of the process can substantially increase the number of participants, although the selection process is not random. In the context of GIPPs, the research subjects themselves obviously cannot offer up further research subjects, but the historians (current and previous) who have written about one group interaction in the process of compiling sources or in subsequent scholarly literature, usually have addressed other similar group interactions, at least in passing, and sometimes in detail. Thus, a reading of the historical literature gives an indication of a range of interactions that are available for analysis. The overall order in which interactions became apparent to the researcher was governed by the essentially random order of the researcher’s reading of sources,<sup>67</sup> and the interactions tend to appear in groups organised on a regional and chronological basis, since the sources often have their own

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<sup>66</sup> The formula to calculate the 95 per cent error bounds for an estimate of proportion is  $1.96 \times \sqrt{\frac{p \cdot q}{n}}$  which for  $n = 120$ ,  $p = .5$ ,  $q = (1 - p)$  evaluates as 0.089.

<sup>67</sup> Organising a reading programme to correspond neatly to regional/chronological analysis or to a sampling structure was not attempted. With over 370 sources cited in Chapter 9 alone, this would have been difficult. It is, however, unlikely that approaching the literature in a different order would have resulted in identifying a radically different sample.

underlying regional and chronological structure.<sup>68</sup> Some of the interactions (like those led by Chingis Khan or Attila the Hun) are of course widely known, beyond scholarly circles, and others were initially encountered through a passing reference in a slightly obscure volume.<sup>69</sup> The sample cases identified are, in Chapter 9, placed in their wider regional and chronological context which provides an opportunity to identify over-arching factors that may influence the interactions in the analysis.<sup>70</sup>

## 2.10 ASSIGNING VALUES

Most of the causal factors included in the study (e.g. climate, population, economics, reign length) have been previously measured in established units which can serve for the basis of subsequent numerical analysis. Some other causal factors (e.g. holy war, gender, cultural complexity) can be readily measured by using categorical variables (e.g. 'Yes' = 1, 'No' = 0) or sums of categorical variables. The answers for many of these variables have already been advanced in the literature. For a few causal factors (e.g. polity power, social cohesion, social effectiveness, religion rating), the strategic options (Table E9.1) and the interaction outcome (Table E9.2), the variables are assigned numerical values in line with the author's coding of the interaction, based on his stated coding frame and on his reading of the literature.

## 2.10 CONCLUSIONS

Literature review and data collection will be conducted on a range of factors likely, on *a priori* consideration, to have a significant potential impact on strategic decisions and their implementation. These include: nomadism, holy war, climate, agriculture, population, power, government, culture, religion, economics, warfare, leadership and history.

The use of statistics is likely to enhance the quality of the study, although this requires consideration of a larger number of cases than is usual in historical studies. The intent is to ensure through statistical analysis that the various weaknesses of data collected about a great many individual cases will cancel themselves out overall. While it is, of course, desirable that all data used are precise, accurate and fairly detailed, this is not essential in order to secure a reliable result.

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<sup>68</sup> One would hardly expect literature (primary or secondary) on the holy wars of the Almohads in North Africa to refer extensively to the activities of nomads in Mongolia.

<sup>69</sup> An initial single reference would rarely suffice to provide all the information required.

<sup>70</sup> The identity numbers have been assigned to facilitate data matching. The numbers do not reflect order of selection for the sample.

The basic unit of study is Group Interactions with Polemogenic Potential (GIPPs) in the period 1250 BCE to 1520 (1850 in sub-Saharan Africa). The strategic options open to such groups extend beyond warfare, including peace with trade and active alliance. The numbers of GIPPs in the study area is estimated (Excursus E2) as 11,400, with 4,500 migrations. An initial estimate suggests that there may have been 40,000 raids and 34,400,000 incidents of brigandage in the study area, associated with these GIPPs.

## **Excursus E2. NUMBERS OF GIPPS**

Carneiro notes the drop in the number of autonomous political units from a maximum of 600,000 in 1000 BCE to 200,000 in 1500,<sup>71</sup> and less than 200 today (with the 1815 Congress of Vienna reducing the 350 states of the Holy Roman Empire to 39).<sup>72</sup> In conjunction with population growth, the size of the units showed a twenty-five-fold increase in size from 1000 BCE to 1500 CE. There are thus far fewer possible interactions through time, but they have more serious consequences. Not all autonomous political units are, of course, fully coherent, due to cultural and linguistic divisions. Even today, there are 6,912 living languages, many spoken by fairly small groups.<sup>73</sup> The resultant impact of linguistic and cultural division can affect the risk of civil war.

Data on modern wars, such as available in the Correlates of War (COW) databases (covering 653 wars from 1816 CE onwards) are strongly state orientated (65% of COW 4.0 wars being state external or civil wars). This may be attributable to the greater ease of studying conflicts where there is state involvement, or to the greater significance attributed to wars that involve the state, or to the fact that in the modern period, wars involving states do actually predominate. The COW figures show that the average number of recorded wars started worldwide per annum was at least 3.42 in the period from 1816 to the present. Table E2.1, which extends over a longer period than the proposed study, shows that the number of recorded wars per annum has increased over time, but this is probably (in large part) a reflection of the likelihood that an event will be recorded and the likelihood, that the record, if made, will survive. On the assumptions a) that the COW data is fully robust and b) that the modern propensity to wage war is equal to the past propensity, then based on backward projection, it is likely that there were ten to eleven thousand wars in the broad period of this study (1250 BCE -1850 CE).

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<sup>71</sup> Day cites an estimate of at least 10,000 political entities in pre-colonial Africa. Day, D. (2013) *Conquest: how societies overwhelm others*. Oxford: Oxford University Press, p.128.

<sup>72</sup> Carneiro.R. (1992) 'The role of warfare in political evolution: past results and future projections', in Ausenda, G. (ed.) *Effects of War on Society*. Woodbridge: Boydell & Brewer Ltd for Centre for Interdisciplinary Research on Social Stress, pp.87-102.

<sup>73</sup> The median size of linguistic group is 25,391 in Africa, but 220,000 in Europe. See *Ethnologue: Languages of the World*. (2005) Fifteenth edn. Dallas, Texas: SIL International, Table 1.

| Period         | Source    | Wars  | Wars per annum | Expected wars (based on COW) |
|----------------|-----------|-------|----------------|------------------------------|
| 3100BCE-999CE  | Wikipedia | 441   | 0.11           | 14,019                       |
| 1000CE-1499CE  | Wikipedia | 274   | 0.55           | 1,710                        |
| 1500CE-1799CE  | Wikipedia | 442   | 1.47           | 1,026                        |
| 1816CE-present | COW       | 653   | 3.42           | 653                          |
| <b>Total</b>   | All       | 1,810 | Na             | 17,408                       |
| 1250BCE-1850CE | All       | na    | 3.42           | 10,602                       |

**Table E2.1 Numbers of wars recorded for the period 3100 BCE – 1850 CE**

Neither assumption is, however, entirely valid. Taking account of the total omission of wars in isolated pre-literate areas such as highland Papua pre-1935, and the likely undercount of non-state and extra-state wars, especially in remote areas,<sup>74</sup> it is unlikely that the COW database has achieved total coverage. Accordingly, it might not be unreasonable to assume that there have been perhaps four or even five wars per annum in recent times.

It is unclear whether the modern period has the same propensity to war as previous periods. The overall death risk from violence in past epochs seems to be of the order of up to seven or even fifteen times as great as the risk in the recent past.<sup>75</sup> Despite the undoubted bloodiness of twentieth century wars, their casualties were inflicted on a much larger population than was the case in previous wars. Pinker, in his 2011 history of violence, *The better angels of our nature*, demonstrates through a wide range of data that in general, violence has declined despite increased slaughter in the largest wars.<sup>76</sup> He attributes this to a range of causes such as the extended and deepened internal control exerted by states over their citizens and subjects; the civilising process and the development of the Enlightenment,<sup>77</sup> and modern concepts of rights. The proportion of violent deaths due to incidents that were either not sustained, not co-ordinated or not between political organisations (i.e. that in one way or another, failed to match the Levy-Thompson definition of war) seems to have dropped radically. While this can be demonstrated in the case of murders, information on smaller incidents (10-1,000 deaths) tend to fall unrecorded into the gap between criminology and history and must be estimated

<sup>74</sup> I.e. areas remote from the recording system accessed for information on the matter. Chaka's wars of conquest (1819-1828) between the Zulu and a range of Bantu tribal foes are shown in the COW database as a single non-state war with 60,000 deaths, whereas the two British-Xhosa wars (1848-52) with under 11,000 deaths in total are shown as two wars.

<sup>75</sup> Morris, I., (2013) *The Measure of Civilisation. How Social Development decides the fate of nations*. London: Profile Books, p.14, p.333.

<sup>76</sup> Pinker, S. (2011) *The Better Angels of Our Nature* op. cit.

<sup>77</sup> Pinker, S. (2018) *Enlightenment Now: the case for reason, science, humanism and progress*. London: Allen Lane.

mathematically.<sup>78</sup> This is unfortunate since the deaths caused by tribal wars and raids are likely to fall in this range.

Over the 3,100-year period of this study (1250 BCE-1850 CE), there was thus probably a minimum of 10,000 wars worldwide, though the minimum might be as high as 15,000. The number of wars, however, is not perfect evidence of the number of interactions which result in war, much less the number of all interactions (whether they result in war or not). While a single interaction can generate several wars (e.g. the three Punic Wars of Rome in the period 264-146 BCE or the eight wars between white settlers and the Xhosa in southern Africa in the early nineteenth century), not all interactions lead to war, with some being addressed through other methods both violent and non-violent. If one assumes that multi-war interactions and non-war interactions balance each other (which they may not), there were likewise probably more than 10,000 GIPPs world-wide, and possibly more than 15,000. Since the area of the current study includes about 91% of the world population in 1CE, the default assumption is that probably 91% of the world's GIPPs lie within its limits – say between 9,100 to 13,700 GIPPs, or a point estimate of perhaps 11,400 GIPPs.

From a database containing more than 3,000 references to the place of peoples, some 1,581 population movements (with 574 attacks and migrations) have been identified in Europe and the Near East in the period 2000 BCE-2000 CE.<sup>79</sup> As this part of the world contained about one third of the world's population in 1CE,<sup>80</sup> it may be estimated by simple extrapolation that worldwide there were 4,700 movements, and 1,700 “attacks and migration”. Adjusting for the extent and duration of this study's period, there may be about 3,300 movements and 1,200 “attacks and migration” (total 4,500) that lie with the broad bounds of the study area. These numbers are not inconsistent with the estimate of conflict numbers, given that population movement and migration (often, but by no means always, associated with nomads) are frequently contributors to interaction, although they are not by any means the sole contributors.<sup>81</sup>

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<sup>78</sup> Pinker, S (2011) *The Better Angels of Our Nature* pp. 266-267.

<sup>79</sup> Sokal, R., Oden, N., Walker, J. D. G. D. and Thomson, B. (2012) 'Historical Population Movements in Europe influence Genetic relationships on Modern samples', *Human Biology*, 84(5), p. 581.

<sup>80</sup> McEvedy, C. and Jones, R. (1985) *Atlas of World Population History*. Harmondsworth: Penguin.

<sup>81</sup> Movement of non-nomadic peoples seems to be quite common. It may be noted that in a small non-random sample of 41 nations in Europe, North Africa and the Near or Middle East during the pre-medieval period, a brief description mentions nomadism 5 times (12%), climate change 3 times (7%) but migration 14 times (34%). Given the estimate of 11,400 GIPPs and 3,300 movements (29%), these results are broadly consistent. Numbers are derived from analysis of Matyszak, P. (2020) *Forgotten Peoples of the Ancient World*. London: Thames and Hudson..

Raiding is not easy to quantify.<sup>82</sup> However, in the period 493-626 (133 years), forty-five raids i.e. about one raid every three years,<sup>83</sup> were recorded in the Balkans of which roughly half involved nomad peoples (see Table E2.2).<sup>84</sup> It is also estimated by the same source that in the period 376-1064, groups of peoples arrived in the Pontic-Danubian area on average every twenty years. These numbers contrast with *haiduk* incidents of brigandage in the seventeenth century in one area of Yugoslavia, where a minimum of 250 incidents were recorded in 78 years,<sup>85</sup> i.e. 3.2 incidents per annum.<sup>86</sup> Controlling for duration and population size, substantial raids are approximately nine times as frequent as migrations, and small-scale brigandage is about one hundred times as frequent as raids. Though the level of death and damage inflicted is probably proportionately greater in each of the bigger events, the sheer number of minor incidents may result in more damage in total. Such raids can vary considerably in size. The modern traveller Thesiger records one raid by six nomadic Arabian tribesmen that killed three herders, and another raid with more than two hundred riders.<sup>87</sup>

| Type                    | Period               | Space         | Frequency per annum | Frequency per 100,000 population |                           |
|-------------------------|----------------------|---------------|---------------------|----------------------------------|---------------------------|
|                         |                      |               |                     | Frequency                        | Based to Migration = 1.00 |
| Migration               | 376-1064 (688 years) | Pontic-Danube | 0.05                | 0.0010                           | 1.00                      |
| Raids                   | 493-626 (133 years)  | Balkans       | 0.34                | 0.0083                           | 8.64                      |
| <i>Haiduk</i> incidents | 1630-1708 (78 years) | Bitola        | 3.21                | 0.8528                           | 885.08                    |

**Table E2.2 Relative frequency of migrations, raids and brigandage in south-eastern Europe**  
Source: Batty (2007)

Applying these ratios to the estimate of 4,500 migrations suggests that there may have been 40,000 raids and 34,400,000 brigandage incidents within the scope of the study (on the fairly weak assumption that the Balkans and part of Yugoslavia can be regarded as typical of the world). Thus, there may have been 11,400 GIPPs or wars, 40,000 raids and 34,400,000 brigandage incidents in the period of the study. All these population estimates are of a size that precludes any benefit from the application of statistical finite population corrections.

<sup>82</sup> Grigg, E. (2018) *Warfare, Raiding and Defence in Early Medieval Britain*. Marlborough: Robert Hale, p.113.

<sup>83</sup> Some of the characteristics of a raid are: short duration, known route, safe return estimated, no families involved, no unnecessary vehicles, limited numbers, suitable transport (horses for short distances, or boats) and specific targets. Batty, R. (2007) *Rome and the Nomads: the Pontic-Danubian realm in Antiquity*. Oxford: Oxford University Press, p.23.

<sup>84</sup> Batty, R. (2007) *Rome and the Nomads* op. cit. Table 3.1.

<sup>85</sup> Batty, R. (2007) *Rome and the Nomads* op. cit. p.167.

<sup>86</sup> Batty, R. (2007) *Rome and the Nomads* op. cit. Table 3.1.

<sup>87</sup> Thesiger, W. (2007) *Arabian Sands*. London: Penguin Classics pp.66-67.



## CHAPTER 3. NOMADISM AND HOLY WAR

### 3.1 INTRODUCTION

The two types of conflict on which this study focuses are those involving nomads and holy war. It is appropriate therefore to consider the characteristics of nomadism and holy war in some detail. As noted in 2.1 above, given the broad range of issues addressed by this study, and that inform the statistical analysis in later chapters, other aspects of the literature are better explored in their specific context, rather than in a single review that would threaten to become unwieldy. Consequently, this chapter similarly provides a review of relevant literature. It will also consider issues of data management, where appropriate. The intention is to develop an understanding of the field, identifying key issues and developing appropriate definitions for use in data capture and analysis, relating to nomadism and to holy war. With a study area extending from the Yellow Sea to the River Senegal over a period of around three thousand years, there is ample scope for examples to be adduced. Subsequent chapters will address topics such as climate and agriculture, population and power, religion and culture, economics, warfare, leaders, history and modelling.<sup>1</sup>

This chapter will examine:

|   |  |
|---|--|
| Nature of nomadism:                         | It is necessary carefully to define the term 'nomadism' and to elucidate some of the variations that may be covered by it.   |
| Relationship of Nomad and Sedentary Groups: | Of particular concern is the relationship between nomadic groups and their sedentary neighbours.                             |
| Holy War:                                   | The term 'holy war' requires careful definition.   |
| <i>Jihad</i> :                              | One particular form of holy war is the Islamic 'jihad'. This is defined and examples cited.                                  |
| Crusade:                                    | Another form of holy war is the Christian 'crusade'. This is also defined and examples cited.                                |
| Nomad Allies and Multiple Attacks:          | This Excursus briefly examines circumstances where interactions cease to be tidily characterizable as nomadic vs. sedentary. |

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<sup>1</sup> This follows the general approach, and many of the specific topics, in Saunder's introduction to the Mongol Conquests. See Saunders, J. (2001) *The History of the Mongol Conquests*. Philadelphia: University of Pennsylvania Press pp. 9-14.

Impact on Effectiveness of Holy War      This Excursus looks at a possible estimate of the impact of holy war on the effectiveness of armies.

### 3.2 NATURE OF NOMADISM

The ongoing nature of the conflict between sedentary and nomad is, as noted by Arabic historian Ibn Khaldun (b.1332, d.1406) and his successors, shaped by the nomadic life style,<sup>2</sup> which is itself an adaption to social and environmental conditions.<sup>3</sup> Contemporary scholars, such as Salzman or Palmer *et al.*, distinguish between pastoralism (using sometimes widely dispersed or geographically extensive natural pasture to feed animals) and nomadism (moving home base and household from place to place on a regular basis).<sup>4</sup> Of the two groups, nomads are less easy to detect and trace,<sup>5</sup> but there exists of course a not-infrequent overlap in terms of these characteristics, though certainly not all nomads are pastoralists and not all pastoralists are nomads. As Gibbon noted (see Chapter 1) there are wandering hunters, and in fact there are also wandering cultivators. He also remarked that, “*The connection between the people and their territory is so frail that it may be broken by the slightest accident. The camp and not the soil is the native country of the genuine Tartar.*”<sup>6</sup>

Furthermore, even given that not all pastoralists are nomads, the fact that animals are mobile and plants are not, means that the pastoralist lifestyle tends to involve more movement than cultivation and this may thereby generate definitional problems. Khazanov thus identifies a wide range of pastoral life styles, from full nomadism as practised in high inner Asia, the Eurasian steppes, Arabia and the Sahara, to semi-nomadism (where agriculture forms a part of life for the group or an associated group), to semi-sedentary, herdsman-husbandry and transhumance

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<sup>2</sup> Gellner, E. (1994) 'Foreword', in Khazanov, A. (ed.) *Nomads and the Outside World*. 2nd ed. London: University of Wisconsin Press, p.ix.

<sup>3</sup> Hole, F. (2009) 'Pastoral Mobility as an Adaption', in Szuchman, J. (ed.) *Nomads, Tribes, and the State in the Ancient Near East: Cross Disciplinary Perspectives*. Oriental Institute Seminars No 5 ed. Chicago: Oriental Institute of the University of Chicago, p.261.

<sup>4</sup> Salzman, P. C. (2004) *Pastoralists: Equality, Hierarchy and the State*. Oxford: Westview Press; Palmer, Carol, Gilbertson, David, el-Rishi, Hwedi, Hunt, Chris, Grattan John, McLaren, Sue, Pyatt, Brian (2007) 'The Wadi Faynan Landscape Today: Landscape, Environment, People', in Barker, G., Gilbertson, D. & Mattingly, D. (eds.) *Archaeology and Desertification: The Wadi Faynan Landscape Survey, Southern Jordan*. Oxford: Council for British Research in the Levant & Oxbow Books, pp. 25-58, p.38.

<sup>5</sup> It can be argued that archaeology privileges place over movement and that “The deserts of the Middle East, like the steppes of Central Asia, are criss-crossed by invisible lines of nomadic movement”. Thus nomadic peoples are hard to detect. Faulkner, N. (2020) “The archaeology of movement” *World Archaeology*, 102, 65.

<sup>6</sup> Quoted in Ure, J. (2002) *In Search of Nomads: An English obsession from Hester Stanhope to Bruce Chatwin*. London: Constable & Robinson, p.127.

practices, and sedentary animal husbandry.<sup>7</sup> Many of the sources of friction between sedentary and nomadic peoples are, however, very similar regardless of the precise circumstances of the nomads.<sup>8</sup> For the purposes of this study, nomads are taken to be full or semi-nomads with no fixed place of residence, although a given people may not be universally nomadic. Pure nomadism demands total dependence on herds and mobility, hence the comment of Lattimore, a twentieth century traveller in Mongolia, that “a pure nomad is a poor nomad”.<sup>9</sup> Pollock notes that transhumance in early Iran was an important alternative to nomadism<sup>10</sup>.

Ian Morris notes that meat has a lower energy density than grains.<sup>11</sup> This technical detail, combined with the fact that consumption of meat places the consumer at a higher (and hence less efficient) trophic level in the food chain, means that nomad land requirements are considerably greater than arable needs, a long-identified issue.<sup>12</sup> It takes the pasturage needed to feed two mares to produce koumiss (fermented milk) with a calorific value of 2,000 calories per day, for example.<sup>13</sup> Diamond shows that hunter-gatherers occupy land at 2 persons per square kilometre (Chatham Island), whereas farmers number 11 per square kilometre (North Island New Zealand).<sup>14</sup> According to the data of Murdock and Wilson,<sup>15</sup> about 60% of hunter-gatherer societies live at under 0.1 persons per square kilometre, compared with about 80% of pastoralist societies living at less than 2 persons per square kilometre. By contrast, 82% of arable societies exceed 2 persons per square kilometre. In general, pastoralism is more efficient in its use of land than hunting, but less efficient than arable cultivation, for the purpose of supporting more dense populations.<sup>16</sup> Population density is accordingly likely to be a relevant factor in the analysis undertaken in this study.

Taking specific examples, Ausenda reports that while a group of agrarian Hausa immigrants settled in eastern Sudan extracts 23% more produce per area than a neighbouring group of

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<sup>7</sup> Khazanov, A. (1994) *Nomads and the Outside World*. 2nd edn. London: University of Wisconsin Press, pp.19-25.

<sup>8</sup> For instance, the disruption caused by the passage of a herd of sheep through a field of crops is the same, whether they are driven by transhumants on the way between seasonal pastures or nomads following an annual circuit.

<sup>9</sup> See Ure, J. (2002) *In Search of Nomads: An English obsession from Hester Stanhope to Bruce Chatwin*. London: Constable & Robinson, p.152.

<sup>10</sup> Pollock, S. (2009) '19. Scales, Difference and Mobility', *Ancient Iran and its Neighbours: Local Developments and Long-Range Interactions in the Fourth Millennium BC*, Oxford: Oxbow Books, pp.379-383.

<sup>11</sup> For details, see Merrill, A. L. and Watt, B. K. (1955) *Energy Value of Foods: Basis and Value*. Washington: US Department of Agriculture.

<sup>12</sup> Morris, I. (2013) *The Measure of Civilisation. How Social Development Decides the Fate of Nations*. London: Profile Books, p.70. Also see Malthus, T.R., (2008) *An Essay on the Principle of Population* Oxford, Oxford World Classics.

<sup>13</sup> Lane, G. (2006) *Daily Life in the Mongol Empire*. Indianapolis: Hackett Publishing Company Inc, p.133.

<sup>14</sup> Diamond, J. (1998) *Guns, Germs and Steel: A Short History of Everybody for the Last 13,000 Years*. London: Vintage, p.61.

<sup>15</sup> Murdock, G. and Wilson, S. (1972) 'Settlement Pattern and Organisation', *Ethnology*, (11),254.

<sup>16</sup> This assumes, of course, that it is possible to cultivate the area at all.

nomad agro-pastoral Hadendowa, the Hausa physical activity level is higher and their need for energy input in excess of the requirements of the Basic Metabolic Rate is 53% higher than levels among the Hadendowa.<sup>17</sup> In other words, the Hausa's additional cost for securing additional benefits, over and above simple survival, is 24% higher than the cost to the Hadendowa for those additional benefits secured. Although the Hausa get considerably more in absolute terms, it requires a disproportionate increase in effort. This suggests that accessing the sedentary surplus after its production, may be a more cost-effective method of securing a supply for nomads than producing it themselves. Access to agricultural products may be secured through trade, raiding or collection of tribute so that "raids are our agriculture", according to a Bedouin saying.<sup>18</sup>

Forde devotes four chapters of his seminal study *Habitat, Economy and Society*,<sup>19</sup> to pastoral nomads, dealing with tribes<sup>20</sup> of cattle herders (Masai in East Africa),<sup>21</sup> camel herders (Badawin of North Arabia), horse and sheep herders (Kazak, Kirghiz and Kalmuck in Central Asia) and reindeer herders (northern Tungus of Siberia).<sup>22</sup> Today, the Masai number well below one million and they are not mounted, with the tsetse fly in damp areas and low grass yields more generally impeding them from becoming mounted. The Tungus are few in numbers (about 20,000 in total), also with restricted access to horses and they inhabit a low energy capture environment, with a widely dispersed population. Their overall capability for responding forcefully to sedentary peoples in cases of conflict is thus limited.

Forde suggests that nomads in Arabia number less than 1,000,000. The Ruwala tribe numbers 3,500 tents, part of the northern 'Anaza who number 20,000 tents and half a million camels in total. Saidel estimates that the Bedouin have on average 6 people per tent.<sup>23</sup> At 6 persons and about 25 camels per tent, the Ruwala have about 21,000 people and 87,500 camels. Since the

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<sup>17</sup> Ausenda, G. (2003) 'Efficiency and Effectiveness: A Comparison Between Settled Agriculturalists and Semi-Nomadic Agro-pastoralists in Eastern Sudan', in Ausenda, G. (ed.) *On Effectiveness*. Woodbridge: The Boydell Press, pp. 177-218.

<sup>18</sup> See Ure, J. (2002) *In Search of Nomads: An English obsession from Hester Stanhope to Bruce Chatwin*. London: Constable & Robinson, p.222.

<sup>19</sup> Forde, D. (1934) *Habitat, Economy and Society*. London: Methuen & Co.

<sup>20</sup> 'Tribal' is often not a term of approbation. For an example, see Haigh, A. (2015) 'Journeying with Cuthbert – a Call to Prayer', *Caim Northumbria Community Newsletter*, (Issue 75, winter 2015), p. 2.

<sup>21</sup> There are other African nomads, see Azarya, V. (2001) 'The Nomadic factor in Africa: Dominance or Marginality', in Khazanov, A. & Wink, A. (eds.) *Nomads in the Sedentary World*. Abingdon: Routledge, p. 250.

<sup>22</sup> See also Bacon, E. (1954) 'Types of Pastoral Nomadism in Central and Southwest Asia', *Southwestern Journal of Anthropology*, Vol. 10(No. 1 (Spring, 1954)), p. 44.

<sup>23</sup> Saidel, B. (2009) 'Pitching camp: ethno archaeological investigation of inhabited tent camps in the Wadi Hisma, Jordan', in Szuchman, J. (ed.) *Nomads, Tribes, and the State in the Ancient Near East: Cross Disciplinary Perspectives Oriental Institute Seminars No 5*. Chicago: Oriental Institute of the University of Chicago.

Ruwala occupy 275,200 square kilometres, this is approximately 0.08 persons per square kilometre, just about 4 percent of the population density estimated for temperate hunter-gatherers. Palmer *et al.* provide estimates of 50 to 200 families for tribes in southern Jordan in the early 20<sup>th</sup> Century.<sup>24</sup> As regards the steppes of Central Asia, Forde notes that the Kazak, Kirghiz and Kalmuck raise horses, cattle and sheep. The Kirghiz number a million, rather less than the Kazak and winter storms are the principal risk to herds. The Kalmuck in 19<sup>th</sup> century in Russian territory numbered 40-50,000 in seven tribes [6-7,000 average].<sup>25</sup> Such a small group is unlikely to develop much power in isolation.

The wealth and power that can be generated by a pastoral nomadic lifestyle is dependent on the number and kind of animals kept. This in turn is governed by the climate and terrain of the land available. Lyublyanovics (writing in the context of Cumans in Hungary, but the comments are of general application) suggests that:

“The animal-based nomad economy operates in cycles. And though a temporary balance is possible, it is extremely vulnerable to droughts, animal disease, extreme weather, the availability of appropriate pastures, trade opportunities with the settled population, or drying up of water resources... This situation led to a high level of instability where secondary countermeasures had to be established: not only primitive forms of agriculture, but also the practise of raiding and requesting tribute.”<sup>26</sup>

Any land that can be used for arable agriculture can be used for pastoral purposes, but if good reliable yields can be obtained from arable agriculture, the energy returns will far exceed those available from pastoral methods. On the other hand, dry, cold or mountainous lands simply cannot be depended upon for good reliable arable yields, and pastoral systems may well offer safer prospects. The colder or drier the climate is, the more that the balance shifts to pastoralism. The choice of agricultural system is a matter of risk management.

The kind of animals available to the pastoralist is relevant here. As Ibn Khaldun points out, sheepmen do not venture deep into the desert,<sup>27</sup> while Bedouin can go deeper with the camel, which is much better adapted to arid conditions (e.g. rain in Qatar averages under 80mm per annum, against potential loss of 2200mm evaporation p.a.).<sup>28</sup> The risk for sheep herders from

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<sup>24</sup> Palmer *et al.*, (2007) 'The Wadi Faynan Landscape', *op. cit.* p.47.

<sup>25</sup> Forde, D. (1934) *Habitat, Economy and Society* *op. cit.*

<sup>26</sup> Lyublyanovics, K. (2017) *New Home, New Herds: Cuman integration and animal husbandry in medieval Hungary from an archaeozoological perspective*. Oxford: Archaeopress Publishing Limited p.18.

<sup>27</sup> Ibn Khaldun, Dawood, T. and Lawrence, B. (2015) *The Muqaddimah: an introduction to History*. Translated by: Rosenthal, F. Oxford: Princeton University Press, p.92.

<sup>28</sup> Macumber, P. (2016) 'The Islamic occupation of Qatar in the context of an Environmental Framework', in McPhilips,

venturing deep into the desert is too great. Palmer *et al.* note that camel nomads are the most prestigious of the various nomadic groups after their appearance in the late 2<sup>nd</sup> Millennium BCE.<sup>29</sup> Animals such as cattle and horses need more water and richer pasture, which reduces their range compared to sheep. Khazanov gives the grazing radius of sheep as 20 miles in cool weather, watering every 4-5 days, or 10-12 miles in warm weather, watering every day.<sup>30</sup> By contrast, camels drink every 8-10 days in warm weather. Daily water demands (litres per day) are 10-30 for humans, 15-20 for camels and 2-5 for sheep or goats, with an average daily journey of 20 kilometres.<sup>31</sup> Horses are kept for war and prestige in the hot desert. In locations such as the southern highlands of Transjordan, few horses are visible to the archaeological record, which also shows a decline of cattle over time with an associated increase in goats.<sup>32</sup> In cooler areas, the horse becomes important for other purposes, whether draught or ridden,<sup>33</sup> and in cooler parts of the Asian continental heartland, such as Mongolia, extreme variations in temperature can occur in a single day and the annual range is -40 to 100 °F. There is a short growing season, and availability of water is key in summer.<sup>34</sup> An annual autumn slaughter of herds is required to ensure that the remaining animals can survive the winter.

As regards lifestyle among historical nomad groups, there seems a longstanding general pattern to the nomadic groups described by chroniclers, although this may be because people living in similar situations live in similar ways, or at least, because they are perceived in similar ways. For instance, the fourth century Roman writer Ammianus Marcellinus describes the Huns and Alans of the western Eurasian steppe in broadly the same terms,<sup>35</sup> though the mobility and bows of the former are regarded as major reasons for their effectiveness in war. His description of the Saracens is similar, but the details tend to suggest to the reader that Saracens are hunters rather than herdsmen.<sup>36</sup>

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S. & Wordsworth, P. (eds.) *Landscapes of the Islamic World: Archaeology, History and Ethnography*. Philadelphia: University Press of Pennsylvania, pp. 34-49.

<sup>29</sup> Palmer et al, (2007) 'The Wadi Faynan Landscape' op. cit.

<sup>30</sup> Khazanov, A. (2009) 'Specific characteristics of chalcolithic and bronze age pastoralism in the Near East', in Szuchman, J. (ed.) *Nomads, Tribes, and the State in the Ancient Near East: Cross Disciplinary Perspectives Oriental Institute Seminars No 5*. Chicago: Oriental Institute of the University of Chicago.

<sup>31</sup> Bartl, E. (2016) 'Water Management in Desert Regions: Early Islamic Qasr Mushah', in McPhillips, S. & Wordsworth, P. (eds.) *Landscapes of the Islamic World: Archaeology, History and Ethnography*. Philadelphia: University Press of Pennsylvania, pp. 50-68, Table 3.1

<sup>32</sup> Brown, R. (2016) 'Faunal Distribution from the Southern Uplands of Transjordan: Regional and Historical Perspectives on the Representation and Roles of Animals in the Middle Islamic period', in McPhillips, S. & Wordsworth, P. (eds.) *Landscapes of the Islamic World: Archaeology, History and Ethnography*. Philadelphia: University Press of Pennsylvania, pp. 71-93.

<sup>33</sup> Khazanov, (1994), *Nomads and the Outside World* op.cit pp.91-92.

<sup>34</sup> McLynn, F. (2016) *Genghis Khan: The man who conquered the world*. London: Vintage, pp.4-5.

<sup>35</sup> Ammianus Marcellinus and Wallace-Hadrill, A. (1986) *The Later Roman Empire (AD354-378)*. Translated by: Hamilton, W. Harmondsworth: Penguin, p.411.

<sup>36</sup> Most nomad and pastoral groups have a range of economic activities on which to call. That the Saracens were

Sneath argues that steppe society was stratified for much of its history, though neither territorialised,<sup>37</sup> nor centralised as states are frequently conceptualised.<sup>38</sup> Wealth and coercion form a part of developing stratification and unifying polities. Pastoral society offers as many possibilities to accumulate wealth as sedentary society does, and for the Vedic peoples of central Asia and India, battle and the desire for cattle could be equated. Hume notes that “One of the Sanskrit words for ‘battle’ is *gavisti*, the precise etymology of which is ‘desire for cattle’.”<sup>39</sup> The Arabs used very similar words for goats and sheep (*ghanam*) and for plunder, booty or loot (*ghanimah*), suggesting a linkage of animals and raiding.<sup>40</sup>

Given that coercion may be needed to maintain a polity, this is only possible within a pastoral nomad community when the would-be coercers are just as mobile as the pastoral nomads that they are seeking to control, and can thus pursue them over great distances). The coercers need access to whatever animals are used by their target for travel. Even so, the relative ease with which parts of the nomad community can secede from even a nomad ruler leaves would be coercers at a disadvantage.<sup>41</sup>

Furthermore, achieving the step from chief to king is not particularly easy in a society of powerful nobles, who may not co-operate in the elevation of their peer to power over themselves. The situation with regard to this process of polity (or indeed, state) formation is complex.<sup>42</sup> Different cultural areas have different attitudes to the matter.<sup>43</sup> The risk of state failure, which is today regarded by western rulers and scholars as a very serious issue,<sup>44</sup> probably

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hunters did not rule out pastoralism. Salzman, P. C. (2004) *Pastoralists: Equality, Hierarchy and the State*. Oxford: Westview Press, p.33.

<sup>37</sup> Now a matter of importance. See Elden, S. (2013) *The Birth of Territory*. Chicago: University of Chicago Press.

<sup>38</sup> Sneath, D. (2007) *The Headless State: aristocratic orders, kinship society and misrepresentations of nomadic Inner Asia* Columbia University Press New York.

<sup>39</sup> See Hume, R. E. (1916) 'Hinduism and War', *The American Journal of Theology*, 20(1), pp. 31-44; also Griffith, B. (2001) *The Garden of Their Dreams: Desertification and Culture in World History*. Halifax Canada: Fernwood Publishing Ltd Zed Books, p.139.

<sup>40</sup> Mackintosh-Smith, T. (2019) *Arabs: a 3,000-year history of peoples, tribes and empire*. New Haven: Yale University Press, p.62.

<sup>41</sup> Salzman, P. C. (2004) *Pastoralists: Equality, Hierarchy and the State*. Oxford: Westview Press, pp. 93-95.

<sup>42</sup> Honeychurch, W. (2014) 'Alternative Complexities: The Archaeology of Pastoral Nomad States', *Journal of Archaeological Research*, 22, pp. 277-326. Kradin, N. (2008) 'Early State Theory and the Evolution of Pastoral Nomads', *Social Evolution & History*, 7(1), pp. 107-130.

<sup>43</sup> Patai, R. (1998) 'The Cultural Areas of the Middle East', in Weissleder, L. (ed.) *The Nomadic alternative: Modes and Models of Interaction in the African-Asian deserts and steppes*. Hague: Mouton Publishers, p. 3.

<sup>44</sup> Howard, T. (2016) *Failed States and the Origins of Violence: A Comparative Analysis of State Failure as a Root Cause of Terrorism and Political Violence*. Abingdon. Electronic: Routledge. Also see Milliken, J. and Krause, K. (2002) 'State Failure, State Collapse, and State Reconstruction: Concepts, Lessons and Strategies', *Development and Change*, 33(5), p. 753.

seemed less severe to many of those involved in the process.<sup>45</sup> A great many peoples, sedentary as well as nomadic, have been less than properly enthusiastic and grateful for the benefits (in the opinion of state rulers) of being ruled by a state.<sup>46</sup>

### 3.3 RELATIONSHIP OF NOMAD AND SEDENTARY

A major part of nomadic life is their relationship with their sedentary neighbours, which in the last fifty years have been studied by scholars such as Barth<sup>47</sup> and others. This has been addressed in very broad terms, linking a range of issues such as desertification, culture, religion and the role of women through their alignment to nomadism and sedentarism.<sup>48</sup> There is much variation at finer level. Khazanov suggests that nomads have a number of modes of adaption for dealing with their sedentary neighbours, including sedentarization itself,<sup>49</sup> trade in goods like horses, sheep, meat, grain and iron or mediatory trade (carrying goods such as silk and spices between sedentaries).<sup>50</sup>

Another option was submission and taking on military service obligations (enabling some access to the concomitant plunder), although nomads choosing this option frequently proved unreliable, especially when pitted against other nomads, which was often the reason for hiring them in the first place (see Excursus E3 below). Lyublyanovics quotes the Arab writer al-Jahiz on the Turks of ninth century Inner Asia:

“so the Turks are nomads, dwellers in the wilderness and owners of beasts ...all their interest is in raids and incursions and hunting and riding and the fights of warriors and seeking for plunder and subduing countries.”<sup>51</sup>

Similarly, “the notion of Jihad ...resulted in practice, in raids and military expansion, and this was fairly attractive to Bedouin”.<sup>52</sup> This was part of an alternative approach to nomad-sedentary

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<sup>45</sup> Leonardo, F. and Borg, S. (2014) 'The Lure of State Failure', *Interventions*, 16(6), p. 877.

<sup>46</sup> See Scott, J. (2009) *The Art of Not Being Governed An Anarchist history of Upland Southeast Asia*. New Haven: Yale University Press.

<sup>47</sup> Barth, F. (1972) 'Ethnic Processes on the Pathan-Baluch Boundary', in Gumperz, J. & Hymes, D. (eds.) *Directions in Sociolinguistics: The Ethnography of Communication*. New York: Holt Rinehart and Winston, p. 454.

<sup>48</sup> See, for instance, the approach of Griffith, B. (2001) *The Garden of Their Dreams* op. cit.

<sup>49</sup> This did not always work out, as when a Pecheneg leader reverted to raiding the Byzantines. See Kaldellis, A. (2019) *Romanland: Ethnicity and Empire in Byzantium*. Cambridge, Massachusetts: The Belknap Press of Harvard University Press, p.153.

<sup>50</sup> Khazanov, 1994, *Nomads and the Outside World* op.cit pp.198-227.

<sup>51</sup> Lyublyanovics, K. (2017) *New Home, New Herds: Cuman integration and animal husbandry in medieval Hungary from an archaeozoological perspective*. Oxford: Archaeopress Publishing Limited p.18.

<sup>52</sup> Khazanov, (1994), *Nomads and the Outside World* ibid. p.216.



relations of subjugation through raids, extortion and protection, and finally conquest, taking pillage, tribute, taxation and rent. Palmer *et al.* note how Jordanian nomads levied the *khawa* ('brotherhood tax') of grain on sedentary villagers.<sup>53</sup> The linear defences often erected by sedentary societies did not work particularly well against nomads.<sup>54</sup>

In general, however, Khazanov regards the nomads' culture as economically dependent on sedentaries (discussed further below), although there was considerable nomad influence on sedentaries in the matter of mounted warfare.<sup>55</sup> Many conquests were, in his view, not a cause but a consequence of sedentary states' weakness, and he notes the readiness of nomads to adopt sedentary practice such as *iqta*.<sup>56</sup> Another aspect of the nomad response is a willingness to accept an urban experience in order to consume goods, combined with a willingness to revert to nomadism or to retreat in face of stronger forces. A willingness to engage in the construction and use of fortification is an important issue in this approach, since fortifications must be garrisoned and form a focus for military operations that limit the mobility of both attackers and defenders.<sup>57</sup>

Sinor suggests that sedentary peoples were often victors in conflict, but seldom by force, and that the nomadic peoples of Inner Asia were usually the aggressor.<sup>58</sup> Sedentary people, whether Chinese, Roman or Byzantine, saw nomads as insatiable but poor, for Inner Asia was too cold and too dry for a thriving agriculture. There was subsistence available in tundra and small nomadic communities were possible in the taiga (about 300-700 people in the 16<sup>th</sup> century), while the steppe had more capacity for population. He notes that the horse was critical in trade, whether used in barter for goods or to take the goods in war. Invading nomads either were absorbed by the conquered society or else imposed an "inferior" civilisation of their own. The hot desert has low productivity, which forces their inhabitants to ensure that they have access to goods produced by their sedentary neighbours, which is not necessarily easy, because

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<sup>53</sup> Palmer et al, (2007) 'The Wadi Faynan Landscape' op. cit.

<sup>54</sup> Shaw, B.D. (1995) 'Fear and loathing: the nomad menace and Roman Africa', in Shaw, B.D. (ed.) *Ruler, Nomads and Christians in Roman North Africa Variorum*. Aldershot: Ashgate Publishing, pp. 25-46.

<sup>55</sup> Khazanov, A. (2001) 'Nomads in the History of the Sedentary World', in Khazanov, A. & Wink, A. (eds.) *Nomads in the Sedentary World*. Abingdon: Routledge, p. 1.

<sup>56</sup> *Itqa* is the Muslim system for the allocation of tax revenues gathered in a particular location to the support of a specified soldier.

<sup>57</sup> Thomas, D. & Gascoigne, A. (2016) 'The Architectural Legacy of the Seasonally Nomadic Ghurids 1148-125', in McPhillips, S. & Wordsworth, P. (eds.) *Landscapes of the Islamic World: Archaeology, History and Ethnography*. Philadelphia: University Press of Pennsylvania, pp. 169-183.

<sup>58</sup> Sinor, D. (1990a) 'Introduction: the concept of Inner Asia', in Sinor, D. (ed.) *The Cambridge History of Early Inner Asia*. Cambridge: Cambridge University Press, p.3, p.10, p.13

Bedouin from the desert have often been characterised by their neighbours as rash, reckless, disloyal to any (excepting their tribes) and treacherous.<sup>59</sup>

Kuznar and Sedlmeyer suggest that *“It is possible that there are underlying, but competing, forces that tip pastoral/agricultural systems into different states of raiding and trading.”*<sup>60</sup> They argue that pastoral nomadism as an economic specialization exists only in conjunction with sedentary agricultural societies, on whom the nomads depend for grain and other goods. Pastoralism is volatile, for livestock holdings vary yearly as they are exposed to environmental hazards like drought, disease, or snow, and social risks such as raiding and theft. Pastoral nomads mitigate risks by maximizing the size of their herds and they have a military pre-adaptation through vigilance, mobility and familiarity with weapons, from hunting and guarding flocks. Thus pastoral/peasant interaction varies from raiding to extortion to trading, based on the relative military and political strengths of nomads and villagers. It has been argued that the lifestyle circumstances of pastoralists can promote the development of personality traits and behaviours that include aggression, use of violence, and capacity to suffer physical hardship, although Khazanov is sceptical of this view of nomads as cold-blooded slaughterers.<sup>61</sup>

The writings of the fourteenth century historian Ibn Khaldun provide evidence on the relationship of nomad to sedentary, for the historian distinguishes between desert and sedentary groups, suggesting that

“Civilisation may be either desert (Bedouin) civilisation found in outlying regions and mountains, in hamlets (near) pastures in waste regions and on the fringe of sandy deserts, or it may be sedentary civilisation as found in cities, villages, towns and small communities that serve the purpose of protection and fortification by means of walls.”<sup>62</sup>

It is not clear whether in the desert civilisation, ‘protection and fortification’ are achieved by means other than walls, or achieved not at all. On the other hand, *“‘sedentary people’ means the inhabitants of cities and countries, some of whom adopt the crafts... while others adopt commerce”* and *“Both Bedouins and sedentary people are natural groups”*.<sup>63</sup> Ibn Khaldun thus draws a distinction between urban sedentary and rural desert. Some desert people are clearly

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<sup>59</sup> Schenk, J. G. (2017) '“New Wars” and Medieval Warfare: some terminological considerations', *Journal of Medieval Military History*, XV, pp. 149-161.

<sup>60</sup> Kuznar, L. and Sedlmeyer, R. (2005) 'Collective Violence in Darfur: An Agent-based Model of Pastoral Nomad/Sedentary Peasant Interaction', *Mathematical Anthropology and Cultural Theory*, 1(4), p. 1.

<sup>61</sup> Khazanov, A., (2001) 'Nomads in the History of the Sedentary World' op. cit.

<sup>62</sup> Ibn Khaldun et al. (2015) *The Muqaddimah* op.cit. p.43.

<sup>63</sup> Ibn Khaldun et al. (2015) *The Muqaddimah* op.cit., p.43.

to be regarded as sedentary by modern usage, for “Some people live by agriculture ... others by animal husbandry. ...Those who live by agriculture and animal husbandry cannot avoid the call of the desert ...it is necessary for them to restrict themselves to the desert.”<sup>64</sup> In consequence, “The inhabitants of the desert ...use tents of hair and wool or houses of wood or clay and stone houses...”<sup>65</sup> and “For those who make their living through the cultivation of grain and through agriculture, it is better to be stationary.”<sup>66</sup> Many, but not all Berbers are in this group.

Khazanov suggests that pastoral nomads are dependent on sedentary peoples in many ways.<sup>67</sup> The precise distinction between nomadism and transhumance may be hard to make for contemporaries,<sup>68</sup> (for example, mountain dwelling groups such as the Albanians of the Balkans have been described (possibly accurately) as nomads by the medieval Byzantine writer Chalkokondyles).<sup>69</sup> Braudel notes that mountains served as a refuge from soldiers and pirates, being apart from civilisation, with slow penetration of religion, and where the practice of transhumance rather than full nomadism prevailed.<sup>70</sup> He comments that mountains were ignored by Arabs from Maghrib to Syria. Where the division of nomad and sedentary was based on climate and power relations rather than terrain, the frontier could move. Ritner draws attention to the way the frontier between nomad and sedentary peoples in the Negev was not stable in the long-term.<sup>71</sup> It migrated back and forth, reaching furthest south (i.e. against the nomads) in the Byzantine and early Islamic period.

A problematic aspect of the interaction of nomad and sedentary peoples is the role of the state, and this is addressed by many scholars. Scott, writing of south east Asia, sets sedentary *padi*<sup>72</sup> states in contrast to those many groups who do not wish to be ruled,<sup>73</sup> (rather than those who

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<sup>64</sup> Ibn Khaldun et al. (2015) *The Muqaddimah* op.cit., p.91.

<sup>65</sup> Ibn Khaldun et al. (2015) *The Muqaddimah* op.cit., p.92.

<sup>66</sup> Ibn Khaldun et al. (2015) *The Muqaddimah* op.cit., p.92.

<sup>67</sup> Khazanov, A., (2001) 'Nomads in the History of the Sedentary World' op. cit.

<sup>68</sup> It was also likely beyond the concerns of many contemporary authors to make such a distinction. Either way, this complicates the job of historians in making categorizing distinctions for historical peoples that are based on such evidence.

<sup>69</sup> Chalkokondyles, L. (2014) *The Histories Vol I, Books 1-5*. Translated by: Kaldellis, A. Cambridge, Massachusetts, Harvard University Press, p. 347. *The Histories Vol II, Books 6-10*. Translated by: Kaldellis, A. Cambridge, Massachusetts, Harvard University Press, p. 213.

<sup>70</sup> Braudel, F. and Ollard, R. (1992) *The Mediterranean and the Mediterranean World in the Age of Philip II*. Translated by: Reynold, S. London: BCA, p.8, p.11, p.62.

Braudel, F. (1993) *A History of Civilisations*. Translated by: Mayne, R. London: Penguin.

<sup>71</sup> Ritner, R. (2009) 'Egypt and the vanishing Libyan: institutional responses to a nomadic people', in Szuchman, J. (ed.) *Nomads, Tribes, and the State in the Ancient Near East: Cross Disciplinary Perspectives Oriental Institute Seminars No 5*. Chicago: Oriental Institute of the University of Chicago, p. 43.

<sup>72</sup> Padi states are states of south-east Asia, largely situated in lowlands and dependent on irrigated padi rice for food.

<sup>73</sup> Scott, J. (2009) *The Art of Not Being Governed: an Anarchist history of Upland Southeast Asia*. New Haven: Yale University Press, p.184.

wish to rule).<sup>74</sup> Hills provide one of those peripheral areas, along with forest, swamp, deserts, where nomadic peoples can be more successful, for mobility serves as one of the principal means of evading authority, and mobility is hard for the grain-grower to achieve.<sup>75</sup> Szuchman highlights the problems encountered in defining and elucidating the relationship of nomad, tribe and state in the ancient Near East.<sup>76</sup> As noted in the discussion of Forde's work above, tribes are rarely large by sedentary population standards, which impacts on their power both to establish their own state, and to resist the authority of an external state. Kaldellis notes the perception among the Byzantines, a sedentary people, that nomads, such as the Huns, lacked a law-based polity, but might develop one on settling, as the Ephthalitai Huns had done.<sup>77</sup> Khazanov suggests that pressures from large sedentary states impel nomads to combine into their own states for defence and then, potentially, conquest.<sup>78</sup> Barfield concurs that nomad states developed in response to the pressure of neighbouring sedentary states, and suggests that an imperial confederacy proved the most effective method.<sup>79</sup> He suggests that steppe rulers are particularly vulnerable to loss of their accumulated wealth (which impacts on their ability to build up and rule their polity) since their wealth, drawn from their people, is held as animals, which must be pastured and herded in order to retain their value, rather than being held over considerable periods with relatively little need for care, as grain stored in granaries. Given the importance of terrain, economics and social structure, some allowance must be made for these factors in the analyses presented later (Chapter 12).

Khazanov identifies varying levels of mingling of peoples and other interactions after conquest, beginning with vassal tribute paid by sedentaries living side by side with nomads, with increasing sedentarization of nomads (e.g. the establishment of semi-permanent settlements evolving into permanent towns for purposes of trade and rule). While the steppe empires certainly carried on significant interactions with sedentary states, the complexity of internal social organisation, economic systems and trade led to a far more dynamic cultural sphere within the empires themselves. In the 1250s, Karakorum was compared by William of Rubruck to a large French village although it was at that time the imperial capital of a vast empire, part of a pattern of

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<sup>74</sup> Scott, J. (1998) *Seeing Like a State: How certain schemes to improve the human condition have failed*. New Haven: Yale University Press.

<sup>75</sup> Scott, J. C. (2017) *Against the Grain: a Deep History of the Earliest States*. New Haven: Yale University Press.

<sup>76</sup> Szuchman, J. (2009) 'Integrating approaches to Nomads, Tribes and the State in the Ancient Near East', in Szuchman, J. (ed.) *Nomads, Tribes, and the State in the Ancient Near East: Cross Disciplinary Perspectives Oriental Institute Seminars No 5*. Chicago: Oriental Institute of the University of Chicago, pp. 1.

<sup>77</sup> Kaldellis, A. (2015) *The Byzantine Republic: People and Power in New Rome*. Cambridge, Massachusetts: Harvard University Press, pp.65-67.

<sup>78</sup> Khazanov, (1994), *Nomads and the Outside World* op.cit. pp.228-302.

<sup>79</sup> Barfield, T. (1989) *The Perilous Frontier: Nomadic Empires and China*. Oxford: Basil Blackwell, pp.7,45.

steppe empire development that integrated nomadic ideals with the requirements of imperial administration and strategies of control.<sup>80</sup>

This leads to an integration, of nomads and sedentaries, that is at first partial and then proceeds to varying degrees of completeness. Even structures strongly associated with sedentary culture, such as long-walls,<sup>81</sup> could be constructed in the steppe area, by dynasties of nomadic origin such as the Liao, probably not so much for military purposes as for control of nomadic peoples.<sup>82</sup> Associated with this is a loss of distinctive nomad culture and military superiority. This pattern of assimilation has become a trope to be found in literature including even science fiction novels detailing contact between historical cultures.<sup>83</sup>

On the other side of the nomad-sedentary divide, Wink notes the impact of nomads on sedentary societies,<sup>84</sup> and shows how the usual military superiority of nomads led to sedentary states attempting to establish mamluk armies.<sup>85</sup> These armies consisted of slaves of nomad origin who were regarded as being of particular military worth (their children, born and raised away from the steppes, were deemed of less military value). This trend had political implications as noted by Blaydes and Chaney.<sup>86</sup> Sinor draws attention to the wider tendency of sedentary individuals to look to “*a government which – the individuals are led to believe – is alone capable of protecting them against the dangers lurking in the Outer Darkness and threatening to despoil them of the labours of their toil*”.<sup>87</sup> This contrasts with the reluctance of nomads to accept the compulsory protection of the state.

### 3.4 HOLY WAR

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<sup>80</sup> Rogers, J.D., Ulambayar, E., & Gallon, M. (2005) 'Urban centres and the emergence of empires in Eastern Inner Asia' *Antiquity* 79 (2005): 801–818.

<sup>81</sup> Long-walls: extended walls constructed cross-country for defence and/or to regulate movement.

<sup>82</sup> Shelach-Lavi, G., Wachtel, I., Golan, D., Batzorig, O., Amartuvshin, C., Ellenblum, R. & Honeychurch, W. (2020) 'Medieval long-wall construction on the Mongolian Steppe during the eleventh to thirteenth centuries AD' *Antiquity* Vol. 94 (375): 724–741.

<sup>83</sup> For example: Harrison, H. (1973) *Deathworld 3*. London: Sphere Books Limited, pp.154-155, focussing on Rome, China and Huns.

<sup>84</sup> Wink, A. (2001a) 'Conclusion', in Khazanov, A. & Wink, A. (eds.) *Nomads in the Sedentary World*. Abingdon: Routledge, pp. 285.

<sup>85</sup> Wink, A. (2001b) 'India and the Turko-Mongol frontier', in Khazanov, A. & Wink, A. (eds.) *Nomads in the Sedentary World*. Abingdon: Routledge, p. 211.

<sup>86</sup> Blaydes, L. and Chaney, E. (2013) 'The Feudal Revolution and Europe's Rise: Political Divergence of the Christian West and the Muslim World before 1500 CE', *American Political Science Review*, 107(No. 1 February 2013), pp. 16.

<sup>87</sup> Sinor, (1990a), 'Introduction: the concept of Inner Asia' op. cit. p.17.

Warlike response to the menace of the outsider can take a religious form. Societies such as the Aztecs may shape their warfare to match their religious beliefs, or like the Assyrians, may regard their warfare as mandated by their gods.<sup>88</sup> Buddhist monks have justified military action on religious grounds, while the initial Jewish occupation of Canaan was expressed in religious terms and Jewish revolts against various overlords mostly had a religious aspect. The concept of the holy war, a war which was, at least notionally, organised specifically for religious reasons is strongly associated with the Islamic *jihad* and the Christian crusade. Regrettably, there is no single word that subsumes *jihad*, crusade and the less formally defined circumstances. Sometimes, in seeking to describe less formal situations, chroniclers, historiographers and historians have assumed that the behaviour of others has been shaped by religious attitudes akin to their own attitudes, an approach which may be viewed with some caution,<sup>89</sup> but the existence of a formal public movement that people are asked to join is certainly a strong marker of something with a claim to be considered a “holy war”. The motives of those establishing the movement and those joining it are another matter. It is possible for nomadic/sedentary issues (e.g. contention over resources) to become involved,<sup>90</sup> and indeed Tibble argues that this was a major driver in the crusades.<sup>91</sup> It is worth noting that for the Byzantines, however, nomads could not make proper Christians, which would seem to reduce their crusading potential.<sup>92</sup>

As was noted in Section 1.4, crusades and *jihads* do not proceed solely from purely religious motives. This could be quite explicit, as attested within a twelfth century invitation to a crusade against the Wends, which included a statement that “*this is an occasion for you to save your souls and, if you wish it, to acquire the best land on which to live*”.<sup>93</sup> Christiansen suggests that

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<sup>88</sup> This allowed the king to present himself as simply implementing the punishment imposed by the god. The god was expected to provide guidance before battle and assistance in battle, but would take a share in the spoils. See Kang, S.-M., (1989) *Divine War in the Old Testament and in the Ancient Near East*. Berlin: Walter de Gruyter. Such attitude was not unknown among pagan princes throughout the Medieval period considering conversion to Christianity (see Kotecki, R., Jensen, C., Selch and Bennett, S. (2021) 'Christianity and War in Medieval East Central Europe and Scandinavia: An Introduction', in Kotecki, R., Jensen, C., Selch and Bennett, S. (eds.) *Christianity and War in Medieval East Central Europe and Scandinavia*. Leeds: ARC Humanities Press, pp. 1-24). The divine assistance offered in battle seems consistent with fogs, storms (particularly thunderstorms and convectional rainstorms) or *in extremis*, meteor strikes. The events described for 1111, during a Rus' campaign against the Polovtsi, though attributed to an angel by the chronicler, could well be a meteor strike (See Kotecki, R. (2021) 'Pious Rulers, Princely Clerics and Angels of Light "Imperial Holy War" Imagery in Twelfth Century Poland and Rus', in Kotecki, R., Jensen, C., Selch and Bennett, S. (eds.) *Christianity and War in Medieval East Central Europe and Scandinavia*. Leeds: ARC Humanities Press, pp. 159-188. Such events occurring at a battle could reasonably be expected to shape the outcome, although ensuring the correct outcome might be problematic.

<sup>89</sup> Making windows into men's souls (as Queen Elizabeth I of England reputedly described matters) is problematic, at best.

<sup>90</sup> Lewis, A. (1988) *Nomads and Crusaders A.D. 1000-1368*. Bloomington: Indiana University Press.

<sup>91</sup> Tibble, S. (2018) *The Crusader Armies 1099-1187*. London: Yale University Press.

<sup>92</sup> Kaldellis, A. (2013) *Ethnography after Antiquity: Foreign Land and Peoples in Byzantine Literature*. Philadelphia: University of Pennsylvania Press, p.58.

<sup>93</sup> Fletcher, R. (1997) *The Conversion of Europe from Paganism to Christianity 371-1386AD*. London: HarperCollins,

“There is little point in trying to distinguish between crusades undertaken for pure or spiritual motives and those that were political, papalist, perverted or corrupt in aim, execution or effect”<sup>94</sup>. In one sense, this is certainly true.<sup>95</sup> For the purpose of the analyses presented later in this thesis, seeking to generate a categorical variable with the twin values of “true crusade” with pure spiritual motives as against “false crusade” with mixed motives is indeed probably futile, since all crusades would fall in the latter category. On the other hand, these two categories may be regarded as the two extreme values of a continuous variable that measure the degree of mixture of the two. This view provides a theoretical underpinning that can be tested numerically to a certain extent. It is possible to assign all notional crusades the same numerical value, and examine the impact on analysis if subsequent adjustment is made to the value, reflecting a perceived variation in the level of spiritual commitment, from one crusade to another. The same may be done with *jihads*. This was taken into account in the analysis of Chapter 12.

Although *jihad* and crusade seem very similar in concept, so that they may be helpfully compared,<sup>96</sup> in fact they relate to their originating religion in markedly different ways and Brundage suggests that there is a lack of evidence to demonstrate that the one developed from the other in any way, though both have may have arisen from deeper common roots,<sup>97</sup> and one may trigger the other,<sup>98</sup> yet in light of the difference between the two styles of holy war, which should be explored in greater depth, it may be that they cannot be subsumed into one variable.

### 3.5 JIHAD

Byzantine writers present the Saracens as nomads leading beastly lives.<sup>99</sup> Watt suggests that the majority of the pre-Islamic Arabian population were nomadic, and practicing *razzia*, marauding expeditions for camels, goats and possibly women.<sup>100</sup> According to Gibbon, Arabs were regarded as robbers.<sup>101</sup> Muhammad directed about 90 *razzias* against Meccan caravans while at Medina.

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pp. 486-487

<sup>94</sup> Christiansen, E. (1997) *The Northern Crusades*. London: Penguin, p.260.

<sup>95</sup> For instance, there were at least five motivations attributed by chroniclers of the time to the conquest of 12-13<sup>th</sup> century Yemen by the Ayyūbids, of which religion, though certainly the most common reason given, was just one. Smith, G. R. (1978) *The Ayyūbids and Early Rasūlids in the Yemen (567-694/1173-1295) Volume 2 A study of Ibn Hātim's Kitāb al-Simṭ including glossary, geographical and tribal indices and maps*. (2 vols). London: Trustees of the “E.J.W. Gibb Memorial” pp.32-35.

<sup>96</sup> Lambert, M. (2016) *Crusade and Jihad: Origins, History and Aftermath*. London: Profile Books.

<sup>97</sup> Brundage, J. (1976) 'Holy War and the Medieval Lawyers', in Murphy, T. (ed.) *The Holy War*. Columbus: Ohio State University Press, p. 99.

<sup>98</sup> Waterson, J. (2010) *Sacred Swords: Jihad in the Holy Land 1097-1291*. Barnsley: Frontline Books.

<sup>99</sup> Kaldellis, A. (2013), *Ethnography after Antiquity* op. cit. p.63.

<sup>100</sup> Watt, W. (1976) 'Islamic conceptions of the Holy War', in Murphy, T. (ed.) *The Holy War*. Columbus: Ohio State University Press, p.141.

<sup>101</sup> As Gibbon remarks (Book I, Chapter VII, p.212) of a Roman emperor: “Philip ... was an Arab by birth and consequently ... a robber by profession”.

*Jihad* might be 'striving' in a personal sense, but there was a linkage between *razzia* and the survival of Islam. By 732, after a century of conquest, there was federation of the Arabic tribes with Arabs in general outside Arabia being treated as a military aristocracy by their leaders and their subjects.

Finer, however, regards Islam as a religion founded by town dwellers and pre-supposing urban ways.<sup>102</sup> He suggests that the town was the focus of Islamization and Arabization and the creation of Islamic situations. The Koran states "*The Arabs of the desert [e.g. the Bedouin] declare 'We are true believers.' Say 'You are not. Rather say "We profess Islam," for faith has not found its way into your hearts'.*"<sup>103</sup> It further states "*The desert Arabs surpass the town-dwellers in unbelief and hypocrisy and have more cause to be ignorant of the laws ... Some desert Arabs regard what they give for the cause of Allah as a compulsory fine and wait for some misfortune to befall you. May ill-fortune befall them!*"<sup>104</sup> Bedouin were and still are unpopular and marginalised, and Finer suggests that "*the Bedouin were universally detested as the very worst offscourings of society*",<sup>105</sup> putting forward the suggestion that one of the reasons for the failure of the Zanj<sup>106</sup> rebellion against the caliphate in Iraq during the ninth century was the fact that the Zanj had received some Bedouin support, alienating other potential supporters. Goodwin refers to "*the warlike and lawless bedouin who needed much but had little to sell to the townsfolk who despised them as much as they feared them*".<sup>107</sup> The Arab historian Khalifa records a comment in 683 "*You are a rough uncivilised Bedouin,*"<sup>108</sup> though not all contemporary commentators were negative, with Ibn Khaldun referring to the moral superiority of Bedouin.<sup>109</sup> The fact that the Bedouin were on the whole not regarded as good Muslims, or indeed good people, by their Arab neighbours, does not in any case mean that they were unenthusiastic practitioners of *jihad*.

Smaldone suggests that the Islamic theory of holy war held that

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<sup>102</sup> Finer, S. (1999b) *The History of Government From the Earliest Times III Empires, Monarchies and the Modern State*. Oxford: Oxford University Press p.681.

<sup>103</sup> *Koran* (1974) Translated by: Dawood, N. Harmondsworth: Penguin. Sura 49, verse 14, p.275.

<sup>104</sup> *Koran*, (1974) op.cit. Sura 9, verse 97-98.

<sup>105</sup> Finer, (1999b), *History of Government* op. cit. p.701.

<sup>106</sup> The Zanj were slaves from East Africa set to cultivate Mesopotamian estates in appalling conditions. They revolted.

<sup>107</sup> Goodwin, G. (2006) *The Janissaries*. London: Saqi, p.126.

<sup>108</sup> Whether the comment was a fair depiction of the views of the speaker (Muslim b 'Uqba-al-Murri, of whom Khalifa also remarks "may God not have mercy on him, and may He curse him", in 683) or simply a total fabrication, it was clearly thought to be something that someone might say. See Hoyland, R. (2014) *Khalifa ibn Khayyat's History on the Umayyid Dynasty (660—750)*. Translated by: Wurzel, C. Liverpool: Liverpool University Press, p.110.

<sup>109</sup> Ibn Khaldun (1958) *The Muqaddimah: Volume I*. New York: Bollingen Foundation, p.94.



“It was the solemn duty of the caliph, as head of the Islamic state, to wage holy war (*jihad*) incessantly by all permissible and practical means until *dar al-Islam* embraced the whole world. *Jihad* was thus conceived as a state of permanent war, to be prosecuted by psychological and political means when military hostilities were suspended because of overriding strategic considerations.”<sup>110</sup>

War was thereby obligatory in defence of the frontiers,<sup>111</sup> against polytheists or pagans, apostates, dissenters, deserters and highway robbers, and Scripturaries.<sup>112</sup> As already noted, booty was important. One fifth went to the treasury, the rest to the warriors with cavalry getting triple that of infantry, two thirds being for the care and maintenance of the horse. Roberts suggests that “*The state was called into being to bring belief to areas where unbelief existed. Warfare thus lay at the very foundation of the ideology of state power because it justified the state’s existence*”.<sup>113</sup> Katbi quotes the comment of the seventh century caliph Umar bin al-Khattab that “*if you become clustered on the land, you will leave the jihad*”.<sup>114</sup> Umar was here expressing reluctance to divide the land between fighters for fear that they would lose interest in the fight.

Islam was, however, soon divided. Messier, in describing the view of *jihad* among the Almoravids of the Maghreb in the eleventh century CE, says that *jihad* firstly comprised a struggle to attain and uphold a true understanding of Islam; secondly involved fighting non-believer desert tribesmen who obstructed the spread of this; thirdly involved overthrowing bad Muslims; and fourthly meant facing the Christian infidel.<sup>115</sup> Fromherz, concerning the Almohads, twelfth century successors to the Almoravids, suggests a similar view, quoting their leader Ibn Tumart as saying “*God will throw out the fear in your hearts and inflame them*” and “*apply yourselves in jihad against the veiled infidels [Almoravids] for this is more important than combating the Christians and all the infidels twice or even more*”.<sup>116</sup> This was also the view of Sunni mullahs in Khorasan. The Shia were regarded as worse than unbelievers, and hence more appropriate targets for *jihad*.<sup>117</sup>

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<sup>110</sup> Smaldone, J. (1977) *Warfare in the Sokoto Caliphate: Historical and sociological perspectives*. Cambridge: Cambridge University Press, p.69.

<sup>111</sup> For example, when water-borne Rus’ raiders attacked the southern Caspian town of Bardha’a in 943, the governor of the town called for volunteers to wage *jihad*. Jarman, C. (2021) *River Kings: a new history of the Vikings from Scandinavia to the Silk Roads*. London: William Collins., p.279

<sup>112</sup> i.e. Christians and Jews with scriptures deemed inspired by God.

<sup>113</sup> Roberts, R. (1987) *Warriors, Merchants, and Slaves: The State and the Economy in the Middle Niger Valley, 1700-1914*. Stanford: Stanford University Press, p.89.

<sup>114</sup> Katbi, G. (2010) *Islamic Land Tax – Al-Kharaj from the Islamic Conquests to the Abbasid Period*. Translated by: Ali, R. London: Centre for Arab Unity Studies & IB Tauris Publishers pp.12-13.

<sup>115</sup> Messier, R. (2010) *The Almoravids and the Meanings of Jihad*. Santa Barbara: Praeger, p. xiv.

<sup>116</sup> Fromherz, A. (2013) *The Almohads: The rise of an Islamic Empire*. London: I.B. Tauris, p.64, p.84.

<sup>117</sup> Howorth, H. H. (1880) *History of the Mongols from the 9th to the 19th Century: Part II The So-called Tartars of Russia and Central Asia Division 2*. London: Longman, Green and Co, p.734.

On the other hand, while some of the nomads, such as the Berber Almoravids, had a concern with *jihad*, others had a much more restricted interest in religious practice. Peacock and Yildiz refer to the limited level of disagreement with Köprülü's model of eleventh century Turkish intrusion into Iran by Turkish nobles leading bands of migrating nomadic Turkmen whose religion was mostly shamanism under a thin veneer of Islam.<sup>118</sup> The Seljuk call to the Turkmen for *jihad* was necessarily more strongly orientated to plunder than to faith.<sup>119</sup> East suggests that the Fulani in the eighteenth and nineteenth century were amenable to *jihad* in west Africa because they were a coherent populace with few feuds, living at a distance from the peasant population from whom they were separated by the nomad vs. peasant divide, and they initially faced weak states.<sup>120</sup> The nearby Touareg, though also Islamic and nomadic, were involved in their own complex civil wars, and hence were less amenable to be recruited to a *jihad*.<sup>121</sup>

### 3.6 CRUSADE

The crusade was a much later development in Christianity than the *jihad* was in Islam.<sup>122</sup> Brundage notes the problem of reconciling war with the Christian ethic, though certainly not all Christians were pacifist.<sup>123</sup> In fact, Riley-Smith draws attention to the violence in France after collapse of central (Carolingian) authority in the face of invasions.<sup>124</sup> There were laws in war, for example the crossbow and ballista were outlawed in war against other Christians (but not non-Christians), implying an acceptance of war in the Christian world.

Riley-Smith suggests that the change from reluctant acceptance of war to active promotion of it in some contexts first started to come in the reign of Gregory VII (1073-85). Pope Gregory encouraged south French nobles to assist Aragon against the Muslims as the Spanish kingdoms pursued the *Reconquista*.<sup>125</sup> Gregory was also pope when news started to reach the west of the catastrophic defeat of the Byzantines by the invading Seljuk Turks at Manzikert in 1071. In the

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<sup>118</sup> Peacock, A. and Yildiz, S. (2015) 'Introduction', in Peacock, A. & Yildiz, S. (eds.) *The Seljuks of Anatolia Court and Society in the Medieval Middle East*. London: IB Tauris, pp.10-11.

<sup>119</sup> Peacock, A. (2010) *Early Seljuq History: a new interpretation*. Abingdon: Routledge, p.61.

<sup>120</sup> East, M. (1967) *The Sokoto Caliphate*. London: Longmans, p.lxxxi.

<sup>121</sup> Clearly, this is an example where the rule that "one size fits all" is not appropriate.

<sup>122</sup> Cowdrey, H. (1976) 'The Genesis of the Crusades: The Springs of Western Ideas of Holy War', in Murphy, T. (ed.) *The Holy War*. Columbus: Ohio State University Press, p.9.

<sup>123</sup> Brundage, J. (1976) 'Holy War and the Medieval Lawyers', in Murphy, T. (ed.) *The Holy War*. Columbus: Ohio State University Press, pp. 99.

<sup>124</sup> Riley-Smith, J. (1995) *The First Crusade and the Idea of crusading*. London: The Athlone Press, p.3.

<sup>125</sup> Lewis, A. (1988) *Nomads and Crusaders A.D. 1000-1368*. Bloomington: Indiana University Press, p.98.

1090s, the Byzantine emperor Alexius wrote to Pope Urban II, asking for 1,000 Latin mercenary knights to help in his struggle against the Turks.<sup>126</sup> Urban's response of 1095-96 at Clermont was a synthesis of holy war, pilgrimage and indulgence in support of Alexius.<sup>127</sup> It was accompanied by cries of "*Deus vult*" (God wills it) from his audience. Eleventh century Christians had a somewhat obsessive attitude to Jerusalem and the Holy Land. With their vision of Christians (a people) in Christendom (a land),<sup>128</sup> it was easy to present them with the concept of Jerusalem as Christ's personal possession,<sup>129</sup> now under threat from the Turks who had captured the city in the same year as the battle of Manzikert.<sup>130</sup>

Crusades were authorised by the Pope, a major difference from *jihad*,<sup>131</sup> although keeping control of events could prove difficult,<sup>132</sup> even though crusaders swore an oath that placed them under the jurisdiction of the church.<sup>133</sup> The call to crusade was delegated to skilled preachers such as Dominican friars who were not always at one with the local secular or monastic clergy, particularly as regards deployment of funds raised.<sup>134</sup> This was a new style of war, God's war rather than simply a just war (*ius bellum*), though that war was then conducted in the style of any other. Profit was an explicit motivation in crusades as well as *jihads* (as noted in the discussion above of "false crusade" and "true crusade"). A crusader slogan at the Battle of Dorylaeum was "*Stand fast together, trusting in Christ and the victory of the Holy Cross. Today may we all gain much booty*".<sup>135</sup>

The Papal role in Crusades did not ease the relationship of Crusaders with Eastern Orthodox churches which did not recognise Papal supremacy. Given that the rite of baptism tended to secure prior right to ecclesiastical taxation of the pagans concerned, the Baltic lands could become an arena for competition between Roman and Orthodox, although the Orthodox Rus'

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<sup>126</sup> Lewis, A. (1988), *Nomads and Crusaders A.D, 1000-1358* op. cit. p.99.

<sup>127</sup> Riley-Smith, J. (1995), *The First Crusade* op. cit. p.1.

<sup>128</sup> Bartlett, R. (1993) *The making of Europe: Conquest, Colonisation and Cultural Change BCA London 1993*. London: BCA, p.250.

<sup>129</sup> Riley-Smith, J. (1995), *The First Crusade* op. cit. p.196.

<sup>130</sup> Runciman, S. (1965a) *A History of the Crusades Volume 1 The First Crusade*. Harmondsworth: Peregrine, pp.75.

<sup>131</sup> Riley-Smith, J. (1995), *The First Crusade* op. cit. p.15.

<sup>132</sup> For example, Valdemar of Denmark was censured by Rome for going on pilgrimage to Jerusalem in 1346 without permission. Rawson, A. (2015) *A clash of thrones: the power-crazed medieval kings, popes and emperors of Europe*. Stroud: The History Press, p.46.

<sup>133</sup> Tyerman, C. (2015) *How to Plan a Crusade: Reason and Religious War in the High Middle Ages*. London: Allan Lane, p. 30.

<sup>134</sup> Jakobsen, J. (2021) 'Preachers of War: Dominican Friars as Promoters of the Crusades in the Baltic Region in the Thirteenth Century', in Kotecki, R., Jensen, C., Selch and Bennett, S. (eds.) *Christianity and War in Medieval East Central Europe and Scandinavia*. Leeds: ARC Humanities Press, pp. 97-116.

<sup>135</sup> Lambert, M. (2016) *God's Armies: Crusade and Jihad: Origins, History, Aftermath*. New York Pegasus Books, p.84.

response to Germans and Christian neighbours tended to be less adverse than their response to their nomad and pagan neighbours.<sup>136</sup>

The mainstream of Crusades was notionally directed towards the Holy Land, although sometimes they acquired an (occasionally, extremely) indirect approach. The 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> Crusades were fought on the way to and in Palestine. The 4<sup>th</sup> Crusade was diverted to Constantinople on the grounds of securing resources for the main attack, and went no further.<sup>137</sup> The 5<sup>th</sup> and 6<sup>th</sup> Crusades were directed to Egypt on the (probably well-based) supposition that Muslim rulers would gladly exchange a major Egyptian city for Jerusalem,<sup>138</sup> and the 7<sup>th</sup> Crusade against Tunis was formally intended to gather resources for an attack on Egypt to secure a bargaining counter for Jerusalem.

Crusades could become extremely political. The 3<sup>rd</sup> Crusade was hampered by the rivalries of the Kings of France and England; the Venetians manipulated the 4<sup>th</sup> Crusade to capture Constantinople, and the 7<sup>th</sup> Crusade, if successful, would have supported the ambitions of the King of France's brother, Charles of Anjou in the western Mediterranean.<sup>139</sup> Another example of the period (not included in the database) is the crusade of Frederick II in 1227-1229. The emperor was excommunicated by the Pope, but went on crusade anyway and successfully negotiated the return of Jerusalem from the Ayyubids. This was reviled by his Christian enemies, for it was achieved in defiance of the Pope and not through the warfare of a "proper" crusade. Morillo suggests that the emperor, having grown up in Sicily, saw war with Arabs in intracultural terms, in which diplomatic arrangements were wholly acceptable, while the pope, viewing both parties as subcultural demons, did not (see Chapter 5.4 for definition of the cultural terms).<sup>140</sup> In a crusade, negotiations were perhaps acceptable as the end to the war, after fighting had secured a victory, but they were not an alternative to the war.

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<sup>136</sup> In the thirteenth and fourteenth centuries, the Russian chroniclers described Mongols, Cumans and often Lithuanians as "godless", "damned", "pagan", "lawless" and "spiller of Christian blood". See Selart, A. (2021) 'Orthodox Responses to the Baltic Crusades', in Kotecki, R., Jensen, C., Selch and Bennett, S. (eds.) *Christianity and War in Medieval East Central Europe and Scandinavia*. Leeds: ARC Humanities Press, pp. 263-284.

<sup>137</sup> In the early twelfth century, Paschal II had supported the attack of Bohemond on the Byzantines by proclaiming a holy war, but this had not triggered a full crusade. See Comnena, A. (1969) *Alexiad of Anna Comnena*. Translated by: Sewter, R. Harmondsworth: Penguin, p. 390.

<sup>138</sup> Joinville, J. (1969) 'The Life of St Louis', in Shaw, M. (ed.) *Chronicles of the Crusades*. Harmondsworth: Penguin Books Ltd, pp.161-353.

<sup>139</sup> For details, see, for example, Runciman's history of the Crusades:

Runciman, S. (1965a) *A History of the Crusades Volume 1 The First Crusade*. Harmondsworth: Peregrine; Runciman, S. (1965b); *A History of the Crusades Volume 2 The Kingdom of Jerusalem*. Harmondsworth: Peregrine; Runciman, S. (1965c) *A History of the Crusades Volume 3 The Kingdom of Acre*. Harmondsworth: Peregrine.

<sup>140</sup> Morillo, S (2006) "A General Typology of Transcultural Wars – The Early Middle Ages and Beyond" in *Transcultural Wars from the Middle Ages to the 21<sup>st</sup> Century*, ed Kortum, H-H., Berlin, Akademie Verlag pp.29-42.

There were also crusades in the Baltic (see Chapter 9.7) and as mentioned above, other crusades were directed against the Moors in Spain, to assist the *Reconquista*, but the majority had the Holy Land as their ultimate objective. Other crusades were also directed towards heretics such as the Albigenses of Languedoc and Hussites of Bohemia.

The Albigensian crusade (1209-1244) was started by Pope Innocent III hoping to deal with Count Raymond VI of Toulouse, whose attitude to the church in general and heretics in particular, was not considered satisfactory. It was thus in the first phases (1208-18), a crusade that started with an individual nobleman as its target, although Count Raymond had to be allowed later to join a crusade that had been largely directed originally against himself.<sup>141</sup> The Pope, paralleling the attitude of Ibn Tumart to *jihad*, used the words: “*Attack the followers of heresy more fiercely even than the Saracens – since they are more evil - with a strong hand and an outstretched arm*”.<sup>142</sup> The war began with the sack of Beziers, reputedly justified by the infamous dictum “*Kill them all, God will know his own*”.<sup>143</sup> Within a few years, the crusade was being opposed by a monarch who had just repelled a Muslim invasion of Iberia.<sup>144</sup> After the death of the crusade’s leader, the campaign developed into a conquest of Languedoc by the King of France (1218-1229), through a long and ultimately successful series of sieges waged by *routier* mercenaries, who were suited to the immediate tactical task, if not to the ostensible broader strategic purpose of the enterprise. Following this, there then proceeded the suppression of the Cathar heresy by the Inquisition (1229-1244)<sup>145</sup>

The Hussite crusades in Bohemia (1419-36) were rooted in theology but largely guided by ethnic tensions between Germans and Slavs, and by political manoeuvres within the context of the Holy Roman Empire, with battles dominated by innovative Hussite technology and tactics implemented by soldiers with high morale, inspired by religious belief. Arguably, it was the Hussites, rather than the crusaders, who were waging holy war.<sup>146</sup>

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<sup>141</sup> Barber, M. (2000) *The Cathars: Dualist Heretics in Languedoc in the High Middle Ages*. Harlow: Pearson Education Limited.

<sup>142</sup> Peter of les Vaux de Cernay, Cernay, (2002) *The History of the Albigensian Crusade*. Translated by: Sibly, W. & Sibly, M. Woodbridge: Boydell & Brewer, p. 37.

<sup>143</sup> Attributed to Arnaud Amalric, Abbot of Citeaux. There is debate whether he said the actual words, but they do seem to capture the crusaders’ approach to bystanders. Oldenbourg, Z. (1998) *Massacre at Montségur: A History of the Albigensian Crusade*. Translated by: Green, P. London: Phoenix, p.116.

<sup>144</sup> Peter II of Aragon commanded at Las Navas de Tolosa against the Almohads in 1212 and against the Crusaders at Muret in 1213. See Oldenbourg, Z. (1998) *Massacre at Montségur: (op.cit)* p.159 and following.

<sup>145</sup> Oldenbourg, Z. (1998) *Massacre at Montségur: op.cit* p.1 and p.17.

<sup>146</sup> Verney, V. (2009) *Warrior of God: Jan Zizka and the Hussite Revolution*. Barnsley, Frontline Books.

### 3.7 CONCLUSIONS

It is important to distinguish between terms that are sometimes used interchangeably, but strictly mean different things. Pastoralism is a form of agriculture, while nomadism relates to the movement of the community. Although many pastoralists are (or have been) nomads, many are not. Contemporary writers such as Ibn Khaldun characterise societies as *sedentary* or *desert* but while sedentary societies are, by definition, not nomadic, desert societies include both sedentary and nomadic groups.

The characteristics of a nomad society are largely governed by the animals kept and the climate in which they are kept. Nomadism supports a relatively small population, which has a need for arable products to supplement pastoral goods, and these arable products are expensive in terms of input energy to produce, making it attractive to seek to acquire them by other means. These means include trade, taxation, raids and service. Nomadic communities tend to be much less centralised than sedentary communities, making it difficult for the sedentary state to evolve relationships with their nomadic neighbours that are universally binding.

Conflicts, where one party has a nomadic lifestyle, are demonstrably highly asymmetrical in nature. The two parties conduct their affairs in different ways, and their response to environmental fluctuations is not the same. Any model must be designed to accommodate this difference, taking account of terrain (Chapter 7), climate (Chapter 4), economics (Chapter 6), religion, polity and state structure, social development (Chapter 5) and policy options (Chapter 9). This qualitative review more generally highlights some of the important characteristics of groups involved in nomadism and holy war and the type of conflicts that occurred and ostensibly why, according to the literature.

Holy wars are rarely conducted for a single motive, and the potential profits, political and economic, are usually included in the planning. There is a distinction between *jihad* and crusade. *Jihad* was integral to Islam from the start, whilst the concept of crusade developed much later in Christianity. In both religions, the language of holy war was fiercer in the context of those regarded as heretics rather than unbelievers. Conflicts where one party is pursuing a holy war are thus at least somewhat asymmetrical in nature. One side has an additional motivation, whose nature and strength are both somewhat variable. In his comparison of Mongol and Arab

conquests, Saunders suggests that this can be critical.<sup>147</sup> Chapter 11 on the database contains further details.

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<sup>147</sup> Saunders, J. J. (1977) 'The Nomad as Empire Builder: A Comparison of the Arab and Mongol Conquests', in *Muslims and Mongols: essays on Medieval Asia*. Canterbury: New Zealand: University of Canterbury, pp. 36-60.

### EXCURSUS E3.1 NOMAD ALLIES AND MULTIPLE ATTACKS

As noted in the Chinese Stratagem number 23,<sup>148</sup> “*Befriend a Distant Enemy to attack one nearby. It is known that nations that border each other become friends while nations separated by distance and obstacles make better allies. When you are the strongest in one field, your greatest threat is from the second strongest in your field, not the strongest from another field*”. The historical record contains many instances of this.<sup>149</sup> A nomad ally is particularly useful in coping with both nomad and sedentary enemies, since the allied army combines different skills and strengths that overmatch those of the enemy.<sup>150</sup>

Any ally is, of course, useful. The Avars, although they ultimately failed in the enterprise, substantially enhanced their chances of capturing Constantinople in 626 by allying with the sedentary Persians.<sup>151</sup> It is debateable who serves as whose ally in such circumstances. At the same time, the Emperor Heraclius was seeking to secure the support of the Avars’ Turkish foes against the Persians.

Another way to increase the chances of success is to engage a foe whose attention and strength is dispersed between several foes. Kaldellis attributes much of the failure of the Byzantine empire in the late eleventh century to the inability of the realm to face simultaneously Normans in Italy, Pechenegs in the Balkans and Seljuk Turks in Anatolia.<sup>152</sup>

### EXCURSUS E3.2 IMPACT ON EFFECTIVENESS OF HOLY WAR (CRUSADE OR JIHAD)

The fact of a holy war is easily identified, although the exact intent may vary from conflict to conflict. The impact on morale could be considerable. Expectations were high. The Koran (Sura 8,65, p319)<sup>153</sup> sets forth a divine expectation that a hundred defeat a thousand, mitigated to a

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<sup>148</sup> These are widely cited stratagems of war and policy. See Tung, D. S. and Tung, T. K. (2010) *36 Stratagems Plus: illustrated by International Cases*. British Columbia: Trafford Publishing.

<sup>149</sup> The Byzantines were particularly adept at setting one foe against another. Pohl, W. (2018) *The Avars: a Steppe Empire in Central Europe 567-822*. Ithaca: Cornell University Press, pp.22-23; Comnena, A. (1969) *Alexiad of Anna Comnena*. Translated by: Sewter, R. Harmondsworth: Penguin p.230.

<sup>150</sup> For example, the success of the Emperor Rudolf against Ottokar of Bohemia at the Marchfeld in 1278 may be attributed to the presence of Magyar and Cuman allies whose horse archers, supported by Austrian and Hungarian knights, outmatched the Bohemians. (See Oman, C. (1991a) *A History of the Art of Warfare in the Middle Ages: Volume One 378-1278AD*. London: Greenhill Books, pp.515-526.). The contingent of Cumans probably numbered about 3,000. (See Horváth, A. P. (1989) *Pechenegs, Cumans, lasians: Steppe peoples in Medieval Hungary*. Translated by: Wilkinson, T. Budapest: Corvina p.73).

<sup>151</sup> Pohl, W. (2018), *The Avars* op. cit. pp.296-297.

<sup>152</sup> Kaldellis, A. (2017) *Streams of Gold, Rivers of Blood: The Rise and Fall of Byzantium, 955AD to the First Crusade*. Oxford: Oxford University Press, p.227.

<sup>153</sup> Koran (1974) *Koran*. Translated by: Dawood, N. Harmondsworth: Penguin.



hundred defeating two hundred on account of human weakness, Bamberg (2015) recounts a tale of Khalid Ibn al-Walid in 636 AD during the Arab invasion of Syria, at the Battle of the Yarmuk against the Byzantines (referred to here as 'Romans'), saying "Before the Battle of Yarmuk began, a Muslim soldier said to him as he rode past 'Khalid, the Romans are so many and we are so few.' The commander replied 'No, we are so many and the Romans are so few because we have God on our side.'" <sup>154</sup> A saying by the Arab general Muthanna, who fought in Iraq against the Persians, suggests that "In the time of the Ignorance, a hundred Persians could defeat a thousand Arabs, but now, God be praised, a hundred Arabs can defeat a thousand Persians". Adjusting a little for the numbers that might have produced a drawn fight, this suggests that the Arabs on *jihad* were 121 (rounded to 120) times more effective than they had been before. Although this seems a very extreme enhancement, it does approximate the recorded achievement of the Muslim army at the battle of Badr in 624 against non-Muslim Arabs (see Section 7.2) which equates to a factor of 126. The success of the first Arab conquerors is indisputable and difficult to explain in purely military terms. The success of the First Crusade is likewise much greater than might be expected. It is assumed that the advantage declines as the participants seek to retire to enjoy the benefits and as other factors, such as state politics and organisation, come to the fore.

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<sup>154</sup> Bamberg, C. (2015) 'The Battle of Yarmuk: Arab Conquest AD636', *Military History*, 60 (September), pp. 46.

## CHAPTER 4. CLIMATE AND AGRICULTURE

### 4.1 INTRODUCTION

In pre-modern and pre-industrial societies, agriculture is usually the principal source of energy, and thus the prime source of wealth, as well as providing the food needed for survival in the numbers needed to support large groups. Effectively agriculture is a fundamental basis of social structures, and given that climate and its fluctuations are major drivers of agriculture and its changes, it seems unlikely that the policies adapted by any group towards any other group will totally ignore matters of agriculture and climate. If it is reasonable to expect the factors of climate and agriculture to influence decisions relating to the interaction of groups, along, of course, with other factors, then climate and agriculture need to be taken into account in this study, using appropriate numerical measures. Thus, this chapter includes a review of relevant literature on climate and agriculture that has informed the approach taken to the consideration of these variables in the analyses presented later in the thesis. In the excurses, there is a consideration of appropriate data and its management. This chapter addresses the following issues:

|   |   |
|---|---|
| World Climate:                            | The complexity of world climate is highlighted.   |
| Hydroclimate:<br>Drought and<br>Flooding: | Drought and flooding are of particular significance.  |
| Climate and<br>Geographic<br>Interaction: | Atmospheric conditions can be modified by local geographical factors.                         |
| Climatic Change:                          | Climate does not remain constant over time.   |
| El Niño Southern<br>Oscillation (ENSO):   | The fluctuations of the Southern Ocean Oscillation produce planet-wide variations in weather. |
| Changeability:                            | The degree of variability in weather is also a climatic characteristic.                       |
| Conclusions on<br>Climate:                | Climatic issues are summarised.   |
| Climate and<br>Agriculture:               | The nature of agriculture and its relationship to climate is explored.                        |
| Climate and<br>Pastoralism:               | Pastoralism has a somewhat different relationship to climate                                  |

|   |  |
|---|--|
| Climate, Livestock and Pasture Requirement: | The amount of pasture required to support livestock varies with climate  |
| Conclusions on Agriculture:                 | Agricultural issues are summarised.  |
| Excurses:                                   | These propose measures that may be used to generate data on:<br>Climate Change<br>Drought<br>El Niño Southern Oscillation (ENSO)<br>Climate and Primary Production<br>Available Water, Non-Aridity and Biocapacity |

## 4.2 WORLD CLIMATE

The global climatic system is immensely complex,<sup>1</sup> with many systems interacting with each other at any one time, and large-scale “teleconnections” in operation, so that changes such as the El Niño Southern Oscillation (ENSO), which manifests itself initially in the Pacific off Peru, have detectable effects halfway round the planet, modifying the Indian Ocean Monsoon and the North Atlantic Oscillation. Importantly, the impact of major “modes of internal variability” like ENSO is not always uniform, and can indeed be inherently asymmetrical across space. Thus, for example, in Peru, El Niño causes (or at least strongly predisposes the system to deliver) warming and heavy rain, whilst in the Indian Ocean, it causes cooling and drought. In addition, changes occur in global average conditions over longer (e.g. centennial and greater) time periods, often responding to “external forcing factors” such as fluctuations in energy received through changes in insolation and planetary wobbles in orbit. These may be cyclical or intermittent, and most parts of the world conform over these longer time period; for example, Chu notes that at a millennial scale, China’s climate broadly follows Norway, although with more erratic and shallower movements.<sup>2</sup> Superimposed on these more or less regular and predictable “forcing factors” are more random incidents and short-term events. For instance, Toohey et al describe the climatic and societal impacts of a volcanic “double event” in the Early Middle Ages, when in 536 and 540 an extratropical Northern Hemispheric eruption followed by a major tropical (i.e. low latitude eruption) led to a temperature decline of -2° Centigrade, with attendant significant crop yield reduction in Scandinavia.<sup>3</sup> Indeed, all changes as referenced above are liable to impact on agriculture.

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<sup>1</sup> Barry, R. and Chorley, R. (2001) *Atmosphere, Weather and Climate*. 7th edn. London: Routledge.

<sup>2</sup> Chu, Kho-Chen (1973) ‘A preliminary study of climatic fluctuations during the last five thousand years in China’ *Scientific Sinica Peking* 14 2.

<sup>3</sup> Toohey, M., Kruger, K., Sigl, M., Stordal, F. and Svernsorn, H. (2016) ‘Climatic and societal impacts of a volcanic double event at the dawn of the Middle Ages’, *Climate Change* 136 3-4, pp. 401-412.

### 4.3 HYDROCLIMATE: DROUGHT AND FLOODING

One of the major climatic impacts on agriculture is variation in precipitation which, in combination with underlying vegetation, soil types and geology, can result in extremes such as drought or waterlogging and flood.<sup>4</sup> There are a number of ways to monitor historical changes in precipitation for periods and places where rainfall records (whether quantitative or qualitative) are absent. Of these, natural archives such as tree-rings can provide data from over a wide area and long timespan, with changes in tree-ring widths and densities often primarily controlled by annual growing season weather. Thus the Monsoon Asia Drought Atlas supplies estimates of spring-summer soil moisture levels from 1300 onwards for China, India and South East Asia,<sup>5</sup> while the Old World Drought Atlas gives coverage back to 1 CE, for Europe, the Near East and North Africa.<sup>6</sup> There are certain drawbacks to each of these atlases, not least their differing periods of coverage. Even within a given atlas, the extent of spatial coverage varies with time, according to the availability of sufficient trees, generally becoming more constricted as we progress back in time. Moreover, there is a gap in Iran and Turkestan between the two atlas areas. Nonetheless, they do provide a wide coverage over much of the study region.

### 4.4 CLIMATE AND GEOGRAPHICAL INTERACTIONS

The interactions of climate and other aspects of geography are complex and frequently non-linear, but often important.<sup>7</sup> Mountainous areas have their own climate, driven by the effects of altitude and ruggedness, and this colder and wetter climate impacts on the soils and growing period, hence influencing the productivity of the area, through growth rate and soil moisture

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<sup>4</sup> For instance, increased rainfall in Hungary in the mid fourteenth century led to the spread of waterlogged areas, abandonment of settlements and a switch to cattle husbandry. Ferenczi, L., Laszlovszky, J., Pinke, Z., Szabó, P. and Vadas, A. (2018) 'Long-term Environmental Changes in Medieval Hungary: Changes in Settlement Areas and their Potential Drivers', in Laszlovszky, J., Nagy, B., Szabó, P. and Vadas, A. (eds.) *The Economy of Medieval Hungary*. Leiden: Brill, pp. 39-47. Water-logged areas were frequently important resources for grazing.

<sup>5</sup> Cook, E., R., Anchukaitis, D., Buckley, B., M., D'Arrigo, R., D., Jacoby, G., C., Wright, (2010) 'Asian Monsoon Failure and Megadrought During the Last Millennium', *Science*, 328 (5977), pp. 486-489.

<sup>6</sup> Cook, Edward R., Seager, R., Kushnir, Y., Briffa, K., R., Büntgen, Ulf, Frank, D., Krusic, P., J., Tegel, W., der, v., Schrier, G., Andreu-Hayles, L., Baillie, M., Baittinger, Claudia, Bleicher, N., Bonde, N., Brown, D., Carrer, Marco, Cooper, R., Čufar, K., Dittmar, C., Esper, J., Griggs, C., Gunnarson, B., Günther, B., Gutierrez, E., Haneca, K., Helama, S., Herzig, F., Heussner, Karl-Uwe, Hofmann, J., Janda, P., Kontic, R., Köse, N., Kyncl, T., Levanič, T., Linderholm, H., Manning, S., Melvin, T., M., Miles, D., Neuwirth, Burkhard, Nicolussi, K., Nola, P., Panayotov, Momchil, Popa, I., Rothe, A., Seftigen, K., Seim, Andrea, Svarva, H., Svoboda, M., Thun, T., Timonen, M., Touchan, R., Trotsiuk, V., Trouet, V., Walder, F., Ważny, Tomasz, Wilson, Rob, Zang, (2015) 'Old World megadroughts and pluvials during the Common Era', *Science Advances*, 1(10), pp. e1500561.

<sup>7</sup> Lee, H., Zhang, D., Brecke, P. and Pei, Q. (2015) 'Regional Geographic factors mediate the climate-war relationship in Europe', *British Journal of Interdisciplinary Studies*, 2(1), pp. 1-28.

availability.<sup>8</sup> Arid areas may become desert, but the water supply is a crucial factor. Great rivers such as the Nile, Tigris, Euphrates and Indus may provide opportunities for flood recession agriculture and irrigation, bringing waters to arid areas from mountains and the swamps formed in more humid conditions.

#### **4.5 CLIMATIC CHANGE**

A numerical measure of climate change is helpful to understand regional differences and to assess trends in the environment in which conflicts were conducted. A regional index of annual change has been computed (see Excursus E4.1 for details of how this was done), from a number of proxy indicators of climate, with high values signifying favourable conditions.<sup>9</sup> As Table 4.1 shows, the average index value for the entire period varies from just over 50 (Egypt: 52, China: 53) to approaching 80 (Turkestan: 75, Russia and Mongolia: 76) or above (Pontic Inner Asia – 83). The only regions to show an improvement on average for the entire period in comparison to conditions at the start (set to 100 in 1250 BCE for each region) are the Balkans (130) and Turkestan (109). The rest of Europe, North Africa, Anatolia and the rest of Inner Asia have had relatively small deteriorations with indices ranging from 94 (Iberia) to 98 (Baltic), whereas the areas to the south of this belt had notably larger deteriorations, with indices ranging from 68 (Arabia) to 87 (Syria).

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<sup>8</sup> Soil moisture availability in soil is based on the balance between precipitation and irrigation, adding moisture, and evapo-transpiration, removing it. All of these can be affected by the moisture-carrying abilities of the air above the soil.

<sup>9</sup> 'Favourable' and 'Improvement' are here taken as warmer and wetter conditions, on the basis that tundra and desert environments are not generally conducive to agriculture. It should be borne in mind that it is possible to have too much of a good thing, and tropical rain forest is not particularly good for agriculture either. Furthermore, pastoralists may benefit from changes that harm arable farming and vice versa. Nonetheless, during the past three millennia, prior to the advent of concerns over global warming, "warm and wet" is probably more likely to have been regarded as beneficial.

| Region  | Average (1250 BCE - 1850 CE) | 1250 BCE | Average (Index re-based, 1250 BC=100) |
|---|------------------------------|----------|---------------------------------------|
| Anatolia  | 63                           | 65       | 96                                    |
| Arabia  | 56                           | 83       | 68                                    |
| Balkans   | 71                           | 54       | 130                                   |
| Baltic  | 70                           | 71       | 98                                    |
| China   | 53                           | 69       | 76                                    |
| Egypt   | 52                           | 70       | 74                                    |
| Europe  | 63                           | 66       | 95                                    |
| Iberia  | 70                           | 74       | 94                                    |
| India   | 68                           | 93       | 73                                    |
| Inner Asia Mongolia                                   | 76                           | 79       | 96                                    |
| Inner Asia Pontic                                     | 83                           | 85       | 97                                    |
| Inner Asia Turkestan                                  | 75                           | 69       | 109                                   |
| Iran  | 65                           | 76       | 86                                    |
| Mesopotamia   | 55                           | 72       | 76                                    |
| North Africa Arable                                   | 58                           | 61       | 95                                    |
| North Africa Pastoral                                 | 58                           | 61       | 95                                    |
| Russia  | 76                           | 78       | 97                                    |
| Sahel/Sahara  | 68                           | 82       | 82                                    |
| Sudan Belt  | 59                           | 80       | 73                                    |
| Syria   | 53                           | 61       | 87                                    |
| All Regions: volcanic eruptions (Greenland sulphates) | 111                          | 113      | 98                                    |

**Table 4.1 Climate trends (monitored through measures of climate change)**

Source: various, as per Excursus E4.1

#### 4.6 EL NIÑO SOUTHERN OSCILLATION (ENSO)

The ENSO Pacific climatic oscillation is a periodic adjustment of seawater temperatures in the currents of the Pacific. This affects the temperature and moisture bearing capacity of the winds blowing over the sea, giving rise to the phenomena known as El Niño and La Niña, with worldwide effects on temperature and rainfall. The very name of the ENSO (El Niño Southern Oscillation) reveals the human tendency to concentrate on one aspect of a situation, to the exclusion of another. Attention was first drawn to the ENSO by the El Niño events off the Peruvian coast, but there are many effects caused worldwide by the same cause. Furthermore, as well as El Niño events occurring in some years, there are (potentially equally damaging) La Niña events occurring in other years, and also years with intermediate El Niño events where the effects are relatively small. The impact of each class of event is not geographically uniform

world-wide, so that it is not in fact possible to deduce the nature of the event which is occurring in any given year simply by observing the kind of weather being experienced. It is necessary to take account of the location of the observation.

ENSO is an oscillation defined by its amplitude and period, and there is evidence that the frequency of ENSO phase change has altered markedly through the period of study.<sup>10</sup> In eras when the phase change occurs more frequently, both El Niño and La Niña effects are observed more frequently.<sup>11</sup> The effect of these phases varies from region to region.<sup>12</sup> La Niña is associated with higher rainfall in the Far East, sub-Saharan Africa and Central Europe, and lower rainfall in Western Europe, the Mediterranean, and Central/Western Asia.<sup>13</sup> El Niño has the opposite association (see Table E4.1 in Excursus E4.3 for details). In semi-arid and arid areas, La Niña is likely to be beneficial to grasslands and herds of the Far East and sub-Saharan Africa while El Niño benefits those of the Mediterranean and Central/Western Asia. In periods of frequent ENSO oscillations, in most years some arid or semi-arid region or another, world-wide, will receive the short-term benefit of higher than usual productivity from increased rainfall, but all are exposed to the hazard of changeability. This issue is addressed in the next section.

#### 4.7 CHANGEABILITY

Both extremes of weather are likely to be harmful to agriculture in some part of the world, and rapid alternation from one to the other is likely to be worse than gradual modification.<sup>14</sup> It is worth noting that in addition to the particular problems of specific forms of extreme weather (drought, heavy rain, heat wave, cold spell), none of which are good for human or beast or growing crop, a suite of additional problems are encountered when these events are all happening in close proximity to each other. The precautions that avail for one situation are at

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<sup>10</sup> Moy, C. M., Seltzer, G., Rodbell, T. and Anderson, D. M. (2002) 'Variability of El Niño/Southern Oscillation activity at millennial timescales during the Holocene epoch', *Nature Volume 420 162-165 14 November 2002*, 420, pp. 162-165.

<sup>11</sup> Cai, W., Wang, G., Santoso, A., McPhaden, M. J., Wu, L., Jin, F.-F., Timmermann, A., Collins, M., Vecchi, G., Lengaigne, M., England, M. H., Dommenges, D., Takahashi, K. and Guilyardi, E. (2015) 'Increased frequency of extreme La Niña events under greenhouse warming', *Nature Climate Change*, 5.

<sup>12</sup> Thompson, L., Mosley-Thompson, E. and Thompson, P. (1992) 'Reconstructing interannual climate variability from tropical and sub-tropical ice core records', in Diaz, H.F. & Margraf, V. (eds.) *El Niño Historical and Palaeoclimatic Aspects of the Southern Oscillation*. Cambridge: Cambridge University Press, pp. 295-323; Philander, G. (1990) *El Niño, La Niña and the Southern Oscillation*. San Diego: Academic Press Inc.; Allan, R., Lindesay, J. and Park, D. (1996) *El Niño, Southern Oscillation and Climatic Variability*. Collingwood: CSIRO Publishing.

<sup>13</sup> Shaman, J. (2014) 'The Seasonal Effects of ENSO on Atmospheric Conditions Associated with European Precipitation: Model Simulations of Seasonal Teleconnections', *Journal of Climate*, 27, pp. 1010-1027.

<sup>14</sup> Dugmore, A.J. et al., 'The role of climate in settlement and landscape change in the North Atlantic islands: an assessment of cumulative deviations in high-resolution proxy climate records', *Human Ecology* 35:2 (2007), 169–78.

best nugatory in another situation and may actually be harmful (i.e., maladaptation).<sup>15</sup> It is much more uncertain whether the coming year will be good, bad or indifferent, which thus increases the incentive to make provision for a bad year. Coping with changeable climatic situations, such as is exemplified by a period of more frequent phase changes of the Southern Ocean Oscillation, where both El Niño and La Niña effects are observed more frequently, is more difficult than might appear from a study of the effects of just one phase alone. This means that a measure of ENSO fluctuation is needed in the study.

#### 4.8 CONCLUSIONS ON CLIMATE

Climatic change, including desertification,<sup>16</sup> has been a matter of current concern for nearly thirty years<sup>17</sup>, but it is also relevant to the past. As early as 1981, Lamb proposed ways to study this.<sup>18</sup> This view is widely supported by studies such as those of Buntgen et al. at the macro- and micro-levels,<sup>19</sup> and the PAGES2K Consortium,<sup>20</sup> although some assessments are not universally accepted.<sup>21</sup> Writers have highlighted the impact of climate on humanity and, more recently, the human impact on climate,<sup>22</sup> citing such matters as climatic change<sup>23</sup>, the El Niño phenomenon<sup>24</sup> and the need for water on civilisation.<sup>25</sup> Bárta identifies climatic fluctuations, mediated through the level of Nile floods, as contributing to the collapse of the Old Kingdom of Egypt.<sup>26</sup> Ellenblum

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<sup>15</sup> A soak in a wadi bottom may serve as a source of water in times of drought, but the wadi is no place to linger when a rainstorm comes. Drowning in desert floods has been recorded. Meyer, J. C. (2017) *Palmyrena: Palmyra and the surrounding territory from the Roman to the Early Islamic period*. Oxford: Archaeopress Publishing Ltd, p.37.

<sup>16</sup> Middleton, N. and Thomas, D. (1997) *World Atlas of Desertification: Second Edition*. 2nd edn. London: Arnold.; Griffith, B. (2001) *The Garden of Their Dreams: Desertification and Culture in World History*. Halifax Canada: Fernwood Publishing Ltd Zed Books.

<sup>17</sup> Folland, C., Karl, T. and Vinnekov, K. (1990) 'Chapter 7 Observed Climatic Variation and Change', in Houghton, J., Jenkins, G. & Ephraums, J. (eds.) *Climate Change: The IPCC Scientific Assessment*. Cambridge, pp. 195-238.

<sup>18</sup> Lamb, H. H. (1981) 'An approach to the study of the development of climate and its impact in human affairs', in Wigley, T., Ingram, M. & Farmer, G. (eds.) *Climate and History: studies in past climates and their impact on man*. Cambridge: Cambridge University Press, p. 291.

<sup>19</sup> Buntgen, U., Tegel, W., Nicolussi, K., Frank, M., Trouet, V., Kaplan, J., Herzig, J., Huessner, K.-U., Wanner, H., Luterbacher, J. and Esper, J. (2011) '2500 Years of Climatic Variability and Human Susceptibility', *Science*, (331), pp. 578-582; Buntgen, U. and Di Cosmo, N. (2016) 'Climatic and environmental aspects of the Mongol withdrawal from Hungary in 1242 CE', *Scientific Reports*, 6, pp. 9, Available: Springer. DOI: 0.1038/srep25606.

<sup>20</sup> PAGES2K Consortium (2013) 'Continental-scale variability during the past two millennia', *Nature Geoscience*, 6, pp. 339-46.

<sup>21</sup> Pinke, Z., Ferenczi, L., Romhányi, B., Laszlovszky, J. and Pow, S. (2017) 'Climate of doubt: A re-evaluation of Buntgen and Di Cosmo's environmental hypothesis for the Mongol withdrawal from Hungary, 1242 CE', *Scientific Reports*, 7, pp. 5, Available: Springer. DOI: 10.1038/s41598-017-12128-6.

<sup>22</sup> Ruddiman, W. F. (2005) *Plows, Plagues and Petroleum: how humans took control of the climate*. Princeton: Princeton University Press.

<sup>23</sup> Fagan, B. (2004) *The Long Summer: how climate changed civilisation*. New York: Basic Books

<sup>24</sup> Fagan, B. (2009) *Flood, Famines and Emperors: El Nino and the Fate of Civilisations*. New York: Basic Books.

<sup>25</sup> Fagan, B. (2011) *Elixir: a human history of water*. London: Bloomsbury Publishing. See also Solomon, S. (2010) *Water: the Epic Struggle for Wealth, Power and Civilisation*. New York: HarperCollins.

<sup>26</sup> Bárta, M. (2019) *Analysing Collapse: The Rise and Fall of the Old Kingdom*. Cairo: American University in Cairo Press pp. 25-36.



identifies a widespread climatic collapse in the eleventh century eastern Mediterranean.<sup>27</sup> Parker looks at the effect of the Little Ice Age on Europe.<sup>28</sup> Ramankutty et al. address the impact of climate change on availability of cultivable land,<sup>29</sup> while Stojanowski and Knudsen consider the impact of climatic deterioration on mobility.<sup>30</sup> Tol and Wagner examine the link between climate and violent conflict.<sup>31</sup> For Behringer, there is a link between climate and cultural history.<sup>32</sup> Caviedes links El Niño and historical developments.<sup>33</sup> Lovelock et al. find climatic links with the European monetary system.<sup>34</sup>

The interaction of climate with economy and strategy is important, for as Kwanten's 1979 assessment assumes,<sup>35</sup> voluntarily starting a war without adequate resources probably did not happen often. It does seem unlikely that any polity would willingly engage in war without at least adequate means to wage war. In light of the interaction of climate with other geographical aspects and with agriculture, and the impacts on climate identified, a wide range of variables are relevant for analysis. These include: El Niño Southern Oscillation (ENSO), temperature, precipitation, potential evapo-transpiration, growing days, aridity, primary vegetation production, water availability, biocapacity, good soil, desert, altitude, relief ruggedness and terrain. Information on climatic variability is also needed. Chapter 11 on the database contains further details.

#### 4.9 CLIMATE AND AGRICULTURE

Arable and pastoral agriculture respond in different ways to climatic fluctuations, reflecting the manner in which they exploit their ecosystem (see Table 4.2). The various forms of arable farming place human beings in the role of herbivores, extracting energy and nutrients directly from selected plants, while pastoral farming has the human population in the role of carnivores,

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<sup>27</sup> Ellenblum, R. (2012) *The Collapse of the Eastern Mediterranean: Climate Change and the Decline of the East 950-1072*. Cambridge: Cambridge University Press.

<sup>28</sup> Parker, G. (2013) *Global Crisis: War, climate change and catastrophe on the seventeenth century*. London: Yale University Press.

<sup>29</sup> Ramankutty, N., Foley, J., Norman, J. and McSweeney, K. (2002) 'The global distribution of cultivable lands: current patterns and sensitivity to possible climatic change', *Global Ecology & Biogeography*, 11, pp. 377-392.

<sup>30</sup> Stojanowski, C. and Knudsen, K. (2014) 'Changing patterns of mobility as a response to climatic deterioration and desertification in middle Holocene Southern Sahara', *American Journal of Physical Anthropology*, 154(1), pp. 79-93.

<sup>31</sup> Tol, R. and Wagner, S. (2010) 'Climate change and violent conflict in Europe over the last millennium', *Climatic Change*, 99, pp. 65-79.

<sup>32</sup> Behringer, W. (2015) *A Cultural History of Climate*. Translated by: Camiller, P. Cambridge: Polity Press.

<sup>33</sup> Caviedes, C. N. (2001) *El Niño in History: Storming Through the Ages*. Gainesville: University Press of Florida.

<sup>34</sup> Loveluck, C. P., McCormick, M., Spaulding, N. E., Clifford, H., Handley, M. J., Hartman, L., Hoffmann, H., Korotkikh, E. V., Kurbatov, A. V., More, A. F., Sneed, S. B. and Mayewski, P. A. (2018) 'Alpine ice-core evidence for the transformation of the European monetary system, AD 640–670', *Antiquity*, 92(366), pp. 1571–1585.

<sup>35</sup> Kwanten, L. (1979) *Imperial Nomads: A history of Central Asia 500-1500*. Leicester: Leicester University Press, p.208.

extracting energy and nutrients from herbivorous animals. In both cases, this may take the form of one-off destructive exploitation (harvesting grain or slaughtering animals) or extraction of an ongoing harvest (harvesting fruit, milking or bleeding cattle). The latter approach may, of course, be extended to the point where it becomes destructive.

| Nature of exploitation | Arable                                      | Pastoral          |
|------------------------|---|-------------------|
| One-off                | Annual/biennial crops e.g. cereals/potatoes | Meat, hides       |
| Ongoing                | Perennial crops e.g. fruit, nuts            | Milk, blood, wool |

**Table 4.2 Nature of Arable and Pastoral Outputs**

Pastoral agriculture is thus effectively a second-order enterprise, placing herbivorous animals in a role similar to arable farmers, and then taking a harvest from the animals. This may be the only effective way of exploiting an environment which will not support a kind of vegetation from which human beings can effectively extract nutrients, but it is of markedly lower efficiency in supporting human population in a given area.

Plant growth is governed by five basic factors: carbon dioxide, light, heat, water and mineral nutrients. In line with Liebig's Law of the Minimum,<sup>36</sup> the rate of growth is limited to the level permitted by the factor that is least available. Furthermore, the rate of growth may be reduced by the destructive effects of factors that are present in excess of what is needed (a Law of the Maximum). Carbon dioxide is rarely the limiting factor, being available on a year-round basis. Availability of mineral nutrients can vary on a seasonal basis, giving rise to stronger growth when the nutrients are available. Temperature, illumination and water availability are much more changeable and to a large extent, they are driven by climatic variations. There is often linkage between the three factors, dependent on exposure to solar radiation, but the greenhouse effect can make this complex, with moist air able to retain heat for a while, even when the source of illumination is reduced by cloud, volcanic ash or nightfall.

For an arable farmer, where an annual crop is planted, the yield is dependent on the cumulative impact of the weather in that year. Cold weather reduces the crop yield and warm weather increases it, unless it is associated with low rainfall, which will reduce the crop. High rainfall can reduce yields though blight, direct physical destruction through precipitation or flooding and waterlogging. This has an immediate effect. Things are more complex for perennial crops. In addition to the immediate effect in the year of the weather on the plants used in this way, where more or less food being available for the cultivators in the current year, there is an ongoing

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<sup>36</sup> Odum, E. P. (1963) *Ecology. Modern Biology Series* New York: Holt, Reinhart and Winston, p.65.

effect in subsequent years. The tree carries forward the stronger or weaker growth resulting from the weather, and this effect impacts on subsequent yields. It is recognised that good weather in one year is likely to be followed by a good crop in the following year.<sup>37</sup>

For a country such as China, animal husbandry forms a minor part of agriculture with 90% of food calories derived from vegetables.<sup>38</sup> Supplies of milk products and draught animals are more easily obtained from nomad neighbours, despite government disapproval of nomadism. The 375mm isohyet forms the edge of arable cultivation.

Rosen describes how the interaction of climatic fluctuation with a maximisation of population that requires the widest use of marginal lands, can result in a fragile agricultural system that collapses in short order under the impact of extreme rainfall such as occurred in Western Europe during 1315-16.<sup>39</sup> Other environments such as the Middle Niger are naturally fragile on account of severe climatic fluctuation and this encourages agricultural diversity in order to minimise risk. Such diversity can in turn require a high level of forbearance between neighbouring pastoral and arable groups.<sup>40</sup>

#### 4.10 CLIMATE AND PASTORALISM

For the pastoralist, matters are still more complicated.<sup>41</sup> The livestock can be killed directly by severe weather such as blizzards and extreme cold (the Mongolian *dzud*), lack of water due to severe drought and drowning in floods due to excess rain which may also increase disease. It should be noted that the pastoralists themselves will usually also be exposed to similar increased risk of death. Paradoxically, where such livestock deaths have occurred, they reduce the livestock population below the carrying capacity of the land and so mitigate the subsequent impact of reduced yield. Begzsuren et al show that annual livestock mortality rate is doubled by

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<sup>37</sup>Övergaard, R., Gemmel, P. and Karlsson, M. (2007) 'Effects of weather conditions on mast year frequency in beech (*Fagus sylvatica* L.) in Sweden', *Forestry*, 80(5).

<sup>38</sup>Needham, J. and Bray, F. (1984) *Science and Civilisation in China: Volume 6 Biology and Biological Technology: Part II Agriculture*. Cambridge: Cambridge University Press p. xxv.

<sup>39</sup>Rosen, W. (2014) *The Third Horseman: Climate change and the Great Famine of the 14th Century*. New York: Viking, p.142.

<sup>40</sup>McIntosh, R. J. (2005) *Ancient Middle Niger: Urbanism and the Self-Organising Landscape*. Cambridge: Cambridge University Press, pp. 117-121.

<sup>41</sup>Nomadic pastoralists may change production and lifestyle in response to climatic pressure. Salzman, P. C. (2004) *Pastoralists: Equality, Hierarchy and the State*. Oxford: Westview Press, pp. 39-40.

a *dzud*,<sup>42</sup> and increased by two-thirds by a drought.<sup>43</sup> When a drought follows a *dzud*, the total increase in mortality rate is only 2.73, rather than the 3.34 that might be expected.<sup>44</sup> Where grazing is provided by perennial grasses rather than annual plants, the biomass of the pasture provides a further reserve, although utilising this impacts on yields in later years. Raising stocks to the carrying capacity of the pasture takes time, as the annual yield of livestock is lower than that of crops (one calf per cow, as opposed to four to eight seeds per seed sown).

Franke notes that the Chin commissioner of herds in twelfth century northern China operated in a system where an annual increase of 20% for horses, camels or oxen (40% for sheep) and an annual death rate of under 15% for horses were regarded as first class outcomes for their management.<sup>45</sup> This regime suggests that a birth rate of 35% (20%+15%) for horses would also be a first class outcome.<sup>46</sup> The average modern annual livestock mortality rate is about 8%, suggesting that on average, Chin horse mortality was probably at least double that of modern herds. Applying the variability of modern *non-dzud* and *dzud* mortality rates to this result suggests death rates of 14.6% and 21.7% (giving population increases of 20% and 13%). A *dzud* year with drought probably averaged about 26.9% deaths (with an increase of 8% at best). A first-rate outcome was thus most unlikely to be attained in a *dzud* year, particularly if this was followed by drought. If the ratio of *dzud* to *non-dzud* death rates was higher in pre-modern times than at present, and if birth rates were lowered by a *dzud*, both of which suppositions are quite credible, then actual absolute herd decreases were likely to occur in *dzud* years.

Fernández-Giménez et al. suggest that increases in livestock numbers in Mongolia between harsh winter events do not appear to be driven by increasing forage biomass and that such changes are only important if they represent more than the rangeland can support, with use of over 50% of forage being heavy stocking and use of over 70% being overgrazing.<sup>47</sup> King and Franz are more concerned with “multi-decadal switches in fractional perennial cover, triggered by

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<sup>42</sup> A *dzud* is a period of particularly severe winter cold, in an area that is normally exposed to severe winters, traditionally occurring once a decade (in some periods, however, more often).

<sup>43</sup> Begzsuren, S., Ellis, J., Ojima, D., Coughenour, M. and Chuluun, T. (2004) 'Livestock responses to droughts and severe winter weather in the Gobi Three Beauty National Park, Mongolia', *Journal of Arid Environments*, 59, pp. 785-796.

<sup>44</sup> Expected level might be normal mortality x 3.34 (i.e. x 2.00 (additional *dzud* mortality) x 1.67 (additional drought mortality), but in fact it is normal mortality x 2.73.

<sup>45</sup> Franke, H. (1994) 'The Chin Dynasty', in Franke, H. & Twichett, D. (eds.) *The Cambridge History of China 6 Alien Regimes and Border States 907-1368*. Cambridge: Cambridge University Press, pp. 215-320, p.293.

<sup>46</sup> Since 60% of range-bred mares bear a live foal, and Carolingian practice was to breed from a mare in alternate years, this estimate seems a plausible target for the Chin commissioner (see Gillmor, C. (2008) 'The Brevium Exempla as a Source for Carolingian Warhorses', *Journal of Medieval Military History*, VI, pp. 32-57).

<sup>47</sup> Fernandez-Gimenez, M., Venable, N., Angerer, J., Steven, R., Fassnacht, S., Reid, R. and Khishigbayara, J. (2017) 'Exploring linked ecological and cultural tipping points in Mongolia', *Anthropocene*, 17, pp. 46-69.

periods of below- or above-average rainfall.”<sup>48</sup> Such changes are somewhat less perceptible, but more significant for pastoralists.

Kaegi records that Muslim geographers emphasised the need to take account of the state of vegetation in planning expeditions into Byzantine territory.<sup>49</sup> Late winter raids (February-March) could last twenty days before the horses needed to return to Muslim territory to find good grass. In spring, the corresponding time was thirty days, and in summer, sixty days. All else being equal, this suggests that the productivity of pasture in the Anatolian borderlands increased threefold between late winter and summer. Seasonal ratios of this magnitude are reported in modern Mongolian pastures.<sup>50</sup>

Effectively, pastoralists buffer themselves against the risks of climatic variations through the use of capital (i.e. livestock), whose very abundance results in low prices per animal that mask their aggregate importance. This suggests that the livelihood of arable farmers is more dependent on annual fluctuations of climate, whereas pastoralists respond more to an averaged climatic pattern. Nonetheless, periods of prosperity were possible. Kwantun argues that “It is safe to assume [prior to the Mongol period of conquest] that the steppe’s economy was thriving: [but] serious difficulties in animal husbandry would have deprived the Mongols of their principal means of conquest, an adequate supply of horses.”<sup>51</sup>

#### 4.11 CLIMATE, LIVESTOCK AND PASTURE REQUIREMENT

The carrying capacity of pastures varies considerably, dependent on location.<sup>52</sup> There are a great number of variables that determine the ability of pastures to support livestock. Each species of

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<sup>48</sup> King, E. and Franz, T. (2016) 'Combining ecohydrological and transitional probability based modelling to simulate vegetable dynamics in a semi-arid rangeland', *Ecological Modelling*, 84, pp. 41-63.

<sup>49</sup> Kaegi, W. (1993) 'Byzantine Logistics: Problems and Perspectives', in Lynn, J. (ed.) *Feeding Mars: Logistics in Western Warfare from the Middle Ages to the Present*. Oxford: Westview Press, pp. 39-56.

<sup>50</sup> Erdenebaatar, B. (2003) 'III Mongolia Case Study 1: Studies on long-distance transhumant grazing systems in Uvs and Khuvsgul Aimags of Mongolia, 1999-2000', in Suttie, J. & Reynolds, S. (eds.) *Transhumant Grazing Systems in Temperate Asia: Vol. 31 Plant Production and Protection Series*. Rome: FAO, pp. 31-68.

<sup>51</sup> Kwanten, L. (1979), *Imperial Nomads: A history of Central Asia 500-1500* op. cit. p.208.

<sup>52</sup> Lkhagvajaw, L. and Erdenebaatar, B. (2003) 'Mongolia Case Study 2: Haymaking from natural pasture in Arkhangai, Mongolia', in Suttie, J. & Reynolds, S. (eds.) *Transhumant Grazing Systems in Temperate Asia: Vol. 31 Plant Production and Protection Series*. Rome: FAO, pp. 69-80; Nyima, T. (2003) 'China case study 3 Pastoral systems, change and the future of the grazing lands in Tibet', in Suttie, J. & Reynolds, S. (eds.) *Transhumant Grazing Systems in Temperate Asia*: op. cit pp. 151-188; Sanaullah, K. and Mukhtar, A. (2003) 'Pakistan case study 2: High altitude pastoral systems in Malakand Division, Pakistan', in Suttie, J. & Reynolds, S. (eds.) *Transhumant Grazing Systems in Temperate Asia* op. cit. pp. 239-248; Sardar, M. (2003) 'Pakistan case study 1: Agropastoral production systems of high altitude pastures of the Upper Kaghan valley, North West Frontier Province, Pakistan', in Suttie, J. & Reynolds, S. (eds.) *Transhumant Grazing Systems in Temperate Asia* op. cit. pp. 217-238; Suttie, J. and Reynolds, S. (2003) 'Transhumant Grazing Systems in Temperate Asia', in Suttie, J.R., S. (ed.) *Transhumant Grazing Systems in*

livestock has its own energy requirements, dependent on current weight, activity and ambient temperature, and each species has its own grazing regime, which dynamically interacts with the plant species available in the pasture, changing the pasture composition as palatable plants are targeted and tough plants survive, to extract resources dependent on the nutrient value and digestibility of available plants. The replenishment of the pasture depends on levels of carbon dioxide, light, heat, water and mineral nutrients (see Section 4.7), subject to the level of physical damage inflicted by the grazing animals by uprooting, trampling, bark stripping and targeting of growth points, with more frequent revisiting by herds/regrazing reducing the capability of the pasture to replenish.

This is of critical significance in assessing the wealth and power of nomad societies, which depend on livestock. To determine this, it is necessary to look at the worth of livestock, their needs and the ability of the land to meet those needs.

Most societies have their own rating of the relative worth of various livestock species. This may be based on scientific attempts to reflect the energy requirements of the animals, or they may be a traditional expression of the perceived utility<sup>53</sup> or value of animals,<sup>54</sup> or the relative frequency with which they are reflected in rock art.<sup>55</sup> In either case, changes from area to area are to be expected. Le Houerou and Hoste present (Table 4.3) two examples of a scientific estimate, for the Mediterranean and Sahel-Sudan areas, while the *bod* is a traditional Mongolian system that has been adjusted a number of times since the early 20<sup>th</sup> century (the oldest version is used here).<sup>56</sup>

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*Temperate Asia*: op. cit.

<sup>53</sup> The horse was used for a wider range of purposes than other herd animals. See Kelekna, P. (2009) *The Horse in Human History*. Cambridge: Cambridge University Press.

<sup>54</sup> Turks seem to have valued Arab horses in particular, although these were probably not subsumed in the general assessment system. See Anonymous (1974) *Book of Dede Korkut*. Translated by: Lewis, G. Harmondsworth: Penguin, p.40.

<sup>55</sup> Rock art in western Mongolia shows a marked decline (31%) in images of ibex (wild goats) and an even greater increase (84%) in images of horses between the Bronze Age period and the Iron Age period (where the divide lies about 1000 BCE). See Kontum, R. (2014) 'Sacred imagery and ritual landscape: new discoveries at the Biluut Petroglyphic Complex in the Mongolian Altai', *Time and Mind*, 7(4), pp. 329-384; Kontum, R. (2021) 'Altai rock art: visions of the past in Mongolia', *Current World Archaeology Magazine*, 106 p.16-22; Jacobson-Tepfer, E. and Meacham, J. E. (2017) 'The Sacred Mountain Shiveet Khaikhan (Bayan Älgiy aimag, Mongolia) and the Centering of Cultural Indicators in the Age of Nomadic Pastoralism', *Annals of the American Association of Geographers*, 107(2), pp. 419-510.

<sup>56</sup> Le Houerou, H. and Hoste, C. (1977) 'Rangeland Production and Annual Rainfall Relations in the Mediterranean Basin and the African Sahelo-Sudanian Zone', *Journal of Range Management*, 30(3).

Table 4.3 shows that when rebased so that the horse is rated the same for all three systems,<sup>57</sup> the three systems agree that a camel is worth more than a horse and a cow less, with sheep and goats being worth substantially less, goats being least valuable.<sup>58</sup> The relative status of their meat reflects this rating of the animals.<sup>59</sup> Further rebasing on the Sahel-Sudan,<sup>60</sup> the Mediterranean rates the non-horse species more highly (average 1.33), and Mongolia rates them even more highly (average 1.60). This suggests that the horse is relatively less valued in the environments where it is most easily raised. Ranking based on milk production for steppe animals suggests that goats and cattle would be more highly rated if this were the sole criterion for the valuation.<sup>61</sup>

Moving on to the needs of livestock, particularly the most widely useful of them, the energy requirements of a horse vary markedly, dependent on workload, body weight and ambient temperature (see Table 4.4 for regional variation relating to temperature). Engels in his work on the logistics of the Macedonian army, equates 10lb. grain to 45lb forage and suggests that a horse needs 55lb (25 kg.) of forage daily or 12.2lb grain.<sup>62</sup> Since 10lb. (4.55 kg.) of grain is equivalent to 4.55 Food Units,<sup>63</sup> this indicates a 5.56 daily Food Unit requirement for a horse, or 2,029 Food Units annually. Le Houerou & Hoste's own figures for the Mediterranean area show that  $300 / .15 = 2000$  Food Units is the annual requirement for a horse. Effectively, these two estimates agree.

For the Sahel-Sudan, Le Houerou and Hoste work on the basis that a horse (= 1 Tropical Livestock Unit)<sup>64</sup> requires 2.8 Food Units per day (1,022 units per annum). Given that a Food Unit equates to 1,650 kilocalories, the findings of Le Houerou & Hoste suggest a daily energy requirement of

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<sup>57</sup> i.e. for each system, the rating of the horse is reset to 1.0, while the ratings of the other animals are adjusted to retain their original ratio to the horse rating.

<sup>58</sup> This is the assessment of the overall worth of the animal, which includes a range of products such as milk, wool, hide and meat. The weight of meat obtainable from a beast is not the sole criterion. A 15<sup>th</sup> century English cow is estimated to yield 130kg of meat and a sheep about 13-14 kg (See Dyer, C. (1989) *Standards of Living in the later Middle Ages Social change in England c1200-1520*. Cambridge: Cambridge University Press, p.59), but the price differential is lower since sheep produce commercially valuable wool (see Chapter 6).

<sup>59</sup> Mutton stew could be served to a group that had been targeted for denigration. Anonymous (1974) *Book of Dede Korkut*. op. cit. p. 27.

<sup>60</sup> i.e. the rebased values for animals other than horses are further rebased, to 1.0 for the Sahel while ratings of the animals in other valuation schemes are adjusted to retain their original ratio to the Sahel rating for such animals.

<sup>61</sup> Anthony, D. (2007) *The Horse, the Wheel and Language, How Bronze-Age Riders from the Eurasian Steppes Shaped the Modern World*. Oxford: Princeton University Press, p.327.

<sup>62</sup> Engels, D. (1978) *Alexander the Great and the Logistics of the Macedonian Army*. London: University of California Press, Table 2.

<sup>63</sup> Le Houerou & Hoste, (1977). 'Rangeland Production and Annual Rainfall Relations in the Mediterranean Basin and the African Sahelo-Sudanian Zone' op.cit.

<sup>64</sup> The Tropical Livestock Unit is the measurement unit devised by Le Houerou and Hoste for the value of livestock in the tropics, calibrated to the value of a horse.

9,000 kilocalories for a typical horse in the Mediterranean area,<sup>65</sup> compared with 4,620 kilocalories in the Sahel-Sudan (this is 51% of the Mediterranean horse's requirement).

The work of McBride et al. suggests that a temperature increase of 10 degrees Centigrade in average temperature would decrease daily dietary requirements by 1.2kg. of oats (or 1.11kg. of barley).<sup>66</sup> Such a temperature difference is similar to that between the regions of North Africa Arable and Sudan defined in Chapter 1 (see Table 4.4). A reduction of 1.11kg. of barley from the daily diet of a horse in the Mediterranean area (5.5kg. of barley) amounts to 20.2 per cent less energy supplied, or about 7,200 kilocalories in total. Le Houerou & Hoste, however, assess the food requirement of a Sahel horse as 4,620 Kilocalories (2.8kg. barley) per day, suggesting a lower body weight for Sahel horses. On the assumption of a body weight of 500kg., for the Mediterranean horse, this suggests a body weight of 320kg. ( $4,620 / 7,200 \times 500$ ) for a Sahel horse, which seems consistent with the descriptions of the smaller horses in the area.<sup>67</sup>

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<sup>65</sup> The European horse weighs 500 kg., though this can rise as high as 545 kg. Le Houerou & Hoste, (1977). 'Rangeland Production and Annual Rainfall Relations in the Mediterranean Basin and the African Sahelo-Sudanian Zone' op.cit.

<sup>66</sup> McBride, G., Christopherson, R. and Sauer, W. (1985) 'Metabolic Rate and Plasma thyroid concentrations of mature horses in response to changes in ambient temperature', *Canadian Journal of Animal Science*, 65, pp. 375-382.

<sup>67</sup> About the same size as a Mongolian pony. Mekouria, T.T., (1989) 'The proto-berbers', pp. 423-440, *General History of Africa II: Ancient Civilisations of Africa* (ed) Mokhtar, G., London, Unesco.



|   | Sahel<br>Tropical Livestock<br>Unit (No) | Mediterranean<br>Conversion Factor | Mongolian<br><i>Bod</i><br>(No) | Milk<br>Production<br>in steppe |
|---|--|------------------------------------|---------------------------------|---------------------------------|
| Horse   | 1.00                                     | 0.15                               | 1.00                            | 0.50                            |
| Camel   | 0.80                                     | 0.10                               | 0.50                            | -                               |
| Cattle  | 1.50                                     | 0.20                               | 1.25                            | 1.00                            |
| Sheep   | 10.00                                    | 1.00                               | 5.00                            | -                               |
| Goat  | 12.00                                    | 1.20                               | 7.50                            | 0.20                            |
| <b>Rebased Value (Local Horse =1)</b>           |  |                                    |                                 |                                 |
| Camel   | 1.25                                     | 1.50                               | 2.00                            | -                               |
| Cattle  | 0.67                                     | 0.75                               | 0.80                            | 2.00                            |
| Sheep   | 0.10                                     | 0.15                               | 0.20                            | -                               |
| Goat  | 0.08                                     | 0.13                               | 0.13                            | 0.40                            |
| <b>Rebased Value (Sahel = 1, Horse=1)</b>       |  |                                    |                                 |                                 |
| Camel   |  | 1.20                               | 1.60                            | -                               |
| Cattle  |  | 1.13                               | 1.20                            | -                               |
| Sheep   |  | 1.50                               | 2.00                            | -                               |
| Goat  |  | 1.50                               | 1.60                            | -                               |
| Average for animals other than<br>horse by area |  | 1.33                               | 1.60                            | -                               |

**Table 4.3 Livestock ratings by species in Sahel-Sudan, Mediterranean and Mongolia**

Source: Le Houerou & Hoste (1977), Anthony (2007)

Mongolian horses are 12.5 to 12.9 hands in height<sup>68</sup> and 330kg. in average weight.<sup>69</sup> This is fairly typical of most steppe mounts, although not of all.<sup>70</sup> Steppe mounts were lighter than the typical European horse,<sup>71</sup> although bigger than the 10-12 hand ponies and small horses which appear

<sup>68</sup> Howorth suggests that this is the impact of exports of larger beasts to the Chinese market and reports that bigger animals are found at a distance from the Chinese border. Howorth, H. H. (1927) *The History of the Mongols from the 9th to the 19th Century: Part 4 Supplement and Index*. London: Longmans, Green, and Co. Reprint, Facsimile: Ch'eng Wen Publishing Company Taipei 1970, p62.

<sup>69</sup> Mongolian Livestock Site accessed 19 June 2018  
[http://www.mofa.gov.mn/livestock/index.php?option=com\\_content&view=article&id=93:2010-09-07-03-22-40&catid=63:2010-09-07-03-16-18&Itemid=95&lang=en](http://www.mofa.gov.mn/livestock/index.php?option=com_content&view=article&id=93:2010-09-07-03-22-40&catid=63:2010-09-07-03-16-18&Itemid=95&lang=en)

The height is consistent with figures quoted by Amitai, but the weight is about 20% greater. Amitai's source assumes a lighter animal and a more nutritious grass, reducing the pasture requirements considerably. See Amitai, R. (2018) 'The Logistics of the Mongol-Mameluk war with special reference to the battle of Wadi'l-Khaznadar 1299 C.E.', in Pryor, J.H. (ed.) *Logistics of Warfare in the Age of the Crusades*. Abingdon: Routledge, pp. 25-42.

<sup>70</sup> The Mongol horse was not the sole mount available in Central Asia. Some large horses were bred there. Ferghana horses stood 15.5 hands high (Hyland, A. (2013) 'Chapter 23 War and the Horse. Part 1 Horses for war: Breeding and keeping a war horse', in Campbell, B. & Tritle, L. (eds.) *The Oxford Handbook of Warfare in the Classical World*. Oxford: Oxford University Press, pp. 493-526.) Presumably the feed requirements of such horses would be greater. Steppe dwellers were not the only people with access to such larger beasts. The Ferghana horse was imported and used by the Chinese elite, to the extent that *The Romance of the Three Kingdoms*, a fourteenth century Ming historical novel which is set in the third century, attributes an escape by Cao Cao, one of the founders of the Three Kingdoms, to his "swift Ferghana horse" (see Luo, G. (2018) *The Romance of the Three Kingdoms*. Londo, Penguin Classics, p.90)

<sup>71</sup> The 15.5 hands of Ferghana horses compares with the 13.7-14.6 hands for the horses of Egyptian Dynasty XVIII, (see Spalinger, A. (2005) *War in Ancient Egypt*. Malden: Blackwell Publishing, p.8) and the more general estimate

to have been used in Roman chariot racing.<sup>72</sup> This suggests that a Mongolian horse requires perhaps 34% less feed than a Mediterranean horse. On the other hand, Mongolia is about 17.5° degrees Centigrade colder than the Mediterranean area. This would suggest a Mediterranean sized horse in Mongolian conditions would require a 35% increase in consumption due to temperature. Accounting for the impact of a 34% smaller size, this amounts to a food requirement for a Mongolian horse in Mongolia of 4.9kg. of barley per day, which is 89% of that needed by a Mediterranean standard horse in the Mediterranean.

The number of horses that can be supported by the local ecology can be crucial to the course of a nomad invasion. It has been argued that the thirteenth century Mongol defeat at 'Ayn Jālūt in Syria can be linked to the limited numbers of Mongol horses that could be grazed in the area at the time.<sup>73</sup> The line of argument has a more universal application.

A Mediterranean horse grazing in the Mediterranean area needs an intake of 6000 kilograms of dry matter, requiring annual production of 12,000 kilograms dry matter per annum by the pasture and above ground phytomass of 24,000 kilograms. The area required per horse per annum, based on Le Houerou & Hoste, varies from 2.2 hectares in Montpellier to 200 hectares in south Tunisia with a sample mean of 23.2 hectares per horse. For the Sahel-Sudan, Le Houerou and Hoste work on the basis that a horse needs 2,555kg. of dry matter and an above ground phytomass of 6,388kg. Based on their assumptions, the area required per horse varies from 1.3 to 16.0 hectares (sample mean 5.3 hectares).

A Mongolian horse grazing in Mongolia thus has an annual requirement of 5,400kg. of dry matter. In the Inner Mongolia area (with production of 702 kg. of dry matter per hectare, of which a half is available to grazing animals), that suggests 15.4 hectares are required per horse, and in the NW desert area of China (production of 366 kg. of dry matter per hectare), 28.8 hectares per horse. By contrast, Drews cites findings that suggest a requirement of 8-10 acres

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of 12.2-14.1 hands for steppes mounts (see Anderson, E. (2016) *Cataphracts: knights of the ancient eastern empires*. Barnsley, Pen & Sword Ltd., p.1).

<sup>72</sup> The Caspian horse from Iran was one of the breeds examined. See Crummy, P. (2020) 'Giddy Up! Horses return to Colchester's Roman Circus', *Current Archaeology*, (360), pp. 44-48. The general run of medieval English horses was under 13.75 hands. See Ameen, C. et al. (2021) 'In search of the 'great horse': A zooarchaeological assessment of horses from England (AD 300–1650)', *International Journal of Osteoarchaeology*, 31(6), pp. 1247-1257.

<sup>73</sup> It is suggested that the cooler and wetter conditions in Syria in 1258-59, linked to dust emission from a volcanic eruption, gave good grazing that permitted the Mongols to deploy in full strength to overrun the area, but the subsequent drought in 1260 resulted in poor grazing that forced a partial withdrawal of their forces, just when the Mamluks launched a counterstrike from Egypt. See di Cosmo, N., Wagner, S. and Büntgen, U (2021) 'Climate and environmental context of the Mongol invasion of Syria and defeat at 'Ayn Jālūt (1258–1260 CE)', *Erdkunde* 75(2):87-104.

(say 3.7 hectares) of arable land to support a team of Bronze Age chariot horses in the Middle East, using grain.<sup>74</sup> This seems consistent with an estimate of 0.33 hectares per sheep or goat or 1 hectare per head of cattle in the more fertile lands available to the Old Kingdom of Egypt.<sup>75</sup> On the assumption that a two horse team is meant, the Middle Eastern arable land requirement to support a horse is about one eighth of the Mongolian pastoral requirement, but depends on the existence of an agrarian surplus.

To place the preceding analysis in context, a Mongol *tumen* consisted in theory of 10,000 men with 10 horses each.<sup>76</sup> Such a force of 100,000 horses would require annually 1,540,000 hectares of Inner Mongolia (15,400 sq kilometres), an area 6.4 x 6.4 kilometres daily (or a circle of radius 3.7 kilometres daily). This level of grazing is probably compatible with military operations, despite the inconvenience, particularly during sieges, of having to move the army herds 6.4 km each day in search of fresh pasture. An army of eight *tumens* would have to move its herds 18.2 km each day to feed its mounts, which would decidedly inconvenience static operations such as sieges<sup>77</sup> and an army of twelve *tumens* (the greater part of Mongol strength in 1227) would have to move the herds 22.5 km each day in pursuit of pasture.<sup>78</sup> This pressure on local pastures, and the likely need to use arable crops as a substitute (though much richer) source of fodder, almost certainly guaranteed impoverishment and famine for the local population.<sup>79</sup> The practice of marching separately,<sup>80</sup> and fighting combined (which the Mongols appear to have applied long

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<sup>74</sup> Drews, R. (1993) *The End of the Bronze Age: Changes in Warfare and the Catastrophe ca. 1200 B.C.* Princeton New Jersey: Princeton University Press, p.111.

<sup>75</sup> Bárta, M. (2019) *Analysing Collapse: The Rise and Fall of the Old Kingdom* op. cit. p.97

<sup>76</sup> The level of remount provision is debateable. Some authorities suggest ten animals per rider (see Linder, R. (1981) 'Nomadism, Horses and Huns', *Past & Present*, (92), pp.3-19), but an alternative plausible assumption is five animals per rider e.g. Amitai (2019) 'The Logistics of the Mongol-Mameluk war' op. cit.

<sup>77</sup> The Avar siege of Constantinople in 626 by an army possibly numbering 30,000 and including a strong cavalry component, is estimated to have been sustainable for only 10 days due to provisioning problems. See Howard-Johnston, J. (2021) *The Last Great War of Antiquity*. Oxford: Oxford University Press p.274, p.281.

<sup>78</sup> After a siege of 16 days, a twelve *tumen* Mongol army would have grazed the environs of the fortress out to a distance of 50 kilometres, which at the speed of Mongol horses, would have imposed a day's delay on the summoning of remounts. Much depended, of course, on whether the environs of the fortress, possibly arable, were richer than Inner Mongolian pastures or not.

<sup>79</sup> As noted above, a Mongolian horse in Mongolia would require the grain equivalent of 4.9kg. of barley daily. In Sudan, this might be perhaps 3.0kg. Such amounts are the grain equivalent of the full economic requirements of between two and four people (see Chapter 6), or the food requirement of three to five people (see Bachrach, B. S. (2018) 'Crusader Logistics: from Victory at Nicaea to Resupply at Dorylaion' Pryor, J.H. (ed.) *Logistics of Warfare in the Age of the Crusades*. Abingdon: Routledge, pp.43-62). The minimum estimate of the additional burden on the environment and economy from the arrival in an area of a *tumen* is of the order of 160,000 people (10,000 people x 1 + 50,000 horses x 3). The sudden arrival of one and a quarter million additional people (the minimum effect of an army of eight *tumens*) would have meant impoverishment and very likely famine for all save the most fertile areas.

<sup>80</sup> A Mongol army could be dispersed over 120 miles (172 kilometres) so that the pasture for those behind was not consumed by those ahead. Howorth, H. H. (1880) *History of the Mongols from the 9th to the 19th Century: Part II The So-called Tartars of Russia and Central Asia Division 1*. London: Longman, Green and Co, p. 295.

before the Emperor Napoleon made use of the system) is the only way that such a force could operate successfully.

| Region                | Mean Annual Temperature (°C) | Difference from 18 °C | Kg. oats daily required to cope with temperature | Kg. barley extra daily required | Adjusted Barley requirement (kg. per day) |
|-----------------------|------------------------------|-----------------------|--|---------------------------------|---|
| Anatolia              | 10.5                         | 7.5                   | 0.9  | 0.8                             | 6.3                                       |
| Arabia                | 26.1                         | -8.1                  | -1.0   | -0.9                            | 4.6                                       |
| Balkans               | 10.2                         | 7.8                   | 0.9  | 0.9                             | 6.4                                       |
| Baltic                | 6.0                          | 12.0                  | 1.4  | 1.3                             | 6.8                                       |
| China                 | 10.4                         | 7.6                   | 0.9  | 0.8                             | 6.3                                       |
| Egypt                 | 22.3                         | -4.3                  | -0.5   | -0.5                            | 5.0                                       |
| Europe                | 5.0                          | 13.0                  | 1.6  | 1.4                             | 6.9                                       |
| Iberia                | 13.5                         | 4.5                   | 0.5  | 0.5                             | 6.0                                       |
| India                 | 23.2                         | -5.2                  | -0.6   | -0.6                            | 4.9                                       |
| Inner Asia Mongolia   | 1.0                          | 17.0                  | 2.0  | 1.9                             | 7.4                                       |
| Inner Asia Pontic     | 8.3                          | 9.7                   | 1.2  | 1.1                             | 6.6                                       |
| Inner Asia Turkestan  | 5.0                          | 13.0                  | 1.6  | 1.4                             | 6.9                                       |
| Iran                  | 15.5                         | 2.5                   | 0.3  | 0.3                             | 5.8                                       |
| Mesopotamia           | 22.1                         | -4.1                  | -0.5   | -0.5                            | 5.0                                       |
| North Africa Arable   | 16.5                         | 1.5                   | 0.2  | 0.2                             | 5.7                                       |
| North Africa Pastoral | 18.5                         | -0.5                  | -0.1   | -0.1                            | 5.4                                       |
| Russia                | 3.7                          | 14.3                  | 1.7  | 1.6                             | 7.1                                       |
| Sahel & Sahara        | 25.7                         | -7.7                  | -0.9   | -0.8                            | 4.7                                       |
| Sudan                 | 26.4                         | -8.4                  | -1.0   | -0.9                            | 4.6                                       |
| Syria                 | 18.3                         | -0.3                  | 0.0  | 0.0                             | 5.5                                       |

**Table 4.4 Temperature (degrees C) and change in food requirement for horses by region**

Assumptions and Sources:

1. Temperature regional average.<sup>81</sup>
2. 0.12 kg more oats daily is needed per °C of ambient temperature below 18°C for a typical horse.<sup>82</sup> It is assumed that a corresponding decrease occurs for hotter temperatures.
3. Oats are somewhat less energy rich than barley - 12 MJ/kg dry matter rather than 13 MJ/kg dry matter<sup>83</sup>. Thus, a little less barley is required to meet temperature decreases.
4. In the Mediterranean, 0.15 horse = 300 food units per year and 1 food unit = 1kg barley, so 1 horse requires 2000 food units per annum or 5.5 food units (5.5 kg barley) per day<sup>84</sup>
5. Horse size is assumed to be 500 kg (Mediterranean norm).<sup>85</sup> No adjustment is included for variations in horse size.
6. In practice, the barley requirement may be partially or wholly supplied in the form of grass, hay or straw.

<sup>81</sup> Title, Pascal O. and Bemmels, Jordan B, (2017) 'ENVIREM: an expanded set of bioclimatic and topographic variables increases flexibility and improves performance of ecological niche modelling' 20 January 2017, Ecography

<sup>82</sup> McBride, G. et al. (1985) 'Metabolic Rate and Plasma thyroid concentrations' op. cit.

<sup>83</sup> Courtney, D. (2002) *Feed Value of Selected Foodstuffs* AG0373. Rutherglen: Victoria Department of Agriculture. Available at: <http://agriculture.vic.au/government/livestock/beef/feeding-and-nutrition/feed-value-of-selected-foodstuffs> (Accessed: 04/10/2017).

<sup>84</sup> Le Houerou, H. and Hoste, C. (1977) 'Rangeland Production and Annual Rainfall ', op. cit.

<sup>85</sup> Le Houerou, H. and Hoste, C. (1977) 'Rangeland Production and Annual Rainfall ', op. cit.

Table 4.5 shows that the pasture of northern Turkestan supports horses at a rate of twenty hectares per animal and southern Turkestan is less rich (about 31 hectares per horse). Arabian pastures are less rich again (about 38 hectares per horse on tropical equivalence).

| Area                          | Total area<br>(1000 sq<br>km) | Range<br>(1000 sq<br>km ) | Range as<br>% of Total<br>area | Million<br>animals | Animals<br>per ha | Animal | Horse-<br>Equivalent per<br>ha |               |
|-------------------------------|-------------------------------|---------------------------|--------------------------------|--------------------|-------------------|--------|--------------------------------|---------------|
|                               |                               |                           |                                |                    |                   |        | Temp-<br>erate                 | Trop-<br>ical |
| Soviet<br>Turkestan:<br>North | 744                           | 546                       | 73.4                           | 18.2               | 0.33              | Sheep  | 0.050                          | 0.033         |
| Soviet<br>Turkestan:<br>South | 942                           | 745                       | 79.1                           | 16.0               | 0.21              | Sheep  | 0.032                          | 0.021         |
| Arabia:<br>Ruwala             | na                            | 275                       | na                             | 0.0872             | 0.03              | Camel  | 0.045                          | 0.026         |

**Table 4.5 Livestock supportable in Turkestan and Arabia**

Based on: Le Houerou (1977), Nechayeva (1985)<sup>86</sup> and Forde (See Chapter 3.1 above)

#### 4.12 CONCLUSIONS ON AGRICULTURE

Arable farmers are more at direct risk from climatic variation than pastoralists, as crop yield is sensitive to the limiting effects of water, light and warmth. Although a pastoralist's herds serve as a buffer to the harmful effects of bad weather, the herds can still be severely affected by drought, blizzard and frost in the short term. Long term availability of fodder sets a ceiling on the number of animals that can be supported in an area, which varies with the climate of the area and the fodder requirements of the animals. Fodder availability serves as a major constraint on the military effectiveness of an army that makes much use of animals. The regional variation in agricultural production and climate provides part of the background to group interactions, both in qualitative understanding and quantitative analysis. The excursions to this Chapter and Chapter 11 on the database contains further details of the data collected and the use made of it.

<sup>86</sup> Nechayeva, N. (1985) 'Union of Soviet Socialist Republics', in Goodin, J. & Northington, D. (eds.) *Plant Resources of Arid and Semi-Arid lands: a Global perspective*. London: Academic Press, p. 291.

## EXCURSUS E4. CLIMATE AND AGRICULTURE INDICATORS

### E4.1 CLIMATE CHANGE

In order to assess trends in the climatic environment in which conflicts were conducted, seeking at the broadest level to look at “favourable” and “less favourable” conditions, a number of proxy indicators of climate have been used. These proxies are very varied in coverage, approach to analysis and units of measurement,<sup>87</sup> with the result that they must be converted to a simple common base. The raw data was downloaded and converted to BCE/CE dates and missing years were linearly interpolated. The resultant time series were expressed as a standardised index (minimum value = 1, maximum value = 120)<sup>88</sup> and inverted (120-score) where necessary so that high values more consistently signified favourable conditions. These indices were grouped by region and, where individual indices did not cover the entire time period 1250 BCE to 1850 CE, they were extrapolated to cover the entire period, using those series that did continue, and their relationship to the truncated time series estimated from the last thirty years of joint records. This was done to avoid sudden leaps in regional averages when one of the indices ceased to be available. A single composite index was then calculated for each year in the region, averaging the available indices. People do not respond solely to year-on-year changes in climate, so in order to obtain coverage of medium and longer term changes, for each year, the average for the previous 10 years and 30 years was also calculated.

These basic proxy indicators, identified from the figures of Brooke (2014),<sup>89</sup> and also from the National Oceanic and Atmospheric Administration's National Climatic Data Center (Shah et al., 2011)<sup>90</sup> are:

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<sup>87</sup> E.g. different regions, different time periods, examining rainfall, temperature, season, tree rings, stalagmites, lakes, icecaps, ocean deposits etc.

<sup>88</sup> In the unlikely event of all 3,100 years returning the same value, the index would be 60.5, i.e.  $(1+120)/2$ , throughout. The design of the index ensures that, unlike the situation with z-scores which are sometimes used for this purpose, there is no possibility of one data series dominating the outcome as a consequence of generating more extreme outlying cases.

<sup>89</sup> Brooke, J. (2014) *Climate Change and the Course of Global History: A Rough Journey*. Cambridge: Cambridge University Press p.17, p.111, p.245.

<sup>90</sup> Shah, A., Morrill, C., Gille, E., Gross, W., Anderson, D., Bauer, B., Buckner, R. and Hartman, M. (2011) *Global speleothem oxygen isotope measurements since the Last Glacial Maximum*. National Oceanic and Atmospheric Administration's National Climatic Data Center, Boulder, Colorado, USA. Available at: <ftp://ftp.ncdc.noaa.gov/pub/data/paleo/syntrace/speleothem/speleothem-d18o-1yr-avg.csv>

- a) Inner Asia: Mongolia: Siberian High Pressure (Rohling et al., 2002),<sup>91</sup> tree rings (Briffa et al., 2002<sup>92</sup> & 2013<sup>93</sup>); Davi et al. (2011),<sup>94</sup> Buntgen et al. (2016)<sup>95</sup>
- b) Inner Asia: Turkestan: North China: Winter Monsoon (Yancheva et al., 2007;<sup>96</sup> Davi et al, 2015),<sup>97</sup> tree rings (Yang et al, 2014;<sup>98</sup> Hou et al., 2016),<sup>99</sup> ice cap oxygen isotopes (Thompson et al., 2006)<sup>100</sup>
- c) China: Summer Monsoon (Dykoski et al., 2005;<sup>101</sup> Cai et al., 2010;<sup>102</sup> Yang et al., 2010;<sup>103</sup> Dong et al., 2010;<sup>104</sup> Cosford et al. 2008<sup>105</sup>), temperature (Yang et al., 2002;<sup>106</sup> Tan et al., 2003;<sup>107</sup> Yuan et al. 2004;<sup>108</sup> Wang, 2005;<sup>109</sup> Ge et al., 2013<sup>110</sup>)

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- <sup>91</sup> Rohling, E., Mayewski, P., Abu-Zied, H., Casford, J. and Hayes, A. (2002) 'Holocene Atmosphere-Ocean Interactions: Records from Greenland and the Aegean Sea', *Climate Dynamics*, 18, p. 587.
  - <sup>92</sup> Briffa, K., Jones, P., Schweingruber, F., Shiyatov, S. and Cook, E. (2002) 'Unusual twentieth-century summer warmth in a 1,000-year temperature record from Siberia', *Nature*, (376 ), pp. 56 - 159.
  - <sup>93</sup> Briffa, K., Melvin, T., Osborn, T., Hantemirov, R., Kirilyanov, A., Mazepa, V., Shiyatov, S. and Esper, J. (2013) 'Reassessing the evidence for tree-growth and inferred temperature change during the Common Era in Yamalia, northwest Siberia', *Quaternary Science Reviews*, 7, pp. 83-107.
  - <sup>94</sup> Davi, N., Jacoby, G., Fang, K., Li, J., D'Arrigo, R., Baatarbileg, N. and Robinson, D. (2011) 'Reconstructing drought variability for Mongolia based on a large-scale tree ring network: 1520 – 1993,' *J. Geophys. Res.*, (115), pp. D22-103.
  - <sup>95</sup> Buntgen, U., Myglan, V., Charpentier, F., Ljungqvist, F., McCormick, M., Di Cosmo, N., Sigl, M., Jungclaus, J., Wagner, S., Krusic, P., Esper, J., Kaplan, J., de Vaan, M., Luterbacher, J., Wacker, L., Tegel, W. and Kirilyanov, A. (2016) 'Cooling and societal change in the Late Antique Little Ice Age from 536 to around 660AD', *Nature Geoscience*, online, pp. 1-5.
  - <sup>96</sup> Yancheva, G., Nowaczyk, N., Mingram, P., Dulski, P., Schutler, G., Negenbink, J., Liu, J., Sigman, J., Petersen, L. and Haug, G. (2007) 'Influence of the Intertropical Convergence Zone on the East Asian Monsoon', *Nature*, 445, pp. 74.
  - <sup>97</sup> Davi, N., D'Arrigo, R., Jacoby, G., Cook, E., Anchukaitis, K., Nachin, B., Rao, M. and Leland, C. (2015) 'A long-term context (931-2005 C.E.) for rapid warming over Central Asia', *Quaternary Science Reviews*, (121), pp. 89-97.
  - <sup>98</sup> Yang, B., Qin, C., Wang, J., He, M., Melvin, T., Osborn, T. and Briffa, K. (2014) 'A 3500-year tree-ring record of annual precipitation on the northeastern Tibetan Plateau', *Proceedings of the National Academy of Sciences*
  - <sup>99</sup> Hou, J., Huang, Y., Zhao, J., Liu, Z., Colman, S. and An, Z. (2016) 'Large Holocene summer temperature oscillations and impact on the peopling of the northeastern Tibetan Plateau', *Geophysical Research Letters* 43(3), pp. 1323-1330.
  - <sup>100</sup> Thompson, L., Yao, T., Davis, M., Mosley-Thompson, E., Mashiotta, T., Lin, P., Mikhalevko, V. and Zagorodnov, V. (2006) 'Holocene climate variability archived in the Puruogangri ice cap on the central Tibetan Plateau', *Annals of Glaciology*, 43(1), pp. 61-69.
  - <sup>101</sup> Dykoski, C., Lawrence Edward, R., Hai, C., Daoxian, Y., Yanjian, C., Meikang, Z., Yushi, L., Jaiming, Q., Zhisheng, A. and Renenaugh, J. (2005) 'A High-Resolution, Absolute-Dated Holocene and Deglacia Asia Monsoon Record from Dongge Cave China', *Earth and Planetary Science Letters*, 233, p.71.
  - <sup>102</sup> Cai, Y., Tan, L., Cheng, H., An, Z., Edwards, R., Kelly, M., Kong, X. and Wang, X. (2010) 'The variation of summer monsoon precipitation in central China since the last deglaciation', *Earth and Planetary Science Letters*, 291, pp. 21-31.
  - <sup>103</sup> Yang, Y., Yuan, D., Cheng, H., Zhang, M., Qin, J., Lin, Y., Zhu, X. and Edwards, R. (2010) 'Precise dating of abrupt shifts in the Asian Monsoon during the last deglaciation based on stalagmite data from Yamen Cave, Guizhou Province, China', *China Earth Science*, 53(5), pp. 633-641.
  - <sup>104</sup> Dong, J., Wang, Y., Cheng, H., Hardt, B., Edwards, R., Kong, X., Wu, J., Chen, S., Liu, D., Jiang, X. and Zhao, K. (2010) 'A high-resolution stalagmite record of the Holocene East Asian monsoon from Mt Shennongjia, central China', *The Holocene*, 20(2), pp. 257-264.
  - <sup>105</sup> Cosford, J., Qing, H., Yuan, D., Zhang, M., Holmden, C., Patterson, W. and Hai, C. (2008) 'Millennial-scale variability in the Asian monsoon: Evidence from oxygen isotope records from stalagmites in southeastern China', *Palaeogeography, Palaeoclimatology, Palaeoecology*, (266), pp. 3–12.
  - <sup>106</sup> Yang, B., Braeuning, A., Johnson, K. and Yafeng, S. (2002) 'General characteristics of temperature variation in China during the last two millennia', *Geophysical Research Letters* (10.1029), pp. 2001 GL014485.
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  - <sup>109</sup> Wang, Y., Cheng, H., Edwards, R., He, Y., Kong, X., An, Z., Wu, J., Kelly, M., Dykoski, C. and Li, X. (2005) 'The Holocene Asian Monsoon: Links to Solar Changes and North Atlantic Climate', *Science*, 308, pp. 854-857.
  - <sup>110</sup> Ge, Q., Hao, Z., Zheng, J. and Shao, X. (2013) 'Temperature changes over the past 2000 yr in China and comparison with the Northern Hemisphere', *Climate of the Past*, 9, pp. 1153-1160

- d) West Africa: rainfall (Shanahan et al., 2009)<sup>111</sup> where the pattern of increasing aridity agrees with previous estimates; <sup>112</sup> Chalie (2002)<sup>113</sup>
- e) India: rainfall (von Rod et al. 1999)<sup>114</sup>
- f) Europe: North Atlantic Anomaly (Bond et al., 2001;<sup>115</sup> Meittinen et al., 2015<sup>116</sup>), temperature (Drysdale et al., 2006;<sup>117</sup> Boch et al., 2009<sup>118</sup>), tree rings (Briffa et al., 2008;<sup>119</sup> Esper et al., 2014<sup>120</sup>) Balkans: temperature (Constantin et al., 2007)<sup>121</sup>
- g) Anatolia: rainfall (Fleitmann et al., 2009)<sup>122</sup>

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<sup>111</sup> Shanahan, T., Overpeck, J., Anchukaitis, K., Beck, J., Cole, J., Dettman, D., Peck, J., Scholz, C. and King, J. (2009) 'Atlantic Forcing of Persistent Drought in West Africa', *Science*, 324, p. 377.

<sup>112</sup> e.g. as outlined in McIntosh, R. J. (2005) *Ancient Middle Niger: Urbanism and the Self-Organising Landscape*. Cambridge: Cambridge University Press, p.78. This links increased ENSO variability to variable rainfall, with low rain in El Niño years.

<sup>113</sup> Chalie, F. G. G. (2002) 'Late-Glacial Holocene Diatom Record of water chemistry and Lake Level Change from the Tropical East Africa Rift Lake Abiyata (Ethiopia)', *Paleogeography, Palaeoclimatology, Paleoeocology*, 187, pp. 259.

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<sup>116</sup> Meittinen, A., Divine, D., Husum, K., Koç, N. and Jennings, A. (2015) 'Exceptional ocean surface conditions on the SE Greenland shelf during the Medieval Climate Anomaly', *Paleoceanography*, 30, pp. 1657-1674.

<sup>117</sup> Drysdale, R., Zanchetta, G., Hellstrom, J., Maas, R., Fallick, A., Picket, M., Cartwright, I. and Piccini, L. (2006) 'Late Holocene drought responsible for the collapse of Old World civilizations is recorded in an Italian cave flowstone', *Geology*, 34 pp. 101–104.

<sup>118</sup> Boch, R., Spötl, C. and Kramers, J. (2009) 'High-resolution isotope records of early Holocene rapid climate change from two coeval stalagmites of Katerloch Cave, Austria', *Quaternary Science Reviews*, 28, pp. 2527-2538.

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<sup>120</sup> Esper, J., Duthorn, E., Krusic, P., Timonen, M. and Büntgen, U. (2014) 'Northern European summer temperature variations over the Common Era from integrated tree-ring density records', *Journal of Quaternary Science*, 29(5), pp. 487-494.

<sup>121</sup> Constantin, S., Bojar, A.-V., Lauritzen, S.-E. and Lundberg, J. (2007) 'Holocene and Late Pleistocene climate in the sub-Mediterranean continental environment: A speleothem record from Poleva Cave (Southern Carpathians, Romania)', *Paleogeography, Palaeoclimatology, Paleoeocology*, 243, pp. 322–338.

<sup>122</sup> Fleitmann, D., Cheng, H., Badertscher, S., Edwards, R., Mudelsee, M., Göktürk, O., Fankhauser, A., Pickering, R., Raible, C., Matter, A., Kramers, J. and Tüysüz, O. (2009) 'Timing and climatic impact of Greenland interstadials recorded in stalagmites from northern Turkey', *Geophys. Res. Lett*, 36, pp. L19707



- h) Arabia: rainfall (Fleitmann et al., 2007;<sup>123</sup> Shakun et al., 2007<sup>124</sup>), monsoon (Neff et al., 2001),<sup>125</sup> temperature (Vaks et al., 2007)<sup>126</sup> Syria: rainfall (Bar-Matthew et al., 2003;<sup>127</sup> Kaufman & Matthews, 2003<sup>128</sup>), temperature (Frumkin et al., 1999)<sup>129</sup>
- i) Egypt: East Africa rain (Russell et al., 2003)<sup>130</sup>. The Nile is the source of Egyptian water and its flooding depends on East African rainfall
- j) North Africa: drought severity (Esper et al., 2007)<sup>131</sup>
- k) Sahara/Sahel: average of West Africa and North Africa <sup>132</sup>
- l) Impact of volcanic eruptions: GISP2 sulphates (Zielinski et al., 1994)<sup>133</sup>, NEEM and NGRIP sulphates (Sigl et al., 2015)<sup>134</sup>. The emissions from volcanic eruptions result in widespread climatic cooling at random intervals. The effect on rainfall is dependent on the location of eruption and the location of concern, e.g. the Western Mediterranean is (on average) wetter for some years after large tropical explosive eruptions, while north-western Europe is drier.<sup>135</sup>
- m) Solar Irradiance (Steinilber et al., 2009) <sup>136</sup>
- n) Northern Hemisphere temperatures (Kobashi et al., 2013)<sup>137</sup>

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<sup>128</sup> Kaufman, D. and Matthews, A. (2003) 'Paleoclimate reconstruction based on the timing of speleothem growth and oxygen and carbon isotope composition in a cave located in the rain shadow in Israel', *Quaternary Research*, 59, pp. 139-284.

<sup>129</sup> Frumkin, A., Ford, D. and Schwarcz, H. (1999) 'Continental Oxygen Isotopic Record of the Last 170,000 Years in Jerusalem', *Quaternary Research*, 51, pp. 317-327.

<sup>130</sup> Russell, J., Johnson, T. and Talbot, M. (2003) '725 yr Cycle in the Climate of Central Africa in the Late Holocene', *Geology*, 31, p. 677.

<sup>131</sup> Esper, J., Frank, D., Büntgen, U., Verstege, A., Luterbacher, J. and Xoplaki, E. (2007) 'Long-term drought severity variations in Morocco', *Geophysical Research Letters*, (34), pp. L17702

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<sup>136</sup> Steinilber, F. and Beer, J., Fröhlich, C. (2009) 'Total solar irradiance during the Holocene', *Geophysical Research Letters*.

<sup>137</sup> Kobashi, T., Goto-Azuma, K., Box, J. E., Gao, C.-C. and Nakaegawa, T. (2013) 'Causes of Greenland temperature variability over the past 4000 yr: implications for northern hemispheric temperature changes', *Climate of the Past*, 9(2), pp. 2200-2317.



## Case 2 Calculation of Climatic Index

Excursus 4.1 addresses the expression of climatic measures as indices

**Example 1:** Shanahan et al. (2009) have  $O^{18}$  data from sediments in Lake Bosumtwi, Ghana, that suggests a five year  $d18O$  average of 2.26 in 1838 CE, and 1.61 in 1833 CE. This suggests that the level in the intervening year of 1837 CE was  $2.26 - (2.26 - 1.61) / 5 = 2.13$ . By similar interpolation, annual estimates can be derived back to 702 BCE when the series starts. With an average of 2.10 and a standard deviation of 0.99 over 2542 years, these figures standardise to 0.168 for 1838, 0.035 for 1837 and -0.493 for 1833. Rebased as an index (1-120) using the minimum and maximum standardised scores (-6.34 and 4.84) derived from all of the eighteen initial climate measures that are used to assess climatic, so that none of the scores fall outside the index range, they are 68 (1838), 61 (1837), and 65 (1833). These values suggest a slight deterioration in the mid-period climatic conditions of the area, followed by improvement.

**Example 2:** Thompson et al. (2011) have annual  $O^{18}$  data from ice cores taken from the Puruogangri glacier in Tibet. These show an average of -14.77 for  $d18O$  per mille in 1069 CE and -14.59 in 1059 CE. Interpolation for for the intervening year of 1066 CE suggests a value of -14.71. Annual estimates can be calculated back to 1 CE, the start of the series. These 1850 annual estimates yield an average of -14.97 and a standard deviation of 0.61, standardising the 1066 estimate as 0.552. This rebases to a score of 74 for 1066, suggesting that Tibet in 1066 (74) may have been climatically a relatively colder year than 1837 in Ghana (61).

On the assumption that in general, cold conditions are worse, the two above series are rebased to (120 – Index), i.e. 59 for Ghana in 1837, 46 for Tibet in 1066.

To calculate an overall summary regional index, the eighteen indices (together with four further indices identified subsequently) are allocated to the regions where the site was located, or where the indices might reasonably be considered relevant. An index may be allocated to more than one region. Thus, the material presented by Bond et al. (2001) on the North Atlantic climate does not relate to a site falling within any of the regions, being derived from Greenland data, but is likely to be relevant to Europe, Iberia and North Africa. The average of the allocated indices is calculated for each year. Accordingly in 1066, the indices for Puruogangri (46), Dongge Cave (53), Quinghai (59) and two All China estimates (87 and 95) average out as 67 for China. In 1837, the Bosumtwi index of 59, averaged with an East Africa index of 68, yields an estimate of 64 for the Sudan region.

Where a region has no index allocated, its index value is calculated using the average of its neighbours' indices. To avoid leaps in averaged index values when one series terminates (not all start at the same date), an estimate is inserted, based on the average ratio of the terminated series to the other series, derived from the period of their overlap.

## E4.2 DROUGHT

The Monsoon Asia<sup>138</sup> and Old World Drought Atlases<sup>139</sup> provide annual estimates of drought and high rainfall (pluvials), expressed in terms of local climate, but as noted in Chapter 4, there are

<sup>138</sup> Cook, E., R. Anchukaitis, D., Buckley, B., M., D'Arrigo, R., D., Jacoby, G., C., Wright, (2010) 'Asian Monsoon Failure and Megadrought During the Last Millennium', *Science*, 328(5977), pp. 486-489.

<sup>139</sup> Cook, Edward R., Seager, R., Kushnir, Y., Briffa, K., R., Büntgen, Ulf, Frank, D., Krusic, P., J., Tegel, W., der, v., Schrier, G., Andreu-Hayles, L., Baillie, M., Baittinger, Claudia, Bleicher, N., Bonde, N., Brown, D., Carrer, Marco, Cooper, R., Čufar, K., Dittmar, C., Esper, J., Griggs, C., Gunnarson, B., Günther, B., Gutierrez, E., Haneca, K., Helama, S., Herzig, F., Heussner, Karl-Uwe, Hofmann, J., Janda, P., Kontic, R., Köse, N., Kyncl, T., Levanič, T., Linderholm, H., Manning, S., Melvin, T., M., Miles, D., Neuwirth, Burkhard, Nicolussi, K., Nola, P., Panayotov, Momchil, Popa, I., Rothe, A., Seftigen, K., Seim, Andrea, Svarva, H., Svoboda, M., Thun, T., Timonen, M., Touchan, R., Trotsiuk, V., Trouet, V.,

challenges in using these datasets. The time periods covered in the Old World Atlas are much longer, extending back to 1CE in northwest Europe and to later dates up to 1170 in areas to the south and east as far as Iran and the Maghrib, where less dendrochronological material was available. The Monsoon Asia Atlas extends back only to 1300, and while an update is long-expected, it is still in progress. The coverage of the two atlases leaves a belt of territory between them, through Iran and Turkestan, which lacks data while the Sudan is completely out of scope for both atlases. Furthermore, the calculation of annual regional averages relevant to the analyses presented later in this thesis, where data is available to permit the calculation, requires GIS conversion of the atlas data for each individual year to a raster format for subsequent electronic analysis and saving of the result. This is effectively a manual task which would have to be repeated for each year and twice for each year post-1300 (i.e. 2,400 repetitions) and would still leave Sudan, part of Iran/Turkestan and the BCE period excluded.

Consequently, a random sample of 100 individual years from the period 1-1850 CE (5.4%) was taken and average drought results obtained for each of the 1261 region-years available (66.4% of values were available). For each region, a regression equation of drought values against the available climate change data (see above) was computed and the equation extrapolated to estimate missing drought values. Drought values for the Sudan belt were extrapolated from results for the neighbouring Sahel/Sahara, Egypt and Arabia regions. More sophisticated approaches based on regression techniques have been recently been developed, and are available for future researchers.<sup>140</sup>

### Case 3 Calculation of Drought Index

Following from Excursus 4.2, for 28 CE, the Drought Rating in the Balkans was 1.82, and in the Baltic, it was -0.50. In 68 CE, the corresponding ratings were -0.57 and 0.22. The Climate Change (Excursus 4.1) measures were 67 in the Balkans and 74 in the Baltic in 28 CE, and 67 and 73 respectively in 68 CE. The presence of a high drought score, as might be expected, is associated with climate changes for the worse (lower score). A regression equation for each region is calculated from a 100-case random sample to link Drought Rating and Climate Change. These equations provide an estimate of Drought Rating for each year over the entire period.

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Walder, F., Ważny, Tomasz, Wilson, Rob, Zang, (2015) 'Old World megadroughts and pluvials during the Common Era', *Science Advances*, 1(10).

<sup>140</sup> Steiger, N. J., Smerdon, J. E., Cook, B. I., Seager, R., Williams, A. P. and Cook, E. R. (2019) 'Oceanic and radiative forcing of medieval megadroughts in the American Southwest', *Sci. Adv.*, 5, pp. eaax0087; Steiger, N. J., Smerdon, J. E., Cook, E. R. and Cook, B. (2018) 'A reconstruction of global hydroclimate and dynamical variables over the Common Era', *SCIENTIFIC DATA* | 5, (180086).

### **E4.3 EL NIÑO SOUTHERN OSCILLATION (ENSO)**

The annual estimate of historical historic duration and strength of ENSO events is based on data for lacustrine flood deposits in Ecuador.<sup>141</sup> The number and size of floods varies each year. Because the basic data is derived from a South American site, where heavy rainfall is aligned with the El Niño phase of ENSO, heavy floods tend to be associated with El Niño. Large floods (defined as one standard deviation above the mean) may be taken as El Niño type events, while small floods (one standard deviation below the mean) may be regarded as indicative of La Niña type events. The average number of events in each category can be calculated as a score for each year, and taken in parallel, they give a measure of whether that year may be more strongly associated with El Niño or La Niña.

It is important to bear in mind that the El Niño phase does not have a uniform effect on all parts of the world. During the El Niño phase, some parts of the world experience the kind of effects that are associated with La Niña in South America (low rainfall), while some regions are less strongly affected than others.<sup>142</sup> The regional rating of the current effect of ENSO events on precipitation is given in Table E4.1, and the estimated weights derived from this are applied to the flood data to give an indication of the likely impact of ENSO on rainfall in a specific region.

Given that pastoralists are more affected by runs of weather over a period of time, while arable farmers are often more quickly impacted by annual fluctuations, both ten-year and thirty-year averages for the levels of El Niño and La Niña events are computed as well. In addition, the scores are also summed to reflect the degree of disturbed weather, with the degree of variability in the weather estimated for each year from the recorded standard deviation of the preceding ten-year and thirty-year period.

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<sup>141</sup> Moy, C. M., Seltzer, G., Rodbell, T. and Anderson, D. M. (2002) 'Variability of El Niño/Southern Oscillation activity at millennial timescales during the Holocene epoch', *Nature Volume 420 162-165 14 November 2002*, 420, pp. 162-165.

<sup>142</sup> Consequently, in one location, a region may be wet in El Niño years, while its neighbour is wet in La Niña years. In another location, two adjacent regions may both be wet in El Niño years, or in La Niña years. For examples, see Klingamen, N. and Keat, W. (2018) *El Niño 2018-19: Historical Impact Analysis October 2018* Reading, Department for International Development.

#### Case 4 Rating of ENSO events

In 659 CE, according to lake deposit sediments, there were 5 floods in Laguna Pallcacocha, southern Ecuador (see main text for citation), with an average Intensity of 134.6. In 476 CE, there were 2 floods with average colour intensity of 58.0. In the ten years preceeding 476 CE, there were no exceptional El Niño or La Niña events, which are defined as instances where the average colour intensity was more than one standard deviation above or below the annual average. In the corresponding period before 659 CE, there were 2.42 exceptional El Niño events, with 3.36 exceptional La Niña events.

| Region              | Impact on Precipitation | Reference   | Note  |
|---------------------|-------------------------|---|---|
| Anatolia            | +                       | Dai et al. (2004), <sup>143</sup> Marti (2014) <sup>144</sup>   | Weak on Black Sea coast   |
| Arabia              | ++                      | Krichak et al. (2014) <sup>145</sup>  |   |
| Balkans             | ++                      | Dai & Wrigley (2000), <sup>146</sup> Dai et al. (2004)  |   |
| Baltic              | -                       | Dai & Wrigley (2000), Dai et al. (2004)   |   |
| China               | --                      | Hu et al. (2005) <sup>147</sup>   |   |
| Egypt               | --                      | Hu et al. (2005), Krichak et al. (2014)   | Nile floods are dependent on the monsoon in Ethiopia. Rainfall in Egypt itself is of limited importance |
| Europe              | ++                      | Mason & Goddard (2001), <sup>148</sup> Lorenzo et al. (2009), <sup>149</sup> Krichak et al. (2014)  |   |
| Iberia              | +                       | Lorenzo et al. (2009), Krichak et al. (2014)  |   |
| India               | --                      | Hu et al. (2005)  |   |
| Inner Asia Mongolia | +                       | Krokhin & Luxemburg (2007), <sup>150</sup> Davi et al. (2015), <sup>151</sup> Jiang et al. (2017), <sup>152</sup> Li et al. (2018), <sup>153</sup> Rojas et al. (2018) <sup>154</sup> | Vegetation poorer during ENSO events (Jiang et al., 2017)   |
| Inner Asia Pontic   | ++                      | Mariotti(2007), <sup>155</sup> Rojas et al. (2018)  |   |

**Table E4.1 Impact of ENSO El Niño on Regional Precipitation**

<sup>143</sup> Dai, A., Trenberth, K. E. and Quian, T. (2004) 'A Global Dataset of Palmer Drought Severity Index for 1870–2002: Relationship with Soil Moisture and Effects of Surface Warming', *American Meteorological Society*, (December), pp. 1117-1129.

<sup>144</sup> Marti, A. I. (2014) 'ENSO Effect on Black Sea Precipitation', *Social and Behavioral Sciences*, (140), pp. 274 – 281.

<sup>145</sup> Krichak, S. O., Breitgand, J., S., Silvio Gualdi, S. and Feldstein, S. B. (2014) 'Teleconnection – extreme precipitation relationships over the Mediterranean region', *Theor Appl Climatol.*, 117, pp. 679-692.

<sup>146</sup> Dai, A. and Wigley, T. M. L. (2000) 'Global Patterns of ENSO-induced Precipitation', *Geophysical Research Letters*, 27(9), pp. 1283-1286.

<sup>147</sup> Hu, Z.-Z., Wu, R., Kinter III, J. L. and Yang, S. (2005) 'Connection of Summer Rainfall variations in South and East Asia: Role of el Niño-Southern Oscillation', *Int. J. Climatol.*, 25.

<sup>148</sup> Mason, S. J. and Goddard, L. (2001) 'Probabilistic Precipitation Anomalies Associated with ENSO', *Bulletin of the American Meteorological Society*, 82(4), pp. 619-638.

<sup>149</sup> Lorenzo, M. N., Taboada, J. J., Iglesias, I. and Gómez-Gesteira, M. (2009) 'Predictability of the spring rainfall in Northwestern Iberian Peninsula from sea surfaces temperature of ENSO areas', *Climate Change*.

<sup>150</sup> Krokhin, V., and Luxemburg, W. (2007) 'Temperatures and precipitation totals over the Russian Far East and Eastern Siberia: long-term variability and its links to teleconnection indices', *Hydrol. Earth Syst. Sci.*, 11, pp. 1831-1841

<sup>151</sup> Davi, N., D'Arrigo, R., Jacoby, G., Cook, E., Anchukaitis, K., Nachin, B., Rao, M. and Leland, C. (2015) 'A long-term context (931-2005 C.E.) for rapid warming over Central Asia', *Quaternary Science Reviews*, (121), pp. 89-97.

<sup>152</sup> Jiang, G., Zhao, T., Liu, J., Xu, L., Yu, G., He, H., Krebs, C. J. and Zhang, Z. (2011) 'Effects of ENSO-linked climate and vegetation on population dynamics of sympatric rodent species in semiarid grasslands of Inner Mongolia, China', *Canadian Journal of Zoology*, 89(8), pp. 678-691.

<sup>153</sup> Li, W., Duan, L., Yanyun, L., Liu, T. and Scharaw, B. (2018) 'Spatiotemporal Characteristics of Extreme Precipitation Regimes in the Eastern Inland River Basin of Inner Mongolian Plateau, China', *Water*, 10.

<sup>154</sup> Rojas, O., Piersante, A., Cumani, M. and Li, Y. (2018) 'Understanding the drought impact of El Niño/La Niña in the grain production areas in Eastern Europe and Central Asia (ECA): Russia, Ukraine and Kazakhstan (RUK) The World Bank and FAO.

<sup>155</sup> Mariotti, A. (2007) 'How ENSO impacts precipitation in southwest central Asia', *Geophys. Res. Lett.*, 34, pp. L16706.

| Region                | Impact on Precipitation | Reference  | Note                        |
|-----------------------|-------------------------|--|-----------------------------|
| Inner Asia Turkestan  | ++                      | Mariotti(2007), Liess et al. (2017), <sup>156</sup> Rojas et al. (2018)  |                             |
| Iran                  | ++                      | Mariotti(2007), Krichak et al. (2014)  |                             |
| Mesopotamia           | ++                      | Mariotti(2007), Krichak et al. (2014)  |                             |
| North Africa Arable   | +                       | Mason & Goddard (2001), Donat et al. (2004), <sup>157</sup> Tremblay et al. (2013), <sup>158</sup> Krichak et al. (2014) | Effect weakens westward     |
| North Africa Pastoral | +                       | Mason & Goddard (2001), , Donat et al. (2004), Tremblay et al. (2013), Krichak et al. (2014)                             | Effect weakens westward     |
| Russia                | -                       | Ionita (2014), <sup>159</sup> Mokhova & Timazhev (2017), <sup>160</sup> Rojas et al. (2018)                              |                             |
| Sahel/Sahara          | -                       | Mason & Goddard (2001), Rodriguez et al. (2015) <sup>161</sup>   | Dust levels reduced in ENSO |
| Sudan Belt            | --                      | Dai & Wrigley (2000)   |                             |
| Syria                 | +                       | Krichak et al. (2014)  |                             |
| All regions           | Variable                | Philander (1990), <sup>162</sup> Thompson et al. (1992), <sup>163</sup> Allan et al. (1996) <sup>164</sup>               |                             |

**Table E4.1 Impact of ENSO El Niño on Regional Precipitation (continued)**

Impact on Precipitation of ENSO

|                      |         |      |
|----------------------|---------|------|
| ++ Definite increase | Weight: | +1.0 |
| + Possible increase  | Weight: | +0.5 |
| n Neutral            | Weight: | 0.0  |
| – Possible reduction | Weight: | -0.5 |
| – Definite reduction | Weight: | -1.0 |

<sup>156</sup> Liess, S., Agrawal, S., Chatterjee, S. and Kumar, V. (2017) 'A Teleconnection between the West Siberian Plain and the ENSO Region', *Journal of Climate*, 30(301-315), p. 301.

<sup>157</sup> Donat, M. G., Peterson, T. C., Brunet, M., King, A. D., Almazroui, M., Kolli, R. K., Boucher, D., Al-Mulla, A. Y., Nour, A., Youssouf, Aly, A. A., Nada, T. A. A., Semawi, M. M., Al Dashti, H., Abdullah., Salhab, T. G., El Fadli, K. I., Muftah, M. K., Eida, S. D., Badi, W., Driouech, F., El Rhaz, K., Abubaker, M. J. Y., Ghulam, A. S., Erayah, A. S., Ben Mansour, M., Alabdouli, W. O., Al Dhanhani, J. e., Salem., Al Shekaili, M. N., (2014) 'Changes in extreme temperature and precipitation in the Arab region: long-term trends and variability related to ENSO and NAO', *Int. J. Climatol.*, 34, pp. 581-592.

<sup>158</sup> Trambly, Y., El Adlouni, S. and Servat, E. (2013) 'Trends and variability in extreme precipitation indices over Maghreb countries', *Nat. Hazards Earth Syst. Sci.*, 13, pp. 3235-3248.

<sup>159</sup> Ionita, M. (2014) 'The Impact of the East Atlantic/Western Russia Pattern on the Hydroclimatology of Europe from Mid-Winter to Late Spring', *Climate*, (2), pp. 296-309.

<sup>160</sup> Mokhova, I. I. and Timazhev, A. V. (2017) 'Assessing the Probability of El Nino-related Weather and Climate Anomalies in Russian Regions', *Russian Meteorology and Hydrology*, 42(10), pp. 635-643.

<sup>161</sup> Rodríguez, S., Cuevas, E., Prospero, J. M., Alastuey, A., Querol, X., López-Solano, J., García, M. I. and Alonso-Pérez, S. (2015) 'Modulation of Saharan dust export by the North African dipole', *Atmos. Chem. Phys.*, 15, pp. 7471-7486.

<sup>162</sup> Philander, G. (1990) *El Niño, La Niña and the Southern Oscillation*. San Diego: Academic Press Inc.

<sup>163</sup> Thompson, L., Mosley-Thompson, E. and Thompson, P. (1992) 'Reconstructing interannual climate variability from tropical and sub-tropical ice core records', in Diaz, H.F. & Margraf, V. (eds.) *El Niño Historical and Palaeoclimatic aspects of the Southern Oscillation*. Cambridge: Cambridge University Press, pp. 295-323

<sup>164</sup> Allan, R., Lindsay, J. and Park, D. (1996) *El Niño, Southern Oscillation and Climatic Variability*. Collingwood: CSIRO Publishing.



#### E4.4 CLIMATE AND PRIMARY PRODUCTION

Average estimates of modern regional climatic conditions and net primary production are calculated using ARC-GIS to consolidate database information to regions (with regional estimates indexed to 120 for maximum score) as follows:

|   |  |
|---|--|
| a) Temperature                            | Title and Bemmels (2017) <sup>165</sup>  |
| b) Precipitation                          | Title and Bemmels (2017)                 |
| c) Aridity                                | Trabucco and Zomer (2009) <sup>166</sup> |
| d) Potential Evapo-Transpiration          | Trabucco and Zomer (2009)                |
| e) Growing Degree Days (0 degrees C base) | Title and Bemmels (2017)                 |
| f) Net Primary Production                 | Zhao and Running (2010) <sup>167</sup>   |

#### E4.5 AVAILABLE WATER, NON-ARIDITY AND BIOCAPACITY

L'vovich (1979) provides a worldwide assessment of water resources and aridity, although the data is at its most robust in the context of the Soviet Union.<sup>168</sup> More modern data seems to concentrate on vegetated areas or on desert area. The World Evapotranspiration webviewer and its associated ARCGIS functions relating to precipitation, evaporation and water balance allow sampling of the situation across regions to assist in the production of indices of aridity.<sup>169</sup> The overall average of Egypt has been adjusted, to take account of the fact that the Nile valley is arid but well-watered by the river, allowing a population far in excess of what any other part of the region could currently support.

National Footprint Accounts (2016) give an assessment of biocapacity which can be converted into an index that gives a broad indication of regional productivity. As with population, adjustment is required to secure alignment of national data with the regions. National data on proportion of desert and good soil<sup>170</sup> is converted into regional format (again indexed to 120 for the maximum score).

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<sup>165</sup> Title, Pascal O. and Bemmels, Jordan B, (2017) 'ENVIREM: an expanded set of bioclimatic and topographic variables' op. cit.

<sup>166</sup> Trabucco, A. and Zomer, R. J. (2009) 'Global aridity index (global-aridity) and global potential evapo-transpiration (global-PET) geospatial database'. 2009 CGIAR Consortium for Spatial Information CGIAR-CSI GeoPortal

<sup>167</sup> Zhao, M. and Running, S. W. (2010) 'Drought-Induced Reduction in Global Terrestrial Net Primary Production from 2000 Through 2009', *Science* 329(5994), pp. 940-943.

<sup>168</sup> L'vovich, M. (1979) *World water resources and their future*. Translated by: Nace, R. Electronic: American Geophysical Union.

<sup>169</sup> At <https://www.esri.com/arcgis-blog/products/arcgis-online/mapping/world-average-annual-evapotranspiration-web-map-now-available/> (accessed 30/06/2021).

<sup>170</sup> Nunn, N. and Puga, D. (2012) 'Ruggedness: the blessing of bad geography in Africa', *The Review of Economics and Statistics*, 94(1), pp. 20-36.

It is recognised that human development of the earth will have changed the rating of biocapacity in particular, but also water resources. It is a matter of historical debate whether the conflicts analysed here actually impacted on irrigation systems in Iraq, and the Mongols certainly considered the possibility of changing land use from cultivation to pasture.<sup>171</sup> The information to develop a time series at regional level is currently absent.

### Case 5 Rating of Water Availability, Non-aridity and Biocapacity

Chapter 4 cites Water Availability, Non-Aridity and Biocapacity as relevant to agriculture. Excursus 4.5 notes that the data are estimates based upon modern conditions and changes over time are not monitored. Historical data appears to be limited at present. As with the population data, some contemporary states must be disaggregated, and reconfigured to the regions used in the study. Data relating to water availability in desert areas tend to be as sparse as the water itself, but they do exist.

**Example 1:** Finland is estimated to receive 185 cubic kilometres of water in precipitation annually, and to lose 79 cubic kilometres in evapotranspiration, leaving a residue of 85 cubic kilometres as runoff. This amounts to 314.5 metres of water per square kilometre of area (0.86 metres daily). Countries such as the Netherlands and Iraq also receive water as runoff from neighbouring countries (e.g. River Rhine and tributaries, Rivers Tigris, Euphrates and tributaries).

The regional residue is then expressed in terms of the maximum regional residue (China: 581 metres of water per square kilometre = 120), so that the residue for Arabia (6 metres of water) is indexed as 1.24 (rounded to 1) and for Balkans (434 metres of water) indexed as 90.

**Example 2:** It is estimated that annual precipitation at the intersection of Niger, Libya and Algeria in the Sahara desert is 10 mm, compared with potential evapotranspiration of 9mm, in an area where wider averages are 24 mm and 28 mm, respectively. For the wider area, this corresponds to a Non-Aridity measure of 0.85 (Precipitation/Potential Evapotranspiration = 24 / 28 = 0.85). By contrast, the vegetation zone of European Mixed Forest, with precipitation of 715 mm and potential evaporation of 645 mm has a Non-Aridity measure of 1.11. The average Non-Aridity measure for a variety of vegetation and climate types is 0.981. The average ratio of Non-Aridity measure to percentage of precipitation retained, after evapotranspiration, for run off is 0.045. Applied to national data, this allows the national Non-Aridity measure to be calculated, e.g. Norway with 86.4% of precipitation available for run-off, has a Non-Aridity measure of 3.9. The national data is combined into regional scores (e.g. China 2.93, Arabia 0.24, India 1.81) which, setting an index of 120 for China, the maximum score, gives an index of 10 for Arabia, and 75 for India.

**Example 3:** The Biocapacity of Mongolia has been estimated as equivalent to 15.66 hectares of land per capita population, mostly grazing and forest. Converted into hectares per square kilometre (multiply by population, divide by area), this is 28.0. Chinese Mongolia has a much lower biocapacity (9.3) and when combined, the average for the entire area is 16.4. (By way of contrast, the Biocapacity of Mesopotamia (Iraq) is 0.29 hectares per capita, principally cropland, which equates to 21.7 hectares per square kilometre. On the basis that the productive part of Egypt would be equivalent to 451 hectares per square kilometre (rich lands may produce substantially in excess of the generality of land used in National Footprint accounts), indexing Egypt to 120 leaves Mongolia with a score of 4 and Mesopotamia with a score of 6. Russia and China both score much more highly (97 and 96).

<sup>171</sup> Their consideration of the change was cut short when a Chinese office spelt out the prospect of 500,000 ounces of silver, 80,000 pieces of silk and 400,000 sacks of grain per annum from the province in question, if it were left in cultivation, under Chinese taxation. See Saunders, J. J. (2001) *The History of the Mongol Conquests*. Philadelphia: University of Pennsylvania Press, p.67.

## CHAPTER 5. POPULATION AND POWER, GOVERNMENT, RELIGIONS AND CULTURE

### 5.1 INTRODUCTION

In determining the policy of a polity throughout the course of a conflict or other interaction, there is more to be taken into account than simple military prowess. This chapter surveys a selection of the literature on issues pertaining to population, power, government, culture and religion. It will also consider issues of data management, where appropriate. The size and make-up of a polity's population, their ability to undertake tasks their power to influence other polities, the effectiveness of their government, culture and religion are all likely to impact on the behaviour of groups, and so need to be considered in the analysis. Other factors can be important, and could be, in theory, measured by appropriate variables, but there is a limit to the number of variables that can be meaningfully analysed, even if they are truly independent of each other, which often they are not. This chapter addresses some of the relevant topics briefly, although each may have an extensive literature that could be invoked, since a detailed analysis of each area would probably result in an over-detailed final model. The topics are:

|                       |  |
|-----------------------|--|
| Population and power: | Population is a measure of the power available to a group to undertake successfully the tasks that they set themselves.  |
| Government:           | Government may be more or less limited in its ability to use the power available to its polity   |
| Culture:              | Culture can influence the approach of a society to policies  |
| Religions:            | Religions can impact on the cohesion and attitudes of a society and culture  |
| Excurses:             | These propose measures that can be used to generate data on:<br>Area, Population, and Population Density<br>Polity Power<br>Cultural Complexity<br>Seshat Rating<br>Rating of Religions and Holy War<br>They also look at the use of Terror and Divination |

### 5.2 POPULATION AND POWER

All else being equal, large populations may be generally expected to be more effective in achieving their aims than small populations, whether their aim is conquering their neighbours, burying their ruler in a splendid tomb or acquiring much wealth.<sup>1</sup> All else is, of course, rarely

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<sup>1</sup> They have more workers and hence, most probably, a greater range of skills.

equal. The area of a polity, over which its population is dispersed, can also impact on its ability to achieve results.<sup>2</sup> A dispersed population is forced to devote a greater fraction of its efforts towards communication and transport, compared with a concentrated population.<sup>3</sup> The importance of population has led to a tendency for many pre-modern states to focus their attention on “a struggle more for men than land”, population often being less available than land.<sup>4</sup> Big polities are more powerful than smaller polities, but not on a simple linear basis, as much of their resources are diverted to maintaining their rule over a great many areas, and are not readily redeployed from these areas to other areas where the need for them is greatest.

In terms of metrics, regional areas, populations and population density are based from McEvedy and Jones,<sup>5</sup> who have compiled estimates on a coherent worldwide basis, drawing on the most authoritative regional sources. Excursus E5.1 addresses some issues relating to population.

The estimate of Polity Power (see Excursus E5.2) for tribes, city states or tribal alliance, local powers, regional powers and Imperial powers is based on Finer’s Conceptual Prologue to his *History of Government* on territorial aspects of the state.<sup>6</sup>

### 5.3 GOVERNMENT

Effectiveness, as defined for analysis in this thesis, is a measure of the organisational ability of a polity to achieve results, while loyalty is a measure of the cohesion of the polity. Any rational consideration of strategy requires some provision to represent the parties’ ability to achieve results and to withstand pressure without fracturing into disunion. Finer discusses effectiveness and social cohesion in the light of structural aspects of the state, looking at the allocation of decision-making, decision implementation, and use of armed force to various portions of the community.<sup>7</sup> Fromherz addresses social cohesion and the various sources of legitimation, for

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<sup>2</sup> And, of course, the level of ecological impact/demand on the ecology is dependent on consumption as well as population. See Toth, G. and Szegeti, C. (2016) 'The historical ecological footprint: From over-population to over-consumption', *Ecological Indicators*, 60(January), p.283.

<sup>3</sup> This may be mitigated by access to faster means of transport, e.g., ships in maritime cultures or horses in steppe cultures.

<sup>4</sup> See Scott, J. (2009) *The Art of Not Being Governed: An Anarchist history of Upland Southeast Asia*. New Haven: Yale University Press, p.67. This focus on manpower rather than land is in fact an expression of Liebig’s Law of the Minimum (see 4.9 above) applied to statecraft rather than agriculture. The resource that is least available governs the maximum productivity of the state.

<sup>5</sup> McEvedy, C. and Jones, R. (1985) *Atlas of World Population History*. Harmondsworth: Penguin

<sup>6</sup> Finer, S. (1999a) *The History of Government From the Earliest Times II: The Intermediate Ages*. Oxford: Oxford University Press, pp.6-9.

<sup>7</sup> Finer, S. (1999a), *The History of Government From the Earliest Times II* op. cit. pp.35-96.

the government.<sup>8</sup> These discussions provide a basis for a consistent estimate of relative effectiveness and cohesion for the parties to an interaction on the GIPP database (See Excursus E5.3 for details about the calculations used in the thesis database).

#### 5.4 CULTURE

The culture of a polity affects the range of skills and other resources on which a polity may call in implementing its policies. Murdock and Wilson give an ethnographic analysis based on the characteristics, derived from the literature, of 186 societies, classifying them on factors such as subsistence, the fixity, compactness and size of settlement, density of population, dwelling types, impressive structures, marital residence, family descent, intermarriage and ceremonial.<sup>9</sup> Murdock and Provost extend this work to develop a cultural index (values ranging from 0 to 40)<sup>10</sup> based on writing, fixity of residence,<sup>11</sup> agriculture, urbanisation, technology, land transport, money, population density, political integration and social stratification.<sup>12</sup> There is thus some overlap with other measures. The societies measured on this index may run from simple to complex, the latter being typified by Rome and Babylon, and this is used to assess the cultures involved in conflicts. It is accomplished by extrapolating from the classification of Murdock and Provost which provides a benchmark range of cultures from Fulani (6), Rwala Bedouin (13), Ahaggaren Tuareg (16), Khalka Mongols (22), Songhai (26) and Bambara (28) to Rome, Egypt and Babylon (39). See Excursus E5.4 for how the index is used in the database.

The Seshat historical database has been recently assembled, covering thirty areas world-wide and fifty-one variables at one hundred year intervals. Turchin et al. analysed this wide-ranging database, grouping the variables into sets covering polity size and population, hierarchical complexity, governmental complexity, infrastructure, information systems, literary texts and economics.<sup>13</sup> They demonstrated that a single principal component explained 77% of the

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<sup>8</sup> Fromherz, A. (2013) *The Almohads: The rise of an Islamic Empire*. London: I.B. Tauris, p.195.

<sup>9</sup> Murdock, G. and Wilson, S. (1972) 'Settlement Pattern and Organisation', *Ethnology*, (11), p. 254.

<sup>10</sup> The measure's maximum value of 40 requires the use of the steam engine or internal combustion engine for movement, which precludes every pre-1825 society, and so, effectively every society in scope for this study, from a maximum score. Their maximum score is thus limited to 39.

<sup>11</sup> By definition, nomads score 0 on this specific measure, thus reducing their theoretical maximum score to 34.

<sup>12</sup> Murdock, G. and Provost, C. (1973) 'Measurement of Cultural Complexity', *Ethnology*, (12), p. 379.

<sup>13</sup> Turchin, P., Currie, T. E., Whitehouse, H., François, P., Feeney, K., Mullins, D., Hoyer, D., Collins, C., Grohmann, S., Savage, P., Mendel-Gleason, G., Turner, E., Dupeyron, A., Cioni, E., Reddish, J., Levine, J., Jordan, G., Brandl, E., Williams, A., Cesaretti, R., Krueger, M., Ceccarelli, A., Figliulo-Rosswurm, J., Tuan, P.-J., Peregrine, P., Marciniak, A., Preiser-Kapeller, J., Kradin, N., Korotayev, A., Palmisano, A., Baker, D., Bidmead, J., Bol, P., Christian, D., Cook, C., Covey, A., Feinman, G., Júlíusson, Á. D., Kristinsson, A., Miksic, J., Mostern, R., Petriem, C., Rudiak-Gould, P., ter Haar, B., Wallace, V., Mair, V., Xie, L., Baines, J., Bridges, E., Manning, J., Lockhart, B., Bogaard, A. and Spencer, C. (2018) 'Quantitative historical analysis uncovers a single dimension of complexity that structures global variation in

variance in the variables, suggesting that communities tend to develop their competencies and skills in step over a wide range of matters. This indicates that the analysis undertaken in this thesis may be able to consolidate primary variables into a lesser number of secondary variables, increasing the statistical robustness of the results.

It should be noted that the relative valuation placed on these various competences and skills may differ from culture to culture. A polity dependent on tax and trade may perhaps place greater value on the abilities of an accountant than on those of a bard, contrary perhaps to the preferences of a polity orientated toward warfare and glory, although both types of polity could doubtless find uses for the talents of both. Excursus E5.5 relates to the use of the Seshat database to inform the thesis database.

The nature of the interaction of parties in warfare can be influenced by the nature of their cultural relationship. Morillo takes warfare within a cultural group (intra-cultural) as the base situation and suggests that here, both parties tend to act on common assumptions and there may be accepted rules in mitigation of the effects of warfare.<sup>14</sup> Warfare between different groups (inter-cultural warfare) is much less certain, due to lack of agreed assumptions or indeed any sort of knowledge of the other party, and tends to be more savage. Where distinct and opposed groups develop within a culture to the point of warfare (sub-cultural warfare), they are likely to demonize the other as malicious underminers of the proper order of things, so that warfare is savage and extermination often becomes a goal, for negotiation with the devil is difficult. Terrorism may become routine. Table 5.1 summarizes some of the suggested impacts that cultural difference can have on the nature, conduct and outcome of warfare. Excursus E5.6 spells out how Morillo’s typology is used in the database, while Excursus E5.8 addresses the use of terror.

|                               | <b>Relationship of opponents</b> | <b>Setting</b>           | <b>Conventions of conflict, ritual</b> | <b>Cultural trend</b>          |
|-------------------------------|----------------------------------|--------------------------|--|--------------------------------|
| <b>Intra-cultural warfare</b> | Mutual comprehension             | Warfare within a culture | Normally present; agreed or assumed    | Stability, or reinforcement of |

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human social organization', *Proceedings of the National Academy of Science*, 115 (2), pp. E144-E151.

<sup>14</sup> Morillo, S. (2006) "A General Typology of Transcultural Wars – The Early Middle Ages and Beyond" in *Transcultural Wars from the Middle Ages to the 21<sup>st</sup> Century*, ed Kortum, H-H., Berlin, Akademie Verlag, pp.29-42.

|                               |  |   |  |  |
|-------------------------------|--|---|--|--|
|                               |  |   | limitations on conflict and treatment of non-combatants                        | cultural identity; sometimes escalating to subcultural war   |
| <b>Inter-cultural warfare</b> | (Semi) mutual incomprehension            | Warfare between Big Cultures                                      | None; pragmatic limitations on conflict and treatment of non-combatants        | Mutual acculturation; towards intra- or subcultural conflict   |
| <b>Sub-cultural warfare</b>   | Mutual anti-comprehension (demonization) | Warfare between subcultures of a Big Culture or larger subculture | Heightened ritual, few limitations on conflict and treatment of non-combatants | Attempted mutual annihilation; if not possible, low level permanent conflict, or towards accommodation and intracultural relations |

**Table 5.1 Impact of culture on warfare**

Source: Morillo<sup>15</sup>

Note: cultural groups vary considerably in size and complexity. The term “Big Culture” above is a broad-brush indication of a culture that is relatively large and/or complex.

## 5.5. RELIGIONS

The fact of a holy war is relatively easily identified, since it must be publicly proclaimed, and the impact on morale could be normally considerable, although not always (see Excursus E3.2). Religions, however, can also have other impacts on GIPPs.

For the purposes of this thesis, religion in general is considered relevant in having a bearing on social cohesion and other aspects of societal behaviour, although the actual impact depends on the homogeneity of the society, and the attitudes of the groups within it as well as the characteristics of the religion. A state divided between several strongly cohering religious groups is at some risk of internal conflict and opportunistic external invasion if the groups are mutually hostile. Finer uses Bellah’s five stage analysis of religion and Rokkan’s secular-religious differentiation to develop a classification of religions based on differentiation and organisation which may be readily applied in the analysis.<sup>16</sup> This is addressed in Excursus E5.7.

It will be noted that although the Murdock and Provost measure of culture treats Rome as complex, the Finer measure of religion treats Roman religion as probably not offering a great deal of social cohesion. Social cohesion and social complexity are different issues and the two issues should be examined separately.<sup>17</sup> There is reason to suppose that Constantine the Great in a complex culture was well aware of the superior social cohesion offered by Christianity when he converted to that religion. On the other hand, nomad lords in relatively non-complex cultures often converted to Islam, Judaism, (Nestorian) Christianity and Buddhism, apparently motivated by the desire for a civilised religion. How much substantive change in behaviour resulted is a matter of debate. The main religion in a group is identified, and a rating for analysis in this thesis

<sup>15</sup> Morillo, S. (2006) ‘A General Typology of Transcultural Wars’ op.cit, p.40.

<sup>16</sup> Finer, S (1999a) *The History of Government* op. cit. pp.23-30.

<sup>17</sup> It is in fact easier to secure cohesion in a simple structure than in a complex structure e.g. a block of concrete is more cohesive than a motor car.

is provided, based on an assessment of the impact of the religions of the parties on their social cohesion, derived from Finer.<sup>18</sup>

## **5.6 CONCLUSIONS**

This chapter outlines the importance of ensuring that variables are included to provide coverage of population and power, government, culture and religions, as these are likely to impact on the approach of GIPPs to their situation. Chapter 11 on the database provides details on the measures used.

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<sup>18</sup> Finer, S (1999a) *The History of Government* op. cit. pp.23-30.



## EXCURSUS E5. POPULATION AND POWER, GOVERNMENT, RELIGIONS AND CULTURE

### E5.1 AREA, POPULATION AND POPULATION DENSITY

As groups of people engage in all manner of activities, the size of the group is a major consideration since the availability of human time to make a contribution to the outcome is the ultimate constraint.<sup>19</sup> All else being equal, a large group will be more powerful than a small group, being able to call on a wider range of skills and a greater input of time, although with diminishing returns as more effort is diverted to co-ordination.

The size of mobile foraging communities was probably “a few dozen”.<sup>20</sup> That might perhaps be more precisely quantified as 40-60. The advent of agriculture made possible larger groups in villages that initially housed 100-200 and might occasionally be as large as 6,000 people, but were more likely to fall in the range of 800-5,000 in the Near East during the seventh millennium BCE.<sup>21</sup> The range of functions performed by such settlements was probably quite limited, with an emphasis on agriculture.

Bigger settlements, supporting more functions, were possible. Cities emerged in the fourth and third millennia BCE in Mesopotamia, with areas three to five times bigger (occasionally seven times bigger) than the largest villages. Their functions were more extended, and it is likely that more space within their bounds was devoted to ceremonial, administrative, industrial and commercial functions, resulting in lower population density.<sup>22</sup> Around them was a five kilometre zone (a walk of approximately one hour) where there were no villages and the land was available for use by the agriculturalists of the city, though these probably amounted to a quarter or less of the population.<sup>23</sup> Most Roman cities were smaller in area than the Mesopotamian cities, and probably rather smaller in population.<sup>24</sup> This suggests that while cities tended to be more

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<sup>19</sup> One may hypothesise societies with future technologies where machines require no human input at all, at any level, in order to function. It is questionable whether such societies could be regarded as human. Certainly the makers of films such as the *Terminator* and *The Matrix* series appear to think of them as non-human.

<sup>20</sup> Woolf, G. (2020) *The Life and Death of Ancient Cities: a natural history*. Oxford: Oxford University Press, p.40.

<sup>21</sup> Calculated from Woolf, G. (2020) *The Life and Death of Ancient Cities*. op. cit. pp. 50-51.

<sup>22</sup> Built up areas in villages had a population density of 400 persons per hectare. On the assumption of a density of 100 persons per hectare, early Mesopotamian cities had populations of 5 - 7.5 thousand. Calculated from Woolf, G. (2020) *The Life and Death of Ancient Cities*, op. cit. pp. 50-51.

<sup>23</sup> A five kilometre zone suggests an area of 7,857 hectares, or a ratio of 100-160 hectares of open land per hectare of built up land. This sort of ratio between built-up and open land, applied to a 2 hectare village of 800 people and 70 houses, would imply an open zone of 643 metres radius and 0.16 hectares of open land per person (this is a minimal level support since most agrarian societies exceed 0.2 persons per hectare; see Section 3.2). In that case, a city zone of 7,857 hectares could support 1,257 people, perhaps about a quarter of the population. Calculated from Woolf, G. (2020) *The Life and Death of Ancient Cities*, op. cit. p.68.

<sup>24</sup> Most Roman cities were less than 50 hectares in area and over 80% probably had a population of less than 5,000. Woolf, G. (2020) *The Life and Death of Ancient Cities*, op. cit. pp. 370-371.

populous than the generality of villages, the key difference was the number of non-agriculturalists that they supported, living on the surplus food produced by their agriculturalist neighbours and on imports from the surplus of other settlements.

As noted in Section 3.2 above, nomad communities lived at considerably lower population densities, depending for a livelihood on their herds of animals. This development seems to have emerged after the development of arable agriculture, and the tribes that could be supported by such a way of life were actually probably rather larger communities than the villages and the generality of cities that they encountered.<sup>25</sup> Given the opportunity to muster its forces, a task which would normally require far longer for a nomadic tribe than for its sedentary rivals, a tribe might expect to compete on equal terms or better with a single village or city. Mobile foraging communities would be likely to be overwhelmed in direct competition with a single village, city or nomadic tribe.<sup>26</sup> The key word here is 'single'. A great deal would depend on communications. Communities of all sizes could trade and call on the resources of others in production, trade, taxation and administration, to act in concert.<sup>27</sup> Cities, in particular, were dependent on this. The largest cities became so by drawing in resources from a large area, and when for some reason, be it war, famine, pestilence or earthquake, this became difficult or indeed impossible, the survival of the city was in question.

Regional areas, populations and population density are based from McEvedy and Jones (1985).<sup>28</sup> As described in Excursus E1 on regions, adjustment is made to allow for the fact that the boundaries of contemporary states do not exactly match to the historically significant alignments. The adjustments were made on the basis of Google Earth using population data.

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<sup>25</sup> For nomads, population density might be as low as 0.0008 per hectare in the Arabian Desert, but tribal population could be as high as 21,000 or as low as 500. For Central Asia, 6-7,000 might be reasonable estimates of tribal size. It is not surprising that a nomad tribe could deal on more or less equal terms with a *single* sedentary village or city, if its full strength could be drawn together. Woolf, G. (2020) *The Life and Death of Ancient Cities*, op. cit. p.105.

<sup>26</sup> A nomadic tribe of 400 living at a density of 0.0008 persons per hectare, would be dispersed over 500,000 hectares, with a theoretical mean distance of 7.1 kilometres between each individual. The corresponding figure for a village of the same population would be 0.1 kilometre. Even allowing for the advantage of mounted travel over pedestrian, the village can muster its population far faster than the nomads.

<sup>27</sup> The ability to access the resources of other places depended on the existence of a functioning communication network, with communities acting as nodes. For villages and cities, which are stationary, the land links can be equated to roads and tracks or rivers, though once shipping is able to venture safely away from the coast, sea links are constrained to areas rather than narrow lines except in pinch points at straits such as Gibraltar, Messina, and the Dardanelles/Bosphorus. Nomad tribes and forager groups, being mobile, could not be accessed from a single line of physical travel other than their own, unless a trading point was agreed with them. Their consent was needed. See Woolf, G. (2020) *The Life and Death of Ancient Cities*, op. cit. pp. 209-227 for the operation of networks in the Mediterranean world.

<sup>28</sup> McEvedy, C. and Jones, R. (1985) *Atlas of World Population History*. Harmondsworth: Penguin.

Areas of smaller states are estimated from a range of maps in McEvedy,<sup>29</sup> Baumer<sup>30</sup> and other scholars.<sup>31</sup> In the absence of sub-regional estimates, population is taken to be pro rata to area.

## E5.2 POLITY POWER

The estimate of Polity Power for tribes, city states or tribal alliance, local powers, regional powers and Imperial powers is based on Finer's Conceptual Prologue to his *History of Government* on territorial aspects of the state.<sup>32</sup> It is computed on the following basis:<sup>33</sup>

Tribes – Small social group (Level 4 in Table E5.1) Rated 0.01 each

City state or tribal alliance (Level 5 in Table E5.1) Rated 0.1 each

Local power or pastoral state (Level 6 in Table E5.1): the power is strong, but there are other identifiable independent substantial power(s) in the region. Rated 0.5

Regional power (Level 6 in Table E5.1): the only identifiable independent substantial power in the region. Rated 1.0

Imperial power (Level 6 in Table E5.1): a power extending over more than one region. Sum of ratings in all regions where the power is present, to a maximum of 5.0

| Level | Type                       | Pop. Size        | Description  |
|-------|----------------------------|------------------|--|
| 6     | Pastoralist states/empires | 100000s-millions | Stable political structures formed by distribution of prestige goods acquired from agricultural regions, destruction of tribal ties, bureaucratisation |
| 5     | Supra-tribal association   | 1000s-100000s    | Alliances of tribes, usually for military emergencies, temporary, supra-tribal leaders   |
| 4     | Tribes                     | 500-1000s        | Alliances of clans, often for military defence, loose leadership structures  |
| 3     | Reproductive Groups        | 50-500           | Related camping groups that met periodically, led by individuals or heads of households, control over migration routes, disputes, etc.                 |
| 2     | Camping Group              | 8-50             | Several related parental groups that travel together, highly unstable  |
| 1     | Parental Group             | 2-8              | Mother plus children, sometimes with father, sharing a dwelling (yurt, wagon)  |

**Table E5.1 Levels of Social Organisation in Pastoralist Society** Christian (1998, p.89)<sup>34</sup>

<sup>29</sup> McEvedy, C. (1972) *The Penguin Atlas of Ancient History*. Harmondsworth: Penguin Books; McEvedy, C. (1973) *The Penguin Atlas of Medieval History*. Harmondsworth: Penguin Books; McEvedy, C. (1996) *Penguin Atlas of African History*. London: Penguin.

<sup>30</sup> Baumer, C. (2014) *The History of Central Asia: The Age of the Silk Road*. (3 vols). London: IB Tauris & Co Ltd; Baumer, C. (2016a) *The History of Central Asia: The Age of Islam and the Mongols*. (3 vols). London: IB Tauris & Co Ltd; Baumer, C. (2016b) *The History of Central Asia: The Age of the Steppe Warriors*. (3 vols). London: IB Tauris & Co Ltd.

<sup>31</sup> Frier, B. (2006) 'Demography', in Bowman, A., Garnsey, P. & Rathbone, D. (eds.) *The Cambridge Ancient History Vol XI The High Empire AD 70-192*. Cambridge: Cambridge University Press.

<sup>32</sup> Finer, S. (1999a) *The History of Government From the Earliest Times II: The Intermediate Ages*. Oxford: Oxford University Press.

<sup>33</sup> Increase in Population and increase in Power do not directly match.

<sup>34</sup> Christian, D. (1998) *A History of Russia, Central Asia and Mongolia: Volume I, Inner Asia from Pre-history to the Mongol Empire*. Oxford: Blackwell Publishing.

The maximum reflects the fact that there are limits to the extent that a power can project its full strength into one place. Examples of ratings are given in Table E5.2.

| Power                  | Regional Power (1.0)                         | Local Power (0.5)   | Rating (raw) | Rating (adjusted) |
|------------------------|--|---------------------|--------------|-------------------|
| Rome (180 CE)          | Iberia, NAA, Egypt, Syria, Anatolia, Balkans | Europe, NAP         | 7.0          | 5.0               |
| West Rome (395 CE)     | Spain, NAA                                   | Europe, NAP         | 3.0          | 3.0               |
| East Rome (395 CE)     | Egypt, Syria, Anatolia, Balkans              |                     | 4.0          | 4.0               |
| East Rome (550 CE)     | Egypt, Syria, Anatolia, Balkans              | Iberia, NAP, Europe | 5.5          | 5.0               |
| East Rome (750 CE)     | Anatolia                                     | Europe, Balkans     | 2.0          | 2.0               |
| East Rome (1050 CE)    | Anatolia, Balkans                            | Europe, Syria       | 3.0          | 3.0               |
| East Rome (1150 CE)    |  | Anatolia, Balkans   | 1.0          | 1.0               |
| Arab Empire (632 CE)   | Arabia                                       |                     | 1.0          | 1.0               |
| Arab Empire (650 CE)   | Arabia, Egypt, Syria, Mesopotamia,           |                     | 4.0          | 4.0               |
| Arab Empire (730 CE)   | Arabia, Egypt, Syria, Mesopotamia, Iran, NAA | NAP, Spain          | 7.0          | 5.0               |
| Han Chinese (100 CE)   | China  | Mongolia, Turkestan | 2.0          | 2.0               |
| Tang Chinese (700 CE)  | China  | Mongolia, Turkestan | 2.0          | 2.0               |
| Sung Chinese (1250 CE) |  | China               | 0.5          | 0.5               |
| Mongols (1229 CE)      | Mongolia, Turkestan                          | China               | 2.5          | 2.5               |
| Ilkhans (1260 CE)      | Iran, Mesopotamia                            | Anatolia            | 2.5          | 2.5               |

**Table E5.2 Examples of Polity Power**

NAA: North Africa Arable; NAP: North African Pastoral

### Case 6 Calculation of Power

Theoretically, scores can range from 0.01 (a single tribe with perhaps 1,000 warriors) to 5.00 (imperial powers with perhaps 30 legions and supporting auxiliaries)

**Example 1:** In 180 CE, Rome was the only considerable power in the regions of Iberia, arable North Africa, Egypt, Syria, Anatolia and the Balkans (i.e. six regions where Rome was rated as a Regional Power [sole major power: score 1] giving a total score of 6.0). In Europe and pastoral North Africa, Rome was a major power but not the sole power (i.e. two regions where it was rated as a Local Power [score 0.5] giving a total score of 1.0). Combined,  $6.0 + 1.0 = 7.0$ . The maximum score is 5.0 on the grounds that major powers must use much of their power to hold themselves together and defend elsewhere. Accordingly, 7.0 is adjusted down to 5.0, which indexes to  $120 (5 / 5 * 120)$ .

**Example 2:** In 1122 CE, the Almohads were a supra-tribal alliance in one region, pastoral North Africa, and so were rated 0.1, which indexes to 2.4 ( $0.1 / 5 * 120$ ).

**Example 3:** In 711 CE, the Visigoths were the regional power in Iberia, having expelled the Byzantine enclave in Iberia, and so were rated 1.0, which indexes to 24 ( $1 / 5 * 120$ ).

### E5.3 EFFECTIVENESS AND SOCIAL COHESION

The estimates of effectiveness and social cohesion are based on Finer's Conceptual Prologue on structural aspects of the state,<sup>35</sup> and Fromherz's work on social cohesion.<sup>36</sup> Effectiveness is a measure of the ability of the polity to achieve results and loyalty is a measure of the cohesion of the polity. The data is computed on the following basis, using values drawn from Table E5.3:

State Effectiveness = (Civil Government Effectiveness + Army Effectiveness) x Decision-making Effectiveness

State Cohesion = (Civil Government Cohesion + Army Cohesion) x Legitimation x Decision-Making Cohesion

Both values are indexed, with a maximum value of 120 permitted. It should be noted that a civil government or army, though not itself particularly loyal, may still secure the loyalty of others (by coercion rather than example). In some instances, foreign infidel mercenaries were preferred by rulers, since as outsiders, they were less prone to subversion.<sup>37</sup>

| Decision-implementation |                |                    | Legitimation (cohesion)    |                |                    |
|-------------------------|----------------|--------------------|----------------------------|----------------|--------------------|
| <b>Civil Government</b> | Effective-ness | Cohesion of polity | Religion or Prophecy based | 5              |                    |
| Community               | 1              | 1                  | Blood-based tribal         | 3              |                    |
| Bureaucracy (Light)     | 3              | 3                  | Urban                      | 2              |                    |
| Bureaucracy (Heavy)     | 5              | 5                  | Dynastic control           | 1              |                    |
| <b>Army</b>             | Effective-ness | Cohesion of polity | <b>Decision-Making</b>     | Effect-iveness | Cohesion of polity |
| Community in Arms       | 1              | 5                  | Palace                     | 5              | 1                  |
| Notables in arms        | 3              | 3                  | Church                     | 2.5            | 2.5                |
| Regular Army            | 4              | 2                  | Nobility                   | 2.5            | 2.5                |
| Mercenaries/Slave       | 5              | 1                  | Forum                      | 1              | 5                  |

**Table E5.3 Basis of State Effectiveness and Cohesion Calculatio**

<sup>35</sup> Finer, S (1999a,) *The History of Government* op. cit. pp.35-96.

<sup>36</sup> Fromherz, A. (2013) *The Almohads: The rise of an Islamic Empire*. London: I.B. Tauris, p.195.

<sup>37</sup> Lower, M. (2016) 'Medieval European mercenaries in North Africa: the Value of Difference', *Journal of Medieval Military History* XIV, pp. 105-122.

## Case 7 Calculation of Cohesion and Effectiveness

Excursus 5.3 proposes a method of assessing social cohesion and effectiveness. Social structures for decision-making and implementation affect both factors. The justification for the existence of the polity (i.e. its Legitimation) does not make its social structures more (or less) effective, but it does affect social cohesion.

**Example 1:** In 711 CE, the Visigothic kingdom in Iberia had a light bureaucracy of officials, limited in number and power (effectiveness 3, cohesion 3), with an army consisting of notables, the nobility, in arms (effectiveness 3, cohesion 3) respectively). Despite the efforts of the king, decision-making was often largely determined by the nobility or church (both effectiveness 2.5, cohesion 2.5). Legitimation of the polity was through dynastic control (cohesion 1). State Effectiveness is thus  $(3 + 3) \times 2.5 = 15$ . State Cohesion is  $(3+3) \times 1 \times 2.5 = 15$ . With maximum values of 50 for effectiveness and 250 for cohesion, the values for the Visigothic state index to  $15 / 50 \times 120 = 36$  for effectiveness and  $15 / 250 \times 120 = 7.2$  for cohesion.

**Example 2:** in 711 CE, the Umayyid Arabs attacking Iberia had at best a light bureaucracy, the remnants of the conquered Byzantine state (effectiveness 3, cohesion 3); and still fought as the community in arms (1 & 5, respectively). Decision-making was largely by the Palace of the Caliph (5 & 1, respectively). Legitimation was Religion-based (cohesion 5). State Effectiveness is thus  $(3 + 1) \times 5 = 20$ . State Cohesion is  $(3+5) \times 1 \times 5 = 40$ . The values for the Arabs index to  $10 / 50 \times 120 = 48$  for effectiveness and  $40 / 250 \times 120 = 19.2$  for cohesion.

**Example 3** In 1054 CE, the Byzantine state had a heavy bureaucracy (effectiveness 5, cohesion 5); a regular army (4 & 2, respectively). Decision-making was in the Palace (5 & 1 respectively). Legitimation was Urban (cohesion 2). State Effectiveness is thus  $(5 + 4) \times 5 = 45$ . State Cohesion is  $(5+2) \times 2 \times 1 = 14$ . The values for the Byzantine state index to  $45 / 50 \times 120 = 108$  for effectiveness and  $14 / 250 \times 120 = 6.7$  for cohesion.

**Example 4:** In 1054 CE, the Kipchaks and Cumans had community civil government (effectiveness 1, cohesion 1) and fought as the community in arms (1 & 5, respectively). Decision-making was largely by the *white bone* nobility (2.5 & 2.5, respectively). Legitimation was blood-based tribal (cohesion 3). State Effectiveness is thus  $(1 + 1) \times 2.5 = 5$ . State Cohesion is  $(1 + 5) \times 2.5 \times 3 = 45$ . These values index to  $5 / 50 \times 120 = 12$  for effectiveness and  $45 / 250 \times 120 = 21.6$  for cohesion.

In the interaction of the two 711 groups, the Arabs were possibly more effective in action than the Visigoths (48 vs. 36), but were also markedly more socially cohesive (19.2 vs. 7.2). In the interaction of the two 1054 groups, the Kipchaks and Cumans were probably less effective in action than the Byzantines (12 vs. 108) although probably more socially cohesive (21.6 vs. 6.7).

## E5.4 CULTURAL COMPLEXITY

The classification of cultural complexity used is that proposed by Murdock and Provost.<sup>38</sup> As noted in Section 5.4, pre-1825 societies are unable to achieve the maximum value of this classification. Groups not directly assessed by Murdock and Provost are allocated a score commensurate with a comparison with groups that have been so assessed. The scores are then rebased to lie within a range of 1-120 (least complex to most complex) in line with other variables.

## Case 8 Calculation of Cultural Complexity

Maximum achievable score on the Murdock and Provost scale is 39, for a society lacking railways and internal combustion.

**Example 1:** The Fulani are rated as 6 by Murdock and Provost. Accordingly, the Fulani of 1804 CE are rated as 6. This indexes as  $6 / 39 \times 120 = 18$

**Example 2:** Rome is rated as 39 by Murdock and Provost. Accordingly, Rome of 300 CE is rated as 39. This indexes as  $39 / 39 \times 120 = 120$ .

**Example 3:** The Khalka Mongols are rated as 22 by Murdock and Provost. Accordingly, the Mongols of 1218 CE are rated as 22. This indexes as  $22 / 39 \times 120 = 68$ .

### E5.5 SESHAT RATING

This is extrapolated from analysis of the Seshat database by Turchin et al.<sup>39</sup> They demonstrated that a single principal component explained 77% of the variance in the examined variables. The Seshat-derived principal component was used in this study as a single variable, which combines the Seshat assessments of polity size and population, hierarchical complexity, governmental complexity, infrastructure, information systems, literary texts and economics for the regions. Values for single years were then linearly interpolated, and for those periods where data was not available, estimates were extrapolated from the existing data using trends in those Seshat cultures that could not be allocated to the regions employed in this thesis. Regions that could not be assigned any Seshat culture were assigned the average of the neighbouring region(s) for which estimates were available.

#### Case 9 Calculation of Seshat Cultural Complexity

**Example 1:** Sung China and Liao (1120 CE) have the highest rating for the Seshat culture factor. It is 1.64 (indexing to 120).

**Example 2:** Sung China (1270 CE) has the third highest rating. This shows some decline in the wake of ongoing conflict with the Mongols. It is 1.57 (indexing to 119).

**Example 3:** Libyans (1200 BCE) have the lowest rating. It is -4.71 (indexing to 1).

**Example 4:** The Visigoths and Umayyid Arabs (711 CE) are rated -0.31 and -0.93 respectively (indexing to 83 and 72)

**Example 5:** The Byzantines and Kipchak/Cumans (1054 CE) are rated 0.40 and 0.18 respectively (indexing to 97 and 93).

The overall mean for all places and times is, by definition, 0.00. This indexes to 89.

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<sup>39</sup> Turchin, P., et al. (2017) 'Quantitative historical analysis uncovers a single dimension of complexity that structures global variation in human social organization', op. cit.

## E5.6 MORILLO TYPOLOGY OF CONFLICT

The rating for the GIPP, based on Morillo,<sup>40</sup> is as follows:

- 0 Intra-cultural
- 1 Inter-cultural
- 2 Sub-cultural

It is expected that nomad vs. sedentary interactions will be rated as inter-cultural, while crusades, *jihads* and other holy wars will be either inter-cultural or sub-cultural.

### Case 10 Calculation of Conflict Typology

The scale offers three values.

**Example 1:** The 1054 CE interaction of Byzantium with the Kipchak/Cumans is inter-cultural (Score 1)

**Example 2:** The 711 CE interaction of Visigoths with Umayyid Arabs is inter-cultural (Score 1)

**Example 3:** The 1209 CE crusade against the Albigenses in southern France is sub-cultural (Score 2). There is evidence of demonization of the Albigenses by the organisers of the Crusade.

## E5.7 RATING OF RELIGIONS AND HOLY WAR

The rating (as shown in Table E5.4) is based on an assessment of the impact of the religions of the relevant parties on their social cohesion, as based on Finer (1999a):<sup>41</sup>

|   |  |
|---|--|
| Religion of Initiator/Respondent        | P = Pagan Animist, R = Roman, E = Egyptian and ancient Middle East, H = Hindu, J = Judaism, B = Buddhist, Z = Zoroastrian, ISH = Islam Shia, ISHS = Islam Shia Sectary, ISU = Islam Sunni, ISUS = Islam Sunni Sectary, M = Manichean, RC = Catholic, GO = Greek Orthodox, C = Confucianism |
| Religion Rating of Initiator/Respondent | Pagan Animist or Roman or Egyptian = 10<br>Hindu = 30<br>Judaism or Buddhist or Zoroastrian or Islam (Shia or Sunni) or Manichean = 60<br>Roman Catholic or Confucianism = 90<br>Greek Orthodox = 120  |

**Table E5.4 Religions and rating**

Religion in general can be employed as a measure of social cohesion for the purposes of the research questions asked in this thesis. Finer uses Bellah's five stage analysis of religion and Rokkan's secular-religious differentiation was then used to develop a categoric classification of

<sup>40</sup> Morillo, S (2006) 'A General Typology' op. cit.

<sup>41</sup> Finer, S. (1999a), *The History of Government* op. cit.



religion on the basis of its distinction from the polity, and the religious organisation (see Table E5.5). This may be readily applied to the GIPPs included in the analysis.<sup>42</sup>

### Case 11 Rating of Impact of Religions on Social Cohesion

The values listed in Table E5.4 for Religious Rating are used, giving a maximum rating of 120. A society with no religion at all, if any exist, would have a rating of 0.

**Example 1:** In 711 CE, the Visigoths are Roman Catholic (rated 90) and the Umayyid Arabs are a Muslim empire (rated 60).

**Example 2:** In 1054 CE, the Byzantines are Greek Orthodox (rated 120) and the Kipchaks/Cumans are pagan (rated 10).

| Differentiation | Effect of differentiation                          | Religious Organisation                                 | Rating | Example  |
|-----------------|--|--|--------|--|
| Minimal         | Local religion                                     | Cult   | 10     | Tropical Africa, Inner Asia, Roman, Egyptian & Ancient Middle East |
| Intermediate    | Local religion closely fused with political system | No corporate church                                    | 30     | Hindu  |
|                 |  | Weakly incorporated church                             | 60     | Muslim Empires, Judaism, Manichaeism, Zoroastrian                  |
| Maximal         | Church differentiated and strongly incorporated    | Separated from society                                 | 60     | Buddhist   |
|                 |  | Closely fused with political system but supra-national | 120    | Greek Orthodox   |
|                 |  | Supra-national   | 90     | Roman Catholic (Confucianism*)                                     |

**Table E5.5 Religious differentiation and organisation**

\* Although neither a religion nor formally organised, Confucianism provided a belief system as pervasive, in the opinion of Finer, as Christianity in western Europe.

As discussed in 5.5, the Murdock and Provost measure of culture treats the culture of Rome as complex, while the Finer measure of religion treats Roman religion as probably not offering a great deal of social cohesion. The two measures are analysed separately.

The simple fact of a holy war being a potential issue is easily identified. A holy war had to be publicly announced, although the exact intent of the war may vary from conflict to conflict. The impact on morale and effectiveness could be considerable, and there is evidence that these

<sup>42</sup> Finer, S. (1999a) *The History of Government* op. cit. pp.23-30.

could be enhanced by a factor of as much as 120.<sup>43</sup> In other cases, the effect seems to have been small. Initially, the existence of a holy war is best treated as a categorical variable, valued as 0 ('No') or 120 ('Yes').

### Case 12 Identification of Holy War

The possibility of grading the level of Holy War is touched upon in Chapter 3. It would require development of a detailed classification. In absence of that work, the variable is treated as categorical, as suggested in Excursus 5.7

**Example 1:** The First Crusade was proclaimed by the Pope in 1095 CE. It is rated as a Holy War (Score 120).

**Example 2:** In approximately 710 BCE, the Kimmerians attacked Uratu. In the absence of evidence to the contrary, the conflict is rated as not a Holy War (Score 0).

### E5.8 TERROR IN WARFARE

One strategy in warfare that has been used is that of terror, which is a form of indirect violence (see Section 7.4). The rationale is simply that if the enemy is sufficiently frightened to refuse to fight, the war is won before it is even fought. In Morillo's terms (Table 5.1 above) it can amount to treating all wars as Sub-cultural, demonising the enemy and recognising no limits on the treatment of non-combatants. Assyria and the Mongols were arch-exponents of this sort of strategy, in which mutilations, massacres and sacks become routine. There were practical benefits from such an approach in the short term, but the hatred generated in the enemies subjected to terror tactics could ultimately recoil on the practitioner.<sup>44</sup> It is, however, not always easy to distinguish terror tactics from the general nastiness of warfare.<sup>45</sup> Even people who regarded themselves as civilised could perpetrate some frightful deeds.<sup>46</sup> Although the use of terror has been profitably addressed by scholars,<sup>47</sup> the numeric measurement of levels of terrorism is a topic that has been left for someone else to follow up.

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<sup>43</sup> The Arab general Muthanna suggested that previously one Persian could defeat ten Arabs, but now one Arab could defeat ten Persians (see Excursus 3.2). Adjusting Muthanna's numbers a little to allow some scope for the numbers that might have been needed to produce a drawn fight rather than a victory, this suggests that the Arabs on jihad were 120 (11 x 11, rounded down) times more effective than they had been before. Although this seems an extreme enhancement, it is in line with data on the Battle of Badr in 624 (see 7.2). The success of the first Arab conquerors is indisputable and difficult to explain in purely military terms.

<sup>44</sup> "Everyone who hears the news about you claps his hands at your fall, for who has not felt your endless cruelty?" Nahum 3, 19 on the fall of Nineveh.

<sup>45</sup> For example, was the Harrying of the North by William I of England in the eleventh century, war or terror?

<sup>46</sup> E.g., Basil II, eleventh century Byzantine emperor, known as "Bulgar-Slayer" is said to have blinded 10,000 Bulgars, save for one in one hundred left with one eye to guide the rest home.

<sup>47</sup> See Ludlow, F., Kostick, C. and Morris, C. (In Press, 2022) 'Climate, Violence and Ethnic Conflict in the Ancient World, in Kiernan, B., Lemos, Maria, T. and Taylor, T. (eds.) *The Cambridge World History of Genocide. Volume I* Cambridge: Cambridge University Press.

## E5.9 ORACLES, SIGNS AND DIVINATION

From the dawn of history, and probably before that, people have sought the guidance of gods, spirits and other supernatural powers and sources of knowledge, on all manner of things, using a variety of techniques.<sup>48</sup> In particular, they have sought to make decisions on war, peace and the conduct of both,<sup>49</sup> and have turned to experts for guidance that could be very detailed. For instance, concerned about the threat of invasion of Assyria by Scythians, the king asks:

“Will they move out and go through the passes [of Hubuškia] to the city Harrania (and) the city Anisus? Will they take much plunder and heavy booty from the territory of [Assyria]? Does your great divinity [know it]?”<sup>50</sup>

The practice was justified by argument:

“My son, also learn from me this lesson, which is the most important of all: never run a risk with yourself or your army contrary to the omens or the auspices, being conscious that men choose their lines of action by guess, and they do not know from which of these they will get advantages.”<sup>51</sup>

There was a certain level of awareness of the need for validation of the diviners’ credentials. Thus Sennacherib of Assyria left this counsel to his son: not to make decisions without the diviners, but to prepare three or four groups of them, to be sure that the verdict is accurate.<sup>52</sup> Croesus of Lydia is reported to have tested seven oracles by asking for a report about his idiosyncratic behaviour on a given day, giving his future business to the only oracle that got it right.<sup>53</sup> Even so, there was a risk of misunderstanding the advice given, as when Croesus received the Delphic oracle’s advice that if he attacked the Persians, he would destroy a great empire. He omitted to ask *which empire?*<sup>54</sup> Furthermore, the advice could simply be wrong, as happened during the unsuccessful Athenian campaign in Sicily in 413 BCE. When the Athenian force was prudently planning withdrawal, an eclipse of the moon occurred, and in obedience to seers (and in accordance with the mood of his troops), Nicias halted the withdrawal for twenty-seven days, turning a defeat into a catastrophe.<sup>55</sup>

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<sup>48</sup> It is fair to suggest that the consultation of SAGE (Scientific Advisory Group for Emergencies) in the UK during 2020-21 concerning Covid-19 resembled the whole process of oracle consultation and divination save that the testing and questioning of this “oracle” were probably rather less sophisticated than the questioning of oracles by Ancient Eastern monarchs, who were often themselves well versed in the subject matter of interest.

<sup>49</sup> Kang, S-M. (1989) *Divine War in the Old Testament and in the Ancient Near East*. Berlin: Walter de Gruyter.

<sup>50</sup> Ulanowski, K. (2021) *Neo-Assyrian and Greek Divination in War*. Leiden, Brill, p.66.

<sup>51</sup> Attributed by Xenophon to the father of Cyrus and quoted in Ulanowski, K. (2021) *Neo-Assyrian and Greek Divination in War* op. cit. p.108.

<sup>52</sup> Ulanowski, K. (2021) *Neo-Assyrian and Greek Divination in War* op. cit. p.97.

<sup>53</sup> Herodotus (1965) *The Histories*. Translated by: de Selincourt, A. Harmondsworth: Penguin. p.30.

<sup>54</sup> Herodotus (1965) *The Histories*. op.cit. p.32.

<sup>55</sup> Ulanowski, K. (2021) *Neo-Assyrian and Greek Divination in War* op. cit. p.126.

This has implications for modelling of events.<sup>56</sup> There can be a strong element of self-fulfilment to prophesy and other divine guidance. If decision-makers are authoritatively told that success comes from following a particular path, then there is a considerable probability that they will follow that path, on the grounds that the oracle has recommended it. The other reasons for following that path will be less heeded (and hence perhaps will tend to register less strongly as an explanatory variable in the statistical modelling) even if they have been in fact subsumed in the production of the oracular advice. So too will other options that offer themselves.

In the event that the advice given by a seer solely incorporates the seer's own personal assessment of current circumstances, this is akin to any other general advice considered in reaching a decision. The explanatory power of the model is unlikely to be affected by this. There are many advisers on any undertaking. If the advice of a seer is based solely on analysis of natural events fundamentally irrelevant to the situation, such as lunar eclipses, the configuration of sheep livers or the flocking of birds, the effect of divination is to reduce the explanatory power of any model by intruding with essentially random but nonetheless authoritative guidance. In the possibly less likely circumstance where the advice of a seer is based solely on analysis of natural events (such as halos or coronae around the moon, which require the presence of high altitude cloud or aerosols, volcanic or otherwise), such as could be relevant to those factors such as climate which may be identified by the model as significant, then the explanatory power of the model is likely to have been silently improved.<sup>57</sup>

It is entirely possible that the advice of the seer is a mixture of personal judgement, analysis of irrelevant variables and/or analysis of relevant variables. The impact of such a mix on the explanatory power of any model generated is unpredictable, but it is more likely that the impact of widespread use of divination (like other unmonitored social factors) will reduce the explanatory power of a model based on a range of monitored physical and social factors.

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<sup>56</sup> Effectively, the question becomes whether advice should be followed because it is authoritative advice (i.e. because it is issued by someone who should be heeded) or because it is good advice (i.e. because it corresponds to what is needed in the situation).

<sup>57</sup> In the hypothetical event that the seer is accessing genuinely supernatural knowledge, the model would need to be radically reorientated, as its accuracy in explaining events would depend principally on the credence given to the oracle (which was not guaranteed, as the Trojan princess Cassandra discovered when her accurate warnings at the end of the Trojan war were simply disregarded).

## CHAPTER 6. ECONOMIC FACTORS

### 6.1 INTRODUCTION

The economic potential of groups has an effect on their own behaviour and that of their neighbours. From an early date, quite sophisticated economies have been in place in sedentary societies, with the needful supporting structures (both physical in terms of buildings, equipment etc., and social, in terms of law, currency etc.).<sup>1</sup> The economic base of societies has a wide influence on social behaviour, and the economy is liable to change.<sup>2</sup> As noted in Chapter 3, nomads tend to be materially poorer than their sedentary neighbours,<sup>3</sup> living in less environmentally rich areas and using relatively low yielding methods of production.<sup>4</sup> This wealth discrepancy has had two important implications, historically. Firstly, nomads have an incentive to seek to secure some of their sedentary neighbours' wealth by one means or another, from undertaking paid service and trade through extorting tribute and conducting raids through to outright conquest. Secondly, their neighbours can use some of their additional resources to seek to secure the rest of their wealth through any or all of policies such as hiring foreign guards, paying tribute (more palatably described as subsidies or gifts), recruiting and equipping a native army or undertaking the construction of defence infrastructure. The historical outcome in terms of the probability of conflict, its course and the (overall or net) victor has depended upon the balance between the parties' choices and efficacy in implementing the above two sets of policies. Even where holy war is a main driver in a conflict, the wealth of the parties involved is by no means irrelevant. Thus, this chapter includes a review of relevant literature on economic matters identified as pertinent. It will also consider issues of data management, where appropriate.

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<sup>1</sup> See Pirngruber, R. (2021) 'Markets, efflorescence, and political economy in the Ancient Mediterranean and the Ancient Near East', in García, J.C.M. (ed.) *Markets and Exchanges in Pre-modern and Traditional Societies*. Oxford Oxbow, pp. 71-90.

<sup>2</sup> North, D. and Thomas, R. (1973) *The Rise of the Western World: A new Economic History*. Cambridge: Cambridge University Press; North, D. (1981) *Structure and Change in Economic History*. London: W. W. Norton & Co; Tilly, C. (1992) *Coercion, Capital and European States AD990-1992*. Oxford: Blackwell; Martinussen, J. (1999) *Society, State and Market: A Guide to Competing Theories of Development*. London: Zed Books Ltd.

<sup>3</sup> Their sedentary neighbours were not always of equal wealth. See Pomeranz, K. (2000) *The Great Divergence: China, Europe and the Making of the Modern World Economy*. Princeton: Princeton University Press.

<sup>4</sup> The thirteenth century Persian historian Juvaini notes that, before Chingis Khan, the sign of a Mongol great emir was that he had iron stirrups. Juvaini, A.-M. (1958) *The History of the World Conqueror Volumes I and II*. Translated by: Boyle, J. Manchester: Manchester University Press Vol I, pp.22.

The specific economic matters treated of are:

|  |  |
|--|--|
| Gross Domestic Product (GDP)           | This explores some of the issues in measuring historical economies through Gross Domestic Product.                       |
| Purchasing Power Parity                | Adjustment must be made for what goods and services may be purchased with economic resources.                            |
| Economic impact of catastrophic events | Catastrophic events, such as the Mongol invasion of Persia, may require short term adjustments to estimates.             |
| Inequality                             | Unequal distribution of wealth does not promote social cohesion, but can allow diversion of resources to state purposes. |
| Conclusions                            | This draws together the economic implications.   |
| Excursus                               | This estimates taxation decline and devaluation in Iran, following Mongol invasion.                                      |

## 6.2 GROSS DOMESTIC PRODUCT (GDP)

It is by no means easy to quantify the matters raised above. Gross Domestic Product (GDP) is a frequently used measure. Unfortunately, many societies lack any written accounts from which GDP figures may be constructed easily, and some even lack the concepts and economic structures which render GDP a meaningful measure, not least money, rent or even private ownership. Combined with the patchiness of records for some epochs in other societies, it is necessary to produce estimates for places and times where records are adequate, and to extrapolate outwards.

As Table 6.1 shows, there are a number of available estimates for the per capita GDP of the Roman Empire, of which Maddison's is comprehensive in terms of units used and closest to reflecting a consensus on the value of GDP as measured in wheat. Maddison sets out estimates of per capita GDP for parts of the Roman Empire and adjacent lands in 14 CE (see Table 6.2),<sup>5</sup> using Purchasing Power Parity-adjusted Geary-Khamis 1990 dollars.<sup>6</sup> This relates the values to a standard benchmark currency, taking account of the changing range and price of goods available for purchase. It should be noted that other benchmarks have been used in the past by other scholars

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<sup>5</sup> Maddison, A. (2013) *Contours of the World Economy, 1-2030AD*. Oxford: Oxford University Press, p.5.

<sup>6</sup> The Purchasing Power Parity-adjusted Geary-Khamis 1990 dollar expresses the value of non-US currencies in terms of the 1990 US dollar, adjusting for the prevailing exchange rates and price relativities in the two economies. For details, see Footnote 2 of Appendix 1.

and these estimates can differ quite markedly, reflecting changing economic situations.<sup>7</sup> Maddison's work is both recent and authoritative.

| GDP per capita in      | Roman GDP per capita |         |          |          |           |
|------------------------|----------------------|---------|----------|----------|-----------|
|                        | 14CE                 |         |          | 150CE    |           |
|                        | Goldsmith            | Hopkins | Maddison | Scheidel | Lo Cascio |
| Sesterces <sup>8</sup> | 380                  | 225     | 380      | 260      | 380       |
| Wheat (kg)             | 843                  | 491     | 843      | 680      | 855       |
| GK 1990 dollars        |                      |         | 570      | 620      | 940       |

**Table 6.1 Estimates of Roman GDP per capita by various scholars**

Source: Lacey<sup>9</sup>

A basic subsistence level is likely to be less than the \$GK 400 per capita per annum assigned by Madison to a barbarian state of development. At the standards of 14 CE, as estimated by Madison, \$GK 300 very nearly equates to 1.2 kg of wheat daily (to cover all needs), and could be earned by working for 200 days per year at \$GK 1.5 per day, or 300 days at \$GK 1 per day. Accordingly, an annual subsistence unit is assumed to be \$GK 300, with an average daily pay of \$GK 1.2 for use in calculating minimum values of projects assessed in terms of labour input.

| Area                                    | GDP per capita | Comments                                  |
|---|----------------|---|
| Italy                                   | 857            | Imperial capital. Highly urbanised        |
| Egypt                                   | 600            | Highly fertile agriculture. Urban centres |
| Eastern Empire                          | 550            | Highly urbanised                          |
| South Spain and Gaul                    | 525            | Urbanised                                 |
| Civilised beyond Empire                 | 500            | Urbanised and agricultural development    |
| Rest of Spain and Mediterranean islands | 475            | Urban development and agriculture         |
| North Gaul and North Africa             | 450            | Urban development and agriculture         |
| Recently barbarian provinces on Danube  | 425            | Some urban development                    |
| Barbarian state of development          | 400            | Basic agriculture                         |

**Table 6.2 GDP per capita estimates for Roman Empire, 14 CE**

Source: Maddison (2007, p53) Per capita GDP in 1990 Purchasing Power Parity (PPP) adjusted \$Geary-Khamis

Madison's estimates of per capita GDP on the same basis for other parts of the world at various times are shown in Table 6.3. He also provides estimates of average annual growth rates which may be used to interpolate estimates for other years,<sup>10</sup> although this approach does not capture

<sup>7</sup> In 1939, the estimation of the dollar value of a Roman payment in gold to Attila was about one fortieth of the same estimation expressed in 1990 terms. McGovern, W. M. (1939) *The Early Empires of Central Asia: a Study of the Scythians and the Huns and the Part They Played in World History*. Chapel Hill, North Carolina: The University Press of North Carolina, p.383.

<sup>8</sup> Sesterce: Roman unit of currency.

<sup>9</sup> Lacey, J. (2014) 'The Grand Strategy of the Roman Empire', in Murray, W. and Hart-Sinnreich, R. (eds.) *Successful Strategies: Triumphant in War and Peace from Antiquity to the present*. Cambridge: Cambridge University Press, pp. 38-64.

<sup>10</sup> Maddison, (2007) *Contours of the World Economy, op.cit.* Table A.3.

known catastrophic shorter term drops in productivity such as may follow events such as the Mongol invasions or periods of famine linked to drought or excessive rainfall.

| Region    | Year |         |         |         |
|-----------|------|---------|---------|---------|
|           | 1 CE | 1000 CE | 1500 CE | 1700 CE |
| China     | 450  | 450     | 600     | 600     |
| India     | 450  | 450     | 550     | 550     |
| West Asia | 522  | 621     | 590     | 591     |
| Arabia    | 400  | 600     | 550     | 550     |
| Iran      | 500  | 650     | 600     | 600     |
| Iraq      | 500  | 650     | 550     | 550     |
| Turkey    | 550  | 600     | 600     | 600     |
| Syria     | 550  | 645     | 645     | 645     |
| Africa    | 472  | 425     | 414     | 421     |

**Table 6.3 GDP per capita estimates for various regions and dates**

Source: Maddison (2007, pp 192 & 382)

Per capita GDP in 1990 Purchasing Power Parity (PPP) adjusted \$Geary-Khamis

These estimates are averages for the region and subject to local variation. For instance, the ability to devote some months of the year to work in a gold mine could provide a substantial local bonus to incomes.<sup>11</sup> As they become available, improved estimates should be inserted in the database for subsequent re-workings of the analysis, but the broad brush estimates currently available provide a reasonable basis for initial analysis.

### 6.3 PURCHASING POWER PARITY

The calculation of GDP alone is not sufficient to obtain an understanding of the economic well-being of an individual or community. The economic activity so measured is intended to secure goods and services. It is not however always clear what goods could be purchased with the amounts shown in Table 6.3, such as \$GK 450 in China, in 1000, as opposed to \$GK 414 in Africa in 1500. Indeed, it should be borne in mind that in places such as Nubia, coinage and currency could be of little use since transactions were conducted by exchange of goods.<sup>12</sup> Arguably, in such contexts, uniform goods and tokens such as iron bars,<sup>13</sup> silver rings,<sup>14</sup> copper rings, bolts of cloth

<sup>11</sup> For example, low yielding small scale gold mines in twelfth century Zimbabwe, worked only in the three to four month dry season and producing less than 1 gram of gold per worker per day (say 0.7 gram), treated as a supplement to the income of a five person household, would be worth about \$GK 230 per capita, a substantial supplement to incomes of around \$GK 400. For background, see Fauvelle, F-X. (2018) *The Golden Rhinoceros: Histories of the African Middle Ages*. Oxford, Princeton University Press, p.129.

<sup>12</sup> Welsby, D. (2002) *The Medieval Kingdoms of Nubia: Pagans, Christians and Muslims along the Middle Nile*. London: British Museum Press, p.303.

<sup>13</sup> For example, in West Africa (1606), domestic help could be secured for two iron bars per month. This would have weighed 58 lb, a hardly trivial burden. See Green, T. (2019) *A fistful of shells: West Africa from the rise of the slave trade to the Age of Revolution*. London: Penguin, p.89.

<sup>14</sup> "Permian" silver rings widely worn by Scandinavians of the Viking period, but found very commonly in the former territory of the Volga Bulgars in eastern Russia, seem to have come in fairly standard weights in multiples of 100



and cowrie shells served as *de facto*, though rarely convenient, currency.<sup>15</sup> Slaves and animals were also used as measures of worth. The Ghuzz nomads paid an annual tribute of 24,000 sheep to their Seljuk overlord Sanjar.<sup>16</sup> The Chaghatayid khanate, which was founded in Central Asia during the mid 13<sup>th</sup> century, did not have a coinage or monetised economy until the reign of Kepek (1320-1327),<sup>17</sup> although the Golden Horde produced a coinage that was used in South Moldavia beyond the limits of the Horde.<sup>18</sup> Enforced changes in local arrangements could provoke unrest and revolt.<sup>19</sup> The Chinese and Romans had different views of the nature of money and the worth of bullion.<sup>20</sup> Most economies valued both gold and silver, but both are commodities as well as measures of value. The relative availabilities of the two metals could impact on their value.<sup>21</sup> However, it is suggested by Milanovic et al that \$GK 300 would be a reasonable estimate in cash terms of basic human subsistence costs.<sup>22</sup> This matches closely the average cost of the two baskets of goods (respectable and barebones) proposed by Campbell for late 13<sup>th</sup> century England (\$GK 313).<sup>23</sup> The calculations of Maddison indicate that if 1 hectolitre of wheat (approximately two months' supply at the English 1688 level of consumption) were used as a valuation unit, then in 1688 England or 14CE Rome, it could be equated to about \$GK 50 (which amounts to about \$GK 300 consumption per annum, and suggests that the estimate of Milanovic is of the right order of

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grams. The most common weight among Russian rings is 400 grams. Such a weight of silver could be valued at \$GK 650, a rather large currency unit for trade. Arm rings in the West were made to weights that were multiples of a Viking Age Dublin ounce (26.6gm, worth \$GK 43). See Jarman, C. (2021) *River Kings: a new history of the Vikings from Scandinavia to the Silk Roads*. London: William Collins, p.59; Goldberg, M. (2021) 'Unwrapping the Galloway Hoard: Secrets of a unique Viking Age collection from south-west Scotland', *Current Archaeology*, (376), pp. 20-27

<sup>15</sup> The cowrie shell went to the other extreme of inconvenience. The 1680 exchange rate of 32,000 cowrie shells to 1 oz gold gave a single shell a value of 0.02 \$GK. Conducting trade in a currency unit worth two cents (one cent by 1805) meant a great deal of wearisome counting and carrying of heavy weights. See Haour, A. (2021) 'A key commodity: The role of cowries in West Africa', in García, J.C.M. (ed.) *Markets and Exchanges in Pre-modern and Traditional Societies*. Oxford: Oxbow, pp. 19-34.

<sup>16</sup> Lambton, A.K.S., (1968) 'The Internal structure of the Saljuq Empire', pp. 203-282, p. 537 in *The Cambridge History of Iran, Volume 5. The Saljuq and Mongol Periods*, (ed.) Boyle, J.A. Cambridge: Cambridge University Press.

<sup>17</sup> May, T. (2018) *The Mongol Empire*. Edinburgh: Edinburgh University Press. p.271.

<sup>18</sup> Sedlar, J. W. (1994) *East Central Europe in the Middle Ages, 1000-1500*. Seattle and London: University of Washington Press, p. 346.

<sup>19</sup> The Bulgars were accustomed in the early eleventh century to pay their taxes in kind, as their khans issued no coinage. A while after the Byzantine conquest, the authorities insisted in payment of tax in money, leading to revolt in 1040. Kaldellis, A. (2019) *Romanland: Ethnicity and Empire in Byzantium*. Cambridge, Massachusetts: The Belknap Press of Harvard University Press, p.236.

<sup>20</sup> Scheidel, W. (2009) 'The monetary systems of the Han and Roman Empires' in Scheidel, W. (ed.) *Rome and China: comparative perspectives on ancient world empires*. Oxford: Oxford University Press. pp. 137-207.

<sup>21</sup> Thus, the arrival in Egypt of large quantities of West African gold brought by rulers travelling to Mecca is recorded as reducing the worth of the dinar, minted from suddenly more abundant gold. At about the same time, the collapse of Chinese and Middle Eastern silver production in the 1370s enhanced the value of the dirham, minted in increasingly scarce silver. The relationship of dinar and dirham was accordingly shifted to the advantage of the latter. See Fuess, A. (2019) 'How to Cope with the Scarcity of Commodities? The Mamluks' Quest for Metal', in Amitai, R. and Conermann, S. (eds.) *The Mamluk Sultanate from the Perspective of Regional and World History: Economic, Social and Cultural Development in an Era of Increasing International Interaction and Competition*. Bonn: Bonn University Press, pp. 61-74.

<sup>22</sup> Milanovic, B., Lindert, P. and Williams, J. (2011) 'Pre-Industrial Inequalities', *Economic Journal*, 121, pp. 255-272.

<sup>23</sup> Campbell, B. M. S. (2016) *The Great Transition: Climate, Disease and Society in the Late-Medieval World*. Cambridge: Cambridge University Press, Table 3.4, p.262.

magnitude).<sup>24</sup> If the price of 1 hectolitre of wheat is higher than \$GK 50, e.g. \$GK 370 in C14th famine New Delhi, or \$GK 66 in 1295 France, the purchasing power of incomes should be correspondingly adjusted downwards since food is an essential good and its purchase takes priority over purchase of other goods. Within a period of eleven years (1443-1453), the price of grain in the Hungarian town of Prešov varied over a tenfold range (from minimum to maximum) and in response, the purchasing power of the salary received by town officials varied over a eightfold range.<sup>25</sup> Imported luxury goods were prone to variation in price, dependent on the arrival of cargoes, often influenced by the activities of nomad empires and other powers as well as climatic variation.<sup>26</sup>

Thus, average grain prices offer a form of basic benchmark, but peoples and their rulers have much more wide-ranging requirements than simply food. After the extensive task of converting prices, wages, transfers and capital costs<sup>27</sup> to consistent units of measurement and valuation is undertaken (see Appendix 1 for methodology and Tables 6.4 and 6.5, below, for results), considerable variation of prices over time and place becomes obvious. In addition to the effect of currency debasement and inflation, both of which tend to reduce the value of money, and the relative availability of metals used as currency, the changing patterns of general economic scarcity and plenty have an effect on the relative price of goods. For example, the results of Boillet suggest that money supply relative to population in the province of Media after its conquest by the semi-nomadic Parthians in 148 BCE amounted to about only three-quarters of the supply available under their Seleucid predecessors, and about 45% of the supply in Mesopotamia.<sup>28</sup> All else being equal, one would expect actual prices to be correspondingly adjusted downwards, as the money supply decreased.

As already noted, scarcity was particularly significant with regard to the price of essentials such as food. A famine year in India in the 14<sup>th</sup> Century recorded wheat prices which, expressed as \$GK

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<sup>24</sup> Maddison, A. (2007) *Contours of the World Economy*, op. cit. pp.51-52.

<sup>25</sup> Nógrady, Á. (2018) 'Seigneurial dues and Taxation Principles', in Laszlovszky, J., Nagy, B., Szabó, P. and Vadas, A. (eds.) *The Economy of Medieval Hungary*. Leiden: Brill, pp. 265-278.

<sup>26</sup> Prices of imports of spices to Europe from beyond the Mediterranean could be as much as 24 times as great as spices produced in the Mediterranean, dependent on commodity and period. Spufford, P. (2002) *Power and Profit: The Merchant in Medieval Europe*. London: Thames & Hudson, pp. 304-316.

<sup>27</sup> Prices: payments made for small goods and services.

Wages: payments received for work done.

Transfers: payments without specified *quid pro quo* e.g. tax, subsidies, gifts.

Capital: payments made for major goods and services, often made over a period of time.

<sup>28</sup> Boillet, P.-Y. (2017) 'Quantifying Monetary Production: Ecbatana and Media in Parthian Times'. *The Parthian and Early Sasanian Empires: Adaption and Expansion*, Vienna. Oxford: Oxbow, 109-122, p.112.

370 per hectolitre,<sup>29</sup> amounted to more than seven times the \$GK general wheat price which was used by Maddison in constructing his GDP estimates (Table 6.3).<sup>30</sup> Improved market performance tended to develop over time, linked to communication density and urbanisation.<sup>31</sup> This reduced the impact of famine by facilitating the import of grain.

Quality was also relevant to prices, so that in 1300, an English courser horse sold for a price that could be expressed as \$GK 7,678, or 7.4 times the price of lesser beasts available in that time and place. This was broadly the ratio of prices prevailing in the Baltic area one hundred years later.<sup>32</sup> The slave trade also reflected the impacts of scarcity and perceived quality, with female slaves in 1805 Timbuktu fetching a price (\$GK 862) two and a quarter times that of male slaves in the same time and place, but only 15% of the price (\$GK 5,611) fetched by female slaves in Roman Egypt. After a victory, there could be a glut of slaves, with prisoners selling at a mere \$GK 13. Glut prices could of course apply for other booty as well.<sup>33</sup>

Prices among hunter and pastoral peoples are less well represented in the sources and subsequent scholarly literature, although the value of exported goods can sometimes be calculated.<sup>34</sup> Consequently, the entries in the database for nomad societies will be less robust. The price of a sheep among the twelfth century Ghuzz (\$GK 0.4) was well below that of the Hungarians (\$GK 4) together with the Irish (\$GK 6) which lie at the bottom of a wide range extending as far as \$GK 114 (Roman Egypt). Sheep were abundant, and hence cheap, among pastoral peoples. Access to salt was crucial for all societies and pastoral peoples could control access to deposits and salt springs as readily as any other group.<sup>35</sup> The wealth of the African gold trade could also be attractive to nomads. Tapping these sources of wealth afforded them political power,<sup>36</sup> and again the

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<sup>29</sup> Ibn Battutah and Mackintosh-Smith, T. (2003) *The Travels of Ibn Battutah*. London: Picador.

<sup>30</sup> Maddison, A. (2007) *Contours of the World Economy* op. cit. pp. 51-52.

<sup>31</sup> van Leeuwen, B. and Philips, R. C. M. (2021) 'Market performance in the grain market of late medieval Western Europe (c.1300-1650)', in García, J.C.M. (ed.) *Markets and Exchanges in Pre-modern and Traditional Societies*. Oxford: Oxbow, pp. 155-170

<sup>32</sup> Eckdahl, S.(2005) 'The Teutonic Order's Mercenaries during the 'Great War' with Poland-Lithuania (1409-11)', *Mercenaries and Paid Men: The Mercenary Identity in the Middle Ages*, Swansea. Leiden: Brill, pp.345-362.

<sup>33</sup> Animals such as camels could sell at a fraction of the normal price in the wake of plundering following a battle, e.g. for \$GK 4 at Satif in North Africa at the end of the 9<sup>th</sup> century. Hamdani, S. A. (2006b) *Between Revolution and State: the path of Fatimid statehood: Qadi al-Nu'man and the Construction of Fatimid Legitimacy*. London: IB Tauris, p.7.

<sup>34</sup> For instance, \$GK 11 for Siberian ermine skins exported to Transoxiana in the 10<sup>th</sup> – 11<sup>th</sup> century. Makarov, N. A. (2012) 'The Fur Trade in the economy of the Northern Borderland of Medieval Russia', in Brisbane, M., Makarov, N. and Nosov, E. (eds.) *The Archaeology of Medieval Novgorod in Context: Studies in Centre/Periphery Relations*. Oxford: Oxbow Books, pp. 381-390.

<sup>35</sup> Avars, Bulgars and Magyars successively controlled the saline lakes and mines of Transylvania in the eighth to tenth centuries. Musteață, S. (2018) *Nomads and Natives beyond the Danube and the Black Sea 700-900 CE*. Leeds: ARC Humanities Press, p.120.

<sup>36</sup> For instance, in 892, the German King Arnulf, in conflict with the Moravians, asked the Bulgarian Khan to stop supplying salt to the Moravians. Musteață, S. (2018) *Nomads and Natives beyond the Danube and the Black Sea*, p.121.

economic price that could be obtained varied. On the other hand, there could be a price for too close a linkage with sedentary peoples. Pastoralists in areas associated with sedentary villages could find themselves subjected to sedentary state taxation.<sup>37</sup>

The highest wage in Table 6.4 is the cost of hiring Seljuk mercenaries to fight in a 12<sup>th</sup> century campaign of Byzantium against Hungary.<sup>38</sup> Their scarcity and perceived fighting quality, together with the need and wealth of their employers, meant that they were paid the equivalent of \$GK 15,512 per annum, or 18 times the pay of a 1300 English foot soldier. An English knight of 1300 was paid the equivalent of \$GK 10,230, a level of pay that would have required the entire annual earnings surplus in excess of basic subsistence needs from 70 unskilled labourers of that time and place (with about 6 needed to support a foot soldier), and Bacharach suggests that the surplus of twelve agricultural workers was required to supply the calorific requirements alone of a mounted warrior and his horse.<sup>39</sup> It is hardly surprising, then, that knights did not form a large proportion of the population. Professional Roman soldiers in the first century CE cost just over \$GK 2,100 per annum, about two and a half times the cost of a 1300 English foot soldier, or twice that of a ninth century Abbasid foot soldier, while Han Chinese infantry of the first century CE cost \$GK 1,750 per annum. Pay rolls for Byzantine thematic armies in 809-10 were about \$GK 7.25 million.<sup>40</sup> These sorts of costs made it difficult for any society to maintain more than about 4% of the population in arms as professional troops.<sup>41</sup> Infantry were much cheaper, e.g. Byzantine heavy cavalry were allocated for their maintenance and recompense as much as sixteen times the area of land allocated to infantry, while Islamic cavalry were allocated a triple plunder allocation, in recognition of the cost of maintaining their horse. As a consequence, infantry tended to be more numerous.

Cost was, indeed, a key consideration and states adopted different approaches to border policy in part due to the comparative costs of paying soldiers or paying subsidies. McLaughlin suggests that the value of the annual subsidies paid by the Han Chinese to various neighbours in the period 50-

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<sup>37</sup> Sometimes, even when a village itself was deserted, the local pastoralists were taxed (late 16<sup>th</sup> century Jordan). See Walker, B. J. (2021) 'Peasants, rural economy and cash crops in medieval Islam', in García, J.C.M. (ed.) *Markets and Exchanges in Pre-modern and Traditional Societies*. Oxford: Oxbow, pp. 91-114.

<sup>38</sup> Byzantine mercenary pay rates could be very variable. In 1301, the Byzantines were paying cavalry in the Catalan Company at a rate four times that of the Company's foot soldiers, but eleven times what the Byzantines were paying their Alan light horse. This may reflect the lower level of prices prevailing in the steppes. Jesse, S. and Isaenko, A. (2013) 'The Military Effectiveness of Alan Mercenaries in Byzantium, 1301-1306', *Journal of Medieval Military History* XI, pp. 107-132.

<sup>39</sup> Bacharach, B. (1993) 'Logistics in pre-Crusade Europe', in Lynn, J. (ed.) *Feeding Mars: Logistics in Western Warfare from the Middle Ages to the Present*. Boulder: Westview Press, p.65.

<sup>40</sup> Plundered by Bulgars and by Arabs. The period covered by the lost pay is not specified. Musteață, S. (2018) *Nomads and Natives beyond the Danube and Black Sea* p.134.

<sup>41</sup> i.e. paid a living wage for their full-time service, rather than serving as conscripts, pressed men, convict troops, levies or part-time militia .

100 CE amounted to a level which would have supported an army of 113,000, including career infantry and conscripts.<sup>42</sup> It was a matter of judgement whether such an army could have delivered a comparable level of security to the subsidies paid. Whilst army costs were mostly subject to the inflation experienced by the society, subsidy costs could, however, change very rapidly in line with political developments. For instance, in the late sixth century, the subsidy paid to the Avars by the Byzantines increased by 25 per cent in a single year, and by a further 25 per cent in the next fifteen years.<sup>43</sup> Table 6.5 shows the costs for some capital goods and unusual items such as Ibn Battuta's salary as a judge in India, the sale price of the Papacy in c.1040, the tribute extorted by Attila from the Eastern Roman Empire and the ransom offered for the return of the Black Stone of Mecca in 930. Table 6.5 also shows the capital costs of castles and fortifications, which were considerable in terms of the subsistence needs of the population, but quite modest in terms of campaigning costs. Public works such as irrigation and drainage were relatively cheap, if costed in terms of subsistence labour, but could be expensive if undertaken through open market unskilled labour.

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<sup>42</sup> McLaughlin, R. (2016) *The Roman Empire and the Silk Routes: the ancient World Economy & the empires of Parthia, Central Asia & China*. Barnsley: Pen and Sword History, pp.205-6 and related appendices.

<sup>43</sup> Lee, A. (2007) *War in Late Antiquity: a Social history*. Oxford: Blackwell Publishing, p.121.

| Quantity | Commodity                                  | \$ Geary-Khamis | Annual Subsistence Equivalent (\$300 GK) |
|----------|--|-----------------|--|
| 1        | kg barley (Egypt 19 <sup>th</sup> dynasty) | 3               | 0.011                                    |
| 1        | kg wheat (Hungary C16)                     | 0.9             | 0.0033                                   |
| 1        | kg grain (Serbia C15)                      | 0.1             | 0.0004                                   |
| 1        | bread for 1 year (Turkey C14)              | 325             | 1.1                                      |
| 1        | bread yr loaves (Russia C10)               | 91              | 0.3                                      |
| 1        | camel (Egypt C4)                           | 4,364           | 14.5                                     |
| 1        | camel (Arabia C6)                          | 445             | 1.5                                      |
| 1        | camels riding (West Africa C14)            | 1,446           | 4.8                                      |
| 1        | camel (Byzantium C5)                       | 1,255           | 4.18                                     |
| 1        | cow (Merovingian 620)                      | 82              | 0.3                                      |
| 1        | cow (England C15)                          | 154             | 0.5                                      |
| 1        | cow (Indian C14)                           | 244             | 0.8                                      |
| 1        | cow fat (West Africa 1805)                 | 145             | 0.5                                      |
| 1        | cow (Irish Early medieval)                 | 140             | 0.5                                      |
| 1        | cow ox (Babylon 570 BCE)                   | 350             | 1.2                                      |
| 1        | ox (Merovingian 620)                       | 164             | 0.5                                      |
| 1        | ox (Hungary C13)                           | 225             | 0.8                                      |
| 1        | donkey (Anatolia/Assyria 1000BCE)          | 273             | 0.9                                      |
| 1        | donkey 1st class (Chin 1169)               | 208             | 0.7                                      |
| 1        | donkey (Babylon 537 BCE)                   | 26              | 0.1                                      |
| 1        | donkey, Byzantium C5                       | 251             | 0.8                                      |
| 1        | wheat h litre famine (India C14)           | 377             | 1.2                                      |
| 1200     | herrings (England 1300)                    | 115             | 0.4                                      |
| 1        | stallion (Merovingian 620)                 | 575             | 1.9                                      |
| 1        | mare (Merovingian 620)                     | 246             | 0.8                                      |
| 1        | horse (England 1285)                       | 1,032           | 3.4                                      |
| 1        | horse: inferior (England 1285)             | 307             | 1.0                                      |
| 1        | horse (West Africa 1353)                   | 7,756           | 25.9                                     |
| 1        | horse courser (England 1285)               | 7,678           | 25.6                                     |
| 1        | horse (Egypt 6-7C)                         | 205             | 0.7                                      |
| 1        | horse: Military 1 (Indian 1300)            | 1,931           | 6.4                                      |
| 1        | horse: Military 2 (Indian 1300)            | 1,492           | 5.0                                      |
| 1        | horse: Military 3 (Indian 1300)            | 1,185           | 3.9                                      |
| 1        | horse: rouncey (England 1300)              | 5,119           | 17.1                                     |
| 1        | horse: ordinary (England 1300)             | 307             | 1.0                                      |
| 1        | horse (Hungary C13)                        | 225             | 0.8                                      |
| 1        | knight's gear (Carolingian C9)             | 2,710           | 9.0                                      |
| 1        | pig (Byzantium C5)                         | 84              | 0.3                                      |
| 1        | pork lb (Rome C2)                          | 0.3             | 0.001                                    |
| 1        | salt bar (West Africa C13)                 | 698             | 2.3                                      |
| 1        | salt bar (West Africa 1805)                | 77              | 0.3                                      |

**Table 6.4 Historical World Prices of Goods and Services (\$ Geary Khamis 1990 PPP adjusted). Sources: see Appendix 1**

| Quantity | Commodity                          | \$ Geary-Khamis | Annual Subsistence Equivalent (\$300 GK) |
|----------|------------------------------------|-----------------|--|
| 1        | salt lb (Chin 1150)                | 1               | 0.003                                    |
| 1        | kg salt (Hungary C12)              | 0.1             | 0.0004                                   |
| 1        | salt bar (West Africa early C19)   | 518             | 1.7                                      |
| 1        | sheep (Egyptian)                   | 114             | 0.4                                      |
| 1        | sheep (Indian Medieval)            | 41              | 0.1                                      |
| 1        | sheep (Babylon 500 BCE)            | 10              | 0.05                                     |
| 1        | sheep (Babylon 537 BCE)            | 14              | 0.05                                     |
| 1        | sheep (Babylon 475 BCE)            | 28              | 0.1                                      |
| 1        | sheep (Ghuzz C12)                  | 0.4             | 0.001                                    |
| 1        | sheep (Hungarian C12)              | 4               | 0.01                                     |
| 1        | sheep (Iranian C5 BCE)             | 41              | 0.1                                      |
| 1        | sheep (England 1300)               | 29              | 0.1                                      |
| 1        | sheep (Irish Early Medieval)       | 6               | 0.02                                     |
| 1        | sheep ram (Babylon 570 BCE)        | 28              | 0.1                                      |
| 1        | slave (Babylon 350 BCE)            | 1,641           | 5.5                                      |
| 1        | slave (Babylon 530 BCE)            | 820             | 2.7                                      |
| 1        | slave (Babylon 570 BCE)            | 560             | 1.9                                      |
| 1        | slave f (West Africa 1805)         | 862             | 2.9                                      |
| 1        | slave f (Egyptian Roman era)       | 5,611           | 18.7                                     |
| 1        | slave, skilled (Byzantium C5)      | 2,509           | 8.4                                      |
| 1        | slave f (India 1300)               | 1,562           | 5.2                                      |
| 1        | slave f (Hungary C12)              | 776             | 2.6                                      |
| 1        | slave f (West Africa C14)          | 1,939           | 6.5                                      |
| 1        | slave f (Irish Early Medieval)     | 140             | 0.5                                      |
| 1        | slave, Gallic boy (Egypt 359)      | 1,478           | 4.9                                      |
| 1        | slave Greek virgin f (Hungary C14) | 3,212           | 10.7                                     |
| 1        | slave (Oghuz C10)                  | 1,334           | 4.4                                      |
| 1        | slave, Slav f (Sicily 1120)        | 1,772           | 5.9                                      |
| 1        | slave, m (West Africa 1805)        | 383             | 1.3                                      |
| 1        | slave, Nubian (Egypt C14)          | 13              | 0.01                                     |
| 1        | slave, Scythian (Greece 414 BCE)   | 1,016           | 3.4                                      |
| 1        | silk bolt (China Song)             | 765             | 2.5                                      |
| 1        | silk bolt (Chin 1169)              | 130             | 0.4                                      |
| 1        | kg silk (China C14)                | 58              | 0.003                                    |
| 1        | skins marten pelt (Russia C10)     | 11              | 0.04                                     |
| 1        | skins squirrel (Russia C12)        | 0.2             | 0.001                                    |

**Table 6.4 Historical World Prices of Goods and Services (\$ Geary Khamis 1990 PPP adjusted (continued)).** Sources: see Appendix 1

| Quantity | Commodity                                     | \$ Geary-Khamis | Annual Subsistence Equivalent (\$300 GK) |
|----------|---|-----------------|--|
| 1        | bolt Bohemian cloth (Hungary C13)             | 451             | 1.5                                      |
| 10       | kg wool (England 1440)                        | 94              | 0.3                                      |
| 10       | kg wool (Babylon 1000BCE)                     | 14              | 0.05                                     |
| 1        | ordinary male outfit (Syria C8)               | 53              | 0.2                                      |
| 1        | yr foot (England 1300)                        | 853             | 2.8                                      |
| 1        | yr career infantry soldier (Han China)        | 1,752           | 5.8                                      |
| 1        | yr foot soldier (Abbasid C9)                  | 1,067           | 3.6                                      |
| 1        | yr career soldier (Rome C2)                   | 2,190           | 7.3                                      |
| 1        | yr cavalry (England 1300)                     | 5,119           | 17.1                                     |
| 1        | yr horse (England 1300)                       | 1,369           | 4.6                                      |
| 1        | yr knight (England 1300)                      | 10,237          | 34.1                                     |
| 1        | yr light horse (England 1300 est)             | 2,559           | 8.5                                      |
| 1        | yr mercenary mounted knight (France 1364)     | 2,067           | 6.9                                      |
| 1        | yr trooper (India 1300)                       | 4,108           | 13.7                                     |
| 1        | yr Turk mercenary (Byzantine C14)             | 15,512          | 51.7                                     |
| 1        | yr Anatolian spahi (Ottoman C15)              | 2,787           | 9.29                                     |
| 1        | yr European spahi (Ottoman C15)               | 4,181           | 13.94                                    |
| 1        | yr vojnik pay (Belgrade garrison C16)         | 451             | 1.5                                      |
| 1        | yr servant salary (England 1300)              | 193             | 0.6                                      |
| 1        | yr unskilled worker (England 1300)            | 427             | 1.4                                      |
| 1        | yr skilled worker (England 1300)              | 1,066           | 3.6                                      |
| 1        | yr unskilled worker (Venice 1389)             | 2,703           | 9.0                                      |
| 1        | yr unskilled worker (Byzantine C5)            | 174             | 0.6                                      |
| 1        | yr skilled worker (Byzantine C5)              | 418             | 1.4                                      |
| 1        | prostitute fee (English 1466)                 | 218             | 0.7                                      |
| 1        | Poor Basket of Goods for Five (Babylon 94BCE) | 364             | 1.2                                      |
| 1        | Respectable Basket of goods (England 1290)    | 441             | 1.5                                      |
| 1        | Barebones Basket of goods (England 1290)      | 186             | 0.6                                      |
| 1        | urban Household income (Hungary C14)          | 2,378           | 7.9                                      |

**Table 6.4 Historical World Prices of Goods and Services (\$ Geary Khamis 1990 PPP adjusted (continued)).** Sources: see Appendix 1



| Quantity   | Item  | \$ Geary-Khamis | Annual Subsistence Equivalent (\$300 GK) |
|------------|---|-----------------|--|
| 13,072,000 | gm gold nomad subsidy (Han China)   | 198,794,769     | 662,649                                  |
| 1,000      | lb gold tribute to Attila (Rome C5)   | 8,295,097       | 27,650                                   |
| 1          | ransom Black Stone (Arabia 931)   | 2,408,896       | 8,030                                    |
| 1          | ransom of Prophet Muhammed's uncle from sacrifice (Mecca C6)                                    | 44,461          | 148                                      |
| 1          | judge salary (Ibn Battuta) (India C14)  | 401,483         | 1,338                                    |
| 1          | price reportedly paid by Omri for site of Samaria (Israel C8 BCE)                               | 89,200          | 297                                      |
| 1          | hoplite's estate (Athens C5 BCE)  | 42,328 - 44,744 | 141-149                                  |
| 1          | cavalryman's estate (Athens C5 BCE)   | 63,492          | 211                                      |
| 1          | purchase of Papacy (Rome1040)   | 745,732         | 2,486                                    |
| 1          | chariot and 2 horses (Israel 900BCE)  | 12,597          | 42                                       |
| 34         | solidi average hoard of Roman gold (Sweden C5)  | 2,792           | 9  |
| 30         | mule loads of drachmas, ransom for King Peroz (Iran C5)   | 110,741         | 369                                      |
| 1          | dowry for army veteran's daughter marriage (Byzantium C5)                                       | 3,346           | 11                                       |
| 1          | to build village church (Byzantium C5)  | 33,457          | 112                                      |
| 134        | Silver marks spent on textile gifts to Cumans (Hungary 1264)                                    | 51,443          | 171                                      |
| 100        | lb gold Lombard tribute to Byzantium (C7)   | 827,770         | 2,759                                    |
| 500        | cows Saxon tribute to Franks (C7)   | 83,642          | 279                                      |
| 33         | dirhams toll attributed to Turkish marauder   | 147             | 0.48                                     |
| 1          | village (Wallachia C15)   | 5,286           | 18                                       |
| 1          | kg amber Near East (Bronze Age)   | 3,281           | 11                                       |
| 263        | kg gold annual output of Nubian mines (C15 BCE)   | 4,799,543       | 15,998                                   |
| 2          | h litres grain daily allowance to Pharoah's daughter annualized (Egypt C7 BCE)                  | 37,367          | 125                                      |
| 300        | taels of silver as attributed monthly revenue of crime boss annualized (China C14, told of C12) | 220,301         | 734                                      |
| 1          | average capital cost of six Turkestan irrigation works at minimum subsistence wages             | 390,000         | 1,300                                    |
| 1          | average estimate of capital cost for Offa's Dyke at minimum wages                               | 851,000         | 2,837                                    |
| 1          | attributed bullion of hoard in tale (Ireland C13, told of C3)                                   | 615,341         | 2,051                                    |
| 1          | Edwardian castle building (England C13)   | 40,488,936      | 134,963                                  |
| 1          | Edwardian campaigning costs (England C13)   | 722,760,776     | 2,409,203                                |

**Table 6.5 Historical Cost of Subsidies, Tributes, Ransoms, Capital goods and Exceptional Items (\$ Geary Khamis 1990 PPP adjusted)).** Sources: see Appendix 1

The economy of the steppes is not well documented but was certainly rather different from the better known economies of arable and commercial communities.<sup>44</sup> The imperial Mongols also made a number of adjustments to the economies that they came to control, including the calibration of currencies to a silver ingot weighing one *subkhe*.<sup>45</sup> Table 6.6 shows some of the prices that can be identified as related to steppe contexts. The first three refer to prices paid for non-steppe produce by wealthy khans in the imperial Mongol period, and they are clearly exceedingly expensive by non-steppe standards, e.g., a tray of fruit is valued at almost as much as two months' supply of grain in a normal year. By pre-imperial steppe standards, the payments are astronomical, with a piece of cotton equivalent in price to a herd of 465 Ghuzz sheep. This textile price is recorded in the context of Chingis Khan demonstrating his awareness of an attempt to overcharge him,<sup>46</sup> but it is possible that he also implied that those who traded fairly, would get a

<sup>44</sup> Table 6.3 shows that the cost of a sheep in pastoral European cultures (Ireland \$GK 6, Hungary \$GK 4) is more than 10 times the cost in a steppe culture (Ghuzz \$GK 0.4), but only about one-fifth or less of the cost in an arable culture (England \$GK 29). Applying this degree of variation to the cost of an inferior horse (England \$GK 307 in 1300) suggests a steppe price of \$GK 4 for a horse. Since Table 4.3 suggests that 1 horse equated to 5 sheep on the steppe, an alternative estimate of \$GK 2 is possible. Accordingly, the steppe price for a horse is estimated as the average of the two estimates, at \$GK 3. This compares with the cost of an eighteenth century West African pony (\$GK 182, based on Johnston, H. A. S. (1970) *The Fulani Empire of Sokoto*. London: Oxford University Press, p.163).

<sup>45</sup> The *subkhe* weighed 1.865 kilogrammes and was not well suited to trade, being better suited to hoarding. An ingot of fine silver with this weight has an estimated value of \$GK 3,060, and in Venice of 1389 would have bought over 75 hectolitres of wheat or paid 283 daily wages for an unskilled worker. A rather more flexible means of trade was provided by the *summo* of Caffa, a fine silver ingot used by the Venetians in Black Sea trade with the Golden Horde during the fourteenth century. This was approximately one sixth of the size of a *subkhe* with a weight of 316.75 grams and a value of approximately \$GK 520 (i.e., broadly similar to the bullion worth of Permian rings found in what was formerly the territory of the Volga Bulgars; see footnote 12). This would buy perhaps 170 horses or 1,300 sheep on the steppes and would hardly suit small scale retail trade. Such a quantity of silver would have bought one stallion in Merovingian France, or perhaps 17 sheep in early fourteenth century England. One commodity for which 1 or 2 *summos* might have sufficed were slaves, as the Golden Horde traded in Qipchaq Turkish slaves, supplying the Mamluk rulers of Egypt with the *ghulams* required to maintain their army against the Ilkhans. Since the *sommo* (details above) seems to have equated to about 200 aspers, a form of the dirham, minted originally by the Golden Horde in the 1280s and subsequently by the Ottomans, the asper was worth about \$GK 2.5 and served as a more easily used medium of trade. See Weatherford, J. (2004) *Genghis Khan and the making of the modern world*. New York: Broadway Books, p.176; Gyllenbok, J. (2018) *Encyclopaedia of Historical Metrology, Weights and Measures, Volume 3*. Cham: Birkhäuser, p. 1760; Lane, F. and Mueller, R. (2019) *Money and Banking in Medieval and Renaissance Venice, Volume One: Coins and Money of Account*. Baltimore: Johns Hopkins University Press, p.164; Mueller, R. (2019) *The Venetian Money Market: Banks, Panics and the Public Debt, 1200-1500*. Baltimore: Johns Hopkins University Press, p.656; Spufford, P. et al. (1986) *Handbook of Medieval Exchange*. London: Offices of the Royal Historical Society, p.289, p.306; Spufford, P. (1989) *Money and its use in medieval Europe*. Cambridge, Cambridge University Press, p.147; Fuess, A. (2019) 'How to Cope with the Scarcity of Commodities? The Mamluks' Quest for Metal', op. cit. pp. 61-74; Favereau, M. (2019) 'The Mamluk Sultanate and the Golden Horde', in Amitai, R. and Conermann, S. (eds.) *The Mamluk Sultanate from the Perspective of Regional and World History: Economic, Social and Cultural Development in an Era of Increasing International Interaction and Competition*. Bonn: Bonn University Press, pp. 345-365.

<sup>46</sup> The overcharging merchant appears to have been seeking a 22.5 fold mark-up (Juvaini, A.-M. (1958) *The history of the World Conqueror, Volumes I and II*. Translated by: Boyle, J. Manchester: Manchester University Press, Vol I, p.78). This was comparatively modest, given that a hundred fold mark-up in price was possible for remotely sourced goods, e.g. the price fetched by amber in the Bronze Age Near East, set against the likely effort required to collect the amber from Baltic shores (Manco, J. (2019) *The Origins of the Anglo-Saxons: decoding the Ancestry of the English*. London: Thames and Hudson, p.77). As noted above, spices imported to Europe from beyond the Mediterranean could be 24 times as expensive as those coming from the Mediterranean (Footnote 23). The Emperor Justinian seems to have sought a mark-up of at least 18 fold and possibly as high as 36 fold on silk imported from China (Footnote 4 in Appendix 1). On shorter and more regularly traded routes, such as that between late 2<sup>nd</sup> millennium BCE Old Assyria and Anatolia, profits of 100% for tin and 200% for textiles (mark-ups of 2-3 fold) were recorded (García, J. C. M. (2021) 'Market and transactions in pre-modern societies', in García, J.C.M. (ed.) *Markets and Exchanges in Pre-modern and*

price that was still above sedentary levels. The fruit prices figure in an account of Ogodai Khan, who ended by paying what the contemporary Persian chronicler Juvaini clearly deemed to be extravagantly generous prices, at eighty times the value of the goods.<sup>47</sup> The grain prices recorded arise in the context of a shortage and are comparable with French prices in 1295. The estimated price of a horse in the steppes was only one hundredth of the price of an inferior beast in an arable community. It should be borne in mind that nomads had relatively little use for precious metals in intra-steppe trade and were apt to accumulate hoards.<sup>48</sup> The ongoing movement of precious metals across nomad territory provided a source for such hoards. This hoarding tended to reduce prices.

| Number | Commodity  | \$ Geary-Khamis | Annual Subsistence Equivalent (\$300 GK) |
|--------|--|-----------------|--|
| 1      | tray of jubjubes (fruit) (C13th) Qara-Qorum                | 43.07           | 0.14                                     |
| 1      | gold embroidered cloth (C13th)                             | 3,193.61        | 10.65                                    |
| 1      | piece cotton (C13th)                                       | 172.26          | 0.57                                     |
| 1      | hectolitre grain Qara-Qorum minimum shortage price (C13th) | 68.13           | 0.23                                     |
| 1      | cartload salt Perekop (1253)                               | 29.3            | 0.10                                     |
| 1      | sheep Ghuzz (C12th)  | 0.37            | 0.001                                    |
| 5      | sheep Ghuzz (possibly two months food supply)              | 1.86            | 0.006                                    |
| 1      | horse (estimated) Mongol                                   | 3.00            | 0.01                                     |
| 1      | camel (Arabia C6)  | 445             | 1.5                                      |

**Table 6.6 Prices paid to or by nomads**

Source: Juvaini<sup>49</sup>, Ibn Battutah<sup>50</sup>

#### 6.4 ECONOMIC IMPACT OF CATASTROPHIC EVENTS

As noted above, catastrophic events such as pestilence, climatic extremes and war can affect productivity. Where relevant information is available, it is possible to adjust Madison's linear interpolations to account for such influences. Excursus E6 contains an example, arising from the

*Traditional Societies*. Oxford: Oxbow, pp. 1-18.)

<sup>47</sup> Even so, the value of the tray of fruit was approximately the same as that of a Ghuzz sheep, illustrating the disparate prices of steppe and settled lands.

<sup>48</sup> If the main currency was an ingot of silver worth \$G-K 520, it is hardly surprising that ordinary trade was pursued by other means. Howorth, H. H. (1880) *History of the Mongols from the 9th to the 19th Century: Part II, The So-called Tartars of Russia and Central Asia, Division 2*. London: Longman, Green and Co, pp.1047-8.

<sup>49</sup> Juvaini, A.-M. (1958) *The history of the World Conqueror, Volumes I and II*. op. cit.

<sup>50</sup> Ibn Battutah and Mackintosh-Smith, T. (2003) *The Travels of Ibn Battutah*. London: Picador.

Mongol invasion of Iran. This data is used to adjust Madison’s GDP data for 13<sup>th</sup> century Iran, which was much more impoverished than would be expected from the interpolation.

## 6.5 INEQUALITY

In near-subsistence societies, classic economic assumptions about maximising returns must be treated with caution. Ensuring survival during and following catastrophic events and bad years may take priority. Borgerhoff-Mulder et al suggest that “the *effects* of shocks are not random with respect to wealth—wealthier households weather calamities better than poorer ones”.<sup>51</sup> This is consistent with Scheidel’s views that only the most violent or extreme shocks were able to meaningfully impact the wealthy.<sup>52</sup>

| Group  | Number of Households | Average annual income per household (£) | Average daily income (d per day) |
|--|----------------------|---|----------------------------------|
| Cottagers & agricultural labourers   | 240,000              | 1.50                                    | 1                                |
| Rural Craftsmen, non-agricultural labourers  | 160,000              | 1.75                                    | 1                                |
| Men-at-arms, miners, fishers and sailors   | 50,000               | 2.50                                    | 2                                |
| Small-holders  | 300,000              | 3.00                                    | 2                                |
| Minor clergy, professionals, lawyers, merchants, tradesmen, craftsmen, builders, urban labourers | 130,000              | 5.50                                    | 4                                |
| Yardlanders [larger small-holders]   | 180,000              | 6.00                                    | 4                                |
| Substantial tenants  | 12,500               | 12.00                                   | 8                                |
| Landowners (spiritual lords, aristocracy, gentry, clergy)  | 21,000               | 28.00                                   | 18                               |
| England c.1290   | 1,093,500            | 3.84                                    | 3                                |
| Gini Coefficient   | 0.37                 |   |                                  |

**Table 6.7 Estimate of Gini Coefficient for Income, England c.1290**

Source: data derived from Campbell (2016).<sup>53</sup> In England of that period, £1 sterling equated to about 512 ŞGK

A standard measure of inequality is the Gini Coefficient, returning a value of zero where something is shared equally between members of a group, and approximately one where everything belongs to one individual, and the rest have nothing. Table 6.7 provides an initial estimate of the level of inequality for a specimen sedentary society based on fairly detailed data. This provides a

<sup>51</sup> Borgerhoff Mulder, M., Fazio, I., Irons, W., McElreath, R., Bowles, S., Bell, A., Hertz, T. and Hazzh, L. (2010) 'Pastoralism and Wealth Inequality: Revisiting an Old Question', *Current Anthropology*, 51(1), pp. 35-48.

<sup>52</sup> Scheidel, W. (2017) *The Great Leveler: Violence and the History of Inequality from the Stone Age to the Twenty-first Century*. Princeton: Princeton University Press, pp.448-49.

<sup>53</sup> Campbell, B. M. S. (2016) *The Great Transition: Climate, Disease and Society in the Late-Medieval World*. Cambridge: Cambridge University Press, pp.262-3.

benchmark value for further comparisons. It suggests that the Gini Coefficient for English households in 1290 was 0.37.

Smith et al. and Shenk et al.<sup>54</sup> also examine the relationship of agricultural type with wealth inequality. They conclude that hunter-gatherers and horticulturalists have limited capability to transmit wealth to the next generation, compared to pastoral and agricultural producers. Table 6.8 presents their data, displaying the broad similarity of inequality levels in some arable and pastoral societies, albeit unadjusted for any variation in overall production. There is evidence that inequalities arising from constraints on land availability are more severe than those arising from constraints of labour and livestock.<sup>55</sup> Kron suggests that the inequality of Athenian citizens in antiquity and citizens of fifteenth century Florence was at a level broadly comparable with these arable societies.<sup>56</sup> These values suggest a rather higher level of inequality for arable societies than might be expected from the Campbell data for 1290 England.

| Arable          |           | Gini | Pastoral         | Gini |
|-----------------|-----------|------|------------------|------|
| East Anglians:  |           | .608 | Datoga           | .386 |
| Kipsigis:       | Land      | .482 | Juhaina Arabs    | .346 |
|                 | Livestock | .450 | Sangu (Ukwaheri) | .694 |
| Krummhorn:      | Land      | .708 |                  |      |
| Yomut (Chomur): | Patrimony | .615 | Yomut            | .599 |

**Table 6.8 Inequality of societies by Agricultural type**

Source: Borgerhoff-Mulder et al, Smith et al and Shenk et al

Milanovic et al draw attention to the fact that there are problems in using the Gini measure to compare the levels of inequality in societies that differ considerably in their overall wealth.<sup>57</sup> A society that fails to permit all its members access to at least a minimum basic subsistence collapses in the medium or long-term, and so only wealth in excess of that minimum basic subsistence may be safely extracted by social elites or the state. Scheidel accepts the view that it is unsafe to compare Gini coefficients derived from societies over very different levels of GDP, and suggests

<sup>54</sup> Smith, E., Borgerhoff-Mulder, M., Bowles, J., Gurven, M., Hertz, T. and Shenk, M. (2010) 'Intergenerational Wealth Transmission and Inequality in Premodern Production Systems, Inheritance, and Inequality in Premodern Societies Conclusions', *Current Anthropology*, 51(February), p. 85; Shenk, M., Borgerhoff Mulder, M., Beise, J., Clark, G., Irons, W., Leonetti, D., Low, B., Bowles, S., Hertz, T., A., B. and Piraino, P. (2010) 'Wealth Transmission and Inequality in Premodern Societies: Intergenerational Wealth Transmission among Agriculturalists: Foundations of Agrarian Inequality', *Current Anthropology*, 51(1 February), p. 65.

<sup>55</sup> Bogaard, A., Fochesato, M. and Bowles, S. (2019) 'The Farming Inequality nexus: new insights from ancient Western Eurasia', *Antiquity*, 93(371), pp. 1129-1142.

<sup>56</sup> inequality was a little higher: Gini Coefficients of 0.708 for Athens (c. 321 BCE) and 0.788 for Florence (1427). See Kron, G. (2011) 'The Distribution of Wealth at Athens in Comparative Perspective', *Zeitschrift für Papyrologie und Epigraphik*, 179, pp. 129-138.

<sup>57</sup> Milanovic et al, (2011) 'Pre-Industrial Inequalities' op. cit.

that early societies tended to be as unequal as they could afford to be.<sup>58</sup> In his view, total war, revolution, state collapse and plague act as four great levellers that can reduce inequality by delivering transformational shocks to prevailing systems from which elites have appropriated much of the available economic surplus.

It must also be remembered that the goods in which a society expresses its inequality may vary. The presence of an abundance of goods that would imply very considerable wealth in one society may not have quite the same significance in another society.<sup>59</sup>

As Table 6.9 shows, even a comparatively modest theoretical inequality, e.g., Byzantium in 1000CE at 41.1 (0.411), may in fact equate to a high level of extraction. The economist's picture of Byzantine inequality matches the historian's findings. Byzantium had an inherited contempt for trade, a gold currency attuned to the needs of the wealthy and a regressive tax system. There were provincial uprisings and antagonism to the ruling centre of Constantinople, which was viewed as a distant parasite. Success in war had fostered the growth of noble families and the establishment of wealthy families in the villages. In order to maintain the supply of peasant soldiers, Basil II found it necessary to impose rigid imperial control on agrarian economy, with laws to protect the peasants from loss of land.<sup>60</sup> Growing inequality was not regarded as a source of strength to the empire, but it did provide the possibility of developing and supporting sophisticated political and military systems unlikely to be the spontaneous product of an equal society.

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<sup>58</sup> Scheidel, W. (2017) *The Great Leveler: Violence and the History of Inequality from the Stone Age to the Twenty-first Century*. Princeton: Princeton University Press, pp.448-49.

<sup>59</sup> Thus, the considerable weight of silver grave goods found in a Bronze Age Spanish community would certainly have been of notable value if transported to Babylon of the same era. (See Lull, V., Rihuete-Herrada, C., Risch, R., Bonora, B., Celdrán-Beltrán, E., Fregeiro, M. I., Molero, C., Moreno, A., Oliart, C., Velasco-Felipe, C., Andúgar, L., Haak, W., Villalba-Mouco, V. and Micó, R. (2021) 'Emblems and spaces of power during the Argaric Bronze Age at La Almoloya, Murcia', *Antiquity*, 95(380), pp. 329–348.) However, in the mineral rich environment of Spain, it may be that silver was relatively abundant *vis a vis* barley and labour and thus perhaps less valuable than it might appear. Nonetheless, it seems unlikely that the grave goods were of little value.

<sup>60</sup> See Angold, M. (1997) *The Byzantine Empire 1025-1204: A political History*. Harlow: Pearson Education Ltd., p.89, Herrin, J. (2008) *Byzantium: the surprising life of a medieval Empire*. London: Penguin, pp.148-156, p.269) and Whittow, M. (1996) *The Making of Orthodox Byzantium 600-1025*. Basingstoke: Macmillan pp.336-342.

| Society              | Gini2 | Maximum feasible Gini (IPF) | Inequality extraction ratio (IER) (%) | Financial Incentive | Mean income in terms of subsistence units |
|----------------------|-------|-----------------------------|---------------------------------------|---------------------|---|
| China 1880           | 24.5  | 44.4                        | 55.2                                  | 44.8                | 1.8                                       |
| Levant 1596          | 39.8  | 69.1                        | 57.6                                  | 42.4                | 3.2                                       |
| South Serbia 1455    | 20.9  | 32.2                        | 64.8                                  | 35.2                | 1.5                                       |
| Tuscany 1427         | 46.1  | 69.3                        | 66.6                                  | 33.4                | 3.3                                       |
| England & Wales 1290 | 36.7  | 53.0                        | 69.2                                  | 30.8                | 2.1                                       |
| Rome 14 CE           | 39.4  | 52.6                        | 75.0                                  | 25.0                | 2.1                                       |
| Byzantium 1000       | 41.1  | 43.7                        | 94.1                                  | 5.9                 | 1.8                                       |
| Moghul India 1750    | 48.9  | 43.4                        | 112.8                                 | 0.0                 | 1.8                                       |

**Table 6.9 Pre-industrial Inequalities**

Source: Millanovic et al (2011)

Maximum Feasible Gini = 19.42 x Subsistence Units + 7.776

Regression on above data, R<sup>2</sup> = 0.943

Financial incentive = (100 – Maximum Feasible Gini) (set to 0 if below 0)

Subsistence unit = \$GK300

It is possible to arrive at a further indication of Gini coefficient for the various societies included in the database (Chapter 11), by using Barker's army lists on relative numbers in their armies.<sup>61</sup> This may be weighted by Contamine's 1300 English troop salaries,<sup>62</sup> supplemented by Coulton's costing of light cavalry.<sup>63</sup> Sumption's 1345 income equivalents of troop types<sup>64</sup> or Robert of Clari's report of the shares of plunder at the Sack of Constantinople in 1204,<sup>65</sup> would provide weights which match closely.<sup>66</sup> From these sets of data, it is possible to estimate the Gini coefficient for their armies on the assumptions of Table 6.10 concerning troop pay and status. This method might be expected to under-estimate the level of inequality in society, since the very poorest members of society tend to be excluded from fighting,<sup>67</sup> while mercenaries, often from outside, have to be offered an acceptable pay rate, given that they are asked to risk their life.<sup>68</sup> A later fifth

<sup>61</sup> Barker, P. (2008a) *DBMM Army Lists for use with the De Bellis Magistorum Militum Wargames Rules Book 2: 500 BC-476 AD*. Nottingham: Partizan Press.

Barker, P. (2008b) *DBMM Army Lists for use with the De Bellis Magistorum Militum Wargames Rules Book 3: 476 AD - 1071 AD*. Nottingham: Partizan Press.

Barker, P. (2009) *DBMM Army Lists for use with the De Bellis Magistorum Militum Wargames Rules Book 1: 3000 BC - 500 BC*. Nottingham: Partizan Press.

Barker, P. (2010) *DBMM Army Lists for use with the De Bellis Magistorum Militum Wargames Rules Book 4 1071AD – 1515 AD: The High Medieval Period*. Cambridge: Wargames Research Group.

<sup>62</sup> Contamine, P. (1987) *War in the Middle Ages*. Translated by Jones, Michael Oxford; Blackwell p92-96

<sup>63</sup> Coulton, G. C. (1934) *The Meaning of Medieval Moneys*. Historical Association Leaflet No 95. London: The Historical Association and G Bell and Sons Ltd, p.12.

<sup>64</sup> Sumption, J. (1999) *Trial by Battle: The Hundred Years War I*, London, Faber & Faber, p.490.

<sup>65</sup> Clari, R. (1996) *The Conquest of Constantinople*. Translated by McNeal, E.H. Toronto: University of Toronto Press, Appendix.

<sup>66</sup> Spanish relativities were somewhat different, reflecting the higher status of light horse. Agrait, N. (2005) 'Castilian Military Reform under the Reign of Alfonso XI (1312-1350)', *Journal of Medieval Military History*, III, pp. 88-126.

<sup>67</sup> They may be unable to afford their own weapons and other equipment, which renders them expensive to raise, but not necessarily particularly effective.

<sup>68</sup> It should be noted that the pay of Hellenistic mercenaries was little more than the pay of a manual worker of average skill, suggesting that the premium for risking one's life (in some contexts at least) was not necessarily great. Garland, Y. (1975) *War in the Ancient World: a social history*. Translated by Lloyd, J. New York: WW Norton & Company Inc., p.102.

century BCE Greek mercenary might have earnings of \$GK 1,764 per annum,<sup>69</sup> comparable with \$GK 1,752 for professional Han Chinese soldiers and rather less than the \$GK 2,190 for professional Roman soldiers, while all these rates are more than double the earnings of a medieval infantryman.

| Troop type                                  | Daily pay in d per day (England 1300) | \$ GK per annum | Official assessment of equivalent annual income (England 1345)* | Share of plunder at Constantinople (1204)* | Daily pay in maravedies (Castille 1388) |
|---|---------------------------------------|-----------------|---|--|---|
| Untrained Foot                              | 1                                     | 427             | -   | -  | 1                                       |
| Foot  | 2                                     | 863             | -   | -  | 3                                       |
| Light Horse/<br>Foot sergeant <sup>70</sup> | 6                                     | 2,559           | 6   | 6  | 10                                      |
| Cavalry                                     | 12                                    | 5,119           | 12  | 12   | 12                                      |
| Knights                                     | 24                                    | 10,237          | 30  | 24   | -                                       |

**Table 6.10 Relative pay and plunder award of troops**

\* Foot Sergeant (Income of £5 pa or \$GK 2,559) indexed as 6

Source: Contamine, Clari, Coulton, Sumption, Agrait

The value of the property required to support cavalymen (maintenance and reward) seems to have displayed a degree of consistency over time. The estimated sale value of the land and property that would be assigned for the support of a Byzantine thematic<sup>71</sup> cavalryman was \$GK 37,328,<sup>72</sup> and for a Nikephoran armoured cavalryman, \$GK 99,451,<sup>73</sup> which was the equivalent of an estate worked by 30 families.<sup>74</sup> These may be compared with the \$GK 63,492 price of a 5<sup>th</sup> century BCE Athenian estate (Table 6.4) which might have supported a cavalryman.<sup>75</sup>

Table 6.11 shows the relative value placed on the lives of various animals and non-military social groups by 6<sup>th</sup> Century Burgundian rulers. Slaves and general craftsmen such as carpenters and blacksmiths probably approximated the status of untrained and trained foot, while skilled craftsmen had a status akin to light horse, well below cavalry and knights. By contrast, Attila the

<sup>69</sup> Ober, J. (2015) 'Classical Athens' in *Fiscal Regimes and the Political Economy of Premodern States*, ed. Monson, A. and Scheidel, W. Cambridge: Cambridge University Press, p.497.

<sup>70</sup> Some light horse were paid as much as 8d per day, but there is little evidence of higher status for archers. Baker, G. (2014) 'Investigating the Socio-Economic Origins of English Archers in the Second Half of the Fourteenth Century', *Journal of Medieval Military History*, XII pp.173-116.

<sup>71</sup> The eighth to tenth century Byzantine 'thematic' system allocated land in each theme, or recruitment area, to peasant families who assumed the responsibility of supplying from their number, a fully equipped soldier. The tenth century emperor Nikephoros introduced more heavily armoured cavalry, whose cost was greater.

<sup>72</sup> Haldon, J. (1999) *Warfare, State and Society in the Byzantine World 565-1204*. Abingdon: Routledge pp.267-8

<sup>73</sup> The ratio of the property values needed for support of Byzantine heavy cavalryman and thematic cavalry (2.66) is virtually the same as the ratio of annual pay for English knights to the average annual pay of light horse and cavalry in Table 6.3 (i.e.2.67). This suggests that the results are broadly consistent.

<sup>74</sup> Anderson, E. (2016) *Cataphracts: knights of the ancient eastern empires*. Barnsley, Pen & Sword Ltd., p.146

<sup>75</sup> There was a linkage between horse ownership and formal high social status in other Greek cities of the period such as Eretria and Chalcis (see Andrewes, A. (1980) *The Greek Tyrants*. London: Hutchinson of London, pp. 34-35).



Hun in the previous century was willing to ransom back Roman prisoners at a standard flat rate of \$GK 660-990,<sup>76</sup> demonstrating the lower valuation that he placed on Roman prisoners, which were in abundant supply and probably difficult to use to their full potential in Hunnish society. On the other hand, the life of a Muslim was rated at the equivalent of about \$GK 14,000 by the laws of Chingis Khan,<sup>77</sup> almost as much as a Burgundian goldsmith.

| Cause                     | Fine   |        | Relative to Slave |
|---------------------------|--------|--------|-------------------|
|                           | Solidi | \$GK   |                   |
| Death of dog              | 1      | 82     | 0.03              |
| Theft of pig, sheep, goat | 3      | 246    | 0.10              |
| Death of slave            | 30     | 2,464  | 1.00              |
| Death of carpenter        | 40     | 3,285  | 1.33              |
| Death of blacksmith       | 50     | 4,106  | 1.67              |
| Death of silversmith      | 100    | 8,212  | 3.33              |
| Death of goldsmith        | 200    | 16,424 | 6.67              |

**Table 6.11 Fines under Burgundian Law Code**

Source: Burgundian Law Code, Davies<sup>78</sup>

In light of these considerations, the salary weighting method does, provide at least a useful initial measure, giving a wide range of indicative Gini values (Table 6.12) ranging from as little as 0.02-0.05 for Estonian and Slav tribes to 0.10 (Huns), 0.27 (Seljuk Turks), 0.34 (Arabs of the Islamic Conquest), 0.40 (Ming Chinese) or 0.62 (English Crusader). Contrary to initial expectations, European crusader armies generally seem to have had high Gini coefficients, and the Gini value for an English crusader army (0.62) is considerably higher than the Gini value of 0.37 based on the entire society for England and Wales in the same period (as estimated both by Milanovic et al. in Table 6.9 and from the Campbell data in Table 6.7) though well in line with results for other arable societies. This probably in part reflects the fact that the pay differential in English armies between the highest and lowest levels was somewhat higher than the differential for household incomes in society (24:1 as opposed to 19:1),<sup>79</sup> and the proportion of higher-level troops was greater.

<sup>76</sup> Thompson, E. A. (1999) *The Huns* Oxford Blackwell Publishing, p.83 and p.178, values adjusted to \$ GK.

<sup>77</sup> Howorth, H. H. (1876) *History of the Mongols from the 9th century to the 19th century: Part 1, The Mongols Proper and the Kalmuks*. London: Longman, Green and Co, p.160.

<sup>78</sup> Davies, N. (2011) *Vanished Kingdoms: the History of Half-forgotten Europe*. London: Penguin, p.98.

<sup>79</sup> In a feudal society, the people setting troop pay levels, their advisors and their associates were of course those people most likely to be serving at the top level of pay, and they were also in a position to divert the tax burden of their pay to other groups in society. In societies where the alignment of cost and benefit was more equitably arranged, generous pay levels were less likely to be offered. Corrigan shows that the ratios of officers' pay to soldiers' pay, and within officers, of senior commanders' pay to junior commanders' pay in the medieval period are approximately twice those in the modern period. Corrigan, G., (2014), *A great and glorious adventure: a military history of the Hundred Years War*, London, Atlantic Books, pp. 8-9, p.75

Crusades were of course largely expeditionary in nature, and the poorest ranks of society could not fund the cost of travel to the Holy Land. The First Crusade did in fact attract rather more poor pilgrims, but many of them failed to reach even so far as Nicaea, save as slaves.

Overall, however, these indicative results suggest that nomadic and tribal peoples are likely to be less unequal than sedentary peoples and states. However, it must be born in mind that the level of wealth extraction in a society depends on two issues: the surplus wealth available to be extracted from the society and the willingness/ability of those in power to do so. A society with high levels of wealth extraction is by definition both wealthy and organised. Whether it is happy and loyal to the elite is another question.

## 6.6 CONCLUSIONS

The greater poverty of nomads provides them with an incentive to secure some of their neighbours' wealth by one means or another, from paid service and trade through extorting tribute and conducting raids through to outright conquest. On the other hand, the neighbours can use some of their additional resources to secure the rest of their wealth through a range of policies. When the interaction of choices results in war, the damage can be severe. The data presented in this chapter quantifies the considerable differences in the output and productivity of various economies, the impact of price variations, the damage of the Mongol invasions of the Middle East, and the level of inequality in societies. Chapter 11 on the database provides details on the measures used including estimates per capita GDP (with adjustments for demonstrable war damage), inequality data.

### Case 13 Calculation of Gini Coefficients

The contribution of a group to overall income inequality can be estimated by comparing its share of total income to its share of total population, which summed over all groups, gives the Gini Coefficient. In an English Crusader army, knights account for 9% of the army, but receive 62% of the pay (seven times greater than equality requires). The other 91% of the army receive only 38% of the pay (under a half of what equality requires). The Gini Coefficient for all groups in the English Crusader army is 0.62.

| Army Type                   | Gini | Army Type                 | Gini | Army Type              | Gini |
|-----------------------------|------|---------------------------|------|------------------------|------|
| Teutonic Order              | 0.63 | Sung                      | 0.44 | Fatimid (Eygpt)        | 0.33 |
| English Crusader            | 0.62 | Parthian                  | 0.44 | Jurchen-Chen           | 0.30 |
| 3rd Crusade                 | 0.62 | Maurikian Byzantine       | 0.43 | Later Mongol Nomad     | 0.30 |
| 2nd Crusade                 | 0.59 | Qara-Khitai               | 0.43 | Early Roman Imperial   | 0.29 |
| 4th Crusade                 | 0.59 | Northern Wei              | 0.42 | Later Moors            | 0.29 |
| 5th-7th Crusades            | 0.59 | Tuareg                    | 0.42 | West Sudanese          | 0.29 |
| French Crusader             | 0.59 | Arab Umayyad N Africa     | 0.42 | Seldjuk Turk           | 0.27 |
| Early Crusades              | 0.59 | Arab Umayyad Iran         | 0.42 | Golden Horde           | 0.27 |
| Khazar                      | 0.57 | Arab Umayyad Syria        | 0.42 | Uratu                  | 0.27 |
| Sarmatians                  | 0.57 | Indian, Rajput            | 0.41 | Sudan Arabs            | 0.27 |
| Sassanid                    | 0.56 | Byzantine, Early          | 0.41 | Lithuanian             | 0.26 |
| Later Muslim Indian         | 0.55 | Massagetae                | 0.41 | Late pre-Islamic nomad | 0.25 |
| German Crusader             | 0.55 | Hsiung-Nu or Juan-Juan    | 0.41 | Blemmyes               | 0.25 |
| Nicaean Byzantine           | 0.53 | Christian Nubian          | 0.41 | Pre-dynastic Khitan    | 0.23 |
| Graeco-Bactrian             | 0.53 | Indian, Classical Maurya  | 0.40 | Baltic Pagans          | 0.21 |
| Central Asian Cities        | 0.53 | Chinese (Ming)            | 0.40 | Ghurids                | 0.19 |
| Arab Late Abbasid Khalifate | 0.53 | Jalayirid                 | 0.40 | Early Bulgar           | 0.19 |
| Palmyra                     | 0.52 | Ghaznavids                | 0.40 | Prussian               | 0.17 |
| Black Sheep Turk            | 0.52 | Canaan                    | 0.40 | Tribal Mongol          | 0.16 |
| Mameluke                    | 0.51 | Safavid                   | 0.40 | Mongol Conquest        | 0.16 |
| Khwarizmian                 | 0.50 | Indian, Classical Gupta   | 0.40 | Ilkhanid               | 0.15 |
| Early Russian               | 0.50 | Persian (Cyrus/Darius)    | 0.40 | Magyar                 | 0.14 |
| Ayyubid Egypt               | 0.49 | Timurid                   | 0.39 | Avar                   | 0.13 |
| Muslims vs. 1st/2nd Crusade | 0.49 | Early Muslim North Africa | 0.39 | Fulani                 | 0.11 |
| Early Tang                  | 0.48 | Cumans & Kipchaks         | 0.39 | Huns                   | 0.10 |
| Later Muslim Indian         | 0.48 | Thematic Byzantine        | 0.38 | Early Hebrew           | 0.07 |
| Feudal Spain                | 0.47 | Post-Mongol Russian       | 0.38 | Slav, Early (Revised)  | 0.06 |
| Late Visigothic             | 0.47 | Khurasanian               | 0.37 | Rus                    | 0.06 |
| Han Chinese                 | 0.46 | Skythian                  | 0.37 | Estonian (Revised)     | 0.05 |
| Byzantine Komnenan          | 0.46 | Petchneg                  | 0.36 | Early Libyan (Revised) | 0.05 |
| Central Asia Turks          | 0.46 | Armenian, Rshtuni         | 0.36 | Early Bedouin          | 0.03 |
| Qarakhanid                  | 0.46 | Yuan Chinese              | 0.36 | Early Libyan           | 0.02 |
| Kushan                      | 0.45 | New Kingdom Egypt         | 0.35 | Slav, Early            | 0.00 |
| Uighur                      | 0.45 | Late Imperial Roman East  | 0.35 | Estonian               | 0.00 |
| Seleukid                    | 0.45 | Arab Conquest nomad       | 0.34 |                        |      |

**Table 6.12 Indicative Gini values derived from army composition**

## EXCURSUS E6. TAXATION DECLINE AND DEVALUATION IN IRAN, FOLLOWING MONGOL INVASION

Tax revenues of realms are very varied, dependent on the size and wealth of the population and the ability of the government to access their wealth. Table E6.1 shows that there was a twenty-five-fold variation in the level of tax take, from thirteenth century France to third century BCE Egypt. Taxes from nomads, when collected, were levied on the size of herd.<sup>80</sup>

| Realm            | Population | Revenue     | Revenue per head in |      |                         |
|------------------|------------|-------------|---------------------|------|-------------------------|
|                  | Millions   | Tons silver | Grams silver        | \$GK | Currency dinars of 1335 |
| Persia 350 BCE   | 17         | 687         | 41                  | 67.3 | 2.0                     |
| Egypt 250 BCE    | 7          | 384         | 55                  | 90.2 | 2.6                     |
| Rome 1CE         | 50         | 825         | 17                  | 27.9 | 0.8                     |
| Rome 150CE       | 50         | 1,050       | 21                  | 34.5 | 1.0                     |
| Byzantium 850 CE | 10         | 150         | 15                  | 24.6 | 0.7                     |
| Abbasids 800CE   | 26         | 1,260       | 48                  | 78.7 | 2.3                     |
| Tang 850CE       | 50         | 2,145       | 43                  | 70.5 | 2.1                     |
| France 1221CE    | 8.5        | 20.3        | 2.4                 | 3.9  | 0.1                     |
| England 1203CE   | 2.5        | 11.5        | 4.6                 | 7.5  | 0.2                     |

**Table E6.1 Per capita tax revenues of various realms**

Source: Lacey<sup>81</sup>

The Mongol invasion inflicted severe damage on the tax-raising ability of the Middle East, as shown by Table E6.2, based on the records cited in the fourteenth century Iranian work, *Nuzhat al-Qulub*.<sup>82</sup> These show the level of currently anticipated provincial tax revenue, at the time of its writing, and the level in the time of the Seljuks (c. 1085, about two hundred and fifty years before), both being expressed in fourteenth century currency. Overall, the tax base in Iran, Mesopotamia and Anatolia was 5.3 times greater in Seljuk times, with the greatest decline in Mesopotamia (6.4) and the least in Anatolia (4.6). The average tax base in Iran was 5.0 times greater in the Seldjuk era, but this disguises considerable regional variation, from actual growth since the earlier period in the arid and relatively inaccessible (to invasion from the north) Fars area to very severe decline (9.9) along the lines that Mongol invasion took and the locations where Mongol presence was most likely.

<sup>80</sup> Kwanten, L. (1979) *Imperial Nomads: A history of Central Asia 500-1500*. Leicester: Leicester University Press, p.215.

<sup>81</sup> Lacey, J. (2014) 'The Grand Strategy of the Roman Empire' op. cit. Table 2.2.

<sup>82</sup> Mustaufi, H.-A. (2017) *The Geographical part of the Nuzhat al Qulub*. Translated by Le Strange, G. Marston: E. J. W. Gibb Memorial Trust.

It is uncertain to what extent the reasons for this decline in tax base may be attributed to declining population (i.e., declining total GDP, but not per capita GDP), increasing poverty of the population (i.e., declining per capita GDP) and decreasing state ability to collect tax due to growing disorder, corruption and incompetence (i.e., no actual effect on GDP). Probably, all three causes played some part. Given that a large part of the tax burden was set as fixed charges on land or as poll tax of non-Muslims,<sup>83</sup> (and as noted by Kwanten, the Mongols did not lower these taxes),<sup>84</sup> theoretically, the yield would not drop at all if the full liability could be collected from an increasingly impoverished population. Recognition of the effects of this impoverishment, including the growing resentment of the population, might perhaps result, in practice, in a relaxation of the taxation regime and economic reform, although Petrushevsky characterises the tax system as inefficient, arbitrary and oppressive,<sup>85</sup> despite the reforms of the Il-khan Ghazan at the end of the thirteenth century.<sup>86</sup>

The value of the currency in Iran declined considerably during the fourteenth century and first half of the fifteenth century. Fragner provides gold valuations which are converted into \$ GK prices in Table E6.3, showing that Iran suffered 0.5% per annum inflation 1300-1382, rising to 3.9% per annum in the next seventy years.<sup>87</sup> This supports the suggestion that the economic recovery during and after the time of Ghazan did not fully restore the economy.<sup>88</sup>

Exploratory calculations, based on the data available from the *Nuzhat*, indicate that in order to generate the observed change of tax revenue, a 35% decline in population,<sup>89</sup> combined with a 50% decline in the ability to extract taxes (from the equivalent of 32% of GDP which operated in Seljuk times), would be accompanied by a calculated concomitant 42% decline in per capita GDP, from an initial \$GK 640 to \$GK 375 (which is well below the \$GK 464 estimated per capita GDP for Inner Asia in the same period and amounts to general poverty). This would presumably reduce the subsequent attractiveness of the area for invasion.

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<sup>83</sup> Mustaufi, H.-A. (2017), *The Geographical part of the Nuzhat al Qulub*. op. cit. p.35.

<sup>84</sup> Kwanten, L. (1979) *Imperial Nomads: A history of Central Asia 500-1500*. Leicester: Leicester University Press, p.213.

<sup>85</sup> Petrushevsky, I.P. (1968) 'The socio-economic condition of Iran under the Il-khans', pp. 483-537, Boyle, J.A. (ed.) *The Cambridge History of Iran, Volume 5, The Saljuq and Mongol Periods*. Cambridge, Cambridge University Press.

<sup>86</sup> Petrushevsky I.P. (1968) 'The socio-economic condition of Iran' op. cit.

<sup>87</sup> Fragner, B. (1986) 'Social and internal economic affairs', in Jackson, P. & Lockhart, L. (eds.) *Cambridge History of Iran Volume 6 The Timurid and Safavid Periods*. Cambridge: Cambridge University Press, pp. 491-568.

<sup>88</sup> Petrushevsky, I. (1968) 'The Socio-Economic condition of Iran under the Il-Khans', in Boyle, J. (ed.) *Cambridge History of Iran, Volume 5, The Saljuq and Mongol Period*. Cambridge: Cambridge University Press, pp. 482-537.

<sup>89</sup> McEvedy & Jones suggest that a 25% decline should be regarded as the minimum for the period of the Mongol invasion. McEvedy, C. and Jones, R. (1985) *Atlas of World Population History*. Harmondsworth: Penguin, p.154.

| Province         | Tax Revenue                                     |   | Ratio of Past Value to Current Value | Location          | Region      |
|------------------|---|---|--------------------------------------|-------------------|-------------|
|                  | Current Value at 1335 (currency dinars of 1335) | Past Value at c. 1085 (currency dinars of 1335) |                                      |                   |             |
| Kurdistan *      | 201,500   | 2,000,000                                       | 9.93                                 | West Iran         | Iran        |
| Arran & Mughan   | 303,000   | 3,000,000                                       | 9.90                                 | Caspian shore     | Iran        |
| Khuzestan        | 325,000   | 3,000,000                                       | 9.23                                 | W Zagros          | Iran        |
| Adharbayan       | 2,169,200                                       | 20,000,000                                      | 9.22                                 | Azerbaijan        | Iran        |
| Shirvan          | 113,000   | 1,000,000                                       | 8.85                                 | N Marches Iran    | Iran        |
| Gustasfi         | 118,500   | 1,000,000                                       | 8.44                                 | Caspian shore     | Iran        |
| Shabankarah      | 266,100   | 2,000,000                                       | 7.52                                 | E of Fars         | Iran        |
| Persian Iraq     | 350,000   | 2,568,000                                       | 7.34                                 | Central Iran      | Iran        |
| Arabian Iraq     | 3,000,000                                       | 21,330,000                                      | 7.11                                 | Mesopotamia       | Mesopotamia |
| Diyarbakr        | 1,925,000                                       | 10,000,000                                      | 5.19                                 | N Mesopotamia     | Mesopotamia |
| Armenia          | 390,000   | 2,000,000                                       | 5.13                                 | East Anatolia     | Anatolia    |
| Rum              | 3,300,000                                       | 15,000,000                                      | 4.55                                 | West Anatolia     | Anatolia    |
| Georgia & Abkhaz | 1,202,000                                       | 5,000,000                                       | 4.16                                 | Georgia           | Iran        |
| Kirman           | 676,500   | 880,000   | 1.30                                 | Great Sand Desert | Iran        |
| Fars             | 2,871,200                                       | 2,335,000                                       | 0.81                                 | SW Zagros         | Iran        |
| <b>Region</b>    |   |   |                                      |                   |             |
| Anatolia         | 3,690,000                                       | 17,000,000                                      | 4.61                                 |                   |             |
| Mesopotamia      | 4,925,000                                       | 31,330,000                                      | 6.36                                 |                   |             |
| Iran             | 8,596,000                                       | 42,783,000                                      | 4.98                                 |                   |             |
| All              | 17,211,000                                      | 91,113,000                                      | 5.29                                 |                   |             |

**Table E6.2 Decline in Tax Revenue in the Middle East from Seljuk to Mongol times**

Source: *Nuzhat al-Qulub* (Mustaufi, 2017) <sup>90</sup>

1 currency dinar: \$GK 34.412

\*Kordestan, today

| Date  | 10,000 dinars worth | Annual inflation (%) |
|-------|---------------------|----------------------|
| 1300  | 189,636             | -                    |
| 1382  | 126,640             | 0.49                 |
| 1452  | 7,793               | 3.91                 |
| \$ GK |                     |                      |

**Table E6.3 Iranian Inflation in Fourteenth and Fifteenth Centuries**

Source: Fagner<sup>91</sup>

<sup>90</sup> Mustaufi, H.-A. (2017) *The Geographical part of the Nuzhat al Qulub* op. cit.

<sup>91</sup> Fagner, B. (1986) 'Social and internal economic affairs' op. cit.

## CHAPTER 7. WARFARE

### 7.1 INTRODUCTION

Warfare has always played a major part in the course and outcome of conflicts and once warfare has begun, further options become available, such as the possibility of local or total conquest. Thus, this chapter includes a review of relevant literature on warfare that informs later analyses. It will also consider issues of data management, where appropriate. More specifically, the chapter explores issues relating to warfare which are likely to have impacted on the decisions made in the course of conflict.

There are two broad models of warfare, the scientific “Clausewitzian” analysis seeking to establish unchanging universal principles, and the approach to aspects of warfare as the “cultural” outworkings of societies.<sup>1</sup> Both are valid approaches and both have valuable lessons.<sup>2</sup> Human beings are frequently violent towards other members of their species, but warfare is more complex than simple physical violence. It involves the organisation of groups of human beings in order to offer violence or the threat of violence to other groups in order to secure some particular objective. It may, in the extreme, involve no actual violence if the other group considers that there is no realistic prospect of successfully resisting, and surrenders. According to some translations of the Chinese master Sun-Tzu, politics, weather, terrain, leadership and training are key to success.<sup>3</sup> Winston Churchill emphasises the wide reach in time and space of manoeuvres that contribute to victory.<sup>4</sup> Gray suggests that people, society, culture, politics, ethics, economics and logistics, organisation, administration, information and intelligence, strategic theory and doctrine, technology, operations, command, geography, friction/chance/uncertainty, adversary and time must be taken into consideration in planning warfare.<sup>5</sup> As Barker summarises the social backdrop to the support of warfare and conflict:

“Civilised states raise money in their own countries by taxation. The amount of tax that can be raised depends on the extent of the area ruled, how repressive the ruler is prepared to be, and the wealth

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<sup>1</sup> Abels, R. (2008) 'Cultural Representation and the Practice of War in the Middle Ages', *Journal of Medieval Military History*, VI, pp.1-31.

<sup>2</sup> For instance, in the sixteenth century, Japanese society adapted and used gunpowder weapons effectively, and then for social and political reasons, elected to discontinue their use.

<sup>3</sup> Cited by Romane, J. (2018) *Rise of the Tang Dynasty: The reunification of China and the military response to the steppe nomads AD581-626*. Barnsley: Pen and Sword Military, p.153.

<sup>4</sup> Churchill, W. S. (1938) *The World Crisis 1911-1918*. London: Odhams Press Limited, p.464.

<sup>5</sup> Gray, C. (1999) *Modern Strategy*. Oxford: Oxford University Press.

of his subjects as measured by their manufacturing skills, the fertility of the land, strategic position on trade routes and so on.”<sup>6</sup>

Boffa puts it as:

“The military system of a State is accounted for by various factors - the organisation of its society, the nature of its economy, the available resources, the structure of government, its administration its technological level, and so on.”<sup>7</sup>

Citino, writing of modern warfare, but the comments apply to most periods, says:

“ ... military operations, however, are highly complex phenomena, influenced not only by a variety of interrelated factors like time, space, supply, weather and terrain, but also by a number of imponderables. They are not merely “contingent” – that is with one thing leading to another; they are sometimes utterly unpredictable, with chance occurrences.”

There is not necessarily a single approach to strategic policy. For example, in the context of the relationship of nomad groups with Imperial China, Barfield characterises two approaches.<sup>8</sup> In the Inner Frontier strategy the nomad made alliance with China against stronger nomads and sought a subsidy in exchange. By contrast, the Outer Frontier strategy focussed on raiding and extortion against China. This line of analysis may be transposed to other times and places. Even when such times and places are little associated in scholarly discourse with the practice of rational planning, e.g., medieval warfare in general and crusades in particular, it was not necessarily absent.<sup>9</sup>

“As mentioned, the key is not that war deals with innumerable variables whose expected values a commander was to weigh or calculate but that so many of these variables were, and are, beset with a considerable degree of uncertainty. Qualitative more so than quantitative assessments entered the cost / benefit calculus. Obviously, there would be ample room for divergent assessments but that assessments, or valuations, were made is indisputable.”<sup>10</sup>

A more numerical approach to scholarly analysis is possible. Ian Morris uses numerical analysis to compare the relative progress of civilisations,<sup>11</sup> based on energy capture, maximum city size (as surrogate for organisational ability), war-making ability and information management.<sup>12</sup> He also notes that the analysis of destructive power must look at number of fighters, range and force of

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<sup>6</sup> Barker, P. (1975) *Ancient Wargaming*. Cambridge Patrick Stephens Ltd, p.92.

<sup>7</sup> Boffa, S. (2004) *Warfare in Medieval Brabant 1356-1406*. Woodbridge: The Boydell Press, p.51.

<sup>8</sup> Barfield, T. (1989) *The Perilous Frontier: Nomadic Empires and China*. Oxford: Basil Blackwell, pp.63-9.

<sup>9</sup> Hosler, J. D. (2018) 'Reframing the Conversation on Medieval Military Strategy', *Journal of Medieval Military History*, XVI, pp. 189-206; Tyerman, C. (2015) *How to Plan a Crusade: Reason and Religious War in the High Middle Ages*. London: Allan Lane.

<sup>10</sup> Brauer, J. and Van Tuyl, H. (2008) *Castles, Battles and Bombs: how Economics explains Military History*. London University of Chicago Press, p.127.

<sup>11</sup> i.e. the increasing size, complexity and capability of civilisations.

<sup>12</sup> Morris, I. (2011) *Why the West rules - for now. The Patterns of History and what they reveal about the future*. London: Profile Books.



weapons, mass and speed of deployment, defensive power, logistic capabilities,<sup>13</sup> morale, leadership, command and control, understanding of strategic, operational and tactical principles and organisational learning.<sup>14</sup> He identifies the “nomad anomaly” of societies poor on energy capture and very poor on organisation and management of information, but effective at war, rating their effectiveness as double most sedentary groups.

It is also necessary to take account of change. As already noted in Chapter 1, war is “*sustained coordinated violence between political organisations*” and both the political organisation and the nature of the violence are prone to develop. Levy and Thompson consider that there have been three major escalations in war, of which two lie within the period of this study, namely 4<sup>th</sup>-3<sup>rd</sup> millennium BCE in Mesopotamia, and 500-1BCE in the East Mediterranean and China.<sup>15</sup> Pastoral/agrarian strife has been seen as a key shaper of war,<sup>16</sup> and Turchin et al. give particular emphasis to the impact of horse-related warfare (chariots, horse-riding and heavy cavalry) learned from the nomads whose skills had intense effects on the nomad frontier.<sup>17</sup>

The rest of the chapter addresses:

|  |  |
|--|--|
| Strategy, Troop Effectiveness, Friction and Numbers: | The successful implementation of a strategy requires both a good strategy and effective troops. While numbers contribute to effectiveness, this is by no means a simple linear relationship. |
| Warfare and Society:                                 | The structure and objectives of society impact on the way that warfare is conducted.   |
| Indirect and Direct Violence:                        | Wars are not solely won by direct violence against humans. There are other approaches to the use of violence.  |
| Nomad Warfare, Cavalry and Mobility:                 | The particular circumstances of nomads leads to a number of differences in the way that warfare is conducted by and against them.  |
| Conclusions:   | Warfare issues are summarised  |
| Excurses:  | These deal with:<br>Numerical Assessment of Military Rating, Tactics and Morale for GIPP Database  |

<sup>13</sup> Lynn, J. (1993) 'Medieval Introduction', in Lynn, J. (ed.) *Feeding Mars: Logistics in Western Warfare from the Middle Ages to the Present*. Boulder: Westview Press, pp. 3.

<sup>14</sup> Morris, I. (2013) *The Measure of Civilisation. How Social Development decides the fate of nations*. London: Profile Books, p.174, p.205.

<sup>15</sup> Levy, J. and Thompson, R. (2011) *The Arc of War: Origins, Escalation and Transformation*. Chicago: University of Chicago Press.

<sup>16</sup> O'Connell, R. (1997) *Ride of the Second Horseman: The Birth and Death of War*. Oxford: Oxford University Press, p.228.

<sup>17</sup> Turchin, P., Currie, T., Turner, E. and Gavrillets, S. (2013) 'War, space and the evolution of Old World complex societies', *Proceedings of National Academy of Science*, 110(41), pp.16384-16389.

## 7.2 STRATEGY, TROOP EFFECTIVENESS, FRICTION AND NUMBERS

Two keys to success in warfare are good strategy and effective troops. The impact of friction and the availability of numbers are also important. These subjects are addressed below.

In discussing the case of the Byzantine empire, Luttwak takes the view that:

“All states have a grand strategy, whether they know it or not. That is inevitable because grand strategy is simply the level at which knowledge and persuasion, or in modern terms intelligence and diplomacy, interact with military strength to determine outcomes in a world of other states, with their own “grand strategies”.<sup>18</sup>

He continues by noting that while all states must have a grand strategy:

“... not all grand strategies are equal. There is coherence and effectiveness when persuasion and force are each well guided by accurate intelligence, and then combine synergistically to generate maximum power from the available resources. More often, perhaps, there is incoherence so that the fruits of persuasion are undone by misguided force, or the hard-won results of force are spoiled by clumsy diplomacy that antagonizes neutrals, emboldens enemies, and disheartens allies.”

It might be noted that whether the strategy was coherent and effective or not, it was by no means always made explicit. Chroniclers were quite often well informed about battles and tactics, but they were more rarely explicit about strategy and the relationship of events to strategy.<sup>19</sup>

The complex interactions of the many variables that are involved in the outcome of any war are described well by the famous Maghrebi Arab historian, Ibn Khaldun (+17 March 1406):

“There is no certainty of victory in war, even when the equipment and the numerical (superiority) that cause victory exist. Victory and superiority in war come from luck and chance. This is explained by the fact that the causes of superiority are, as a rule, a combination of several factors. There are external factors, such as the number of soldiers, the perfection and good quality of weapons, the number of brave men, (skilful) arrangement of the line formation, the proper tactics, and similar

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<sup>18</sup> Luttwak, E. (2009) *The Grand Strategy of the Byzantine Empire*. Cambridge Massachusetts: Belknap Press of University of Harvard Press, p.409.

<sup>19</sup> It is reasonable to suppose that battles and tactics were public matters, but the councils that determined strategy were probably not. See Given-Wilson, C. (2004) *Chronicles: The Writing of History in Medieval England*. London: Hambledon and London, pp.188-193.

things. Then there are hidden factors. These may be the result of human trickery, such as spreading alarming news and rumours to cause defections (in the ranks of the enemy); occupying high points, so that one is able to attack from above, which surprises those below and causes them to abandon each other; hiding in thickets or depressions and concealing oneself from the enemy in rocky terrain, so that one's own armies suddenly appear when (the enemy) is in a precarious situation, and he must then flee to safety (instead of defending himself), and similar things. These hidden factors may also be celestial matters, which man has no power to produce for himself. They affect people psychologically, and thus generate fear in them. They cause confusion in the centres of armies, and there are routs. Routs very often are the result of hidden causes, because both parties make much use of (the opportunities offered by) them in their desire for victory. One of them must by necessity be successful in their use. Muhammad said: 'War is trickery'. An Arab proverb says: 'Many a trick is worth more than a tribe.'<sup>20</sup>

The aggregate effects of these many factors could result in major differences in the course and outcome of warfare. At the battle of Badr (in 624) in Arabia, the victorious Muslim forces were 14 times as effective as their Meccan opponents in killing the enemy, which taking into account the relative numbers of the two armies, equates to a factor of approximately 125.<sup>21</sup>

Napoleon is widely attributed with the view that "*An army's effectiveness depends on its size, training, experience and morale, and morale is worth more than any of the other factors combined.*"<sup>22</sup> He is also attributed with restating this view more generally, with the remark that "*There are only two forces in the world, the sword and the spirit. In the long run, the sword will always be conquered by the spirit*". These insights concerning the importance of morale are adopted by scholars who have studied warfare and its outcomes, e.g., de Picq,<sup>23</sup> Keegan,<sup>24</sup> and Griffiths.<sup>25</sup> Sabin suggests that in ancient warfare, "*Troop quality was clearly more significant than either numbers or casualties*" and that "*the first and most important measure of fighting power at the unit level ... concerns the morale, discipline, cohesion, skill and reputation of the troops*

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<sup>20</sup> Ibn Khaldun (1958) *The Muqaddimah: Volume I*. New York: Bollingen Foundation, p.229.

<sup>21</sup> Muhammed deployed 300 men who killed 70 Meccans (and captured 70 more), while the 900 Meccans killed 15 Muslims. The Muslims were thus 14 times as lethal (excluding prisoners taken) as the Meccans, despite the Meccan advantage in numbers (which, according to the Lanchester Square Law (see footnote to Excursus E11), should *ceteris paribus* have made the Meccans 9 times as effective as the Muslims in inflicting casualties). The implication is that the basic effectiveness of the Muslims was 126 times (14 x 9) that of the Meccans. The numbers appear of a plausible level of magnitude. See Mackintosh-Smith, T. (2019) *Arabs: a 3,000-year history of peoples, tribes and empire*. New Haven: Yale University Press, p.154. The Muslims seem subsequently to have been fairly accurately aware of their advantage (see footnote to Excursus E5.7).

<sup>22</sup> He assessed the ratio of morale to other factors as 3:1 in his *Observations on Spanish Affairs* quoted in Napier, W.F.P. (1839) *History of the War in the Peninsula and in the South of France from the Year 1807 to the Year 1814*. Brussels, Meline, Cans & Co., p.635.

<sup>23</sup> de Picq, A. (1921) *Battle Studies: Ancient and Modern Battles*. Translated by: Greely, J.N. & Cotton, R.C. Great Britain: Amazon.

<sup>24</sup> Keegan, J. (1988) *The Mask of Command*. Harmondsworth: Penguin; Keegan, J. (2004) *A History of Warfare*. London: Pimlico.

<sup>25</sup> Griffiths, P. (1996) *Battle Tactics of the Western Front: the British Army's Art of Attack 1916-18*. New Haven: Yale University Press.

themselves".<sup>26</sup> He expresses this in numeric form (Table 7.1). Cavalry was, in his judgement, twice as effective as infantry.

| Type             | Veteran | Average | Levy |
|------------------|---------|---------|------|
| Relative Numbers | 1       | 2       | 4    |
| Fighting Value   | 4       | 3       | 2    |

**Table 7.1 Fighting Values and relative numbers in units of ancient armies**

Source: Sabin (2007, p21)

Herman suggests that there are three physical components to warfare – force, space and time – of which the easiest to measure is force, whether it is measured as numbers or equipment,<sup>27</sup> particularly at the highest levels.<sup>28</sup> Each of these three components is a physical measure, but despite its non-physicality, unit cohesion is also widely regarded as a major aspect of a unit's ability to perform effectively. Unit cohesion can be degraded by friction (the effects of its own activities, e.g. marching through a swamp rather than across a parade ground) and disruption (the effect of enemy activities e.g. an ambush) which can reduce the lethality of the unit. Given the number of relevant variables, and the likely complexity of their interaction, there are ongoing efforts to model these variables and their interactions in order to supplement qualitative insights about their relative importance and contribution to given outcomes in particular historical and hypothetical cases. Collins offers a dynamic model theory of battle victory and defeat which centres on three key factors, namely Material, Manoeuvre and Morale (see Figure 7.1), although Technical edge and Training also impact as sub-models.<sup>29</sup> The key factors of Material, Manoeuvre and Morale have long been recognised, and had been identified as sources of "potential energy" by the Tang Chinese general Li Jing.<sup>30</sup> Napoleon claimed that "*aptitude for maneuver is the supreme skill in a general*" (quoted by Chandler).<sup>31</sup>

Fletcher et al. test the model, expanding its scope to include not only the outcome of an individual battle, but also the cumulative effect of all the battles fought<sup>32</sup> (it is possible to win battles and lose the war).<sup>33</sup> In a computerised version, their model defines battle victory as falling to the side

<sup>26</sup> Sabin, P. (2007) *Lost Battles: Reconstructing the Great Clashes of the Ancient World*. London: Continuum, p.15, p.19, p.22.

<sup>27</sup> Numbers and equipment are both expressions of force.

<sup>28</sup> Herman, M. (2002) 'Entropy-based warfare: a unified theory for modelling the Revolution in Military Affairs', in Cornell, T. & Allen, T. (eds.) *War and Games*. Woodbridge: The Boydell Press, pp.263-290

<sup>29</sup> Collins, R. (2010) 'A Dynamic Theory of Battle Victory and Defeat', *Clodynamics*, 1, pp. 3-25.

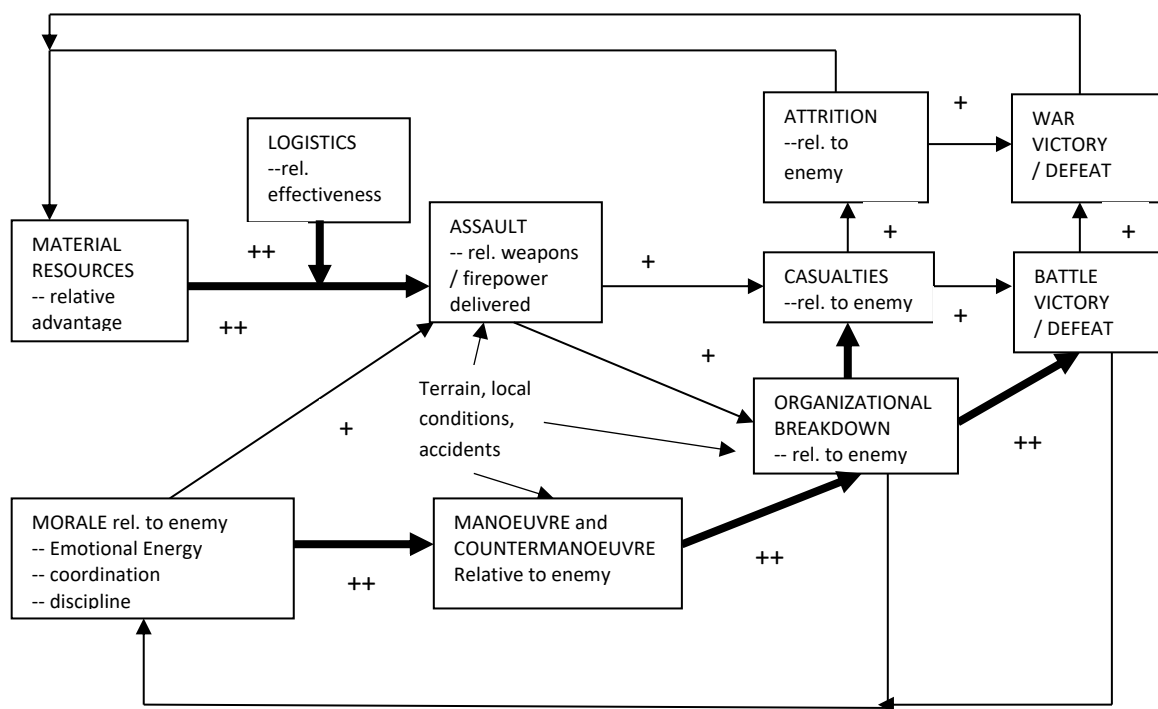
<sup>30</sup> Li Jing appears to have identified three ways of energizing an army, corresponding to each of Collins' key factors. Sun-tzu, (2003) *The Art of War*. Translated by: Miniford, J. London: Penguin Press, pp.175-176.

<sup>31</sup> Chandler, D. G. (1993) *The Campaigns of Napoleon*. London: Weidenfeld & Nicholson Ltd, p.151.

<sup>32</sup> Fletcher, J., Apkarian, J., Roberts, A., Lawrence, K., Chase-Dunn, C. and Hanneman, R. (2011) 'War Games: Simulating Collins' Theory of Battle Victory', *Clodynamics*, 2, pp. 252-275.

<sup>33</sup> In the campaign of 1814, Napoleon won his battles, but was nevertheless defeated.

securing a 2:1 advantage in organisation or a 6:1 advantage in material casualties, and defines war victory as a net gain of 10 battles or a 6:1 advantage in casualties. The results show that in an asymmetrical situation,<sup>34</sup> the side with morale advantage is more likely to win in a quickly resolved war, whereas the side with material advantage tends to win by attrition over a longer period. Conflicts where there is a stronger element of noise (i.e., the various non-modelled effects are having a greater impact on the conflict) tend to result in an exponential shortening of the length of the war. It is, however, debateable whether this lesson is much heeded in war analysis by modern armies, due to the difficulty of calculating a number for the human factor.<sup>35</sup>



**Figure 7.1 Battle Victory and Defeat: Collins Model**

++ = strong causal path  
 + = moderate causal path  
 Source: Collins (2010)

Fuller, writing post-World War One, had assigned to each of these three factors of Material, Manoeuvre and Morale, three further sub-factors, respectively: weapons, protection and movement; reason, imagination and will; and fear, morale and courage (arguably, movement might have been assigned to Manoeuvre).<sup>36</sup> He also notes the long established awareness of these

<sup>34</sup> E.g. the Russo-Ukraine Conflict started in February 2022.

<sup>35</sup> Murray, L. (2018) *War Games: the Psychology of Combat*. London: Biteback Publications, pp. 5-7.

<sup>36</sup> Fuller, J.F.C. (1925) *The Foundations of the Science of War*. London: Hutchinson and Co. Limited, p.225, pp. 302-303

factors, drawing attention to the way that the 4<sup>th</sup> century BCE Greek writer Xenophon, in the second book of his *Cyropaedia*, looks at the importance of both numbers and equipment.

In an empirical study of skirmishes during the Hundred Years' War, Braasch suggests that the French performed less well than other groupings on his database. He shows the reasons attributed by chroniclers for one party obtaining victory in the combat and further analysis indicates that Material advantage is the most common reason for victory (37%) with Morale (32%) and Manoeuvre (31%) slightly behind. Combining the two sets of findings (Fletcher and Braasch), it may be concluded that it is probably easier to organise a Material advantage than an advantage in Morale or Manoeuvre, but that, once attained, an advantage derived from Morale or Manoeuvre is likely to prove more effective.<sup>37</sup> It is reasonable to suppose that a force engaged in a holy war is likely have a basic advantage in Morale, although this may not always suffice to secure a victory such as the Muslims had at Badr in 624 (see above).

| Victory due to        |        | n  | per cent | Collins Key Factor | Per cent |
|-----------------------|--------|----|----------|--------------------|----------|
| Surprise              | Ambush | 10 | 16       | Manoeuvre          | 31       |
|                       | Other  | 7  | 11       | Manoeuvre          |          |
| Trickery              |        | 2  | 3        | Manoeuvre          |          |
| Superior Numbers      |        | 13 | 21       | Material           | 37       |
| Use of Longbow        |        | 10 | 16       | Material           |          |
| Indiscipline of Enemy |        | 11 | 18       | Morale             | 32       |
| English Courage       |        | 7  | 11       | Morale             |          |
| Leadership            |        | 2  | 3        | Morale             |          |
| Total                 |        | 62 | 100      |                    |          |

**Table 7.2 Attributed Cause of victory in skirmishes in Hundred Years' War 1357-1453**

Source: Braasch III

Hattaway & Jones define the fighting strength of a unit as proportionate to “*the square of its numerical strength multiplied by the fighting value of its individual units*”.<sup>38</sup> This, however, takes no account of frictional effects, as examined below. As Clausewitz noted, “*Everything is very simple in War, but the simplest thing is difficult. These difficulties accumulate and produce a friction which no man can imagine exactly who has not seen war*”.<sup>39</sup> Delbruck spells out the implications of this:

<sup>37</sup> Braasch III, R.W. (2018) 'The Skirmish: A Statistical Analysis of Minor Combats during the Hundred Years' War, 1357-1453' *Journal of Medieval Military History* XVI, pp.123-157.

<sup>38</sup> Hattaway, H. and Jones, A. (1991) *How the North Won: A Military History of the Civil War*. Urbana: University of Illinois Press, p.727. They use the work of Lanchester as a base. Also see Beringer, R. E. et al. (1986) *Why the South Lost the Civil War*. Athens, Georgia: The University of Georgia Press, Appendix II.

<sup>39</sup> Clausewitz, C., Howard, M. and Paret, P. (1984) *On War*. Translated by: Howard, M. & Paret, P. Princeton: Princeton University Press., Book I, Chapter 7, p.119.

“A movement that is made by an organization of 1,000 men without complications becomes an accomplishment for 10,000 men, a work of art for 50,000 and an impossibility for 100,000”.<sup>40</sup>

Dupuy presents an analysis of the increasing impact of friction on casualty rates.<sup>41</sup> This suggests that friction reaches a nearly constant maximum for bodies of 100,000 and more.<sup>42</sup> Although beyond this point, the problems of friction may not grow markedly worse, increasing the size of the force deployed is probably more likely to increase the problems of supply and disease than it is to increase the military effectiveness of the force. This has implications for the outcome of a conflict, for the ability of more populous states to raise larger armies is mitigated by the lesser per capita effectiveness of such armies. Oka *et al.* suggest that the existence of scaling relationships (which are logarithmic) between population and war group size and between war group size and conflict casualties provides an explanation of variation in the frequency and lethality of war over time.<sup>43</sup> Effectively, larger groups are less effectively deployed to war than smaller groups. See Appendix 2 for more details.

The social structure must also be taken into account.<sup>44</sup> Sedentary states had a larger population, but the higher degree of social specialisation tended to reduce the proportion available to fight, both as *ad hoc* levy and full-time professional. This was unlike nomadic societies where most adult males could fight if required. This was so much taken for granted that neither the Turkic nor Mongol languages contains a native word for ‘soldier’, A Persian word was used when a specific term was required.<sup>45</sup> Gat provides estimates of the ability of various states to support knights and professional cavalry (mostly 0.1-0.2% of the total population, although the Ottomans sustained 0.35-0.4% sipahi who were professional troopers rather than minor nobility)<sup>46</sup>. In absolute numbers, France had 16,000-32,000 knights in the medieval period. For the most part, infantry were much cheaper for states to raise, as cavalry required four to sixteen times the land allocated

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<sup>40</sup> Delbruck, H. (1990a) *Medieval Warfare: History of the Art of War, Volume III*. Translated by: Renfroe, W. London: University of Nebraska Press, p.33.

<sup>41</sup> Dupuy, T. (1992) *Understanding War: History and Theory of Combat*. London: Leo Cooper.

<sup>42</sup> Analysis of the Dupuy’s data suggests that: Friction Effect =  $0.773 + 1.278 \times \log(\text{Number of company equivalents})$  where a company = 200 men.  
(See Appendix 2).

<sup>43</sup> Oka, R. C., Kissel, M., Golitko, M., Sheridan, S. G., Kim, N. C. and Fuentes, A. (2017) 'Population is the main driver of war group size and conflict casualties', *Proceedings of the National Academy of Science*, Early Edition, pp. 1-10.

<sup>44</sup> Halsall, G. (2003) *Warfare and society in the Barbarian West 450-900*. London: Routledge; Gabrielson, V. (2007) 'Warfare and the State', in Sabin, P., Van Wees, H. & Whitby, M. (eds.) *The Cambridge History of Greek and Roman Warfare*. Cambridge: Cambridge University Press, pp. 248-272.

<sup>45</sup> Peacock, A. (2010) *Early Seljuq History: a new interpretation*. Abingdon: Routledge, p.83.

<sup>46</sup> Gat, A. (2008) *War in Human Civilisation*. Oxford: Oxford University Press, p.352.

to their support (sixteen times for Byzantine heavy cavalry)<sup>47</sup> and under Islamic practice, cavalry received a triple plunder entitlement. In 1498, the Florentine state was supporting an army that on paper consisted of about 20% cavalry, but these accounted for nearly 40% of the non-specialist payroll.<sup>48</sup> Nomadic societies, by contrast, were able to call up a very substantial proportion of the population. Juvaini characterises the Mongols as “an army after the fashion of peasantry”,<sup>49</sup> by which he means that they were subject to taxation and conscription rather than a privileged elite that must be cosseted and cajoled. For such nomadic societies, about a quarter of the population can be deployed to war (see Appendix 3 on numbers).

Despite the above estimates of numbers, caution is necessary in accepting numbers from historical authors for as Man records, a 12<sup>th</sup> century army reported as 10,000 was proved on closer assessment to be 1,080.<sup>50</sup> A Chinese history relates that an army reputed to number 20-30,000 eventually proved to contain 3-4,000.<sup>51</sup> Such over-statement of numbers may arise from an attempt by people of the time to explain an observed advantage that actually arose from a cause other than simple weight of numbers, for example in cases where the advantage arising from the ease of movement and manoeuvre enjoyed by small and mobile units was a decisive advantage. A fifth century force of forty Huns in Roman service in Libya was for example deemed far superior to the considerably more numerous native Roman troops and was reported to have effectively engaged enemies numbering over a thousand men.<sup>52</sup> Morale was even less easy for historical authors to assess, much less measure, and more prone to change. See Appendix 3 for more details on numbers, and see Appendix 4 for more details on morale.

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<sup>47</sup> One Nicephorian cataphract required the support of 30 households (Anderson, E. (2016) *Cataphracts: knights of the ancient eastern empires*. Barnsley: Pen & Sword Ltd., p.146). The trooper is equivalent to perhaps 0.7% of the directly supporting population, and not all of the overall population were directly supporting troops.

<sup>48</sup> Ansani, F. (2019) “Supplying the Army, 1498. The Florentine Campaign in the Pisan Countryside” *Journal of Medieval Military History XVII* pp. 201-236

<sup>49</sup> Juvaini, A.-M. (1958) *The History of the World Conqueror Volumes I and II*. Translated by: Boyle, J. Manchester: Manchester University Press Vol I, pp.30-31.

<sup>50</sup> Man, J. (2007) *Kublai Khan: From Xanadu to Superpower*. London: Bantam Books, p.311.

<sup>51</sup> Ssu-Ma, Chi'en. (1969) *Records of the Historian: Chapters from the Shih Chi of Ssu-ma Ch'ien*. Translated by: Watson, B. New York: Columbia University Press, p.183.

<sup>52</sup> Wright, P. (2011) *Snakes, Sands and Silphium: Travels in Classical Libya*. London: Silphium Press, p.202. Synesius argues that 200 Huns would suffice to end the fifth century war in Libya with the Ausurians.



### 7.3 WARFARE AND SOCIETY

There is a link between the structure of a society and the way that it approaches war. Sedentary societies are fourteen times more likely to be classified as more politically centralised than non-sedentary societies (Odds Ratio: 14.15).<sup>53</sup> For sedentary societies, political centralisation is associated with more emphasis on war, with greater concern with territorial causes of war and with more sophistication of weaponry than is the case with non-sedentary societies. Table 7.3 shows that the linkage of more territorial causes of war to greater political centralisation is ten times greater for sedentary societies, and the linkage of a warlike character to political centralisation is almost six times greater. The linkage of use of both projectile and shock weapons, taken as greater sophistication of military development, to political centralisation is 3.5 times greater for sedentary societies. By contrast, the linkage of professional military organisation to political centralisation is *less* (0.6 times) for sedentary societies. Expressed another way, political centralisation is less relevant to war, territorial causes of war and military sophistication among non-sedentary peoples. On the other hand, in non-sedentary societies, political centralisation *is* associated with more professional military organisation.

It is worth noting that propensity for war and preferred reasons for war are attitudinal matters and so carry no direct economic costs to a society until carried into action. There may or not be an additional economic cost to a society arising from the use of shock weapons,<sup>54</sup> since some shock weapons are usable for civil purposes (e.g., spears, scythes, machetes, bills and axes) and others are not (e.g., pikes, swords, and halberds). A people in arms may well be capable of meeting the relatively small additional cost of shaft weapons, although swords (and armour) tend to be expensive (see Chapter 6). Professional military organisation, however, inevitably imposes an economic cost on society, which requires some form of extractive process, most readily applied when there is sufficient political centralisation to impose taxes. It may be debateable whether such political centralisation would be maintainable without a professional military organisation to provide the measure of coercion required to ensure the ongoing existence of both itself and the political centralisation. It is probably reasonable to assume that many sedentary societies have the economic wherewithal to support at least a limited professional military organisation, whereas non-sedentary societies may not.

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<sup>53</sup> The Odds Ratio converts percentages into odds that can be compared, using the data quoted by Levy and Thompson ((2011 Table 2.11) drawn from Otterbein on military sophistication: Otterbein, K. (1970) *The Evolution of War: a cross-cultural study*. New Haven, Connecticut: HRAF Press).

<sup>54</sup> Shock weapons produce their effect only when held, as opposed to projectile weapons which leave the wielders, allowing them to inflict damage at a distance.

| Among sedentary societies, as compared to non-sedentary societies, that | The sedentary society is more likely to be politically centralised by a factor of:<br>Odds Ratio |
|---|--|
| Have more territorial causes of war                                     | 10.46  |
| Are more warlike  | 5.73   |
| Uses both projectiles & shock weapons                                   | 3.52   |
| Have more professional organisation of army                             | 0.59   |

**Table 7.3 Comparison of the linkage of various characteristics of war to political centralisation for sedentary and non-sedentary societies**

Source: recalculation of Levy & Thompson 2011, Tables 2.12-2.14, which use Otterbein (1970) data

Military service, including professional military organisation, varies. Morillo advances a typology of military service, based on two dimensions: basis of terms of service (political vs economic) and degree of social embedding. In this typology, nomad armies are likely to tend towards political terms of service for strongly socially embedded forces.<sup>55</sup> Finer notes that the military guarantees existence and form of community and suggests that military power is distributed in the community in a way determined by military technology,<sup>56</sup> the iron stirrup being an example of something that gives an advantage to those who can access it. A nomad horde tends to be democratic and egalitarian until the war leader transforms it, but concentrated power may turn against civil authorities. There is a need for a balance of efficiency, expense and loyalty, and of tax to pay for it. Battle practice also varied from society to society. Lendon, in describing Greek and Roman battle practice from 1200 BCE to 363 CE, identifies the tension between courage and cunning, or courage and discipline, as an ongoing theme.<sup>57</sup> This parallels Sabin's division of generals into leaders and commanders,<sup>58</sup> and Porter describes how these dichotomies can be superimposed on cultural differences in a version of orientalism,<sup>59</sup> though the differences may themselves be real.<sup>60</sup>

Furthermore, the relationship of the cultures involved in a war can be linked to the way that it is carried out. Kortüm draws attention to the many kinds of war, e.g., war of pillaging, war of extermination, war of religion, and by analysis, draws attention to the importance of transcultural wars (across cultural boundaries) and subcultural wars (with discrete groups within a society entering conflict) in giving rise to savage warfare.<sup>61</sup> Intracultural wars, where both parties operate

<sup>55</sup> Morillo, S. 'Mercenaries, Mameluks and Militia: towards a cross cultural typology of military service', *Mercenaries and Paid Men: The Mercenary Identity in the Middle Ages*, Swansea, 2008. Leiden: Brill, pp.243-260.

<sup>56</sup> Finer, S. (1999a) *The History of Government From the Earliest Times II The Intermediate Ages*. Oxford: Oxford University Press, pp.15-22; DeVries, K. (1998) *Medieval Military Technology*. Peterborough Ontario: Broadway Press.

<sup>57</sup> Lendon, J. (2005) *Soldiers and Ghosts: A history of Battle in Antiquity*. London: Yale University Press.

<sup>58</sup> Sabin, P. (2007) *Lost Battles: Reconstructing the Great Clashes of the Ancient World*. London: Continuum.

<sup>59</sup> Porter, P. (2009) *Military Orientalism: Eastern War through Western Eyes*. London: C Hurst & Co (Publishers) Ltd.

<sup>60</sup> Fairbank, J. K. (1973) 'Introduction: Varieties of the Chinese Military Experience', in Kierman Jr, F.A. (ed.) *Chinese Ways in Warfare*. Cambridge, Massachusetts: Harvard University Press, pp. 1-26.

<sup>61</sup> There are several relevant dichotomies e.g. public v. private, symmetric v. asymmetric, regular v. irregular, limited v. total. Kortüm, H. K. (2006) 'Clash of Typologies – the Naming of Wars and the Invention of Typologies', in Kortüm, H. and Kenning (eds.) *Transcultural Wars from the Middle Ages to the 21<sup>st</sup> Century*. Berlin: Akademie Verlag, pp. 11-

on the same assumptions, are often more restrained (see 5.4 for more details).<sup>62</sup> The type of warfare preferred by a society frequently reflects the circumstances of that society. Thus Reid notes that in an under-populated land, control of slaves and livestock are of greater significance than control of land itself, which makes a raiding form of warfare more appropriate.<sup>63</sup> This parallels the view of Scott (see 5.2 above).<sup>64</sup>

Gat, in his wide-ranging study of war in human civilisation, draws attention to some issues that are key to the planning of war.<sup>65</sup> A single tribe in a tribal society could number 2,000 in rich environments, while tribal confederacies were substantially larger, able to field armies numbered up to some tens of thousands around an elite core of perhaps three-five thousand professionals as the polity developed into a kingdom. Larger states, such as the Roman Republic, had a level of manpower that offered the possibility of victory through attrition.<sup>66</sup> Pastoral tribes were of similar size to tribes of farmers, although living at lower density, with a lower overall population supportable by a given area. Nevertheless, pastoralists posed a threat even on foot, and more so as they developed horseback riding in the 1<sup>st</sup> millennium BCE, which was more effective than chariots. Medium horses (14-15 hands)<sup>67</sup> allowed mounted combat in addition to the strategic mobility offered by ponies, and brought about significant changes to social aspects of warfare.<sup>68</sup>

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<sup>62</sup> For instance, deaths at the battle of Brémule, 1119 CE, between French and Normans, were very small. Morillo, S. (2006) 'A General Typology of Transcultural Wars – The Early Medieval Ages and Beyond', in Kortüm, H.K. (ed.)

<sup>63</sup> Reid, R. (2020) 'The Ambiguity of Victory: The Spectrum of 'Winning' in African History', in Strohn, M. (ed.) *Winning Wars: The Enduring Nature and Changing Character of Victory from Antiquity to the 21st Century*. Oxford: Casemate Publishers, pp. 213-228.

<sup>64</sup> Scott, J. (2009) *The Art of Not Being Governed: An Anarchist History of Upland Southeast Asia*. New Haven: Yale University Press, p. 67.

<sup>65</sup> Gat, A. (2008) *War in Human Civilisation*. Oxford: Oxford University Press.

<sup>66</sup> Indeed, the Romans made use of their numbers in this way. If one army was defeated, another was sent in its place and then yet another, if need be. It was this strategy that brought success in the long run against skilled generals such as Pyrrhus of Epirus and Hannibal, and in the conquest of martial peoples in areas such as Iberia. See Parchami, A. (2020) 'Winning' in Classical Antiquity and the Roman Conception of Victory', in Strohn, M. (ed.) *Winning Wars: The Enduring Nature and Changing Character of Victory from Antiquity to the 21st Century*. Oxford: Casemate Publishers, pp. 13-30.

At a micro-scale, the Knights Hospitaller and Knights Templar were similarly able to control Assassin communities in the crusader kingdoms of Outremer. The leader of the Assassins calculated that if one Grand Master was assassinated, another would simply take his place, with minimum impact on the policy of the Order. This was simply not worth the attendant loss of trained assassins in the attack. Joinville, J. (1969) 'The Life of St Louis', in Shaw, M. (ed.) *Chronicles of the Crusades*. Harmondsworth: Penguin Books Ltd, p.277.

<sup>67</sup> At 10.16 cm to 1 hand, this is 142-152 centimetres.

<sup>68</sup> The use of the horse in combat altered many social relationships, as it served as an equalizer that downgraded the significance of personal strength. La Cote Male Tayle is told in *Morte d'Arthur* that young knights lack experience on horseback but are strong on foot, which is why veterans will not dismount to fight them. In a thirteenth century romance, it is told how among a contingent of French knights fighting in the service of the King of England, the hero, Silencia, like her male companions, remains on horseback as long as possible, and carves a devastating path through the enemy. Herodotus tells of shipwrecked Amazons who first capture a herd of horses and then compete on equal terms with the young men of the Scythians. Women among nomads had a relatively high status. There is archaeological evidence of warrior status accorded to some Scythian women, and there are references to the involvement of women in politics, religion, economics and warfare among Mongols, Turks and Qarakhitai. This may have had its roots in the equalizing effect of the horse, though since the use of projectile weapons likewise had an

The horse was most effective on the flat in wider areas where a smaller population meant more pasture and less fortified urban settlement. Western Europe which was somewhat rugged, and tended to inadequate pasture, inhibited the advantages that accrued to nomadic societies. In Arabia, large-scale horsed cavalry was fairly impractical due to the lack of pasture, and infantry was key, using the more desert-proof camel for strategic mobility.

As Dunnigan expressed it,

“In ancient armies infantrymen had the weakest weapons, spears, and shields. They were put in front to absorb the enemy’s arrows and spears, and to keep the other side’s infantry occupied. Meanwhile, the wealthier, and usually noble, horsemen in the rear waited for the right moment to charge to victory or retreat from defeat. Win or lose, the infantry took most of the casualties.”<sup>69</sup>

This was not invariably so, however, for the phalanx of Ancient Greece, using spear and shield in an organised technique of fighting, greatly outclassed any opponent encountered in the classical period<sup>70</sup> (excluding the equally organised and disciplined Roman infantry cohort). In a modern context, Dunnigan offered numerical expression of the combat value per man to reflect qualitative differences in equipment, weapons, manpower, national economy and leadership, and a force multiplier to take account of the reduction in ideal efficiency due to imperfect leadership, training and other support. Such effects were quite as real in the ancient and medieval period. This thesis must therefore include measures that reflect such things.

#### 7.4 INDIRECT AND DIRECT VIOLENCE

The violence of warfare may not necessarily be direct.<sup>71</sup> Action against someone or something valued by the other side may be as effective as attacking the other side directly (e.g., in diminishing

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equalizing effect, it is more likely the two effects reinforced each other, so that it is fighting as horse archers that particularly promoted equal societies. See Malory, T (1962) *Malory's Morte d'Arthur: King Arthur and the legends of the Round Table* (ed.) Baines, K. New York: Mentor Classics, p.210; also Anonymous (2007) *Silence: A thirteenth-century French romance*, Roche-Mahdi, S. (ed.). East Lansing: Michigan State University Press, pp. 255-265; Herodotus (1965) *The Histories* op.cit. pp. 277-279; Cunliffe, B. (2019) *The Scythians: nomad warriors of the Steppe* op. cit. pp. 140-141; de Nicola, B. (2018) *Women in Mongol Iran: the khatuns, 1206-1335*, op. cit. pp.34-57; Turchin, P. (2016) *Ultra Society: how 10,000 years of war made humans the greatest cooperators on Earth*. Chaplin Connecticut: Beresta Books, p.106.

<sup>69</sup> Dunnigan, J. (1982) *How to Make War: A comprehensive guide to Modern Warfare*. London: Book Club Associates, p.18, pp.417-8.

<sup>70</sup> Matthew, C. (2012) *A Storm of Spears: Understanding the Greek Hoplite at War*. Barnsley: Pen & Sword Military, p. 167.

<sup>71</sup> Thus, at sea, it is possible but not necessary to fight the enemy in person, since sinking their ships will drown them, and exposing them to storms will radically increase the chances of their ships sinking. In facing the Spanish Armada in 1588, the English fleet attempted to sink ships at a distance by gunfire, deployed fireships to panic the enemy from their safe anchorage at Calais, and pursued the Spaniards into the stormy waters north of Britain where many of them

morale). Furthermore, direct personal violence may be less effective than manipulating the environment of the other side to harm or destroy them. A forest fire started by one fighter can destroy hundreds of the enemy in a way, and with efficiency that hand-to-hand combat would not allow.<sup>72</sup> The ancient concept of the elements provides a simple way of analysing the possible means of such indirect attack on the environment of the enemy (Table 7.4). The ancient Chinese master, Sun-tzu, for example, identified five ways to use fire as a weapon, as well as noting the importance of wind and water.<sup>73</sup> Chinese soldiers seem sometimes to have acquired a reputation for particular skill in the use of fire or water.<sup>74</sup>

| Group    | Earth   | Water   | Air  | Fire   | Quintessence (Spirit)                      |
|----------|---|---|--|--|--|
| Examples | Rock fall<br>Tree felling<br>Stones in fields<br>Blockade | Thirst<br>Poison wells<br>Flood (dam burst)<br>Artificial drought | Drowning<br>Poison gas<br>Asphyxiation<br>Storms | Burning:<br>People<br>Property<br>Crops<br>Forests<br>Communications | Panic<br>Propaganda<br>Plunder<br>Holy War |

**Table 7.4 Methods of Indirect Violence**

The raising, organising and equipping of a group of fighters, as well as their subsequent maintenance, is at the least, a moderately complex task, and disrupting this task provides a way to win a war without fighting a full-scale battle. Troops that are never mustered pose little problem in practice. Apart from the direct approach of attacking the mustering forces, it is possible to act against the supply of those goods that they need – metal for weapons,<sup>75</sup> animals for combat and transport, food and drink for themselves and their animals. As was attributed to the twelfth century Venetian doge, Enrico Dandolo, “... *the man who has something to eat fights with a better chance of winning than the man with nothing in his stomach*”, and medieval generals were well aware of the importance of gathering supplies,<sup>76</sup> rather than dispersing to forage.<sup>77</sup> Since many of these supplies are widely valued for purposes beyond war, raiding soldiers have an incentive to seize them as booty. The need for provisions can lead to failures with far reaching implications,

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were drowned in ship wrecks. The Spaniards were able at no point to use the undoubted fighting skills of the soldiers carried on their ships, for they never came into action.

<sup>72</sup> Hughes, J. D. (2013) 'Warfare and Environment in the Ancient World', in Campbell, B. & Tritle, L. (eds.) *The Oxford Handbook of Warfare in the Classical World*. Oxford: Oxford University Press, pp. 128-139.

<sup>73</sup> Sun-tzu, (2003) *The Art of War* op. cit. , pp.85-87.

<sup>74</sup> E.g., Colonels Shan Tinggui and Wei Dingguo in the fourteenth century Chinese historical novel, *The Water Margin*. Though fictional, the existence of such specialist soldiers was clearly considered plausible by the author. See Shi, N. (2010) *The Water Margin: Outlaws of the Marsh*. Translated by: Jackson, J.H. North Clarendon VT: Tuttle Publishing, p.759.

<sup>75</sup> Or stone or glass or wood, depending on local weapon technology.

<sup>76</sup> Prestwich, M. (1996) *Armies and Warfare in the Middle Ages: The English Experience*. New Haven: Yale University Press, p.245.

<sup>77</sup> Villehardouin, G. (1969) 'The Conquest of Constantinople', in Shaw, M. (ed.) *Chronicles of the Crusades*. Harmondsworth: Penguin Books Ltd, pp. 29-160, p. 59.

such as Edward II's problems with provisioning his Scottish campaigns,<sup>78</sup> or even cause radical changes in strategy, as when the Fourth Crusade was diverted from its original objective of Jerusalem to Zara and then to Constantinople.<sup>79</sup> In the later Middle Ages, light cavalry such as hobelars and *munatores* were developed to practice raiding, while castle defences and tower houses impeded raids.<sup>80</sup>

This indirect approach to warfare has a wider significance. The environment may be exploited by the parties to the detriment of their enemies, but the environment itself can deliver severe harm to either or both parties. Cline cites an instance in the Bronze Age, where a single shipwreck resulted in the loss of enough materials to equip 300 men for war, which in a period when so many men could have crewed a flotilla of seven ships or served as one tenth of a ruler's bodyguard, must have been a marked blow to the intended recipients.<sup>81</sup> Van Lerberghe et al describe an attempt to use water deprivation as a military strategy in the Middle East, 3,700 years ago during a period marked by precipitation decline.<sup>82</sup> The deaths from thirst in the Macedonian army of Alexander, retiring from India through the deserts of Gedrosia in 325 BCE,<sup>83</sup> or the destruction by sand storms of the Persian expedition to Siwa in 525 BCE,<sup>84</sup> were examples of direct environmental harm. The Byzantines were well aware that the best time to attack nomads was in early spring before the nomad horses could recover from the rigours of winter pasturing. Disease could also be used as a weapon, with the launching of plague bodies over city walls perhaps more effective in creating fear and hence destroying morale than actually spreading disease, although the Black Death may be traced back to the Mongol siege of Kaffa. This thesis thus requires an awareness of the environment in which armies operated.

## 7.5 NOMAD WARFARE, CAVALRY AND MOBILITY

Lattimore, after his travels in Mongolia, saw nomadism as equally suited for attacking or running

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<sup>78</sup> Krug, I. (2018) 'Food, Famine and Edward II's Military Failure', *Journal of Medieval Military History*, pp. 63-79.

<sup>79</sup> Bell, G. D. (2008) 'Unintended Consumption: the Interruption of the Fourth Crusade at Venice and Its Consequences', *Journal of Medieval Military History*, VI, pp. 79-94.

<sup>80</sup> Prestwich, M. (2006) 'Transcultural Warfare – the Later Middle Ages', in Kortüm, H.K. (ed.) *Transcultural Wars from the Middle Ages to the 21<sup>st</sup> Century*. Berlin, pp. 43-56.

<sup>81</sup> Cline, E. (2014) *1177 BC: The Year Civilisation Collapsed*. Oxford: Princeton University Press, p.74.

<sup>82</sup> Van Lerberghe, K., Kaniewski, D., Abraham, K., Guiot, J. and Van Campo, E. (2017) 'Water Deprivation as military strategy in the Middle east, 3,700 years ago', *Mediterranean, Water Deprivation as military strategy in the Middle East, 3,700 years ago*, Available: Varia

<sup>83</sup> Arrian (1971) *The Campaigns of Alexander*. Translated by de Selincourt, A. Introduction: Hamilton J.R. Harmondsworth: Penguin, p. 335.

<sup>84</sup> Herodotus, (1968), *The Histories*. Translated by: de Selincourt, A. Harmondsworth: Penguin. p.185.

away,<sup>85</sup> but nomadic communities of the ancient and medieval period, such as the Mongols, were in many ways better equipped for war than their sedentary neighbours, although by no means unbeatable, and this influenced their choices and outcomes. Chatwin, a mid-twentieth traveller in Afghanistan, suggested that “*Any nomad migration must be organised with the precision and flexibility of a military campaign. Behind, the grass is shrivelling. Ahead the passes may be blocked with snow.*”<sup>86</sup>

Van Creveld notes that while in the eastern and western parts of Eurasia, coasts, rivers and cities favoured foot warfare, the immense open spaces of the centre favoured horse-and-composite-bow.<sup>87</sup> The development of a quantified measure of Clausewitzian friction is of particular importance in understanding how small mobile communities can cope with larger, apparently more powerful, neighbours. Expressed in Clausewitzian terms, there is a Culminating Point of Attack where the power of attackers and defenders balance and while moving away from home base weakens the attacker, it is possible to ease the problem by moving base.<sup>88</sup> Moving base is much easier for nomads. Furthermore, a strong cavalry component increased the likelihood of a victorious campaign.<sup>89</sup>

Many wars of the early modern period pitted an agrarian society against a nomadic or semi-nomadic society. In general the agrarian society had better logistics, and the conflict was highly asymmetric with the cavalry and mobility of nomadic societies set against the numbers, infantry and fortifications of agrarian societies.<sup>90</sup> The strategy of agrarian societies was also asymmetrical, so that, for instance, Alexander the Great preferred demonstrations against tribal nomadic groups across the Danube and the Jaxartes, rather than the strategy of conquest that he adopted against the settled communities that he encountered.<sup>91</sup> A strategy of fortification, blockade, and the

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<sup>85</sup> Cited by Ure, J. (2002) *In Search of Nomads: An English Obsession from Hester Stanhope to Bruce Chatwin*. London: Constable & Robinson, p.150.

<sup>86</sup> Quoted in Ure, J. (2002) *In Search of Nomads* op. cit. p.51.

<sup>87</sup> van Creveld, M. (1990) *Technology and War: From 2000 BC to the Present*. New York: The Free Press, p.16; Nicholson, H. (2004) *Medieval Warfare: Theory and Practice of War in Europe 300-1500*. Basingstoke: Palgrave Macmillan; Nicolle, D. (1996) *Medieval Warfare Source Book, Volume 2: Christian Europe and its Neighbours*. London: Arms and Armour.

<sup>88</sup> Garvin, E. (2015) “Clausewitz and Ancient Warfare”, pp.11-26 in *Greece, Macedon and Persia* ed. Howe, T., Garvin, E. and Wrightson, G. Oxford: Oxbow Books.

<sup>89</sup> Cavalry was particularly effective in pursuit, and successful pursuit could convert a victorious battle into a victorious campaign. See Citino, R. M. (2002) *Quest for Decisive Victory: From Stalemate to Blitzkrieg in Europe, 1899-1940*. Lawrence, Kansas: University Press of Kansas, pp. xii-xv.

<sup>90</sup> Black, J. (1999) 'Introduction', in Black, J. (ed.) *War in the Early Modern World 1450-1845*. Boulder: Westview Press, pp. 1-24.

<sup>91</sup> Anson, E. “Counter-insurgency: the lesson of Alexander the Great”, pp.94-106 in *Greece, Macedon and Persia* ed. Howe, T., Garvin, E. and Wrightson, G. Oxford: Oxbow Books.

fostering of dissension was widely used by sedentary states against inaccessible groups of all kinds from China to Wales.<sup>92</sup>

Furthermore, agrarian communities were by no means uniform over time or culture, in their ability to achieve their ends. For instance, Keen distinguishes between the Byzantines, on one hand, whose agrarian society started with a sophisticated bureaucracy and effective tax collection machine, supported by a powerful military machine, and ended with no more than the bureaucracy, and on the other hand, a Western European world that built these things up from an initial weak base.<sup>93</sup>

In the medieval period, there were three basic forms of warfare: sieges, battles and devastation. A preliminary estimate of the relative significance of these three forms, in the west at any rate, may be formed from the frequencies of skirmishes associated with them. Table 7.5 shows that siege and devastation were overwhelmingly the forms of warfare used, if the Hundred Years' War may be taken as an exemplar of medieval warfare.

| Form of Warfare | Percentage | Adjusted percentage |
|-----------------|------------|---------------------|
| Siege           | 42         | 49                  |
| Battle          | 16         | 18                  |
| Devastation     | 29         | 33                  |
| Undetermined    | 12         | na                  |

**Table 7.5 Percentage of skirmishes during the Hundred Years' War, by form of warfare**

Source: Braasch III<sup>94</sup>

In urbanised society, wars were decided by sieges and blockades, though as Sun-tzu comments, siege warfare is the last resort.<sup>95</sup> Gillingham, however, sees the basic form of warfare in the medieval period as the raid.<sup>96</sup> Raiding was an integral part of devastation,<sup>97</sup> and it was particularly conducive to marginal societies seeking to wage irregular warfare.<sup>98</sup> The pattern of raiding and

<sup>92</sup> The Welsh, though not nomadic, were pastoral in their practices and sufficiently mobile as a community to avoid English attacks. The strategy of fortification, blockade and fostering dissension was recommended by Gerald of Wales. See Gerald of Wales (2004) *The Journey Through Wales and The Description of Wales* (ed. Thorpe, L.) London: Penguin Books, pp. 268-272.

<sup>93</sup> Keen, M. (2001) 'Introduction: War and the Middle Ages', in Keen, M. (ed.) *Medieval Warfare: A History*. Oxford: Oxford University Press, pp. 1-12; Carey, B., Allfree, J. and Cairns, J. (2006) *Warfare in the Medieval World*. Barnsley: Pen & Sword Military.

<sup>94</sup> Braasch III, R. W. (2018) 'The Skirmish' op. cit.

<sup>95</sup> Sun-tzu (2003) *The Art of War* op. cit. p.15.

<sup>96</sup> Gillingham, J. (2001) 'An age of expansion c1020-1204', in Keen, M. (ed.) *Medieval Warfare: A History*. Oxford: Oxford University Press, pp. 59-88; Gillingham, J. B. (2004) "'Up with Orthodoxy": In Defence of Vegetian Warfare', *Journal of Medieval Military History*, II, pp.149-158.

<sup>97</sup> The number of combats in the course of a raid was variable, and the nature of those combats (skirmish, battle or even siege) was likewise variable.

<sup>98</sup> France, J. (2016) 'Medieval Irregular War c.1000-1300', *Journal of Medieval Military History* XIV, pp. 123-132; In the



small combats, characterised as ‘Vegetian’<sup>99</sup> by Morillo, is viewed by him as natural in the context of a sedentary pre-modern society in a cross-border conflict.<sup>100</sup> War was not an occasion but a condition to be lived with, and the distinction between criminal violence and war was weak. Battle was not to be sought, save when the advantage to be gained was large or the need was great, for battle was chancy with an element of personal risk to the commander, though victory tended to go to the better organised and qualitatively superior force.<sup>101</sup> Raids could be caught, due to raiders’ reluctance to kill plundered animals by over-driving. In the Latin East raids were intended to impoverish the enemy and destroy morale, and they provided the means to coerce tribes into paying tribute.<sup>102</sup> Ayton notes the impact of “ferocious ‘horse peoples’ of the steppes”, especially when formed into permanent armies.<sup>103</sup> Eastern horses were light, weighing 700-900 lbs (320-410 kilograms), compared with the 1200-1300lbs (545-590 kilograms) of the Western horses used by knights and stradiot light cavalry were mounted on swift, light Turkish horses (costing \$GK 512-1024). These were more mobile. Mongol ponies could cover 60 miles per day, and Robert of Clari describes Cumans as using strings of 10-12 horses to cover six to eight days journey in 24 hours during the early thirteenth century.<sup>104</sup>

Gibbon draws attention to the widespread availability of horses for the nomads’ active cavalry,<sup>105</sup> and suggests that animal slaughter and hunting serve as a discipline for war.<sup>106</sup> He also draws attention to the development of those military arts and technologies (particularly fortifications and gunpowder) which tend to counter the natural advantages of so-called primitive peoples.<sup>107</sup> Oman attributes Mongol success to their ability, although their own armies were very

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conquest of Estonia, 1208-1227, there were 50 expeditions of which two-thirds were raiding only. There were ten battles and ten sieges. Gillingham, J. (2017) 'A Strategy of Total War? Henry of Livonia and the Conquest of Estonia 1208-1227', *Journal of Medieval Military History* XV, pp. 187-204.

<sup>99</sup> i.e., in line with the principles outlined by Vegetius, a writer on military matters much studied in medieval Europe. These reflected the practice of the late Roman period in which he wrote, and emphasised ambush, raid and harassment over battle and siege.

<sup>100</sup> Morillo, S. (2003) 'Battle seeking: the contexts and limits of Vegetian Strategy', *Journal of Medieval Military History*, I, pp. 1-20.

<sup>101</sup> See France, J. (2020) 'The European Concept of 'Winning' in the Middle Ages', in Strohn, M. (ed.) *Winning Wars: The Enduring Nature and Changing Character of Victory from Antiquity to the 21<sup>st</sup> Century*. Oxford: Casemate Publishers, pp. 31-46. Numbers were never irrelevant. When told in the film *The Lion, the Witch and the Wardrobe*, that superior numbers are not everything, Peter Pevensie replies, “But I bet they help”.

<sup>102</sup> Edbury, P. (2001) 'Warfare in the Latin East', in Keen, M. (ed.) *Medieval Warfare: a history*. Oxford: Oxford University Press, pp. 89-112.

<sup>103</sup> Ayton, A. (2001) 'Arms, Armour and Horses', in Keen, M. (ed.) *Medieval Warfare: a history*. Oxford: Oxford University Press, pp. 186-208.

<sup>104</sup> Clari, R. (1996) *The Conquest of Constantinople*. Translated by: McNeal, E.H. Toronto: University of Toronto Press, pp.78-88.

<sup>105</sup> Gibbon, E. (1910) *The Decline and Fall of the Roman Empire (six volumes)*. London: Everyman’s Library, Vol III, Chap XXVI, p.7, p.8, p.11.

<sup>106</sup> See also the description of Mongol hunting practice in Juvaini (1958) *The History of the World Conqueror* op. cit. Vol. I pp.27-28.

<sup>107</sup> Gibbon, (1910) *Decline and Fall* op. cit Vol IV, Chap XXXVIII, pp.122-125.

miscellaneous, to lure their enemies into scattering during battle.<sup>108</sup> He draws attention to the fact that a cavalry army is ineffective in dense wood, marshland and precipitous hills and passes. As Morillo puts it “*Geography placed limits on the dominance of cavalry. It was difficult for cavalry to operate in rough terrain – heavily wooded areas, broken or hilly ground – or in areas lacking sufficient forage*”.<sup>109</sup> Deserts, according to Napoleon’s comments concerning terrain,<sup>110</sup> along with mountains, are superior to rivers as defence obstacles but from the viewpoint of a nomad, a desert may be preferable to mountains. In such an environment, camels served a strategic rather than a tactical function for, as Calwell notes, they could travel long distances with little fodder or water, but exhibited poor speed on the battle field.<sup>111</sup> Non-Bedouin horses, unused to camels, did not react well to their presence, and *in extremis*, camels could be used as a defensive parapet, but in general their usefulness was at a maximum in deserts, where they could move 24-32 kilometres per day.<sup>112</sup>

Nonetheless, the absence of forage was important. Maurice’s *Strategikon* is a late sixth century military handbook which groups together tribes such as the Avars, Turks, Huns and Skythians and highlights the importance of horses to such peoples, who give special attention to horse archery.<sup>113</sup> Shortage of fodder can be a problem for them (they are best attacked in February or March when their horses are in wretched condition after the winter) and they do not fight well on foot.<sup>114</sup> The author characterises them as fickle and “*composed of so many tribes as they are, they have no sense of community or unity with one another*”. This pattern did not change quickly. Five hundred years later, the *Alexiad* of the Byzantine princess and historian Anna Comnena describes similar horse archer tactics of the Turks encountered by the Emperor Alexius Comnenus.<sup>115</sup> There is no reason to suppose that their problems of forage had gone away. Nomadic people were themselves well aware of the difficulty. The Secret History of the Mongols thus describes how the

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<sup>108</sup> Oman, C. (1991b) *A History of the Art of Warfare in the Middle Ages: Volume Two, 1278-1485AD*. London: Greenhill Books. Oman does not remark on the strategic advantage that the Mongols were able to achieve by marching separately and then combining their forces for a battle.

<sup>109</sup> Morillo, S. (1999) 'The “Age of Cavalry” Revisited', in Kagay, D. & Villalon, L. (eds.) *The Circle of War in the Middle Ages: Essays on Medieval Military and Naval History*. Woodbridge: The Boydell Press, p.46.

<sup>110</sup> Officer’s Guide (1862) *Napoleon’s Maxims of War*. Richmond: West & Johnston, Maxim 1.

<sup>111</sup> Callwell, C. (1996) *Small Wars: Their Principles and Practice*. 3rd edn. Bison Books Edition. Lincoln: University of Nebraska Press, pp.425-427.

<sup>112</sup> Kennedy, H. (1981) *The Early Abbasid Caliphate: A Political History*. London: Croom Helm, p.32.

<sup>113</sup> Maurice (1984) *Maurice’s Strategikon: Handbook of Byzantine Military Strategy*. Translated by: Dennis, G. Philadelphia: University of Pennsylvania Press, p.64, pp.116-117.

<sup>114</sup> Chinese generals were also aware of this weakness, although their political masters sometimes chose to ignore it. McGovern, W. M. (1939) *The Early Empires of Central Asia: a Study of the Scythians and the Huns and the Part They Played in World History*. Chapel Hill, North Carolina: The University Press of North Carolina, p.158.

<sup>115</sup> Comnena, Anna. (1969) *Alexiad of Anna Comnena*. Translated by: Sewter, R. Harmondsworth: Penguin, pp.479-480.

Naiman khan devised a plan to lure the Mongols into an area of difficult terrain and poor pasture where the well-grazed Naiman horses would outlast the lean Mongol horses.<sup>116</sup>

Cavalry has a variety of forms. At the beginning of the fifth century, Roman cavalry of the *comitatenses* consisted of 15 per cent heavy armoured, 61 per cent heavy and 24 percent light cavalry.<sup>117</sup> The tactical difference between the types is important.<sup>118</sup> Pohl identifies two kinds of eastern cavalry in the Black Sea area during the Hellenistic, Roman Republican and early Principate periods, namely light cavalry with reflex bow (broadly, Skythians) and heavy armoured cavalry with lance (principally, Sarmatian,<sup>119</sup> but also, later, the Avars).<sup>120</sup> This is no clear ethnic distinction since lances and armour are found in Skythian graves and bows in Sarmatian graves. Sarmatian armour was made of horn, a material more readily accessible than iron to nomadic people. The Turkish standard equipment was bow, mace and horse.<sup>121</sup> Robert of Clari describes the thirteenth century Cumans as unarmoured archers,<sup>122</sup> although the tactics of the Cumans were rather more complex than this description might imply.<sup>123</sup> There is a social distinction between the two cavalry types, since armour and lance presupposes a considerable degree of wealth (see discussion in Chapter 6) such as is often found among sedentary neighbours such as the Georgians.<sup>124</sup> Armour gave a considerable advantage in hand-to-hand combat.<sup>125</sup> A distinction can be made between

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<sup>116</sup> Anonymous (1957) *The Secret History of the Mongol Dynasty. Publications of the Department of History, Muslim University of Aligarh*. Translated by: Wei, K.S. Aligarh: Department of History, Muslim University of Aligarh, pp.133-134.

<sup>117</sup> Heavy armoured cavalry had full armour for the rider, and armour for the horse; heavy cavalry had armour for the rider; light cavalry had little armour. Haldon, J. (1999) *Warfare, State and Society in the Byzantine World, 565-1204*. Abingdon: Routledge, p.192.

<sup>118</sup> The difference of cavalry types is not simply a matter of equipment. The medieval European *coustillier* was a lightly armed mounted auxiliary originally fighting alongside the knight of his lance (squad) in ordinary combat. If brigaded separately, the *coustilliers* could be used for foraging, raiding, and pillaging, as well as scouting and reconnaissance. When serving in such roles, use of light armour and javelins certainly made them more effective, but they were not supporting their knight in ordinary combat. An alternative approach was to recruit and deploy dedicated light cavalry: *jinetes*, *hobelars*, *stradiots* or similar. See Harbison, M. (2021) 'Coureurs and Their Role in Late Medieval Warfare', *Journal of Medieval History* XIX, 147-190. Nomad horse archers required little adaption in order to act in the light cavalry role.

<sup>119</sup> Pohl, W. (2006) 'Telling the difference: signs of ethnic identity', in Noble, T. (ed.) *From Roman Provinces to Medieval Kingdoms*. London: Routledge, pp.129.

<sup>120</sup> Stirrups were not needed by horse archers, and are usually found with lance heads. Curta, F. (2008) 'The earliest Avar age stirrups, or the "stirrup controversy" revisited', pp. 297-326 in Curta, Florin & Kovalev, R. (eds.) *The Other Europe in the Middle Ages: Avars, Bulgars, Khazars and Cumans East Central and Eastern European in the Middle Ages Volume 2* Leiden, Brill.

<sup>121</sup> Anonymous (1974) *Book of Dede Korkut*. Translated by: Lewis, G. Harmondsworth: Penguin, p. 61.

<sup>122</sup> Robert of Clari (1996) *The Conquest of Constantinople*. op. cit. pp.87-88.

<sup>123</sup> Mitchell, R. (2008) 'Light Cavalry, Heavy Cavalry, Horse Archers, Oh My! What Abstract Definitions Don't Tell Us About 1205 Adrianople', *Journal of Medieval Military History*, VI, pp. 95-118.

<sup>124</sup> Tsurtsamia, M. (2014) 'Couched Lance and Mounted Shock Combat in the East: The Georgian Experience', *Journal of Medieval Military History* XII, pp. 81-108.

<sup>125</sup> For instance, the breastplates of Macedonian cavalry gave a considerable benefit to them in coping with the greater numbers of cavalry in the service of Sitalces, king of the Odrysian Thracians in 419 BCE. Thucydides (1968) *The Peloponnesian War*, trans. Warner, R. Harmondsworth: Penguin, p. 160.

noble armoured cavalry and the horse archers of the general populace.<sup>126</sup> The reflex bow works best in a slightly dry climate, and hence western neighbours of the Huns, Avars and Magyars did not adopt it.

The horse bow was perceived as very effective. In the ninth century, the Arab historian al-Jahiz wrote:

“If a thousand of their [Turks’] horse join battle and let off a single shower of arrows, they can mow down a thousand [Arabs’] horse. No army can withstand this kind of assault. The Kharajites and the Bedouin have no skill worth mentioning in shooting from horseback ... the Turk ... loosing ten arrows before the Kharajite can nock one”<sup>127</sup>

Possibly this is overdrawn, but Dupuy provides an analysis suggesting that the lethality of a Mongol horse bow was about two and a half times that of an ordinary short self-bow,<sup>128</sup> such as might be readily available to any community with access to timber.<sup>129</sup> In the absence of controlled trials, it is unclear to what extent this is a comparison of bows rather than the archers who wielded them. The controlled trials that do exist suggest that the equipment did vary significantly, with western arrows less likely to penetrate armour than eastern arrows, but more likely to inflict harm if they did.<sup>130</sup> On the basis of the Lanchester square law equation (see Excursus E11), wielding the horse bow would thus be equivalent to a superiority of 58% in manpower in a conflict. Not all nomads enjoyed this advantage, however, as al-Jahiz makes clear.

Heath suggests that Turcoman and Bedouin raiders could cover approximately 50 kilometres per day, compared with about 15 kilometres per day for an army including infantry and baggage or 30 kilometres per day for a purely cavalry army without baggage.<sup>131</sup> Goodwin estimates that Turks could cover 100 km per day.<sup>132</sup> Luttwak suggests that cavalry could cover 80 kilometres per day and infantry on good roads about 5 kilometres per hour (say 30 kilometres over a six hour day).<sup>133</sup> This discrepancy may reflect the impact of Clausewitz’s friction, for an assessment of this kind depends in part on the numbers involved in making the march. The ratio of distances achieved

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<sup>126</sup> Anderson, E. (2016) *Cataphracts: knights of the eastern empires*. op. cit. p.9 and p.70.

<sup>127</sup> Cited in Eaton, R. M. (2020) *India in the Persianate Age, 1000-1705*. London: Penguin, p.31.

<sup>128</sup> Dupuy, T. (1979) *Numbers, Prediction and War: Using history to evaluate combat factors and predict the outcome of battles*. Indianapolis: Bobbs-Merill. Figure 1-2.

<sup>129</sup> Pohl, W. (2006) 'Telling the difference: signs of ethnic identity', op. cit. p.129.

<sup>130</sup> Mitchell, R. (2006) 'Archery vs. Mail: Experimental Archaeology and The Value of Historical Context', *Journal of Medieval Military History*, IV, pp. 18-28.

<sup>131</sup> Heath, I. (1980) *A Wargamer's Guide to the Crusades*. Cambridge: Patrick Stephens Limited, p.145.

<sup>132</sup> Goodwin, G. (2006) *The Janissaries*. London: Saqi, p.20.

<sup>133</sup> Luttwak, E. (1976) *The Grand Strategy of the Roman Empire from the First Century AD to the Third*. Baltimore: John Hopkins University Press, p.133.

(100:50 for Turks or 80:30 for general cavalry) suggested by the differing sets of answers could arise by comparing a body of 200 cavalry with one of 1,500, neither being an implausible number.

Sabin cites findings that the Mongol army could advance 27km per day in battle conditions.<sup>134</sup> Given that Peacock cites May as giving the size of the Mongol army in 1241AD as 97,575,<sup>135</sup> such a speed could hardly be achieved without utilising the troops' greater mobility and discipline to "march dispersed, strike united".<sup>136</sup> This approach was referred to by Du You, the Tang Chinese commentator.<sup>137</sup> May describes the Mongol conquest strategy as the Tsunami Strategy, as it involved them in invading a neighbouring area, devastating a large region and receding into the empire, while retaining a relatively small portion of the invaded region. They struck in converging columns which could not be easily caught without equal mobility or else ambush.<sup>138</sup> The Mongol approach to warfare was very effective.<sup>139</sup>

This means that in a situation where troops are initially dispersed evenly along the frontier, an *ad hoc* army formed from units summoned from any specified number of days' march away will be of the order of two to three times bigger if the units are nomad raiders than if they are a standard mix of cavalry, infantry and baggage. Luttwak notes the balance of the cost of delayed interception,<sup>140</sup> against the advantage of delay in order to concentrate,<sup>141</sup> but this is less of an issue for the mobile nomads. As Grygiel suggests, "*concentration of forces, a fundamental military principle, is an ineffectual posture in front of widely dispersed localized attacks*".<sup>142</sup>

To this may be added the strategic mobility of nomads typified in Herodotus' account of the Skythians. Herodotus gives an explanation of Skythian strategy, which is a continuation of their peace time practices, wandering in an empty land where defence of neither towns nor cultivated land was required.<sup>143</sup> Only finding the tombs of their forefathers, if this could be done, would

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<sup>134</sup> Sabin, P. (2012) *Simulating War: Studying Conflict through Simulation Games*. London: Continuum, p.85.

<sup>135</sup> Peacock, A. (2010) *Early Seljuq History: a New Interpretation*. Abingdon: Routledge, p. 87.

<sup>136</sup> Freedman, L. (2013) *Strategy: A history*. Oxford: Oxford University Press, p.105.

<sup>137</sup> Sun-tze (2003) *The Art of War*. op. cit. p.187.

<sup>138</sup> May, T. (2016a) 'Mongol Conquest Strategy in the Middle East', in De Nicola, B. & Melville, C. (eds.) *The Mongols': Middle East Continuity and Transformation in Ilkhanid Iran*. Leiden: Brill, pp. 13-37.

<sup>139</sup> May, T. (2007) *The Mongol Art of War: Chinggis Khan and the Mongol Military System*. Barnsley: Pen and Sword; May, T. (2016b) *The Mongol Art of War*. Barnsley: Pen and Sword Military; May, T. (2017) 'Crusades against the Mongols', in May, T. (ed.) *The Mongol Empire: a Historical Encyclopedia*. Santa Barbara: ABC-Clío.

<sup>140</sup> Luttwak, E. (1976) *The Grand Strategy of the Roman Empire* op. cit. p.144.

<sup>141</sup> As Sun-tzu says, "I have heard that in war, haste can be folly, but have never seen delay that was wise". Sun-tzu (2003) *The Art of War*. op. cit. p.123.

<sup>142</sup> Grygiel, J. J. (2018) *Return of the Barbarians: Confronting Non-State Actors from Ancient Rome to the Present*. Cambridge: Cambridge University Press, p.124.

<sup>143</sup> Herodotus, (1965) *The Histories* op. cit. p.283.

require them to halt and fight at a time and place not of their own choosing. Lattimore suggests that this nomadic mobility imposes the requirement on sedentary powers to secure a swift victory, as the sedentary population and assets are disproportionately exposed to the hazards and losses of war and raiding.<sup>144</sup> The Skythian pattern of raiding and evasion in warfare is common in conflicts between sedentary and nomadic peoples.<sup>145</sup> Grygiel argues that nomads, like other barbarians, were mostly decentralised, although leaders could sometimes unite them so that “*A large nomadic group could therefore expand or contract, unify and divide, very rapidly, depending on the warrior prowess of its chief*”.<sup>146</sup> Luttwak, writing about the Roman defence of their empire, notes the balance between active defence vs. deterrence, and the differing options of elastic defence, defence in depth and perimeter defence.<sup>147</sup> He also comments that his rational value judgement excludes cases of glorious martyrdom and the situation where the opponent has no valuables that are vulnerable to attack or attack-worthy. The former may be linked to holy war, and the latter to the Skythian strategy.<sup>148</sup> This of course ceases to be valid when a steppes conqueror has established a fixed capital, needed to rule his empire. Khazanov cites the Chinese aphorism: “*although you inherited the Chinese empire on horseback, you cannot rule it from that position*”<sup>149</sup>. It is indeed open to question whether an army is necessarily best commanded from that position either.<sup>150</sup>

The high level of mobility enjoyed by nomad light cavalry armies can be linked to their success. As noted in Appendix 4, situational awareness and surprise are key to achieving shock, especially when supplemented by speed and a defender perception of attacker invulnerability. Deployment of light cavalry in open country was the usual means to reveal the circumstances of the enemy whilst concealing one’s own situation, and nomad armies were well fitted to do this. In the incident from the *Secret History of the Mongols* described above,<sup>151</sup> Chinggis Khan has agreed a

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<sup>144</sup> Freedman, L. (2013) *Strategy: A History*. Oxford: Oxford University Press, p.147.

<sup>145</sup> Native American plains people in the nineteenth century fought successfully in this style against US troops, as did Arabs of the same period in North Africa against French troops. It may be noted that Ottoman Turkish troops had achieved better success against the Arabs than the French, using an eighth of the numbers, by mounting their infantry to enhance mobility, and seeking less rigorous control. Marcy, R. B. (1859) *The Prairie Traveler*. New York: Harper and Brothers. Reprint, 1981. Facsimile Reprint, Time-Life Books Inc, pp. 200-206.

<sup>146</sup> Grygiel, J. J. (2018) *Return of the Barbarians* op. cit. pp.57-58.

<sup>147</sup> Luttwak, E. (1976) *The Grand Strategy of the Roman Empire*, p.130, p.198.

<sup>148</sup> Luttwak, E. (1976), *The Grand Strategy of the Roman Empire* op.cit. Appendix.

<sup>149</sup> Khazanov, A. (2001) 'Nomads in the History of the Sedentary World', in Khazanov, A. & Wink, A. (eds.) *Nomads in the Sedentary World*. Abingdon: Routledge, p. 1. Originally attributed in the form “Your majesty may have won [all he possesses] on horseback but can you rule it on horseback?” to Master Lu, addressing Kao-tsu, founder of the Han dynasty (Chien Ssu-ma 1969, p.209).

<sup>150</sup> When the US Civil War General Pope claimed to have his headquarters “in the saddle”, the jibing rejoinder was that he had his headquarters where his hindquarters should be. Foote, S. (1958) *The Civil War: a Narrative. Fort Sumter to Perryville*. New York: Random House, p.529.

<sup>151</sup> Anonymous (1957) *The Secret History of the Mongol Dynasty*. Translated by: Wei, K.S. Aligarh: Department of History Muslim University of Aligarh. pp.133-4.

plan to inflate his apparent numbers with dummy fires and then sweep away the Naiman scouts in a concerted attack on their camp. The nomad armoured cavalry may benefit from perceptions of invulnerability.

In summary, therefore, nomad military power is enhanced by force multipliers such as:

- a. Culture of hunting
- b. Horse availability
- c. Reflex bow
- d. Ability to use a large fraction of the adult male population for fighting

These are further enhanced by the general absence of accessible strategic targets whose loss would impose critical damage on them. A sedentary power that was able to secure the support of a force of nomad light cavalry was normally assured of victory against another sedentary power,<sup>152</sup> and could negate the advantage of an attacking group of nomads.

Nonetheless, nomad horse archers were not universally triumphant. In swamp, mountain and wood, their battle effectiveness was less, and maintaining their mounts in deserts was difficult. Furthermore, though skilled, their skill did not match that of professionals who spent their days in training. Thus, the mamluks of a sedentary realm such as Egypt, who developed nomad skills to the limit, could be matched only by a more numerous force of nomads, supposing that the local vegetation supported the deployment of such a large force.<sup>153</sup>

## 7.6 CONCLUSIONS

Given the importance of warfare in the conduct of group interactions, any model of the factors that have influenced the choice of the strategic objectives of nomadic peoples, holy warriors and their opponents will need to address strategy, troop effectiveness, friction and numbers; the relationship of warfare and society; indirect and direct violence and nomad warfare, cavalry and mobility. All of these topics have been addressed by scholars and numerical representation of

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<sup>152</sup> Vasary, I. (2005) *Cumans and Tartars: Oriental Military in Pre-Ottoman Balkans, 1185-1365*. Cambridge: Cambridge University Press, p.166.

<sup>153</sup> Ayton, A. (2006) 'From Muhi to Mohács – Armies and Combatants in Later Medieval European Transcultural Wars' in Kortüm, H. and Kenning (eds.), *Transcultural Wars from the Middle Ages to the 21<sup>st</sup> Century*. Berlin: Akademie Verlag, pp. 213-247.

these aspects of societies and their capabilities in conducting warfare is possible. Excursus E7 (below) and Chapter 11 on the database provide further details on the specific measures used to capture and assess the contribution of these variables in the conflict outcomes.



## EXCURSUS E7. ARMIES, MILITARY SOPHISTICATION AND TERRAIN

### E7.1 NUMERICAL ASSESSMENT OF MILITARY RATING, TACTICS AND MORALE FOR GIPP

#### DATABASE

Wargames are important in developing a strategy to achieve one's objectives in the face of an opponent who thinks and acts.<sup>154</sup> The points system of the Wargames Research Group (WRG), active from the 1960s to the present,<sup>155</sup> broadly reflects all the lines of thought outlined in Chapter 7. WRG has produced material which they seek to base on the best available historical information and analysis, so as to permit gamers to design historically appropriate armies with equal capacity to achieve victory.<sup>156</sup> By reversing the process to examine the kinds of force available to a group, this provides a consistent and robust numerical basis for comparing the military potential of the forces of cultural groups from 3000BC to 1500 AD (or beyond, in situations where industrialised weaponry and warfare was late in arriving).<sup>157</sup> This can be used to produce composite military assessments of the cultures involved in conflict.

For the armies listed in Table 11.12, Army Mean Rating, Percent Cavalry, Artillery and Aggression are derived from the WRG army lists.<sup>158</sup> The largest permitted army is used to determine the weighted average point score (weighted by manpower per figure: Cavalry – 125, Infantry – 250, Levy – 1,000, Others – 80), the percentage of cavalry and the artillery rating of the army. Converted to an index, the natural range of average point score is 0.5 – 120, and the other indicators are adjusted to match. Some examples of basic strength are given in Table E7.1

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<sup>154</sup> van Creveld, M. (2013) *Wargames from Gladiators to Gigabytes*. Cambridge: Cambridge University Press, pp.3.

<sup>155</sup> Peterson, J. (2012) *Playing the World: A History of Simulating Wars, People and Fantastic Adventures from Chess to Role-playing Games*. San Diego: Unreason Press, p.431.

<sup>156</sup> Although such balance is clearly artificial, it requires accurate data to achieve it. The need for realism is important. See Perla, P. (2011) *The Art of Wargaming: A guide for Professionals and Hobbyists*. Great Britain: Amazon, p.23.

<sup>157</sup> The spread of, successively, handguns, arquebuses, muskets and flintlocks; bombards and guns was protracted and uneven. While Danes had re-equipped with flintlocks and bayonets before 1670 in Europe, Ethiopian armies were still using the arquebus, in limited numbers. Gush, G. (1984) *Army Lists 1420-1700: For Use with Wargames Research Group Wargames Rules*. Worthing: Gush.

<sup>158</sup> Barker, P. (2008a) *DBMM Army Lists for use with the De Bellis Magistorum Militum Wargames Rules, Book 2: 500 BC-476 AD*. Nottingham: Partizan Press

Barker, P. (2008b) *DBMM Army Lists for use with the De Bellis Magistorum Militum Wargames Rules, Book 3: 476 AD - 1071 AD*. Nottingham: Partizan Press

Barker, P. (2009) *DBMM Army Lists for use with the De Bellis Magistorum Militum Wargames Rules, Book 1: 3000 BC - 500 BC*. Nottingham: Partizan Press

Barker, P. (2010) *DBMM Army Lists for use with the De Bellis Magistorum Militum Wargames Rules, Book 4 1071AD – 1515 AD The High Medieval Period*. Cambridge: Wargames Research Group.

| Army                       | Barker Reference | Start Date | End Date | Point Value | Percent Cavalry | Artillery Points |
|----------------------------|------------------|------------|----------|-------------|-----------------|------------------|
| Roman Early Imperial       | B2-56            | 25 BCE     | 197      | 27.6        | 9.9             | 36               |
| Roman Late Imperial (East) | B2-78            | 307        | 408      | 21.8        | 12.3            | 56               |
| Rus 860-1054               | B3-48            | 860        | 1054     | 13.9        | 1.0             | 0                |
| Russian Post-Mongol        | B4-44            | 1246       | 1533     | 35.0        | 51.5            | 4                |
| Sassanid                   | B2-69            | 220        | 651      | 15.9        | 21.0            | 0                |

**Table E7.1 Specimen army details**

Source: data from Barker (2008-10)

Aggression (rated 0-4) is a WRG assessment of the culture and used to estimate the likelihood of a battle being fought in an army's home territory on the basis that when two armies are of equal aggressiveness, the likelihood of a battle in their respective territories is likewise equal. According to this assessment method, an army with Aggression 4 facing an army of Aggression 0 has a 97% (rather than 50%) chance of fighting in its enemy's territory rather than its own. The variable is available at minimal effort for indexing and inclusion in further analysis (in Chapter 12). Morale is estimated, using average Morale Equivalents which are collected using WRG's rules and assessment of the army lists.

## **E7.2 NUMERICAL ASSESSMENT OF OTTERBEIN INDEX OF MILITARY SOPHISTICATION FOR GIPP DATABASE**

In an important study, Otterbein analysed a range of societies and identified thirteen factors (see Table E7.2)<sup>159</sup> that combined to form an index of military sophistication with considerable explanatory power. However, this index was devised to apply to a wide range of societies, and the societies identified in this study proved to be clustered at the upper end of the index (28 of 97 armies (29%), were rated with the maximum level of sophistication). Such a high level of clustering on a single value might be expected to reduce the explanatory power of the index.<sup>160</sup> By adding another two variables (possession of artillery (mechanised projectile devices) and possession of fire and/or gunpowder weapons), the present researcher was able to reduce the level of high-end clustering in the database (only 4 of 97 armies recorded the highest level of sophistication).

<sup>159</sup> Otterbein, K. (1970) *The Evolution of War: a Cross-Cultural Study*. New Haven, Connecticut: HRAF Press.

<sup>160</sup> If all cases in a database record the same value for a variable, the variable can explain nothing. If 30% of cases record the same extreme value, the variable's explanatory power is unlikely to be high.

| Variable                                      | Sophisticated practice      |
|---|-----------------------------|
| Military organisation                         | Professional                |
| Subordination                                 | High                        |
| Initiating party                              | Designated official         |
| Means of Initiation                           | Announcement or arrangement |
| Diplomatic Negotiation                        | Present                     |
| Tactical systems                              | Lines and ambushes          |
| Weapons                                       | Shock and projectile        |
| Protection                                    | Present                     |
| Field Fortifications                          | Present                     |
| Cavalry                                       | Present                     |
| Fortified Villages                            | Present                     |
| Siege operations                              | Present                     |
| Causes of War                                 | Political control           |
| Additional variables (added by current study) |                             |
| Artillery                                     | Present                     |
| Fire weapons and/or gunpowder                 | Present                     |

**Table E7.2 Otterbein Index of Military Sophistication (adjusted)**

### Case 14 Calculation of Military Sophistication

The military sophistication index, for each society, codes each of the component factors (see Table E7.2) as having a sophisticated practice (score 1) or not (score 0). The sum of the codes is indexed to a maximum of 120. As an example, the Blemmyes of 200 CE score 2 (index 18) by having cavalry and initiating war through a designated official, while the Timurids of 1356 CE score 15 (index 120) with all component factors having the sophisticated practice.

### E7.3 NUMERICAL ASSESSMENT OF TERRAIN AND LAND USE FOR GIPP DATABASE

It is generally recognised that defenders experience a military advantage, simply by being on the defensive.<sup>161</sup> This tends to become greater in enclosed or irregular terrain.<sup>162</sup> Estimates of the values of this terrain enhancement are offered in the work of Dupuy, based on estimated terrain and on the associated military advantages.<sup>163</sup> This terrain enhancement is used by the present researcher, based on an estimate of the proportions of various land types in each region, weighted by an estimate of the advantage given to the defender by that land type.

Land use is based on 2000 CE national data recorded by the Food and Agriculture Organisation (FAO). Irrigated agricultural land (Paddy), other agricultural land (Cultivated), meadow and forest

<sup>161</sup> Even if they do not fortify the key positions of the battlefield, the defenders are usually able to prepare themselves by deploying in the most advantageous places, thus forcing the attackers to come to them. The Saxons at Hastings (1066) and the Byzantines at Dyrrachium (1081) illustrate the point. The defender's advantage does not guarantee success, as the examples also illustrate.

<sup>162</sup> The interaction of effects is complex. In tactical combat, movement becomes more difficult in heavily vegetated or broken terrain, with mobility reduced by a third to two thirds, but the possibility of surprise is enhanced by as much as fivefold. The effectiveness of missile weapons is reduced by as much as 40%. See Rowland, D. (2019) *The Stress of Battle: Quantifying Human Performance for Historical Analysis and Wargaming*. Ed. Curry, J. Milton Keynes: The Wargames Project, p.106. Also see Curry, J. and Perla, P. (2020) *Tacspiel: The American Army's Wargaming Rules for the Vietnam War [1966]*. Great Britain: The History of Wargaming Project, p.20.

<sup>163</sup> Dupuy, T. (1979) *Numbers, Prediction and War: Using history to evaluate combat factors and predict the outcome of battles 1979*. Indianapolis: Bobbs-Merill.

are recorded as such. The type of other land in the region can be assessed as swamp, desert or mountain on the basis of the aridity, the proportion of inland water (provided in the FAO data) and altitude in the region.

Weights are computed as an index, based on the operational/tactical impact of the terrain type on mobility and combat effectiveness of cavalry and infantry (see Table E7.3).<sup>164</sup>

| Terrain           | Terrain Effect on |         |          |         | Index |
|-------------------|-------------------|---------|----------|---------|-------|
|                   | Mobility          | Defence | Infantry | Cavalry |       |
| Rugged Heavy Wood | 0.40              | 1.50    | 0.60     | 0.20    | 96    |
| Rugged Mixed      | 0.50              | 1.55    | 0.70     | 0.40    | 65    |
| Rugged Bare       | 0.60              | 1.45    | 0.80     | 0.50    | 44    |

**Table E7.3 Specimen terrain effects**

Derived from Dupuy, (1979), Appendix A, Table 1, p28

Full results are given in Table E7.4.

The weights used are: Desert – 120, Mountain – 90, Swamp – 120, Forest – 70, Paddy – 80, Cultivated – 30, Meadow – 20. Desert has been updated by the present researcher to 120 to take account of the absence of water, which imposes a great additional strategic disadvantage on most armies. An alternative set of weights are: Desert – 55, Mountain – 90, Swamp – 120, Forest – 70, Paddy – 80, Cultivated – 30, Meadow – 20. This alternative assessment of terrain uses the tactical/operational assessment of desert, in line with other terrain types without the modification for the strategic problems of water shortage. It is more appropriate for Bedouin attackers who are well adapted to coping with water shortage.

As with population, adjustment is required to secure alignment of national data with the regions under consideration (see Excursus E1). It is recognised that human development of the earth will have changed the rating of regional terrain, although not necessarily in any consistent way. Draining a swamp for rice cultivation will reduce the impassibility of the land, whereas replacing a forest with a paddy field may well increase impassibility. The information to develop a time series at regional level is absent. National data on ruggedness and altitude was converted into regional estimates, averaging component national data, or appropriate sub-national data, weighted by area.<sup>165</sup>

<sup>164</sup> Sun-tzu draws attention to ravines, swamp, marshland, mountain, forest and thick undergrowth as particularly dangerous. Sun-tzu (2003) *The Art of War*. Translated by: Miniford, J. London: Penguin Press, p.54.

<sup>165</sup> Nunn, N. and Puga, D. (2012) 'Ruggedness: the blessing of bad geography in Africa', *The Review of Economics and Statistics*, 94(1), pp. 20-36.

| Terrain                | Terrain Effect on |                 |                      |         | Index |
|------------------------|-------------------|-----------------|----------------------|---------|-------|
|                        | Mobility          | Defence         | Infantry             | Cavalry |       |
| Rugged Heavy Wood      | 0.40              | 1.50            | 0.60                 | 0.20    | 96    |
| Rugged Mixed           | 0.50              | 1.55            | 0.70                 | 0.40    | 65    |
| Rugged Bare            | 0.60              | 1.45            | 0.80                 | 0.50    | 44    |
| Rolling Heavy Wood     | 0.60              | 1.35            | 0.80                 | 0.60    | 40    |
| Rolling Mixed          | 0.80              | 1.30            | 0.90                 | 0.80    | 25    |
| Rolling Bare           | 1.00              | 1.20            | 1.00                 | 1.00    | 16    |
| Flat Heavily Wooded    | 0.70              | 1.10            | 0.80                 | 0.70    | 27    |
| Flat Mixed             | 0.90              | 1.20            | 0.90                 | 0.90    | 20    |
| Flat Bare              | 1.05              | 1.05            | 1.00                 | 1.00    | 13    |
| Desert Flat            | 0.95              | 1.18            | 1.00                 | 1.00    | 17    |
| Desert Dunes           | 0.30              | 1.40            | 1.00                 | 0.60    | 68    |
| Swamp Jungle           | 0.30              | 1.40            | 0.60                 | 0.20    | 120   |
| Swamp Mixed/Open       | 0.40              | 1.30            | 0.80                 | 0.30    | 62    |
| General Terrain        | Average           | Index (rounded) | Group                |         |       |
| Mountain               | 68                | 90              | All Rugged           |         |       |
| Wood                   | 54                | 70              | All Heavily Wooded   |         |       |
| Desert                 | 42                | 55              | All Desert           |         |       |
| Swamp                  | 91                | 120             | All Swamp            |         |       |
| Agricultural           | 22                | 30              | Rolling & Flat Mixed |         |       |
| Agricultural Irrigated | 62                | 80              | Swamp Mixed          |         |       |
| Bare                   | 15                | 20              | Flat + Rolling       |         |       |

**Table E7.4 Terrain Effects**

Derived from Dupuy, (1979), Appendix A, Table 1, p.28

### Case 15 Calculation of Terrain Index

For each specific terrain type, an impact score is calculated as Defence / Mobility / Impact using values from Table 7.4. On the assumption of a typical army of 80% Infantry and 20% Cavalry, the Impact [of Terrain] is calculated as the weighted average of Cavalry Impact and Infantry Impact on Infantry and on Cavalry (Infantry x 0.80 + Cavalry x 0.20)

**Example 1:** Flat Bare (see Table E7.4) has Defence 1.05, Mobility 1.05, Infantry Impact: 1.00, Cavalry Impact: 1.00. The weighted Impact is  $1.0 \times 0.8 + 1.0 \times .2 = 1.0$   
Impact Score is  $1.05 / 1.05 / 1.00 = 1.00$

**Example 2:** Swamp Jungle has Defence 1.40, Mobility 0.30, Infantry Impact: 0.60, Cavalry Impact: 0.20. The weighted Impact is  $0.6 \times 0.8 + 0.2 \times .2 = 0.52$   
Impact Score is  $1.40 / 0.30 / 0.52 = 8.97$

An index score is calculated using Swamp Jungle (the terrain having most impact on troops) as the base value of 120. Thus, Flat Bare terrain has an index of  $1.00 / 8.97 \times 120 = 13.37$

For the more generalised terrain types, the specific terrain types are grouped (some being included in more than one group) and the group average calculated. The group averages are then re-indexed using Swamp (the generalised terrain with most effect on troops) as the base value of 120.

## CHAPTER 8. LEADERSHIP

### 8.1 BACKGROUND

The selection and implementation of policies depends, to some degree, on the decisions of individuals in positions of leadership. The competence, gender and frequency of change among such leaders can influence these policies and their outcome and so this chapter includes a review of relevant literature on such matters, and that has informed the inclusion of such variables in the later analysis. The chapter will also consider issues of data management, where they arise. The rest of the chapter deals with:

|               |   |
|---------------|---|
| Competence:   | The competence of a group's leaders is important, but hard to assess independently of the outcome of their actions.                       |
| Reign change: | Frequency of changes in rulers varies from society to society, but can cause social stresses that impact on the effectiveness of a ruler. |
| Gender:       | The ability of a ruler to attain and exercise power may be affected by attitudes to their gender, both within their group and outside it. |
| Conclusions:  | This draws together the leadership implications.  |
| Excursus:     | This examines in more depth the relationship of religion and ethnicity to reign change and gender.  |

### 8.2 COMPETENCE

The competence of the leadership of a group has an impact on the origin, course and likely outcome of any conflict in which the group becomes involved,<sup>1</sup> but it is not easy to identify and quantify cases where this effect is substantial. Some societies, such as the Mongols, provided opportunities to enhance leadership skills through service in an elite unit or through a form of apprenticeship with a veteran leader,<sup>2</sup> but this was not the general practice with acquiring experience of military command less valued in some places and periods.<sup>3</sup> Barker presents lists for

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<sup>1</sup> Thucydides suggests that although the numbers of Skythians, if united, meant that none could stand against them, they did not govern themselves wisely or make intelligent use of their resources. Thucydides (1968) *The Peloponnesian War* trans. Warner, R., Harmondsworth: Penguin p.158.

<sup>2</sup> May, T. (2016b) *The Mongol Art of War*. Barnsley: Pen and Sword Military, p.86.

<sup>3</sup> Prestwich, M. (1996) *Armies and Warfare in the Middle Ages: The English Experience*. New Haven: Yale University Press, p.159

313 armies and from these identifies 140 generals that he regards as exhibiting a noteworthy difference from average levels of competence.<sup>4</sup>

Comparison with the data of Sabin on the quality and nature of command in thirty-five major battles<sup>5</sup> suggests that Barker is broadly consistent as regards the identity and proportion of such noteworthy generals (about one sixth, more likely to be above competent than below competent).<sup>6</sup> The style of successful leadership varied, with some leading from the front, displaying charismatic qualities, and others directing from the rear with organisational skill.<sup>7</sup> Fuller suggests that courage, creative intelligence and physical fitness are major components of successful generalship, and links these abilities to comparative youthfulness.<sup>8</sup>

The difficulty of using leadership competence for analytical purposes is that, in the absence of any objective and validated method for *a priori* assessment of competence among the rulers and generals of antiquity, the only firm basis for assigning a competence rating is their level of success (“*The test of merit in my profession is success. It is a hard rule, but I think it right.*”<sup>9</sup>) i.e., the very dependent variable that is to be explained by their competence, but a variable which may also be due to a whole range of other causes including “pure blind luck”. Subject to this caveat, Table 8.1 shows the instances where a general identified by Barker can be assigned to a conflict held on the study database. Some 17 of these 120 conflicts have at least one noteworthy general, and there are 15 different such generals, with some figuring in more than one conflict. Only about a quarter

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<sup>4</sup> Barker, P. (2008a) *DBMM Army Lists for use with the De Bellis Magistorum Militum Wargames Rules Book 2: 500 BC-476 AD*. Nottingham: Partizan Press; Barker, P. (2008b) *DBMM Army Lists for use with the De Bellis Magistorum Militum Wargames Rules Book 3: 476 AD - 1071 AD*. Nottingham: Partizan Press; Barker, P. (2009) *DBMM Army Lists for use with the De Bellis Magistorum Militum Wargames Rules Book 1: 3000 BC - 500 BC*. Nottingham: Partizan Press; Barker, P. (2010) *DBMM Army Lists for use with the De Bellis Magistorum Militum Wargames Rules Book 4 1071AD – 1515 AD The High Medieval Period*. Cambridge: Wargames Research Group.

<sup>5</sup> Sabin, P. (2007) *Lost Battles: Reconstructing the Great Clashes of the Ancient World*. London: Continuum.

<sup>6</sup> Those who obtain rule or command are often subject to a fierce process of natural selection, and whilst naturally incompetent generals and leaders are probably initially quite as numerous in the population as the naturally highly competent, this is unlikely to continue after battle. There are no second prizes in battle, and victors tend to live longer than losers. In aggregate, 5% of European monarchs 600-1800 CE, including those who did not engage in battle at all, died in battle (Eisner, M. (2011) 'Killing Kings: Patterns of regicide in Europe 600-1800', *British Journal of Criminology*, 51, pp. 556-577). Comments concerning the surprisingly large number of less than competent generals, even after training, refer perhaps to those who appear in positions of power rather than those who remain in them (Lawrence, C. A. (2017) *War by Numbers: Understanding Conventional Combat*. Lincoln Nebraska: Potomac Press University of Nebraska Press, p.348.).

<sup>7</sup> Prestwich, M. (1996) *Armies and Warfare in the Middle Ages: The English Experience*. New Haven: Yale University Press, p.181. Sabin also identifies this dichotomy among generals.

<sup>8</sup> Of course, not all successful and competent generals are youthful, e.g. in Fuller's (non-random) sample of 100 pre-1866 generals, he includes Chingis Khan, aged 53 at the Crossing of the Great Wall of China in 1213 and Timur, aged 62 in his Indus campaign of 1378. See Fuller, J.F.C. (1933) *Generalship: Its Diseases and Their Cure; A Study of The Personal Factor in Command*. London: Faber and Faber Limited, p.20, Appendix.

<sup>9</sup> General A.S. Johnston to President J. Davis, March 1862. See Foote, S. (1958) *The Civil War: a Narrative. Fort Sumter to Perryville*. New York: Random House, p.234.

of the noteworthy generals are allocated to the GIPP in the respondent role i.e. the GIPP which is likely to have less choice in participating in the interaction, and one of these noteworthy generals is a less than competent commander.

| Conflict Number | Date  | Leader                | Role       | Competence level |          |
|-----------------|-------|-----------------------|------------|------------------|----------|
|                 |       |                       |            | Positive         | Negative |
| 60              | -1200 | Joshua                | Initiator  | x                |          |
| 35              | 440   | Attila                | Initiator  | x                |          |
| 7               | 546   | Li Shimin             | Respondent | x                |          |
| 30              | 632   | Khalid ibn al Walid   | Initiator  | x                |          |
| 95              | 900   | Mahmud of Ghazi       | Initiator  | x                |          |
| 56              | 1086  | El Cid                | Respondent | x                |          |
| 61              | 1095  | Bohemond              | Initiator  | x                |          |
| 61              | 1095  | Kerbogha              | Respondent |                  | x        |
| 14              | 1120  | Wan-yen Akuta         | Initiator  | x                |          |
| 63              | 1189  | Richard Coeur de Lion | Initiator  | x                |          |
| 15              | 1211  | Genghis Khan          | Initiator  | x                |          |
| 46              | 1218  | Genghis Khan          | Initiator  | x                |          |
| 49              | 1237  | Subotei               | Initiator  | x                |          |
| 38              | 1241  | Subotei               | Initiator  | x                |          |
| 31              | 1260  | Baibars               | Respondent | x                |          |
| 17              | 1270  | Bayan                 | Initiator  | x                |          |
| 48              | 1370  | Timur-i- lenk         | Initiator  | x                |          |
| 47              | 1399  | Timur-i- lenk         | Initiator  | x                |          |

**Table 8.1 Leaders with competence level showing noteworthy difference from average**

Source: Barker (2007, 2008, 2009, 2010)

### 8.3 REIGN LENGTH AND STABILITY

As Ibn Khaldun expresses it, *“Furthermore, every Bedouin is eager to be the leader. There is scarcely one among them who would cede his power to another.”*<sup>10</sup> Regardless of the competence of those in leadership roles, another aspect of the impact of leadership concerns its variable stability, and this needs to be measured, if possible. Constant change of leadership gives less opportunity for leadership skill to be developed or deployed in support of a group. Change of ruler, even when this occurs according to accepted procedures at an anticipated time, imposes potential instabilities on a polity, as policies and practices are adjusted or implemented with differing efficacy. Where the change is mediated by conquest, civil war, coup, assassination and intrigue, the instability is likely worse and is even more so when the change occurs frequently. The level of

<sup>10</sup> Ibn Khaldun (1958) *The Muqaddimah: Volume I*. New York: Bollingen Foundation, p.119.



the impact of a change in ruler may be judged by the way that in calculating his instability index,<sup>11</sup> Monson rates a ruler change on a par with minor revolt/rioting, a war with a weaker foe or a continuing war in terms of the effect on state stability.

As background to this thesis, a sample of 4,491 reigns, mostly drawn from throughout the area and period of the study,<sup>12</sup> was found to have a mean reign duration of 13.27 years, which may be placed in the context of an average lifespan lying in the range of 45-55 years.<sup>13</sup> Longer reigns tended to be associated with accession at an early age, though there was always hope for prolonged life.<sup>14</sup> To place this sort of reign length, and the associated reign changes, in the context of the impact on polity instability, the average reign duration would add a mean score of 0.75 per decade to Monson's Instability Index (i.e. 6 percent of the theoretical maximum annual score).<sup>15</sup> In general, therefore, one would expect reign changes to be a real but perhaps only a fairly minor component of instability. In particular cases, the impact of reign change may be more or less.. Of course, some reign changes may even enhance stability.<sup>16</sup>

From the mean reign duration, a Reign Change Index (see Excursus E8) is calculated, with mean value of 9.6. As Chapter 9 will show, the polities of China have figured as a major sedentary interactor with nomads. Table 8.2 shows that through time, Chinese dynasties have scored variably, with some high average scores of the Reign Change Index (Later Han: 30.2 from two rulers) and some low average scores (Wu 2.8 from 4 rulers), for an overall average Reign Change Index of 9.2 for China. This contrasts (Table 8.3) with nomad dynasties, where scores have also varied considerably from an average of 22.4 (1<sup>st</sup> Turkish khanate with 11 rulers) to an average of 1.3 (Astrakhan khanate with 3 rulers), but overall, the average score is detectably higher at 11.2.<sup>17</sup>

Thus, It may be hypothesised that the nomad political environment was subject to more reign change than the Chinese environment, and so tended to afford most of their leaders shorter time

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<sup>11</sup> Monson, A. (2015) 'Hellenistic Empires', in Monson, A. & Scheidel, W. (eds.) *Fiscal regimes and the political economy of pre-modern states*. Cambridge: Cambridge University Press, pp. 169-207, Table 1.

<sup>12</sup> Morris, C. (2018) "May the King Live for Ever: A Statistical Analysis of Stress from Reign Change in Imperial and Non-Imperial Polities" *Ex Historia* 10, pp. 1-19.

<sup>13</sup> Heather, P. (2018) *Rome Resurgent: War and Empire in the Age of Justinian*. Oxford: Oxford University Press, pp. 33-34.

<sup>14</sup> As in 491, when the populace of Constantinople shouted "Holy Lord, give her long life! Lord have mercy! Many years for the Augusta!", as quoted in Heather, P. (2018), *Rome Resurgent* op. cit. p. 70.

<sup>15</sup> Monson, A. (2015) 'Hellenistic Empires' op. cit. pp. 169-207.

<sup>16</sup> For instance, the assassination of the Roman emperor Caligula and his replacement by the less dramatic and possibly less able Claudius may well have enhanced the stability of the Roman empire. The continued reign of Nero, without the successful intervention of an assassin, ended with a multi-party civil war.

<sup>17</sup> With Chinese overall results based on 145 cases, and nomad overall results based on 611 cases, it is reasonable to hypothesise that nomad polities are more likely than Chinese polities to experience reign change stress.

spans (greater stress score from reign change) in which to exercise their skills (possibly against their peers rather than their foreign rivals). Periods of civil war offered opportunities for their enemies to apply the maxim of “*Divisa et impera*”.

Religion may also have had an important influence with, for example, Shia polities tending to have lower scores than Sunni polities (see Excursus E8). Furthermore, although some of the most militarily competent leaders, such as Chingis Khan and Tamerlane, were certainly able to gain power quickly and to retain it into old age, they were among the minority.

#### 8.4 GENDER OF RULER

There is some evidence that states ruled by women are more likely to become involved in war. In a study on European polities in the 15<sup>th</sup> to 20<sup>th</sup> centuries, this is attributed by Dube and Harish in some cases to a perception by others that such states were weaker,<sup>18</sup> and in other cases, to a greater willingness by the ruler to seek alliances and to delegate responsibilities to be fulfilled by her spouse. It is also possible that some foreign rulers shared the view of some of the ruler’s subjects that she lacked legitimacy, or else were, at any rate, willing to exploit the resultant weakness. Many nomad cultures had scope for women to take an active role,<sup>19</sup> including female rulers or at least highly influential members of the royal dynasty (e.g., the Queen of Sheba, Queen Zabibē of Qedar, Sâmsi queen of the Arabs,<sup>20</sup> Boarex of the Sabirs,<sup>21</sup> Queen ‘Alam in Yemen,<sup>22</sup> Ying-t’ien of the Liao, Kan-t’ien of the Qarakhitai, Terken Khatūn of the Khwarazmshah empire,<sup>23</sup> Orghina Khatūn, regent of the Chaghataid khanate<sup>24</sup>). Although female rulers were possibly less common in the GIPPs that are included in this study, they were not unknown (e.g., the Berber leader Kahina, and Tomyris, the queen of the Massagetae<sup>25</sup>) and the gender of the ruler may have

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<sup>18</sup> Dube, O. and Harish, S. (2017) 'Queens', *SSRN*, Available: Elsevier: <https://ssrn.com/abstract=2947181>

<sup>19</sup> Anonymous (1974) *Book of Dede Korkut*. Translated by: Lewis, G. Harmondsworth: Penguin, p.11.

<sup>20</sup> Breton, J.-F. (2009) *Arabia Felix from the time of the Queen of Sheba: Eighth Century B.C. to First Century A.D.*. Notre Dame: University of Notre Dame Press, p.42.

<sup>21</sup> Her personal name was ‘Boa’ and she bore the title ‘rex’. Theophanes the Confessor (1997) *Byzantine and Near Eastern History AD 284-813*. Translated by: Mango, C., Scott, R. and Greatrex, G., Oxford: Clarendon Press, pp.266-267.

<sup>22</sup> Smith, G. R. (1978) *The Ayyūbids and Early Rasūlids in the Yemen (567-694/1173-1295) Volume 2: A study of Ibn Hātim’s Kitāb al-Simṭ including Glossary, Geographical and Tribal indices and Maps*. (2 vols). London: Trustees of the “E.J.W. Gibb Memorial”, p.57.

<sup>23</sup> De Nichola, B. (2018) *Women in Mongol Iran: the khatuns, 1206-1335*. Edinburgh: Edinburgh University Press, pp.53-55.

<sup>24</sup> De Nichola, B. (2018) *Women in Mongol Iran* op. cit. pp.76-79.

<sup>25</sup> Also, Sparethra of the Massagetes, cited in addition to Tomyris by Comnena, A. (1969) *Alexiad of Anna Comnena*. Translated by: Sewter, R. Harmondsworth: Penguin; Comnena, A. (1969) *Alexiad of Anna Comnena*. Translated by: Sewter, R. Harmondsworth: Penguin, p.377

had an impact on policies. Accordingly, it is recorded for analysis with an appropriate metric (see Excursus E8).

## **8.5 CONCLUSIONS**

The leadership of a community has an effect on its policies and their outcomes. The competence of leaders has been quantified on the basis of their success, but the difficulty with this approach lies in determining the direction of causality. Is a leader deemed to be competent because he happens to have been successful, or is he successful because he is competent? An alternate approach can be based on frequency of reign change, since frequent change can stress a society and limit the time spans available to leaders in which to develop and exercise their skills. An analysis suggests that nomad societies were subject to more frequent reign change than Chinese dynasties, and that some religions were associated with less change than others (e.g., Shia compared with Sunni). The gender of the leaders may also be a relevant variable for analysis.

| Dynasty     | Mean Reign Change Index | N   |
|-------------|-------------------------|-----|
| Later Han   | 31.0                    | 2   |
| Liang       | 29.3                    | 5   |
| Qi          | 19.5                    | 5   |
| Lio Song    | 13.7                    | 7   |
| Later Zhou  | 13.6                    | 3   |
| East Jin    | 13.3                    | 11  |
| Later Tang  | 13.1                    | 4   |
| Later Liang | 11.5                    | 3   |
| Early Tang  | 11.1                    | 13  |
| Chen        | 10.1                    | 5   |
| Sui         | 9.9                     | 3   |
| East Han    | 9.8                     | 12  |
| South Sung  | 7.1                     | 9   |
| Shu Han     | 7.0                     | 2   |
| Qin         | 5.6                     | 2   |
| Later Jin   | 4.9                     | 2   |
| North Sung  | 4.7                     | 9   |
| Ming        | 4.7                     | 11  |
| West Jin    | 4.2                     | 4   |
| Late Tang   | 4.0                     | 10  |
| Wei         | 3.9                     | 5   |
| West Han    | 3.0                     | 14  |
| Wu          | 2.8                     | 4   |
| Total       | 9.2                     | 145 |

**Table 8.2 Reign Change Index by Chinese dynasty**

Sources for Table 8.2: Based on database (Morris, 2018) drawn from Baumer (2014<sup>26</sup>, 2016a<sup>27</sup>, 2016b<sup>28</sup>), Bosworth (1980<sup>29</sup>, 1996<sup>30</sup>), Brook (2010),<sup>31</sup> Dignas and Winter(2007),<sup>32</sup> Kuhn (2009)<sup>33</sup>, Paludan (1998),<sup>34</sup> Rowe (2009),<sup>35</sup> Sturlason (1930),<sup>36</sup> Tapsell (1983),<sup>37</sup> Venning (2013)<sup>38</sup>

Seven cases were constrained to the maximum value of 120

<sup>26</sup> Baumer, C. (2014) *The History of Central Asia: The Age of the Silk Road*. (3 vols). London: IB Tauris & Co Ltd.

<sup>27</sup> Baumer, C. (2016a) *The History of Central Asia: The Age of Islam and the Mongols*. (3 vols). London: IB Tauris & Co Ltd.

<sup>28</sup> Baumer, C. (2016b) *The History of Central Asia: The Age of the Steppe Warriors*. (3 vols). London: IB Tauris & Co Ltd.

<sup>29</sup> Bosworth, C. (1980) *The Islamic Dynasties: a Chronological and Genealogical handbook*. Edinburgh: Edinburgh University Press.

<sup>30</sup> Bosworth, C. (1996) *The New Islamic Dynasties: A Chronological and Genealogical Manual. The New Edinburgh Islamic Surveys* Edinburgh: Edinburgh University Press.

<sup>31</sup> Brook, T. (2010) *The Troubled Empire: China in the Yuan and Ming dynasties. History of Imperial China* Cambridge Massachussets: Belknap Press of Harvard University Press.

<sup>32</sup> Dignas, B. and Winter, E. (2007) *Rome and Persia in Late Antiquity: Neighbours and Rivals*. Cambridge: Cambridge University Press.

<sup>33</sup> Kuhn, D. (2009) *The Age of Confucian Rule: the Song transformation of China. History of Imperial China* Cambridge Massachussets: Belknap Press of Harvard University Press.

<sup>34</sup> Paludan, A. (1998) *Chronicle of the Chinese Emperors: The reign by reign record of the rulers of Imperial China*. London: Thames & Hudson.

<sup>35</sup> Rowe, W. (2009) *China's Last Empire: the Great Qing. History of Imperial China* Cambridge Massachussets: Belknap Press of Harvard University Press.

<sup>36</sup> Sturlason, S. (1930) *Heimskringla: The Olaf Sagas*. Translated by: Laing, J. London: JM Dent & Sons.

<sup>37</sup> Tapsell, R. (1983) *Monarchs, Rulers, Dynasties and Kingdoms of the World*. New York: Facts on File Publications.

<sup>38</sup> Venning, T. (2013) *The Kings & Queens of Anglo-Saxon England*. Stroud: Amberley Publishing

| <b>Dynasty</b>     | <b>Mean Reign Change Index</b> | <b>N</b> |
|--------------------|--------------------------------|----------|
| 2nd Turkic Khanate | 22.4                           | 11       |
| Seljuk (Kirman)    | 22.0                           | 18       |
| Timurids           | 21.2                           | 19       |
| Yuan               | 20.1                           | 11       |
| 1st Turkic Khanate | 19.3                           | 9        |
| Golden Horde       | 18.7                           | 55       |
| Crimea Khanate     | 18.2                           | 10       |
| Jalayirids         | 15.3                           | 10       |
| Rouran             | 14.7                           | 16       |
| Chagatai           | 14.6                           | 25       |
| East Turk Khanate  | 12.8                           | 8        |
| Parthian           | 12.0                           | 38       |
| Gt Seljuk (Iran)   | 11.5                           | 9        |
| Karakhanid         | 11.4                           | 49       |
| Seljuks of Rum     | 11.1                           | 27       |
| Uighur             | 11.0                           | 15       |
| Chorasmia          | 10.1                           | 17       |
| Ilkhanate          | 9.9                            | 9        |
| Danishmend         | 9.2                            | 13       |
| Gt Seljuk          | 9.1                            | 10       |
| White Horde        | 9.1                            | 12       |
| Kazan Khanate      | 8.5                            | 12       |
| Qara Qoyunlu       | 7.7                            | 12       |
| Qara Khitai        | 7.6                            | 15       |
| Seljuk (Syria)     | 6.4                            | 6        |
| Hsiung Nu          | 6.4                            | 47       |
| Danube Bulgar      | 6.2                            | 17       |
| Ulus Ogodei        | 6.2                            | 3        |
| Hungary            | 5.1                            | 40       |
| Genghis Khan       | 5.1                            | 13       |
| Tangut             | 4.4                            | 12       |
| Qasimov            | 3.9                            | 8        |
| Idiqut Kocho       | 3.2                            | 7        |
| Zangids            | 2.9                            | 1        |
| Less Kushan        | 1.9                            | 4        |
| Kushan             | 1.9                            | 10       |
| Kushan Sassanid    | 1.9                            | 7        |
| Shibanids          | 1.5                            | 3        |
| Astrakhan khanate  | 1.3                            | 3        |
| Total              | 11.2                           | 611      |

**Table 8.3 Reign Change Index by nomadic dynasty**

Sources: Based on database (Morris, 2018) drawn from Baumer (2014, 2016a, 2016b), Brook (2010), Dignas & Winter(2007),Kuhn (2009), Paludan (1998), Rowe (2009), Sturlason (1930), Tapsell, (1983) Venning (2013)  
Seven cases were constrained to the maximum value of 120

## EXCURSUS E8. REIGN CHANGE AND GENDER

High frequency of reign changes, whether planned or unintended, peaceful or violent, can cause stress, tensions and problems for any polity. An index of this has been compiled for inclusion in later analysis,<sup>39</sup> on the basis of: Average reign length / Individual reign length to maximum of 120 (truncated if in excess of 120: this was a minor adjustment, occurring in just 7 cases of 4,991).

This is re-based in the database as (120 - score), a re-basing not used in the analysis reported here, so that high values represent the more benign situation in the database.

Table E8.1 shows that the three regions with the highest reign change Index values were Egypt (17.0, driven by the instability of the many brief Mamluk dynasties who ruled Egypt in the late Medieval period, rated at a mean of over 26), Russia (15.3, where Rurikid princes moved frequently from one state to another as part of the cultural structure) and Europe (12.4, where the Roman Empire and Papacy experienced frequent change of ruler,<sup>40</sup> and the mean score for other European states, excluding emperors and popes, was 5.7).

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<sup>39</sup> Morris, C. (2018) "May the King Live for Ever: A statistical Analysis of Stress from Reign Change in Imperial and Non-Imperial Polities" *Ex Historia* 10, pp. 1-19.

<sup>40</sup> Most popes were old men, when elected. The Roman empire was prone to succession by civil war.

| Region               | Mean | N    | Std. Deviation |
|----------------------|------|------|----------------|
| Egypt                | 17.0 | 138  | 21.9           |
| Russia               | 15.3 | 113  | 16.2           |
| Europe               | 12.4 | 498  | 19.9           |
| Pontic               | 12.2 | 185  | 14.1           |
| Mongolia             | 11.4 | 142  | 15.3           |
| Turkestan            | 11.0 | 164  | 17.1           |
| India                | 10.5 | 166  | 16.9           |
| North Africa         | 10.3 | 202  | 15.9           |
| Syria                | 9.8  | 216  | 18.9           |
| Iran                 | 8.8  | 701  | 14.9           |
| <i>British Isles</i> | 8.7  | 664  | 16.1           |
| Balkans              | 8.5  | 225  | 13.7           |
| Sudan                | 8.5  | 373  | 15.1           |
| China                | 8.3  | 173  | 12.8           |
| Iberia               | 7.9  | 360  | 12.5           |
| Mesopotamia          | 7.3  | 317  | 11.5           |
| Anatolia             | 7.3  | 221  | 11.9           |
| Arabia               | 5.7  | 115  | 9.1            |
| Baltic               | 4.1  | 18   | 6.2            |
| Total                | 9.6  | 4991 | 15.7           |

**Table E8.1 Reign Change Index by Region**

Sources: Based on database (Morris, 2018) drawn from Baumer (2014, 2016a, 2016b), Brook (2010), Dignas and Winter (2007), Kuhn (2009), Paludan (1998), Rowe (2009), Sturlason (1930), Tapsell (1983), and Venning (2013)

Seven cases were constrained to the maximum value of 120

British Isles are included in the database, but are not a region included in the thesis

Table E8.2 suggests a possible connection between religion and reign change. Some of this may be plausibly associated with the social structure in which the religion operated (e.g., the rulers characterised as ‘pagan Roman’ and ‘Christian’<sup>41</sup> were Roman emperors reigning in a less stable polity, and so many of them had short reigns for reasons little associated with religion), but other differences may reflect the religion itself. The level of change associated with Shia reigns (5.30) is less than that of Sunni polities (8.7), for example. This may be associated with the greater emphasis on the hereditary principle in Shia theological thinking, where the succession of Ali as caliph after his uncle’s death is a key issue. Shia thinking emphasises the descent of religious and political authority by inheritance from the nephew of the Prophet Muhammed to imams, which sets the context for the view of an Ismaili (Shia) credal statement from the Yemen commentator in 1209-1215 CE that *“This means that any action intended to oppose the Imam to prevent him*

<sup>41</sup> The term ‘Christian’ is applied in the period prior to the final division of the Roman empire on the death of Theodosius the Great, when the distinction of ‘Catholic’ and ‘Orthodox’ was of little relevance.

*from occupying his office etc is to be considered a great sin*".<sup>42</sup> As the eleventh century CE Persian writer Shahrstrani expressed it,

"The Shi'ites are those who follow 'Ali only. They hold that his caliphate and imamate were based on designation and appointment, either open or hidden. They maintain also that the imamate must remain in 'Ali's family; if it were ever to go outside of it, this would be either because of a wrong on the part of another, or because of dissimulation of the rightful imam. According to them, the imamate is not a civil matter, validly settled by the will of the people appointing an imam of their own choosing: it is a fundamental matter and a basic element of religion. Messengers of God may not ignore and disregard it, nor leave it to the choice of the common people."<sup>43</sup>

Table E8.3 presents the variation of Reign Change Index by Ethnicity. Many of the Mamluk sultans of Egypt, a group experiencing frequent reign change,<sup>44</sup> were Circassians, thus explaining the high rating for this ethnic group (26.4). The Romans also experienced considerable reign change (21.8), as did Mongols and Turks with frequent change (13.3 and 11.3), well above the overall mean.

Table E8.4 shows that the Reign Change Index was notably higher for male rulers (9.6) than for female rulers (6.7). Given this evidence of the association of the gender of a ruler with reign change, gender is recorded as a variable in the GIPP database where it is known that there is a female ruler in the period. The code was 1 for both Initiator (1 case) and Respondent (11 cases), as appropriate. Other cases were coded 0.

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<sup>42</sup> Quoted by Williams, J. (1971) *Themes of Islamic Civilisation*. Berkley: University of California Press, p.40.

<sup>43</sup> Shahrastani, M. i. A. a. K. (1984) *Kitab al-Mital wa 'l nihal*. Translated by: Kazi, A. & Flynn, J. London: Kegan Paul International, p.125.

<sup>44</sup> In Mamluk Egypt, it was common for a usurper to seize power quickly from the short reigning heir of a previous usurper, who might himself have enjoyed a fairly long reign.



| <b>Religion</b> | <b>Mean<br/>Reign Change Index</b> | <b>N</b> | <b>Std. Deviation</b> |
|-----------------|------------------------------------|----------|-----------------------|
| Pagan Roman     | 24.7                               | 70       | 33.1                  |
| Judaism         | 16.8                               | 38       | 34.9                  |
| Christian       | 14.1                               | 27       | 16.8                  |
| Zoroastrian     | 10.8                               | 69       | 17.1                  |
| Orthodox        | 10.8                               | 380      | 14.9                  |
| Sunni           | 10.7                               | 1856     | 16.2                  |
| Pagan Classical | 9.5                                | 28       | 14.5                  |
| Confucianism    | 9.2                                | 145      | 13.6                  |
| Pagan Animist   | 9.2                                | 254      | 13.4                  |
| Manicheism      | 9.0                                | 7        | 8.6                   |
| Sunni sect      | 8.7                                | 33       | 13.1                  |
| Catholic        | 8.5                                | 1289     | 15.1                  |
| Pagan           | 7.8                                | 457      | 12.9                  |
| Shia            | 5.3                                | 235      | 10.0                  |
| Hindu           | 4.4                                | 25       | 10.2                  |
| Pagan Egyptian  | 3.8                                | 44       | 4.8                   |
| Shia sect       | 3.1                                | 6        | 2.3                   |
| Pagan Celt      | 2.3                                | 18       | 1.1                   |
| Buddhist        | 2.2                                | 10       | 2.6                   |
| Total           | 9.6                                | 4991     | 15.7                  |

**Table E8.2 Reign Change Index by Religion**

Sources: Based on database (Morris, 2018) drawn from Baumer (2014, 2016a, 2016b), Brook (2010), Dignas and Winter (2007), Kuhn (2009), Paludan (1998), Rowe (2009), Sturlason (1930), Tapsell (1983) and Venning (2013)

Seven cases were constrained to the maximum value of 120

| <b>Ethnicity</b> | <b>Mean<br/>Reign Change<br/>Index</b> | <b>N</b> | <b>Ethnicity</b> | <b>Mean<br/>Reign Change<br/>Index</b> | <b>N</b>    |
|------------------|--|----------|------------------|--|-------------|
| Circassian       | 26.4                                   | 28       | Saxon            | 6.7                                    | 174         |
| Roman            | 21.8                                   | 97       | Hsiung Nu        | 6.4                                    | 47          |
| Funj             | 17.0                                   | 28       | Daylami          | 5.9                                    | 72          |
| Jew              | 16.8                                   | 38       | Tangut           | 5.7                                    | 23          |
| Russian          | 15.3                                   | 113      | Norse            | 5.6                                    | 32          |
| Papacy           | 14.7                                   | 199      | Manchu           | 5.5                                    | 42          |
| Vlach            | 14.5                                   | 60       | South Slav       | 5.4                                    | 72          |
| Mongol           | 13.3                                   | 196      | Hungarian        | 5.1                                    | 40          |
| Parthian         | 11.8                                   | 39       | Aramean          | 5.1                                    | 45          |
| Taifa            | 11.4                                   | 97       | Moor             | 4.9                                    | 11          |
| Turk             | 11.3                                   | 741      | Egyptian         | 4.8                                    | 18          |
| Afghan           | 10.9                                   | 19       | Armenian         | 13.7                                   | 58          |
| Berber           | 10.6                                   | 200      | Frank            | 4.8                                    | 39          |
| Babylonian       | 10.1                                   | 58       | Pathan           | 4.5                                    | 15          |
| Irish            | 10.0                                   | 438      | Norman           | 4.5                                    | 20          |
| Hausa            | 9.8                                    | 160      | Wadai            | 4.5                                    | 12          |
| Greek            | 9.7                                    | 114      | Indian           | 4.4                                    | 25          |
| Han<br>Chinese   | 9.2                                    | 145      | Baltic           | 4.1                                    | 18          |
| Arab             | 8.9                                    | 395      | French           | 4.1                                    | 26          |
| Bulgar           | 8.5                                    | 28       | Spanish          | 3.5                                    | 144         |
| Bedouin          | 8.4                                    | 46       | Bagirme          | 3.3                                    | 19          |
| Iranian          | 8.0                                    | 223      | Assyrian         | 3.2                                    | 41          |
| African          | 7.8                                    | 118      | Nubian           | 3.1                                    | 26          |
| Kassite          | 7.7                                    | 11       | Occitan          | 2.2                                    | 17          |
| West Slav        | 7.5                                    | 85       | Tibetan          | 2.2                                    | 10          |
| Persian          | 7.3                                    | 19       | Kushan           | 1.9                                    | 10          |
| Kurd             | 6.9                                    | 140      | Darfur           | 1.6                                    | 10          |
| German           | 6.8                                    | 90       | <b>Total</b>     | <b>9.6</b>                             | <b>4991</b> |

**Table E8.3 Reign Change Index by Ethnicity**

Sources: Based on database (Morris, 2018) drawn from Baumer (2014, 2016a, 2016b), Brook (2010), Dignas and Winter (2007), Kuhn (2009), Paludan (1998), Rowe (2009), Sturlason (1930), Tapsell (1983) and Venning (2013)

Seven cases were constrained to the maximum value of 120

| <b>Gender</b> | <b>Mean<br/>Reign Change<br/>Index</b> | <b>N</b> |
|---------------|--|----------|
| Male          | 9.6                                    | 4958     |
| Female        | 6.7                                    | 33       |

**Table E8.4 Reign Change Index by Gender**

Sources: Based on database (Morris, 2018) drawn from Baumer (2014, 2016a, 2016b), Brook (2010), Dignas and Winter (2007), Kuhn (2009), Paludan (1998), Rowe (2009), Sturlason (1930), Tapsell (1983) and Venning (2013)

Seven cases were constrained to the maximum value of 120

## CHAPTER 9. INTERACTIONS IN THEIR REGIONAL AND HISTORICAL CONTEXT

### 9.1 INTRODUCTION

Previous chapters have addressed specific types of factors considered likely to influence the actions of groups. This chapter attempts to convey a sense of the sorts of actions and behaviour that actually occurred among the groups falling inside the scope of the study. Thus, it addresses relevant literature pertaining to the general sweep of actual events linked to nomads and to holy war, placing them in their broad context of time and place so that the situations summarised in the database may be understood in relation to wider events. Although each interaction is unique, a broad repetitive pattern tends to emerge over the various regions. The chapter also seeks to provide an account and some analysis of interactions of individuals and peoples by region, taking account of geographical and other influences. It draws on broad brush sources such as atlases and outline histories,<sup>1</sup> but also looks at specialist sources. The understanding of events, as outlined here, informs the assessment of the strategic option choices and outcomes achieved which govern values assigned to the parties which are included in the GIPP database. The other interactions described in the chapter provide a basis for subsequent validation both of the values assigned to individual cases included in the basic database, and also of any conclusions reached, by testing them against a subsidiary database assembled from several sources (see Chapter 11.3). The record is also available for use in further research. There is, however, no attempt to provide a detailed and comprehensive historical account of all 120 GIPP and 20 GIPP2 nomad/holy war interactions, each of which could support an entire paper or chapter, or even a whole book of their own. The regions and excursus are:

- Mongolia and China
- Turkestan and Iran
- Central Asia and India
- Arabia and Near East
- North Africa and Iberia
- Sahara, Sahel and Sudan Belt
- Baltic and Other Crusades
- Western Steppes, Balkans, Russia and Rest of Europe
- Excursus on Strategic Options and Outcomes

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<sup>1</sup> Ashtor, E. (1976) *A Social and Economic History of the Near East in the Middle Ages*. London: Collins; Atlas (2010) *Central Asia Atlas of Natural Resources*. Electronic: Asian Development Bank; Barraclough, G. and Overy, R. (1999) *The Times History of the World*. London: Time Books; Grant, M. (1971) *Ancient History Atlas 1700 BC to AD 565* London: Weidenfeld & Nicholson; Anonymous (1932) *The Outline History of the World: a record of World Events from the Earliest Historical Times to the Present Day*. London: The Amalgamated Press Ltd.

A key part of the thesis is to assemble databases for analysis. The interactions selected as cases for these databases, using a sort of 'snowball' sampling technique, based on reading of the literature,<sup>2</sup> are indicated in relevant parts of this chapter through an italicised and emboldened note in square brackets that draws attention to the selection of a case, mentioning database and identity number(s) e.g. [*GIPP #1 selected*]. It should be noted that some ethnic groups, particularly those based in Central Asia, have had interactions with other groups in several parts of the world. Given the geographic basis of analysis used in the chapter, it does not provide an integrated history of any wide ranging group such as the Mongols, Kushans or Arabs, whose history will be divided between the areas where they were active in interaction with other groups.<sup>3</sup> Furthermore, certain events are quite difficult to assign to a single pair of regions.<sup>4</sup>

## 9.2 MONGOLIA AND CHINA

The Mongols and their nomad predecessors<sup>5</sup> lived in the steppes and arid lands to the north of the Yellow River valley, where increasing aridity precluded arable cultivation.<sup>6</sup> In the Chinese territories to the south, animal husbandry formed a minor part of agriculture. Wheat and millet were the staple crops in the Yellow River basin, which formed the core of China.<sup>7</sup> Over time, the centre of gravity for the Chinese population shifted southwards towards into swampy areas round the Yangzi river, where rice was the staple crop.<sup>8</sup> There were many droughts in the north<sup>9</sup>, whereas excess rain was the problem in the south.<sup>10</sup>

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<sup>2</sup> The preliminary work of Chris Morris offered 46 initial cases. Other cases became apparent as relevant literature (primary and secondary) was consulted to develop an understanding of the historical context.

<sup>3</sup> McGovern, W. M. (1939) *The Early Empires of Central Asia: a Study of the Scythians and the Huns and the Part They Played in World History* Chapel Hill, North Carolina: The University Press of North Carolina, p.7

<sup>4</sup> For instance, the war of the sedentary Byzantine and Persian empires in 603-630 embraced Avar-Byzantine opposition on the Danube and Persian-Turkish opposition on the Oxus (taking account of Turkish relations with Tang China and the Avars). Bedouin raids from Arabia and the rise of Islam are linked to the course of the war, as is the raising of Berber auxiliaries in North Africa by the Emperor Heraclius in support of his seizure of power from his predecessor Phocas. See Howard-Johnston, J. (2021) *The Last Great War of Antiquity*. Oxford, Oxford University Press p.9, p.41, p.91, p.117.

<sup>5</sup> Parker, E. (1969) *A thousand years of the Tartars*. London: Dawson.

<sup>6</sup> Needham, J. and Bray, F. (1984) *Science and Civilisation in China: Volume 6 Biology and Biological Technology: Part II Agriculture*. Cambridge: Cambridge University Press, p.6; Lattimore, O. (1962) *Studies in frontier history: collected papers, 1928-1958*. Oxford: Oxford University Press; Lattimore, O. (1963) 'The Geography of Chingis Khan', *Geographical Journal*, 129(1), p. 1; Hu, Z. and Zhang, D. (2003) 'Chapter V China's Pasture resources', in Suttie, J. & Reynolds, S. (eds.) *Transhumant Grazing Systems in Temperate Asia: Vol. 31 Plant Production and Protection Series*. Rome: FAO, p. 81-114.

<sup>7</sup> Lewis, M. (2007) *The Early Chinese Empires: Qin and Han. History of Imperial China* Cambridge, Massachusetts: Belknap Press of Harvard University Press, pp.7-9.

<sup>8</sup> The skills of the Chinese probably changed, as suggested by a comment attributed in a Ming novel to the third century ruler Xuande: "Southerners are sailors and northerners are horsemen". See Luo, G. (2018) *The Romance of the Three Kingdoms*. Translated by Palmer, M., He, Y., Ramsay, J. and Finlay, V. London: Penguin Classics, p.286.

<sup>9</sup> Lewis, M. (2009a) *China between Empires: the northern and southern dynasties. History of Imperial China* Cambridge Massachusetts: Belknap Press of Harvard University Press, p.11.

<sup>10</sup> Lewis, M. (2009a), *The Perilous Frontier* op.cit.. p.13.

China served as an adversary to various nomadic peoples (namely, the Hsiung-nu, the Turks and the Mongols from 200BCE to 1500CE). Although nomadic invasions of Chinese territories are often attributed to drought<sup>11</sup> (and still are<sup>12</sup>), there are other factors that explain the long and diverse history of such events. Nomads who remained nomads had less influence, and it was necessary to develop a “Shadow empire” in order to wield the power that was required to oppose the Chinese.<sup>13</sup>

In the 4<sup>th</sup> century BCE, nomads facing China mastered horse riding, and when the nomadic Hsiung-nu in modern Mongolia in 200 BCE developed a way to transfer rule without civil war, the development of a lucrative extortion relationship with China became possible.<sup>14</sup> **[GIPP #10 selected]** The Chinese drew the distinction between barbarian cultures as ‘cooked’ (closer to the Chinese and so more influenced by them) and ‘uncooked’ barbarians.<sup>15</sup> From 200BCE to 300CE there was a struggle between the Hsiung-nu and China under the Han dynasty,<sup>16</sup> slowly tending to the advantage of China and finally resulting in the defeat of the Hsiung-nu. In the course of the struggle, however, the Hsiung-nu obtained much food (20,000 to 34,000 bushels of rice annually).<sup>17</sup> Conflicts occurred, and Chinese casualties were generally high; for example the casualty rate could be as high as 90% on a *successful* expedition.<sup>18</sup> Hence the Chinese emperor thus rated the recruiter above the general due to the need to keep Han forces up to strength.<sup>19</sup> The role of the Emperor was strategic.<sup>20</sup>

An imperial shift to armies based on peasant levy infantry and cavalry took place from the fourth century BCE onwards,<sup>21</sup> but standing garrisons, horsemanship and crossbow skill were what was

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<sup>11</sup> Barfield, T. (1989) *The Perilous Frontier: Nomadic Empires and China*. Oxford: Basil Blackwell, p.4.

<sup>12</sup> Bai, Y. and Kung, K. (2011) 'Climate shocks and Sino-nomadic conflict', *The Review of Economics and Statistics*, 93(3), pp. 970-981; Chen, Q. (2015) 'Climate shock, dynastic cycles and nomadic conquests: evidence from historical China', *Oxford Economic Papers*, 67(2), pp. 185-204.

<sup>13</sup> Barfield, T. (2001) 'Steppe Empires, China and the Silk Route: Nomads as a force in International Trade and Politics', in Khazanov, A. & Wink, A. (eds.) *Nomads in the Sedentary World*. Abingdon: Routledge, p. 234.

<sup>14</sup> Barfield, (1989), *The Perilous Frontier* op. cit. p.238.

<sup>15</sup> “Cooked” barbarians are those which have been exposed to Chinese culture and have begun the process of adapting Chinese ways. [The Chinese may well have adopted barbarian ways to greater or less extent, but that was not necessarily a matter for comment.] “Uncooked” barbarians have not begun the process of assimilation. Morgan, D. (2003) *The Mongols*. Oxford: Blackwell Publishers, p.35.

<sup>16</sup> Hulsewe, A. (1979) *China in Central Asia. The early stage 125BC-AD25 An annotated translation of Chapters 61 AND 96 of the History of the Former Han Dynasty*. Leiden: Brill.

<sup>17</sup> Ying-Shih, Y. (1990) 'The Hsiung-nu', in Sinor, D. (ed.) *The Cambridge History of Early Inner Asia*. Cambridge: Cambridge University Press, pp.140-143.

<sup>18</sup> The Han sent out a number of expeditions into the West, to places such as Ferghana. Keay, J. (2009) *China: a History*. London: Harper Press. pp.136-141.

<sup>19</sup> Ssu-ma, Chi'en, (1969) *Records of the Historian: Chapters from the Shih Chi of Ssu-ma Ch'ien*. Translated by: Watson, B. New York: Columbia University Press, p.52.

<sup>20</sup> Ssu-ma, (1969), *Records of the Historian: Chapters* op. cit. p.198.

<sup>21</sup> Lewis, M. (2007), *The Early Chinese Empires* op. cit. p.30.

needed.<sup>22</sup> Even stories recognised this.<sup>23</sup> The Han dynasty established standing armies numbering tens of thousands with cavalry that was mostly drawn from nomads serving under their own chiefs.<sup>24</sup> Effectively, the frontiers were resettled with nomads<sup>25</sup>, while the growth of private armies dissolved the bonds holding together Chinese states,<sup>26</sup> with an accompanying growth of landlordism and regionalism.

The collapse of the Han dynasty in 190-220CE led to the establishment of Chinese states under nomad rule in the period 220-58.<sup>27</sup> The Chinese were sometimes successful in their attempts to deal with nomads, however, and while successful nomads usually moved east into Chinese territory, defeated nomads had a tendency to retreat into the west. Tokharian-speaking Yueh-Chih fled from the Hsiung-Nu to Sogdia,<sup>28</sup> and the fragmented remains of the Hsiung-nu themselves also retreated westward in the sixth century under the name of Juan-Juan and Avars, after their final defeat by the Chinese and their nomad allies. **[GIPPs #9, #11 selected]**

The next cycle of interaction began as Turkish khanates achieved supremacy in the steppes in 500-700 **[GIPPs #7, #8 selected]**. According to the eighth century Turkish veteran Tonyuquq, the Turks

“... number but one to every hundred of the Chinese. They seek water and pasture, they hunt; they have no fixed abode and they practice warfare. When they feel that they are strong, they advance. If they believe themselves weak, they retreat and hide. In this way, they compensate for the advantage that the Chinese possess in their superior numbers, an advantage of which they can make no use.”<sup>29</sup>

Across the period, the Turks increased their raiding twenty-fold from 24 raids on China in 75 years to 72 raids in 10 years. It was their own political instability that brought their downfall, in the face of the increasing strength of China under the T'ang dynasty (618-907). In the seventh to eighth centuries, the Turks seem to have suffered a devastating strategic defeat, and the Turks were forced to leave some areas in response to specific military moves by their Chinese sponsors, as,

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<sup>22</sup> Lewis, M. (2007), *The Early Chinese Empires* op. cit. p.67.

<sup>23</sup> When Mulan went to war against the Huns, she ensured that she secured horse and horse furniture. See Kwa, S. and Idema, W.L. (2010) *Mulan: Five versions of a Classic Chinese Legend with Related Texts* Ed. and Trans. Kwa, S. and Idema, W.L. Indianapolis Hackett Publishing Co. Inc., p.xiv.

<sup>24</sup> Lewis, M.(2007), *The Early Chinese Empires* op. cit. p.139.

<sup>25</sup> Lewis, M. (2007), *The Early Chinese Empires* op. cit. p.25.

<sup>26</sup> Lewis, M. (2007), *The Early Chinese Empires* op. cit. p.262.

<sup>27</sup> Lewis, M. (2009a) *China between Empires* op. cit.

<sup>28</sup> Narain, A. (1990) 'Indo-Europeans in Inner Asia', in Sinor, D. (ed.) *The Cambridge History of Early Inner Asia*. Cambridge: Cambridge University Press, p.153.

<sup>29</sup> Grousset, R. (1970) *The Empire of the Steppes: A history of Central Asia*. Translated by: Walford, N. New Brunswick: Rutgers University Press., p.111. Tokharian is an Indo-European, rather than an Altaic(Turkic or Mongolian) language,

for instance, when in 708 the Chinese army cut them from the south by establishing fortified points.<sup>30</sup>

During the first half of the T'ang dynasty's reign, the majority of the Chinese population was centred in the north, while in the second half, the heartland lay in the south,<sup>31</sup> which was more fertile, with a longer growing season. This change altered the numeric balance of Chinese to nomads further against the nomads. The Uighurs whose base in Central Asia bounded on China's northwestern extremities, elected to become allies of the T'ang during the period 750-840, **[GIPP #16 selected]** thus prospering considerably. They absorbed Iranian culture and converted to Manichaeism.<sup>32</sup> During the ninth century, in their need for a permanent seat for government, they formed cities, which was profitable but left them vulnerable to other nomads. **[GIPP #55 selected]**

China under the Sung suffered a 1.5°C decline in temperature between the end of the 10<sup>th</sup> and the end of 12<sup>th</sup> centuries.<sup>33</sup> This reduced agricultural productivity and hence the revenues available to cope with nomads such as the Khitans and Jurchen. In 900, the Khitans founded the Liao state, conquering an area of Chinese territory coterminous with much of present north and north-eastern China. They were interested less in territory than in authority/subordination and rulership/submission,<sup>34</sup> and when defeated by the (pastoralist-nomadic) Jurchen, they fled west as Qara-Khitai into Central Asia where in 1141 they defeated the Seljuk Turks. **[GIPP #114 selected]** They did not convert to Islam during the years 1130-1218.<sup>35</sup>

The Jurchen founded the Chin dynasty in 1120, extending their territory southwards against the Sung dynasty of China to the area where wheat and millet was replaced by rice, where cavalry effectiveness was reduced.<sup>36</sup> By 1187, the populace of their state was predominantly sedentary, but was political power in the hands of the nomads.<sup>37</sup> In the neighbouring state of Hsia-Hsia there

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<sup>30</sup> de la Vaissière, É. (2015) 'Away from the Ötüken: A Geopolitical Approach to the seventh Century Eastern Türks' 453-462 in *Complexity of interaction along the Eurasian steppe zone in the first millennium CE* (eds.) Bemann, J. & Schmauder, M. Bonn, Vor- und Frühgeschichtliche Archäologie Rheinische Friedrich-Wilhelms-Universität Bonn

<sup>31</sup> Lewis, M. (2009b) *China's Cosmopolitan Empire: the Tang dynasty. History of Imperial China* Cambridge Massachusetts: Belknap Press of Harvard University Press, p.5.

<sup>32</sup> Mackerras, C. (1990) 'The Uighurs', in Sinor, D. (ed.) *The Cambridge History of Early Inner Asia*. Cambridge: Cambridge University Press, p. 317.

<sup>33</sup> Brook, T. (2010) *The Troubled Empire: China in the Yuan and Ming dynasties. History of Imperial China*. Cambridge Massachusetts: Belknap Press of Harvard University Press, p.72.

<sup>34</sup> Standen, N. (2004) 'What nomads want: raids, invasions and the Liao invasion of 947', in Amitai, R. & Biran, M. (eds.) *Mongols, Turks and others: Eurasian nomads and the Sedentary World*. Electronic: Brill, p.129.

<sup>35</sup> Biran, M. (2004) 'True to their ways: why the Qara Khitai did not convert to Islam', in Amitai, R. & Biran, M. (eds.) *Mongols, Turks and others: Eurasian nomads and the Sedentary World*. Electronic: Brill, p. 129.

<sup>36</sup> Cunliffe, B. (2015) *By Steppe, Desert, and Ocean: The Birth of Eurasia*. Oxford: Oxford University Press, p.386.

<sup>37</sup> Kuhn, D. (2009) *The Age of Confucian Rule: the Song transformation of China. History of Imperial China* Cambridge Massachusetts: Belknap Press of Harvard University Press, p.75.

were prohibitions on trade with external nomads. The state's own nomads, the Tanguts, served as cavalry for the state.<sup>38</sup> **[GIPPs #12, #13, #14 selected]**

The Mongols formed the next cycle of interaction between nomadic peoples and Imperial China,<sup>39</sup> after their unification by Chingis Khan.<sup>40</sup> There were 12 tribes of Mongols and horse, sheep, camel, cattle and goats were their main herds.<sup>41</sup> After their unification,<sup>42</sup> their empire was the only one to hold both the Inner Asian steppe and neighbouring sedentary lands,<sup>43</sup> in pursuit of their claimed divine commission to conquer the world.<sup>44</sup> On the death of Chingis Khan, the Mongol empire was divided into realms taken by his sons, who distributed land to their followers,<sup>45</sup> who dispersed across Eurasia.<sup>46</sup> Some remained as nomads in Central Asia, the Golden Horde was based in the steppe, adjacent to the Russians, while the Ilkhans operated in the context of the urban society of Iran,<sup>47</sup> but the main focus was on China. Chingis Khan had not moved into China until his steppe supremacy was established but the Mongols' engagement with north China and its conquest (1211-1234) was unlike the majority of nomad interactions with China **[GIPP #15 selected]**. It had been planned as extortion, but had developed into conquest, and operations were characterised by a Mongol willingness to engage in battle rather than their usual tactic of retreat.

Qubilai Khan subsequently shifted the capital to Peking in order to undertake the conquest of south China under the Sung dynasty (1260-1279). **[GIPP #17 selected]** The conquest was successful and the Yuan dynasty established. Chinese revolts began and in 1368, the Yuan dynasty fell to the Ming. The Ming refused to pay nomads, resulting in much warfare thereafter.<sup>48</sup> **[GIPP**

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<sup>38</sup>Kychanov, E. (2001) 'Nomads in the Tangut State of Hsia-Hsia (982-1227 AD)', in Khazanov, A. & Wink, A. (eds.) *Nomads in the Sedentary World*. Abingdon: Routledge, pp. 191-200.

<sup>39</sup> Golden, P. (2015) 'Inner Asia c 1200', in di Cosmo, N., Frank, A. & Golden, P. (eds.) *The Cambridge History of Inner Asia: The Chinggisid Age*. Cambridge: Cambridge University Press.

<sup>40</sup> Man, J. (2011) *Genghis Khan: Life, Death, Resurrection*. London: Bantam Books.

Man, J. (2015) *The Mongol Empire Genghis Khan, His Heirs and the Founding of Modern China*. London: Corgi Books.

<sup>41</sup> Allsen, T. T. (1994) 'The rise of the Mongolian Empire and Mongolian rule in North China', in Franke, H. & Twitchett, D. (eds.) *The Cambridge History of China 6 Alien Regimes and Border States 907-1368*. Cambridge: Cambridge University Press, pp. 214-320.

<sup>42</sup> Ratchnevsky, P. (1993) *Genghis Khan: his life and legacy*. Translated by: Haining, T. Oxford: Blackwell.

<sup>43</sup> Morgan, D. (2003), *The Mongols*, Oxford: Blackwell Publishers p.5.

<sup>44</sup> Byzantine writers of the period note the laws which gave coherence to the Mongols. See Kaldellis, A. (2013) *Ethnography after Antiquity: Foreign Land and Peoples in Byzantine Literature*. Philadelphia: University of Pennsylvania Press, p.159.

<sup>45</sup> Allsen, T. T. (2001) 'Sharing out the Empire: Apportioned Lands under the Mongols', in Khazanov, A. & Wink, A. (eds.) *Nomads in the Sedentary World*. Abingdon: Routledge, p. 172.

<sup>46</sup> Allsen, T. T. (2018) 'Population Movements in Mongolian Eurasia', in Amitai, R. & Biran, M. (eds.) *Nomads as Agents of Cultural Change; The Mongols and their Eurasian Predecessors*. Honolulu: University of Hawai'i Press, pp. 119-151.

<sup>47</sup> Cunliffe, B. (2015), *By Steppe, Desert, and Ocean* op. cit. p.433.

<sup>48</sup> Veit, V. (2015) 'The eastern steppe: Mongol regimes after the Yuan (1368-1636)', in di Cosmo, N., Frank, A. & Golden, P. (eds.) *The Cambridge History of Inner Asia: The Chinggisid Age*. Cambridge: Cambridge University Press, pp. 157-181.



**#69 selected]** It was a period was characterised by bad weather in China, which increased the difficulties of the ruling dynasty, of whatever origin.<sup>49</sup> The Mongols were able to maintain themselves on the steppes against Ming Chinese pressure after 1368.<sup>50</sup> In 1644, after the study period, the nomadic Manchu established themselves in China, as the Qing dynasty, in a highly unequal society (Gini =0.98).<sup>51</sup> With access to their own nomadic forces, and using the power of gunpowder weapons, the success of the Manchu against other nomads was greater than that of the Ming.<sup>52</sup>

### 9.3 TURKESTAN AND IRAN

Turkestan is the arid heart of Asia, and also features high mountain ranges that severely constrain movement southwards to the gap between the Hindu Kush and the Caspian.<sup>53</sup> Iran lies to the south, and is a land of mountains and desert, as well as cultivated areas.<sup>54</sup> For the purposes of this discussion, it also includes the Caucasus area (Armenia, Georgia and Azerbaijan) as well as the Hindu Kush (Afghanistan).

While some nomadic peoples in Turkestan attended to matters Chinese,<sup>55</sup> others were drawn towards Iran.<sup>56</sup> In this, they were following a long tradition, dating back to the defeat of Cyrus, the Great King of Persia, by the Massagetae in the sixth century BCE, as chronicled by Herodotus **[GIPP #116 selected]**. The stronger displaced the weaker in possession of good watered land and the weak went to the desert or mountain.<sup>57</sup> There is little basis for belief in the existence of nomadism in Iran itself, although there were pastoral tribes,<sup>58</sup> and the horse is probably not indigenous,

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<sup>49</sup> Brook, T. (2010) *The Troubled Empire: China in the Yuan and Ming dynasties. History of Imperial China* Cambridge Massachussets: Belknap Press of Harvard University Press, p.50, p.243, p.269.

<sup>50</sup> McChesney, R. (2015) 'The Chinggisid restoration in Central Asia: 1500-1785', in di Cosmo, N., Frank, A. & Golden, P. (eds.) *The Cambridge History of Inner Asia: The Chinggisid Age*. Cambridge: Cambridge University Press, p. 277  
Millward, J. (2015) 'Eastern Central Asia (Xinjiang): 1300-1800', in di Cosmo, N., Frank, A. & Golden, P. (eds.) *The Cambridge History of Inner Asia: The Chinggisid Age*. Cambridge: Cambridge University Press, p. 260.

<sup>51</sup> Rowe, W. (2009) *China's Last Empire: the Great Qing. History of Imperial China* Cambridge Massachussets: Belknap Press of Harvard University Press, p.48.

<sup>52</sup> di Cosmo, N. (2015) 'The Qing and Inner Asia: 1636-1800', in di Cosmo, N., Frank, A. & Golden, P. (eds.) *The Cambridge History of Inner Asia: The Chinggisid Age*. Cambridge: Cambridge University Press, p. 333

<sup>53</sup> Taafe, R. (1990) 'The geographical setting', in Sinor, D. (ed.) *The Cambridge History of Early Inner Asia*. Cambridge: Cambridge University Press, p. 19.

<sup>54</sup> Petrie, C. 'Ancient Iran and its neighbours: the state of play', *Ancient Iran and its neighbours: local developments and long-range interactions in the fourth millennium BC*, Cambridge, 2009: Oxbow Books, p.p 1-24.

<sup>55</sup> Bregel, Y. (2015) 'Uzbeks, Qazaqs and Turkmens', in di Cosmo, N., Frank, A. & Golden, P. (eds.) *The Cambridge History of Inner Asia: The Chinggisid Age*. Cambridge: Cambridge University Press, pp. 221.

<sup>56</sup> Bregel, Y. (2003) *Historical Atlas of Central Asia*. Electronic: Brill Academic Publishers.

<sup>57</sup> Frye, R. (1984) *The History of Ancient Iran*. Munchen: CH Beck'sche Verlagsbuchhandlung, p.24.

<sup>58</sup> It is suggested that prior to the period of this thesis, climatic amelioration (warm and wet) in 18<sup>th</sup> -15<sup>th</sup> century BCE had given an increased population in the steppes which was affected by climatic deterioration (cooling) in 13<sup>th</sup> – 12<sup>th</sup> century BCE that forced the population south into Iran. Potts, D. (2014) *Nomadism in Iran from Antiquity to the Modern Era*. Oxford: Oxford University Press, pp.59-63.

although the great Nisean horses (once introduced) flourished on the lucerne pastures of Media. It is possible that climatic change gave rise to the Iranians and their subsequent migration.<sup>59</sup> In Bactria, there was cultivation of the scattered best areas, mostly low lying areas with access to water, and pasture in the rest. Before 140 BCE, the Graeco-Bactrians lost ground to Saka (Skythian) and Yueh-chih nomads, persisting in the Afghan mountains after nomads conquered the plains **[GIPP #90 selected]**. The actual mechanism of change may have been infiltration rather than the arrival of an invading army.

Parni nomads migrated or invaded from Khwarezm south of the Aral Sea to Parthia **[GIPP #118 selected]** in about 247BCE,<sup>60</sup> and established the Parthian empire as a composite of nomad and sedentary peoples, comparable to the Liao and Chin realms (see Section 9.2, above). This empire was at times at risk (e.g. 210 BCE<sup>61</sup> and 131 BCE<sup>62</sup>), caught between sedentary resistance by the Seleukid realm in front, to south and west, and nomad pressure behind, to north and east.<sup>63</sup> Nonetheless, they forced the Seleukids from Mesopotamia and dominated the Saka nomads from 80-70 BCE onward as part of the construction of their Iranian empire (for which the nomad bow and bowman long remained a numismatic symbol,<sup>64</sup> and formed a part of armies that penetrated as far as southern Syria in the first century BCE).<sup>65</sup> Meanwhile the Kushans (one of the Yueh-chih clans) formed a large empire that lasted until the first century CE. **[GIPPs #89, #92 selected]**

The Parthian empire was replaced through internal revolt in the third century CE by the Sasanian Persians who established a more tightly controlled empire. The empire boasted a symbiotic relationship of the settled population and nomadic tribes,<sup>66</sup> but due to the lack of primary sources, the full workings of this is only glimpsed in Sasanian times, mostly when the nomads are recorded as aiding or disrupting the imperial order. The Sasanian empire aimed to be urban, and the

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<sup>59</sup> Potts, D. (2014), *Nomadism in Iran* op. cit., p.6.

<sup>60</sup> Grainger, J. D. (2018) *The Rise of the Seleukid Empire 323-223 BC*. Barnsley: Pen and Sword Military. The date of 247 BCE coincides with a volcanic eruption whose climatic effects are associated with political unrest in the Ptolemaic kingdom in Egypt. It is possible that these effects were also felt around the Aral Sea. See Manning, J. G., Ludlow, F., Stine, A. R., Boos, W. R., Sigl, M. and Marlon, J. R. (2017) 'Volcanic suppression of Nile summer flooding triggers revolt and constrains interstate conflict in ancient Egypt', *Nature Communications*, 8.

<sup>61</sup> Grainger, J. D. (2015b) *The Seleukid Empire of Antiochus III 223-187 BC*. Barnsley: Pen and Sword Military.

<sup>62</sup> Grainger, J. D. (2015a) *The Fall of the Seleukid Empire 187-75 BC*. Barnsley: Pen and Sword Military; Nabel, J. (2017) 'The Seleucids imprisoned: Arsacid-Roman hostage submission and its Hellenistic precedents', in Schlude, J. & Rubin, B. (eds.) *Arsacids, Romans and Local Elites: cross-cultural Interactions of the Parthian Empire*. Oxford: Oxbow Books, pp. 25-50.

<sup>63</sup> Curtis, V.S. & Magub, A. (2020) *Rivalling Rome: Parthian coins and Culture*. London, Spink and Sons Ltd p.6, 8, 49.

<sup>64</sup> Lerner, J. (2017) 'Mithradates I and the Parthian archer', in Schlude, J. & Rubin, B. (eds.) *Arsacids, Romans and Local Elites: cross-cultural Interactions of the Parthian Empire*. Oxford: Oxbow Books, pp. 1-24.

<sup>65</sup> Josephus, F. (2000) *The Works of Josephus*. Translated by: Whiston, W. Peabody MA: Hendrickson Publishers, Book 14, chapter 13; 3-4 p.387.

<sup>66</sup> Daryaee, T. (2009) *Sasanian Persia: The Rise and Fall of an Empire*. London: IB Tauris: pp. 39-41.

nomadic contribution was mainly military. On their northern and eastern frontier, the Sasanians had to cope, not always successfully,<sup>67</sup> with a variety of further nomadic groups,<sup>68</sup> **[GIPP #78 selected]** including the Ephthalite (or White) Huns,<sup>69</sup> until their destruction by Turks in the sixth century. They were assisted in this by fortifications.<sup>70</sup> Turkish tribes founded an empire on the ruins of the Juan-Juan who had fled from Chinese dominance.<sup>71</sup> The Sasanians were able to hold their frontier until the empire collapsed in the wake of the Arab attack in the seventh century. This led to a confrontation of Turks and Arabs. **[GIPP #100 selected]**

Plundering was a major part of Turkish culture,<sup>72</sup> unlike with the sedentary view that there is “No kingship without army, no army without revenues, no revenues without agricultural development, no agricultural development without the king’s justice”.<sup>73</sup> The Turks were fairly slow to convert from paganism to convert to Islam, providing Muslims with a theological justification for the enslavement of Turks<sup>74</sup>, who were much valued for their military skill,<sup>75</sup> and Muslim states purchased Oghuz (i.e. Turkish) slaves.<sup>76</sup>

By the tenth to eleventh century, the border province of Khurasan was ruled by the Ghaznavids, a dynasty of Turkish slave origin whose army of elephants and heavy cavalry held firm against the tenth century Turkish Qarakhanids<sup>77</sup> **[GIPP #120 selected]** but proved of limited effect against subsequent Turkish invasion under Seljuk leadership. The Ghaznavids were defeated by 1040.<sup>78</sup> **[GIPP #26 selected]**

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<sup>67</sup> Pseudo-Joshua (2000) *The Chronicle of Pseudo-Joshua the Stylite. Translated texts for Historians*. Translated by: Tombley, F. & Watt, J. Liverpool: Liverpool University Press, p.11.

<sup>68</sup> Rezakhani, K. (2017) *Reorienting the Sasanians: East Iran in Late Antiquity*. Edinburgh: Edinburgh University Press

<sup>69</sup> Grousset, (1970), *The Empire of the Steppes* op.cit. p.69.

<sup>70</sup> Jackson Bonner, M. (2020) *The Last Empire of Iran* Piscataway, New Jersey: Gorgias Press pp. 96-97

<sup>71</sup> Sinor, D. (1990b) 'The establishment and dissolution of the Turkish Empire', in Sinor, D. (ed.) *The Cambridge History of Early Inner Asia*. Cambridge: Cambridge University Press, p.291.

<sup>72</sup> Subtelny, M. (2007) *Timurids in Transit: Turko-Persian politics and acculturation in medieval Iran*. Electronic: Brill, p.103.

<sup>73</sup> Medieval Iranian writers, quoted in Subtelny, M. (2007) *Timurids in Transit: Turko-Persian politics and acculturation in medieval Iran*. op.cit. p.106. In an alternative version, the twelfth century Iranian historian Ibn Balkhi has “There is no kingdom without an army, no army without wealth, no wealth without material prosperity and no material prosperity without justice”. The idea spread widely. At much the same time in southern India, the Telugu poet Baddena wrote “To acquire wealth, make the people prosper. To make the people prosper, justice is the means. O Kirti Narayana! They say justice is the treasury of kings.” Eaton, R. M. (2020) *India in the Persianate Age 1000-1705*. London: Penguin, pp. 15-16.

<sup>74</sup> The enslavement of Muslims by Muslims was not acceptable.

<sup>75</sup> Goodwin, G. (2006) *The Janissaries*. London: Saqi, p.20.

<sup>76</sup> Golden, P. (1990a) 'The Karakhanids and early Islam', in Sinor, D. (ed.) *The Cambridge History of Early Inner Asia*. Cambridge: Cambridge University Press, p.347.

<sup>77</sup> Nomads of Uighur origin retreating westward through Central Asia. Potts, D (2014) *Nomadism in Iran* op.cit. p.178

<sup>78</sup> Peacock, A. (2015b) *The Great Seljuk Empire*. Edinburgh: Edinburgh University Press. pp.36-38.

The support of Turkmen tribes was sought by the Seljuk dynasty, whose links appear to have been with the Khazar.<sup>79</sup> These peoples went under various names such as 'turk', 'ghuzz' and 'Turkmen',<sup>80</sup> and they coalesced around aristocratic leaders as needed.<sup>81</sup> Their desire for plunder reflected the fact that herds could place a severe strain on pasture and the nomads were vulnerable to loss of herds if access to seasonal pastures was denied.<sup>82</sup> Shamanism lingered long and served as a substrate to Islam, as did other tribal practices.<sup>83</sup> It was said that Turks are nomads of heights, high land and cold steppes; Arabs remain nomads of plains and hot lands.<sup>84</sup>

The initial invasion of Iran by the Seljuks began with a small force.<sup>85</sup> Thereafter, the Seljuks deployed larger companies.<sup>86</sup> Their empire was run by Persian speakers from Khurasan, while Turkmen and provided manpower to Seljuk claimants. Seljuk sultans were able to present as 'jihad', their bringing of Turkmen to order by securing for them plunder and pasture. The swamp and arid desert of Iraq were unsuitable for Turkmen who had an aversion to intensive agriculture and irrigation, and resented being brought to the area. From about 1055 onwards, with the conquest of Baghdad and Syria [**GIPPs #29, #32 selected**], the Seljuks started to replace Turkmen with *ghulams*, preferring a conventional professional army were supported financially by *iqta*.<sup>87</sup> Progressive exhaustion of *iqta*, nomadic pressure from behind (north and east) and the threat of Arab nomads in Iraq, with raids on Baghdad and Kufa, all contributed to a situation in which the Seljuk empire was falling apart by the 4<sup>th</sup> generation. Actual Turkish settlement, as opposed to dynastic control, was most marked in Anatolia [**GIPP #21 (dynastic) and GIPP2 #9 (settlement selected)**] where the victory of Manzikert<sup>88</sup> against the Byzantines in 1071 opened the way to the

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<sup>79</sup> Peacock, A. (2010) *Early Seljuq History: a new interpretation*. Abingdon: Routledge.

<sup>80</sup> al-Athir, I. a.-d. I. (2002) *The Annals of the Saljuq Turks Excerpts from al-Kamil f'ib-Ta'rikh*. Translated by: Richards, D. London: Routledge Curzon.

<sup>81</sup> Peacock, A. (2015a) 'Sufis and the Seljuk Court in Mongol Anatolia: politics and patronage in the works of Jalal Al-din Rumi and Sultan Walad', in Peacock, A. & Yildiz, S. (eds.) *The Seljuks of Anatolia Court and Society in the Medieval Middle East*. London: IB Tauris, p. 206. See also Korobeinikov, D. (2015) 'The King of the East and the King of the West: the Seljuk dynastic concept and titles in the Muslim and Christian sources', in Peacock, A. & Yildiz, S. (eds.) *The Seljuks of Anatolia Court and Society in the Medieval Middle East*. London: IB Tauris, pp. 68.

<sup>82</sup> Peacock, A. (2015b) pp. 47-61, p.123.

<sup>83</sup> Anonymous (1974) *Book of Dede Korkut*. Translated by: Lewis, G. Harmondsworth: Penguin.

<sup>84</sup> Peacock, A. (2010), op. cit. p.155, quoting de Planhol, X. (1968) *Les fondements géographiques de l'histoire de l'Islam*. Paris: Flammarion.

<sup>85</sup> Peacock, A. (2015a), 'Sufis and the Seljuk Court' op. cit. p.1.

<sup>86</sup> Peacock, A. (2010), *Early Seljuq History* op. cit. p.81.

<sup>87</sup> *Ghulam* is a slave soldier, and *iqta* is the name of the Muslim system for the allocation of tax revenues from individual parcels of land to the support of individual soldiers.

<sup>88</sup> Hillenbrand, C. (2002) *Turkish myth and Muslim symbol: The Battle of Manzikert*. Edinburgh: Edinburgh University Press.

establishment of a series of Turkish states culminating in the non-nomadic Ottomans.<sup>89</sup> Their culture had a considerable admixture of Byzantine practices.<sup>90</sup>

The Mongols were not in origin a nomad group from Turkestan, but operated in that area. After their defeat of the Khwarizmians of Central Asia in 1231 **[GIPP #46 selected]**, in which the Mongols extensively destroyed cities, dams and irrigation works to forward their military operations in the Khorezm area,<sup>91</sup> a Mongol army was sent through Turkestan to Persia in 1233, under the command of Hulagu, one of the sons of Chingis Khan.<sup>92</sup>**[GIPP #25 selected]** The Ismailis, whose use of Persian assassins was noted in the *Fihrist* of al Nadim,<sup>93</sup> were the first Mongol target. They were crushed in 1236 and two years later, Baghdad, capital of the Abbasid caliphate, fell to Mongol attack. **[GIPP #28 selected]** The Mongols continued their advance into Syria,<sup>94</sup> **[GIPP #31 selected]** but at Ayn Jalut in Palestine in 1261, they were halted by the Mamluks of Egypt,<sup>95</sup> leading to an ongoing war.<sup>96</sup> In 1263 the Mongols under Hulagu established the Ilkhanate which began to change, though slowly,<sup>97</sup> from its original steppe culture,<sup>98</sup> becoming Muslim in 1295.<sup>99</sup> In their campaigns, Azerbaijan fulfilled the same function of forward base for the pasture of herds as the Hungarian plain did in Europe,<sup>100</sup> and Armenia was incorporated in the empire.<sup>101</sup> **[GIPP #20 selected]** The life expectancy of members of the dynasty was low,<sup>102</sup> with the result that by 1335, it had failed,<sup>103</sup>

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<sup>89</sup> Faroqhi, S. (2004) *The Ottoman Empire and the world around it*. London: IB Tauris; Pitcher, D. (1972) *A historical geography of the Ottoman Empire from the earliest times to the end of the sixteenth century*. Leiden: Brill.

<sup>90</sup> Yildiz, S. and Sahin, H. (2015) 'In the Proximity of Sultans: Majd Al-Din Ishaq, Ibn Arabi and the Seljuk court', in Peacock, A. & Yildiz, S. (eds.) *The Seljuks of Anatolia Court and Society in the Medieval Middle East*. London: IB Tauris, p. 173; Leiser, G. (2015) 'Conclusion: research on the Seljuks of Anatolia: some comments on the state of the art', in Peacock, A. & Yildiz, S. (eds.) *The Seljuks of Anatolia Court and Society in the Medieval Middle East*. London: IB Tauris, p. 264; Shukorov, R. (2015) 'Harem Christianity: the Byzantine identity of Seljuk princes', in Peacock, A.Y.S. (ed.) *The Seljuks of Anatolia Court and Society in the Medieval Middle East*. London: IB Tauris, p. 115.

<sup>91</sup> Andrianov, B. V. (2016) *Ancient Irrigation Systems of the Aral Sea area: The History, Origin and Development of Irrigated Agriculture*. Oxford: Oxbow Books, p.32, p.178.

<sup>92</sup> Morgan, D. (2003) *The Mongols*, op. cit., p.148.

<sup>93</sup> al-Nadim (1970) *The Fihrist: A tenth century survey of Muslim culture*. Translated by: Dodge, B. London: Columbia University Press. p. 473.

<sup>94</sup> Amittai-Preiss, R. (2004) *Mongols and Mamluks: The Mamluk-Ilkhanid War, 1260-1281*. Cambridge: Cambridge University Press.

<sup>95</sup> Smith, J. (1984) 'Ayn Jalut: Mamluk success or Mongol Failure', *Harvard Journal of Asiatic Studies*, 44, p.307.

<sup>96</sup> James, B. (2016) 'Mamluk and Mongol Peripheral Politics: Asserting Sovereignty in the Middle East's 'Kurdish Zone' (1260-1330)', in de Nicola, B. & Melville, C. (eds.) *The Mongols' Middle East: Continuity and Transformation in Ilkhanid Iran*. Leiden: Brill, pp. 277-305.

<sup>97</sup> Kolbas, J. (2016) 'Historical epic as Mongol propaganda? Juwayni's Motifs and Motives', in de Nicola, B. & Melville, C. (eds.) *The Mongols' Middle East: Continuity and Transformation in Ilkhanid Iran*. Leiden: Brill, pp. 155-171.

<sup>98</sup> Amittai, R. (2016) 'Continuity and Change in the Mongol Army of the Ilkhanate', in de Nicola, B.M., C. (ed.) *The Mongols' Middle East: Continuity and Transformation in Ilkhanid Iran*. Leiden: Brill, pp. 38-54.

<sup>99</sup> Jackson, P. (2017) *The Mongols and the Islamic world: from conquest to conversion*. London: Yale University Press.

<sup>100</sup> Whittow, M. (1996) *The Making of Orthodox Byzantium 600-1025*. Basingstoke: Macmillan, p.29.

<sup>101</sup> Dashdondog, B. (2016) 'Darughachi in Armenia', in de Nicola, B. & Melville, C. (eds.) *The Mongols' Middle East: Continuity and Transformation in Ilkhanid Iran*. Leiden: Brill, pp. 216-236.

<sup>102</sup> Their life expectancy was lowered by illness, alcohol consumption and civil war.

<sup>103</sup> Melville, C. (2016) 'The end of the Ilkhanate and After: Observations on the Collapse of the Mongol World Empire', in de Nicola, B. & Melville, C. (eds.) *The Mongols' Middle East: Continuity and Transformation in Ilkhanid Iran*. Leiden: Brill, pp. 309-335.

being replaced by the Jalayrids, whose culture was still more strongly influenced by the culture of the more numerous sedentary Persian population.<sup>104</sup>

The Seljuks were less disruptive than Mongols to the sedentary society of Iran, because they were fewer and already Muslim from the start.<sup>105</sup> The *iqta* system allowed them to use state revenue to support soldiers. The Mongols did not use the *iqta* system until comparatively late.

Iran broke up into smaller successor states, and in one such state, in the late fourteenth century, Timur Leng,<sup>106</sup> with his nomad troops drawn from the Chagatai Mongols, ruled over the sedentary population of Transoxiana,<sup>107</sup> before establishing a transitory empire over much of the Middle East,<sup>108</sup> confronting Ottomans and the Mamluks, who previously had had little contact with the Mongols in Central Asia beyond the Ilkhans.<sup>109</sup> **[GIPPs #47, #48 selected]** His descendants formed the Timurid dynasty, and with an affinity to the Ilkhanids.<sup>110</sup> In the zone between Timur and the Ottomans, two Oghuz confederacies established themselves: the Black Sheep Turks (Qaraqoyunlu) lasting from 1378-1469 **[GIP #115 selected]** and the White Sheep Turks (Ar-qoyunlu) from 1378-1502 **[GIPP #113 selected]**. The White Sheep Turks developed the structures required to establish taxes.<sup>111</sup> In Turkestan, the Chagatai Mongols became Muslim, lasting to the sixteenth century. Thereafter, the native Safavid dynasty took power in Iran,<sup>112</sup> with challenges from the Uzbeks **[GIPP2 #11 selected]** although in the subsequent period, the ruling Qajars which replaced the Safavids had to cope with an internal large mobile population,<sup>113</sup> divided into bands of 2-300

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<sup>104</sup> Wing, P. (2017) *The Jalayirids: Dynastic state formation in the Mongol Middle East*. Edinburgh: Edinburgh University Press; Smith, J. (1975) 'Mongol Manpower and Persian Population', *Journal of the Economic and Social History of the Orient*, 18 (No. 3 (Oct., 1975)), p. 271.

<sup>105</sup> Amitai, R. (2001) 'Turko-Mongol Nomads and the Iqta system in the Islamic Middle East (ca 1000-1400 AD)', in Khazanov, A. & Wink, A. (eds.) *Nomads in the Sedentary World*. Abingdon: Routledge, p. 152.

<sup>106</sup> Marozzi, J. (2004) *Tamerlane: Sword of Islam, Conqueror of the World*. London: Harper.

<sup>107</sup> Manz, B. (2015) 'Temur and the early Timurids to c.1450', in di Cosmo, N., Frank, A. & Golden, P. (eds.) *The Cambridge History of Inner Asia: The Chinggisid Age*. Cambridge: Cambridge University Press, pp. 182-198.

<sup>108</sup> Dale, S. (2015) 'The later Timurids c.1450-1526', in di Cosmo, N., Frank, A. & Golden, P. (eds.) *The Cambridge History of Inner Asia: the Chinggisid Age* Cambridge: Cambridge University Press, pp. 199-217.

<sup>109</sup> Biran, M. (2019) 'The Mamluks and Central Asia', in Amitai, R. and Conermann, S. (eds.) *The Mamluk Sultanate from the Perspective of Regional and World History: Economic, Social and Cultural Development in an Era of Increasing International Interaction and Competition*. Bonn: Bonn University Press, pp. 367-389.

<sup>110</sup> Subtelny, M. (2007) op. cit. p.113. Manz, B. (2016) 'The Empire of Tamerlane as an Adaptation of the Mongol Empire: An answer to David Morgan, "The Empire of Tamerlane: An Unsuccessful Re-Run of the Mongol State?"', *Journal of the Royal Asiatic Society*, 26(1-2), p. 281.

<sup>111</sup> Potts, D. (2014), *Nomadism in Iran* op. cit. p.214.

<sup>112</sup> Newman, A. (2009) *Safavid Iran: Rebirth of a Persian Empire*. London: IB Tauris & Co Ltd; Mitchell, C. (2012) *The Practice of Politics in Safavid Iran: Power, Religion and Rhetoric*. London: I.B.Tauris & Co Ltd.

<sup>113</sup> Bradburd, D. (2001) 'The Influence of Pastoral Nomad Populations on the Economy and Society of Post Safavid Iran', in Khazanov, A. & Wink, A. (eds.) *Nomads in the Sedentary World*. Abingdon: Routledge, p. 128.

herdsmen under elected chiefs,<sup>114</sup> setting a weak state against a quasi-state of nomads in an environment where only 15% of the land was arable.

#### 9.4 CENTRAL ASIA AND INDIA

India was isolated by the Himalayan mountain range which, backed by the Tibetan plateau and the Yunnan uplands, formed a massive obstacle to the entry of armies, entry from the northwest was possible. The nomadic Vedic (or Aryan) peoples came to India by this route as early as the sixteenth century BCE.<sup>115</sup> As the Graeco-Bactrians lost ground in Central Asia to encroaching Saka (Skythian) and Yueh-chih nomads in the second century BCE, and were forced to retreat southwards from the plains into the Afghan mountains they were able to recoup some of their losses through conquests of lands beyond the mountains in the Indus plains, until the nomads followed them through into India [*GIPP #88 selected*]. There, the Kushans (one of the Yueh-chih clans) formed their own large empire that lasted until the first century CE.

While India has notable internal nomad peoples, particularly on the Himalayan slopes, they are mostly integrated into the wider arable agricultural system of the country.<sup>116</sup> Rural agricultural development was key to the generation of surpluses that would support an empire.<sup>117</sup> Indian states were not fully sovereign for there were many inner frontiers, arid or humid lands that were traversed by pastoralists, traders and warrior bands, between the sedentary cores of peasants. The poor weather of the monsoon period reduced access to such areas in the absence of good roads.<sup>118</sup> In general, India is not suitable for extensive pasture and it is unhealthy, compared with the steppes, with many more endemic diseases and parasites. The thirteenth century Iranian historian of the Mongol conquest, Juvaini, records that India is insalubrious.<sup>119</sup> Nonetheless, the population was much greater than that of the steppes, though outside the North West and Deccan, horses had to be imported, with the ongoing purchase of steppe horses during medieval

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<sup>114</sup> Potts, D. (2014), *Nomadism in Iran* op. cit. p.218.

<sup>115</sup> Hume, R. E. (1916) 'Hinduism and War', *The American Journal of Theology*, 20(1), pp. 31-44

<sup>116</sup> Wink, A. (2001b) 'India and the Turko-Mongol frontier', in Khazanov, A. & Wink, A. (eds.) *Nomads in the Sedentary World*. Abingdon: Routledge, p.211.

<sup>117</sup> Wink, A. (2020) *The Making of the Indo-Islamic World c.700-1800 CE*. Cambridge: Cambridge University Press, pp. 10-29.

<sup>118</sup> Gommans, J. (1999) 'Warhorse and gunpowder in India c.1000-1850', in Black, J. (ed.) *War in the Early Modern World 1450-1845*. Boulder: Westview Press, p.107.

<sup>119</sup> Juvaini, Ata-Malik, J. (1958) *The history of the World Conqueror Volumes I and II*. Translated by: Boyle, J. Manchester: Manchester University Press, Vol p.137, Vol II, p.417.

times,<sup>120</sup> because they were bigger and better fed than Indian animals, which could not match them.<sup>121</sup>

Horse archers with stirrup and composite bow were a feature of north India, not south India,<sup>122</sup> and the Marathas who initially launched highly effective light cavalry from arid and semi-arid zones, turned, once established, to slow moving heavy armies, using bullocks and dromedaries for transport. Such armies were better suited for handling 'fitna' dissension and intrigue<sup>123</sup>.

Although there were nomad raids [**GIPPs #91, #95, #96 selected**], there was little nomad conquest, save on the fringes of India, although dynasts of nomad origin did effectively deploy small armies of *mamluks* and other professionals in their wars, most notably in the Delhi Sultanate (1206-1526). In the ongoing conflicts of the Turks of the Delhi Sultanate with the Hindu Rajputs of Gujerat, the Rajputs were not accustomed to manoeuvre as a single unified army, and so they depended on mass rather than manoeuvre, thereby placing Turkish manoeuvres at an advantage.<sup>124</sup> There were also a number of Mongol attacks on the Delhi Sultanate in the thirteenth and fourteenth century. [**GIPPs #104, #105 selected**] None were particularly successful, and the third of these, with an army of thirty or forty thousand, was defeated in 1305. At the end of the fourteenth century, Timur Leng sacked Delhi, but failed to establish a lasting dominion in India.

## 9.5 ARABIA AND NEAR EAST

Arabia is an area of desert, arid grassland and oases, where rainfall is for the most part below 250 mm per annum, save in the Yemen highlands. The surrounding regions experience higher rainfall (Syria and Anatolia) or can undertake irrigation from rivers flowing from uplands (Mesopotamia and Egypt). Desertification has been an ongoing issue,<sup>125</sup> with the boundary between nomad and sedentary advancing and retreating over time.<sup>126</sup>

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<sup>120</sup> Frankopan, P. (2016) *The Silk Roads*. London: Bloomsbury, p.235.

<sup>121</sup> Chandra, S. (2013) *Medieval India from Sultanat to the Mughals Part One: Delhi Sultanate 1206-1526*. New Delhi: Har-Anand Publications PVT, p.15.

<sup>122</sup> Gommans, J. (1999), 'Warhorse and gunpowder in India' op. cit. p.110.

<sup>123</sup> The ongoing problems of local revolts and separatism.

<sup>124</sup> Chandra, S. (2013), *Medieval India* op. cit.p.30.

<sup>125</sup> Barker, G., Gilbertson, D. and Mattingly, D. (2007) 'The Wadi Faynan Landscape Survey: research themes and project development', in Barker, G., Gilbertson, D. & Mattingly, D. (eds.) *Archaeology and Desertification: The Wadi Faynan Landscape Survey, Southern Jordan*. Oxford: Council for British Research in the Levant & Oxbow Books, pp. 3-24.

<sup>126</sup> Rosen, S. (2009) 'History does not repeat itself: cyclicity and particularism in nomad-sedentary relations in the Negev in the long-term', in Szuchman, J. (ed.) *Nomads, Tribes, and the State in the Ancient Near East: Cross Disciplinary Perspectives Oriental Institute Seminars No 5*. Chicago: Oriental Institute of the University of Chicago, p. 57; Cook, M. (2016) 'The long-term geopolitics of the pre-modern Middle East', *Journal of the Royal Asiatic Society*, 26(1-2), p. 33.



Some of the very earliest nomad-sedentary clashes probably arose in the area of Arabia and the Near East, where arable farming first began. By the end of the second millennium BCE, central authorities in South Arabia had begun to produce spice, with the domestication of camels facilitating transport.<sup>127</sup> A number of trends developed during the first millennium BCE. There was increased trade, but the deterioration of border kingdoms led to easier infiltration and the inadequate manpower of empires led to the recruitment of Arabs for the protection of trade. Nomads of North Sinai, North Arabia and the Syro-Arabian desert raised camel and sheep, lived in tents and unfortified temporary camps, moved place to place with flocks and sporadically raided permanent settlements (including oases with nomads). They sometimes entered the service of the great powers in their wars, as when Bedouin served as Hittite scouts.<sup>128</sup> The relative advantages of grain cultivation and pasturing camel or sheep varied from time to time on the inner plains of Syria, depending on climatic and political circumstance.<sup>129</sup>

The Egyptian New Kingdom at the end of the second millennium BCE found it difficult to confront Libyans out of north Africa and to secure a victory.<sup>130</sup> Libyans eventually reached the west bank of Nile **[GIPP #80 selected]**. There were also attacks from the south out of Nubia. **[GIPP2 #2 selected]** Canaanite cities remaining under Egyptian rule had to cope with Arabs and Habiru from the desert.<sup>131</sup> **[GIPPs #59, #60 selected]**

Biblical accounts mention the effective intervention of Abraham and the 318 men of his household in a war of sedentary kingdoms,<sup>132</sup> the battle in Sinai of the Hebrews with the Amalekites,<sup>133</sup> the Hebrew conquest of Canaan,<sup>134</sup> raids of camel-mounted Midianites **[GIPP2 #4 selected]**, Amalekites and “the people of the East” on Israel,<sup>135</sup> and further wars with the Amalekites.<sup>136</sup> These examples are drawn from just one time and one part of the Fertile Crescent, but the pattern continued for most of the millennium. Canaanites had to deal with Aramean infiltrators,<sup>137</sup> and

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<sup>127</sup> Eph'al, I. (1982) *The Ancient Arabs: Nomads on the Borders of the Fertile Crescent 9th-5th Centuries BC*. Jerusalem: The Magnes Press The Hebrew University, p.4.

<sup>128</sup> Cline, E. (2014) *1177 BC: The Year Civilization collapsed*. Oxford: Princeton University Press, p.81.

<sup>129</sup> Hourani, A. (2013) *A History of the Arab Peoples*. London: Faber, p.91.

<sup>130</sup> Ritner, R. (2009) 'Egypt and the vanishing Libyan: institutional responses to a nomadic people', in Suchman, J. (ed.) *Nomads, Tribes, and the State in the Ancient Near East: Cross Disciplinary Perspectives Oriental Institute Seminars No 5*. Chicago: Oriental Institute of the University of Chicago, p.43.

<sup>131</sup> Liverani, M. (2014) *The Ancient Near East*. London: Routledge, p.402.

<sup>132</sup> Genesis 14.

<sup>133</sup> Exodus 17, 8.

<sup>134</sup> Joshua, Judges.

<sup>135</sup> Judges 6.

<sup>136</sup> 1 Samuel, 15 & 30.

<sup>137</sup> Liverani, M. (2014), *The Ancient Near East*. op. cit. p.434.

Arabia was not the only source of nomads to attack the Fertile Crescent. Skythians, Cimmerians and then later, Huns [**GIPP2 #3 selected**], were able to reach into the area from north of the Caucasus (when passes such as the Caucasian Gates was not held against them), to inflict damage. The sedentary kingdom of Urutu in the eighth century BCE,<sup>138</sup> was subject to attacks by Cimmerians through the west Caucasus [**GIPP #54 selected**] and Scythians through the east Caucasus. These nomads introduced the use of organised cavalry about 1000 BCE, and by 835 BCE, cavalry was a substantial part of sedentary armies as well as nomad.<sup>139</sup>

The Assyrians authorities were hostile to the mobility of pastoral and particularly nomadic peoples.<sup>140</sup> Assyrians could defeat the Arabs<sup>141</sup> or the Arameans in battle, but could not halt their infiltration,<sup>142</sup> [**GIPP2 #8 selected**] even though the desert nomads relied on slow and clumsy camels rather than horses.<sup>143</sup> Horses only became available from the second half of the 1<sup>st</sup> Century CE,<sup>144</sup> and as late as 600CE, Arab armies were weak in horsed cavalry.<sup>145</sup>

The Achaemenid Persians (537 – 329 BCE) ruled the lands of Mesopotamia and Syria, and claimed to rule Arabia, but the Arabs were exempted from paying tribute unlike other nomads on the borders of the empire,<sup>146</sup> The early Hellenistic king Antigonos, failed in his attempt to conquer the sedentary Nabataean Arabs. Thereafter, the attention of the Hellenistic kings was more directed towards their own internecine wars. When the Parthians conquered Babylonia in the later 2<sup>nd</sup> century BCE, it was their turn to cope with Arab raids, possibly linked to a period of cattle disease in 112 BCE.<sup>147</sup>

By the end of the Roman Republic, the Near East was mostly divided between Rome and the empire of the Parthians, whose nomad roots were in Iran. The local peoples such as the Jews

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<sup>138</sup> Redgate, A.E., (2000), *The Armenians*, Oxford, Blackwell, p.10.

<sup>139</sup> Turchin, P. (2016) *Ultra Society: how 10,000 years of war made humans the greatest cooperators on Earth*. Chaplin Connecticut: Beresta Books.

<sup>140</sup> Rozenweig, M. (2016) 'Cultivating subjects in the Neo-Assyrian Empire', *Journal of Social Archaeology*, 84, pp. 307-334.

<sup>141</sup> Breton, J.-F. (2009) *Arabia Felix from the time of the Queen of Sheba: Eighth Century B.C. to First Century A.D.* Notre Dame: University of Notre Dame Press, p.114.

<sup>142</sup> Liverani, M. (2014), *The Ancient Near East*. op. cit. p.435.

<sup>143</sup> More useful in battle, but less able to survive travel in desert conditions.

<sup>144</sup> Breton, J.-F. (2009), *Early Seljuq History* op. cit. p.104.

<sup>145</sup> Turchin P. et al, (2016) *Ultra Society* op. cit.

<sup>146</sup> Brosius, M. (2000) *The Persian Empire from Cyrus II to Artaxerxes*. London: LACTOR, pp.11, 30, 78.

<sup>147</sup> Curtis, V.S. & Magub, A. (2020) *Rivalling Rome: Parthian coins and Culture*. London, Spink and Sons Ltd, p.8.

under Herod the Great,<sup>148</sup> the Osrhoeni,<sup>149</sup> and the Arabs of Nabataea,<sup>150</sup> Palmyra,<sup>151</sup> and Hatra,<sup>152</sup> found themselves steering their diplomatic way between the two great powers,<sup>153</sup> whilst fighting among themselves.<sup>154</sup> In the 1<sup>st</sup> Century BCE to 1<sup>st</sup> Century CE, Arab nomads infiltrated the Yemen area, which was controlled by neither of the great powers, in a process typified by skirmishes rather than pitched battles.<sup>155</sup>

Though cities could be and were annexed by the great powers, the nomads were less easily controlled. Under the Romans' later Empire, the Sahara-dwelling Blemmyes attacked Egypt.<sup>156</sup> **[GIPP #23 selected]**. The Arab relationship with their sedentary neighbours in Syria and Iraq was rather more complex, with many groups on either side of the frontier, opening the possibility of using one nomad to control another.<sup>157</sup>

The Romans established a generally effective integrated system of defence in Syria against Arab intrusions.<sup>158</sup> The Sasanians similarly controlled their Arab neighbours, when Shapur II drove Arabs from Iraq in the 320s after Bedouin raids arising because of the lowered water table in eastern Arabia,<sup>159</sup> (also see the *Shahnameh* for the folklore version of Persian and Arab relations).<sup>160</sup> Between 223 and 632 CE, the Arab world could be divided into three parts: Sasanian subjects,

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<sup>148</sup> Schlude, J. and Overman, J. (2017) 'Herod the Great: a Near Eastern case study in Roman-Parthian Politics', in Schlude, J. & Rubin, B. (eds.) *Arsacids, Romans and Local Elites: cross-cultural Interactions of the Parthian Empire*. Oxford: Oxbow Books, pp. 93-110.

<sup>149</sup> Edwell, P. (2017) 'Osrhoene and Mesopotamia between Rome and Arsacid Parthia', in Schlude, J. & Rubin, B. (eds.) *Arsacids, Romans and Local Elites: cross-cultural Interactions of the Parthian Empire*. Oxford: Oxbow Books, pp. 111-135.

<sup>150</sup> Schlude & Overman, (2107) 'Herod the Great' op. cit.

<sup>151</sup> Edwell, P. M. (2008) *Between Rome and Persia: the Euphrates, Middle Mesopotamia and Palmyra under Roman control*. Abingdon: Routledge.

<sup>152</sup> Anderson, B. (2017) 'Beyond Rome/Parthia: intersection of local and imperial traditions in the visual record of Hatra', in Schlude, J. & Rubin, B. (eds.) *Arsacids, Romans and Local Elites: cross-cultural Interactions of the Parthian Empire*. Oxford: Oxbow Books, pp. 137-158.

<sup>153</sup> Fisher, G. (2017) 'Editor's Introduction', in Fisher, G. (ed.) *Arabs and Empires before Islam*. Oxford: Oxford University Press, pp. 1-10.

<sup>154</sup> Josephus, F. (2000) *The Works of Josephus*. Translated by: Whiston, W. Peabody MA: Hendrickson Publishers, Book 15, chapter 5, 1.

<sup>155</sup> Breton, J.-F. (2009), *Early Seljuq History* op. cit. p.165.

<sup>156</sup> Barnard, H. (2009) 'Archaeology of the Pastoral Nomads between the Nile and the Red Sea', in Szuchman, J. (ed.) *Nomads, Tribes, and the State in the Ancient Near East: Cross Disciplinary Perspectives* Oriental Institute. Seminars No 5 ed. Chicago: Oriental Institute of the University of Chicago, p. 15; Jackson, R. (2002) *At Empire's Edge: exploring Rome's Egyptian frontier*. New York: Yale University Press; Southern, P. (2001) *The Roman Empire from Severus to Constantine*. London: Routledge, p.70.

<sup>157</sup> Macdonald, M. C., Corcella, A., Daryae, T., Fisher, G., Gibbs, M., Lewin, A., Violante, D. and Whately, C. (2017) 'Arabs and Empires before the Sixth Century', in Fisher, G. (ed.) *Arabs and Empires before Islam*. Oxford: Oxford University Press, p. 11-89.

<sup>158</sup> Southern, P. (2001), *The Roman Empire from Severus to Constantine* op. cit. p.144.

<sup>159</sup> The water table fluctuation was possibly climatic in origin. Frye, R. (1984) *The History of Ancient Iran*. Munchen: CH Beck'sche Verlagsbuchhandlung, p.309.

<sup>160</sup> Ferdowsi, A. (2007) *Shahnameh: The Persian Book of Kings*. Translated by: Davis, D. London: Penguin, p.578.

Roman subjects and independents.<sup>161</sup> Palmyrene militia were used to protect territory and trade against raids, although the Palmyrenes originally had strong links with the nomadic peoples.<sup>162</sup> **[GIPP #51 selected]** Through a proxy policy, the Lakhmids and Ghassanids were used by the Sasanians and Romans, respectively, to control the Arabs and to threaten the other great power. The Sasanians destroyed Lakhmid power as an over-mighty vassal, which opened the way for other powers, as when Harith established an Arab realm in North Arabia,<sup>163</sup> and an alliance of Bedouin tribes destroyed a Sasanian army at Du Kar, only a quarter of a century before the rise of Islam. Religion played an increasing part in the pre-Islamic wars of the Arabian Peninsula, as Christianity and Judaism spread and neighbouring great powers supported aligned religious groups.<sup>164</sup>

Near Eastern civilisation underwent a decline in the early seventh century CE due to environmental problems and the major war of the Persians and Byzantines was an unwise response to those environmental problems.<sup>165</sup> It ruined the old order,<sup>166</sup> so that Persia and the Byzantines were not fit to resist an Arab attack.<sup>167</sup> In Chinese terms, the Arabs would have been regarded as 'cooked barbarians'.<sup>168</sup> Some had converted to Christianity, influenced by desert fathers. Many had served in Persian and Byzantine armies, and they had established states of their own. Arabic served as a linguistic core. Nomads provided raw fighting power for a leadership not innocent of civilisation, drawn from Yemen and oasis towns of central and northwest Arabia. The nomads were mobile, used to fighting in everyday life, and since herding was less labour-intensive, more time could be spared for raids or campaigns. Arab experience in the service of Byzantium and Persians provided military skills and acculturation. Hourani concurs, viewing the armies of the Arab conquest not as a tribal horde but an organised force, some with military skill and experience.<sup>169</sup> The prospect of land and wealth was an attraction for many, the fervour of conviction was a motivation for some. The Arabs were a mixture of Bedouin and city dwellers in

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<sup>161</sup> Dignas, B. and Winter, E. (2007) *Rome and Persia in Late Antiquity: Neighbours and Rivals*. Cambridge: Cambridge University Press, p.162.

<sup>162</sup> Stoneman, R. (1992) *Palmyra and Its Empire: Zenobia's revolt against Rome*. Ann Arbor: The University of Michigan Press, p.27.

<sup>163</sup> Frye, R. (1984), *The History of Ancient Iran* op. cit. p.324.

<sup>164</sup> Conrad, L. I. (2019) 'Chapter 2C The Arabs to the time of the Prophet', in Shepard, J. (ed.) *The Cambridge History of the Byzantine Empire c500-1492*. Cambridge: Cambridge University Press, p. 173-195.

<sup>165</sup> Hoyland, R. (2015) *In God's Path: the Arab Conquests and the Creation of an Islamic Empire*. Oxford: Oxford University Press, p.28.

<sup>166</sup> See Jackson Bonner, M. (2020) *The Last Empire of Iran* Piscataway, New Jersey: Gorgias Press p. 267.

<sup>167</sup> Cunliffe, (2015) *By Steppe, Desert, and Ocean* op. cit. p. 344.

<sup>168</sup> Hoyland, R. (2015), *In God's Path* op. cit. p. 18.

<sup>169</sup> Hourani, A. (2013) *A History of the Arab Peoples*. London: Faber, p.23.

whom spiritual teaching had instilled discipline, with armies that tended to lie in the size range of 10-18,000.<sup>170</sup>

When Muslim Arabs marched against the two empires,<sup>171</sup> brief campaigns (636-638) broke Byzantine and Sasanian resistance.<sup>172</sup> [GIPPs #30, #27 selected] After the fall of their capital of Ctesiphon, the Sasanians were unable to muster a coherent resistance [GIPP #24 selected]. The Byzantine capital of Constantinople lay behind the protection of the mountainous territories of Anatolia, and the Armenians lived in eastern Anatolia and the fringes of the Caucasus mountains. Hence, Byzantines and Armenians both were better able to defend themselves against Arab attacks.<sup>173</sup> [GIPPs #18, #19 selected] For the next century, there were Arab conquests across Iran into India, and through Egypt [GIPP #22 selected] and North Africa [GIPPs #4, #107 selected] into Spain, mingled with civil wars between factions within the Arab conquerors.<sup>174</sup> By 732, civil wars among the conquerors had begun to predominate over conquests. Although described as *jihad*, these wars of conquest against external foes may be regarded as a means for the caliphs to control the energies of their Arab subjects.<sup>175</sup> Arab attacks ceased to be campaigns for conquest and though still characterised as *jihad*, they became a series of plundering raids [GIPP2 #6 selected]. The Byzantines first mastered these and eventually began to push back, regaining control of the Anatolian and Iranian marches before advancing into Syria during the period 950-1023.<sup>176</sup>

The use of non-military means and the recruitment of non-Arabs to Islam gave zeal and integrative power to the Arab conquest.<sup>177</sup> As early as the dynasty of the Umayyid caliphs (661-750), the professionalisation of Arab armies had begun.<sup>178</sup> Turks, who were pagan, numerous, and who

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<sup>170</sup> Delbruck, H. (1990c) *Warfare in Antiquity: History of the Art of War Volume I*. Translated by: Renfroe, W. London: University of Nebraska Press, pp.203-205.

<sup>171</sup> Lewis, B. (1974) *Islam from the Prophet Muhammed to the Capture of Constantinople: I Politics and War*. Translated by: Lewis, B. London: Macmillan.

<sup>172</sup> Kennedy, H. (2007) *The Great Arab Conquests: how the spread of Islam changed the world we live in*. Philadelphia: Da Capo Press.

<sup>173</sup> Haldon, J. and Kennedy, H. (2008) 'The Arab-Byzantine frontier in the eighth and ninth centuries: military organisation and society in the borderlands', in France, J. & De Vries, K. (eds.) *Warfare in the Dark Ages: The International Library of Essays on Military History*. Aldershot: Ashgate, pp. 445-482.

<sup>174</sup> Hoyland, R. (2014) *Khalifa ibn Khayyat's History on the Umayyid Dynasty (660—750)*. Translated by: Wurzel, C. Liverpool: Liverpool University Press; Roolvink, R., el Ali, S., Mones, H. and Mohd, S. (1969) *Historical Atlas of the Muslim Peoples*. Amsterdam: Djeembatam.

<sup>175</sup> Hourani, A. (2013) *A History of the Arab Peoples* op. cit.

<sup>176</sup> Kaldellis, A. (2017) *Streams of Gold, Rivers of Blood: The Rise and Fall of Byzantium, 955AD to the First Crusade*. Oxford: Oxford University Press.

<sup>177</sup> Hoyland, R. (2015), *In God's Path* op. cit. p.228.

<sup>178</sup> Amitai, R. (2006) 'The Mamluk institution or one thousand years of military slavery in the Islamic world', in Brown, C. & Morgan, D. (eds.) *Arming slaves from Classical times to the modern Age*. New Haven: Yale University Press, p.42.

exhibited military qualities of archery and cavalry, were valued,<sup>179</sup> and *mamluk* slaves were not of low status, given their military prowess.<sup>180</sup>

Although the caliphate never had much influence over the desert core of Arabia and the Abbasids lost some control of the fringes in the ninth century, subsequent pressure from the nomadic peoples on the sedentary peoples around them consisted of low level attacks such as infiltration into the Jezireh of northern Iraq by Arab nomads and semi-nomads or Kharijite brigands.<sup>181</sup> **[GIPPs #53, #101 selected]** Larger scale activity was rare, though in the 960s, the Bedouin confederacies of Kibab, Kalb, and Tayy controlled the desert fringe of Syria,<sup>182</sup> and the Carmathians of Bahrayn, using Arab tribesmen,<sup>183</sup> were able to capture the Black Stone from Mecca, ransoming it for \$GK 2.4 million in 931 (see Table 6.3). In 1123 a Bedouin confederacy almost captured Baghdad.<sup>184</sup> **[GIPP2 #6 selected]**

The intrusion of Turkish raiders and conquerors into Syria and Anatolia in the late eleventh century triggered a series of Crusades from western Europe, directed towards the Holy Land. **[GIPPs #61 - #67 selected]** The most successful was the 1<sup>st</sup> Crusade in 1095-1099 which passed through Anatolia to establish a string of Frankish states in Syria.<sup>185</sup> Within two years, reinforcing crusades failed to reach Syria through Anatolia **[GIPP2 #5 selected]**, and the disunited Muslim states began to unite under a series of rulers, who started to launch counter-offensives. In 1144, the capture of Edessa by Zengi triggered the 2<sup>nd</sup> Crusade (1148) which suffered severe losses in Anatolia and achieved little in reinforcing the Frankish states in Syria. The failure of the Frankish states to prevent the unification of Syria with Egypt under Saladin from 1174 onwards opened the way to Saladin's victory in 1187 at the Horns of Hattin, and the subsequent capture of Jerusalem.<sup>186</sup> This triggered the 3<sup>rd</sup> Crusade (1189-1192), which again demonstrated the difficulties of crossing Anatolia, and failed to recapture Jerusalem, but did preserve the rump of the Frankish states in Syria. The 4<sup>th</sup> Crusade (1202-1204) was diverted to Constantinople on the grounds of securing resources for the main attack on Jerusalem, but went no further (see Section 9.9 for further details). The 5<sup>th</sup> and 6<sup>th</sup> Crusades (1219 and 1249) were directed to the power base of the Ayyubid

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<sup>179</sup> Kaegi, W. E. (2019) 'Confronting Islam: emperors versus caliphs (641-c.850)', in Shepard, J. (ed.) *The Cambridge History of the Byzantine Empire c500-1492*. Cambridge: Cambridge University Press, pp. 365-394

<sup>180</sup> Irwin, R. (1986) *The Middle East in the Middle Ages: The Early Mamluk Sultanate 1250-1382*. Electronic book: ACLS Humanities Southern Illinois University Press, p.3.

<sup>181</sup> Kennedy, H. (1981) *The Early Abbasid Caliphate: A political history*. London: Croom Helm, p.21.

<sup>182</sup> Brett, M. (2017) *The Fatimid Empire*. Edinburgh: Edinburgh University Press, p.82.

<sup>183</sup> Brett, M. (2017) *The Fatimid Empire* op. cit. p.82.

<sup>184</sup> McLynn, F. (2016) *Genghis Khan: The man who conquered the world*. London: Vintage p. xxxiv.

<sup>185</sup> Runciman, S. (1965a) *A History of the Crusades Volume 1 The First Crusade*. Harmondsworth: Peregrine.

<sup>186</sup> Runciman, S. (1965b) *A History of the Crusades Volume 2 The Kingdom of Jerusalem*. Harmondsworth: Peregrine

successors of Saladin, followed by the Mamluk sultans, in Egypt,<sup>187</sup> on the basis that Muslim rulers would gladly exchange a major Egyptian city for Jerusalem,<sup>188</sup> and the 7<sup>th</sup> Crusade against Tunis (1270) was formally intended to gather resources for an attack on Egypt to secure such a bargaining counter for Jerusalem (see Section 9.6 for context). In the period 1220-1289, the advance of the Mongols provided a distraction for Muslim princes and potential allies for the Frankish states. It also provided an incentive to the Mamluk sultans of Egypt such as Baybar to reduce the dangerous enclaves on their western flank.<sup>189</sup> From 1268 to 1290, the Mamluk sultans systematically eliminated Frankish strongholds on the Syrian mainland.<sup>190</sup>

Crusades could become extremely political. The 3<sup>rd</sup> Crusade was hampered by the rivalries of the Kings of France and England; the Venetians manipulated the 4<sup>th</sup> Crusade to capture Hungarian territory before attacking Constantinople; in the crusade of Frederick II in 1229, the emperor was excommunicated by the Pope, but went on crusade anyway and successfully negotiated the return of Jerusalem from the Ayyubids [*GIPP2 #12 selected*]. This was reviled by his Christian enemies, for it was achieved in defiance of the Pope and not through the warfare of a “proper” crusade. In a crusade, negotiations were acceptable as the end to the war, after fighting had secured a victory, but they were not an alternative to the war.

## 9.6 NORTH AFRICA AND IBERIA

North Africa consists of a belt of arable land, mountain and dry grassland between the Sahara Desert and Spain, supporting both sedentary and nomadic peoples. Spain is separated from North Africa by a narrow strait that is readily crossed in both directions by invaders. Given its isolation from the rest of Europe by the Pyrenees Mountains, and the influence of North African invaders, Spain is treated as a separate region. The Sahara is an area of considerable climatic harshness, and has rarely served as a base for substantial organised nomad states, but it has been an ongoing reservoir of nomad raiders and infiltrators. Libyans and Blemmyes have attacked Egypt and Tuareg confederacies have raided into the Sudan belt, from this desert reservoir. The Nile also provides a routeway for peoples of less nomadic life style to penetrate into Egypt and it is sometimes a

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<sup>187</sup> Joinville, J. (1969) 'The Life of St Louis', in Shaw, M. (ed.) *Chronicles of the Crusades*. Harmondsworth: Penguin Books Ltd, pp. 161-353.

<sup>188</sup> It is likely enough that the Muslims would have acted so, but as an Egyptian city was never held long enough to be used as a bargaining chip, the point is moot.

<sup>189</sup> Khamisy, R. G. (2018) 'Baybar's Strategy of War against the Franks', *Journal of Medieval Military History*, XVI, pp. 35-63.

<sup>190</sup> Runciman, S. (1965c) *A History of the Crusades Volume 3 The Kingdom of Acre*. Harmondsworth: Peregrine.

problem to discern whether, for example, the most substantial threat to southern borders of Ptolemaic Egypt came from the settled kingdom of Irem in Nubia or an African desert people.<sup>191</sup>

From the earliest days of Carthaginian settlement and Roman conquest in North Africa, the various indigenous peoples had resisted them in organised wars, guerrilla campaigns and raids.<sup>192</sup> The attacks of the Moors of North Africa constantly troubled the neighbouring Romans [**GIPP #50 selected**], and reached as far as southern Spain in 171, during the reign of Marcus Aurelius,<sup>193</sup> causing damage to Roman silver mines.<sup>194</sup> The Roman frontier established a system of outposts to distinguish transhumant herd movements from the incursions of tribal raiders.<sup>195</sup> The fifth century Vandal invasion of Africa from Spain caused dislocations that “stimulated a new capacity for large-scale predatory ambition towards the wealth of the settled agricultural land”,<sup>196</sup> among the Moors. This did not recede after the Byzantine reconquest under Justinian in 535,<sup>197</sup> although the Berbers of Tripoli and Pentapolis were recruited as auxiliaries by the Byzantine emperor Heraclius in his 608 seizure of power,<sup>198</sup> and so were not a threat to the settled land.

The Arabs invaded North Africa and in 643, captured Tripoli in Libya, it was another fifty years before the Byzantine stronghold of Carthage was finally captured by the Arabs.<sup>199</sup> This was due largely to the ongoing resistance to the Arabs of the indigenous Berbers, led by chiefs such as the prophetess Kahina who was defeated in the period 698-703. Kahina was Jewish,<sup>200</sup> and it is arguable that the conflict could be regarded at that point by both sides as a holy war. The database entry so shows it.

Although the Arabs were sufficiently successful in their campaigning to establish their rule across North Africa (the Maghreb), turning the Berbers towards Islam [**GIPP #52 selected**] and passing

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<sup>191</sup> Burstein, S. (2015) “Alexander’s unintended legacy: borders” pp. 118-126 in Howe, T., Garvin, E. and Wrightson, G. (ed.) *Greece, Macedon and Persia*. Oxford: Oxbow Books.

<sup>192</sup> Kaegi, W. (2010) *Muslim Expansion and Byzantine Collapse in North Africa*. Cambridge: Cambridge University Press, p.4.

<sup>193</sup> Anonymous (1983) *Lives of the Later Caesars*. Penguin Classics. Translated by: Birley, A. Harmondsworth: Penguin Books, p.129.

<sup>194</sup> Hirt, A. M. (2020) “Gold and silver mining in the Roman empire”, pp. 111-124 in Butcher, K. (ed) *Debasement: manipulation of coin standards in pre-modern monetary systems*. Oxford: Oxbow Books.

<sup>195</sup> Southern, P. (2001), *The Roman Empire from Severus to Constantine*. London: Routledge, p.45.

<sup>196</sup> Heather, P. (2013) *The Restoration of Rome: Barbarian Popes and Imperial Pretenders*. London: Macmillan, p.171.

<sup>197</sup> Moorhead, J. (2019) 'Chapter 3 Western Approaches', in Shepard, J. (ed.) *The Cambridge History of the Byzantine Empire c500-1492*. Cambridge: Cambridge University Press, pp. 196-250.

<sup>198</sup> Howard-Johnston, J. (2021) *The Last Great War of Antiquity*. Oxford: Oxford University Press p.41, p.57.

<sup>199</sup> Kaegi, W. (2010) *Muslim Expansion and Byzantine Collapse in North Africa* op. cit. p.13.

<sup>200</sup> Julien, C.-A. (1970) *History of North Africa: Tunisia, Algeria, Morocco From the Arab Conquest to 1820*. Translated by: Petrie, J. London: Routledge & Keegan Paul, p.13.



on into Spain with an army that was largely Berber in composition **[GIPP #79 selected]**, they did not fully control land or people. The Islamic movement of the Kharijites served as a vehicle for Berber resistance,<sup>201</sup> establishing egalitarian sects.<sup>202</sup> This appealed to Berbers and led to a revolt (739-789) against the caliphate. A *mahdi* claimant, al-Zakia, routed the Abbasids from Morocco **[GIPP #81 selected]**, and by 880, the Aghlabids had seceded from the Abbasid caliphate, maintaining its independence with a black slave army. Seaborne Viking raiders reached both Iberia and the Maghreb from the 840s onwards, and may have given an impetus to the construction of fortified *ribats* along the coasts of both areas, where spiritual devotions were associated with military service.<sup>203</sup>

The Berbers continued, however, to be just as much a threat to successor states for “*the tribes were particularly susceptible to the appeal of the Muslim zealot who preached both for and against the political order: for the right which it represented and against the wrong that it did.*”<sup>204</sup> At the end of the 9<sup>th</sup> century, the Kutāma were drawn into a new Shi’ite Muslim community<sup>205</sup> with a small army. Nonetheless, they were able to overthrow the Aghlabids in Tunisia, and establish the Fatimid Caliphate.<sup>206</sup> **[GIPP #5 selected]** The Fatimids were themselves exposed to the same sort of risk of overthrow, first from a “false Mahdi” in 912 and then from an extreme Kharijite, Abū Yazīd, in 937-947.<sup>207</sup> **[GIPP #1 selected]**

After the Fatimids were able to conquer Egypt in 969 at a time of grain shortage, revenue shortage and low Nile floods,<sup>208</sup> they were less vulnerable to destruction by tribal rebellions such as that of Abu Rakwa (‘The man with the goatskin waterskin’) in 1004-1007. **[GIPP #111 selected]** Their attention moved towards matters such as trade with the Seljuks in Asia.<sup>209</sup> On the other hand, they were also less able to exercise control over the tribes of the Maghreb. As their control weakened, the Fatimids sent the Arab tribe of Banu Hillal against the Zirids in 1051, causing

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<sup>201</sup> Julien, C.-A. (1970) *History of North Africa* op. cit. p.19.

<sup>202</sup> Kennedy, H. (1981) *The Early Abbasid Caliphate* op. cit. p.188.

<sup>203</sup> Christys, A. (2015) *Vikings in the South: voyages to Iberia and the Mediterranean*. London: Bloomsbury Academic, p.p. 68-77.

<sup>204</sup> Brett, M. and Fentress, E. (1996) *The Berbers*. Oxford: Blackwell Publishers, p.93.

<sup>205</sup> Hamdani, S. (2006) *Between Revolution and State: The Path to Fatimid Statehood*. London: Institute of Ismaili Studies & IB Tauris. p.6.

<sup>206</sup> al-Maqrizi, T. a.-d. (2009) *Towards a Shi'i Mediterranean Empire: Fatimid Egypt and the founding of Cairo*. Translated by: Jiwa, S. London: IB Tauris & Co Ltd.

<sup>207</sup> Juvaini, A.-M. (1958) *The history of the World Conqueror Volumes I and II*. Translated by: Boyle, J. Manchester: Manchester University Press, pp.651-2.

<sup>208</sup> Hamdani, S. (2006) *Between Revolution and State: The Path to Fatimid Statehood*. London: Institute of Ismaili Studies & IB Tauris., p.80.

<sup>209</sup> Scanlan, G. (1973) 'A note on Fatimid-Saljuq trade', in Richards, D. (ed.) *Papers on Islamic History III: Islamic Civilisation 950-1150*. Oxford: Bruno Cassiser (Publishers Ltd).

devastation and the deepening Arabization of North Africa, possibly through mixture of peoples in the Libyan desert. **[GIPPs #102, #103 selected]**

In the 1040s, a religious leader, Ibn Yāsīn, began to preach the duty “to command the right and forbid the wrong” to the Berber nomads of the western Sahara. **[GIPPs #82, #83 selected]** By 1056 his followers had control of both the north and south ends of the trans-Sahara trade route. The army deployed by Ibn Yāsīn in 1058 was comparable in size to the initial Fatimid army a hundred and fifty years before.<sup>210</sup> In 1068, these *murābiṭūn* or Almoravids emerged from the Sahara **[GIPP #3 selected]** to conquer the whole of the Maghreb, fighting everything outside the Law of God, into which category, they placed paganism, Christianity and forms of Islam unacceptable to the Almoravids.<sup>211</sup> *Jihad* provided a basis for imposing Muslim unity,<sup>212</sup> and the Almoravids were anti-Kharijite.

In the period 1063-1085, Spanish Christians had received papal support for the *Reconquista* of Spain, which also laid the precedent for the subsequent 1<sup>st</sup> Crusade to the Holy Land. There were some Christian successes gained against a fragmented Muslim community in Iberia. In 1086, the Almoravids entered Spain to combat the Christian advance, although the Muslims proved somewhat unenthusiastic about being united by the Almoravids **[GIPP #56 selected]**.

In the period 1118-1121, Ibn Tumart arose as leader of the Almohads, claiming to be Mahdi, although he was not the only such claimant to the status of Mahdi. These claimants, al-Jizani, Ibn Talal, al-Massi and Ibn Qasi, took different political stances.<sup>213</sup> **[GIPPs #2, #83, #84, #106, #112 selected]** Ibn Tumart appealed to Berber mountain tribes, calling on his followers to “apply yourselves in *jihad* against the veiled infidels [Almoravids] for this is more important than combating the Christians and all the infidels twice or even more”. By 1147, the Almoravids were defeated in the Maghreb.

The Almohads campaigned in both Spain **[GIPP #57 selected]** and Ifriqiya (Tunisia), but by the early thirteenth century, there was increasing civil strife among the Almohad elite. By 1269, the Almohads had been defeated by the Banu Merin.<sup>214</sup> **[GIPP #109 selected]**

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<sup>210</sup> Messier, R. (2010) *The Almoravids and the Meanings of Jihad*. Santa Barbara: Praeger, p.35.

<sup>211</sup> Their name links them with the *ribats* where they established themselves. As noted above in the context of coastal defence against Viking raids, a *ribat* was a place where spiritual devotion was associated with military service.

<sup>212</sup> Bennison, A. (2016) *The Almoravid and Almohad Empires*. Edinburgh: Edinburgh University Press. p.29.

<sup>213</sup> Fromherz, A. (2013) *The Almohads: The rise of an Islamic Empire*. London: I.B. Tauris.p.146; Bennison (2016), pp.72-74.

<sup>214</sup> Brett and Fentress, (1996) *The Berbers* op. cit. p.115.

The Hafsids in Tunisia resisted a French crusade in 1270,<sup>215</sup> and also survived Merinid invasions in 1347 and 1353.<sup>216</sup> **[GIPP2 #15 selected]** The confederation of the Benu Merin first appeared in 1195 when the Almohads were still powerful. The revolt of the Merinids in 1215 was met by a large Almohad army and by 1224, the Merinids had suffered a severe defeat. However, they remained in existence, returning from the desert edge in 1244. After their victory over the Almohads in 1269, they reached a zenith in 1331-1351 before entering a long decline and lingering to 1465, although their power was effectively gone by 1420. By the 15<sup>th</sup> century, nomadic Zenata and nomadic Arabs were fusing, and by the following century, the area was becoming a battle zone between the gunpowder empires of Spain and the Turks.

### 9.7 SAHARA, SAHEL AND SUDAN BELT

The Sudan belt of Africa, the grasslands of *savannah* and *sahel* between the rain forests to the south and the Sahara desert to the north forms a wide and distinct ecological and cultural zone<sup>217</sup> although by no means isolated or entirely separated from the Mediterranean lands. Tumuli complexes were constructed that required a bigger society than a clan or nomadic family group, and pastoralism spread from the less arid Central Sahara into the more arid West Sahara.<sup>218</sup> Despite the time of the journey (3-4 months), Roman goods percolated across the desert as far as Senegal and the modern state of Sudan. although the desert became steadily drier throughout the study period, there were highland areas within the desert where life was possible and the Romans established a measure of control over groups such as the Garamantes.<sup>219</sup> Later, in the wider region, there were states with knowledge of Islam,<sup>220</sup> but having little concern to establish Islam as a state religion. Their armies were cavalry dependent, but horses were expensive to import from the north and liable to severe mortality from tsetse fly. Horse cavalry was associated with the ruling classes, with Tuareg allies from the Sahara supplying camel cavalry. Some of the Fulani

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<sup>215</sup> This was the 7<sup>th</sup> Crusade, which if successful, would have supported the ambitions of the King of France's brother, Charles of Anjou, in the western Mediterranean. In theory it was intended to obtain resources for an attack on Egypt that would then force the Muslims to return Jerusalem.

<sup>216</sup> Julien, C.-A. (1970) *History of North Africa* op. cit. p.147.

<sup>217</sup> See Holmes, P. (1987) *Nigeria: giant of Africa*. London: Swallow Editions Ltd; Anonymous (1988) *Nigeria: A jubilee Journey*. Buckhurst Hill: Scorpion Publishing Ltd; Udo, R. (1970) *Geographical Regions of Nigeria*. Berkley: University of California Press.

<sup>218</sup> Brooks, N., Clarke, J., Gauthier, Y. and Guagnin, M. (2018) 'The Extensive Survey', in Clarke, J.B., Nick (ed.) *The Archaeology of Western Sahara*. Oxford: Oxbow Books, pp. 56-105.

<sup>219</sup> Salama, P. (1989) 'The Sahara in classical antiquity', pp. 513-532 *General History of Africa II: Ancient Civilisations of Africa* (ed) Mokhtar, G., London, Unesco.

<sup>220</sup> Wilks, I., Levtzion, N. and Haight, B. (1986) *Chronicles from Gonja: a tradition of West African Muslim Historiography*. Translated by: Levtzion, N. Cambridge: Cambridge University Press.

people were nomads, mostly foot-based, and not militarily strong, but they were Muslim and willing to heed the teaching of their sedentary kinsfolk on the subject of *jihad*. Although the harsh conditions of the Sahara were generally an effective obstacle to invasion from further afield, on several occasions successful attacks were launched across the desert along established trade routes, or following the River Nile upstream.

A number of relevant themes (and events) may be discerned in the history of the region that inform (and are included in) later analyses. The first theme was the establishment of sedentary empires and states.<sup>221</sup> The Empire of Ghana was formed before the eighth century,<sup>222</sup> and built on the introduction of the camel to the Sahara in order to foster trans-Saharan trade in salt, gold and slaves, a trade which had the potential to detectably affect the valuation of European currencies (see Chapter 6). The Almoravids (covered more fully in the section on North Africa) attacked and destroyed Ghana over the period between 1055 and 1077,<sup>223</sup> in order to maximise their trade profits by gaining control of both ends of the trans-Saharan route [**GIPP #72 selected**]. In the 14<sup>th</sup> century, the empire of Mali in the 14<sup>th</sup> century was established.<sup>224</sup> This was followed by another great empire, Songhai, which in the period 1464-92 was able to pacify the Tuareg around Timbuktu,<sup>225</sup> [**GIPP #110 selected**] and fight against the Fulbe (a Fulani people), before it was crippled by a small but effective Moroccan army that travelled in 1590 across the Sahara.<sup>226</sup> The Moroccan forces soon became one of many autonomous groups, vying for control of the area with other groups from the Sahara.<sup>227</sup> The victory, decisive in the short-term, was less decisive in the longer run.<sup>228</sup>

A second theme is the intervention of nomads from the desert and semi-desert,<sup>229</sup> whose circumstances gave less impetus to state building.<sup>230</sup> The small population of the Sahara meant

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<sup>221</sup> Gomez, M. A. (2018) *African Dominion: A New History of Empire in Early and Medieval West Africa*. Princeton, New Jersey: Princeton University Press.

<sup>222</sup> Levtzion, N. (1971) 'The Early States of the Western Sudan to 1500', in Ajayi, J. & Crowder, M. (eds.) *History of West Africa*. London: Longman, pp. 120-157, p.120.

<sup>223</sup> Hogben, S. (1967) *An introduction to the history of the Islamic states of Northern Nigeria*. Oxford: Oxford University Press.

<sup>224</sup> Reid, R. (2020) 'The Ambiguity of Victory: The Spectrum of 'Winning' in African History', in Strohn, M. (ed.) *Winning Wars: The Enduring Nature and Changing Character of Victory from Antiquity to the 21st Century*. Oxford: Casemate Publishers, pp. 213-228.

<sup>225</sup> Hunwick, I. (1971) 'Songhai, Bornu and Hausaland in the sixteenth century', in Ajayi, J. & Crowder, M. (eds.) *History of West Africa*. London: Longman, pp. 202-239, p.225.

<sup>226</sup> Hunwick, I. (1971) 'Songhai, Bornu and Hausaland in the sixteenth century' op. cit. pp.237-238.

<sup>227</sup> Willis, J. (1971) 'The Western Sudan from the Moroccan invasion (1590) to the death of al-Mukhtar al-Kunti', in Ajayi, J. & Crowder, M. (eds.) *History of West Africa*. London: Longman, pp. 441-484, p. 451.

<sup>228</sup> Reid, R. (2020) 'The Ambiguity of Victory:', op.cit.

<sup>229</sup> Bendry, R. (2015) 'Review of Ethnoarchaeology of the Kel Tadarit Tuareg: Pastoralism and resilience in the Central Sahara by Stefano Biagetti', *Pastoralism: Research, Policy and Practice*, (5).

<sup>230</sup> Adeleye, R. (1971) 'Hausaland and Bornu 1600-1800', in Ajayi, J. & Crowder, M. (eds.) *History of West Africa*. London:

that the Tuareg based there were better suited to be raiders rather than conquerors of the Sudan belt, and the level of rainfall tended to drive the level of raiding.<sup>231</sup> Timbuktu on the River Niger became a Tuareg camp as early as the 12<sup>th</sup> century [**GIPP #58 selected**]. Despite the small number of horses in the area, with very few horses bred in Timbuktu and a dependence on animals imported from North Africa, the nomad raids could be wide ranging. The Tuareg in the east raided as far as the Hausa states in the late 17<sup>th</sup> century and by the 17<sup>th</sup> and 18<sup>th</sup> centuries, the Tuareg, at a time when the desiccation of their homeland was increasing,<sup>232</sup> were dominant along the middle Niger through the formation of the two confederacies of the Kel Tadmakka, and the Aulimadan.<sup>233</sup> Despite fear of nomad exploiters, there were always some sedentary groups willing to invite desert nomads to intervene in their conflicts, often resulting in widespread pillaging of sedentary lands.<sup>234</sup> There was often linkage of Islamic clerisy groups to nomad groups<sup>235</sup> and the Tuareg were prominent in making alliance with anti-Fulbe tribes.<sup>236</sup>

The third theme is the *jihads* of the Fulbe or Fulani who first began to be a significant presence during the tenth century in Futa Jallon (modern Sierra Leone and Guinea).<sup>237</sup> They fell into four groups,<sup>238</sup> and the viewed cattle as wealth.<sup>239</sup> The Fulani became discernable in Futa Toro during the 1330s and had reached Segu and Massina in the middle Niger delta in the time of Songhai.<sup>240</sup> [**GIPP2 #19 selected**] In the 1470s, Futa Jallon was finally conquered by the Fulani.<sup>241</sup> The Fulani became widely dispersed across West Africa,<sup>242</sup> with Fulani restiveness occurring in areas as far from Futa Jallon as Bornu (modern Nigeria).<sup>243</sup>

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Longman, pp. 485-530, p.486; Furta, A. b. (1987) *A Sudanic Chronicle: The Borno Expeditions of Idris Alauma (1564-1576)*. Translated by: Lange, D. Stuttgart: Fritz Steiner Verlag Weisbaden.

<sup>231</sup> Bovill, E. (1968) *The Golden Trade of the Moors*. London, p.12.

<sup>232</sup> Mulitza, S. et al (2010) 'Increase in African dust flux at the onset of commercial agriculture in the Sahel region' *Nature* Vol 466 | 8 July 2010 | doi:10.1038/nature09213

<sup>233</sup> Willis, J. (1971) 'The Western Sudan from the Moroccan invasion (1590) to the death of al-Mukhtar al-Kunti', in Ajayi, J. and Crowder, M. (eds.) *History of West Africa*. London: Longman, pp. 441-484.

<sup>234</sup> Thornton, T. (1999) 'Warfare, slave trading and European influence: Atlantic Africa 1450-1800', in Black, J. (ed.) *War in the Early Modern World 1450-1850*. Boulder: Westview Press, p. 129-146, p.140.

<sup>235</sup> Allowing the literate theological group to call upon the services of a militarily effective group.

<sup>236</sup> Azarya, V. (2001) 'The Nomadic factor in Africa: Dominance or Marginality', in Khazanov, A. and Wink, A. (eds.) *Nomads in the Sedentary World*. Abingdon: Routledge, pp. 250.

<sup>237</sup> Unlike the Tuareg, who were external to West Africa, the Fulani were an internal group. Last, M. (1967) *The Sokoto Caliphate*. London: Longmans.

<sup>238</sup> Johnston, H. (1967) *The Fulani Empire of Sokoto*. Oxford: Oxford University Press, p.21.

<sup>239</sup> Suret-Canale, J. (1971) 'The West Atlantic coast 1600-1800', in Ajayi, J. & Crowder, M. (eds.) *History of West Africa*. London: Longman, pp. 387-440, p.419.

<sup>240</sup> Willis, J. (1971) 'The Western Sudan from the Moroccan invasion (1590) to the death of al-Mukhtar al-Kunti', in Ajayi, J. & Crowder, M. (eds.) *History of West Africa*. London: Longman, pp. 441-484, p.461.

<sup>241</sup> Turchin, P., Currie, T. and Turner, E. (2016) 'Mapping the Spread of Mounted Warfare', *Cliodynamics*, 7, pp. 217-227.

<sup>242</sup> Stenning, D. (1954) *Savannah nomads: a study of the Wodabe Fulani of Western Bornu Province Northern Region Nigeria*. London: International African Institute Oxford University Press.

<sup>243</sup> Adeleye, R. (1971), 'Hausaland and Bornu 1600-1800' op. cit. p.507.

“Muslim scholars and military leaders organised successful movements of reform and state-building. The reform movements, they called *jihad*.”<sup>244</sup> Because the pastoral Fulani followed the lead of the sedentary and educated,<sup>245</sup> often for the booty,<sup>246</sup> *jihads* were effectively pastoralists led by the scholars.<sup>247</sup> There was a failed *jihad* in 1673 in Futa Jallon and more successful *jihads* in Futa Jallon, 1725-1776, and Futa Toro, 1776.<sup>248</sup> **[GIPPs #73-75 selected]** The Futa Toro *jihad* arose from a rising against a ruler who had failed to control intruding external nomads. The most notable of the Fulani *jihads* was, however, that led by Uthman dan Fodio in 1804, based initially in Gudu, within what is now Northern Nigeria **[GIPPs #6, #41-45, #76 selected]**. This established the Caliphate of Sokoto whose remnants survived to British colonial times and beyond.

There were also *jihads* in Massina (modern Senegal) among the Tukolors in 1810 and again among the Tukolors during 1852-54 under Umar **[GIPP #77 selected]**. The Umarian state failed to bring to reality its vision of a revitalised Islamic society, despite initial military successes.<sup>249</sup> Widespread rebellions among Muslim peoples prevented the state from controlling production and reaping the economic advantages.

Further to the east (modern Chad), and at a much earlier period, the polity of Kanuri was established by an Arab leading nomads with the Sefawa established as the 9-10<sup>th</sup> century dynasty of Kanuri.<sup>250</sup> In the thirteenth century, the first Kanuri empire was established through expansion into the Fezzan area of the Sahara.

In the far east, in the modern Sudan, Nubian pastoral communities lay on the fringe of the Meroitic state,<sup>251</sup> which eventually (late fourth century) divided into three successor states: Makuria, Nobadia and Alwa. Environmental changes, i.e increasing aridity, and nomadic pressure from the desert facilitated the emergence of these regional powers.<sup>252</sup> The initial attempt at Arab conquest,

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<sup>244</sup> Robinson, D. (2000) 'Revolutions in the Western Sudan', in Levtzion, N. & Pouivels, R. (eds.) *The History of Islam in Africa*. Athens: Ohio University Press, p. 131.

<sup>245</sup> Mabogunje, A. (1971) 'The land and peoples of West Africa', in Ajayi, J. & Crowder, M. (eds.) *History of West Africa*. London: Longman, pp. 1-32, p. 20.

<sup>246</sup> Bovill, E. (1968) *The Golden Trade of the Moors*. op. cit., p.230.

<sup>247</sup> Levtzion, N. (2000) 'Islam in the Bilad al Sudan to 1800', in Levtzion, N. & Peacock, A. (eds.) *The History of Islam in Africa*. Athens: Ohio University Press, p. 63.

<sup>248</sup> Johnston, H. (1967), *The Fulani Empire of Sokoto*. op. cit. p.24.

<sup>249</sup> Roberts, R. (1987) *Warriors, Merchants, and Slaves: The State and the Economy in the Middle Niger Valley, 1700-1914*. Stanford: Stanford University Press., pp. 78-9, p.82.

<sup>250</sup> Smith, A. (1971) 'The early states of the Central Sudan', in Ajayi, J. & Crowder, M. (eds.) *History of West Africa*. London: Longman, pp. 158-201, p.166.

<sup>251</sup> Brass, M. (2015) 'Interactions and Pastoralism along the Southern and Southeastern Frontiers of the Meroitic State, Sudan', *Journal of World Prehistory*, 28, pp. 255-288.

<sup>252</sup> Kozieradzka-Ogunmakin, I. (2021) 'New Insights into the Collapse of the Kushite Kingdom of Meroë', *Ancient Egypt*, 21(126), pp. 16-23.

attacking Makuria in 650, was repelled by Nubian archers.<sup>253</sup> **[GIPP #70 selected]** The subsequent conflict became a three-cornered fight between the sedentary Nubians, the various successive sedentary powers in Egypt and nomadic Arabs in the Sahara. In 1253, the Arabs achieved considerable success against the Mamluks of Egypt.<sup>254</sup> **[GIPP #119 selected]** During the sixteenth century, the Arabs were also allied against Alwa with the Funj of Sennar, a largely sedentary people who could call on the aid of their own and other people's nomads, for although the Funj were not regarded as good Muslims, their attacks from the south were helpful to the Arabs.<sup>255</sup> **[GIPP #71 selected]** Like most realms of the Sudan, the Funj themselves depended on slave soldiers and armoured cavalry.<sup>256</sup> By the beginning of the sixteenth century, the Funj were in occupation of Nubia.<sup>257</sup>

As noted above, the warfare of West Africa was greatly shaped by cavalry. The correct balance of cavalry and infantry was the key to victory.<sup>258</sup> The development of cavalry in the region may be dated to the fourteenth century.<sup>259</sup> In the fifteenth century, the realm of Kano (modern northern Nigeria) was able to gain success over the realm of Zaria, using horses and mail which the latter lacked.<sup>260</sup>

The Mossi states in the savannah from the upper river Volta in the modern states of Burkina Faso were cavalry dependent,<sup>261</sup> with heavy cavalry serving in a defensive role, while light cavalry were raiders. Indigenous populations served as supporting bowmen. In 1338, Mossi horsemen and Ghana took and looted Timbuktu.<sup>262</sup>

Many of the horses were small and best suited for javelin cavalry.<sup>263</sup> This could be effective. From the fourteenth to the sixteenth centuries (approximately), Muslim cavalry invasions of Jos Plateau

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<sup>253</sup> Hoyland, R. (2015), *In God's Path* op. cit. p.77.

<sup>254</sup> Hasan, Y. (1967) *The Arabs and the Sudan*. Edinburgh: Edinburgh University Press, p.100.

<sup>255</sup> Spalding, J. (2000) 'Pre-colonial Islam in the Eastern Sudan', in Levtzion, N. & Pouivels, R. (eds.) *The History of Islam in Africa*. Athens: Ohio University Press, p. 117.

<sup>256</sup> Graukroger, N. and Scott, R. (2011) *Cities of Gold: Africa and the Americas 1494-1698*. Oxford: Osprey.

<sup>257</sup> Kelley, R. (1985) *The Nuer Conquest*. Ann Arbor: University of Michigan Press.

<sup>258</sup> Smaldone, J. (1977) *Warfare in the Sokoto Caliphate: Historical and Sociological Perspectives*. Cambridge: Cambridge University Press, p.81.

<sup>259</sup> Turchin et al. (2016) 'Mapping the Spread of Mounted Warfare' op. cit.

<sup>260</sup> Insoll, T. (2003) *The Archaeology of Islam in sub-Saharan Africa*. Cambridge: Cambridge University Press, pp.297.

<sup>261</sup> Wilks, J. (1971) 'The Mossi and Akan states 1500-1800', in Ajayi, J. & Crowder, M. (eds.) *History of West Africa*. London: Longman, pp. 344-386, p.345.

<sup>262</sup> Turchin, P. et al, (2016) 'Mapping the Spread of Mounted Warfare' op. cit.

<sup>263</sup> Thornton, T. (1999), 'Warfare, slave trading and European influence: Atlantic Africa 1450-1800' op. cit. p.132.

are recorded as being repulsed by Sura tribesmen riding ponies, hurling javelins, and employing harrying guerrilla tactics.<sup>264</sup>

A heavy cavalry striking force required imported horses from North Africa and access to mail such as that made by the Hausa, which left such cavalry very expensive. Imported muskets were also expensive. Neither heavy cavalry nor guns were assured of success. The battle of Hausa and Fulani at Tabkin Kwotto in 1804 illustrated their potential for failure.<sup>265</sup> In the *jihad* period of 1790-1817, the Fulani depended upon bow and arrow wielded by infantry at long range, waging a guerrilla war where fortresses, lacking a standing garrison, were likewise of limited value.<sup>266</sup> Later on (1817-1860) the Fulani added to their forces light cavalry armed with sword and spear to fight hand-to-hand.

The effective use of gunpowder also required the development of appropriate tactics, which was largely lacking. In West Africa, the musketeers were usually slave troops,<sup>267</sup> and guns were more valued in this period and region for noise-making than for the delivery of large volumes of fire power.<sup>268</sup> In 1852, Umar Tal led east an army of Tukolors from Futa Toro, equipped with rifles and muskets, but the weapons proved little more effective against the pagans than they had in earlier conflicts.<sup>269</sup>

## 9.8 BALTIC AND OTHER CRUSADES

The modern Baltic states, Lithuania, Latvia and Estonia, lie on the southern shores of the Baltic in the last area of Europe to be Christianised, a process that began late and did not reach completion until the late fourteenth century. In terms of geography, the area, though remote from the cultural centres of Europe, is not notably different from the surrounding areas. The process of Christianisation was linked with the colonisation and exploitation of the Baltic by Germans and

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<sup>264</sup> Turchin, P. et al. (2016) 'Mapping the Spread of Mounted Warfare' op. cit.

<sup>265</sup> Johnston, H. (1967) *The Fulani Empire of Sokoto*. Oxford: Oxford University Press, p.45.

<sup>266</sup> Smaldone, J. (1977) *Warfare in the Sokoto Caliphate*: op. cit.

<sup>267</sup> Thornton, J. (2006) 'Armed Slaves and Political Authority in Africa in the era of Slave Trade 1450-1800', in Brown, C. & Morgan, D. (eds.) *Arming Slaves from Classical Times to the Modern Age*. New Haven: Yale University Press, p. 84.

<sup>268</sup> It was not enough simply to acquire gunpowder weapons. Troops needed to evolve the best tactics for the use of the equipment. In 1520, the battle of Raichur in southern India involved the use of recently acquired gunpowder weapons, and it was the defeated party rather than the victors who learned the lessons of the battle. See Eaton, R. M. (2020) *India in the Persianate Age 1000-1705*. London: Penguin, pp. 169-70.

<sup>269</sup> Pakenham, T. (1992) *The Scramble for Africa 1876-1912*. London: Abacus, p.166.



Danes. The Danes were only partially Christianised in 1100 and engaged in Baltic sea raiding against Slavic towns and settlements, while the Wends retaliated as light cavalry raiders. Raiding and slaving were the predominant activities in this warfare, for such operations could be carried out by frontiersmen. Conquest was more dangerous as it involved taking an army overseas.<sup>270</sup>

Bernard of Clairvaux arranged in 1147 for a papal bull that authorized North Germans to go against local heathen populations to convert or wipe them out, which speedily led to a clash of interests over conduct and objectives between locals and crusaders, for as the Bishop of Stettin in Pomerania said, when his diocesan seat of Stettin was threatened by the first army of crusaders in the area: *"If they had come to strengthen the Christian faith ... they should do so by preaching, not arms"*. Nonetheless, campaigns against the Wends and other Slavs in the following forty years were broadly successful in converting and subjugating them.<sup>271</sup>

By the start of the thirteenth century, this left unconquered the Balts (a language group including mostly Prussians and Lithuanians, but also other tribes), who were a people numerous, warlike, committed to their religion and living in defensible terrain to the south of the Baltic.<sup>272</sup> In these respects, they did not differ greatly from other peoples in Ireland/Scotland/Wales, Brandenburg and Spain, at the cutting edge of medieval European expansion. They were pagans and lived in largely inaccessible woods, marshes, and moors. They comprised Prussians, Lithuanians, Latvians and Curonians. The Lithuanians were less numerous than Prussians, living in hamlets of about 50 people across five to eight households, but were ruled by five great chiefs and sixteen lesser chiefs so that thirteenth century Mongol attacks from the east affected some twenty princes, of varied prominence. Adjacent to these peoples were the Livs, forming three tribes, **[GIPP2 #14 selected]** while the neighbouring Estonians were organised in fifteen to sixteen tribes **[GIPP2 #14 selected]**.

Set against these peoples were several orders of armed monks: the Knights of Christ (Sword Brothers), established in 1202 in Riga and the Knights of Dobrin, established in 1207, and who were tasked with the mission of serving as perpetual garrison in their lands. In 1229 the Teutonic Knights, originally founded in the Kingdom of Acre, also established themselves in the Baltic area. By 1290, an area the size of Britain, with a population of perhaps 1.25 million, had been conquered in East Baltic lands. The situation was complicated by the presence of Orthodox Rus' beyond the

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<sup>270</sup> Christiansen, E. (1997) *The Northern Crusades*. London: Penguin, p.47.

<sup>271</sup> Reynolds, B. (2016) *The Prehistory of the Crusades: Missionary War and the Baltic Crusades*. London: Bloomsbury Academic.

<sup>272</sup> Bartlett, R. (1993), *The making of Europe: Conquest, Colonisation and Cultural Change*. London: BCA, p.17.

Baltic lands in Russia.<sup>273</sup> They had their own interests in the area, and by the period 1240-1378<sup>274</sup>, the encounters of Catholic Germans and Scandinavians with Orthodox Rus left the two parties at loggerheads. Over much the same period (1283-1410)<sup>275</sup>, the Order of the Teutonic Knights, having conquered Prussia, set about the conquest of Lithuania [**GIPP #68 selected**].

Despite savage and prolonged campaigning, the Teutonic Knights failed in this attempt. The forested and swampy land only permitted a raiding style of warfare to which the Lithuanians were quite as well fitted as western knights. Turchin cites the Lithuanian response of consolidation as an example of the impact of meta-ethnic frontier pressure.<sup>276</sup> In 1290, Lithuania was an area of 120 miles radius under twenty princes, but by 1377 it was an area of 400 miles radius, under one prince, whose status was sufficient to command a dynastic alliance with Poland (1386). That alliance sufficed to break the power of the Teutonic Knights at the Battle of Tannenburg (1410), a fight in which all three participants were at least notionally Catholic.<sup>277</sup>

Crusades other than in the Baltic were also organised in Europe. Some were directed against the Moors in Spain, to assist the *Reconquista*, but the majority had the Holy Land as their ultimate objective, albeit sometimes with an (occasionally, extremely) indirect approach. Other European crusades were directed towards heretics such as the Albigenses of Languedoc (1209-1244) [**GIPP #108 selected**] or the Hussites of Bohemia (1419-36) [**GIPP2 #1 selected**]. The former was a military success,<sup>278</sup> but the latter was not.<sup>279</sup> More detail is provided in Chapter 3.

## 9.9 WESTERN STEPPES, BALKANS, RUSSIA AND REST OF EUROPE

The Ponto-Caspian steppes, north of the Black Sea and Caspian, and with their extension into Hungary, are the richest of the steppe lands of Eurasia.<sup>280</sup> To the north are forest lands, deciduous and then coniferous (Russian and Baltic) with relatively abundant swamps. To the south lies the

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<sup>273</sup> Selart, A. (2015) *Livonia, Rus' and the Baltic Crusades in the Thirteenth Century*. Leiden: Brill.

<sup>274</sup> Dates referred: A newly intruded Swedish fort on Neva was destroyed by Novgorod: 1295 A crusade against Russia was preached, but failed to materialise: 1378. See Christiansen, E. (1997) *The Northern Crusades*. op. cit. pp. 177-198.

<sup>275</sup> Dates referred: Final subjugation of Prussia and turning of attention of Teutonic Knights to Lithuanians: 1283: Decisive defeat of Teutonic Knights at Tannenberg by allied Poles and Lithuanians: 1410. See Christiansen, E. (1997) *The Northern Crusades*. op. cit. pp.139-176.

<sup>276</sup> Turchin, P. (2006), *War and Peace and War*. London: Penguin, p.194.

<sup>277</sup> Urban, R. (2003) *The Teutonic Knights: a Military History*. London: Greenhill, Chapter 10.

<sup>278</sup> Barber, M. (2000) *The Cathars: Dualist Heretics in Languedoc in the High Middle Ages*. Harlow: Pearson Education Limited.

<sup>279</sup> Verney, V. (2009) *Warrior of God: Jan Zizka and the Hussite Revolution*. Barnsley, Frontline Books.

<sup>280</sup> Frank, A. (2015) 'The Western steppe: Volga-Ural region, Siberia and the Crimea', in di Cosmo, N., Frank, A. & Golden, P. (eds.) *The Cambridge History of Inner Asia: The Chinggisid Age*. Cambridge: Cambridge University Press, p. 237.

mountainous Balkans, extending to the Mediterranean. Westward is the rest of Europe, a composite region including France, Germany, Italy and Scandinavia with their marches.<sup>281</sup> The offshore islands of Britain and Ireland are excluded on the grounds that they are not accessible without ships<sup>282</sup>. Although the Vikings of Scandinavia used ships to access Russia, the Ponto-Caspian steppe and Anatolia/Balkans in the East, as well as Iberia and Maghreb in the West, they could in theory be reached by land from the steppes. The “rest of Europe”, in the period of this study, included a mixture of cultivated, wooded, hilly, mountainous and swampy terrain that was not conducive to the nomad style of warfare.

Nomads moving westwards through the steppes towards European lands, possibly fleeing from a stronger nomad power and bringing with them, their own culturally distinct treasures out of Central Asia,<sup>283</sup> found themselves passing into richer but more constrained pastures. Return into the east involved movement against the ecological gradient, entering poorer pastures again, and it was impossible if a stronger nomad power was following behind from the east. If the sedentary powers, taking the case of the Byzantine Empire, were able to persuade this second nomadic power to make an alliance, the prospects for the survival of the initial nomadic power were not good, as per the destruction of the Petchneps by an alliance of Byzantines and Cumans at the battle of Lebonion (1091).<sup>284</sup> Conversely, if it happened that several nomadic powers attacked at the same time, deploying the full strength of the empire in one theatre might become impossible.<sup>285</sup> The Byzantines thus needed to manage diplomacy so as to ensure that the nomads were disunited and one of their groups was an ally.<sup>286</sup> This could be done by trade and subsidy

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<sup>281</sup> Backman, C. R. (2003) *The Worlds of Medieval Europe*. Oxford: Oxford University Press.

<sup>282</sup> The experience of the Avars besieging Constantinople and the Mongols invading Java and Japan suggests that less militarily sophisticated nomads would have fared very badly indeed with amphibious attacks. The eleventh century Turkish emir Tzachas (Anna Comnena’s version of his name) did have some maritime success in the Aegean, but his ships appear to have been locally built and, more importantly, locally crewed. (See Comnena, A. (1969) *Alexiad of Anna Comnena*. Translated by: Sewter, R. Harmondsworth: Penguin, pp. 274-275 and elsewhere). In the fourteenth century, Umur and other Turks in coastal emirates of Anatolia also had some considerable naval success, but on a similar basis to Tzachas. (See Luttrell, A. (1970) 'The Crusade in the Fourteenth Century', in Hale, J., Highfield, R. and Smalley, B. (eds.) *Europe in the Late Middle Ages*. London: Faber and Faber Ltd, pp. 122-154).

<sup>283</sup> Szmoniewski, B. S. (2008) 'Two worlds: one hoard. What do metal finds from the forest-steppe belt speak about?' pp. 263-296 in Curta, F. & Kovalev, R. (ed) *The Other Europe in the Middle Ages Avars, Bulgars, Khazars and Cumans* Leiden, Brill.

<sup>284</sup> Haldon, J. (2001) *The Byzantine Wars*. Stroud: Tempus, p.127. The destruction was not complete, allowing the Petchneps to be destroyed again by the next emperor, but as a power, they counted for little thereafter.

<sup>285</sup> Kaldellis, A. (2017) *Streams of Gold, Rivers of Blood: The Rise and Fall of Byzantium, 955AD to the First Crusade*. Oxford: Oxford University Press, p.181.

<sup>286</sup> Petersen, L. I. R. (2017) 'In Search of Equilibrium: Byzantium and the Northern Barbarians: 400-800', *Journal of Medieval Military History*, XV, pp. 37-68.

that resulted in the movement of silver and gold to groups such as the Khazars, Onogur Bulgars and Avars,<sup>287</sup> and ensured protection of the frontiers.<sup>288</sup>

Initially, movement between the steppes and the rest of Europe appears to have been in both directions.<sup>289</sup> It seems likely that the horse was first tamed in the Ponto-Caspian steppes. Given the strategic and tactical advantages of access to the horse, the established cultures of the area quickly became much stronger militarily, able to repel attacks by powers such as the Persians **[GIPP #117 selected]**. The Cimmerians and Scythians were indistinguishable culturally,<sup>290</sup> though archaeologically and historically it is known that Royal Scythians and Nomad Scythians were nomad,<sup>291</sup> while other Scythians were semi-nomad or sedentary. The plains north of the Caucasus were used by both Scythian and Cimmerian as a base for attacks on the Near East, as described in the section of this study on Arabia and the Near East.<sup>292</sup> Neighbouring nomad peoples such as the Getae allied with sedentary peoples such as the Odrysian Thracians, supplying considerable numbers of horse archers.<sup>293</sup> The threat of horse archers could be handled in the mountains and woods of the Balkans, as the Macedonian Successor king Lysimachus did in 313 BCE,<sup>294</sup> but in the more open lands beyond the Danube, twenty years later, Lysimachus was resoundingly defeated.<sup>295</sup> Others were more successful beyond the Danube. There is some evidence of Galatian encroachment onto the Hungarian steppe from Bohemia in the mid fourth century BCE and onto the Ukrainian steppe from the Balkans in the later 3<sup>rd</sup> century BCE.<sup>296</sup> The rulers of Pontos in the second and first centuries BCE were able, assisted by sea power, to establish footholds in coastal cities of the Crimea and Ukrainian steppe, which allowed them to defeat the nomads and regulate

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<sup>287</sup> Somogyi, P. (2008) 'New remarks on the flow of Byzantine coins in Avaria and Walachia in the 2<sup>nd</sup> half of the seventh century.' pp. 83-150 in Curta, F. & Kovalev, R. (ed.) *The Other Europe in the Middle Ages: Avars, Bulgars, Khazars and Cumans*: Leiden, Brill.

<sup>288</sup> Vachkova, V. (2008) 'Danube Bulgaria and Khazaria as part of the Byzantine *oikoumene*' pp. 339-362 in Curta, F. & Kovalev, R. (ed) *The Other Europe in the Middle Ages Avars, Bulgars, Khazars and Cumans* Leiden, Brill.

<sup>289</sup> Childe, V. G. (1957a) *The Dawn of European Civilisation*. St Albans: Paladin, pp.193-220.

<sup>290</sup> Byzantine writers used the term 'Skythian' of nomadic, lightly armoured and flexible cavalry peoples north of the Black Sea. At different times, Huns, Avars, Turks, Bulgars, Hungarians, Pechenegs and Cumans were so described. See Kaldellis, A. (2013), *Ethnography after Antiquity: Foreign Land and Peoples in Byzantine Literature*. Philadelphia: University of Pennsylvania Press.p.113.

<sup>291</sup> Philips, E. (1965) *The Royal Hordes: Nomad Peoples of the Steppes*. London: Thames & Hudson.

<sup>292</sup> Melykova, A. (1990) 'The Scythians and Sarmatians', in Sinor, D. (ed.) *The Cambridge History of Early Inner Asia*. Cambridge: Cambridge University Press, p.98.

<sup>293</sup> For example, the Odrysian army contingent in King Sitalces' army in 429 BCE was one third cavalry, and the nomadic Getae were the second most important contributors of cavalry. Thucydides (1968) *The Peloponnesian War*. Trans Warner, R. Harmondsworth: Penguin, pp.159-160.

<sup>294</sup> Bennett, B. & Roberts, M. (2019) *The Wars of Alexander's Successors 323-282BC: Volume I Commanders and Campaigns*. Barnsley: Pen & Sword, p.155.

<sup>295</sup> Bennett, B. & Roberts, M. (2019) *The Wars of Alexander's Successors 323-282BC: Volume I* op. cit., p.187

<sup>296</sup> Grainger, J. D. (2019) *The Galatians: Celtic Invaders of Greece and Asia Minor*. Barnsley: Pen and Sword, pp. 6-8, 76-79.

trade.<sup>297</sup> Another nomad people, the Sarmatians, formed of many tribes such as the Alans, emerged from the Aral area in the fourth century BCE,<sup>298</sup> and established themselves from the Volga as far west as the Hungarian plain. There, they raided their sedentary neighbours, including the Romans [*GIPP #93 selected*], who proved able to defend their frontiers effectively,<sup>299</sup> until the need was removed when the Huns shattered the power of the Alans and other Sarmatian peoples in 375.<sup>300</sup> The Goths, whose ancestors had migrated from the shores of the Baltic south-east onto the Ukrainian steppe in the third and fourth centuries CE, were forced out again south-west onto the Roman borders by the arrival of the Huns [*GIPP2 #7 selected*]. The Gothic victory over the Romans at the battle of Adrianople (378) was disastrous for the long-term defence of the Roman frontier.<sup>301</sup>

The origin of the Huns has remained a matter of scholarly debate, since at least the time of Gibbon. One theory suggests that when the Chinese were able to defeat the Hsiung-nu in 89 CE through the division of the nomads (see the section on Mongolia and China for more details), many of the defeated fled west across the River Irtysh. The reason for the three hundred years delay in attacking Rome is variously attributed to a hope of return to the East, to the strength of the Alans, to the strength of Rome, or to the demoralisation and disunity of the Hsiung-nu, whose name does bear a similarity of sound to 'Hun'.<sup>302</sup> On the other hand, climatic warming and nomad pressure from behind would have provided an incentive to move more quickly.<sup>303</sup> The Akatzirs were at the rear of the Huns.<sup>304</sup> The treatment meted out to the sedentary states with which the Huns came in contact was also similar to the practice of the Hsiung-nu [*GIPP #35 selected*], though as noted above, the pressure of the Huns on German tribes added further problems for the Roman empire beyond.<sup>305</sup> Some characterises Hunnic society as essentially parasitic, dependent on neighbouring sedentary peoples for textiles, weapons and grain, and extracting tribute of gold from

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<sup>297</sup> Roller, D. (2020) *Empire of the Black Sea: The Rise and Fall of the Mithridatic World*. Oxford: Oxford University Press, pp. 64-67, 113-119.

<sup>298</sup> Baumer, C. (2016b) *The History of Central Asia: The Age of the Steppe Warriors*. (3 vols). London: IB Tauris & Co Ltd.

<sup>299</sup> By, amongst other things, using the *testudo* to defend against Alan missiles. Howe, T. (2015) 'Arrian and 'Roman' military tactics: Alexander's campaign against the autonomous Thracians,' pp.87-93 in Howe, T., Garvin, E. and Wrightson, G. (eds.) *Greece, Macedon and Persia*. Oxford, Oxbow Books.

<sup>300</sup> Melyukova, (1990) 'The Scythians and Sarmatians' op. cit. p.113.

<sup>301</sup> Heather, P. (1998) *The Goths*. Oxford, Blackwell Publishing.

<sup>302</sup> Hodgkin, T. and Newark, T. (1996) *Huns, Vandals and the Fall of the Roman Empire*. London: Greenhill Books, pp.11-38.

<sup>303</sup> Heather, P. (2009) *Empires and Barbarians: Migration, Development and the Birth of Europe*. London: Macmillan, pp. 212-13.

<sup>304</sup> Sinor, D. (1990c) 'The Hun Period', in Sinor, D. (ed.) *The Cambridge History of Early Inner Asia*. Cambridge: Cambridge University Press, p.190.

<sup>305</sup> Thompson, E. (1982) *Romans and Barbarians: The decline of the Western Empire*. Madison Wisconsin: The University of Wisconsin Press; Potter, D. S. (2004) *The Roman Empire at Bay AD 180-395*. London: Routledge; Jones, A. (1966) *The Decline of the Ancient World*. London: Longman; Jones, T. and Ereira, A. (2006) *Terry Jones' Barbarians*. London: BBC Books.

neighbouring states.<sup>306</sup> Attila the Hun was aiming to profit from plunder in wartime and extortion in peace.<sup>307</sup> Given that he was a successful khan, his views prevailed as policy.<sup>308</sup> At other times, Huns readily served as mercenaries for sedentary states.<sup>309</sup> In their dependence on sedentary neighbours for the weapons used against them, the Huns may be grouped with the Avars, Turks and even the Mongols. The shift in Hunnic society to where “*Instead of herding cattle, they had learned the more profitable business of herding men*”<sup>310</sup> led to growing inequality within that society and to the overstretch of their limited manpower. Once they settled in Hungary, there were perhaps about 15,000 mounted Hunnic warriors, presumably supported by auxiliaries levied from the subject Germanic and Slavic peoples.<sup>311</sup> Some regard the Hun effect as broadly benign.<sup>312</sup> Delbruck in his history of the art of war is extremely quiet about the activities of the Huns in general and Attila in particular,<sup>313</sup> presumably because acknowledging their skill and success would have called into question his basic thesis of German military superiority to all other peoples. Essentially, however, the Hunnic empire was unstable and disintegrated upon Attila’s death in 454, leaving two nomadic fragments, the Utigurs and Cutrigurs [*GIPPs #85, #86 selected*] who were reluctant to attack each other, “*For they not only speak our language, dwell in tents like us, dress like us and live like us, but they are our kin, even if they follow other leaders*” (Menander Protector).<sup>314</sup> Despite their reluctance to attack each other, it was possible to play one against the other.<sup>315</sup>

In 552-559, the Avars, a mixture of Mongols and White Huns under pressure from the West Turks, began to move west out of central Asia [*GIPP #33 selected*]. There were perhaps 20,000 of them,<sup>316</sup> and they brought a number of technological innovations such as stirrups and hand-powered trebuchets<sup>317</sup>. They appear to have planned large scale attacks rather than smaller raids.<sup>318</sup> By 558 they were approaching the Balkan frontier of the Byzantine empire, seeking

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<sup>306</sup> Thompson, E. (1996) *The Huns*. Oxford: Blackwell Publishers, pp.177-202.

<sup>307</sup> Goldsworthy, A. (2010) *The Fall of the West: The Death of the Roman Super-Power*. London: Phoenix, p.323.

<sup>308</sup> Man, J. (2005) *Attila the Hun: A Barbarian King and the Fall of Rome*. London: Bantam Press.

<sup>309</sup> Hughes, I. (2016) *Belisarius: The Last Roman General*. Barnsley: Pen and Sword.

<sup>310</sup> Thompson, (1996), *The Huns* op. cit. p.195.

<sup>311</sup> Linder, R. (1981) 'Nomadism, Horses and Huns', *Past & Present*, (92) p. 1. Page numbers?

<sup>312</sup> Kim, H. J. (2016) *The Huns*. Abingdon: Routledge.

<sup>313</sup> Delbruck, H. (1990b) *The Barbarian Invasions: History of the Art of War Volume II*. Translated by: Renfroe, W. London: University of Nebraska Press.

<sup>314</sup> Quoted in Pohl, W. (2006) 'Telling the difference: signs of ethnic identity', in Noble, T. (ed.) *From Roman Provinces to Medieval Kingdoms*. London: Routledge, p.120.

<sup>315</sup> Heather, P. (2018) *Rome Resurgent: War and Empire in the Age of Justinian*. Oxford: Oxford University Press. p.281.

<sup>316</sup> Szadwczky-Kardoss, S. (1990) 'The Avars', in Sinor, D. (ed.) *The Cambridge History of Early Inner Asia*. Cambridge: Cambridge University Press, p.206.

<sup>317</sup> Haldon, (2001) *The Byzantine Wars* op. cit. p.49.

<sup>318</sup> Petersen, L. I. R. (2017) 'In Search of Equilibrium: Byzantium and the Northern Barbarians: 400-800' op. cit.

subsidies as they absorbed Utigurs and Cutrigurs,<sup>319</sup> and conquered Slavs,<sup>320</sup> Germans and Byzantines.<sup>321</sup> **[GIPP2 #16, #17, #18 selected]** In 576, the Turks began to follow them and left the Khazars in the Caucasus area on the division of the Khanate in 582. The anger of Turks, when the Byzantines allied with the Avars,<sup>322</sup> had to be set against the way that the Avars were picking a fight by making outrageous demands, for example, requesting an elephant and a golden couch in 583, as proof of imperial friendship.<sup>323</sup> The Avars were able to make their own alliances, in particular with the Persians with whom they cooperated in the siege of Constantinople in 626. Prestige was key for nomad empires,<sup>324</sup> and the failure of that siege initiated the Avar decline, which was nonetheless long drawn out, before their conquest by Charlemagne as part of his wider strategy of Carolingian expansion.<sup>325</sup> **[GIPP2 #10 selected]**

The Utigurs and Cutrigurs emerged again, combining as Bulgars **[GIPP #87 selected]**, but their state collapsed in 630 and by 650 they were being forced westward by Khazar pressure,<sup>326</sup> crossing the Danube in 670.<sup>327</sup> Some Bulgars had already (in 631) ventured as far west as Bavaria to seek refuge with the Frankish king Dagobert, with the survivors of the massacre that he subsequently organised against them finally taking refuge among the Wends.<sup>328</sup> The Khazars were powerful enough to adopt Judaism rather than Christianity or Islam,<sup>329</sup> **[GIPPs #39, #98 selected]** and they established trade as well as simply applying military pressure to their neighbours. This led to the acquisition of considerable wealth. Greater economic development is possible to nomads organised in a state (such as the Khazars)<sup>330</sup> compared with that possible to stateless nomads.<sup>331</sup> There was exchange across the nomad-sedentary divide. The sedentary Rus' adopted a system of

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<sup>319</sup> Heather, P. (2013) *The Restoration of Rome: Barbarian Popes and Imperial Pretenders*. London: Macmillan, pp.183.

<sup>320</sup> Pohl, W. (2018) *The Avars: a Steppe Empire in Central Europe 567-822*. Ithaca: Cornell University Press, p.117.

<sup>321</sup> Vida, T. (2008) Conflict and Co-existence. 'The Local Population of the Carpathian Basin under Avar rule (sixth to seventh century)' pp. 13-46 in Curta, F. & Kovalev, R. (ed) *The Other Europe in the Middle Ages Avars, Bulgars, Khazars and Cumans* Leiden, Brill.

<sup>322</sup> Obolensky, D. (2000) *The Byzantine Commonwealth Eastern Europe 500-1453*. London: Phoenix Press, pp.168.

<sup>323</sup> Heather, P. (2013), *The Restoration of Rome*, op. cit. p.179.

<sup>324</sup> Heather, P. (2013), *The Restoration of Rome*, op. cit. p.184.

<sup>325</sup> Bowlus, C. R. (2003) 'Italia-Bavaria-Avaria: The Grand Strategy behind Charlemagne's *Renovatio Imperii* in the West', *Journal of Medieval Military History*, 1, pp. 43-60.

<sup>326</sup> Fidler, U. (2008) 'Bulgars in the Lower Danube Region. A survey of the Archaeological evidence and the state of current research.' pp. 151-256 in Curta, F. & Kovalev, R. (ed) *The Other Europe in the Middle Ages Avars, Bulgars, Khazars and Cumans* Leiden, Brill.

<sup>327</sup> Haldon, J.(2001), *The Byzantine Wars* op. cit. p.71.

<sup>328</sup> Cited in Mondschein, K. (2017) *Game of Thrones and the Medieval Art of War*. Jefferson, NC: McFarland and Company, Inc, p192. Fredegar (1960) *The Fourth Book of the Chronicle of Fredegar with its continuations*. Translated by: Wallace-Hadrill, J.M. Oxford: Oxford University Press. Reprint, Greenwood Press Book 4,72 (p.60).

<sup>329</sup> Fletcher, R. (1997) *The Conversion of Europe from Paganism to Christianity 371-1386AD*. London: HarperCollins p. 352.

<sup>330</sup> Not all would characterize Khazaria as a state. See Hartley, J. M. (2021) *The Volga: a history of Russia's greatest river*. London: Yale University Press, p.13.

<sup>331</sup> Noonan, T. (2001) 'The Kazar Qaghanate and its Impact on the early Rus' State: The *Translatio Imperii* from Itil to Kiev', in Khazanov, A. & Wink, A. (eds.) *Nomads in the Sedentary World*. Abingdon: Routledge.

succession similar to the Turkish, and Georgians made much use of Kipchaks as soldiers.<sup>332</sup> The Volga Bulgars turned to Islam (922)<sup>333</sup> as part of their struggle with the Khazars, for the religion served as social cement.<sup>334</sup>

Even after defeat in 737 by the Arabs [*GIPP #99 selected*], the Khazars retained some power in alliance with the Magyars and with Volga Bulgars who had remained in the east and settled down by the eighth century to grow grain and trade in furs, forest products, slaves and swords with areas as far apart as India, Egypt and Scandinavia.<sup>335</sup> It was not until 1050 that the Khazars finally disappeared. The Avars were destroyed in 796 by the Franks and Danube Bulgars.<sup>336</sup> The Danube Bulgars established a mixed polity with nomad boyars as the warrior aristocracy over lower classes with a Slavic admixture, able to make religious inscriptions in Greek to invoke the *Tengri*.<sup>337</sup> Although the polity lasted a long time [*GIPP #34 selected*], the routes through the Balkans to Constantinople were narrow and difficult,<sup>338</sup> and the struggle with Byzantium was balanced.<sup>339</sup> By the time that it was resolved, the Bulgars had ceased to be nomadic,<sup>340</sup> and had adopted a Slavic language.

In 860, the Patzinaks or Petchnegs emerged from the Aral area [*GIPPs #36, #97 selected*] to force back the Magyars, who retreated to Hungary by 893,<sup>341</sup> [*GIPP #40 selected*] and began intensive raiding of Germany and neighbouring Slavs, until their defeat at Lechfeld in 955. They needed raids as a substitute for access to Russian trade routes, although they had difficulty in bringing back slaves from their deep penetrating raids.<sup>342</sup> Another alternative was fighting as mercenaries for sedentary peoples such as Moravians, Germans and Byzantines,<sup>343</sup> as their combat style complemented that of the sedentary peoples. When Magyars turned to raiding, there was lack of

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<sup>332</sup> Golden, P. (2001) 'Nomads in the Sedentary World: The case of Pre-Chinggisid Rus' and Georgia', in Khazanov, A. & Wink, A. (eds.) *Nomads in the Sedentary World*. Abingdon: Routledge.

<sup>333</sup> Hartley, J. M. (2021) *The Volga* op. cit p20.

<sup>334</sup> Golden, P. (1990b) 'The Peoples of the Russian Forest Belt', in Sinor, D. (ed.) *The Cambridge History of Early Inner Asia*. Cambridge: Cambridge University Press, p.237.

<sup>335</sup> Hartley, J. M. (2021) *The Volga* op. cit pp.20-21

<sup>336</sup> Bowlus, C. R. (1995) *Franks, Moravians and Magyars, the struggle for the Middle Danube, 788-907*. Philadelphia: University of Pennsylvania Press.

<sup>337</sup> The steppe supreme spirit. Fletcher, R. (1997) *The Conversion of Europe from Paganism to Christianity 371-1386AD*. London: HarperCollins, pp. 337, 339.

<sup>338</sup> Whittow, M. (1996) *The Making of Orthodox Byzantium 600-1025*. Basingstoke: Macmillan, p.18.

<sup>339</sup> The Bulgar kingdom vanished at various points in history. See Psellus, Michael (1966) *Fourteen Byzantine Rulers*. Harmondsworth: Penguin Classics.

<sup>340</sup> Stepanov, T. (2008) 'From 'Steppe' to Christian Empire and back. Bulgaria between 800 and 1100' pp. 363-378 in Curta, F. & Kovalev, R. (ed) *The Other Europe in the Middle Ages Avars, Bulgars, Khazars and Cumans* Leiden, Brill.

<sup>341</sup> Macartney, C. A. (1968) *The Magyars in the ninth century*. Cambridge: Cambridge University Press.

<sup>342</sup> Leyser, K. (1982) 'The Battle at the Lech 955', in Leyser, K. (ed.) *Medieval Germany and its neighbours 900-1250*. London: The Hambledon Press, p. 43.

<sup>343</sup> Bowles, C. R. 'The Early Hungarians as mercenaries', *Mercenaries and Paid Men: The Mercenary Identity in the Middle Ages*, Swansea, 2008. Leiden: Brill, pp.193-205.



unity in dealing with them. Magyar success depended on speed, short combats and eluding the slow-moving hosts of Europe, with re-concentration of the Magyar forces on receipt of smoke signals. The destruction of the Magyars could be achieved only by relentless pursuit with the capture and execution of leaders, for their leaders alone gave cohesion.<sup>344</sup> In the long run, military predation was not a better option than agriculture and pastoralism.<sup>345</sup> After their 955 defeat at Lechfeld, the Magyar established a progressively more sedentary society, although with a strong pastoral element,<sup>346</sup> including nomadic communities who were granted asylum from pursuing enemies, although this generated social and political problems.<sup>347</sup> The nomads included at least five different groups.<sup>348</sup> Over time, horse-raising became less important and swine herding became more important.<sup>349</sup>

The Patzinaks had been followed by Ghuzz tribes who in the late 11<sup>th</sup> century drove them further west, allowing the re-emergence of the Alans in the Caucasus. By 1120, in alliance with the Byzantines, the Ghuzz had destroyed the Patzinaks as a power in the steppes. Patzinak clans fled westward into Hungary, whose king attempted to use them to consolidate his power.<sup>350</sup> He also invited in the Teutonic Knights to defend Transylvania against Cuman incursions.<sup>351</sup> The Ghuzz, from whom the Seljuk Turks had emerged, were also variously known as Cumans, Kipchaqs, Uzes,<sup>352</sup> Oghuz and Polovtsians and they dominated the western steppes although the Cumans had no single king.<sup>353</sup> **[GIPPs #37, #94 selected]** There was much raiding, but not conquest, for *“Nonetheless, this was not a war that could be in any sense won. Battles, of course, were won and*

<sup>344</sup> It is unclear whether this contributed to the finding that modern Magyars are similar in DNA to their Slavic neighbours, while the ancient Magyar elite are different in their DNA from modern Magyars, displaying classic Asian haplogroups. (See Mallory, J. P. (2018) *The Origins of the Irish*. London: Thames & Hudson Ltd pp.238-239). A possible explanation may lie in the repopulation of Hungary in the wake of the 1243 Mongol withdrawal. See Urban, R. (2003) *The Teutonic Knights*, op. cit. pp. 37-39.

<sup>345</sup> Bowles, C. (2008) 'The Early Hungarians as mercenaries' op. cit.

<sup>346</sup> Laszlovszky, J. (2018) 'Agriculture in Medieval Hungary', in Laszlovszky, J., Nagy, B., Szabó, P. and Vadas, A. (eds.) *The Economy of Medieval Hungary*. Leiden: Brill, pp. 81-112.

<sup>347</sup> Kubinyi, A. and Laszlovszky, J. (2018) 'Demographic Issues in Late Medieval Hungary: Population, Ethnic Groups, Economic Activities', in Laszlovszky, J., Nagy, B., Szabó, P. and Vadas, A. (eds.) *The Economy of Medieval Hungary*. Leiden: Brill, pp. 48-63.

<sup>348</sup> These included Petchnegs, Oguz, Tatars, several waves of Cumans and a group known as the Jász or Iasians.. See Tatár, S. (2020) 'Auxiliary Peoples and Military Reform on Hungary's Western Frontier in the Thirteenth Century' *Journal of Medieval Military History* XVIII, pp. 99-115.

<sup>349</sup> Bartosiewicz, L., Biller, A. Z., Csuppán, P., Daróczi-Szábo, L., Daróczi-Szábo, M., Gúl, E., Kováts, I., Lyublyanovics, K. and Nyerges, É. Á. (2018) 'Animal Exploitation in Medieval Hungary', in Laszlovszky, J., Nagy, B., Szabó, P. and Vadas, A. (eds.) *The Economy of Medieval Hungary*. Leiden: Brill, pp. 113-165.

<sup>350</sup> Horváth, A. P. (1989) *Pechnegs, Cumans, Iasians: Steppe peoples in Medieval Hungary*. Translated by: Wilkinson, T. Budapest: Corvina, p.31.

<sup>351</sup> See Urban, R. (2003) *The Teutonic Knights* op.cit. pp.33-37..

<sup>352</sup> a.k.a Iazgyes. Sedlar, J. W. (1994) *East Central Europe in the Middle Ages, 1000-1500*. Seattle and London: University of Washington Press, p.11.

<sup>353</sup> Golden, P. (1990c) 'The Peoples of the Russian Steppes', in Sinor, D. (ed.) *The Cambridge History of Early Inner Asia*. Cambridge: Cambridge University Press, p.280.

lost, but lands never were, and there was always sure to be another battle in the near future.”<sup>354</sup> Again, there was nomad-sedentary interchange.<sup>355</sup> Russians applied the Khazar title ‘kagan’ to the ruler of Kiev, and they had considerable knowledge of Petchneg ways, using nomad fugitives as auxiliaries against the Cumans (Polotvsians), and making alliance with the nomads,<sup>356</sup> although their relations were not always friendly.<sup>357</sup> The Cumans also allied with the Vlachs and Bulgars, and helped in the destruction of a Crusader army at Adrianople in 1205,<sup>358</sup> as the crusaders chased Cumans who turned to shoot when they stopped.<sup>359</sup> Cuman raiders served as the cutting edge of the Vlach-Bulgar army throughout this period, applying the usual nomad tactics with considerable success,<sup>360</sup> bringing them victory in 1255 against the Nicean Byzantines.<sup>361</sup>

This continued until the coming of the Mongols in 1221, in a destructive raid. Although the Mongol Golden Horde began its career with the conquest of the Volga Bulgars in 1229-1237 and conquered Alans, Cumans, and south Russians before invading Eastern Europe during 1241 [**GIPPs #49, #38 selected**], in fact, Cumans provided the bulk of Golden Horde manpower.<sup>362</sup> Assimilating the Cuman refugees to Hungary (numbering around 75,000) posed problems,<sup>363</sup> including conversion that was slower than hoped.<sup>364</sup> The pastoral way of life kept Mongols on the steppes.<sup>365</sup> They did not move into the Russian forest zone and Russia was not occupied because it had little to offer the Mongols through direct economic exploitation. The Mongols sought maximum benefit at minimum cost and the Russians were close enough to be ruled from the steppes.<sup>366</sup> Conversely,

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<sup>354</sup> Halperin, C. (1987) *Russia and the Golden Horde: The Mongol Impact on Medieval Russian History*. Bloomington: Indiana University Press, p.16.

<sup>355</sup> The sale of nomad slaves maintained the *mamluk* armies of Egypt. Korobeinikov, D. (2008) ‘A broken mirror: the Kipçak World in the thirteenth century’ pp. 379-412 in Curta, F, & Kovalev, R. (ed) *The Other Europe in the Middle Ages Avars, Bulgars, Khazars and Cumans* Leiden, Brill.

<sup>356</sup> Halperin, (1987), *Russia and the Golden Horde* op. cit. p.20.

<sup>357</sup> E.g. the description by the Kievan Chronicler of Bonyak the Polotvsian khan in 1096 as “that godless, mangy thief and bandit”. See Anonymous (2020) *The Primary Chronicle of Kyivan Rus’* Translated by Karolyshyn, D. Maitland, Florida: Xulon Press p.153.

<sup>358</sup> Clari, R. (1996) *The Conquest of Constantinople*. Translated by: McNeal, E.H. Toronto: University of Toronto Press. Villehardouin, G. (1969) ‘The Conquest of Constantinople’, in Shaw, M. (ed.) *Chronicles of the Crusades*. Harmondsworth: Penguin Books Ltd, pp. 29-160.

<sup>359</sup> This was in the immediate aftermath of the 4<sup>th</sup> Crusade, which set out for Jerusalem at the start of the thirteenth century, but was diverted, to the Pope’s displeasure, into attacks on Christian cities, both Catholic and Orthodox. The Franks had captured Constantinople and were attempting to establish a Frankish empire.

<sup>360</sup> Vasary, I. (2005) *Cumans and Tartars: Oriental Military in Pre-Ottoman Balkans, 1185-1365*. Cambridge: Cambridge University Press, pp.47-54.

<sup>361</sup> Kanellopoulos, N. S. and Lekea, J. K. (2007) ‘The Struggle between the Nicean Empire and the Bulgarian State (1254-1256): towards a Revival of Byzantine Military Tactics under Theodore II Laskaris’, *Journal of Medieval Military History*, V, pp. 56-69.

<sup>362</sup> Morgan, D. (2003), *The Mongols*, op. cit. p.137.

<sup>363</sup> 70,000 to 80,000. See Horváth, A. P. (1989) *Pechnegs, Cumans, Iasians* op. cit., p.61

<sup>364</sup> Berend, N. (2001) ‘Cuman integration in Hungary’, in Khazanov, A. & Wink, A. (eds.) *Nomads in the Sedentary World*. Abingdon: Routledge, p. 103.

<sup>365</sup> See Horváth, A. P. (1989) *Pechnegs, Cumans, Iasians* op. cit., p.64

<sup>366</sup> Halperin, C. (1987), *The Byzantine Wars* op. cit. p.30.

the steppes were avoided by the Russians who found forests easier to exploit and defend.<sup>367</sup> The Golden Horde lasted to 1502, even after its fracture in 1445. The Alans emerged again as an independent force in 1430, about seventeen hundred years after their first recorded appearance, proving that even on the ever-changing steppes, there was some continuity. A group of 16,000 Alans (8,000 warriors) were active in their own right before that, taking service as Byzantine mercenaries against the Turks in 1305-6.<sup>368</sup>

## 9.10 CONCLUSIONS

This review seeks to provide an overview of the sort of interactions intended for analysis in quantitative terms later in the study. Over a wide range of environments, from West Africa to the Yellow Sea, from 1250BCE to 1850, a general pattern emerges of an ongoing conflict between, on one side, relatively primitive but militarily effective nomadic peoples in relatively deprived areas, and on the other side, richer sedentary peoples in relatively advantaged areas. Excursus E9 summarises options and outcomes for those involved.

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<sup>367</sup> Noack, C. (2015) 'The Western steppe: the Volga-Ural region, Siberia and the Crimea under Russian rule', in di Cosmo, N., Frank, A. & Golden, P. (eds.) *The Cambridge History of Inner Asia: The Chinggisid Age*. Cambridge: Cambridge University Press, p.313.

<sup>368</sup> Jesse, S. and Isaenko, A. (2013) 'The Military Effectiveness of Alan Mercenaries in Byzantium, 1301-1306', *Journal of Medieval Military History* XI, pp. 107-132.

## EXCURSUS E9. STRATEGIC OPTIONS, OUTCOMES AND DURATION

Options for Initiator Strategy and Respondent Strategy (Table E9.1), and Outcome (Table E9.2) are gathered from Barfield (1989), and derived for individual interactions from the historical accounts summarised in the Historical chapter. The duration of the GIPP is estimated from the historical record.<sup>369</sup> For the purposes of this study, an interaction is in scope when war is a possible response, even though war may not actually arise. The Initiator of the interaction is the party who begins it, and the Respondent is the other party (with the nomad or holy war party assumed to be the Initiator in absence of evidence to the contrary). There may not be explicit information on the precise development of events, but in this study, in absence of evidence, it is assumed that movement into the area occupied by another or beginning of hostile activities against others serves as initiation of an interaction. In some instances, e.g. entry into an empty area, it is deemed that the more mobile party (normally, the nomad) is the Initiator. Rebels are treated as the Initiator.

Initiator Options (see Table E9.1)

- 1 Ally: the initiator attempts to make an alliance with the respondent and to co-operate against others. To work, this requires the respondent to seek alliance as well.
- 0 Peace: the initiator attempts to live at peace and to trade with the respondent. To work, this requires the respondent to seek alliance, to seek peace or to endure.
- 1 Endure: the initiator accepts the consequences of the respondent's option choice without any active polity response, although members of the polity may flee, construct defences or defend themselves (active counter-measures by groups such as mounting ambushes or counter-raids are better rated as defence). This is unlikely to be a common situation, as the initiator usually has the option of evading contact altogether.
- 2 Raid: small bands from the initiator take people and goods by force, or by trade on manifestly unfair terms backed by the threat of use of force.<sup>370</sup>
- 3 Extort: the initiator seeks to formalise a situation where the respondent hands over people, goods and services to the initiator polity, thereby preventing raids.
- 4 Limited Attack: the initiator launches full war with the objective of plundering, devastating or conquering limited areas controlled by the respondent,<sup>371</sup> or seeks to subjugate the respondent.
- 5 Total Attack: the initiator launches full war with the objective of plundering, devastating or conquering the entire area controlled by the respondent, or seeks to destroy the respondent.

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<sup>369</sup> "Every transaction requires for its accomplishment a certain time that we call its duration." Clausewitz, C. (1984), *On War*, Princeton: Princeton University Press, Book 1, Chapter 1 p.82.

<sup>370</sup> It has been suggested that raiding is a preferable option since a raid brought gold, grain, tea and glory with little expenditure of horses, whereas trade brought just material goods without glory and it cost horses (Grygiel, J. J. (2018) *Return of the Barbarians: Confronting Non-State Actors from Ancient Rome to the Present*. Cambridge: Cambridge University Press, p.81). The party being raided no doubt has a different assessment of what is preferable.

<sup>371</sup> There is a distinction between winning battles and holding ground. The latter needs many more men. Corrigan, G., (2014), *A great and glorious adventure: a military history of the Hundred Years War*, London; Atlantic Books p.283.

Respondent Options (see Table E9.1)

- 1 Ally: the respondent attempts to make an alliance with the initiator and to co-operate against others. To work, this requires the initiator to seek alliance as well.
- 0 Peace: the respondent attempts to live at peace and to trade with the initiator. To work, this requires the initiator to seek alliance, to seek peace or to endure.
- 1 Endure: the respondent accepts the consequences of the initiator's option choice without any active polity response, although members of the polity may flee, construct defences or defend themselves (active counter-measures by groups such as mounting ambushes or counter-raids are better rated as defence).
- 2 Pay Tribute: the respondent seeks to formalise a situation where the respondent hands over people, goods and services to the initiator polity, thereby preventing raids
- 3 Defend: the respondent seeks to hold, repel or destroy raids and attacks of the initiator.
- 4 Counter-attack: in addition to defending, the respondent launches raids and attacks on the initiator.
- 5 Attack: the respondent launches full war with the objective of plundering, devastating or conquering all or part of the areas controlled by the initiator, or seeks to subjugate or destroy the initiator.

| Initiator Option |                | Respondent Option |       |        |             |        |                |        |
|------------------|----------------|-------------------|-------|--------|-------------|--------|----------------|--------|
|                  |                | -1                | 0     | 1      | 2           | 3      | 4              | 5      |
|                  |                | Ally              | Peace | Endure | Pay Tribute | Defend | Counter-attack | Attack |
| -1               | Ally           | Alliance          | Peace | Peace  | Peace       | Peace  | War            | War    |
| 0                | Peace          | Peace             | Peace | Peace  | Peace       | Peace  | War            | War    |
| 1                | Endure         | Peace             | Peace | Peace  | Peace       | Peace  | War            | War    |
| 2                | Raid           | Raid              | Raid  | Raid   | Raid        | Raid   | War            | War    |
| 3                | Extort         | Raid              | Raid  | Raid   | Tribute     | Raid   | War            | War    |
| 4                | Limited Attack | War               | War   | War    | War         | War    | War            | War    |
| 5                | Total Attack   | War               | War   | War    | War         | War    | War            | War    |

**Table E9.1 Options and Outcomes**

| Outcome | Initiator | Respondent | Net Gain |
|---------|-----------|------------|----------|
| A       | 4         | 4          | 8        |
| P       | 2         | 2          | 4        |
| R       | 1         | -2         | -1       |
| T       | 2         | -1         | 1        |
| W-BO    | -3        | -3         | -6       |
| W-ID    | -4        | -1         | -5       |
| W-IC    | -5        | 1          | -4       |
| W-IX    | -6        | 3          | -3       |
| W-RD    | -1        | -4         | -5       |
| W-RC    | 1         | -5         | -4       |
| W-RX    | 3         | -6         | -3       |

**Table E9.2 Outcome Rating**

A: Alliance Formed

P: Peace and Trade

R: Raiding along the frontier

T: Respondent pays tribute (goods, people and services) to Initiator

W: War. This war will have one of several possible final outcomes

IX Initiator Exterminated

IC Initiator Conquered

ID Initiator Defeated

BO Balanced outcome

RD Respondent Defeated

RC Respondent Conquered

RX Respondent Exterminated

## CHAPTER 10 MODELLING

### 10.1 INTRODUCTION

This chapter will review relevant literature on modelling, which is essential because the modelling approach adopted is likely to impact on the thesis results. It will also consider issues of data management, where appropriate. As noted in the previous chapter, over a wide range of environments, from West Africa to the Yellow Sea, from 1250BCE to 1850, a general pattern emerges of ongoing conflict between on one side, relatively primitive but militarily effective nomadic peoples in relatively deprived areas, and on the other side, richer sedentary peoples in relatively advantaged areas. Detailed examination of individual conflicts provides the foundation for investigation of this phenomenon, for insights from studying individual conflicts, including which factors may often be at play in their origin, course, and outcome, can be derived qualitatively. Over long time-periods and large areas, however, there may be ultimately very many potential factors. If it is possible to code or quantify the potential factors, statistical modelling can be employed to assess, on a macro scale, those factors which seem to have been of repeated significance and even apportion relative importance.

It is necessary to have a robust methodology for combining the results. A suitable model is thus required. A model is here defined as a set of factors that together offer a partial or complete explanation of a phenomenon.<sup>1</sup> Effectively, it seeks to shift the balance and focus from 'contingency' to 'structure' in historical explanation.<sup>2</sup> Various mathematical and statistical models have been devised in the past and may provide an appropriate foundation for producing generalised results, or else to provide a basis for the development of an alternative approach to offer some degree of explanation of the observed outcomes (etc.) of the set of interactions under study.<sup>3</sup>

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<sup>1</sup> Many disciplines find the use of a model helpful. The Medieval Model of the Universe is woven into medieval and renaissance literature and explains much of what is to be found there. In some medieval thinking, events on earth, including the rise and fall of empires, are guided by the terrestrial Intelligence *Fortuna*. See Lewis, C. (1964) *The Discarded Image: an Introduction to Medieval and Renaissance Literature* Cambridge: Cambridge University Press pp. 11-12,139-40.

<sup>2</sup> Where 'contingency' is unpredicted and unpredictable historical accident (such as might be attributed to *Fortuna* by the medievals) and 'structure' is what seems likely to happen, given underlying trends. See Fennell, J. (2019) *Fighting the People's War: The British and Commonwealth Armies and the Second World War*. Cambridge: Cambridge University Press, p.14.

<sup>3</sup> The simulation of military conflict through mathematical means is common, e.g. Strickland, J. (2011) *Using Math to Defeat the Enemy: Combat Modelling for Simulation*. Colorado Springs: Lulu Inc.

It is important to bear in mind that “[classic forms of modelling] ... *cannot forecast outcomes that are not already embedded in the underlying mathematical constructs of the model*”.<sup>4</sup> It has also been remarked that “*all models are wrong, but some are useful*”.<sup>5</sup> As Levy and Thompson suggest,<sup>6</sup>

“Statistical models are particularly useful in testing theoretical generalisations about the conditions under which war is likely to occur, providing that it is possible to measure key variables in a large number of cases. They are less useful, however, in helping to explain individual historical events.”<sup>7</sup>

This is inevitable given that even the best historical model falls short of omniscience in its inclusion of relevant explanatory factors, and allowance must be made for the random effects of ‘contingency’ (or perhaps, of course, the medieval *fortuna*).

The exercise of statistical modelling proceeds by testing the probability of a null (or default) hypothesis in which specified variables are assumed to be *insignificant* in general for explaining observed outcomes, and it departs from this default assumption to accept the alternative hypothesis that the specified variables are in fact *significant*, only when there are robust grounds for rejecting the null hypothesis. In any particular *individual* case, the specified variables may actually offer a complete explanation of what is observed, or they may indeed be totally irrelevant, but neither of these circumstances has any major effect on the validity of an overall conclusion that is drawn concerning the *generality* of cases.<sup>8</sup> In fact, quite frequently the researcher may not be in any very strong position to assess the relative significance of specific factors for a given individual case. Her contribution is to draw attention to, and to quantify, the likelihood that these factors are generally relevant.

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<sup>4</sup> Perla, P. (2016) ‘Operations Research, System Analysis and Wargaming: Riding the Cycle of Research’, in Harrigan, P., Kirschenbaum, M. and G. (eds.) *Zones of Control: Perspectives on Wargames*. Cambridge Massachusetts: The MIT Press, pp. 159-182.

<sup>5</sup> G.Box, quoted by Miller, B. J. (2016) ‘The Application of Statistics and Forensic Validation to Simulation Modeling in Wargames’, in Harrigan, P., Kirschenbaum, M. and G. (eds.) *Zones of Control: Perspectives on Wargames*. Cambridge Massachusetts: The MIT Press, pp. 183-200.

<sup>6</sup> Levy, J. and Thompson, W. (2010) *Causes of War*. Chichester: Wiley-Blackwell, p.216.

<sup>7</sup> Although insistence on the uniqueness of historical cases can have a paralysing effect on the development of the subject. See Morpeth, N. (2006) *Thucydides’ War: Accounting for the Faces of Conflict*. Hildesheim: Georg Olms Verlag, p. 53.

<sup>8</sup> “One counter example does not negate statistical significance” See Storr, J. (2009) *The Human Face of War*. Continuum UK, London, p.29.



The rest of the chapter addresses:

|                            |  |
|----------------------------|--|
| Game Theory:               | A widely used background to models is game theory. Lessons from this approach are identified.                          |
| Decision-making Hierarchy  | The order in which factors are addressed.  |
| Factors used in modelling: | The factors used in any model are key to the result. It is important that none are ruled out on inappropriate grounds. |
| Historical models:         | This outlines a number of models that have been used in recent studies.  |
| Non-statistical models     | Not all models are statistical, but non-statistical models can also provide helpful insights.                          |
| Method used in the study:  | The method used for analysis is summarised.  |
| Excursus:                  | This examines data on the incidence of famine and pestilence.  |

## 10.2 GAME THEORY

Game theory provides a background to the models likely to be generated in this study, which is intended to examine “*the strategic aims and objectives initially adopted by nomads, holy warriors and their opponents in their conflicts*” (see 1.4 above). Rasmussen, writing about game theory, defines strategy as “*a rule that tells [a player] which action to choose at each instant of the game, given his information set*”,<sup>9</sup> and cites historical examples from Pliny<sup>10</sup> and Herodotus<sup>11</sup> to demonstrate thinking in antiquity that is relevant to game theory. While it is unlikely that all antique and medieval parties to GIPPs thought as explicitly as Pliny and Darius in terms of the analysis governing the action that they should take, there may be implicit but discernible rules governing their actions. Amongst a great many other topics, Rasmussen specifies a series of games based on the response of a monopolist to an attempt of another party to enter into the market.<sup>12</sup> This provides a broad parallel to the issues raised by the intrusion of a nomad or *jihadist* into the lands ruled by an (often) sedentary state. Relevant options available to the parties under

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<sup>9</sup> Rasmussen, E. (1989) *Games and Information: An Introduction to Game Theory*. Oxford: Blackwell, p.12, p.117, p.392, p.30.

<sup>10</sup> The death of Afranius Dexter. Pliny (1969) *The Letters of the Younger Pliny*. Trans, Radice, B. London: Penguin, pp.221-223.

<sup>11</sup> The coup leading to the accession of Darius. Herodotus (1965) *The Histories*. Trans., de Selincourt, A. Harmondworth: Penguin, p.205.

<sup>12</sup> Entry Deterrence I-V : Rasmussen, E (1989) *Games and Information* op. cit., pp.97-98, 143-145, 153-154.

consideration by Rasmussen are those such as *Collude, Fight, Enter, Stay Out, Strong Entrant, Weak Entrant, Informed and Not informed*, but the categories of action offered by the game are inevitably simplified from the complexities of reality. More seriously, perhaps, the probabilities and pay offs assigned to those categories of action are often fairly arbitrary. For the parties in the present study, as described in Excursus E9 above, matters are much more complicated. There are at least seven identifiable options for both parties (from seeking *Alliance* through to *Total War*, with five broad outcomes (from *Alliance* through to *War*), with one outcome (*War*) being particularly variable in its detailed outcomes (seven outcomes running from one party being exterminated through a balance between the parties to the other party being exterminated). The strengths of both parties and the awareness of both parties concerning both these strengths are all uncertain quantities and better expressed as continuous variables rather than categorical variables (e.g. *Strong vs. Weak*) which have no clearcut definition.<sup>13</sup> A form of analysis that can accommodate such complexity is thus required.<sup>14</sup>

### 10.3 DECISION-MAKING HIERARCHY

The way in which decisions are made is important in determining which variables are important in arriving at the decision. There are two broad approaches possible. In the egalitarian approach, a number of options are all treated as more or less equal, and nothing is ruled out until the final decision is made. In the hierarchical approach, certain issues are prioritised, and in so doing, many options are eliminated without receiving much or indeed any consideration. The advantage of the latter approach is that it is quicker and easier, but the advantage of the first option is that it is flexible and offers consideration of all known options.

In the context of this study, pertaining to the course and outcomes of conflict, it is possible that decision-makers of a polity considered a range of policies from seeking alliance with the other party through to launching an all-out war of conquest. On the other hand, they may have given priority to the question of whether the polity should go to war or not, and in the light of that decision, certain policies ceased to be relevant, while others were considered in greater depth.

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<sup>13</sup> In Luke 14.31, the question is propounded: "What king, going to encounter another king in war, will not sit down first and take counsel whether he is able with ten thousand to meet he who comes against him with twenty thousand?" Misjudgements about the two sets of numbers, or the quality of the men and their leaders, not to mention the circumstances in which they will meet, can result in unfortunate decisions.

<sup>14</sup> For instance, there may be multiple equilibrium points for army marginal costs, offering alternative responses (e.g., tribal confederacy or empire). See Findlay, R. & Lundahl, M. (2017) *The Economics of the Frontier: Conquest and Settlement*. London: Palgrave Macmillan, Chapter 4.

#### 10.4 FACTORS USED IN MODELLING

An important issue is the choice of factors for inclusion in a model. As May points out, “*While intriguing, mono-causal explanations rarely explain anything*”.<sup>15</sup> A range of factors, both exogenous and endogenous to the model, are thus usually needed to explain the full range of what is going on,<sup>16</sup> and exogenous factors, in particular, can pose problems. As Hatcher and Bailey state,

“Exogenous factors are by definition independent of other factors and follow their own paths, and consequently have a tendency to undermine the coherence and internal consistency of models based on logical principles and predictable outcomes. Climate and disease are two phenomena which are commonly considered to be exogenous, and all three leading medieval supermodels [i.e. Malthusian, Marxist and monetarist] therefore downplay their significance.”<sup>17</sup>

This tends to give rise to models that provide simple and easy to understand answers to complex and difficult questions, by excluding the more awkward parts.<sup>18</sup> Polybius expresses this concern slightly differently as “*Mere mortals should always make allowance for the unexpected, especially in warfare*.”<sup>19</sup> Inconvenient as exogenous factors may be for the model-builder, just as for the ruler or general, they do occur and they can be important when they do occur.<sup>20</sup>

The desire to exclude “awkward parts” seems to become rather more problematic in appraisal of models that straddle disciplinary boundaries. For instance, Diamond explicitly acknowledges in presenting his model of collapse that “*I don’t know of any case in which a society’s collapse can be attributed solely to environmental damage: there are always other contributing factors*.”<sup>21</sup> Nonetheless, critiques such as those found in the volume *Questioning Collapse*<sup>22</sup> seem to major in

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<sup>15</sup> May, T. (2018) *The Mongol Empire*. Edinburgh: Edinburgh University Press, p.3.

<sup>16</sup> Herodotus mocked a predilection for linear patterns and a single definitive cause. See Lateiner, D. (1989) *The Historical Method of Herodotus*. Toronto: University Of Toronto Press, pp. 41-42.

<sup>17</sup> Hatcher, J. and Bailey, M. (2001) *Modelling the Middle Ages: the History & Theory of England’s Economic Development*. Oxford: Oxford University Press, p.18.

<sup>18</sup> It is an approach rather like seeking to explain the events of a Formula One race solely in terms of the workings of the internal combustion engine, which of course play a very important part in the outcome, but are by no means the sole explanation of matters. As has been suggested, to every complex and difficult question, there is an answer that is simple, easy to understand – and wrong.

<sup>19</sup> Polybius (2010) *The Histories*. Translated by: Waterfield, R. Oxford: Oxford University Press, p.79.

<sup>20</sup> This is particularly the case with “Black Swan” events. Named after the European encounter with “impossible” black swans in Australia in the eighteenth century, these events are essentially unpredictable, but have enormous effects when they do happen. See Perla, P. (2011) *The Art of Wargaming A guide for Professionals and Hobbyists*. Great Britain: Amazon, p.284.

<sup>21</sup> Diamond, J. (2011) *Collapse: How Societies Choose to Fail or Survive*. London: Penguin Books, p.11.

<sup>22</sup> McAnany, P. A. and Yoffee, N. (2010) ‘Why We Question Collapse and Study Human Resilience, Ecological Vulnerability and the Aftermath of Empire’, in McAnany, P. A., Norman, Y. (eds.) *Questioning Collapse: Human resilience, Ecological Vulnerability, and the Aftermath of Empire*. New York: Cambridge University Press.

demonstrating the existence of these other factors, or in denying outright the fact of environmental damage, rather than addressing the specific circumstances of the environmental damage.

It is thus important to ensure that any model has a good (and as far as possible representative) selection of relevant prospective explanatory factors, but this almost certainly means that these will be inter-disciplinary in their scope. The decisions made by nomadic peoples or groups on *jihad* and crusade, in their conflicts, reflect their perceptions of the full range of their known circumstances at the time, and are highly unlikely to give much if any regard to the disciplinary bounds observed by academics hundreds or even thousands of years later. As Schelling, quoted by Perla,<sup>23</sup> remarked “*The one thing I cannot write down is a list of things that I have never thought of*”. It is important to draw on cross-disciplinary and inter-disciplinary insights to ensure an adequate coverage of explanatory factors.

Apart from the need to define the expansion and development of the existing GIPP database in terms of the kind of conflicts and the regions where they occur (Chapter 9), there is a need to define the model used to analyse the data, both in terms of the variables used and the techniques applied. The validity and utility of statistical techniques such as factor analysis, regression analysis and structural equation modelling will thus be considered with a view to their inclusion in the study. Factor analysis provides a means to identify a limited number of dimensions which combine the impact of a wider range of associated variables, so that, for example, a suite of fifty variables may be reduced to sixteen dimensions that shown to be almost as effective in explaining the variations found as the larger suite, but are more readily comprehended.<sup>24</sup> Regression analysis provides a range of techniques that seek to explain the variation in dependent variables, e.g. conflict outcome or strategy choice, in terms of the variation evident in independent variables such as population (chapter 5) or gross domestic product (Chapter 6) or troop quality (Chapter 7) or leadership (Chapter 8). This includes the possibility of using the dimensions identified as important in factor analysis as the variables in regression, allowing the possibility of explaining dependent variables in terms of broad brush groupings of variables. Such an approach will allow the present study to address the issue that the independent variables are not truly independent of one another. For instance, good soil is associated with high biocapacity and deserts with low

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<sup>23</sup> Perla, P. In the foreword of Curry, J. and Young, M. (2017) *The Confrontation Analysis Handbook: How to resolve Confrontations by Eliminating Dilemma* The History of Wargaming Project p.4 . [www.wargaming.co](http://www.wargaming.co).

<sup>24</sup> This borders on the approach utilised in physics and mathematics where ‘bundles’ of multi-dimensional space-time are identified and analysed. See Penrose, R. (2005) *The Road to Reality: a Complete Guide to the Laws of the Universe*. London, Vintage, pp.325-329.

water availability. In a hypothetical analysis, 'good soils' and 'few deserts' are variable values that are both associated with greater productivity, which is itself attractive to outside groups, but the greater productivity leads to a greater resident population, which serves as a deterrent to those same outside groups. It is quite likely that a more sophisticated approach to modelling is ultimately required to fully reflect such complexities, and structural equation modelling may perhaps provide the means to approach such a situation.

Models identified as having explanatory power may be the product of chance variation, and hence would vanish in an alternative sampling of the data. The original size of the GIPP database was too small to allow much internal comparison of identifiable groups,<sup>25</sup> but an increase in size to 120 cases (for the present study) more feasibly allows a random division of the sample into sub-samples, permitting the assessment of the robustness of models derived from one sub-sample, when applied to the other sub-sample. Another approach to this is the statistical technique of bootstrapping, the repeated random selection of very large numbers of sub-samples to provide an assessment of the sample characteristics. Fagan et. al. have examined an appropriate number of sub-sample pairs from data on the Battle of Britain (1940) using *weighted bootstrapping* to create a new quantitative basis to help address controversies about the strategies used.<sup>26</sup>

As noted above, there has long been an awareness that both material and morale factors have a bearing on the outcome of conflicts,<sup>27</sup> and Collins has produced a model that extends this to include the impact of manoeuvre, as well as material and morale, on warfare.<sup>28</sup> This model has been tested by Fletcher et al. and found to generate plausible outcome results in the context of the US Civil War.<sup>29</sup> A qualitative approach to these factors is given by Beringer et al.<sup>30</sup> Appendix 5 considers the possibility that the GIPP database is biased towards factors impacting principally on material matters. It thus seems unlikely that the proposed range of indicators will successfully explain the full range of variation in observed historical conflict outcomes, since it seems likely to

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<sup>25</sup> Morris, C. (2016) "*Paradise or Booty*": Choices of strategy and their outcome in Ancient and Medieval holy wars and nomad conflicts. MA Society, Space and Culture, Queen's University of Belfast, Unpublished.

<sup>26</sup> The computation of comparative probabilities of "victory" for the actual and various counterfactual campaigns provides a quantified assessment of the likelihood of German achievement of air superiority, thereby facilitating invasion. The heavier targeting of airfields by the Luftwaffe, and an earlier start to Germany's air campaign are identified as likely to secure air superiority. See Fagan, B., Horwood, I., MacKay, N., Price, C., Richards, E. and Wood, J. A. (2020) 'Bootstrapping the Battle of Britain', *Journal of Military History*, Vol 84 (January 2020), pp. 151-86.

<sup>27</sup> For example, Clausewitz's "sum of means" and "strength of will" (Clausewitz, C., Howard, M. and Paret, P. (1984) *On War*. Translated by: Howard, M. and Paret, P. Princeton: Princeton University Press p. 77).

<sup>28</sup> Collins, R. (2010) 'A Dynamic Theory of Battle Victory and Defeat', *Clodynamics*, 1, pp. 3-25.

<sup>29</sup> Fletcher, J. et al. (2011) 'War Games: Simulating Collins' Theory of Battle Victory', *Clodynamics*, 2, pp. 252-275.

<sup>30</sup> See Beringer et al. (1986) *Why the South Lost the Civil War*. Athens, Georgia: The University of Georgia Press. Chapter 2.

offer coverage that is biased towards one aspect of matters. This suggests that the study also will need to develop measures which remedy the identified imbalance or at least to draw attention to the need to develop some sort of correction in the future. Nonetheless, the range of included variables is likely sufficiently broad to offer a meaningful (if still inevitably partial) degree of explanation. It is also possible to use the approach detailed in Appendix 5 to look at a composite index of the variables included, which will serve to monitor the extent to which this or any other study is biased in one direction or another with respect to material, manoeuvre or morale.

## 10.5 HISTORICAL MODELS

There have been attempts in various disciplines to apply numerical analysis to historical conflicts, as detailed below.<sup>31</sup> Midlarsky seeks to develop a mathematical model of the onset of systemic war in Europe, comparing the expected and observed occurrence under various configurations of power distribution.<sup>32</sup> Karaman and Pamuk examine tax revenues in 12 European states over a period of 300 years, identifying the impact of warfare, political regime and economic structure.<sup>33</sup> Blaydes and Chaney use reign duration in Islamic and European states, 700-1500, as a surrogate for political stability,<sup>34</sup> and address issues of religion, agriculture, military technology, and Mongol invasion. Besney and Reynal-Querol examine recorded conflict in Africa, 1400-1700, as an explanation of post-colonial conflict, weak national identity and slow development.<sup>35</sup> Anthropologists Downey, Hass, and Sheenan analyse data on 2,378 European Neolithic sites for evidence of early warning signs linked to population cycles of various causations.<sup>36</sup>

Relevant studies are also notably offered by economists and economic historians. Van Leeuwen and Philips show how market performance tended to develop over time, linked to communication density and urbanisation.<sup>37</sup> This reduced the impact of famine by facilitating the import of grain.<sup>38</sup>

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<sup>31</sup> Boyer, M. (2003) 'Old Whine in New Bottles', *Journal of International Relations and Development*, 6(4), pp. 390-396.

<sup>32</sup> Midlarsky, M. (1988) *The Onset of World War*. London: Unwin Hyman.

<sup>33</sup> Karaman, K. and Pamuk, E. (2013) 'Different Paths to the Modern State in Europe: The Interaction Between Warfare, Economic Structure, and Political Regime', *American Political Science Review*, 107, (3), pp. 603-626.

<sup>34</sup> Blaydes, L. and Chaney, E. (2013) 'The Feudal Revolution and Europe's Rise: Political Divergence of the Christian West and the Muslim World before 1500 CE', *American Political Science Review*, 107(1) pp.16-34.

<sup>35</sup> Besley, T. and Reynal-Querol, M. (2014) 'The Legacy of Historical Conflict: Evidence from Africa', *American Political Science Review*, 108(2), pp. 319-336.

<sup>36</sup> Downey, S., Hass, W. and Sheenan, S. (2016) 'European Neolithic societies showed early signs of population collapse', *Proceedings of National Academy of Sciences of the United States of America*, 113(35), p. 9751.

<sup>37</sup> van Leeuwen, B. and Philips, R. C. M. (2021) 'Market performance in the grain market of late medieval Western Europe (c.1300-1650)', in García, J.C.M. (ed.) *Markets and Exchanges in Pre-modern and Traditional Societies*. Oxford: Oxbow, pp. 155-170.

<sup>38</sup> It may be noted that the frequency that famine is associated with political unrest in Livy's histories of Rome seems to diminish over time, something that is coincident with Rome securing access to grain drawn from a larger area. See Livy (1971) *The Early History of Rome*. Translated by: de Selincourt, A. Harmondsworth: Penguin Classics; Livy (1972)

Dincecco and Prado, and Dincecco and Onorato have undertaken econometric modelling to demonstrate the relationship of warfare with fiscal development,<sup>39</sup> and the relationship of warfare with urban development, respectively.<sup>40</sup> The latter study links urban development, as measured by population growth, with a range of variables such as communal government, episcopal seats, universities, urban density, Atlantic ports, soil quality and suitability of the soil for potato cultivation, some of which are probably of limited relevance to the practice of nomadic or holy war. Other variables used, such as ruggedness, local geography and distance from battles, are perhaps more relevant to these matters. The statistical relationship between climatic events and violence in medieval Ireland, based on data drawn from geophysical sources and from the Annals of the Four Masters, has been explored by researchers such as Ludlow et al.<sup>41</sup>

The basic unit of Dincecco and Onorato's study is not the state but a 150 x 150 km grid (22,500 sq km), about the size of a city state,<sup>42</sup> such as the medieval Republic of Florence, which would fit into Mongolia about 160 times (a substantial difference in scale). The unit of analysis for Besney and Reynal-Querol, a 120 x 120 km grid, is even smaller.

Bennett presents a model that attempts to demonstrate the impact of demographic-structure crises in the spread of large scale agrarian states as observed historically.<sup>43</sup> Correcting for the variable area of a spherical grid (rather than an equi-area Euclidean grid), he develops equations for population growth, carrying capacity, population collapse, peasant and elite populations, combat effectiveness, together with combat outcome and impact. The initial model version, which was seeded at the start with three established large-scale agrarian states in Egypt, Mesopotamia and China, failed to produce a fast developing system in the west or large scale-agrarian states based in India. The latter issue was readily resolved by the introduction of a fourth seed state in Harappan India. The restrictions imposed on cultural expansion in western Eurasia, by the presence of the Persian Gulf, Red Sea, Mediterranean, Black Sea and Caspian Sea, required the addition of a system that allowed seaborne warfare and maritime expansion. Given the radically

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*The War with Hannibal*. Translated by: de Selincourt, A. Harmondsworth: Penguin Classics; Livy (1976) *Rome and the Mediterranean*. Translated by: Bettenson, H. Harmondsworth: Penguin Classics; Livy (1982) *Rome and Italy*. Translated by: Ogilvie, R.M. Harmondsworth: Penguin Classics.

<sup>39</sup> Dincecco, M. and Prado, M. (2012) 'Warfare, fiscal capacity, and performance', *J Econ Growth*, 17, pp.171-203

<sup>40</sup> Dincecco, M. and Onorato, M. (2014) 'Military Conflict and the Economic Rise of Urban Europe', *Working paper IMT Institute for Advanced Studies Lucca*, March(7/2012), pp. 1-41; Dincecco, M. and Onorato, M. (2016) 'Military conflict and the rise of urban Europe'. *Journal of Economic Growth* (5) pp.259-282. .

<sup>41</sup> Ludlow, F., Cook, E., Kostick, C. and McCormick, M. (2016) 'Drought as a Catalyst for Early Medieval European Subsistence Crises and Violence'. *Geophysical Research Abstracts*.

<sup>42</sup> Scott, T. (2014) *The City-State in Europe, 1000-1600*. Oxford: Oxford University Press.

<sup>43</sup> Bennett, J. (2016). 'Repeated Demographic-Structural Crises Propel the Spread of Large-scale Agrarian States throughout the Old World', *Cliodynamics* 7, 1–36.

greater efficiency of maritime travel, this relaxation is highly significant and points towards the possibility of the formation of a single very extensive state simultaneously controlling Rome, Alexandria and Cartagena (as indeed Rome did). The restriction of this model adjustment to the Mediterranean alone, rather than allowing its application to other coastal maritime areas, requires a theoretical justification.<sup>44</sup> The spread of military technology<sup>45</sup> and the development of transport links, together with nomadic confederations, allows further refinement of the model.<sup>46</sup>

Cioffi-Revilla et al. examine the 2,000 year period between the rise of the Xiongnu and end of the Zunghar state in the same geographic region of Asia and identify some 18 specific polities.<sup>47</sup> From these, duration and their half-life are derived, suggesting that 150 years is the half-life for these polities.<sup>48</sup> They develop their model to show “patterns of virtual history in the rise and fall of sets of polities... [with] eight confederation polities rising, fluctuating, and declining as a result of conquests, rebellions, and secessions”.<sup>49</sup> Other relevant studies include that by Taagepera which examines the expansion and contraction of large polities,<sup>50</sup> while Nimgade analyses instability and violence in Rome.<sup>51</sup> Khmaladze et al. look at the succession of Chinese emperors.<sup>52</sup>

Rogers and Cioffi-Revilla present a model of social change of empires on the eastern steppes, based on their canonical theory of social change. This shows groups developing governmental expertise through repeated experience of broadly similar circumstances, which may be sometimes

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<sup>44</sup> Possibly this is linked to narrow seas, as opposed to ocean littorals. Ethiopia conducted war in Yemen across the Red Sea; both Goths and Rus’ raided across the Black Sea and Varangians raided in the Caspian. Further east, the narrow seas of Indonesia and Japan facilitated cultural spread (and piracy) suggesting narrow seas have never been too much of an obstacle to expansion. Absence of ships and the timber to build them or the expertise to sail them may sometimes have been an issue.

<sup>45</sup> Turchin, P., Hoyer, D., Korotayev, A., Nikolay, K., Nefedov, S., Feinman, G., Levine, J., Reddish, J., Cioni, E., Thorpe, C., Bennett, J., Francois, P. and Whitehouse, H. (2021) 'Rise of the war machines: Charting the evolution of military technologies from the Neolithic to the Industrial Revolution', *PLOS ONE*, 16, pp. e0258161.

<sup>46</sup> Bennett, J. S. (2022) 'Retrodicting the rise, spread, and fall of large-scale states in the Old World.', *PLoS One*, 17(1).

<sup>47</sup> Cioffi-Revilla, C., Rogers, J., Wilcox, S. and Alterman, J. (2008) 'Computing the Steppes: Data Analysis for Agent-Based Modelling of Polities in Inner Asia'. *104th Annual Meeting of the American Policy Science Association*, Boston, MA. Also presented as Cioffi-Revilla, C., Rogers, J. D., Wilcox, S. and Alterman, J. (2011) 'Computing the Steppes: Data Analysis for Agent-Based Models of Polities in Inner Asia' in Brosseder, U. and Miller, B (eds.), *Xiongnu Archaeology: Multidisciplinary Perspectives of the First Steppe Empire in Inner Asia.*, Bonn Vor- und Frühgeschichtliche Archäologie Rheinische Friedrich-Wilhelms-Universität Bonn, pp. 97-110.

<sup>48</sup> i.e. half of polities formed will have ceased to exist by the end of a period of 150 years.

<sup>49</sup> Cioffi-Revilla, C., Honeychurch, W. and Rogers, J. D. (2015) 'Mason Hierarchies: a Long-Range Agent Model of Power, Conflict, and Environment in Inner Asia' in Bemmann, J. and Schmauder, M.(eds.) *Complexity of Inter Action along the Eurasian Steppe Zone in the First Millennium CE*, Bonn Vor- und Frühgeschichtliche Archäologie Rheinische Friedrich-Wilhelms-Universität pp. 89-1114.

<sup>50</sup> Taagepera, R. (1997) 'Expansion and Contraction Patterns of Large Polities: Context for Russia', *International Studies Quarterly*, 41, pp. 475-504.

<sup>51</sup> Nimgade, A. (2016) 'Instability and violence in imperial Rome: a laboratory for studying contagion', *Complexity*, 21(52), pp. 613-622.

<sup>52</sup> Khmaladze, E., Brownrig, R. and Haywood, I. (2010) 'Memoryless Reigns of the Sons of Heaven', *International Statistical Review*, 78(3), pp. 348-362.



modified by changes in neighbouring societies through elimination of diversity, creation of continuity, overlay mechanisms, and incorporation of marginal territories. The model is multi-causal.<sup>53</sup> At a lower level of aggregation, Rogers et al. show through modelling how the number of steppe nomad households is likely to show marked decline in times of *dzud* and drought, especially when both occur in the same year.<sup>54</sup> Chapter 4.10 of the current study presents the corresponding impact on livestock.

Turchin develops a range of models addressing a number of issues relevant to the rise and fall of states, such as collective solidarity (e.g., the concept of *asabiya*, expressed by Ibn Khaldun) and the role of frontiers in generating such solidarity; the change of collective solidarity (as evidenced by conversion to Islam in Iran and Spain, or the growth of Christianity, and the growth and decline of states powered by changes in *asabiya*, population growth and the influence of elites).<sup>55</sup> Turchin also identifies (Table 10.1) factors which he argues are conducive to the formation of ethnic identity on either side of a frontier, and assigns numerical values to these.<sup>56</sup> Trade is assessed in a similar manner, allowing the possibility that intense trade may break down ethnic identity.

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<sup>53</sup> Rogers, J.D. and Cioffi-Revilla, C. (2009) 'Expanding Empires and a Theory of Change', in Bemmann, J., Parzinger, H., Pohl, E. and Damdinsuren, T. (eds.), *CURRENT ARCHAEOLOGICAL RESEARCH IN MONGOLIA: Papers from the First International Conference on "Archaeological Research in Mongolia" held in Ulaanbaatar, August 19th–23rd, 2007: Vol. 4.*, Bonn: Vor- und Frühgeschichtliche Archäologie Rheinische Friedrich-Wilhelms-Universität Bonn, pp. 445-460.

<sup>54</sup> Rogers, J. D., Nichols, T., Emmerich, T., Latek, M. and Cioffi-Revilla, C., (2012) 'Modeling scale and variability in human–environmental interactions in Inner Asia' *Ecological Modelling* 241, 5-14.

<sup>55</sup> Turchin, P. (2003) *Historical Dynamics: Why States Rise and Fall*. Princeton: Princeton University Press.

<sup>56</sup> Frontiers differ greatly. See Abulifia, D. (2002) 'Introduction: seven types of ambiguity', in Abulifia, D. & Berend, N. (eds.) *Medieval frontiers: concepts and practices*. Aldershot: Ashgate, pp. 1-34.

| Factor   | Description  | Value |
|----------|--|-------|
| Religion | Islam and Christianity interact with each other or paganism  | 3     |
|          | Major religious divisions in Christianity or Islam eg Catholic vs. Orthodox post-1000 CE or Shia vs. Sunni | 2     |
|          | Sects in Christianity or Islam, non-exclusive pagan religions  | 1     |
|          | No religious difference  | 0     |
| Language | Different linguistic family  | 2     |
|          | Same linguistic family   | 1     |
|          | No linguistic difference   | 0     |
| Economy  | Nomad and settled agriculture  | 2     |
|          | Urban literate with developed agriculture  | 1     |
|          | Same   | 0     |
| Warfare  | Intense war, with depopulation   | 2     |
|          | Raiding  | 1     |
|          | Peace or mild war  | 0     |
| Trade    | Extortion or unfair trade  | 1     |
|          | Normal trade   | 0     |
|          | Intense trade  | -1    |

**Table 10.1 Meta-ethnic Factors**

Source (for religion to warfare): Turchin (2003), p.79

Source (for trade): own formulation

Turchin suggests that simple self-interest does not serve as an adequate root for action, as many of the benefits of communal life may be enjoyed without any contribution to securing them.<sup>57</sup> In order to obtain the benefits of teamwork rather than fragmentation, *asabiya* is needed and this is fostered by religion, language and the proximity of other communities, e.g. nomad vs. farmer, or Christian vs. Muslim, or more generally, 'them' vs. 'us' establishing groups that extend beyond the approximately 150 which is the maximum size of a group that can be maintained by personal relationship. Turchin et al. emphasise the importance of factors such as religion, bureaucracy, education in promoting collective solidarity.<sup>58</sup>

Turchin and Nefedov identify a cycle of expansion, stagflation, crisis and depression, describing two cycles in successive periods of history in four countries: England, France, Rome and Russia.<sup>59</sup> They suggest that the drivers of these cycles are a Malthusian cycle driving the price of grain, together with the growth of an elite with increasing demand by that elite for goods which increases the consumption of the agricultural surplus. Fracturing of the elite can result in civil war or a weaker response to social challenges. After the Black Death, societies in Eastern Europe were able to re-impose serfdom as a response to peasant demands for higher wages, whereas societies of Western Europe were largely forced to concede to these demands. The exceptionally cohesive

<sup>57</sup> Turchin, P. (2006) *War and Peace and War*. London: Penguin.

<sup>58</sup> Turchin, P., Currie, T., Turner, E. and Gavrillets, S. (2013) 'War, space and the evolution of Old World complex societies', *Proceedings of National Academy of Science*, 110(41), pp. 16384-16389.

<sup>59</sup> Turchin, P. and Nefedov, S. (2009) *Secular Cycles*. Princeton: Princeton University Press.

Mamluks<sup>60</sup> were able to maintain their own consumption after the Black Death for there was nowhere else for Egyptian peasants to go. Other factors are also identified as significant. For instance, the faster movement of the cycle in the Maghreb (100 years, rather than 2-300 years) is attributed to faster growth of the elite through polygyny and to the presence of pastoral neighbours providing a resource for warfare.

Turchin et al also demonstrate that polity population, extent of polity territory, and “capital” population; hierarchical complexity, government specialisation and infrastructure; record-keeping, literature and monetary development all tend to advance in parallel, for a large sample of societies drawn world-wide and over extensive periods of time.<sup>61</sup> An ad hoc analysis of their data suggests that when Mongolia is examined in isolation, this parallelism breaks down to a certain degree. The polity extent cannot be validly subsumed with the other variables. Given that the Mongols are the only fully nomadic culture in the sample, it is hardly surprising that for any given level of population, their territorial extent is greater than other cultures.

Chan and Laffargue show that the basic Chinese-Nomad scenario of raiding, extortion and tribute matches a game-structure although this does not cover conquest as an objective or build in the costs to war.<sup>62</sup> Rogers uses agent-computational models of the pastoralism of Inner Asia which suggest that when overarching social controls were in place distinctive territorial differences emerged. When social controls were less centralized, individual households became wealthier. In regions with dense populations, expanding the scope of landscape knowledge allowed micro-mobility to effectively mitigate social restrictions. As a result population expanded, but became poorer. In less densely inhabited regions, greater knowledge of the landscape expanded the mid-range of wealth distribution without expanding the number of poor.<sup>63</sup>

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<sup>60</sup> That is ‘cohesive’ as a group maintaining their own interests. As Chapter 8 highlights, the survival rate of individual rulers was not high.

<sup>61</sup> Turchin, P., Currie, T. E., Whitehouse, H., François, P., Feeney, K., Mullins, D., Hoyer, D., Collins, C., Grohmann, S., Savage, P., Mendel-Gleason, G., Turner, E., Dupeyron, A., Cioni, E., Reddish, J., Levine, J., Jordan, G., Brandl, E., Williams, A., Cesaretti, R., Krueger, M., Ceccarelli, A., Figliuolo-Rosswurm, J., Tuan, P.-J., Peregrine, P., Marciniak, A., Preiser-Kapeller, J., Kradin, N., Korotayev, A., Palmisano, A., Baker, D., Bidmead, J., Bol, P., Christian, D., Cook, C., Covey, A., Feinman, G., Júlíusson, Á. D., Kristinsson, A., Miksic, J., Mostern, R., Petriem, C., Rudiak-Gould, P., ter Haar, B., Wallace, V., Mair, V., Xie, L., Baines, J., Bridges, E., Manning, J., Lockhart, B., Bogaard, A. and Spencer, C. (2018) 'Quantitative historical analysis uncovers a single dimension of complexity that structures global variation in human social organization', *Proceedings of the National Academy of Science*, 115 (2), pp. E144-E151.

<sup>62</sup> Chan, K. and Laffargue, J.-P. (2016) 'Plunder and tribute in a Malthusian world', *Mathematical Social Sciences*, 84, pp. 138-150.

<sup>63</sup> Rogers, J. D. (2013) “Pastoralist Mobility and Social Controls In Inner Asia: Experiments Using Agent-Based Modeling”, *Structure and Dynamics*, 6(2) <http://www.escholarship.org/uc/item/7rg669rm>

In a finer-scale analysis, Kuznar and Sedlmeyer examined recent collective violence in Darfur, using an agent-based model of nomad/sedentary peasant interaction.<sup>64</sup> This showed a linkage between the onset of drought and a change in nomad raiding from seasonal to sustained continuous raiding, but over a limited period in the late twentieth century, when the availability of assault rifles was adjudged to increase the mortality of raids by a half. Hsiang et al. show that at a global scale, war and civil unrest can be linked to ENSO events.<sup>65</sup>

## 10.6 NON-STATISTICAL MODELS

Statistical models are not universally helpful. As already noted of such models, “They are less useful... in helping to explain individual historical events.”<sup>66</sup> To this may be added the propensity already mentioned for models to downplay the significance of exogenous variables so as to give simple and easy to understand answers to complex and difficult questions, by excluding the more awkward parts.

All this must be viewed in the context of chaos theory which tends to generate complex answers to apparently simple questions. In general, this is due to a sensitive dependence on initial conditions,<sup>67</sup> where a difference as small as 0.025% in one variable can generate a radically different outcome to a model. The logistic difference equation<sup>68</sup>:

$$x_n = r x_{n-1} (1 - x_{n-1})$$

used by Turchin and Bennett in their studies, has been shown to result in different overall patterns, dependent on the value of the growth rate  $r$ . Low values of  $r$  (under 3) give rise to stability,<sup>69</sup> while higher values give rise to repeating cycles or chaotic outcomes. Two themes emerge from study of this or similar equations' behaviour. Firstly, when a quantity changes, it can change arbitrarily fast, leaping from one value to another without exhibiting the intervening mathematical values at all, e.g., there can be shifts from deluge to drought without an intervening

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<sup>64</sup> Kuznar & Sedlmeyer, (2005) 'Collective Violence in Darfur', op. cit.

<sup>65</sup> Hsiang, S. M., Meng, K. C. and Cane, M. A. (2011) 'Civil conflicts are associated with the global climate, *Nature*, 476(25), pp. 438-441.

<sup>66</sup> Levy & Thompson, (2010) *Causes of War* op. cit. p.216.

<sup>67</sup> Gleick, J. (1993) *Chaos: Making a new Science*. London: Abacus, pp.16, 23, 63, 70-73, 92.

<sup>68</sup> This is the equation underlying the growth and subsequent dwindling of populations, including the course of epidemics such as Covid-19. Exponential growth (*pace* some media presentations which tend more to the dramatic than to the accurate) cannot continue indefinitely in a finite environment. It slows down and then stops.

<sup>69</sup> Covid-19 has a  $r$  value of about 3, measles has a  $r$  value of around 12, making the growth of the former more predictable.

period of moderate weather.<sup>70</sup> Secondly, there is a persistence of effects, e.g., once a drought has occurred, it becomes more likely that it will occur again.

The effective definition of models is not recent. Thus, the seventeenth century writer Thomas Hobbes defines the Power of a man as his present means to obtain some future good, and proceeds to describe relevant factors which augment that power, such as Natural Powers, Riches, Friends, Reputation, Success, and Arts of Public Use. He further alludes to the Value or Worth of a man, which he may command for the use of his Power, and which may be expressed in terms of Riches or Honour.<sup>71</sup> Since he then links the desire for power, ease, knowledge and praise as reasons for action,<sup>72</sup> and cites hope of gain and glory or fear of loss as reasons for war,<sup>73</sup> he sketches out a wide-reaching matrix of linked and interacting factors at the personal level. This is not quantified, but it could feasibly be. It could also be extended from the individual to communities. It should be noted that people sometimes over-estimate their own powers.<sup>74</sup>

There have also been older, less quantified, models applied to the relationship of nomads and sedentary peoples. For instance, Finer sketches the model of Ibn Khaldun, the fourteenth century North African historian, in which the antagonism between nomadic desert tribesmen on one hand, and sedentary townsmen and cultivators on the other, provides the dynamic for history of this region.<sup>75</sup> Ibn Khaldun argues that a cycle begins with desert rebellion leading to tribal conquest of the towns, followed by the assimilation, “seduction”, of the tribesmen to the towns, leading to a fresh desert rebellion.

Writing about the Almohads of North Africa, Fromherz presents his interpretation of Ibn Khaldun (see Table 10.2).<sup>76</sup> Here, religion or prophesy provide the strongest cohesion for a group, followed by tribal blood links. Economic interests and dynastic state coercion are weakest.

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<sup>70</sup> The smaller the time period used to measure the variable, the more likely such a quantum leap is.

<sup>71</sup> Hobbes, T. (2017), *Leviathan*, ed. Brook, C. London: Penguin Classics, p.p70-79.

<sup>72</sup> Hobbes, T. *Leviathan*, op. cit. pp.79-86.

<sup>73</sup> Hobbes, T. *Leviathan*, op. cit.p.102.

<sup>74</sup> Thucydides noted the increased propensity of the Athenians to believe that nothing could withstand them, confusing their strength and their hopes. Cited in Munn, M. (2017) 'Why History? On the emergence of historical writing', in Howe, T., Müller, S. and Stoneman, R. (eds.) *Ancient Historiography on War and Empire*. Oxford: Oxbow Books, pp. 2-25.

<sup>75</sup> Finer, (199b), *The History of Government From the Earliest Times III Empires, Monarchies and the Modern State*, op. cit. p.681.

<sup>76</sup> Fromherz, A. (2013) *The Almohads* op.cit. p.195.

| Form of Cohesion<br>(in descending order of effectiveness) | Occurrence   | Effectiveness   |
|--|--|---|
| Religion or Prophecy-based                                 | Must be combined with tribal cohesion for success, but can also occur with more settled tribes   | Most effective when new religious movement rallies around saint or messianic figure (e.g., Ibn Tumart, 'Abd Allah)  |
| Blood-based tribal   | Increases inversely as decadent 'urban' influences decrease (most powerful among nomadic Bedouin of desert)                                    | In absence of religious motivation, manifests itself in fleeting raids and enforced tribute                         |
| Urban  | Based on loose economic interests and weakened by division of labour but the streets and bazaars can still be an important source of authority | Strongest when cities set up municipal councils independent from strong dynastic control                            |
| Forced dynastic control                                    | Prone to decadence and the whims of dynastic succession. Based on forced compliance, not common interests                                      | Constantly vulnerable to the rise of new dynasties based on a combination of religious, tribal and urban dissidence |

**Table 10.2 Representation of Ibn Khaldun's hierarchy of Social Cohesion**

Based on Fromherz (2013, p195)

The interpretations by Finer and Fromherz of Ibn Khaldun's model seem robust in the context of North Africa and, as noted above, Turchin develops a quantitative version of the model. There may be less justification for extrapolating the model to nomad dealings in other parts of the world. The Chinese state (with access to a larger agrarian hinterland than was available to North African city-based states<sup>77</sup>) was far bigger and more stable than Maghreb states, with some dynasties that lasted several hundred years. As noted in Chapter 9, Barfield identifies three cycles of interaction between nomads and China.<sup>78</sup> He suggests that nomad states developed in response to the challenge of the sedentary state that confronted them, and found that an imperial confederacy was most effective, for "A nomadic leader who failed to establish a lucrative extortion relationship with China was building a political structure on sand."<sup>79</sup> He identifies two broad strategies that could be followed, alliance or raiding and extortion. Megoran draws attention to the fact that peace as well as war can be subject to geographical analysis<sup>80</sup>. This suggests that geographical variables will impact on peaceful interactions as well as on interactions involving warfare,

The use of numerical and textual models is thus common.

<sup>77</sup> Turchin, P. (2009) 'A theory for formation of large empires', *Journal of Global History*, 4(2), pp. 191-217.

<sup>78</sup> Barfield, T.(1989) *The Perilous Frontier* op. cit.

<sup>79</sup> Barfield, T. (1989) *The Perilous Frontier* op.cit. p.238.

<sup>80</sup> Megoran, N. (2011) 'War and peace? An agenda for peace research and practice in geography', *Political Geography*, 30(4), p. 178.

## 10.7 METHOD USED IN THE STUDY

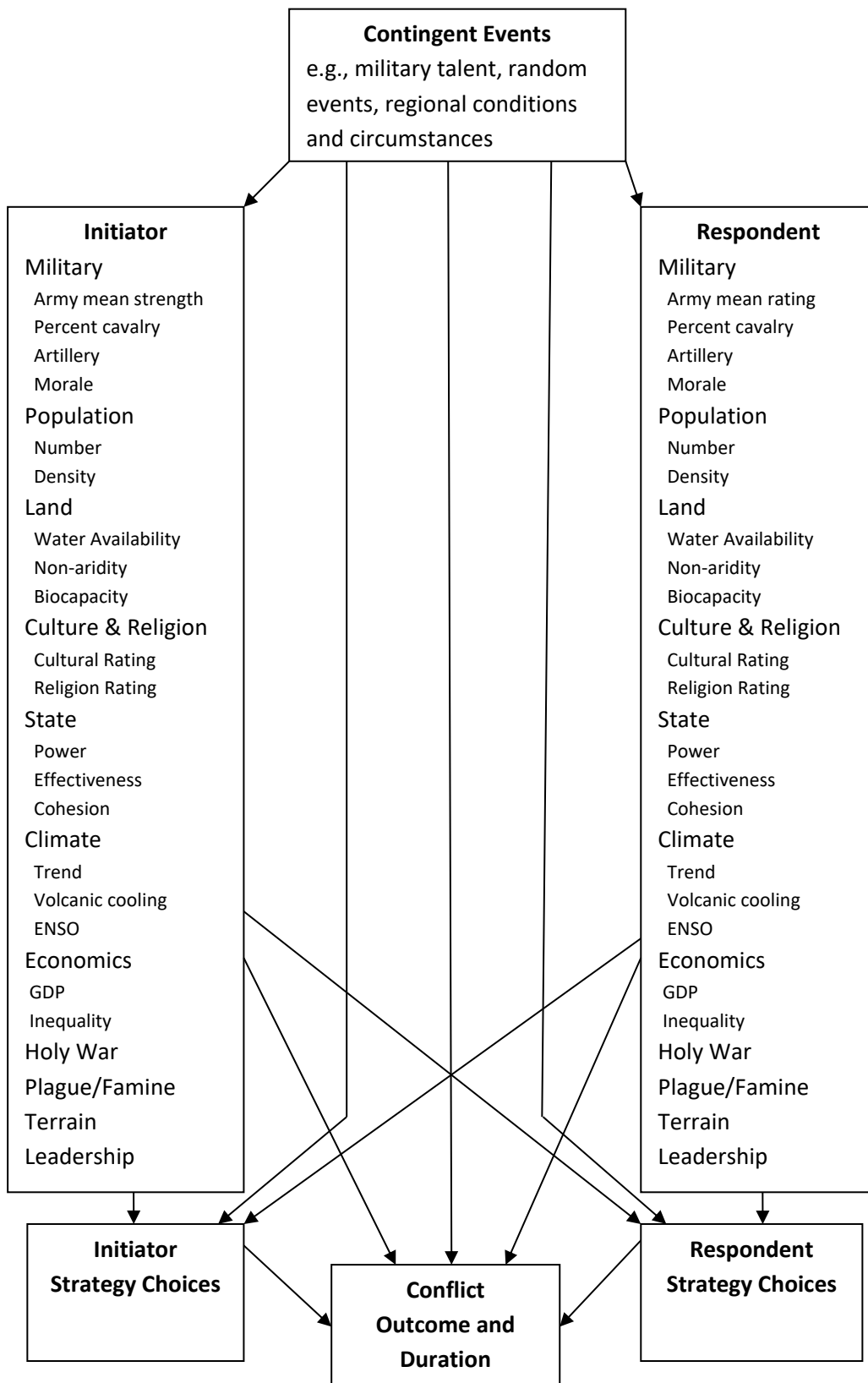
In the previous seven chapters, it has been shown that there is a wide range of variables relevant to this thesis. Chapter 11 summarises the numerical measures representing these variables. The numerical measures are subjected to cross tabulation and stepwise linear regression analysis using the computer program, SPSS. Stepwise regression orders the independent variables according to the statistical significance of each variable's contribution, in isolation, to explaining the variance of the dependent variable. It then calculates a series of ever more complex regression equations entering in turn according to their initial ordering, each of the independent variables, if the addition makes a statistically significant improvement to the explanation of the variance of the dependent variable, and removing any variables that have ceased to make a statistically significant contribution after a new variable has been entered. When all of the independent variables have been either included or excluded, the final equation is available as a model.<sup>81</sup> This addresses the relationship of the independent variables to one another. Figure 10.1 shows the model for the initial assumption concerning the relationship between the independent variables assessed in this thesis (Military (see Chapter 7), Leadership (see Chapter 8), Population (see Section 5.2), Land (see Sections 4.9-4.12), Culture (see Section 5.4) and Religion (see Section 5.5), State (see Section 5.3), Economics (see Chapter 6) and Climate (see Sections 4.2-4.8)) for conflict Initiator and Respondent, the intermediate variables of strategy choice by Initiator and Respondent, and the final dependent variable of Outcome for the conflict. The existence of Contingent Events (unassessed systematic variables, regionally significant variables and random events) is noted as these also impact strategy choices and outcomes.

## 10.8 CONCLUSIONS

The approach adopted in game theory, although sometime highly simplified in the values used, can be helpful. The order in which factors are addressed can be critical since the factors used in any model are key to the result and it is important that none are ruled out on inappropriate grounds. A large number of models, both statistical and non-statistical, used in recent studies, can be identified and provide guidance on factors that might be included in the thesis model. The statistical method used for analysis (stepwise regression) and the independent variables considered are summarised.

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<sup>81</sup> Regression is widely used e.g. in the studies of Dincecco et al. cited in Section 10.5 above. Stepwise regression is a refinement to address the possibility that the independent variables are related to each other.



**Figure 10. 1 Model of Strategy and Outcome**



## EXCURSUS E10. FAMINE AND EPIDEMIC

Along with war, famine and pestilence have been matters of ongoing concern to humanity since biblical times,<sup>82</sup> and great historical consequences have been attributed to disease.<sup>83</sup> Data has been long gathered on the subject.<sup>84</sup> The level of house-building has been linked to plague levels,<sup>85</sup> but the cause of pestilence outbreaks<sup>86</sup> has been not always been easy to establish.<sup>87</sup> It is almost inevitable that the occurrence of famine and pestilence, and their interaction, will impact to some degree on the interaction of groups, whether peaceful or warlike.

Table E10.1 shows that for Late Rome and Early Byzantium, an area including at differing time, between two and eight of the regions identified in this study (the empire lost and regained territory) over a period of 450 years, there were 134 famines and 124 epidemics, i.e., approximately 5.7 incidents per decade, about equally divided between epidemics (2.8) and famines (3.0) overall. In the fourth and fifth centuries, famines were approximately twice as frequent as epidemics, but thereafter epidemics were the most frequent events (at least according to the available historical record). After approximate adjustment for duration and imperial extent, there were 0.4-0.7 famines per decade in the fourth to seven centuries, more than doubling to 1.20 famines per decade in the eighth century. This may perhaps be calibrated against 95 English famines in “the Middle Ages” (say 1.0 famine per decade over 1,000 years) or 1,828 Chinese famines (9.1 famines per decade) over 2,019 years (108 BCE to 1911).<sup>88</sup> Bearing in mind the relative sizes of the realms,<sup>89</sup> and the fact that the English and Chinese estimates may not be fully

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<sup>82</sup> The menaces of sword, famine and pestilence are frequently referred to in the Books of Jeremiah and Ezekiel, and feature in the Book of Revelation. In medieval England (1386), famine and pestilence were foretold as divine punishment and a period of civil war regarded as equivalent (Westminster Chronicle, quoted in Given-Wilson, C. (2004) *Chronicles: The writing of History in Medieval England*. London: Hambledon and London, p.24.)

<sup>83</sup> Harper, K. (2017) *The Fate of Rome: climate, disease and the end of an empire*. Oxford: Princeton University Press; Rosen, W. (2007) *Justinian's Flea: Plague, Empire and the Birth of Europe*. London: Viking; Watts, S. (1999) *Epidemics and History: disease, power and imperialism*. New Haven: Yale University Press.

<sup>84</sup> See Walford, C. (1879) *The famines of the World, Past and Present*. London: Edward Stanford. See Walford, C. (1884) *A Statistical Chronology of Plagues and Pestilences as Affecting Human Life with an Inquiry into Their Causes*. London: Harrisons and Sons.

<sup>85</sup> Ljungqvist, F. C., Tegeld, W., Krusic, P. J., Seim, A., Gschwind, F. M., Haneca, K., Herzig, F., Heussner, K.-U., Hofmann, J., Houbrechts, D., Kontic, R., Kyncl, T. Š., Leuschner, H. H., Nicolussi, K., Perrault, C., Pfeifer, K., Schmidhalter, M., Seifert, M., Walder, F., Westphal, T. and Büntgen, U. (2018) 'Linking European building activity with plague history', *Journal of Archaeological Science*, 98, pp. 81-92.

<sup>86</sup> These would include famine, and also perhaps include conflict itself, through famine, ecological disturbance from scorched earth policies, deforestation, deliberate flooding, and movement and close proximity of large numbers of peoples.

<sup>87</sup> Baillie, M. (2001) *Exodus to Arthur: Catastrophic encounters with comets*. London: B.T. Batsford Ltd; Baillie, M. (2006) *New Light on the Black Death: The cosmic Connection*. Stroud: Tempus Publishing Ltd.

<sup>88</sup> Unsourced Wikipedia estimates, accessed July 2018.

<sup>89</sup> The larger the area under consideration, the greater the chance is that a famine will occur somewhere or other within it. An area that is 22 times that of England might reasonably expect to record nine times as many famines. If the annual probability of a famine occurring in an area the size of England is 0.1, then the probability of at least one famine occurring in some part of an area that is 22 times that size, but otherwise similar, is 0.9. In considering these numbers,

robust, the Roman-Byzantine estimate seems more or less compatible with them. It may be noted that the average number of el Niño events per decade in the Late Roman-Early Byzantine period is 3.7.

A realm subject to internal conflict, disease and famine is much weakened and vulnerable to attack by outsiders. Although it is experiencing impoverishment, it may well still be richer than its attackers. This has long been a commonplace as with the historic Chinese Stratagem 5, Loot a Burning House: “When a country is beset with internal conflicts, when disease and famine ravage the population, when corruption and crime are rife, then it will be unable to deal with an outside threat. This is the time to attack.”<sup>90</sup>

Monson proposes an index of instability based on the level of internal and external conflict experienced by a polity.<sup>91</sup> Famine and plague are not included as factors in his index. In Table E10.2, an extended version of Monson’s index, including famine and disease, is proposed as the 4-H Index.<sup>92</sup>

| Century | Famines | Epidemics | Total | Regions covered | Famines per decade adjusted for extent and duration | Epidemic per decade adjusted for extent and duration |
|---------|---------|-----------|-------|-----------------|---|--|
| Fourth  | 31      | 14        | 45    | 8               | 0.39  | 0.18   |
| Fifth   | 35      | 18        | 53    | 4-8             | 0.58  | 0.30   |
| Sixth   | 37      | 52        | 89    | 4-7             | 0.67  | 0.95   |
| Seventh | 19      | 23        | 42    | 2-8             | 0.38  | 0.46   |
| 700-750 | 12      | 17        | 29    | 2               | 1.20  | 1.70   |
| All     | 134     | 124       | 258   | Na              |   |  |

**Table E10.1 Late Roman and Early Byzantine Famines and Epidemics**

Source for Famine and Epidemic data: Stathokopoulos<sup>93</sup>

It is thus clearly possible to compile a single quantitative 4-H index of societal stress that would comprise civil strife, war, famine and pestilence. For societies that have an adequate level of

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it must also be borne in mind that there may have been some years in which more than one regionally distinct famine occurred.

<sup>90</sup> For example, see the statement of the folk wisdom saying in Tung, D. S. and Tung, T. K. (2010) *36 Stratagems Plus: Illustrated by International Cases*. British Columbia: Trafford Publishing, p. 54.

<sup>91</sup> Monson, A. (2015) 'Hellenistic Empires', in Monson, A. & Scheidel, W. (eds.) *Fiscal regimes and the political economy of pre-modern states*. Cambridge: Cambridge University Press, pp. 169-207.

<sup>92</sup> The name '4-H Index', i.e. Four Horseman Index, is derived from the Four Horsemen described in the Book of Revelation 6. White is civil strife; Red is external war; Black is famine; Pale is pestilence. The first two items are taken from Monson’s index, see Monson, A. (2015) op.cit.

<sup>93</sup> Stathakopoulos, D. C. (2004) *Famine and Pestilence in the Late Roman and Early Byzantine Empire: a systematic search of subsistence crises and epidemics*. Abingdon Routledge, Table 2.1.

record keeping, this would be a valuable analytical tool. For many societies, however, particularly nomadic societies, the level of literacy would raise serious questions about the number of incidents recorded. While the occurrence of a *dzud* or drought, with attendant harm to the herds and possible famine for people, was of key importance to a nomadic society, it might not be systematically recorded (although there may be alternative sources of information on climatic causes of famine). An outbreak of infectious disease with notable mortality is less easily detected by indirect means such as house building, and may in fact be less prone to happen among a widely dispersed nomadic people.

Thus, although computation of the 4-H measure is feasible for a great many societies, and would be of value where this is possible, it is not likely to be feasible for all societies. Consequently, this measure, though recorded for the consideration of others who may find it appropriate, is not used in this study.

| Index        | Impact                         |                                 | Impact                    |                                  |
|--------------|--------------------------------|---------------------------------|---------------------------|----------------------------------|
| <b>White</b> | <b>Dynastic/citizen unrest</b> |                                 | <b>Subject unrest</b>     |                                  |
|              | 0                              | None                            | 0                         | None                             |
|              | 1                              | Ruler change/political killings | 1                         | Minor revolt/rioting             |
|              | 2                              | Dynastic/civil war              | 2                         | Major revolt                     |
|              | 3                              | Both 1 and 2                    | 3                         | Multiple revolts                 |
| <b>Red</b>   | <b>External War</b>            |                                 | <b>Military Success</b>   |                                  |
|              | 0                              | None                            | 0                         | Overall victory                  |
|              | 1                              | Asymmetric war with weaker foe  | 1                         | No change                        |
|              | 2                              | Symmetric war with strong foe   | 2                         | Overall defeat                   |
|              | 3                              | Multiple wars                   | 3                         | 2 and territory loss             |
| <b>Black</b> | <b>Famine Extent</b>           |                                 | <b>Famine Intensity</b>   |                                  |
|              | 0                              | None                            | 0                         | Light (up to 5% mortality)       |
|              | 1                              | One province                    | 1                         | Moderate (5 to 10% mortality)    |
|              | 2                              | Several provinces               | 2                         | Severe (10 to 20% mortality)     |
|              | 3                              | All parts                       | 3                         | Very severe (over 20% mortality) |
| <b>Pale</b>  | <b>Epidemic Extent</b>         |                                 | <b>Epidemic intensity</b> |                                  |
|              | 0                              | None                            | 0                         | Light (up to 5% mortality)       |
|              | 1                              | One province                    | 1                         | Moderate (5 to 10% mortality)    |
|              | 2                              | Several provinces               | 2                         | Severe (10 to 20% mortality)     |
|              | 3                              | All parts                       | 3                         | Very severe (over 20% mortality) |

**Table E10.2 4-H Index of Realm Stress**

Source: Monson (2015) Instability index for the definition of the White and Red components

## CHAPTER 11. STRUCTURE OF THE GIPP DATABASES

### 11.1 INTRODUCTION

The main database of Group Interactions with Polemogenic Potential (GIPP 1) contains both primary and secondary variables. Previous chapters and Excursi have reviewed topics deemed relevant to understanding and predicting the course and outcomes of GIPPs, as well as considering how best to incorporate such as quantitative variables in the analysis. Here, there are both Primary and Secondary variables. Primary variables are largely real world data, with a certain degree of simple processing and interpolation, and are generally based on published data or the judgement of this author as informed by the literature.

Secondary variables are the product of statistical processing of an array of primary variables. Using Principal Components Analysis, the primary variables are reduced to a smaller number of synthetic summary variables that can be used to target analysis in Chapters 12 and 13 towards areas where the variables are more likely to be statistically significant.

The GIPP 1 primary variables used in subsequent analysis, together with their reference point (initiator, respondent, both or the overall situation) and source, are summarised in Section 11.2, below. In order to provide further explanation of their source and computation, notes are supplied. Where the theoretical basis requires more detailed explanation, a reference to the relevant chapter is supplied. Secondary variables, derived from analysis of primary variables, are also included in the annotation.

GIPP 1 is a single sample of GIPPs, added to the database as they were identified. No doubt, a different sample would yield different conclusions. It would be desirable to have a different sample on which the likely extent of such difference in conclusions can be tested. Thus, a secondary database, GIPP 2, is compiled to allow independent testing of the conclusions derived from GIPP 1. The basis for selection, together with the details of the GIPPs selected for inclusion in this database is shown in Section 11.3.

## 11.2 GIPP 1 DATABASE

The main database used for analysis by the thesis is GIPP 1. Table 11.1 lists the 120 interactions held on the GIPP 1 database, showing the date, the groups involved (both initiator and respondent)<sup>1</sup>, the region of the respondent group, the type of the interaction and the identity number of the GIPP (used in Chapter 9 to place it in a wider context). In some instances, a group is not an ethnic or social group, but the followers of an individual or dynasty.<sup>2</sup>

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<sup>1</sup> As noted in Excursus E9, the Initiator of the interaction is the party who begins it, and the Respondent is the other party (with the nomad or holy war party assumed to be the Initiator in absence of evidence to the contrary).

<sup>2</sup> The name given to a party in a GIPP in Table 11.2, Table 11.3 or Tables 11.9-11.11 is intended as a convenient identifier, rather than a carefully calculated classificatory variable. There are a range of different implications for different terms. Thus the Ptolemaic dynasty ruled Ptolemaic Egypt, a period in the history of a long established polity and ethnic group in a single region, but the Seleucid dynasty ruled a miscellaneous group of ethnic groups in a variable extent of territories straddling four regions. Antigonos ruled a tract of territory across two regions (Syria, Anatolia), at a considerable remove from the polity and ethnic groups ruled by his Antigonid descendants in a different region (Balkans). The Chinggisid dynasties were strongly associated with the Mongol ethnic group, whereas the Timurid dynasty, though linked to the Mongols, had a much less clearly defined association with the group. Many groups were led by Mahdi claimants, rather than dynasties, polities or ethnic communities.

| Primary Variable                      | Initiator/<br>Respondent/<br>Both/<br>Overall | Source  | Further<br>Information                 |
|---------------------------------------|---|---|--|
| Parties                               | B   | Historical Accounts   | Table 11.2<br>Chapter 9<br>Excursus E1 |
| Date (includes date Before Present)   | O   | Historical Accounts   |  |
| Duration                              | O   | Historical Accounts   |  |
| Region                                | B   | Historical Accounts   | Note P2                                |
| Group                                 | I   | Historical Accounts   |  |
| Nomad Ally                            | R   | Historical Accounts   | Chapter 9<br>Excursus E3               |
| Area                                  | B   | Various maps  | Excursus E5.1                          |
| Population                            | B   | McEvedy and Jones (1985)  |  |
| Population Density                    | B   | McEvedy and Jones (1985)  |  |
| Polity Power                          | B   | Finer's Conceptual Prologue (1999a, p6-9) *   | Excursus E5.2                          |
| Social Effectiveness                  | B   | Finer's Conceptual Prologue (1999a, p35-96) *   | Excursus E5.3                          |
| Social Cohesion                       | B   | Fromherz (2013, p195) *   |  |
| Cultural Complexity                   | B   | Murdock and Provost (1973) *  | Excursus E5.4                          |
| Seshat Composite Factor               | B   | Turchin et al (2017)  | Excursus E5.5                          |
| Religion Rating                       | B   | Finer (1999a) *   | Excursus E5.6                          |
| Holy War                              | B   | Historical Accounts*  | Excursus E8                            |
| Reign Change                          | B   | Baumer (2014, 2016), Brook (2010), Dignas & Winter(2007),Kuhn (2009), Paludan (1998), Rowe (2009), Sturlason (1915), Tapsell, (1983) Venning (2013) |  |
| Gender                                | B   | As for Reign Change   |  |
| Temperature (modern)                  | B   | Title and Bemmels (2017)  | Excursus E4.4                          |
| Precipitation (modern)                | B   | Title and Bemmels (2017)  |  |
| Aridity Index (modern)                | B   | Trabucco and Zomer (2009)   |  |
| Potential Evapotranspiration (modern) | B   | Trabucco and Zomer (2009)   |  |
| Growing Degree Days (0°C) (modern)    | B   | Title and Bemmels (2017)  |  |
| Net Primary Production (modern)       | B   | Zhao and Running (2010)   |  |
| Aridity (modern)                      | B   | L'vovich (1979) & the World Evapotranspiration webviewer  |  |
| Water Availability (modern)           | B   | L'vovich (1979) & the World Evapotranspiration webviewer  |  |
| Biocapacity (modern)                  | B   | National Footprint Accounts (2016)  | Excursus E4.5                          |
| Desert (modern)                       | B   | Nunn & Puga (2012)  |  |
| Good Soil (modern)                    | B   | Nunn & Puga (2012)  |  |
| Drought                               | B   | Cook et al (2010, 2015)   | Excursus E4.2                          |
| Regional Climatic Change Index        | B   | Various sources   | Excursus E4.1                          |
| Greenland Ice Core Sulphates          | O   | Zielinski (1994)  |  |
| Northern Hemisphere Temperature       | O   | Kobashi et al (2013)  |  |
| El Niño Southern Oscillation          | O   | Moy et al (2002)  |  |
| Terrain (modern)                      | B   | Dupuy (1979) *  | Excursus E7.3                          |
| Ruggedness                            | B   | Nunn & Puga (2012)  |  |
| Altitude                              | B   | Nunn & Puga (2012)  |  |
| GDP per capita                        | B   | Maddison (2007)   | Chapter 6                              |
| Inequality                            | B   | Maddison (2007) & Milanovic (2011), Barker (2008-2010)  |  |
| Meta Ethnic Measure                   | O   | Turchin (2003)  | Chapter 10                             |
| Army Mean Rating                      | B   | Barker (2007-2010)  | Excursus E7.1                          |
| Percent Cavalry                       | B   | Barker (2007-2010)  |  |
| Artillery                             | B   | Barker (2007-2010)  |  |
| Aggression                            | B   | Barker (2007-2010)  |  |
| Leadership Rating                     | B   | Barker (2007-2010)  |  |
| Morale                                | B   | Barker (2007-2010)  |  |
| Index of Military Sophistication      | B   | Otterbein (1970) adjusted for artillery and fire/gunpowder  | Excursus E7.2                          |
| Strategy                              | B   | Historical Accounts   | Excursus E9                            |
| Outcome                               | B   | Historical Accounts   |  |

**Table 11.1 Summary of primary variables held on the GIPP Database, sources and further information**

I: Initiator only; R: Respondent only; B: Both parties: Same variable is held for both parties; O: Overall characteristic of GIPP as a whole.

\* Numerical values are in part or in total attributed by the present author to conceptual categories.

| Date     | Region                | Initiator             | Respondent           | Type  | Identity Number |
|----------|-----------------------|-----------------------|----------------------|-------|-----------------|
| 1250 BCE | Syria                 | Arab Early Bedouin    | Canaanite            | Nomad | 59              |
| 1200 BCE | Syria                 | Hebrew                | Canaanite            | Holy  | 60              |
| 1200 BCE | Egypt                 | Libyan                | Egyptian             | Nomad | 80              |
| 710 BCE  | Anatolia              | Kimmerians            | Uratu                | Nomad | 54              |
| 545 BCE  | Inner Asia Turkestan  | Persian (Cyrus)       | Massagetae           | Nomad | 116             |
| 520 BCE  | Inner Asia Pontic     | Persian (Darius)      | Scythians            | Nomad | 117             |
| 200 BCE  | China                 | Hsiung nu             | Han                  | Nomad | 10              |
| 180 BCE  | India                 | Saka in India         | Indians              | Nomad | 88              |
| 180 BCE  | Iran                  | Saka in Central Asia  | Graeco-Bactrian      | Nomad | 90              |
| 150 BCE  | Mesopotamia           | Parthian              | Seleukids            | Nomad | 118             |
| 120 BCE  | Iran                  | Kushans               | Saka                 | Nomad | 92              |
| 80       | Inner Asia Mongolia   | Hsiung nu             | Xianbei              | Nomad | 9               |
| 100      | India                 | Kushans               | Indians              | Nomad | 89              |
| 160      | North Africa Arable   | Moors Later           | Roman early Imperial | Nomad | 50              |
| 250      | Syria                 | Arab Late Pre-Islamic | Palmyra              | Nomad | 51              |
| 300      | Egypt                 | Blemmyes              | Roman                | Nomad | 23              |
| 320      | Balkans               | Sarmatians            | Roman                | Nomad | 93              |
| 330      | China                 | Joujan                | Wei                  | Nomad | 11              |
| 440      | Balkans               | Huns                  | Roman                | Nomad | 35              |
| 455      | Iran                  | Hephthalites          | Sassanid             | Nomad | 85              |
| 455      | Balkans               | Cutrigurs             | Byzantine            | Nomad | 86              |
| 455      | Balkans               | Utigurs               | Byzantine            | Nomad | 91              |
| 455      | India                 | Hephthalites          | Indians              | Nomad | 78              |
| 546      | China                 | 1st Turks             | Sui & Tang           | Nomad | 7               |
| 565      | Balkans               | Avars                 | Byzantine            | Nomad | 33              |
| 600      | Europe                | Khazar                | Europe               | Nomad | 39              |
| 600      | Russia                | Khazar                | Rus                  | Nomad | 98              |
| 632      | Mesopotamia           | Arab Conquest         | Sassanid             | Holy  | 27              |
| 632      | Syria                 | Arab Conquest         | Byzantine            | Holy  | 30              |
| 635      | Balkans               | Bulgar 1st wave       | Byzantine            | Nomad | 87              |
| 640      | Anatolia              | Arab Conquest         | Byzantine            | Holy  | 18              |
| 640      | Anatolia              | Arab Conquest         | Armenian             | Holy  | 19              |
| 640      | Egypt                 | Arab Conquest         | Byzantine            | Holy  | 22              |
| 640      | Iran                  | Arab Conquest         | Sassanid             | Holy  | 24              |
| 650      | North Africa Arable   | Arab Conquest         | Byzantine            | Holy  | 4               |
| 650      | Sudan Belt            | Arab Conquest         | Makouria             | Holy  | 70              |
| 660      | Syria                 | Khawarj               | Arab Umayyad         | Holy  | 53              |
| 679      | China                 | 2nd Turks             | Sui & Tang           | Nomad | 8               |
| 695      | North Africa Pastoral | Arab Conquest         | Kahina               | Holy  | 107             |
| 700      | North Africa Pastoral | Arab Umayyid          | Moors Later          | Holy  | 99              |
| 700      | Inner Asia Pontic     | Arab Umayyids Iran    | Khazar               | Holy  | 100             |

**Table 11.2 Interactions held on GIPP 1 database** (dates in CE unless otherwise stated, Holy takes priority as type)

| Date | Region                | Initiator          | Respondent     | Type  | Identity Number |
|------|-----------------------|--------------------|----------------|-------|-----------------|
| 700  | Inner Asia Turkestan  | Arab Umayyids Iran | 2nd Turks      | Holy  | 52              |
| 711  | Iberia                | Arab Umayyid       | Visigoth       | Holy  | 79              |
| 744  | China                 | Uighur             | Sui & Tang     | Nomad | 16              |
| 760  | North Africa Arable   | Al-Zakia           | Abbasids       | Holy  | 81              |
| 830  | Europe                | Magyar             | Europe         | Nomad | 40              |
| 840  | Inner Asia Turkestan  | Kirghiz            | Uighur         | Nomad | 55              |
| 850  | Balkans               | Petchneg           | Byzantine      | Nomad | 36              |
| 850  | Russia                | Petchneg           | Rus            | Nomad | 97              |
| 900  | Balkans               | Bulgar 2nd wave    | Byzantine      | Nomad | 34              |
| 900  | India                 | Ghaznavids         | Indians        | Nomad | 95              |
| 907  | China                 | Liao               | Sung           | Nomad | 13              |
| 909  | North Africa Arable   | Fatimids           | Aghlabids      | Holy  | 5               |
| 939  | North Africa Pastoral | Abu Yazid          | Fatimids       | Holy  | 1               |
| 990  | Iran                  | Qarakhanids        | Ghaznavids     | Nomad | 120             |
| 1004 | North Africa Arable   | Abu Rakwa          | Fatimids       | Holy  | 111             |
| 1024 | Syria                 | Banu Jarrah        | Fatimids       | Nomad | 101             |
| 1030 | Iran                  | Seldjuk            | Khurassians    | Nomad | 26              |
| 1050 | Anatolia              | Seldjuk            | Byzantine      | Nomad | 21              |
| 1050 | Mesopotamia           | Seldjuk            | Abbasids       | Nomad | 29              |
| 1050 | Syria                 | Seldjuk            | Abbasids       | Nomad | 32              |
| 1050 | North Africa Arable   | Banu Hilal         | Zirids         | Nomad | 103             |
| 1050 | Egypt                 | Lawata             | Fatimids       | Nomad | 102             |
| 1054 | Balkans               | Cumans & Kipchaks  | Byzantine      | Nomad | 37              |
| 1054 | Russia                | Cumans & Kipchaks  | Russians       | Nomad | 94              |
| 1056 | North Africa Pastoral | Almoravid          | Fatimids       | Holy  | 3               |
| 1056 | Sudan Belt            | Almoravid          | Ghana          | Holy  | 72              |
| 1063 | North Africa Pastoral | Al-Jizani          | Fatimids       | Holy  | 82              |
| 1063 | North Africa Pastoral | Ibn Talal          | Almoravids     | Holy  | 83              |
| 1086 | Iberia                | Almoravid          | Iberia         | Holy  | 56              |
| 1095 | Syria                 | Crusades           | Seldjuk & Arab | Holy  | 61              |
| 1120 | China                 | Jurchen            | Sung           | Nomad | 12              |
| 1120 | China                 | Jurchen            | Liao           | Nomad | 14              |
| 1122 | North Africa Pastoral | Almohad            | Almoravids     | Holy  | 2               |
| 1124 | Inner Asia Turkestan  | Qara Khitai        | Qarakhanids    | Nomad | 114             |
| 1145 | Iberia                | Almohad            | Iberia         | Holy  | 62              |
| 1145 | Syria                 | Crusades           | Seldjuk & Arab | Holy  | 57              |
| 1145 | North Africa Pastoral | Ibn Qasi           | Almohads       | Holy  | 84              |
| 1148 | North Africa Pastoral | Al-Massi           | Almohads       | Holy  | 106             |
| 1150 | India                 | Ghurids            | Indians        | Nomad | 96              |
| 1186 | North Africa Pastoral | Almohad            | Banu Ghaniya   | Holy  | 112             |

**Table 11.2 Interactions held on GIPP 1 database (continued)**



| Date              | Region               | Initiator          | Respondent       | Type  | Identity Number |
|-------------------|----------------------|--------------------|------------------|-------|-----------------|
| 1189              | Egypt                | Crusades           | Egypt (Ayubid)   | Holy  | 63              |
| 1193              | Baltic               | Teutonic Order     | Baltic Pagans    | Holy  | 68              |
| 1195              | North Africa Arable  | Banu Merin         | Almohad          | Nomad | 109             |
| 1204              | Anatolia             | Crusades           | Byzantine        | Holy  | 64              |
| 1209              | Europe               | Crusade Albigenses | Albigenses       | Holy  | 108             |
| 1211              | China                | Mongol             | Chin             | Nomad | 15              |
| 1213              | Egypt                | Crusades           | Egypt (Ayubid)   | Holy  | 65              |
| 1218              | Inner Asia Turkestan | Mongol             | Khwarizmians     | Nomad | 46              |
| 1220              | India                | Ilkhanid           | Delhi            | Nomad | 104             |
| 1237              | Russia               | Golden Horde       | Russians         | Nomad | 49              |
| 1240              | Egypt                | Sudan Arabs        | Mameluks         | Nomad | 119             |
| 1241              | Europe               | Golden Horde       | Europe           | Nomad | 38              |
| 1243              | Anatolia             | Ilkhanid           | Armenian         | Nomad | 20              |
| 1243              | Iran                 | Ilkhanid           | Khurassians      | Nomad | 25              |
| 1245              | Mesopotamia          | Ilkhanid           | Abbasids         | Nomad | 28              |
| 1248              | Egypt                | Crusades           | Egypt (Ayubid)   | Holy  | 66              |
| 1260              | Syria                | Ilkhanid           | Mamluks          | Nomad | 31              |
| 1270              | China                | Yuan               | Sung             | Nomad | 67              |
| 1270              | North Africa Arable  | Crusades           | Tunis            | Holy  | 17              |
| 1292              | India                | Late Mongol        | Delhi            | Nomad | 105             |
| 1370              | Inner Asia Mongolia  | Timurids           | Late Mongol      | Nomad | 48              |
| 1389              | Iran                 | Black Sheep        | Jalayirids       | Nomad | 115             |
| 1399              | Anatolia             | Timurids           | Black Sheep      | Nomad | 47              |
| 1400              | China                | Oirats             | Chinese (Ming)   | Nomad | 69              |
| 1400              | Sudan Belt           | Funj               | Alwa             | Holy  | 71              |
| 1453              | Sudan Belt           | Tuareg             | Timbuktu         | Nomad | 58              |
| 1499              | Iran                 | White Sheep        | Safavids         | Nomad | 113             |
| 1600              | Sudan Belt           | Kel Tadmarka       | Songhai          | Nomad | 110             |
| 1673              | Sudan Belt           | Fulani             | Futa Toro 1673   | Holy  | 73              |
| 1725              | Sudan Belt           | Fulani             | Futa Jallon 1725 | Holy  | 75              |
| 1776              | Sudan Belt           | Fulani             | Futa Toro 1776   | Holy  | 74              |
| 1804              | Sudan Belt           | Fulani             | Gobir            | Holy  | 6               |
| 1805              | Sudan Belt           | Fulani             | Katsina          | Holy  | 41              |
| 1805              | Sudan Belt           | Fulani             | Daura            | Holy  | 42              |
| 1805              | Sudan Belt           | Fulani             | Kano             | Holy  | 43              |
| 1805              | Sudan Belt           | Fulani             | Zaria            | Holy  | 45              |
| 1810              | Sudan Belt           | Fulani             | Bornu            | Holy  | 44              |
| 1810              | Sudan Belt           | Fulani             | Massina 1810     | Holy  | 76              |
| 1854 <sup>3</sup> | Sudan Belt           | Tukolors           | Bambara 1854     | Holy  | 77              |

**Table 11.2 Interactions held on GIPP 1 database (continued)**

<sup>3</sup> This GIPP is slightly beyond the study limits, but it is the last holy war before European interventions became significant in the area.

The interactions held on the GIPP database fall into six groupings, readily identifiable by geographical origin and the nature (e.g. ethnic group or dynasty) of the initiator, leaving a seventh residual group which accounts for 25% of the 120 interactions (see Table 11.3). The Crusades (8%), the Arab conquest (9%), West African (10%) and Maghrebi (21%) interactions are dominated by holy war, whilst the Chinggisid (9%) group is linked to dynastic conquest by Genghis Khan and his descendants and the Turkish group (18%) is dominated by nomadic peoples from Central Asia.

| Interaction Group | Definition  | Comment   | Percent |
|-------------------|---|---|---------|
| Crusades          | Origin in Europe  | Crusades  | 7.5     |
| Arab Conquest     | Initiator: Arab Conquest, including Umayyids to 732 CE                              | Mostly <i>jihād</i>   | 9.2     |
| West Africa       | Origin in West Africa   | Dominated by Fulani <i>jihād</i>  | 10.0    |
| Maghrebi          | Origin in Maghreb or Sahel/Sahara   | Dominated by Berbers and <i>jihād</i>   | 20.8    |
| Chinggisid        | Initiator: Mongol empire and successor states: Ilkhan, Chagatai, Golden Horde, Yuan | Dynastic conquest by Genghis Khan and successors  | 9.2     |
| Turkish           | Origin in Turkestan or Pontic region, 500 CE or later, not Chinggisid               | Turkish nomad waves   | 18.3    |
| General           | Origin and initiator do not match any of the above                                  | This miscellaneous group is not used as an analytic variable: Mostly Indo-European, Mongol and Semitic nomads | 25.0    |

**Table 11.3 Interaction groupings based on origin (geographical, ethnic or dynastic)**

In addition to primary variables which attempt to measure various relevant factors, the GIPP database contains some secondary variables which are computed from these primary variables. Table 11.4 describes these secondary variables in aggregate, with some subsequent description of them individually.

| Secondary variable (and Numbers)  | Initiator/ Respondent/ Both/ Overall | Primary variables used   | Further Information in Section |
|---|--------------------------------------|--|--------------------------------|
| Composite variables (13 x 2 parties = 26)                                     | B                                    | 37 primary variables for each of the parties (74 in total), in six groups                              | 11.6                           |
| Second order principal components (5 x 2 parties = 10) of composite variables | B                                    | 13 principal components for each of the parties (26 in total)  | 11.7                           |
| "3M" Indices (i.e., Material, Manoeuvre, Morale)                              | B                                    | GDP, Population, Area; Military Sophistication, Mobility, Terrain; <i>jihād</i> , Cohesion, Aggression | 11.8                           |
| Combined 3M Indices   | B                                    |  |                                |
| Initiator 3M advantage  | O                                    | Combined 3M Indices  |                                |
| Military ratio  | O                                    | Population, area, mobilisation value, proportion of cavalry, troop quality                             | Excursus 11                    |

**Table 11.4 Summary of secondary variables held on the GIPP Database, sources and further information**

The number of primary variables available for each interaction (37 for each of the parties involved, 74 in total) is large enough to raise theoretical issues concerning the robustness of any regression carried out on the basic database since this contains no more than 120 cases.<sup>4</sup> To deal with this issue, it is helpful to reduce the number of variables used, whilst losing as little as possible of the information they convey. Accordingly, composite variables have been compiled for six groups of broadly related variables.<sup>5</sup> Each variable held on a database concerning a number of cases may be regarded as a separate dimension in a multi-dimensional array of data. The statistical technique known as Principal Component Analysis (PCA) can be used to consolidate that array.<sup>6</sup> This technique has in the past been used for analysis on the Seshat database.<sup>7</sup> Tables 11.5 and 11.6 show the results of Principal Component Analyses carried out on each of the six groups (Geomorphology, Climatology, Biogeography, Social, Economic and Military). All of the groups yield one to three statistically significant components (thirteen in total) which explain from 65% (Social and Economics components) to 72% (Climate and Military) and 88% (Geomorphology and Biogeography) of the variance in their respective groups. The highest weighting for each of the variables against identified components is shaded in Table 11.6. Using the thirteen principal component scores as composite variables for each of the parties, rather than the individual variables, thus reduces the number of variables used by a factor of 2.85, from 74 to 26.

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<sup>4</sup> It may be argued that in an analysis conducted on a database consisting of sets of purely random numbers (e.g., dice throws or similar), the nature of statistical testing means that five out of every 100 comparisons will show a difference that will be large enough to be deemed statistically significant at the 95% level. The more variables there are in a database, the more comparisons will be needed, to analyse it, and the more likely that one will appear statistically significant by chance.

A further issue is that the reliability of statistical techniques is also affected when there are many variables relative to the number of cases. It has been recognised for over thirty years that this is an issue, and that the number of cases should exceed the number of variables by a factor of three to four in regression and ten in principal component analysis. See Goggen, M. L. (1986) 'The "Too Few Cases/Too Many Variables" Problem in Implementation Research', *The Western Political Quarterly*, 39(2), pp. 328-347, and Flury, B. and Raedwyl, H. (1988) *Multivariate Analysis: A Practical Approach*. London Chapman and Hall, p.9.

<sup>5</sup> Summary labels attached by author.

<sup>6</sup> PCA seeks to generate composite or synthetic dimensions that summarise the data of a database in the most efficient way, using a minimum number of statistically significant synthetic dimensions. The maximum number needed to explain the variance of the data is equal to the number of variables, but it is normally possible to identify a more limited selection of statistically significant synthetic dimensions (each such dimension is, effectively, a new summary or composite variable). The *eigenvalues* of each new dimension provide a measure of the alignment of each existing variable with that dimension, so that the value of the new composite variables for each case may be calculated by applying the appropriate *eigenvalues* to the existing variables.

<sup>7</sup> Turchin, P., Currie, T. E., Whitehouse, H., François, P., Feeney, K., Mullins, D., Hoyer, D., Collins, C., Grohmann, S., Savage, P., Mendel-Gleason, G., Turner, E., Dupeyron, A., Cioni, E., Reddish, J., Levine, J., Jordan, G., Brandl, E., Williams, A., Cesaretti, R., Krueger, M., Ceccarelli, A., Figliulo-Rosswurm, J., Tuan, P.-J., Peregrine, P., Marciniak, A., Preiser-Kapeller, J., Kradin, N., Korotayev, A., Palmisano, A., Baker, D., Bidmead, J., Bol, P., Christian, D., Cook, C., Covey, A., Feinman, G., Júlíusson, Á. D., Kristinsson, A., Miksic, J., Mostern, R., Petriem, C., Rudiak-Gould, P., ter Haar, B., Wallace, V., Mair, V., Xie, L., Baines, J., Bridges, E., Manning, J., Lockhart, B., Bogaard, A. and Spencer, C. (2018) 'Quantitative historical analysis uncovers a single dimension of complexity that structures global variation in human social organization', *Proceedings of the National Academy of Science*, 115 (2), pp. E144-E151.

| Group         | Components    |                         |                   | % Variance explained by Components |
|---------------|---------------|-------------------------|-------------------|------------------------------------|
|               | 1.            | 2.                      | 3.                |                                    |
| Geomorphology | Relief        | Terrain                 |                   | 87.9                               |
| Climate       | Temperature   | Precipitation           | Climate Variation | 71.7                               |
| Biogeography  | Biocapacity   | Bioproductivity         | Soil Quality      | 86.0                               |
| Social        | Culture       | Jihad & Coherence       |                   | 64.7                               |
| Economic      | Economics     |                         |                   | 66.3                               |
| Military      | Troop Quality | Military Sophistication |                   | 72.1                               |

**Table 11.5 Identified statistically significant Principal Components by Group**

| Geomorphology     | % of Variance |           | Climate                       | % of Variance |                 |                     |
|-------------------|---------------|-----------|-------------------------------|---------------|-----------------|---------------------|
| 1 Relief          | 52.134        |           | 1 Temperature                 | 40.293        |                 |                     |
| 2 Terrain         | 35.779        |           | 2 Precipitation               | 18.728        |                 |                     |
| Total             | 87.913        |           | 3 Climate Variation           | 12.662        |                 |                     |
|                   |               |           | Total                         | 71.683        |                 |                     |
| Eigenvalues       |               |           | Eigenvalues                   |               |                 |                     |
| Geomorphology     | 1 Relief      | 2 Terrain | Climate                       | 1 Temperature | 2 Precipitation | 3 Climate Variation |
| Terrain           | -0.088        | 0.898     | Temperature                   | 0.970         | -0.095          | -0.087              |
| Terrain (Bedouin) | 0.267         | 0.897     | Precipitation                 | 0.108         | 0.962           | -0.026              |
| Altitude          | 0.795         | -0.409    | Aridity                       | -0.341        | 0.906           | 0.056               |
| Ruggedness        | 0.955         | 0.227     | Potential Evapo-Transpiration | 0.951         | -0.210          | -0.061              |
| Percent Rugged    | 0.947         | 0.211     | Growing Days (0 degrees)      | 0.977         | -0.092          | -0.067              |
|                   |               |           | Solar Radiation               | -0.258        | -0.069          | 0.558               |
|                   |               |           | Volcanic Emission             | -0.079        | 0.202           | 0.650               |
|                   |               |           | Climate                       | -0.607        | -0.062          | 0.059               |
|                   |               |           | Drought                       | 0.110         | -0.088          | 0.671               |

**Table 11.6 Principal Components of six Variable Groups.** Source: SPSS Principal Components Analysis (varimax rotation) for 37 variables assigned to six analysis groups, for 240 cultures (120 Initiator, 120 Respondents) in the main sample. Thirteen statistically significant dimensions are identified and treated as Composite Variables. Summary labels for groups supplied by author.

| <b>Biogeography</b>    |                      | <b>% of Variance</b>      |                       | <b>Social</b>                  |                        | <b>% of Variance</b>             |  |
|------------------------|----------------------|---------------------------|-----------------------|--------------------------------|------------------------|----------------------------------|--|
| 1 Biocapacity          | 43.061               |                           |                       | 1 Culture                      | 44.804                 |                                  |  |
| 2 Bio-Productivity     | 26.028               |                           |                       | 2 <i>Jihad &amp; Coherence</i> | 19.900                 |                                  |  |
| 3 Soil Quality         | 16.957               |                           |                       | Total                          | 64.704                 |                                  |  |
| Total                  | 86.046               |                           |                       |                                |                        |                                  |  |
| <b>Eigenvalues</b>     |                      |                           |                       | <b>Eigenvalues</b>             |                        |                                  |  |
| <b>Biogeography</b>    | <b>1 Biocapacity</b> | <b>2 Bio-Productivity</b> | <b>3 Soil Quality</b> | <b>Social</b>                  | <b>1 Culture</b>       | <b>2 'Jihad &amp; Coherence'</b> |  |
| Biocapacity            | 0.895                | 0.117                     | 0.036                 | State type                     | 0.827                  | -0.303                           |  |
| Water                  | 0.877                | -0.198                    | 0.265                 | Efficiency                     | 0.712                  | -0.449                           |  |
| Non-aridity            | 0.859                | 0.134                     | 0.176                 | Coherence                      | -0.464                 | 0.792                            |  |
| Net Primary Production | 0.087                | 0.873                     | 0.282                 | Reign Stress                   | 0.036                  | -0.471                           |  |
| Pasture                | -0.008               | 0.956                     | -0.063                | Culture                        | 0.853                  | -0.075                           |  |
| Soil Quality           | 0.062                | 0.242                     | 0.909                 | Seshat Index                   | 0.678                  | -0.142                           |  |
| Desert                 | -0.318               | 0.051                     | -0.883                | <i>Jihad</i>                   | -0.062                 | 0.864                            |  |
|                        |                      |                           |                       | Religion                       | 0.688                  | 0.434                            |  |
| <b>Economics</b>       |                      | <b>% of Variance</b>      |                       | <b>Military</b>                |                        | <b>% of Variance</b>             |  |
| 1 Economics            | 66.312               |                           |                       | 1 Troop Quality                | 44.311                 |                                  |  |
| Total                  | 66.312               |                           |                       | 2 Military Sophistication      | 27.781                 |                                  |  |
|                        |                      |                           |                       | Total                          | 72.092                 |                                  |  |
| <b>Eigenvalues</b>     |                      |                           |                       | <b>Eigenvalues</b>             |                        |                                  |  |
| <b>Economics</b>       | <b>1 Production</b>  |                           |                       | <b>Military</b>                | <b>1 Troop Quality</b> | <b>2 Military Sophistication</b> |  |
| Extraction Level       | 0.966                |                           |                       | Aggression                     | 0.143                  | -0.710                           |  |
| GDP                    | 0.267                |                           |                       | Troop Quality                  | 0.964                  | 0.050                            |  |
| Gini                   | 0.992                |                           |                       | Cavalry                        | 0.930                  | -0.096                           |  |
|                        |                      |                           |                       | Artillery                      | 0.540                  | 0.484                            |  |
|                        |                      |                           |                       | Military Sophistication        | 0.155                  | 0.851                            |  |

**Table 11.6 Principal Components of six Variable Groups (continued).** Source: SPSS Principal Components Analysis (varimax rotation) for 37 variables assigned to six analysis groups, for the 240 cultures (120 Initiator, 120 Respondents) in the main sample. Thirteen statistically significant dimensions are identified and treated as Composite Variables. Summary labels for groups supplied by author.

Table 11.7 presents the results of a secondary principal components analysis, which is applied to the thirteen composite variables identified in the preliminary analysis which is described in

connection with Table 11.6. The purpose of this exercise is to further summarize the data. Five statistically significant components or dimensions, explaining 76% of the variance, are identified.

| Second Order PCA                     | % of Variance |  |
|--------------------------------------|---------------|--|
| 1 'Culture & Land'                   | 24.466        |  |
| 2 'Troop Quality & Bio-Productivity' | 20.509        |  |
| 3 General                            | 12.990        |  |
| 4 'Jihad & Cohesion'                 | 9.426         |  |
| 5 'Temperature, Drought et al'       | 8.775         |  |
| Total                                | 76.167        |  |

| Eigenvalues             |                      |                                      |             |                      |                                |
|-------------------------|----------------------|--------------------------------------|-------------|----------------------|--------------------------------|
| Second Order PCA        | 1 'Culture and Land' | 2 'Troop Quality & Bio-Productivity' | 3 'General' | 4 'Jihad & Cohesion' | 5 'Temperature, Drought et al' |
| Relief                  | 0.440                | 0.262                                | 0.176       | -0.112               | -0.699                         |
| Terrain                 | 0.661                | -0.407                               | 0.256       | -0.011               | 0.277                          |
| Temperature             | -0.080               | -0.898                               | -0.006      | -0.327               | 0.001                          |
| Precipitation           | 0.544                | -0.224                               | -0.583      | 0.484                | 0.048                          |
| Climate Variation       | 0.157                | 0.065                                | 0.109       | -0.306               | 0.577                          |
| Biocapacity             | 0.837                | -0.195                               | 0.051       | 0.234                | -0.143                         |
| Bio-Productivity        | 0.162                | 0.680                                | 0.465       | 0.260                | 0.318                          |
| Soil Quality            | 0.216                | 0.334                                | -0.803      | 0.180                | 0.176                          |
| Culture                 | 0.823                | -0.069                               | 0.205       | -0.197               | -0.101                         |
| Jihad & Cohesion        | -0.084               | -0.469                               | 0.358       | 0.613                | -0.085                         |
| Economic Production     | 0.600                | 0.419                                | 0.292       | 0.040                | 0.169                          |
| Troop Quality           | -0.027               | 0.745                                | -0.113      | -0.137               | -0.202                         |
| Military Sophistication | 0.636                | -0.062                               | -0.328      | -0.433               | 0.011                          |

**Table 11.7 Second Order Composite Variables: Principal Components Analysis of thirteen Composite Variables reduced to five Dimensions (Second Order Composite Variables).**

Source: SPSS Principal Components Analysis (varimax rotation) of the 13 composite variables identified in first order analysis, for the 240 cultures (120 Initiator, 120 Respondents) in the main sample.

The darker shading for each variable indicates the Group to which that variable is most closely related. The light shading for Group 3 (with which no variable has its closest relationship) indicates that variable which has the strongest relationship with this group (i.e. Bio-Productivity).

Again, summary labels are attached by the author to describe the results. They range from 9% explanation ('Jihad & Cohesion' or 'Temperature, Drought et al.') to 24% explanation ('Culture and Land'). For seven of the thirteen variables, the dimension with highest weighting is 'Culture and Land'. Three variables (Bio-Productivity, Soil Quality and Troop Quality) load most strongly onto the second dimension, and two variables (Temperature, Drought et al.) load onto the fifth dimension. The fourth dimension consists solely of *Jihad & Cohesion*, and the third dimension ('General') has no variable for which it is the strongest weighting.

As noted in Chapter 10, Collins offers a three-way model of battle victory based on Material, Manoeuvre and Morale ("3M"). In order to cover this area, three indices are calculated: Material, based on GDP, Population, Area; Manoeuvre based on Military Sophistication, Mobility, Terrain; Morale based on *Jihad*, Cohesion, Aggression (see Table 11.8). All nine component variables are computed as a standard index (minimum value = 1, maximum value = 120) and the three derivative indices are computed as the geometrical average of their three component variables.

The Combined Indices (see Table 11.8) are calculated for each party by summing the weighted individual derivative indices.<sup>8</sup> To derive the weights, a SPSS Principal Components Analysis (varimax rotation) was carried out on the three derivative indices for 240 cultures (120 Initiator, 120 Respondents). This yielded one statistically significant dimension (45% explanation of total variance). The *eigenvalues* for each derivative index from this dimension were used as weights.

The Initiator Advantage (see Table 11.8) gives a measure of a possible advantage to one or other of the parties. It is the difference between the two cultures in an interaction (Initiator Combined Index – Respondent Combined Index), with a minus value indicating an advantage to the Respondent.

| Measure             | Variable 1                                   | Variable 2      | Variable 3   |
|---------------------|--|-----------------|--------------|
| Material Index      | GDP  | Population      | Area         |
| Manoeuvre Index     | Military Sophistication                      | Mobility        | Terrain      |
| Morale Index        | Jihad  | Cohesion        | Aggression   |
| Combined Index      | Material Index                               | Manoeuvre Index | Morale Index |
| Initiator Advantage | Combined Indices of Initiator and Respondent |                 |              |

**Table 11.8 Variables included in 3M Indices**

### 11.3 GIPP2 DATABASE

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<sup>8</sup> i.e. Material, Manoeuvre, Morale

To provide the possibility of testing the model resulting from analysis on a sample of interactions that was not used to derive the model, a GIPP2 database is assembled after analysis. This consists of 60 GIPPs in three sub-samples of 20 cases each. The three sub-samples are:

- a) new cases of NSIs and/or HPIs, not included in previous analysis (Table 11.9);
- b) a random selection of cases from the GIPP1 database (Table 11.10);
- c) a random selection of cases that are neither NSI nor HPI, hence not eligible for inclusion in GIPP1 (Table 11.11).

Sub-sample A consists of twenty further nomad and/or holy war cases, identified from Chapter 9 post-analysis, which were eligible for inclusion in the GIPP1 database, but had not been selected. Since it is reasonable to expect that a robust model that captured generalizable results would also apply to such cases, this sub-sample provides the opportunity to test that expectation.

Sub-sample B consists of twenty nomad and/or holy war cases which were included in the GIPP1 database, and were then subsequently randomly selected, for inclusion in the GIPP2 database. This sub-sample provides a basis for comparisons with Sub-sample A.

Sub-sample C consists of twenty cases randomly selected from a non-exhaustive list of forty interactions, mostly within the spatial and temporal limits of the study, which do not appear on first consideration to involve nomad or holy war issues. This group of sedentary and secular cases has contributed nothing to the development of the model and there is no particular reason for them to resemble either of the other sub-samples in either initial characteristics or modelling outputs. Any statistically significant resemblance is therefore worthy of comment.

The explanatory variables held on this database are only those variables which have been identified as statistically significant after the analysis of Chapters 12 and 13), since a sub-sample of 20 cases is too small to permit the full range of variables to be used meaningfully.



| <b>IDNO</b> | <b>Initiator</b> | <b>Respondent</b> | <b>Type</b> | <b>Date CE</b> |
|-------------|------------------|-------------------|-------------|----------------|
| 1           | German Crusaders | Hussites          | Holy        | 1419           |
| 2           | Egypt            | Irem (Nubians)    | Nomad       | -1235          |
| 3           | Huns             | Syria             | Nomad       | 395            |
| 4           | Israelites       | Midianites        | Holy        | -1250          |
| 5           | Mixed Crusaders  | Syrian Muslim     | Holy        | 1100           |
| 6           | Nomad Arab       | Abbasid Caliphate | Nomad       | 1100           |
| 7           | Huns             | Goths             | Nomad       | 360            |
| 8           | Arameans         | Assyrians         | Nomad       | -700           |
| 9           | Turks            | Byzantines        | Nomad       | 1080           |
| 10          | Avars            | Franks            | Nomad       | 560            |
| 11          | Uzbeks           | Safavids          | Nomad       | 1510           |
| 12          | German Crusader  | Muslim            | Holy        | 1229           |
| 13          | Abbasid raiders  | Byzantines        | Holy        | 750            |
| 14          | Baltic Crusader  | Estonian          | Holy        | 1210           |
| 15          | Merinid          | Hafsid            | Nomad       | 1347           |
| 16          | Avars            | Gepids            | Nomad       | 565            |
| 17          | Avars            | Slavs             | Nomad       | 560            |
| 18          | Avars            | Lombards          | Nomad       | 565            |
| 19          | Songhai          | Fulbe (Fulani)    | Nomad       | 1460           |
| 20          | Baltic Crusader  | Livonian          | Holy        | 1200           |

**Table 11.9 New Nomad and Holy War Interactions included in the GIPP2 Database**

| <b>IDNO</b> | <b>Initiator</b>     | <b>Respondent</b> | <b>Type</b> | <b>Date CE</b> |
|-------------|----------------------|-------------------|-------------|----------------|
| 1           | Abu Yazid            | Fatimids          | Holy        | 939            |
| 7           | 1st Turks            | Sui & Tang        | Nomad       | 546            |
| 14          | Jurchen              | Liao              | Nomad       | 1120           |
| 18          | Arab Conquest        | Byzantine         | Holy        | 640            |
| 20          | Ilkhanid             | Armenian          | Nomad       | 1243           |
| 23          | Blemmyes             | Roman             | Nomad       | 300            |
| 27          | Arab Conquest        | Sassanid          | Holy        | 632            |
| 30          | Arab Conquest        | Byzantine         | Holy        | 632            |
| 54          | Kimmerians           | Uratu             | Nomad       | -710           |
| 56          | Almoravid            | Iberia            | Holy        | 1086           |
| 57          | Almohad              | Iberia            | Holy        | 1145           |
| 64          | Crusades             | Byzantine         | Holy        | 1204           |
| 72          | Almoravid            | Ghana             | Holy        | 1056           |
| 77          | Tukolors             | Bambara 1854      | Holy        | 1854           |
| 79          | Arab Umayyid         | Visigoth          | Holy        | 711            |
| 83          | Ibn Talal            | Almoravids        | Holy        | 1063           |
| 84          | Ibn Qasi             | Almohads          | Holy        | 1145           |
| 90          | Saka in Central Asia | Graeco-Bactrian   | Nomad       | -180           |
| 93          | Sarmatians           | Roman             | Nomad       | 320            |
| 106         | Al-Massi             | Almohad           | Holy        | 1148           |

**Table 11.10 Random selection of GIPP1 Interactions included in the GIPP2 Database**

| IDNO | Initiator                   | Respondent              | Date  | Included in Sample |
|------|-----------------------------|-------------------------|-------|--------------------|
| 1    | England                     | France                  | 1329  | *                  |
| 2    | Danes                       | Norwegians              | 1014  | *                  |
| 3    | Danes                       | Swedes                  | 1014  | *                  |
| 4    | Castile                     | Aragon                  | 1252  | *                  |
| 5    | Persia                      | Greece                  | -550  | *                  |
| 6    | Macedon                     | Persia                  | -340  |                    |
| 7    | Seleucid                    | Ptoleimid               | -301  |                    |
| 8    | Antigonus                   | Seleucid                | -323  | *                  |
| 9    | Rome                        | Carthage                | -340  |                    |
| 10   | Hatti                       | Egypt                   | -1250 | *                  |
| 11   | Rus                         | Byzantium               | 860   | *                  |
| 12   | Rome (Augustan)             | Germans                 | -30   | *                  |
| 13   | Rome (Marcus Aurelius)      | Germans                 | 165   |                    |
| 14   | China (Han)                 | Vietnamese              | -50   | *                  |
| 15   | Gupta                       | Indian Neighbours       | 320   |                    |
| 16   | Lombard                     | Byzantium               | 560   | *                  |
| 17   | Frank                       | Saxon                   | 772   | *                  |
| 18   | Frank                       | Alemanni                | 405   | *                  |
| 19   | Saxons                      | Britons                 | 410   |                    |
| 20   | Venice (Early)              | Byzantium               | 560   |                    |
| 21   | Venice (Late)               | Byzantium               | 812   |                    |
| 22   | Mali                        | West African states     | 1000  |                    |
| 23   | Ghana                       | West African states     | 750   | *                  |
| 24   | Rome                        | Persia (Sasanid)        | 226   | *                  |
| 25   | Rome                        | Parthia                 | -65   |                    |
| 26   | Sparta                      | Athens                  | -480  |                    |
| 27   | Gauls (early)               | Rome                    | -390  |                    |
| 28   | Rome                        | Gauls (late)            | -125  |                    |
| 29   | Rome                        | Ptoleimid Egypt         | -373  |                    |
| 30   | China (three dynasties Wei) | China (three dynasties) | 220   | *                  |
| 31   | China (Sui)                 | Korygo (Korea)          | 581   |                    |
| 32   | England                     | Scotland                | 1066  |                    |
| 33   | Anglo-Norman                | Irish                   | 1165  | *                  |
| 34   | Guelf (German)              | Ghibelline (German)     | 1137  | *                  |
| 35   | Guelf (Italian)             | Ghibelline (Italian)    | 1137  |                    |
| 36   | Maurya                      | Indian Neighbours       | -322  | *                  |
| 37   | Assyria                     | Babylon                 | -1107 | *                  |
| 38   | Vikings                     | French                  | 800   |                    |
| 39   | Vikings                     | English                 | 800   |                    |
| 40   | Normans                     | Lombards                | 1017  |                    |

**Table 11.11 Random selection of cases not eligible for GIPP1 database included in the GIPP2 Database**

#### **11.4 CONCLUSIONS**

In addition to the statistically derived variables, Excursus E11 seeks to establish a force ratio between the two parties in an interaction, derived from a range of variables, such as population, area, friction and effectiveness. These variables are available for further analysis.

## EXCURSUS 11 MILITARY RATIO

This measure aims to link manpower, friction, mobility, territory and combat effectiveness for both defenders and attackers.<sup>9</sup>

### a) Numbers Available

The proportion of the population available to a group for warfare is variable, dependent on the culture of the society (see the list below Table E11.1 for the background, based on Section 5.2, Section 7.2, Section 7.3 and Appendix 3, - to estimates in the table) and is assumed to be as follows:

| State/Polity       | % Population |
|--------------------|--------------|
| Tribal (nomadic)   | 24           |
| Tribal (sedentary) | 24           |
| Feudal             | 16           |
| Semi-Sedentary     | 8            |
| Sedentary          | 4            |

**Table E11.1 Percentage of population available for recruitment by State/Polity type**

Tribal (nomadic): a tribal community dependent on pastoral and hunter-gathering practises and in-year mobility. Includes larger polities based principally on such communities (see Appendix 3 on numbers).

Tribal (sedentary): a tribal community with sufficient dependence on arable or non-nomadic pastoral practices to prevent in-year mobility of the entire community. Includes larger polities based principally on such communities (see Appendix 3 on numbers)

Feudal: sedentary polities where wealth (land tenure or herd ownership) is dependent on military service (see Chapter 6 on economics)

Semi-sedentary: sedentary polities where a foreign tribal (nomadic) community serves as the elite. The elite contributes 24% of its population and the sedentary community, 4%.

Sedentary: polities with sufficient proportion of urban communities to exclude classification as tribal (sedentary). They can support about 4% of their population as professional soldiers (see Chapter 8 on economics)

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<sup>9</sup> "MAXIM IX. The strength of an army, like the power in mechanics, is estimated by multiplying the mass by the rapidity; a rapid march augments the morale of an army, and increases its means of victory. Press on!" Guide, Officers'. (1862) *Napoleon's Maxims of War*. Richmond: West & Johnston.

### **b) Impact of army size in reducing efficiency**

The broad size of armies used by the polity is used to assess Clausewitzian friction, on the basis that such friction is proportionate to the log base 10 of approximate army size.

This term gives values ranging from 2 (100 men) to 5 (100,000 men).

The Clausewitzian friction is calculated as:

$\log_{10} \text{ of army size} / \log_{10} (5,000)$

This assesses the level of friction vis-à-vis that which might be experienced by a Roman legion of 5,000 men.

### **c) Mobility of troops**

The area within reach of a body of troops is assessed in square kilometres as:

$\pi \times ((20 + 10 \times (\% \text{ Cavalry}) / 100) \times 8/5)^2$

An all-infantry army is deemed to march at 20 miles per day and an all-cavalry army at 30 miles per day.

### **d) Ability of troops to cover the territory of their polity**

Troop coverage is computed as Manpower / (Territorial area of Polity / Area of troop reach).<sup>10</sup>

### **e) Effectiveness of troops covering territory**

The effectiveness is computed by:

$\text{Troop coverage}^2 \times \text{Troop effectiveness} / \text{Clausewitzian friction}$

This uses the Lanchester square law equation,<sup>11</sup> but adjusts for friction.

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<sup>10</sup> The Romans found it necessary to deploy troops at a density of 0.20 – 0.33 soldiers per square kilometre in border provinces, but 2 soldiers per square kilometre in Judea, where rebellion was being suppressed. See Eck, W. (2021) 'The Extraordinary Roman Military Presence in Judea from AD 70 until the 3rd Century', in Eisenberg, M. and Khamisy, R. (eds.) *The Art of Siege Warfare and Military Architecture from the Classical World to the Middle Ages*. Oxford: Oxbow Books, pp. 119-128.

<sup>11</sup> The Lanchester equations provide estimates of total casualties inflicted by two forces, combining their number and individual effectiveness. The linear law model assumes that there is small opportunity for several fighters to engage a single enemy. The square law model assumes that this sort of concentration of several on one is possible. Effectively, it is an area-based approach. The square law equations, rather than the linear law equations, are deemed more appropriate for this study, because at the scale of the model, an areal approach is reasonable and there is every likelihood that several fighters will be able to concentrate against one enemy. See Perla, P. P. (2016) 'Operations Research, System Analysis and Wargaming: Riding the Cycle of Research', in Harrigan, P., Kirschenbaum, M. and G. (eds.) *Zones of Control: Perspectives on Wargames*. Cambridge Massachusetts: The MIT Press, pp. 159-182. Also see Fuller, J. F. C. (1925) *The Foundations of the Science of War*. London: Hutchinson and Co. Limited, p.267.

**f) Military Ratio**

Military Ratio is given by:

Initiator effectiveness / Respondent effectiveness

## CHAPTER 12. ANALYSIS OF GIPP DATABASE

### 12.1 INTRODUCTION

The analysis of the GIPP1 database is undertaken in three phases. Sections 12.2-12.3 deal with primary variables: the El Niño Southern Oscillation (ENSO) and characteristics of Initiators and Respondents. In Sections 12.4 to 12.6, secondary variables (composites and principal components) are analysed with regard to group, region, religion and conflict, and the 3M (Material, Manoeuvre and Morale) Indices examined. Some preliminary conclusions are drawn in Section 12.7 regarding the strategies adapted by the groups, prior to further investigation using regression in Chapter 13. The regressions seek to explain Initiator and Respondent Strategy, Outcome and Duration for the GIPPs, using secondary composite variables and then primary variables, as indicated by principal components. Excursus E13 examines the results of the analysis of the GIPP2, as a validation of the previous analysis. Figure 12.1 summarises, in graphical form, this analysis path.

### 12.2 TIMING OF INTERACTIONS IN RELATION TO EL NIÑO SOUTHERN OSCILLATION (ENSO) EVENTS

The relationship of GIPPs to climatic events is likely to be important. ENSO is one of the major climatic drivers of the planet, with associated radical droughts and rainfall (see Section 4.3). Table 12.1 shows that El Niño events<sup>1</sup> have a long-term average occurrence probability of 0.16 per year (approximately one year in six), but this has varied over time. Figure 12.2 shows the fluctuation in El Niño events per century. The 1300 year period from the 7<sup>th</sup> century BCE to 6<sup>th</sup> century CE was quieter, with ten centuries experiencing fewer El Niño events than average. By contrast, there were five centuries (8<sup>th</sup> BCE, 7<sup>th</sup>, 11<sup>th</sup>, 12<sup>th</sup> and 14<sup>th</sup> CE) where the annual probability of an El Niño event almost doubled, rising to 0.29 or more. Over the entire study period of over three thousand years, the average ten year summed score for El Niño events is 0.88, but for those years noted as the start year for a database interaction, the average score was 1.35 (the 95% limits by bootstrap analysis being 1.21-1.49). The likelihood of having experienced the effects of an El Niño event in the recent past was thus markedly greater for the start date of GIPP database interactions than for the generality of years.

Looked at on a centennial scale, those centuries with high activity of the ENSO oscillation and many El Niño events align to periods of notable nomad and holy war activity

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<sup>1</sup> As calculated on the basis of lacustrine deposits (see E4.3, Moy et al. (2002)).



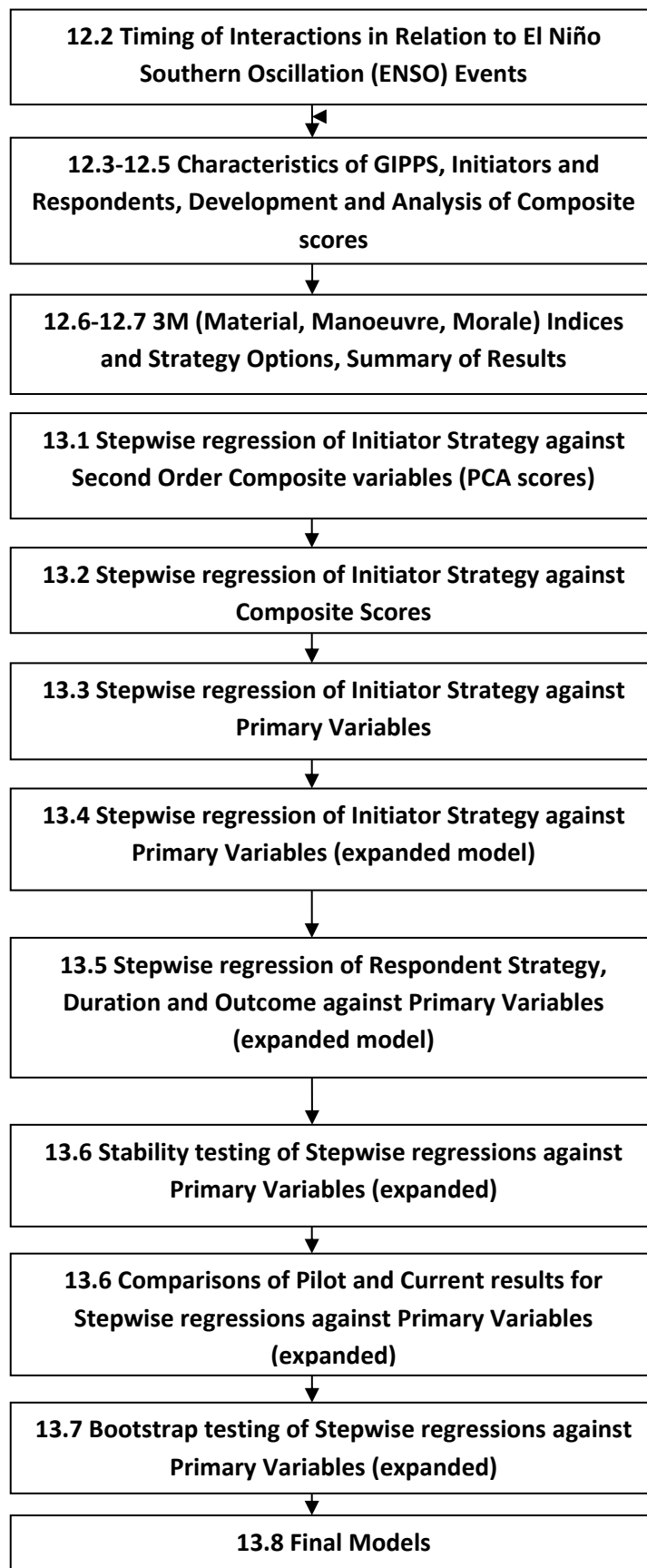
(Cimmerians/Skythians;<sup>2</sup> Arab Conquest; Turks/Berbers; Berbers and Mongols/Turks). Table 12.2 details the database interactions occurring in each of these periods, and shows that overall, GIPP database interactions are less numerous than El Niño events (by about one quarter, 120 vs. 487). In peak El Niño centuries<sup>3</sup>, however, there are more interactions recorded and so the ratio is found to be somewhat higher in such periods (29% or 48 vs. 167). In other periods, there are fewer interactions and so the ratio drops to 23% (72 vs. 320). Statistical analysis of El Niño events and GIPP database interactions reveals highly significant biases in the five identified periods.<sup>4</sup>

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<sup>2</sup> The increasing humidity and warmth of the steppes in this period are noted and linked to the establishment of the Tagar culture and the Saka/Skythians by Cunliffe, B. (2019) *The Scythians: nomad warriors of the Steppe*. Oxford: Oxford University Press, p.88.

<sup>3</sup> An ENSO Peak Century is here defined as a century with a high level of El Niño events, where a high level of events is defined as one where the annual probability of an event is one standard deviation or more above the mean probability of such events for the entire period of study.

<sup>4</sup> The chi-squared score is 494.7,  $v=93$ .

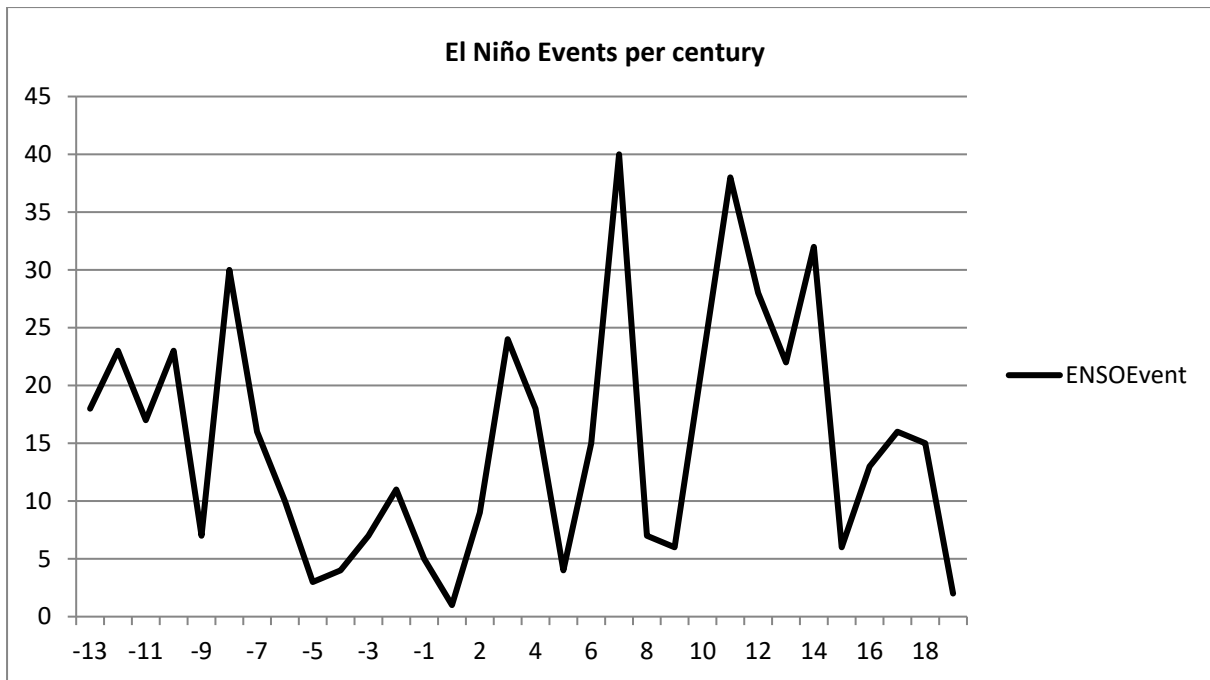


**Figure 12.1 Analysis Path as followed in subsequent sections**

| Century   | Years with El Niño event | No. Years in period | Probability of El Niño event | Standardised Probability of El Niño event | High Probability (GE 1 standardised probability) | Notable ethnic groups of period |
|---|--------------------------|---------------------|------------------------------|---|--|---------------------------------|
| -13   | 12                       | 50                  | 0.24                         | 0.80                                      |  |                                 |
| -12   | 23                       | 100                 | 0.23                         | 0.71                                      |  |                                 |
| -11   | 17                       | 100                 | 0.17                         | 0.13                                      |  |                                 |
| -10   | 24                       | 100                 | 0.24                         | 0.80                                      |  |                                 |
| -9  | 7                        | 100                 | 0.07                         | -0.83                                     |  |                                 |
| -8  | 29                       | 100                 | 0.29                         | 1.29                                      | *  | Cimmerians & Skythians          |
| -7  | 17                       | 100                 | 0.17                         | 0.13                                      |  |                                 |
| -6  | 10                       | 100                 | 0.10                         | -0.54                                     |  |                                 |
| -5  | 3                        | 100                 | 0.03                         | -1.22                                     |  |                                 |
| -4  | 4                        | 100                 | 0.04                         | -1.12                                     |  |                                 |
| -3  | 7                        | 100                 | 0.07                         | -0.83                                     |  |                                 |
| -2  | 10                       | 100                 | 0.10                         | -0.54                                     |  |                                 |
| -1  | 6                        | 100                 | 0.06                         | -0.93                                     |  |                                 |
| 1   | 1                        | 100                 | 0.01                         | -1.41                                     |  |                                 |
| 2   | 9                        | 100                 | 0.09                         | -0.64                                     |  |                                 |
| 3   | 24                       | 100                 | 0.24                         | 0.80                                      |  |                                 |
| 4   | 18                       | 100                 | 0.18                         | 0.23                                      |  |                                 |
| 5   | 4                        | 100                 | 0.04                         | -1.12                                     |  |                                 |
| 6   | 15                       | 100                 | 0.15                         | -0.06                                     |  |                                 |
| 7   | 40                       | 100                 | 0.40                         | 2.34                                      | *  | Arabs                           |
| 8   | 7                        | 100                 | 0.07                         | -0.83                                     |  |                                 |
| 9   | 6                        | 100                 | 0.06                         | -0.93                                     |  |                                 |
| 10  | 22                       | 100                 | 0.22                         | 0.61                                      |  |                                 |
| 11  | 38                       | 100                 | 0.38                         | 2.15                                      | *  | Turks and Berbers               |
| 12  | 28                       | 100                 | 0.28                         | 1.19                                      | *  | Berbers                         |
| 13  | 22                       | 100                 | 0.22                         | 0.61                                      |  |                                 |
| 14  | 32                       | 100                 | 0.32                         | 1.57                                      | *  | Mongols and Turks               |
| 15  | 6                        | 100                 | 0.06                         | -0.93                                     |  |                                 |
| 16  | 13                       | 100                 | 0.13                         | -0.25                                     |  |                                 |
| 17  | 16                       | 100                 | 0.16                         | 0.03                                      |  |                                 |
| 18  | 15                       | 100                 | 0.15                         | -0.06                                     |  |                                 |
| 19  | 2                        | 54                  | 0.04                         | -1.15                                     |  |                                 |
| Total   | 487                      | 3104                | 0.16                         |   |  |                                 |
| Average 10 year El Niño SO rating (0-1): sum of ratings in the ten year period ending in the year |                          | All Years           |                              | Interaction periods                       |  |                                 |
|   |                          | 0.88<br>(n = 3104)  |                              | 1.35<br>(n =120)                          |  |                                 |

**Table 12.1 Periods of high likelihood of El Niño event and notable peoples of the period**

Source: Based on data of Moy et al. (2002)



**Figure 12.2 El Niño Southern Oscillation events per century**

Source: Moy et al (2002)

| Period   | Number of El Niño events | Number of GIPPs | Region                | Initiator          | Respondent   |
|--|--------------------------|-----------------|-----------------------|--------------------|--------------|
| 8th Century BCE  | 29                       | 1               | Anatolia              | Kimmerians         | Uratu        |
| 7th Century CE   | 40                       | 15              | Mesopotamia           | Arab Conquest      | Sassanid     |
| 13 GIPPs have Arabs involved                                       |                          |                 | Syria                 | Arab Conquest      | Byzantine    |
|  |                          |                 | Balkans               | Bulgar 1st wave    | Byzantine    |
|  |                          |                 | Anatolia              | Arab Conquest      | Byzantine    |
|  |                          |                 | Anatolia              | Arab Conquest      | Armenian     |
|  |                          |                 | Egypt                 | Arab Conquest      | Byzantine    |
|  |                          |                 | Iran                  | Arab Conquest      | Sassanid     |
|  |                          |                 | North Africa Arable   | Arab Conquest      | Byzantine    |
|  |                          |                 | Sudan Belt            | Arab Conquest      | Makouria     |
|  |                          |                 | Syria                 | Khawarj            | Arab Umayyad |
|  |                          |                 | China                 | 2nd Turks          | Sui & Tang   |
|  |                          |                 | North Africa Pastoral | Arab Conquest      | Kahina       |
|  |                          |                 | North Africa Pastoral | Arab Umayyid       | Moors Later  |
|  |                          |                 | Inner Asia Pontic     | Arab Umayyids Iran | Khazar       |
| Inner Asia Turkestan   | Arab Umayyids Iran       | 2nd Turks       |                       |                    |              |
| 11th Century CE  | 38                       | 16              | North Africa Arable   | Abu Rakwa          | Fatimids     |
| 5 GIPPs have Seldjuks involved, 4 have Almoravids, 5 have Fatimids |                          |                 | Syria                 | Banu Jarrah        | Fatimids     |
|  |                          |                 | Iran                  | Seldjuk            | Khurassians  |
|  |                          |                 | Anatolia              | Seldjuk            | Byzantine    |
|  |                          |                 | Mesopotamia           | Seldjuk            | Abbasids     |
|  |                          |                 | Syria                 | Seldjuk            | Abbasids     |
|  |                          |                 | North Africa Arable   | Banu Hilal         | Zirids       |
|  |                          |                 | Egypt                 | Lawata             | Fatimids     |
|  |                          |                 | Balkans               | Cumans & Kipchaks  | Byzantine    |
|  |                          |                 | Russia                | Cumans & Kipchaks  | Russians     |
|  |                          |                 | North Africa Pastoral | Almoravid          | Fatimids     |
|  |                          |                 | Sudan Belt            | Almoravid          | Ghana        |
|  |                          |                 | North Africa Pastoral | Al-Jizani          | Fatimids     |
|  |                          |                 | North Africa Pastoral | Ibn Talal          | Almoravids   |
| Iberia   | Almoravid                | Iberia          |                       |                    |              |
| Syria  | Crusades                 | Seldjuk & Arab  |                       |                    |              |

**Table 12.2 Interactions in ENSO Peak Centuries i.e. with high levels of El Niño events**

| Period                                  | Number of ENSO events | Number of GIPPs | Region                              | Initiator      | Respondent           |
|---|-----------------------|-----------------|-------------------------------------|----------------|----------------------|
| 12th Century CE                         | 28                    | 13              | China                               | Jurchen        | Sung                 |
| 6 GIPPs have Almohads involved          |                       |                 | China                               | Jurchen        | Liao                 |
|   |                       |                 | North Africa Pastoral               | Almohads       | Almoravids           |
|   |                       |                 | Inner Asia Turkestan                | Qara Khitai    | Qarakanids           |
|   |                       |                 | Iberia                              | Almohads       | Iberia               |
|   |                       |                 | Syria                               | Crusades       | Seldjuk & Arab       |
|   |                       |                 | North Africa Pastoral               | Ibn Qasi       | Almohads             |
|   |                       |                 | North Africa Pastoral               | Al-Massi       | Almohads             |
|   |                       |                 | India                               | Ghurids        | Indians              |
|   |                       |                 | North Africa Pastoral               | Almohads       | Banu Ghaniya         |
|   |                       |                 | Egypt                               | Crusades       | Egypt (Ayubid)       |
|   |                       |                 | Baltic                              | Teutonic Order | Baltic Pagans        |
|   |                       |                 | North Africa Arable                 | Banu Merin     | Almohads             |
| 14th Century CE                         | 32                    | 3               | Inner Asia Mongolia                 | Timurids       | Mongol Later Nomad   |
| 3 GIPPs have Mongols and Turks involved |                       |                 | Iran                                | Black Sheep    | Jalayirids           |
|   |                       |                 | Anatolia                            | Timurids       | Black Sheep Turkoman |
| ENSO Peak Centuries                     | 167                   | 48              | GIPPs per Event (ENSO Peak Century) | 0.29           |                      |
| All Other Centuries                     | 320                   | 72              | GIPPs per Event (other Century)     | 0.23           |                      |
| Total                                   | 487                   | 120             | GIPPs per Event (All centuries)     | 0.25           |                      |

**Table 12.2 Interactions in ENSO Peak Centuries i.e. with high levels of El Niño events (continued)**

Source: Based on data of Moy et al (2002)

An ENSO Peak Century is here defined as a century with a high level of El Niño events, where a high level of events is defined as one where the annual probability of an event is one standard deviation or more above the mean probability of such events for the entire period of study.

While attention has understandably often focused on El Niño events, these are only part of the impact of ENSO, which as an oscillation, has two extremes. Over the 3,100 years of this study, La Niña events have occurred, if anything, more frequently than El Niño, but typically in the same periods of activity. Table 12.3 shows that the level of La Niña activity in the ten years leading to the start of a GIPP is 67% higher than in an average ten year period, while El Niño levels are 51% higher. Both differences are statistically significant at the 99% confidence level. Given that the

interactions included in the GIPP were chosen independently of knowledge of the state of ENSO in any given year or period, these observations are quite striking.

| Group                               | El Niño Ten Year Activity | La Niña Ten Year Activity | ENSO Ten Year Activity |
|-------------------------------------|---------------------------|---------------------------|------------------------|
| Overall period                      | 0.85                      | 1.47                      | 2.31                   |
| Prior to GIPP database interactions | 1.28                      | ,2.45                     | 3.74                   |
| % excess of GIPP database           | 50.6                      | 66.7                      | 61.9                   |
| Statistical Significance            | ***                       | ***                       | ***                    |

**Table 12.3 El Niño and La Niña Ten Year Activity, overall and prior to GIPP interactions**

\*\*\* 99.9% confidence

Table 12.4 gives the mean and average variation (standard deviation) for annual numbers of El Niño events, La Niña events, ENSO events<sup>5</sup> and Northern Hemisphere Temperatures in the ten and thirty year periods prior to all years in the study period, compared to the periods preceding the GIPP interactions. GIPP interactions are characterised by significantly more variation in El Niño, La Niña and ENSO, but not Northern Hemisphere Temperatures. This suggests that ENSO variation (which implies major alterations in patterns of wind and rainfall as well as temperature) rather than temperature variability *per se* is a notable tendency of the periods preceding GIPP interactions.

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<sup>5</sup> ENSO events are the sum of El Niño events and La Niña events. In theory, periods with high levels of El Niño events might also experience counter-balancing low levels of La Niña (or vice versa) so that there would be little difference in the overall level of climatic activity, between one period to another. This appears not to be the case, but it is theoretically possible.

| All years in Study Period            | Ten year variation |         |        | Thirty year variation |         |        | Northern Hemisphere Temperature |                       |
|--------------------------------------|--------------------|---------|--------|-----------------------|---------|--------|---------------------------------|-----------------------|
|                                      | El Niño            | La Niña | ENSO   | El Niño               | La Niña | ENSO   | Ten year variation              | Thirty year variation |
| Mean                                 | 0.154              | 0.185   | 0.211  | 0.188                 | 0.233   | 0.275  | 0.007                           | 0.020                 |
| N                                    | 3104               | 3104    | 3104   | 3104                  | 3104    | 3104   | 3104                            | 3104                  |
| Std. Deviation                       | 0.1343             | 0.1839  | 0.1699 | 0.0970                | 0.1577  | 0.1356 | 0.0106                          | 0.0211                |
| GIPP start years                     |                    |         |        |                       |         |        |                                 |                       |
| Mean                                 | 0.221              | 0.270   | 0.283  | 0.226                 | 0.301   | 0.313  | 0.007                           | 0.023                 |
| N                                    | 120                | 120     | 120    | 120                   | 120     | 120    | 120                             | 120                   |
| Std. Deviation                       | 0.1115             | 0.1694  | 0.1333 | 0.0850                | 0.1415  | 0.1118 | 0.0075                          | 0.0238                |
| Difference of GIPP mean from overall | 0.0672             | 0.0854  | 0.0717 | 0.0381                | 0.0678  | 0.0380 | -0.0005                         | 0.0036                |
| Statistical Significance             | ***                | ***     | ***    | ***                   | ***     | ***    | NS                              | NS                    |

**Table 12.4 Variability in ENSO and Northern Hemisphere Temperature, overall and in periods prior to GIPP interactions**

NS not significant

\*\*\* 99.9% confidence

The alignment of ENSO event peaks and variability with periods of nomad and holy war activity suggests that there may be some form of causal linkage, albeit not necessarily straightforward. The interactions in the GIPP database were selected at the start of the study without any consideration or indeed awareness of El Niño/La Niña event dates and yet the chosen interactions are found to display a bias (non-random) to those centuries that experienced El Niño and La Niña peaks and higher levels of climatic variation. Given that ENSO events today, whether El Niño or La Niña, are linked with marked impacts on human society through drought or flooding (Sections 4.3-4.7, Excursus E4.3), it is reasonable to assume that they may have had similar effects in the past.

The impact of ENSO varies with global location, so that some areas (which may be termed “El Niño areas”) experience warm and wet weather during an El Niño event, while other areas (“La Niña areas”) experience cold and dry weather, with the reverse situation occurring during a La Niña event. Table 12.5 shows that more than two thirds of the Initiators on the GIPP database are located in El Niño areas. By contrast, more than half of the Respondents are located in La Niña areas. The actual weather experienced at the start of the GIPP can be estimated from the ENSO events of the time. About half of the GIPPs start in El Nada years (neither El Niño nor La Niña events, neutral weather effects expected),. About 30% of the polities are likely to have experienced cold and dry weather and 20% of polities are likely to have experienced warm and



wet weather at the start of the GIPP. Initiators are slightly less likely than Respondents to experience cold and dry weather (28% vs. 30%) and slightly more likely to experience warm and wet weather (21% vs. 18%). This suggests that GIPPs are associated, in broad terms, with a climatic configuration where the polities concerned, particularly Respondents, experience cold and dry conditions.<sup>6</sup>

| Weather    | La Niña area |            | El Niño area |            | All Areas |            | Total polities |
|------------|--------------|------------|--------------|------------|-----------|------------|----------------|
|            | Initiator    | Respondent | Initiator    | Respondent | Initiator | Respondent |                |
| Cold & Dry | 13.5%        | 20.0%      | 27.5%        | 41.8%      | 27.5%     | 30.0%      | 28.8%          |
| Neutral    | 51.4%        | 52.3%      | 51.7%        | 50.9%      | 51.7%     | 51.7%      | 51.7%          |
| Warm & Wet | 35.1%        | 27.7%      | 20.8%        | 7.3%       | 20.8%     | 18.3%      | 19.6%          |
| N          | 37           | 65         | 83           | 55         | 120       | 120        | 240            |

**Table 12.5 Analysis of GIPPs by climatic region, status of polity and weather**

La Niña area: a region where the El Niño event is associated with cold and dry weather

El Niño area: a region where the El Niño event is associated with warm and wet weather

### 12.3 CHARACTERISTICS OF GIPPS, INITIATORS AND RESPONDENTS

Table 12.6 shows that of the 120 GIPPs considered, there are 69 (i.e., about 58%) that have a nomadic involvement without holy war, 25 holy wars without nomadic involvement and 26 that are holy wars with nomadic involvement (i.e., about 21% each). The categories are not mutually exclusive. Table 12.7 shows that for the initiator, 96% of holy war GIPPs involve an attack of some kind, with raiding accounting for the remaining 4%, compared with 70% of nomadic GIPPs involving an attack and 19% raiding. For both holy war and nomadic GIPPs, the difference in preferred option between them and other GIPPs is statistically significant. Where nomads are involved, respondents mostly (about 85%) opt for Defend, with 7% opting for a less aggressive option (Ally or Paying Tribute) and 7% for a more aggressive option (Counterattack or Attack). In holy wars, most respondents (98%) opt for Defend, with Counterattack also possible. This difference is clear but not statistically significant.<sup>7</sup>

It is not particularly surprising that GIPPs initially identified as involving holy wars are found to be linked to choices of policy involving attacks, or at least raiding, on one side and hence on the other side, defence or counterattack. On the other hand, there is more flexibility for both sides in nomadic GIPPs.

<sup>6</sup> This would seem to be borne out using different data and different metrics for conflict in both Europe and China. See Tol, R. and Wagner, S. (2010) 'Climate change and violent conflict in Europe over the last millennium', *Climatic Change*, 99, pp. 65-79. See Zhang, D. D., Jim, C. Y., Lin, G. C.-S., He, Y.-Q., Wang, J. J. and Lee, H. (2006) 'Climatic Change, Wars and Dynastic Cycles in China over the Last Millennium', *Climatic Change*, 76, pp. 459-477.

<sup>7</sup> The dominance of Defend as the preferred option means that there are insufficient other instances to generate any sort of statistical significance.

| Nomadism a factor? | Holy War a factor? |     | Total |
|--------------------|--------------------|-----|-------|
|                    | No                 | Yes |       |
| No                 | 0                  | 25  | 25    |
| Yes                | 69                 | 26  | 95    |
| <b>Total</b>       | 69                 | 51  | 120   |

**Table 12.6 Status of GIPPs**

| Initiator                         |        |          | Respondent                        |       |          |
|-----------------------------------|--------|----------|-----------------------------------|-------|----------|
| Strategy                          | Nomad  | Holy War | Strategy                          | Nomad | Holy War |
| Ally                              | 1.1%   | 0.0%     | Ally                              | 1.1%  | 0.0%     |
| Raid                              | 18.9%  | 3.9%     | Pay Tribute                       | 6.3%  | 0.0%     |
| Extort                            | 10.5%  | 0.0%     | Defend                            | 85.3% | 98.0%    |
| Limited Attack                    | 18.9%  | 2.0%     | Counter-attack                    | 6.3%  | 2.0%     |
| Total Attack                      | 50.5%  | 94.1%    | Attack                            | 1.1%  | 0.0%     |
| All                               | 95     | 51       | All                               | 95    | 51       |
| Pearson Chi-Square                | 17.245 | 43.375   | Pearson Chi-Square                | 4.171 | 8.497    |
| df                                | 4      | 4        | df                                | 4     | 4        |
| Asymptotic Significance (2-sided) | 0.002  | p<0.001  | Asymptotic Significance (2-sided) | 0.383 | 0.075    |
| Significance                      | ***    | ***      | Significance                      | NS    | NS       |

**Table 12.7 Policies adopted in GIPPs**

Note: GIPPs that are holy wars with nomad involvement are included in both strategy analyses

NS Not significant

\*\*\* 99.9% confidence

It is helpful to have some understanding of how the database represents the polities involved in its GIPPs. Table 12.8 shows that initiator polities are mostly larger in area than respondent polities, but with lower densities of population, so that their populations are less than a fifth of the respondents. In general, the GDP per capita (in Geary-Khamis 1990 dollars) of initiator polities is less than respondent polities, but it must be borne in mind that the measure is not sufficiently sensitive to detect sub-regional variations. For interactions occurring wholly within zones such as Sub-Saharan Africa, both parties are assumed to have similar GDP. Overall, initiator polities have a mean GDP of \$GK 450 per capita, which is 8% less than the \$GK 483 mean for respondent polities. The initiators thus tend to be weaker in material terms, being both smaller in population and poorer than respondents (having about one sixth of their wealth on average).

Table 12.9 shows that initiators, nonetheless, despite their relative poverty, tend to have effective armies (overall score: 26 vs. 22) and more cavalry (38% vs. 25%) than respondents, though their

artillery index is less (6 vs. 8).<sup>8</sup> This pattern is most marked in zones including steppes (e.g., Mongolia, Pontic and Turkestan) where horses are easily raised in large numbers at little cost.<sup>9</sup> Given the usefulness of horses in warfare, the ready availability of cheap horses, offers greater military power to otherwise poor groups.

| Respondent Zone                          | Initiator Area (million sq km) | Respondent Area (million sq km) | Initiator Population (million) | Respondent Population (million) | Initiator Population Density (person per sq km) | Respondent Population Density (persons per sq km) | Initiator GDP per capita (\$ G-K) | Respondent GDP per capita (\$ G-K) |
|--|--------------------------------|---------------------------------|--------------------------------|---------------------------------|---|---|-----------------------------------|------------------------------------|
| Arabia & Near East                       | 1.57                           | 0.64                            | 1.45                           | 3.77                            | 2.84  | 6.20  | 450.30                            | 550.94                             |
| Mongolia & China                         | 4.36                           | 3.88                            | 3.91                           | 59.93                           | 0.97  | 15.52   | 432.58                            | 459.64                             |
| Sub-Saharan Africa                       | 0.17                           | 0.12                            | 0.22                           | 0.36                            | 3.65  | 4.08  | 449.51                            | 449.51                             |
| Maghreb & Iberia                         | 0.98                           | 0.80                            | 1.19                           | 1.76                            | 1.67  | 2.52  | 458.84                            | 464.20                             |
| Pontic, Europe, Balkans, Russia & Baltic | 0.58                           | 0.93                            | 1.34                           | 3.05                            | 2.21  | 5.14  | 432.82                            | 421.33                             |
| Turkestan, Iran & India                  | 2.61                           | 2.02                            | 2.48                           | 6.36                            | 1.15  | 6.48  | 439.56                            | 507.62                             |
| <b>Total</b>                             | 1.60                           | 1.24                            | 1.67                           | 9.38                            | 2.14  | 6.15  | 444.97                            | 483.16                             |

**Table 12.8 Area, Population, Population density and GDP by polity and respondent zone**

<sup>8</sup> See Excursus 7.1 and Table 11.1 for details.

<sup>9</sup> \$GK 3 for a steppe horse, when compared with \$GK 300 for an inferior horse in an arable culture, is an almost trivial cost (see Chapter 6). It was possible for a nomad power to mount 10 horse archers (each with nine remounts) for the cost of mounting one English archer on a single horse.

| Respondent Zone                          | Initiator Army Value | Respondent Army Value | Initiator % Cavalry | Respondent % Cavalry | Initiator Artillery | Respondent Artillery |
|--|----------------------|-----------------------|---------------------|----------------------|---------------------|----------------------|
| Arabia & Near East                       | 24.04                | 23.26                 | 29.77               | 27.42                | 7.68                | 8.97                 |
| Mongolia & China                         | 35.78                | 29.66                 | 61.48               | 35.88                | 12.20               | 22.46                |
| Sub-Saharan Africa                       | 13.68                | 14.28                 | 7.03                | 11.73                | 0.00                | 0.00                 |
| Maghreb & Iberia                         | 16.17                | 17.38                 | 15.97               | 19.77                | 0.00                | 3.43                 |
| Pontic, Europe, Balkans, Russia & Baltic | 33.93                | 23.75                 | 63.11               | 26.55                | 7.07                | 15.75                |
| Turkestan, Iran & India                  | 33.68                | 21.82                 | 54.28               | 27.54                | 11.07               | 2.38                 |
| <b>Total</b>                             | <b>25.89</b>         | <b>21.56</b>          | <b>37.61</b>        | <b>24.78</b>         | <b>6.30</b>         | <b>8.24</b>          |

**Table 12.9 Average values of Army Indicators by polity and respondent zone**

#### 12.4 COMPOSITE VARIABLES

As described in Chapter 11.4 on the Database, thirteen composite variables have been compiled from six groups of broadly related variables, comprising 37 variables in total. Principal Component Analyses have been carried out on each of the six groups (named Geomorphology, Climatology, Biogeography, Social, Economic and Military). All of the groups yield one to three statistically significant components that can be used as composite variables (summing to thirteen in total; Table 12.10).

Given that the values of underlying variables are aligned so that higher scores are indicative of more favourable or better developed situations, the composite scores are similarly aligned by the calculations. Positive values signify favourable or developed conditions, and negative values indicate unfavourable or less developed conditions.<sup>10</sup> Table 12.10 shows that, on average, the composite scores for Initiators are mostly less than zero. Of the thirteen composite variables, only *Troop Quality*, *Jihad & Coherence* and *Bio-Productivity* have a positive score for Initiators (and that for *Bio-Productivity*, though positive, is close to zero i.e. the difference between Initiators and Respondents is not great). The results thus show that Initiators are generally in more unfavourable or less developed circumstances. Conversely, the Respondents are in more favourable or more developed circumstances. On the other hand, Initiators have better quality troops and higher

<sup>10</sup> The overall average is set by the calculation method as zero.

cohesion. This conforms to the pattern of disadvantaged but militarily strong initiator against advantaged but militarily weaker respondent.

| Component                      | Initiator | Respondent |
|--------------------------------|-----------|------------|
| <b>Military Sophistication</b> | -0.620    | 0.620      |
| <b>Culture</b>                 | -0.524    | 0.524      |
| <b>Biocapacity</b>             | -0.413    | 0.413      |
| <b>Terrain</b>                 | -0.377    | 0.377      |
| <b>Precipitation</b>           | -0.256    | 0.256      |
| <b>Economics</b>               | -0.221    | 0.221      |
| <b>Relief</b>                  | -0.170    | 0.170      |
| <b>Temperature</b>             | -0.166    | 0.166      |
| <b>Soil</b>                    | -0.137    | 0.137      |
| <b>Drought et al</b>           | -0.046    | 0.046      |
| <b>Bio-Productivity</b>        | 0.084     | -0.084     |
| <b>Troop Quality</b>           | 0.233     | -0.233     |
| <b>Jihad &amp; Coherence</b>   | 0.387     | -0.387     |
| <b>Average</b>                 | -0.171    | 0.171      |

**Table 12.10 Average Composite Scores for Initiators and respondents**

With all interactions combined, the overall average for each composite score, by definition, is zero

It is helpful to form an awareness of the characteristics of the polities in the various regions of the study. For this purpose, the distinction between Initiator and Respondent is not particularly germane. Table 12.11 shows the scores for each region for each component, the average for the physical measures, the average for cultural measures and the overall average. When analysed by region, the average value for all component scores ranges from -0.469 (Arabia), -0.351 (Turkestan) and -0.469 (Sahel/Sahara), to +0.626 (Balkans), +0.634 (Europe) and +0.803 (China), suggesting that China and Europe/Balkans experienced the most favourable circumstances and the desert areas of Africa and Asia experienced the least favourable. Broadly speaking, this is true for both cultural and physical measures.

| Region                | Physical Measures (average) | Relief | Terrain | Temperature | Precipitation | Drought et al. | Bio-capacity | Bio-Productivity | Soil   |
|-----------------------|-----------------------------|--------|---------|-------------|---------------|----------------|--------------|------------------|--------|
| China                 | 0.919                       | 2.754  | 1.349   | -0.108      | 1.462         | 0.138          | 2.908        | -0.673           | -0.478 |
| Europe                | 0.660                       | -0.271 | 0.980   | -1.037      | 1.760         | 0.451          | 1.658        | 1.606            | 0.130  |
| Balkans               | 0.547                       | 0.736  | 0.313   | -0.565      | 1.215         | 0.135          | 0.973        | 0.499            | 1.069  |
| India                 | 0.490                       | -0.287 | 1.313   | 0.914       | 1.280         | -0.230         | 1.018        | -0.341           | 0.256  |
| Anatolia              | 0.294                       | 1.431  | 0.230   | -0.536      | 0.234         | -0.756         | 0.557        | 0.079            | 1.113  |
| Iberia                | 0.298                       | 0.277  | -0.061  | -0.324      | 0.553         | 0.526          | -0.104       | 0.474            | 1.043  |
| Mesopotamia           | 0.223                       | -0.969 | 1.635   | 0.970       | -0.901        | 0.725          | -0.075       | 0.788            | -0.390 |
| Syria                 | 0.127                       | -0.282 | 0.185   | 0.558       | -0.671        | 0.326          | 0.171        | 0.500            | 0.227  |
| Egypt                 | 0.071                       | -0.992 | 2.118   | 0.893       | -1.402        | 0.671          | 0.680        | -0.016           | -1.384 |
| Iran                  | 0.164                       | 1.559  | 0.277   | 0.032       | -0.626        | 0.071          | -0.185       | 0.013            | 0.172  |
| Russia                | 0.411                       | -1.171 | 1.766   | -1.417      | 0.768         | 0.074          | 1.350        | 1.555            | 0.365  |
| North Africa Arable   | -0.173                      | -0.801 | -0.912  | 0.232       | 0.072         | 0.055          | -1.197       | 0.162            | 1.007  |
| Inner Asia Pontic     | -0.054                      | -1.028 | 0.027   | -1.086      | 0.262         | -0.214         | -0.755       | 1.040            | 1.326  |
| Baltic                | 0.213                       | -1.183 | 0.783   | -1.482      | 1.100         | -0.849         | 0.980        | 1.699            | 0.653  |
| Sudan Belt            | -0.015                      | -0.889 | -0.142  | 1.542       | 1.235         | -0.192         | 0.047        | -2.332           | 0.612  |
| Inner Asia Mongolia   | -0.315                      | 0.346  | -2.034  | -1.397      | -0.379        | 0.646          | -0.884       | 0.346            | 0.834  |
| North Africa Pastoral | -0.325                      | 0.109  | -0.233  | 0.334       | -0.910        | 0.200          | -0.571       | 0.317            | -1.844 |
| Sahel/Sahara          | -0.217                      | -1.003 | 1.050   | 1.041       | -1.180        | 0.751          | -0.763       | -0.412           | -1.223 |
| Inner Asia Turkestan  | -0.495                      | 0.274  | -1.355  | -1.193      | -0.793        | -0.275         | -0.625       | 0.136            | -0.131 |
| Arabia                | -0.527                      | -0.166 | -0.641  | 1.094       | -1.048        | -1.335         | -0.586       | -0.057           | -1.480 |
| All Regions           | 0.000                       | 0.000  | 0.000   | 0.000       | 0.000         | 0.000          | 0.000        | 0.000            | 0.000  |

**Table 12.11 Composite Scores by Region**

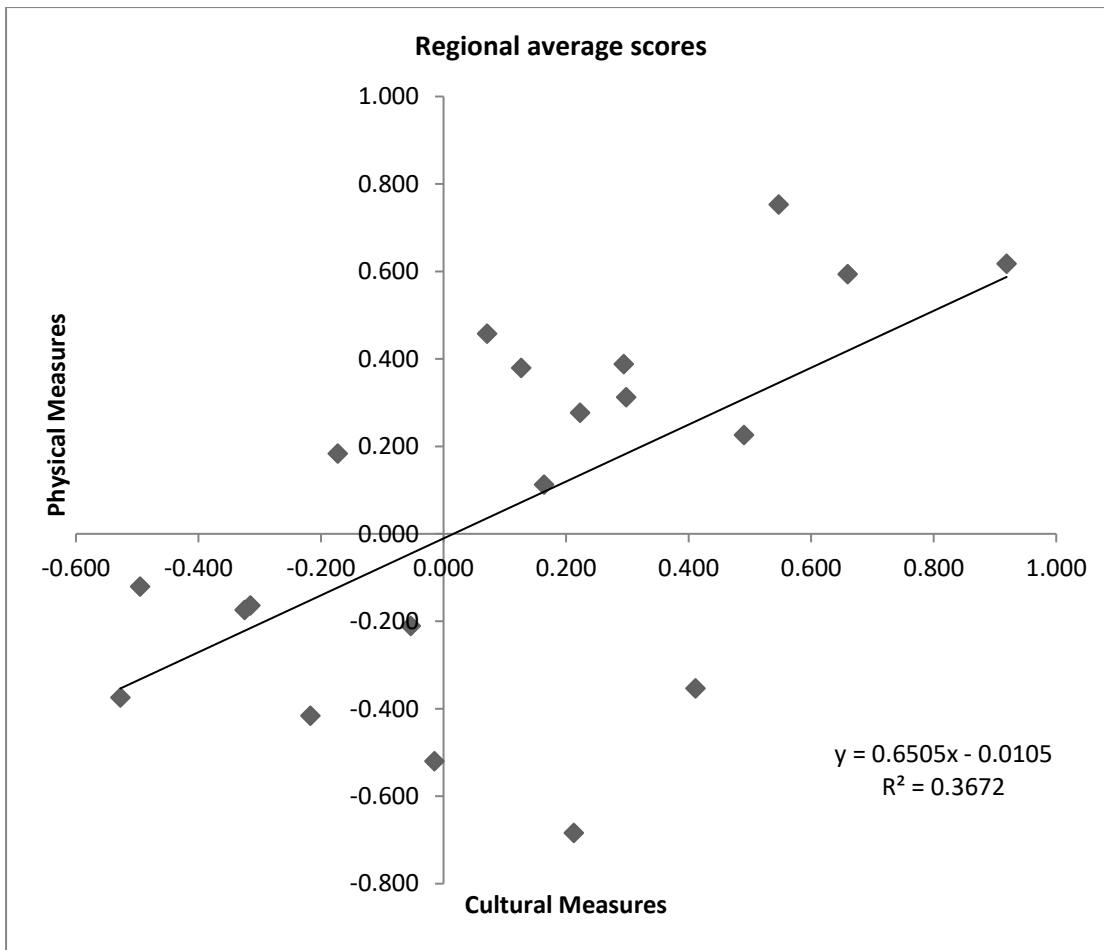
With all interactions combined, the overall average for each composite score, by definition, is zero

| Region                | Average Score (13 scores) | Cultural Measures (average) | Culture | Jihad & Coherence | Economics | Troop Quality | Military Sophistication |
|-----------------------|---------------------------|-----------------------------|---------|-------------------|-----------|---------------|-------------------------|
| China                 | 0.803                     | 0.618                       | 1.486   | -0.234            | 0.620     | 0.535         | 0.682                   |
| Europe                | 0.634                     | 0.594                       | 0.635   | 1.390             | 1.617     | -0.506        | -0.166                  |
| Balkans               | 0.626                     | 0.753                       | 1.593   | -0.154            | 0.507     | 0.572         | 1.247                   |
| India                 | 0.389                     | 0.226                       | 0.964   | -0.700            | 0.712     | -0.743        | 0.897                   |
| Anatolia              | 0.33                      | 0.388                       | 1.139   | -0.128            | 0.299     | -0.137        | 0.767                   |
| Iberia                | 0.303                     | 0.312                       | 0.862   | 0.181             | 0.919     | -0.731        | 0.330                   |
| Mesopotamia           | 0.244                     | 0.277                       | 1.112   | -0.819            | 0.945     | -0.546        | 0.692                   |
| Syria                 | 0.224                     | 0.379                       | 1.198   | -0.694            | 0.738     | -0.015        | 0.669                   |
| Egypt                 | 0.220                     | 0.458                       | 1.392   | -0.564            | 0.637     | -0.061        | 0.884                   |
| Iran                  | 0.144                     | 0.112                       | 0.316   | -0.632            | 0.386     | 0.223         | 0.269                   |
| Russia                | 0.117                     | -0.354                      | -0.495  | -0.601            | -0.556    | -0.485        | 0.369                   |
| North Africa Arable   | -0.036                    | 0.183                       | 0.632   | -0.197            | 0.168     | -0.188        | 0.502                   |
| Inner Asia Pontic     | -0.114                    | -0.211                      | -1.090  | -0.361            | -0.138    | 1.026         | -0.490                  |
| Baltic                | -0.132                    | -0.684                      | -1.240  | -0.307            | -0.902    | -0.628        | -0.342                  |
| Sudan Belt            | -0.209                    | -0.520                      | -0.623  | 0.135             | -1.399    | -0.992        | 0.279                   |
| Inner Asia Mongolia   | -0.257                    | -0.164                      | -1.194  | -0.546            | -0.190    | 1.328         | -0.217                  |
| North Africa Pastoral | -0.267                    | -0.174                      | -0.022  | 0.965             | -0.659    | -0.587        | -0.568                  |
| Sahel/Sahara          | -0.294                    | -0.416                      | -0.738  | 0.516             | -0.382    | -0.500        | -0.976                  |
| Inner Asia Turkestan  | -0.351                    | -0.121                      | -0.752  | -0.490            | 0.333     | 0.945         | -0.639                  |
| Arabia                | -0.469                    | -0.374                      | -0.867  | 1.409             | -0.820    | -0.647        | -0.947                  |
| All Regions           | 0.000                     | 0.000                       | 0.000   | 0.000             | 0.000     | 0.000         | 0.000                   |

**Table 12.11 Composite scores by Region (continued)**

With all interactions combined, the overall average for each composite score, by definition, is zero

Figure 12.3 shows, in graphical form, the marked positive correlation between physical and cultural measures ( $r = .616$ ,  $p = 0.004$ ). There is a clear gradient from the least culturally and physically advantaged regions to the most advantaged, with 36.7% of variance being explained by the calculated regression. Comparison with events (Chapter 9) shows that the long established qualitative pattern of disadvantaged areas with military strength in conflict with advantaged areas with less military strength is being represented here in quantitative form.



**Figure 12.3 Regional average composite scores for physical and cultural measures**

The existence of seven broad groups of GIPPs has been noted (Section 11.2 and Table 11.3). Table 12.12 presents average results for these groups. For all groups save the European (i.e., the crusades), the Initiator has a low score, ranging from -0.328 (Arab Conquest) to -0.047 (Chingisids), while the Respondent has a higher score (from -0.083 to +0.441).

Religious wars warrant some attention. Table 12.13 shows Crusades as associated with high average composite scores (+0.353). By contrast, Holy Wars, mostly *jihads*, have lower than average scores (-0.146). General conflicts tend to lie between the other two types (overall average +0.043). Holy wars are often initiated by disadvantaged groups, whether desert Arabs, Berbers or Fulani, while Crusades are carried out by more advantaged protagonists (e.g Western Europeans vs. East Europeans).

More generally, religions may be associated with particular types of environments. Table 12.14 shows the scores by religion, with average scores of 0.330 to 0.840 for Hindu, Christian and Confucianism, 0.052 to 0.114 for Roman and Greek Pagan, Jewish, Egyptian and Middle East Pagan



and Zoroastrian. The lowest scores, -0.223 to -0.034 are recorded for Islamic Sunni Sectaries and Pagan Shamanism, being associated with harsher climate and more difficult terrain.

| Group              | Party      | All Variables | Cultural | Physical |
|--------------------|------------|---------------|----------|----------|
| Europe             | Initiator  | 0.640         | 0.569    | 0.684    |
|                    | Respondent | 0.241         | 0.320    | 0.191    |
|                    | Overall    | 0.440         | 0.445    | 0.437    |
| Arab Conquest      | Initiator  | -0.328        | -0.158   | -0.435   |
|                    | Respondent | 0.079         | 0.398    | -0.120   |
|                    | Overall    | -0.125        | 0.120    | -0.277   |
| Sub-Saharan Africa | Initiator  | -0.218        | -0.549   | -0.011   |
|                    | Respondent | -0.220        | -0.554   | -0.011   |
|                    | Overall    | -0.219        | -0.552   | -0.011   |
| Maghreb & Sahara   | Initiator  | -0.231        | -0.195   | -0.254   |
|                    | Respondent | -0.083        | -0.040   | -0.109   |
|                    | Overall    | -0.157        | -0.118   | -0.181   |
| Chingisid          | Initiator  | -0.047        | 0.295    | -0.260   |
|                    | Respondent | 0.441         | 0.382    | 0.479    |
|                    | Overall    | 0.197         | 0.338    | 0.109    |
| Turk               | Initiator  | -0.255        | -0.187   | -0.298   |
|                    | Respondent | 0.392         | 0.343    | 0.422    |
|                    | Overall    | 0.068         | 0.078    | 0.062    |
| General            | Initiator  | -0.273        | -0.298   | -0.257   |
|                    | Respondent | 0.292         | 0.218    | 0.338    |
|                    | Overall    | 0.010         | -0.040   | 0.041    |
| Total              | Initiator  | -0.171        | -0.149   | -0.185   |
|                    | Respondent | 0.171         | 0.149    | 0.185    |
|                    | Overall    | 0.000         | 0.000    | 0.000    |

**Table 12.12 Average composite scores by Conflict Group and Status**

With all interactions combined, the overall average for each composite score, by definition, is zero

| Conflict Type | Average (13 scores) | Relief | Terrain | Temperature       | Precipitation | Drought et al. | Biocapacity             |
|---------------|---------------------|--------|---------|-------------------|---------------|----------------|-------------------------|
| General       | 0.043               | 0.237  | -0.005  | -0.403            | -0.025        | 0.079          | 0.064                   |
| Holy War      | -0.146              | -0.309 | -0.161  | 0.710             | -0.057        | -0.256         | -0.270                  |
| Crusade       | 0.353               | -0.373 | 0.789   | -0.229            | 0.454         | 0.592          | 0.764                   |
| Total         | 0.000               | 0.000  | 0.000   | 0.000             | 0.000         | 0.000          | 0.000                   |
| Conflict Type | Bio-Productivity    | Soil   | Culture | Jihad & Coherence | Economics     | Troop Quality  | Military Sophistication |
| General       | 0.182               | 0.226  | -0.066  | -0.412            | 0.199         | 0.399          | 0.084                   |
| Holy War      | -0.490              | -0.364 | -0.047  | 0.561             | -0.545        | -0.582         | -0.091                  |
| Crusade       | 0.892               | -0.033 | 0.725   | 0.545             | 1.022         | -0.345         | -0.214                  |
| Total         | 0.000               | 0.000  | 0.000   | 0.000             | 0.000         | 0.000          | 0.000                   |

**Table 12.13 Composite Scores by Conflict Type**

With all interactions combined, the overall average for each composite score, by definition, is zero

| Religion                   | Average (13 scores) | Relief | Terrain | Temperature       | Precipitation | Drought et al. | Biocapacity             |
|----------------------------|---------------------|--------|---------|-------------------|---------------|----------------|-------------------------|
| Confucianism               | 0.840               | 2.754  | 1.349   | -0.102            | 1.482         | 0.028          | 2.905                   |
| Manichaeism                | 0.669               | -0.271 | 0.980   | -1.142            | 1.775         | -0.176         | 1.964                   |
| Roman Catholic             | 0.566               | -0.162 | 0.772   | -0.888            | 1.518         | 0.507          | 1.285                   |
| Eastern Orthodox           | 0.422               | 0.300  | 0.487   | -0.254            | 0.573         | -0.369         | 0.670                   |
| Hindu                      | 0.333               | -0.286 | 1.313   | 0.852             | 1.249         | -0.361         | 0.944                   |
| Zoroastrian                | 0.114               | 0.764  | 0.738   | 0.291             | -0.765        | -0.667         | 0.315                   |
| Egyptian & Near East Pagan | 0.087               | 0.523  | 0.550   | 0.069             | -0.708        | 0.515          | 0.350                   |
| Jewish                     | 0.068               | -0.813 | -0.140  | -0.521            | -0.056        | -0.152         | -0.697                  |
| Roman & Greek Pagan        | 0.052               | -0.047 | 0.337   | 0.380             | -0.624        | -0.017         | -0.661                  |
| Islam Shia                 | -0.034              | 0.181  | 0.116   | 0.362             | -0.739        | -0.019         | -0.507                  |
| Islam Sunni                | -0.090              | -0.174 | -0.029  | 0.569             | -0.353        | -0.105         | -0.263                  |
| Pagan Shaman               | -0.222              | -0.168 | -0.542  | -0.411            | -0.013        | 0.060          | -0.351                  |
| Islam Sunni Sectary        | -0.223              | -0.177 | -0.123  | 0.469             | -0.841        | 0.212          | -0.655                  |
| Total                      | 0.000               | 0.000  | 0.000   | 0.000             | 0.000         | 0.000          | 0.000                   |
| Religion                   | Bio-Productivity    | Soil   | Culture | Jihad & Coherence | Economics     | Troop Quality  | Military Sophistication |
| Confucianism               | -0.673              | -0.478 | 1.861   | -0.182            | 0.817         | 0.298          | 0.858                   |
| Manichaeism                | 1.604               | 0.069  | 0.277   | 1.835             | 1.519         | -0.858         | 1.117                   |
| Roman Catholic             | 1.379               | 0.317  | 0.704   | 1.118             | 1.484         | -0.527         | -0.153                  |
| Eastern Orthodox           | 0.182               | 0.709  | 1.220   | -0.011            | 0.502         | 0.311          | 1.172                   |
| Hindu                      | -0.338              | 0.269  | 0.870   | -0.666            | 0.523         | -0.928         | 0.896                   |
| Zoroastrian                | 0.325               | -0.076 | 0.612   | -0.831            | 1.348         | -0.498         | -0.078                  |
| Egyptian & Near East Pagan | 0.190               | 0.053  | 0.666   | -0.912            | 0.284         | -0.640         | 0.192                   |
| Jewish                     | 0.767               | 0.620  | -0.918  | 0.856             | 1.152         | -0.190         | 0.976                   |
| Roman & Greek Pagan        | 0.299               | 0.311  | 0.512   | -1.313            | 0.587         | -0.038         | 0.946                   |
| Islam Shia                 | 0.200               | -0.749 | 0.648   | 0.668             | -0.236        | -0.475         | 0.110                   |
| Islam Sunni                | -0.337              | -0.220 | 0.144   | 0.190             | -0.113        | -0.221         | -0.260                  |
| Pagan Shaman               | -0.104              | 0.334  | -0.955  | -0.618            | -0.423        | 0.508          | -0.197                  |
| Islam Sunni Sectary        | 0.165               | -1.429 | 0.031   | 1.365             | -0.674        | -0.614         | -0.627                  |
| Total                      | 0.000               | 0.000  | 0.000   | 0.000             | 0.000         | 0.000          | 0.000                   |

**Table 12.14 Composite Scores by Religion**

With all interactions combined, the overall average for each composite score, by definition, is zero

Table 12.15 shows that where the Respondent power has a nomad ally, on average, the respondent has a higher average composite score (+0.456 compared with -0.325 for the initiator, i.e., a difference of 0.781), than in instances where the respondent power has no nomad ally (+0.140 compared with -0.154, a difference of 0.294). It is not perhaps surprising that a more advantaged power finds it easier to secure the additional advantage of a nomad ally, but the need also becomes greater in those situations where the initiator is stronger.

| Respondent has no Nomad Ally | Average (13 scores) | Relief      | Terrain        | Temperature                  | Precipitation    | Drought et al.       | Biocapacity                    | Bio-Productivity |
|------------------------------|---------------------|-------------|----------------|------------------------------|------------------|----------------------|--------------------------------|------------------|
| Initiator                    | -0.154              | -0.107      | -0.381         | -0.053                       | -0.281           | 0.005                | -0.378                         | 0.003            |
| Respondent                   | 0.140               | 0.163       | 0.333          | 0.242                        | 0.172            | 0.073                | 0.342                          | -0.159           |
|                              |                     | <b>Soil</b> | <b>Culture</b> | <b>Jihad &amp; Coherence</b> | <b>Economics</b> | <b>Troop Quality</b> | <b>Military Sophistication</b> |                  |
| Initiator                    |                     | -0.251      | -0.464         | 0.474                        | -0.157           | 0.118                | -0.533                         |                  |
| Respondent                   |                     | 0.080       | 0.471          | -0.398                       | 0.186            | -0.264               | 0.574                          |                  |
|                              |                     |             |                |                              |                  |                      |                                |                  |
| Respondent has Nomad Ally    | Average (13 scores) | Relief      | Terrain        | Temperature                  | Precipitation    | Drought et al.       | Biocapacity                    | Bio-Productivity |
| Initiator                    | -0.325              | -0.738      | -0.338         | -1.185                       | -0.039           | -0.502               | -0.722                         | 0.819            |
| Respondent                   | 0.456               | 0.238       | 0.775          | -0.519                       | 1.018            | -0.203               | 1.049                          | 0.591            |
|                              |                     | <b>Soil</b> | <b>Culture</b> | <b>Jihad &amp; Coherence</b> | <b>Economics</b> | <b>Troop Quality</b> | <b>Military Sophistication</b> |                  |
| Initiator                    |                     | 0.885       | -1.066         | -0.397                       | -0.802           | 1.273                | -1.409                         |                  |
| Respondent                   |                     | 0.656       | 0.996          | -0.288                       | 0.540            | 0.044                | 1.033                          |                  |

**Table 12.15 Composite Scores by Status and nomad alliance**

With all interactions combined, the overall average for each composite score, by definition, is zero

Turchin's MetaEthnic Index (Section 10.5) provides an estimate of the level of pressures tending to develop ethnic identity. The relationship of this measure for a GIPP to other measures relating to the GIPP, can be calculated using Pearson's product moment correlation (ranging from -1.0, strongly negative, to +1.0, strongly positive). This provides an indication of how development of ethnic identity may be linked to other factors. Table 12.16 shows that the Index has a strongly significant relationship with soil and precipitation in particular, but there is also a statistically significant relationship with military sophistication and terrain. In all but one of the nine significant relationships identified in the table below, a high MetaEthnic score is associated with a high composite score, i.e., with an advantaged party as defined in the present analysis. Given that Turchin's index is intended to measure the pressure towards ethnic formation generated by a conflict, these results suggest that good physical conditions and more effective armies are connected with ethnic formation.

| Pearson Correlation, Turchin MetaEthnic Score | Relief  | Terrain | Temperature       | Precipitation | Drought et al. | Biocapacity             | Bio-Productivity |
|---|---------|---------|-------------------|---------------|----------------|-------------------------|------------------|
| Initiator                                     | -0.210* | -0.016  | -0.104            | 0.331**       | -0.165         | 0.093                   | -0.128           |
| Respondent                                    | -0.105  | 0.270** | 0.113             | 0.324**       | -0.023         | 0.204*                  | -0.170           |
| Pearson Correlation                           | Soil    | Culture | Jihad & Coherence | Economics     | Troop Quality  | Military Sophistication |                  |
| Initiator                                     | 0.403** | -0.119  | -0.114            | -0.012        | 0.226*         | 0.034                   |                  |
| Respondent                                    | 0.337** | -0.013  | -0.174            | 0.042         | -0.031         | 0.407**                 |                  |

**Table 12.16 Correlation of Turchin’s MetaEthnic Score with Composite Scores**

\*95% significance \*\* 99% significance

Correlations can be used to examine the relationship of population level and other variables. Table 12.17 shows there is a strong statistical correlation, between the level of population and the various composite scores (sixteen out of twenty-six correlations being statistically significant). As regards social measures, (Culture to Military Sophistication) larger population is associated with higher scores (nine out of ten correlations are positive, if only marginally, excepting the instance of the *Jihad & Coherence* for the initiator) and seven out of ten of the relationships are statistically significant. This suggests that initiators with large populations are associated with low *Jihad & Coherence* rating. Of the sixteen physical measures (Relief to Soil), nine are statistically significant. For initiators, higher population is significantly (negatively) correlated with lower scores for terrain, temperature and precipitation, suggesting that the most numerically strong initiators are found in cooler and drier environments, with cultivated and meadow land rather than forest and mountain.

| Pearson Correlation   | Relief | Terrain | Temperature       | Precipitation | Drought et al. | Biocapacity             | Bio-Productivity |
|-----------------------|--------|---------|-------------------|---------------|----------------|-------------------------|------------------|
| Initiator Population  | .664** | -.286** | -.245**           | -.197*        | 0.128          | -0.001                  | 0.122            |
|                       | 0.072  | .196*   | -.364**           | 0.146         | .450**         | .467**                  |                  |
| Pearson Correlation   | Soil   | Culture | Jihad & Coherence | Economics     | Troop Quality  | Military Sophistication |                  |
| Respondent Population | .723** | .336**  | -0.135            | .360**        | 0.040          | .725**                  | -0.144           |
|                       | -.187* | .340**  | 0.055             | .181*         | .400**         | 0.030                   |                  |

**Table 12.17 Correlation of Population with Composite Scores**

\*95% significance \*\* 99% significance

## 12.5 PRINCIPAL COMPONENTS ANALYSIS OF COMPOSITE VARIABLES

As noted in Chapter 11.5 on the Database, a principal components analysis of the thirteen composite variables drawn up as per Chapter 11.4 identifies five statistically significant dimensions. For seven of the thirteen variables, the dimension with the highest weighting is *Culture & Land*. Three variables (*Bio-Productivity*, *Soil Quality* and *Troop Quality*) load most strongly onto the second dimension, and two variables (*Temperature*, *Drought et al*) load onto the fifth dimension. The fourth dimension consists solely of *Jihad & Coherence*, and the third dimension has no variable for which it is the strongest weighting.

Table 12.18 gives the correlation between several of the variables, suggesting a possible explanation for their linkage. The proportion of cavalry in the armies of the parties, particularly the initiators, has statistically significant correlations with the *Troop Quality & Bio-Productivity* dimension, with *Troop Quality*, with *Pasture* and with *Soil*. Given that the proportion of cavalry in an army is dependent on the accessibility and cost of horses, it is likely that a party based in an area with much pasture and good soil, factors which are conducive to horse rearing, will have more cavalry. This in turn improves overall *Troop Quality*, as cavalry are more highly rated as troops.

| Pearson correlation of | With                                       |               |         |        |
|------------------------|--|---------------|---------|--------|
|                        | Troop Quality & Bio-Productivity Dimension | Troop Quality | Pasture | Soil   |
| % Cavalry              |  |               |         |        |
| Initiator              | .582**                                     | .950**        | .190*   | .458** |
| Respondent             | .387**                                     | .845**        | .137    | .068   |

**Table 12.18 Correlation of Cavalry Proportion with Troop Quality, Pasture and Soil**

\*95% significance \*\* 99% significance

Table 12.19 shows the average scores for each region on each dimension. When considering *Culture & Land*, the average ranges from -1.33 (Mongolia), -1.05 (Pontic), -0.91 (Turkestan) and -0.82 (Arabia), to +1.28 (India), +1.47 (Egypt) and +2.30 (China). Inner Asia and Arabia have the worst *Culture & Land* rating.

| Region                | Culture & Land | Troop Quality & Bio-Productivity | General | Jihad & Coherence | Temperature & Drought |
|-----------------------|----------------|----------------------------------|---------|-------------------|-----------------------|
| China                 | 2.304          | -0.097                           | 0.210   | 0.034             | -1.964                |
| Egypt                 | 1.471          | -0.382                           | -1.589  | 0.361             | 1.546                 |
| India                 | 1.280          | -0.623                           | 0.719   | 0.077             | 0.520                 |
| Balkans               | 1.124          | 0.493                            | 1.048   | 0.383             | -0.431                |
| Mesopotamia           | 1.084          | -0.027                           | -0.970  | 0.447             | 1.955                 |
| Europe                | 1.080          | 1.640                            | 1.165   | -1.923            | 0.637                 |
| Anatolia              | 0.788          | 0.177                            | 0.525   | 0.297             | -1.203                |
| Syria                 | 0.719          | 0.056                            | -0.480  | 0.741             | 0.708                 |
| Iran                  | 0.482          | 0.023                            | -0.648  | 0.928             | -0.643                |
| Iberia                | 0.443          | 0.506                            | 0.661   | -0.259            | 0.390                 |
| Russia                | 0.378          | 0.938                            | 1.067   | -0.535            | 1.341                 |
| North Africa Pastoral | -0.207         | -0.149                           | -1.501  | -0.815            | -0.038                |
| Sahel/Sahara          | -0.349         | -0.566                           | -1.280  | -0.624            | 1.342                 |
| North Africa Arable   | -0.416         | -0.088                           | 0.472   | 0.527             | 0.635                 |
| Sudan Belt            | -0.469         | -2.120                           | 1.244   | -0.188            | 0.077                 |
| Baltic                | -0.475         | 1.040                            | 1.548   | -1.202            | 0.603                 |
| Arabia                | -0.818         | -0.611                           | -1.185  | -1.303            | -0.803                |
| Inner Asia Turkestan  | -0.910         | 0.771                            | -0.399  | 0.654             | -0.685                |
| Inner Asia Pontic     | -1.053         | 1.048                            | 1.055   | 0.192             | 0.697                 |
| Inner Asia Mongolia   | -1.339         | 0.885                            | 0.319   | 1.074             | -0.397                |
| Total                 | 0.000          | 0.000                            | 0.000   | 0.000             | 0.000                 |

**Table 12.19 Dimensions of Secondary Principal Component Analysis by Region**

With all interactions combined, the overall average for each composite score, by definition, is zero

Table 12.20 shows that for all Groups of interactions save the European (i.e., the crusades), the initiator has a low *Culture & Land* score, ranging from -0.771 (Chingisids) to -0.329 (Maghreb and Sahara), while the respondent has a higher score (from -0.249 to +0.887).

| Group              | Party      | Culture & Land | Troop Quality & Bio-Productivity | General | Jihad & Coherence | Temperature & Drought |
|--------------------|------------|----------------|----------------------------------|---------|-------------------|-----------------------|
| Europe             | Initiator  | 1.014          | 1.718                            | 1.124   | -2.092            | 0.689                 |
|                    | Respondent | 0.775          | 0.276                            | -0.243  | -0.050            | 0.915                 |
|                    | Overall    | 0.894          | 0.997                            | 0.440   | -1.071            | 0.802                 |
| Arab Conquest      | Initiator  | -0.474         | -0.528                           | -1.079  | -1.049            | -1.068                |
|                    | Respondent | 0.380          | -0.009                           | -0.101  | 0.248             | -0.389                |
|                    | Overall    | -0.047         | -0.268                           | -0.590  | -0.400            | -0.729                |
| Sub-Saharan Africa | Initiator  | -0.747         | -1.861                           | 1.226   | -1.239            | -0.144                |
|                    | Respondent | -0.249         | -2.380                           | 1.234   | 0.748             | 0.286                 |
|                    | Overall    | -0.498         | -2.121                           | 1.230   | -0.245            | 0.071                 |
| Maghreb & Sahara   | Initiator  | -0.329         | -0.257                           | -1.171  | -0.774            | 0.596                 |
|                    | Respondent | 0.104          | -0.397                           | -0.461  | 0.070             | 0.509                 |
|                    | Overall    | -0.113         | -0.327                           | -0.816  | -0.352            | 0.552                 |
| Chingisid          | Initiator  | -0.771         | 0.744                            | -0.108  | 1.728             | -0.406                |
|                    | Respondent | 1.217          | 0.205                            | 0.138   | 0.368             | 0.077                 |
|                    | Overall    | 0.223          | 0.474                            | 0.015   | 1.048             | -0.165                |
| Turk               | Initiator  | -1.009         | 0.893                            | 0.348   | 0.288             | -0.022                |
|                    | Respondent | 0.947          | 0.420                            | 0.491   | 0.126             | -0.115                |
|                    | Overall    | -0.031         | 0.656                            | 0.419   | 0.207             | -0.069                |
| General            | Initiator  | -0.851         | 0.479                            | -0.227  | 0.247             | -0.367                |
|                    | Respondent | 0.817          | 0.051                            | 0.146   | 0.399             | -0.335                |
|                    | Overall    | -0.017         | 0.265                            | -0.041  | 0.323             | -0.351                |
| Total              | Initiator  | -0.579         | 0.192                            | -0.139  | -0.265            | -0.070                |
|                    | Respondent | 0.579          | -0.192                           | 0.139   | 0.265             | 0.070                 |
|                    | Overall    | 0.000          | 0.000                            | 0.000   | 0.000             | 0.000                 |

**Table 12.20 Dimension scores of Secondary Principal Components Analysis by Conflict Group and Status**

With all interactions combined, the overall average for each composite score, by definition, is zero. The 'General' Conflict Group is a miscellaneous group of GIPPs with no particular identifying characteristic. The 'General' Dimension is one with no contributing variable being primarily aligned to it.

From these results, it again seems that initiators tend to be polities of comparatively disadvantaged *Culture & Land*. Table 12.21 shows that this is the case for the various geographical zones considered previously. In all six zones, the respondent polity scores more highly on *Culture*

& Land, and the initiator (with the exception of Maghreb and Iberia) scores more highly on *Troop Quality & Bio-Productivity*. Other factors show no clear predominance in either direction.

| Respondent Zone                          | Initiator Culture & Land    | Respondent Culture & Land    | Initiator Troop Quality & Bio-Productivity | Respondent Troop Quality & Bio-Productivity | Initiator General | Respondent General |
|--|-----------------------------|------------------------------|--|---|-------------------|--------------------|
| Arabia & Near East                       | -0.39                       | 0.99                         | 0.33                                       | -0.05                                       | -0.47             | -0.61              |
| Mongolia & China                         | -1.11                       | 1.78                         | 0.82                                       | 0.05  | 0.07              | 0.23               |
| Sub-Saharan Africa                       | -0.64                       | -0.26                        | -1.53                                      | -2.31                                       | 0.62              | 1.26               |
| Maghreb & Iberia                         | -0.27                       | -0.15                        | -0.11                                      | -0.09                                       | -1.02             | -0.45              |
| Pontic, Europe, Balkans, Russia & Baltic | -0.70                       | 0.75                         | 1.02                                       | 0.84  | 0.90              | 1.12               |
| Turkestan, Iran & India                  | -0.65                       | 0.47                         | 0.45                                       | -0.01                                       | -0.49             | -0.08              |
| <b>Total</b>                             | <b>-0.58</b>                | <b>0.58</b>                  | <b>0.19</b>                                | <b>-0.19</b>                                | <b>-0.14</b>      | <b>0.14</b>        |
| Respondent Zone                          | Initiator Jihad & Coherence | Respondent Jihad & Coherence | Initiator Temperature & Drought            | Respondent Temperature & Drought            |                   |                    |
| Arabia & Near East                       | -0.67                       | 0.49                         | -0.03                                      | 0.65  |                   |                    |
| Mongolia & China                         | 0.99                        | 0.21                         | -0.36                                      | -1.67                                       |                   |                    |
| Sub-Saharan Africa                       | -1.12                       | 0.60                         | 0.06                                       | 0.24  |                   |                    |
| Maghreb & Iberia                         | -0.93                       | 0.01                         | 0.16                                       | 0.28  |                   |                    |
| Pontic, Europe, Balkans, Russia & Baltic | 0.04                        | -0.28                        | 0.45                                       | 0.35  |                   |                    |
| Turkestan, Iran & India                  | 0.55                        | 0.51                         | -0.76                                      | -0.26                                       |                   |                    |
| <b>Total</b>                             | <b>-0.27</b>                | <b>0.27</b>                  | <b>-0.07</b>                               | <b>0.07</b>                                 |                   |                    |

**Table 12.21 Dimension scores of Secondary Principal Components Analysis by Respondent Zone and Status**

With all interactions combined, the overall average for each composite score, by definition, is zero. The 'General' Dimension is one with no contributing variable being primarily aligned to it.



### 12.6 3M (MATERIAL, MANOEUVRE, MORALE) INDICES AND STRATEGY OPTIONS

As explained in Chapter 11.6, three indices, assessing Material, Manoeuvre, and Morale, were computed for each of the parties in each interaction, combined and then compared to express the Initiator advantage. Table 12.22 shows the relative contribution of the six indices to the result (assessed by SPSS stepwise regression). The Manoeuvre Index of the Initiator (56%) is a more important contributor than the Manoeuvre Index for Respondent, and the Morale Index for Initiator (11%), is likewise a more important contributor than Morale Index for Respondent. On the other hand the contribution of the Material Index of the Initiator (5%) is less than the Material Index of the Respondent (8%). The contribution of Respondent Indices is much more evenly balanced between Manoeuvre (13%), Morale and Material (both 8%). This is consistent with the traditional view of a nomad attacker, strong on manoeuvre and morale, facing a sedentary power with a greater dependence on material resources. It is perhaps worth noting that for Respondents, the balance between Material (27%) on one hand and Manoeuvre and Morale on the other matches the findings of Appendix 4 for a highly competent modern army (Germany 1936: 25%).

| Index   | Initiator | Respondent |
|---|-----------|------------|
| Manoeuvre   | 56.0      | 13.0       |
| Morale  | 10.6      | 7.8        |
| Material  | 4.8       | 7.8        |
| Total   | 71.4      | 28.6       |
| Material as proportion of explanation provided by agent | 7%        | 27%        |

**Table 12.22 Percent of variance in Initiator advantage explained by 3M Indices**

SPSS stepwise regression of Initiator 3M advantage against the six 3M indices

The Initiator advantage can be considered in relation to the strategy adopted by the Initiator. Table 12.23 shows that the average largest Initiator advantages (0.29 as measured by the 3M combined Indices) are enjoyed by those initiators who adopt strategies of Raid or Total Attack, while the least advantage is enjoyed by those seeking alliance (-0.41). Limited Attack (-0.14) and Extort (-0.22) are also associated with lesser advantage. This would be consistent with the weak seeking alliance and the strong unleashing full war or raids, whilst those of intermediate strength apply intermediate approaches.

| Initiator Strategy chosen | Initiator 3M Combined | Respondent 3M Combined | Initiator Advantage |
|---------------------------|-----------------------|------------------------|---------------------|
| Raid                      | 0.14                  | -0.15                  | 0.29                |

|                       |       |       |       |
|-----------------------|-------|-------|-------|
| <b>Total Attack</b>   | 0.29  | 0.00  | 0.29  |
| <b>Limited Attack</b> | -0.29 | -0.15 | -0.14 |
| <b>Extort</b>         | -0.77 | -0.55 | -0.22 |
| <b>Ally</b>           | -0.02 | 0.38  | -0.41 |
| <b>Total</b>          | 0.09  | -0.09 | 0.17  |

**Table 12.23 3M Indices by Initiator Strategy Option**

The Initiator advantage may also be considered in relation to the strategy adopted by the respondent. Table 12.24 shows that for the respondent, the policy of Pay Tribute is adopted when the initiator has a relatively low advantage (-0.02) while Defend (0.16), Counterattack (0.61) and Attack (0.96) are associated with ever greater levels of Initiator advantage. This is consistent with a situation where weak neighbours are bought off with subsidies and alliances, while stronger threats are met with escalating response.

| <b>Respondent Strategy chosen</b> | <b>Initiator 3M Combined</b> | <b>Respondent 3M Combined</b> | <b>Initiator Advantage</b> |
|-----------------------------------|------------------------------|-------------------------------|----------------------------|
| <b>Ally</b>                       | -0.02                        | 0.38                          | -0.41                      |
| <b>Pay Tribute/ Subsidy</b>       | -0.54                        | -0.52                         | -0.02                      |
| <b>Defend</b>                     | 0.14                         | -0.02                         | 0.16                       |
| <b>Counter-attack</b>             | 0.04                         | -0.57                         | 0.61                       |
| <b>Attack</b>                     | -1.32                        | -2.28                         | 0.96                       |
| <b>Total</b>                      | 0.09                         | -0.09                         | 0.17                       |

**Table 12.24 3M Indices by Respondent Strategy Option**

## 12.7 SUMMARY OF INITIAL FINDINGS

A number of preliminary conclusions may be drawn. Firstly, the interactions held on the GIPP database prove to be significantly biased to years in which ENSO activity is in its El Niño phase. Since the interactions were selected blind to ENSO activity, it may be concluded that the phase of the El Niño Southern Oscillation has an impact on the frequency of GIPP interactions. Secondly, GIPP interactions are generally initiated by polities that are poorer and less populous than the respondents that they confront, though the availability of numerous cheap horses in the steppes at about one hundredth of the cost of horses in the sedentary lands alters the balance of military strength to wealth in the steppes. Many more people can be equipped for war as cavalry in the steppes. Composite scores confirm these basic findings. Crusades and holy wars can be distinguished, Islamic sectary groups and pagan shamanism tend to occur in areas with harsher

climate and poorer conditions. Wealthier respondents find it easier to secure nomad allies. Turchin's MetaEthnic Score, measuring propensity to ethnic formation, is linked to better physical conditions and more effective armies. Larger populations are associated with cultural development.

The traditional pattern of events, appearing repeatedly in the history recounted in Chapter 9, is of a nomad attacker, strong on manoeuvre and morale, facing a sedentary power with a greater dependence on material resources. As regards strategy, weak nomads seek alliance and strong nomads unleash full war or raids, whilst those of intermediate strength apply intermediate approaches. Respondents seek to buy off weak neighbours with subsidies and alliances, while stronger threats are met with escalating responses. Analysis of the 3M indices yields results in line with this.

These findings, with the exception of the connection between El Niño frequency and the year of GIPP interactions, are well recognised features of the qualitative analyses contained in the literature reviewed in previous chapters. The fact that the quantitative analysis aligns with existing scholarly qualitative findings suggests that the data included in the database, for quite a large number of polities and variables over a long period of time, are robust. This suggests that the database may be used for further analysis.

In addition, it is helpful to have quantitative demonstration that, e.g., the *Jihad* & Coherence measure for Shia Islam is 0.668 and for Sunni Islam is 0.190. This suggests that the level of coherence for the former is not just greater, but perhaps more than three times greater. By contrast, Islamic Sunni sectaries have a *Jihad* & Coherence measure of 1.365, which is double that of Shia Islam and seven times that of Sunni Islam. It is not difficult to see why Shia polities held their own, and why the Sunni sectaries were hard for their mainstream Islamic rivals to eliminate, indeed why they are still an ongoing issue in the politics of the Middle East. The difference between the faith groups is real and it seems substantial.

## CHAPTER 13. POLICY CHOICES, DURATION AND OUTCOMES

### 13.1 CAUSES AND CONTRIBUTIONS

Four key variables in the understanding of an interaction are Initiator Strategy, Respondent Strategy, Interaction Duration and Overall Interaction Outcome. This study treats these four variables as dependent variables which may be explained in terms of a number of independent variables.<sup>1</sup> Chapter 3 addresses the two variables, Nomadism and Holy War, which are the focus of this study, while Chapters 4 to 9 display the wide range of other issues and variables which impact on interactions. As noted in Chapter 11.2, there are theoretical statistical concerns with using directly the full range of independent variables available and so seventy-four primary variables were reduced to twenty-six First Order Composite variables. These twenty-six First Order Composite variables were then reduced in a similar manner to ten Second Order Composite variables (or dimensions). These independent variables are used to construct four provisional models, one for each key dependent variable, to which the study independent variables, nomadism and holy war can be added to produce a final model.

Table 13.1 shows the results of a stepwise regression of the Initiator's Strategy against the ten Second Order Composite variables (i.e., the five dimension scores derived from the second Principal Components Analysis, calculated for each of the parties).

The Table shows that six of the ten variables available are statistically significant at  $p < 0.05$  (>95% confidence), and hence are selected by the program for its final regression model. These are Initiator *Culture & Land*; Initiator *Temperature & Drought*; Respondent *Troop Quality & Bio-productivity*; Respondent *Culture & Land*; Respondent *General* and Respondent *Jihad & Cohesion*. In aggregate, they explain about 45% of the variance in the dependent variable, Initiator Strategy, with the two variables related to the Initiator accounting to about two thirds of the total. For all but one of the six variables, the sign of the coefficient is negative i.e the higher the independent variable, the lower the dependent variable. Thus the impact of the dimension is to reduce the likelihood of total war and increase the likelihood of raiding and extortion.. As the Initiator *Culture*

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<sup>1</sup> It is likely that both parties will adjust their strategy in response to the other party's strategic choice. To represent this in the model would render it non-linear, i.e. Initiator Strategy and Respondent Strategy become simultaneously both dependent and independent variables. This renders it difficult to apply valid statistic methods to such a model. Accordingly, Respondent Strategy is not treated as a possible independent variable for Initiator Strategy, but Initiator Strategy is treated as a possible independent variable for Respondent Strategy.

and Land score increases, however, the likelihood of a total attack increases and the likelihood of raiding and extortion is reduced.

| Model  | R                           | R Square   | Adjusted R Square         | Std. Error of the Estimate | Adjusted R-Square added |
|--|-----------------------------|------------|---------------------------|----------------------------|-------------------------|
| 1  | .342                        | 0.117      | 0.110                     | 1.145                      | 0.110                   |
| 2  | .549                        | 0.302      | 0.290                     | 1.023                      | 0.180                   |
| 3  | .629                        | 0.396      | 0.381                     | 0.955                      | 0.091                   |
| 4  | .648                        | 0.420      | 0.400                     | 0.940                      | 0.019                   |
| 5  | .671                        | 0.451      | 0.427                     | 0.919                      | 0.027                   |
| 6  | .687                        | 0.473      | 0.445                     | 0.905                      | 0.018                   |
| Dimensions used                              | Unstandardized Coefficients | Std. Error | Standardized Coefficients | t                          | Sig.                    |
|  | B                           |            | Beta                      |                            |                         |
| (Constant)                                   | 4.695                       | 0.119      | NA                        | 39.614                     | <0.001                  |
| Initiator 'Culture & Land'                   | 0.628                       | 0.130      | 0.374                     | 4.817                      | <0.001                  |
| Initiator 'Temperature & Drought'            | -0.610                      | 0.102      | -0.430                    | -5.969                     | <0.001                  |
| Respondent 'Troop Quality & Bioproductivity' | -0.426                      | 0.093      | -0.342                    | -4.572                     | <0.001                  |
| Respondent 'Culture & Land'                  | -0.294                      | 0.103      | -0.218                    | -2.863                     | 0.005                   |
| Respondent 'General'                         | -0.259                      | 0.090      | -0.207                    | -2.875                     | 0.005                   |
| Respondent 'Jihad & Cohesion'                | -0.281                      | 0.130      | -0.160                    | -2.162                     | 0.033                   |

**Table 13.1 Stepwise regression of Initiator Strategy against Second Order Composite variables: Dimensions**

Adjusted R-Square added: the increase in R Square provided by this model

Taking a less broad brush approach, Table 13.2 shows the results of a stepwise regression of the Initiator's Strategy against the twenty six First Order Composite scores (i.e., the thirteen dimension scores of the first Principal Components Analysis calculated for each of the parties).

Again, six of the variables prove statistically significant at  $p < 0.05$ , though this is a smaller fraction of the number of variables available, and so these six are selected by the model. They are Initiator Culture, Production, Terrain, Soil and Biocapacity, and Respondent Military Sophistication. In aggregate, they explain 50% of the observed variance, with 48% being explained by Initiator characteristics. As with the previous model, the higher the initiator culture rating, the more intense is the attack strategy (total war more likely, raiding and extortion less likely). High production, closed terrain, good soil, high biocapacity and high respondent military sophistication all reduce the likelihood of an intense attack strategy. The improvement in explanatory power

(Table 13.1 vs. 13.2) is small but discernible, though it involves selection from a larger number of variables (six out of twenty-six available). This provides a basic interim model for consideration in further analysis.

| Model                              | R                           | R Square   | Adjusted R Square         | Std. Error of the Estimate | Adjusted R-Square added |
|------------------------------------|-----------------------------|------------|---------------------------|----------------------------|-------------------------|
| 1                                  | .524                        | 0.275      | 0.269                     | 1.038                      | 0.269                   |
| 2                                  | .621                        | 0.386      | 0.376                     | 0.959                      | 0.107                   |
| 3                                  | .656                        | 0.431      | 0.416                     | 0.928                      | 0.040                   |
| 4                                  | .689                        | 0.475      | 0.457                     | 0.895                      | 0.041                   |
| 5                                  | .711                        | 0.505      | 0.483                     | 0.872                      | 0.027                   |
| 6                                  | .725                        | 0.526      | 0.501                     | 0.858                      | 0.017                   |
| Composite scores used              | Unstandardized Coefficients | Std. Error | Standardized Coefficients | t                          | Sig.                    |
|                                    | B                           |            | Beta                      |                            |                         |
| (Constant)                         | 4.795                       | 0.120      | NA                        | 39.827                     | <0.001                  |
| Initiator Culture                  | 0.806                       | 0.146      | 0.469                     | 5.530                      | <0.001                  |
| Initiator Production               | -0.456                      | 0.086      | -0.362                    | -5.293                     | <0.001                  |
| Initiator Terrain                  | -0.382                      | 0.101      | -0.287                    | -3.768                     | <0.001                  |
| Initiator Soil                     | -0.241                      | 0.077      | -0.213                    | -3.138                     | 0.002                   |
| Initiator Biocapacity              | 0.429                       | 0.153      | 0.238                     | 2.814                      | 0.006                   |
| Respondent Military Sophistication | -0.256                      | 0.115      | -0.160                    | -2.229                     | 0.028                   |

**Table 13.2 Stepwise regression of Initiator Strategy against Composite Scores**

Adjusted R-Square added: the increase in R Square provided by this model

Focusing attention on the specific factors falling in the areas identified as broadly significant, Table 13.3 shows the results of a stepwise regression of the Initiator's Strategy against the sixteen primary variables that fall within those six Composite Scores identified from Table 13.2 as statistically significant. Again, just six of the variables are statistically significant, and are thus selected by the model.

These six variables selected are Initiator religion, good soil percent, culture, percentage desert and Bedouin terrain (i.e., taking account of the impact of camel mobility in the desert) and Respondent

military sophistication. In aggregate, they explain 46% of variance, with 45% being explained by Initiator characteristics. The higher the Initiator culture and religion rating, the greater the likelihood of an intense attack while good soil percent, or alternatively, desert and Bedouin terrain, together with high Respondent military sophistication, all reduce the likelihood of an intense attack strategy. The decline in explanatory power is small but discernible, and involves selection of just six variables from the sixteen available, by the program.

| Model                              | R                           | R Square   | Adjusted R Square         | Std. Error of the Estimate | Adjusted R-Square added |
|------------------------------------|-----------------------------|------------|---------------------------|----------------------------|-------------------------|
| 1                                  | .427                        | 0.182      | 0.175                     | 1.102                      | 0.175                   |
| 2                                  | .524                        | 0.274      | 0.262                     | 1.043                      | 0.087                   |
| 3                                  | .601                        | 0.361      | 0.345                     | 0.983                      | 0.083                   |
| 4                                  | .669                        | 0.448      | 0.429                     | 0.917                      | 0.084                   |
| 5                                  | .686                        | 0.470      | 0.447                     | 0.903                      | 0.018                   |
| 6                                  | .699                        | 0.488      | 0.461                     | 0.891                      | 0.014                   |
| Primary Variable used              | Unstandardized Coefficients | Std. Error | Standardized Coefficients | T                          | Sig.                    |
|                                    | B                           |            | Beta                      |                            |                         |
| (Constant)                         | 5.940                       | 0.757      | NA                        | 7.843                      | <0.001                  |
| Initiator Religion Rating          | 0.012                       | 0.004      | 0.286                     | 3.335                      | <0.001                  |
| Initiator Good Soil Percent        | -0.037                      | 0.006      | -0.695                    | -6.102                     | <0.001                  |
| Initiator Culture                  | 0.019                       | 0.004      | 0.348                     | 4.438                      | <0.001                  |
| Initiator Desert Percent           | -0.033                      | 0.008      | -0.466                    | -4.257                     | <0.001                  |
| Initiator Bedouin Terrain          | -0.022                      | 0.011      | -0.178                    | -2.052                     | 0.042                   |
| Respondent Military Sophistication | -1.424                      | 0.709      | -0.140                    | -2.008                     | 0.047                   |

**Table 13.3 Stepwise regression of Initiator Strategy against primary variables within Composite Scores found to be statistically significant**

Adjusted R-Square added: the increase in R Square provided by this model

Given the small fall in explanatory power from using more detailed data, a considerable number of variables relating to a limited range of subject matter, the use of a wider range of subject matter is indicated. Table 13.4 adds five further variables to the basic model (i.e. as used in 13.2) that were not used in computation of the composite variables: two morale, two climatic and one economic. These variables are the morale of Initiator and Respondent; Northern Hemisphere

Temperatures; La Niña Events (the converse of El Niño in the Southern Ocean Oscillation – i.e., warm and wet in monsoon areas and cool and dry in western Europe) and the Extraction level for the Initiator (i.e., the level of inequality, taking account of the need to allow a minimal standard of living to all, as explained in Section 6.3). In this model, eight variables are finally identified as significant at  $p < 0.05$ ,<sup>2</sup> after ten models are considered by the program, which increases the level of explanation from 46% to 58%. Initiator religion and Bedouin terrain cease to be significant factors.

| Model                                       | R                           | R Square   | Adjusted R Square         | Std. Error of the Estimate | Adjusted R-Square added |
|---|-----------------------------|------------|---------------------------|----------------------------|-------------------------|
| 1   | 0.427                       | 0.182      | 0.175                     | 1.1022368                  | 0.175                   |
| 2   | 0.524                       | 0.274      | 0.262                     | 1.0428160                  | 0.087                   |
| 3   | 0.601                       | 0.361      | 0.345                     | 0.9826866                  | 0.083                   |
| 4   | 0.669                       | 0.448      | 0.429                     | 0.9172889                  | 0.084                   |
| 5   | 0.695                       | 0.483      | 0.460                     | 0.8919730                  | 0.031                   |
| 6   | 0.725                       | 0.525      | 0.500                     | 0.8581026                  | 0.040                   |
| 7   | 0.72                        | 0.519      | 0.498                     | 0.8600092                  | -0.002                  |
| 8   | 0.746                       | 0.556      | 0.532                     | 0.8301596                  | 0.034                   |
| 9   | 0.763                       | 0.581      | 0.555                     | 0.8094821                  | 0.023                   |
| 10  | 0.778                       | 0.605      | 0.576                     | 0.7901121                  | 0.021                   |
| Composite Score or Additional variable used | Unstandardized Coefficients | Std. Error | Standardized Coefficients | T                          | Sig.                    |
|   | B                           |            | Beta                      |                            |                         |
| (Constant)                                  | 59.381                      | 14.019     | NA                        | 4.236                      | <0.001                  |
| Initiator soil                              | -0.037                      | 0.005      | -0.699                    | -6.920                     | <0.001                  |
| Initiator culture                           | 0.024                       | 0.004      | 0.438                     | 6.893                      | <0.001                  |
| Initiator desert                            | -0.034                      | 0.007      | -0.472                    | -4.527                     | <0.001                  |
| Northern Hemisphere temperature             | -3.470                      | 0.902      | -0.241                    | -3.847                     | <0.001                  |
| La Nina 10 year events                      | 0.183                       | 0.040      | 0.295                     | 4.610                      | <0.001                  |
| Initiator morale                            | 0.011                       | 0.005      | 0.142                     | 2.147                      | 0.034                   |
| Respondent military sophistication          | -1.922                      | 0.635      | -0.188                    | -3.026                     | 0.003                   |
| Initiator wealth inequality                 | -0.981                      | 0.383      | -0.172                    | -2.561                     | 0.012                   |

**Table 13.4 Stepwise regression of Initiator Strategy against expanded basic model**

Adjusted R-Square added: the increase in R Square provided by this model

Higher Respondent morale and warmer northern hemisphere temperatures increase the likelihood of raiding/extortion, whilst higher Initiator morale and the occurrence of La Niña events are associated with more intense attacks. Initiators with lower levels of economic extraction, and

<sup>2</sup> Of the five additional variables, only Respondent Wealth Inequality fails to achieve statistical significance in the model.



hence lower levels of inequality, are more likely to engage in more intense attacks, rather than raiding and extortion.

Moving on from the Initiator Strategy to the Respondent Strategy, taking the same range of variables input to the model for Table 13.4 and adding to this, Initiator Strategy, which is likely to impact on Responder Strategy, Table 13.5 shows that the Respondent Strategy is driven by five variables: Initiator Strategy, level of initiator artillery, Initiator army value, Respondent extraction level and Respondent friction. In total, only 14% of variance is explained, which is very low.

| Model                                       | R                           | R Square   | Adjusted R Square         | Std. Error of the Estimate | Adjusted R-Square added |
|---|-----------------------------|------------|---------------------------|----------------------------|-------------------------|
| 1   | 0.205                       | 0.042      | 0.034                     | 0.509                      | 0.034                   |
| 2   | 0.271                       | 0.073      | 0.058                     | 0.503                      | 0.024                   |
| 3   | 0.332                       | 0.110      | 0.087                     | 0.495                      | 0.030                   |
| 4   | 0.382                       | 0.146      | 0.116                     | 0.487                      | 0.029                   |
| 5   | 0.418                       | 0.175      | 0.139                     | 0.481                      | 0.023                   |
| Composite Score or Additional variable used | Unstandardized Coefficients | Std. Error | Standardized Coefficients | T                          | Sig.                    |
|   | B                           |            | Beta                      |                            |                         |
| (Constant)                                  | 3.596                       | 0.485      | NA                        | 7.411                      | < 0.001                 |
| Initiator Strategy                          | 0.083                       | 0.039      | 0.194                     | 2.148                      | 0.034                   |
| Initiator Artillery                         | -0.009                      | 0.003      | -0.284                    | -2.952                     | 0.004                   |
| Initiator Army Value                        | 0.011                       | 0.003      | 0.327                     | 3.155                      | 0.002                   |
| Respondent Wealth Inequality                | -0.528                      | 0.253      | -0.196                    | -2.088                     | 0.039                   |
| Respondent Friction                         | -1.103                      | 0.551      | -0.178                    | -2.002                     | 0.048                   |

**Table 13.5 Stepwise regression of Respondent Strategy against five variables**

Adjusted R-Square added: the increase in R Square provided by this model

The results show that more aggressive Initiator Strategy and more skilled Initiator armies, together with larger Respondent units (more Respondent friction) are linked with more assertive defensive policies. Higher levels of Respondent economic extraction and higher levels of Initiator artillery are linked with less assertive defensive policies. Though these are scarcely implausible conclusions, it may be assumed, given the low level of variance explained, that other, as yet undemonstrated, variables are more important in determining responses.

The duration of an interaction is likely to be influenced by the strategies adopted by the parties. Again applying the variables input to the model from Table 13.4 and including Initiator and Respondent strategies, Table 13.6 shows that the duration of the GIPP is linked to five variables: Initiator Strategy, and artillery, Respondent state efficiency and nomad allies, and the level of ENSO variability. In total, 39% of the variance of the observed duration of interactions is explained, nearly half of it by the Initiator Strategy. This analysis finds that longer duration of a GIPP is linked to less aggressive Initiator Strategy, and to lower state efficiency of the Respondent. A Respondent with nomad allies, stronger Initiator artillery and experiencing greater ENSO variability are also related to longer duration.

| Model                                       | R                           | R Square   | Adjusted R Square         | Std. Error of the Estimate | Adjusted R-Square added |
|---|-----------------------------|------------|---------------------------|----------------------------|-------------------------|
| 1   | 0.444                       | 0.197      | 0.190                     | 61.85458                   | 0.190                   |
| 2   | 0.529                       | 0.280      | 0.267                     | 58.84245                   | 0.077                   |
| 3   | 0.582                       | 0.339      | 0.322                     | 56.59758                   | 0.055                   |
| 4   | 0.624                       | 0.390      | 0.368                     | 54.63327                   | 0.046                   |
| 5   | 0.641                       | 0.411      | 0.385                     | 53.90969                   | 0.017                   |
| Composite Score or Additional variable used | Unstandardized Coefficients | Std. Error | Standardized Coefficients | T                          | Sig.                    |
|   | B                           |            | Beta                      |                            |                         |
| (Constant)                                  | 157.108                     | 24.578     | NA                        | 6.392                      | <0.001                  |
| Initiator Strategy                          | -20.173                     | 4.440      | -0.356                    | -4.544                     | <0.001                  |
| Respondent State Efficiency                 | -0.882                      | 0.209      | -0.304                    | -4.221                     | <0.001                  |
| Initiator Artillery                         | 1.118                       | 0.299      | 0.271                     | 3.744                      | <0.001                  |
| Respondent Nomad Ally                       | 58.162                      | 17.967     | 0.255                     | 3.237                      | 0.002                   |
| ENSO ten year variability                   | 12.787                      | 6.309      | 0.147                     | 2.027                      | 0.045                   |

**Table 13.6 Stepwise regression of Interaction Duration against five variables**

Adjusted R-Square added: the increase in R Square provided by this model

The outcome of the interaction (measured by highest positive results for alliance, lowest negative results for balanced warfare or destruction of one party) is of concern. Table 13.7 shows a regression of the net outcome of the interaction for the two parties against three variables that yield a significant relationship. Initiator Strategy, Respondent Strategy and Respondent Wealth

Inequality level account for 74% of variance in the outcome. As the strategies of the parties become more aggressive, the outcome becomes less benign, with the Initiator Strategy more critical. The greater the level of Respondent Wealth Inequality, the less benign the overall outcome, suggesting that greater inequality has a negative outcome through giving the Respondent greater ability to fight on.

| Model                                       | R                           | R Square   | Adjusted R Square         | Std. Error of the Estimate | Adjusted R-Square added |
|---|-----------------------------|------------|---------------------------|----------------------------|-------------------------|
| 1   | .685                        | 0.470      | 0.465                     | 1.413                      | 0.465                   |
| 2   | .847                        | 0.718      | 0.713                     | 1.034                      | 0.248                   |
| 3   | .866                        | 0.749      | 0.743                     | 0.979                      | 0.030                   |
| Composite Score or Additional variable used | Unstandardized Coefficients | Std. Error | Standardized Coefficients | t                          | Sig.                    |
|   | B                           |            | Beta                      |                            |                         |
| Constant                                    |                             |            |                           |                            |                         |
| Respondent Strategy                         | -2.263                      | 0.179      | -0.607                    | -12.650                    | <0.001                  |
| Initiator Strategy                          | -0.897                      | 0.079      | -0.564                    | -11.367                    | <0.001                  |
| Respondent Wealth Inequality                | -1.888                      | 0.497      | -0.188                    | -3.801                     | <0.001                  |

**Table 13.7 Stepwise regression of Overall Interaction Outcome against three variables**

Adjusted R-Square added: the increase in R Square provided by this model

In order to finalize these four provisional regression equations, it is appropriate to include the study independent variables for nomadism and holy war at the final stage to test the possibility that these could replace or add meaningfully to the variables identified as significant, either wholly or in part. However, it is helpful first to establish the stability of the results so far obtained,

### 13.2 STABILITY OF RESULTS

These results are all based on a single sample. Because it is arguable that alternative samples would yield different results, possibly meaningfully different, this argument was tested. In SPSS, the technique of stepwise regression, used in this study to address the issue of the possible inter-relationships of independent variables, cannot be readily combined with the technique of bootstrapping which draws a very large number of sub-samples from the database to test the robustness of the conclusions. Accordingly a stability test is conducted to assess the robustness of the variable selections. Table 13.8 shows the results of ten separate stepwise regressions for each of Initiator Strategy, Respondent Strategy, Interaction duration and Overall Interaction outcome, derived from sub-samples of 60 GIPPs randomly selected from the main sample. For Initiator Strategy, on average, these sub-samples (smaller and hence less likely to be statistically significant) identify the same range of statistically significant variables as the overall sample does (five variables are selected by the model as significant either nine or ten times over the whole process, and a further two variables selected six times).

It may be concluded that Initiator access to good soil, Initiator culture level, Initiator desert, level of La Niña events, and Northern Hemisphere temperatures are unlikely to be excluded from any model while Initiator wealth inequality and Respondent military sophistication are more likely than not to be included.

The much weaker explanation of Respondent Strategy has only two variables (Initiator Strategy and Initiator artillery) identified as significant in more than half the sub-samples. By contrast, the duration of the GIPP is most strongly driven by Respondent state efficiency, Initiator Strategy, Initiator artillery and presence of Respondent nomad allies (all identified as statistically significant in more than half the sub-samples). Overall outcome is determined by the strategies of the two parties (identified in all ten sub-samples for both variables) and by the Respondent wealth inequality (eight sub-samples). The full sample is more robust than the sub-samples, on account of its size, but the sub-samples are consistent with the full sample.

| Regression          |                                    | 120 cases   |        | 10 samples x 60 cases |                             |
|---------------------|------------------------------------|-------------|--------|-----------------------|-----------------------------|
| Dependent           | Explanatory variables              | Coefficient | Sig.   | Average               | Number of times Significant |
| Initiator Strategy  | (Constant)                         | 59.381      | <0.001 | 65.202                | 10                          |
|                     | Initiator good soil                | -0.037      | <0.001 | -0.040                | 10                          |
|                     | Initiator culture                  | 0.024       | <0.001 | 0.027                 | 9                           |
|                     | Initiator percent desert           | -0.034      | <0.001 | -0.041                | 9                           |
|                     | La Nina 10 year events             | 0.183       | <0.001 | 0.222                 | 9                           |
|                     | Northern Hemisphere temperature    | -3.470      | <0.001 | -4.266                | 9                           |
|                     | Initiator wealth inequality        | -0.981      | 0.012  | -1.812                | 6                           |
|                     | Respondent military sophistication | -1.922      | 0.003  | -2.266                | 6                           |
|                     | Initiator morale                   | 0.011       | 0.034  | -0.883                | 2                           |
|                     | Initiator Religion                 | X           | X      | 0.013                 | 2                           |
|                     | Initiator Terrain(Bedouin)         | X           | X      | -0.032                | 2                           |
| Adjusted R squared  | 0.576                              |             | 0.576  |                       |                             |
| Respondent Strategy | (Constant)                         | 3.596       | <0.001 | 3.546                 | 10                          |
|                     | Initiator Strategy                 | 0.083       | 0.034  | 0.094                 | 8                           |
|                     | Initiator artillery                | -0.009      | 0.004  | -0.016                | 6                           |
|                     | Respondent friction                | -1.103      | 0.048  | -2.066                | 5                           |
|                     | Initiator army                     | 0.011       | 0.002  | 0.018                 | 4                           |
|                     | Respondent wealth inequality       | -0.528      | 0.039  | -0.968                | 3                           |
|                     | Adjusted R squared                 | 0.139       |        | 0.206                 |                             |
| Duration of GIPP    | (Constant)                         | 157.108     | <0.001 | 157.731               | 10                          |
|                     | Respondent state efficiency        | -0.882      | <0.001 | -0.927                | 9                           |
|                     | Initiator Strategy                 | -20.173     | <0.001 | -13.476               | 8                           |
|                     | Initiator artillery                | 1.118       | <0.001 | -2.388                | 7                           |
|                     | Respondent nomad ally              | 58.162      | 0.002  | 83.951                | 6                           |
|                     | ENSO 10 year variability           | 12.787      | 0.045  | 20.920                | 3                           |
|                     | Initiator wealth inequality        | X           | X      | 74.959                | 1                           |
|                     | Adjusted R squared                 | 0.385       |        | 0.411                 |                             |
| Outcome of GIPP     | (Constant)                         | 8.072       | <0.001 | 7.400                 | 10                          |
|                     | Initiator Strategy                 | -0.897      | <0.001 | -0.836                | 10                          |
|                     | Respondent Strategy                | -2.263      | <0.001 | -2.176                | 10                          |
|                     | Respondent wealth inequality       | -1.888      | <0.001 | -2.013                | 8                           |
|                     | Adjusted R squared                 | 0.743       |        | 0.728                 |                             |

**Table 13.8 Stability test: Comparison of variables selected by random sub-sample regression results with variables in full sample regression**

The pilot study, although smaller and more restricted in coverage than the thesis study, provides a further check on the stability of results<sup>3</sup> Table 13.9 compares results for Initiator Strategy and Respondent Strategy (based on 120 interactions and 13 variables) with the results for the original pilot study (based on 46 interactions and 6 variables. The pilot study interactions were carried into the thesis study). The table broadly aligns the significant variables for Initiator Strategy and Respondent Strategy in the current and pilot studies, placing together variables that are similar in import.

|                              | Initiator Strategy                 |   | Respondent Strategy          |                                 |
|------------------------------|------------------------------------|---|------------------------------|---------------------------------|
|                              | Current                            | Pilot                                       | Current                      | Pilot                           |
| <b>Cases</b>                 | 120                                | 46  | 120                          | 46                              |
| <b>% variance Explained</b>  | 57.6                               | 58  | 13.9                         | 17                              |
| <b>Explanatory variables</b> |                                    |   | Initiator Strategy           |                                 |
|                              | Initiator wealth inequality        |   | Respondent wealth inequality |                                 |
|                              | Initiator good soil                | Initiator Population                        |                              |                                 |
|                              | Initiator percent desert           |   |                              |                                 |
|                              | Initiator culture                  | Initiator religion                          |                              | Respondent Culture              |
|                              | La Nina 10 year events             | Short-term climate deterioration (volcanic) |                              | Initiator Climate deterioration |
|                              | Northern Hemisphere temperature    |   |                              |                                 |
|                              | Respondent military sophistication | Initiator army                              | Initiator army               |                                 |
|                              | Initiator morale                   |   | Initiator artillery          |                                 |
|                              |                                    |   | Respondent friction          |                                 |

**Table 13.9 Comparison of Current and Pilot studies**

This suggests that the level of variance explained is similar for both studies (58% for Initiator Strategy obtained in both studies and 14-17% for Respondent Strategy), and the explanatory variables for both studies seem to focus on culture, wealth, climate and military prowess, although

<sup>3</sup> Morris, Chris, (2016). *"Paradise or Booty": Choices of strategy and their outcome in Ancient and Medieval holy wars and nomad conflicts*. MA Society, Space and Culture, Queen's University of Belfast, Unpublished.

the precise variables identified are not identical.<sup>4</sup> It is worth noting that 42% and 86% of the variance in Initiator Strategy and Respondent Strategy respectively is not explained by the models. Other factors, not included in the provisional models, may provide an additional level of explanation, and random input into the decision-making underlying the chosen strategies may also be relevant, not least when divination was used in informing military ventures.<sup>5</sup>

### 13.3 BOOTSTRAP TESTING

A bootstrap analysis<sup>6</sup> using 20,000 iterations (sub-samples) was then conducted for each of the provisional models of the key variables (Initiator Strategy, Respondent Strategy, Interaction Duration and Overall Interaction Outcome). As noted at the end of Section 13.2, the intention is to expand the provisional models through inclusion of the study independent variables for nomadism and holy war at the final stage to test the possibility that these could replace or add meaningfully to the identified significant variables either wholly or in part. Accordingly, the study variables are included with the four provisional models. This part of the study was conducted using standard regression rather than stepwise, as required by the SPSS program.

The expanded provisional model for Initiator Strategy uses thirteen independent variables to explain the dependent variable. Table 13.10 shows that of these thirteen independent variables

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<sup>4</sup> The pilot study showed no evidence of Initiator Strategy depending on the characteristics of the Respondents, of which the Initiator may perhaps have had little accurate awareness (see footnote 33 in Murray, W. (2014a) 'Introduction', in Murray, W. and Sinnreich, R.H. (eds.) *Successful Strategies: Triumphant in War and Peace from Antiquity to the Present*. Cambridge: Cambridge University Press, pp. 1-16), even though in real life, "the enemy gets a vote" on events (quoted, p. 297, in Murray, W. (2014b) 'US naval strategy and Japan', in Murray, W. and Hart-Sinnreich, R. op. cit. pp. 280-313). Clausewitz notes that a general has full knowledge of his own circumstances but not of the enemy's circumstances, which may lead him to incorrect assessments of the relative situations of the two sides. Arguably, Clausewitz is being rather generous to generals' knowledge of their own circumstances. (Clausewitz, C. (1984), *On War*, Princeton: Princeton University Press, p.84.). Sun Tzu states that "So it is said that if you know others and know yourself, you will not be imperilled in a hundred battles; if you do not know others, but know yourself, you will win one and lose one; if you do not know yourself and do not know others, you will be imperilled in every single battle." Quoted in Mott, C. (2015) *The Formless Empire: a short history of Diplomacy and Warfare in Central Asia*. Yardley Pennsylvania: Westholme, p. 190. Vegetius advised knowing as much as possible about both armies at a battle (cited by Barker, P. (1975) *Ancient Wargaming*. Cambridge Patrick Stephens Ltd, p.92). Ignorance of their own troops and, even more so, of the enemy is recognised as likely to impact on the value of the general as an informant for chroniclers of the time (hence of modern scholars). See Courroux, P. (2020) 'What Types of Sources did Medieval Chroniclers Use to Narrate Battles (England and France, Twelfth to Fifteenth Century)?' *Journal of Medieval Military History*, XVIII, pp. 117-141. Ignorance of the enemy is apt to foster over-confidence in strategy, ignoring the dictum of the fifteenth century Holy Roman Emperor, Frederick III, who advised that one should never sell a bearskin before capturing the bear. See de Commynes, P. (1972) *Memoirs: the Reign of Louis XI 1461-83*. Translated by: Jones, M. Harmondsworth: Penguin Classics.

<sup>5</sup> The widespread practise of divination and oracle consultation introduces an effectively random element to decision making for those who use it (or if divination is to be regarded as not random, it is probably still not amenable to statistical analysis), while the limited availability of intelligence data is a constraint on most powers. See Finer for a qualitative exposition of these points, in the context of a Scythian incursion and more widely. Finer, S. (1999b) *The History of Government from the Earliest Times II: The Intermediate Ages*. Oxford: Oxford University Press, p.215, pp.223-224 and p.227.

<sup>6</sup> Bootstrap analysis consists of repeated regression analysis of subsamples derived by omitting one randomly selected case. This is done for a very large number of such subsamples, and the average of the results is then presented.

tested to explain Initiator Strategy, five fail to achieve significance though bootstrapping. These five are Initiator Morale, Initiator Terrain (Bedouin), Initiator Religion, Respondent Morale and Holy War. The other variables (Initiator Culture, Initiator good soil, La Niña 10 year event, Initiator desert, Respondent military sophistication, Northern Hemisphere temperature, Initiator wealth inequality and Nomadism) are all significant. This is in line with the stability test.

| Initiator Strategy                        | B      | Bootstrap |            |                 |                         |        |
|---|--------|-----------|------------|-----------------|-------------------------|--------|
|   |        | Bias      | Std. Error | Sig. (2-tailed) | 95% Confidence Interval |        |
|   |        |           |            |                 | Lower                   | Upper  |
| <b>(Constant)</b>                         | 52.419 | 0.398     | 14.973     | 0.001           | 23.783                  | 82.801 |
| <b>Initiator Culture</b>                  | 0.025  | 0.00001   | 0.005      | <0.001          | 0.017                   | 0.034  |
| <b>Initiator good soil</b>                | -0.034 | 0.000     | 0.008      | <0.001          | -0.049                  | -0.019 |
| <b>La Nina 10 year events</b>             | 0.170  | -0.001    | 0.044      | 0.001           | 0.083                   | 0.256  |
| <b>Initiator desert</b>                   | -0.031 | 0.000     | 0.009      | 0.001           | -0.049                  | -0.014 |
| <b>Respondent military sophistication</b> | -1.939 | -0.061    | 0.575      | 0.001           | -3.278                  | -0.986 |
| <b>Northern Hemisphere temperature</b>    | -2.961 | -0.022    | 0.972      | 0.004           | -4.935                  | -1.101 |
| <b>Initiator wealth inequality</b>        | -1.324 | 0.014     | 0.504      | 0.010           | -2.338                  | -0.342 |
| <b>Nomadism</b>                           | -0.478 | -0.004    | 0.213      | 0.025           | -0.904                  | -0.069 |
| <i>Initiator morale</i>                   | 0.011  | -0.00004  | 0.007      | 0.108           | -0.003                  | 0.025  |
| <i>Initiator Terrain (Bedouin)</i>        | -0.014 | 0.000     | 0.010      | 0.160           | -0.033                  | 0.006  |
| <i>Initiator Religion</i>                 | 0.004  | 0.000     | 0.005      | 0.463           | -0.007                  | 0.013  |
| <i>Respondent morale</i>                  | -0.005 | 0.000     | 0.010      | 0.466           | -0.027                  | 0.018  |
| <i>Holy War</i>                           | -0.219 | 0.010     | 0.390      | 0.576           | -0.950                  | 0.574  |

**Table 13.10 Bootstrap estimate of Initiator Strategy model coefficients**

Sample size: 20,000

Bias: measure of difference between bootstrap estimate and sample estimate



Table 13.11 shows that of the seven independent variables used to explain Respondent Strategy in the expanded provisional model, none achieve significance through bootstrapping. This is probably due to the low basic level of explanation provided, since some of the variables were often selected in the stability test.

| Respondent Strategy                 | B      | Bootstrap |            |                 |                         |        |
|-------------------------------------|--------|-----------|------------|-----------------|-------------------------|--------|
|                                     |        | Bias      | Std. Error | Sig. (2-tailed) | 95% Confidence Interval |        |
|                                     |        |           |            |                 | Lower                   | Upper  |
| (Constant)                          | 3.790  | -0.004    | 0.479      | <0.001          | 2.956                   | 4.842  |
| <i>Respondent wealth inequality</i> | -0.664 | 0.054     | 0.344      | 0.123           | -1.311                  | -0.018 |
| <i>Initiator army</i>               | 0.009  | -0.001    | 0.006      | 0.191           | -0.004                  | 0.019  |
| <i>Respondent friction</i>          | -1.054 | 0.130     | 0.733      | 0.206           | -2.429                  | 0.402  |
| <i>Initiator artillery</i>          | -0.010 | 0.001     | 0.007      | 0.257           | -0.022                  | 0.003  |
| <i>Nomadism</i>                     | -0.113 | 0.004     | 0.103      | 0.314           | -0.343                  | 0.050  |
| <i>Holy War</i>                     | -0.156 | 0.022     | 0.183      | 0.470           | -0.516                  | 0.172  |
| <i>Initiator Strategy</i>           | 0.089  | -0.027    | 0.106      | 0.500           | -0.120                  | 0.250  |

**Table 13.11 Bootstrap estimate of Respondent Strategy model coefficients**

Sample size: 20,000

Bias: measure of difference between bootstrap estimate and sample estimate

Table 13.12 shows that of the eight independent variables used to explain Interaction Duration in the expanded provisional model, only two variables, Respondent state efficiency and Respondent nomad ally, are significant by both stepwise regression and bootstrapping, which is in line with the stability test.

| Duration                           | B       | Bootstrap |            |                 |                         |         |
|------------------------------------|---------|-----------|------------|-----------------|-------------------------|---------|
|                                    |         | Bias      | Std. Error | Sig. (2-tailed) | 95% Confidence Interval |         |
|                                    |         |           |            |                 | Lower                   | Upper   |
| <b>(Constant)</b>                  | 145.106 | -8.254    | 44.163     | 0.008           | 48.026                  | 220.725 |
| <b>Respondent state efficiency</b> | -0.912  | 0.040     | 0.305      | 0.015           | -1.467                  | -0.281  |
| <b>Respondent nomad ally</b>       | 53.597  | 2.251     | 22.511     | 0.027           | 11.767                  | 100.244 |
| <b>ENSO 10 year</b>                | 13.892  | -0.839    | 6.840      | 0.062           | 0.139                   | 27.022  |
| <b>Initiator Strategy</b>          | -16.440 | 1.896     | 8.295      | 0.064           | -29.194                 | 2.931   |
| <b>Initiator artillery</b>         | 1.003   | -0.106    | 0.528      | 0.077           | -0.186                  | 1.890   |
| <b>Holy War</b>                    | -12.370 | -2.507    | 18.537     | 0.512           | -53.476                 | 19.325  |
| <b>Nomadism</b>                    | 6.645   | -1.084    | 13.933     | 0.636           | -21.701                 | 32.745  |
| <b>Initiator wealth inequality</b> | 17.683  | 0.509     | 40.312     | 0.675           | -64.563                 | 92.249  |

**Table 13.12 Bootstrap estimate of Interaction Duration model coefficients**

Sample size: 20,000

Bias: measure of difference between bootstrap estimate and sample estimate

Table 13.13 shows that only three of the five independent variables used to explain Overall Interaction Outcome achieve significance through bootstrapping, as suggested by the stability test. These are Initiator Strategy, Respondent Strategy and Respondent Wealth Inequality.

| Outcome                             | B       | Bootstrap |            |                 |                         |          |
|-------------------------------------|---------|-----------|------------|-----------------|-------------------------|----------|
|                                     |         | Bias      | Std. Error | Sig. (2-tailed) | 95% Confidence Interval |          |
|                                     |         |           |            |                 | Lower                   | Upper    |
| <b>(Constant)</b>                   | 8.11587 | 0.47853   | 1.30051    | <0.001          | 6.79982                 | 11.67932 |
| <b>Initiator Strategy</b>           | -0.904  | -0.022    | 0.105      | <0.001          | -1.136                  | -0.724   |
| <b>Respondent Strategy</b>          | -2.258  | -0.138    | 0.373      | <0.001          | -3.315                  | -1.894   |
| <b>Respondent wealth inequality</b> | -1.793  | 0.006     | 0.519      | 0.001           | -2.786                  | -0.740   |
| <b>Holy War</b>                     | 0.074   | 0.036     | 0.242      | 0.764           | -0.349                  | 0.601    |
| <b>Nomadism</b>                     | 0.064   | 0.000     | 0.251      | 0.804           | -0.423                  | 0.565    |

**Table 13.13 Bootstrap estimate of Overall Interaction Outcome model coefficients**

Sample size: 20,000

Bias: measure of difference between bootstrap estimate and sample estimate

### 13.4 FINAL MODELS

As noted in Section 13.2, the final stage of the analysis is to adjust the provisional models for Initiator Strategy, Respondent Strategy, Interaction Duration and Interaction Outcome, by including the study independent variables, nomadism and holy war. Table 13.14 presents the four final models, using the independent variables which have been identified by stepwise regression as statistically significant, but noting those variables which are not confirmed by bootstrapping.

|                                    | Initiator Strategy | Respondent Strategy | Duration       | Overall outcome |
|------------------------------------|--------------------|---------------------|----------------|-----------------|
| % Variance Explained               | 57.1               | 13.9                | 38.5           | 74.5            |
| Equation                           |                    |                     |                |                 |
| Constant                           | 52.370             | 3.596               | 157.108        | 8.072           |
| <i>Holy War</i>                    | <i>0.347</i>       | -                   | -              | -               |
| ENSO 10 year                       | -                  | -                   | <i>12.787</i>  | -               |
| La Niña 10 year events             | 0.164              | -                   | -              | -               |
| Northern Hemisphere temperature    | -2.998             | -                   | -              | -               |
| <i>Initiator army</i>              | -                  | <i>0.011</i>        | -              | -               |
| <i>Initiator artillery</i>         | -                  | <i>-0.009</i>       | <i>1.118</i>   | -               |
| Initiator culture                  | 0.021              | -                   | -              | -               |
| Initiator desert                   | -0.039             | -                   | -              | -               |
| Initiator good soil                | -0.038             | -                   | -              | -               |
| Initiator strategy                 | NA                 | <i>0.083</i>        | <i>-20.173</i> | <i>-0.897</i>   |
| Initiator wealth inequality        | -1.040             | -                   | -              | -               |
| <i>Respondent friction</i>         | -                  | <i>-1.103</i>       | -              | -               |
| Respondent military sophistication | -1.832             | -                   | -              | -               |
| Respondent nomad ally              | -                  | -                   | 58.162         | -               |
| Respondent strategy                | NA                 | NA                  | -              | -2.263          |
| Respondent state efficiency        | -                  | -                   | -0.882         | -               |
| Respondent wealth inequality       | -                  | <i>-0.528</i>       | -              | <i>-1.888</i>   |

**Table 13.14 Final model Coefficients** Note: Variables shown in italics are deemed statistically significant by sample stepwise regression, but not by bootstrapping. Their inclusion is thus perhaps less robustly supported.

NA signifies that the variable is not appropriate as an independent variable in this equation (e.g. Initiator Strategy cannot be used to explain Initiator Strategy; Respondent Strategy is often a reaction, dependent on Initiator Strategy)

Some 57% of the variance of Initiator Strategy can be explained by its final model. Initiator Strategy tends to be orientated towards more intense forms of warfare (higher scoring) in those interactions which occur in periods of lower temperature or numerous La Nina events, i.e., broadly, in deteriorating or more variable climates. Greater Respondent military sophistication is associated with less intense forms of warfare or even peace, whilst greater levels of Initiator culture are linked to more intense forms of warfare. For the Initiator, both greater levels of good

soil and greater levels of desert tend to be associated with less intense forms of war.<sup>7</sup> Nomadism *per se* adds nothing further to the explanation offered by the provisional model, according to the stepwise methodology, but the bootstrap methodology suggests that nomadism is in fact significantly associated with less intense forms of warfare (returning a coefficient of -0.478, Table 13.10). By contrast, holy wars are significantly associated with more intense warfare by the stepwise methodology, although bootstrapping does not confirm this. This suggests, given that nomadism and holy war overlap, that the two methods of analysis may assign priority in explaining the overlap group to different variables (nomadism by the bootstrapping methodology, holy war by the stepwise methodology).

None of the variables used to explain Respondent Strategy are confirmed by bootstrapping and so the final model must be viewed with some caution. Only about 14% of variance is explained by this final model. Higher quality Initiator army and more aggressive Initiator Strategy are associated with more aggressive Respondent strategies. Stronger Initiator artillery, greater Respondent friction and greater Respondent wealth inequality are associated with less aggressive Respondent Strategies.

About 39% of variance in Interaction Durations can be explained by the final model. Interactions tend to last for longer periods in times of high ENSO 10 year activity, if the Initiator is stronger in artillery,<sup>8</sup> or if the Respondent has a nomad ally (only the last is confirmed by bootstrapping). The interactions tend to last for a less long time if the Initiator Strategy is more aggressive or the Respondent has greater state efficiency (only the latter is confirmed by bootstrapping). In the final model, neither Nomadism *per se* nor Holy War adds anything further to the level of explanation offered by the provisional model.

Some 74% of variance in Interaction Outcome can be explained by the final model. An outcome of ongoing balanced warfare (where both parties continue to suffer the consequences of war. See Excursus E9) becomes more likely as Initiator and Respondent opt in their strategy for more intense forms of warfare. It is also more likely in interactions where Respondents have higher levels of wealth inequality, i.e., where the society is more wealthy and organised. All of these are confirmed by bootstrapping. The inclusion of Nomadism and Holy War in the final model contributes nothing further to the explanation offered by the provisional model.

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<sup>7</sup> Arguably, access to good soils within the same region offers local targets for raiding, so reducing the need to go further afield, while large tracts of desert within the region reduce the ability to wage war and launch an attack.

<sup>8</sup> Possibly the presence of Initiator artillery is associated with sieges, a slower form of warfare than raids and battles.

| Initiator Strategy<br>57.1%        |       | Respondent Strategy<br>13.9%        |      | Duration<br>38.5%           |       | Overall Outcome<br>74.5%     |       |
|------------------------------------|-------|-------------------------------------|------|-----------------------------|-------|------------------------------|-------|
| <i>Holy War</i>                    | 23.3% | <i>Initiator Strategy</i>           | 3.4% | <i>Initiator Strategy</i>   | 19.0% | Respondent Strategy          | 46.5% |
| Initiator good soil                | 7.9%  | <i>Initiator artillery</i>          | 2.4% | Respondent state efficiency | 7.7%  | Initiator Strategy           | 24.9% |
| Initiator desert                   | 10.7% | <i>Initiator army</i>               | 3.0% | <i>Initiator artillery</i>  | 5.5%  | Respondent wealth inequality | 3.1%  |
| Initiator culture                  | 5.1%  | <i>Respondent wealth extraction</i> | 2.9% | Respondent nomad ally       | 4.6%  |                              |       |
| La Niña 10 year events             | 3.2%  | <i>Respondent friction</i>          | 2.3% | <i>ENSO 10 year</i>         | 1.7%  |                              |       |
| Northern Hemisphere temperature    | 2.6%  |                                     |      |                             |       |                              |       |
| Respondent military sophistication | 1.8%  |                                     |      |                             |       |                              |       |
| Initiator wealth inequality        | 2.4%  |                                     |      |                             |       |                              |       |

**Table 13.15 Variance in final model explained by independent variables**

Note: Variables shown in italics are deemed statistically significant by stepwise regression, but not by bootstrapping. Their inclusion is thus less robustly supported.

Table 13.15 shows the relative explanatory power of the variables in the final models. Holy war accounts for 23% of variance for Initiator Strategy, with Initiator desert (11%) and good soil (8%) together accounting for almost as much. Five other independent variables, (broadly cultural, climatic, military and economic) account for 2-5% each. In the final model for Respondent Strategy, the five independent variables (military, strategic and economic) identified by the model each account for 2-3% of variance. Initiator Strategy (19%) and Respondent state efficiency (8%) account for the bulk of explanation for Interaction Duration variance in the final model, with three other variables (military, diplomatic and climatic) each explaining 2-6%. Respondent Strategy (47%) and Initiator Strategy (25%) account for the bulk of explanation in variance in the final model for Overall Interaction Outcome, with one other variable (economic) explaining 3%.

Thus in general, most of the individual variables taken alone only explain about 2-6% of variance in their various models and the only more important variables are Holy War, Initiator desert, Initiator good soil, Initiator Strategy, Respondent Strategy, and Respondent state efficiency (shaded in Table 13.15). Since Initiator Strategy and Respondent Strategy both figure in the first

instance as dependent variables, it is arguable that the most powerful drivers are Holy War, Initiator desert and good soil, and Respondent state efficiency, supported by a further three climatic, five military/diplomatic and three cultural/economic variables. Nomadism per se is not one of these supporting variables, according to stepwise regression, although it was identified by bootstrapping as significant.

The issue being highlighted by this outcome is that of the close association between nomadism and environmental variables such as soil quality and desert. Different statistical techniques give somewhat different results in this situation. The standard regression method used in bootstrapping takes each variable as given, without analysis of their interaction. Stepwise regression identifies the environmental variables as offering the better explanatory power, and hence highlights them as significant at the expense of nomadism. It is of course arguable that nomadic practices can impact on the proportions of good soil and desert in an area, an issue of some significance to agronomists, which can be explored in further research.

| Variable Group               | Initiator Strategy | Respondent Strategy | Duration of GIPP | Overall Outcome of GIPP | Weighted mean of relative level of explanation |
|------------------------------|--------------------|---------------------|------------------|-------------------------|--|
| Climate & Geography          | 24.4%              | 1.5%                | 9.8%             | 15.5%                   | 27.8%  |
| Culture, Economy & Diplomacy | 30.8%              | 4.7%                | 22.6%            | 32.3%                   | 49.1%  |
| (of which, Holy War alone)   | 23.3%              | 1.4%                | 7.8%             | 14.8%                   | 25.7%  |
| Military                     | 1.8%               | 7.8%                | 6.1%             | 26.7%                   | 23.1%  |

**Table 13.16 Variance in final models explained by groups of independent variables**

Table 13.16 shows that when grouped together, Military variables are least important for Initiator Strategy and most important for Overall Interaction Outcome (see Excursus E9 for details). Climate and physical geography primarily influence Initiator Strategy, while Culture, Economics and Holy War affect all dependent variables, Initiator Strategy most strongly. When the relative levels of explanation of the models<sup>9</sup> are converted to an average over all four variables<sup>10</sup>, it is clear that the culture, economy and diplomacy variables (which include Holy War) provide very nearly half of the explanatory power of the models, while climate and geography variables provide somewhat over a quarter and military variables contribute a little under a quarter. Holy War alone supplies a little over a quarter and the other cultural, economic and diplomacy variables a little under a quarter.

<sup>9</sup> i.e., the percentage of total explanation by the model, contributed by this group of variables.

<sup>10</sup> Weighted by the percentage level of total explanation achieved by the model.

This suggests that in aggregate, the climate and geography variables; Holy War; other culture, economic and diplomacy variables and military variables are all of fairly similar significance in explaining the characteristics of GIPPs, although this varies from model to model.

### EXCURSUS E13. ANALYSIS OF GIPP2 DATABASE

As noted in section 11.3, a GIPP2 database was assembled using variables that proved, after the analysis of chapter 12, to be statistically significant. This database includes equal numbers of cases in three categories: nomad and/or holy war interactions that were not used in the analysis; a random selection of those interactions that were used in the analysis; and a random selection of interactions that were neither nomadic nor holy wars. This last group (sedentary and secular) may or may not be well represented by the model derived from the analysis, since this model relates to interactions that are nomadic and/or holy war. The additional cases are included to provide a basis for an opinion on the point.

Table E13.1 shows that 40% of initiators are sedentary among the additional nomad and/or holy war cases compared with 15% in the GIPP1 subsample (by definition, 100% are sedentary in sedentary non-holy war cases). By contrast, the differential for sedentary respondents is much less (85% vs. 80%). The GIPP1 sample has more nomads (90% vs. 70%).

| Percentage of cases in group where | Initiator is Sedentary | Respondent is Sedentary | Nomad is involved | N  |
|------------------------------------|------------------------|-------------------------|-------------------|----|
| Additional Nomad and/or Holy War   | 40                     | 85                      | 70                | 20 |
| GIPP1 sample                       | 15                     | 80                      | 90                | 20 |
| Sedentary Non-Holy War             | 100                    | 100                     | 0                 | 20 |

**Table E13.1 Types of culture in GIPP2 database**

Table E13.2 shows the average values of independent variables included in the GIPP2 database, analysed by the three origins (additional nomad/holy war, random GIPP1, sedentary non-holy war) of the interactions. Of the twelve variables, six show statistically significant differences between the origin types. The additional nomad/holy war cases experience less ENSO activity and show lower respondent military sophistication, while the cases from GIPP1 have initiators with more desert and less good soil, with higher respondent state efficiency. The sedentary non-holy war cases have a higher initiator culture (sedentary cultures tend to have higher culture ratings, and by definition, all initiators in this group are sedentary). These results suggest that Initiators in GIPP1 cases are more desert orientated than either of the other groups.

| Group                              | Additional Nomad/Holy War | GIIP1 Sample | Sedentary non-holy war | Total | Significance |
|------------------------------------|---------------------------|--------------|------------------------|-------|--------------|
| ENSO 10 year                       | 0.53                      | 1.39         | 1.02                   | 0.98  | 0.023        |
| La Nina                            | 2.54                      | 3.01         | 1.55                   | 2.37  |              |
| Northern Hemisphere Temperature    | 15.64                     | 15.63        | 15.63                  | 15.64 |              |
| Initiator Artillery                | 0.86                      | 3.00         | 4.00                   | 2.62  |              |
| Initiator Culture                  | 80.77                     | 74.92        | 96.10                  | 83.93 | 0.035        |
| Initiator Desert                   | 8.26                      | 24.87        | 0.57                   | 11.23 | <0.001       |
| Initiator good soil                | 37.89                     | 18.75        | 38.72                  | 31.79 | 0.009        |
| Initiator Wealth extraction        | 0.38                      | 0.40         | 0.51                   | 0.43  |              |
| Respondent Military Sophistication | 0.66                      | 0.80         | 0.70                   | 0.72  | 0.040        |
| Respondent Nomad Ally              | 0.00                      | 0.05         | 0.00                   | 0.02  |              |
| Respondent State Efficiency        | 37.40                     | 60.00        | 45.40                  | 47.60 | 0.020        |
| Respondent Wealth extraction       | 0.44                      | 0.44         | 0.41                   | 0.43  |              |

**Table E13.2 Independent variables in GIIP2 database (average values)**

Table E13.3 shows that of the nine dependent variables (three observed and six calculated), five have statistically significant differences between the three origin groups. The additional nomad/holy war cases have a less aggressive Initiator Strategy, and sedentary cases have a very much longer Interaction Duration than the GIIP1 cases. The estimates, using the final model, for Interaction Duration for all groups are significantly different from each other, with both the additional nomad/holy war cases and the sedentary cases estimated as lasting considerably longer than the GIIP1 cases.

The final model over-estimates the aggressiveness of the Initiator Strategy for both the additional nomad/holy war cases and the sedentary cases. It over-estimates Interaction Duration for the additional nomad/holy war cases and significantly under-estimates Interaction Duration for the sedentary cases.

| Group              | Additional Nomad/Holy War | GIIP1 Sample | Sedentary non-holy war | All  | Significance |
|--------------------|---------------------------|--------------|------------------------|------|--------------|
| Initiator Strategy | 3.50                      | 4.55         | 4.25                   | 4.10 | 0.026        |



|   |        |       |         |        |        |
|---|--------|-------|---------|--------|--------|
| <b>Interaction Duration</b>                 | 51.25  | 29.50 | 224.90  | 101.88 | <0.001 |
| <b>Overall Interaction Outcome</b>          | -3.00  | -3.35 | -3.60   | -3.32  |        |
| <b>Initiator Strategy Estimate</b>          | 4.33   | 4.24  | 4.46    | 4.34   |        |
| <b>Interaction Duration Estimate</b>        | 61.31  | 36.38 | 48.88   | 48.86  | 0.044  |
| <b>Overall Interaction Outcome Estimate</b> | -2.79  | -3.52 | -4.55   | -3.62  |        |
| <b>Initiator Strategy Error</b>             | +0.83  | -0.31 | +0.21   | +0.24  | 0.030  |
| <b>Overall Interaction Duration Error</b>   | +10.06 | +6.88 | -176.02 | -53.03 | <0.001 |
| <b>Overall Outcome Error</b>                | +0.21  | -0.17 | -0.95   | -0.30  |        |

**Table E13.3 Dependent variables in GIPP2 databases (average values)**

These results suggest that when sedentary non-holy war societies act in the initiator role of an interaction, they tend to adopt less aggressive strategies, but do so over a longer period, than a model based on the analysis of behaviour in nomad and/or holy wars would suggest. It is perhaps hardly surprising that this is so. Sedentary societies deploy somewhat less effective armies than nomadic (rated as 22.3 as against 25.8) but are more stable as regards reign change (see chapter 8). A policy of “slow and sure” may seem more attractive, particularly if one is less ideologically motivated.

## CHAPTER 14 DISCUSSION & CONCLUSIONS

### 14.1 OBJECTIVES OF STUDY

The overarching objective of this study has been to identify the strategic aims and objectives initially adopted by nomads, holy warriors and their opponents in those interactions with a potential for conflict; to identify and assess the relevant importance of factors that appear likely to have influenced their choices and determined the duration, course and final outcomes of these interactions. Specifically, the study identified and expressed in numeric form on a database: strategic aims and objectives initially adopted by nomads and holy warriors in their interactions; a selection of the factors that appear likely to have influenced the choice of those strategic aims and objectives with quantification of the relative significance of these identified factors, jointly and severally, in this choice; and the final outcomes, again with quantification of the relative significance of identified factors, jointly and severally, in bringing about these outcomes.

A considerable number of factors are identified as likely to be relevant, as based upon extensive reviews (comprising both secondary and primary literature) presented in Chapters 3 to 9. Potentially relevant factors include not only nomadism and holy war, themselves the focus of the study, but also climate, agriculture, population and power, government, culture, religion, economics, warfare, and leadership. A summary of relevant historical events (of the kind from which the database of interactions was derived) placed these factors in context. The intent has been to accord no hegemony to the approaches and methods of any individual discipline in identifying potential factors and in generating results and conclusions. Statistics are thus applied in conjunction with qualitative analysis.

A basic unit of study, the Group Interaction with Polemogenic Potential (GIPP), is defined and placed in a spatial and temporal context that spans from West Africa to the Yellow Sea, from 1250 BCE to 1850 CE in Africa south of the Sahara, or 1520 CE elsewhere. This thesis has estimated that the number of GIPPs in this area and period was probably of the order of 11,400, from which 160 were included on databases for further analysis, of which 140 interactions were identified as involving nomads and/or holy warriors.<sup>1</sup>

### 14.2 NOMADISM AND HOLY WAR

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<sup>1</sup> i.e., 120 interactions involving nomadic and/or holy war groups included in initial analysis; 20 interactions, involving nomadic and/or holy war groups, included in verification; 20 interactions, involving neither nomadic nor holy war groups, included in verification.

The above approach to case selection was adopted since the basic intent of the thesis was to look at nomads and holy warriors. Accordingly, such interactions formed the starting point of the investigation (Chapter 3) in which key aspects of nomadism and holy war, including their definitions, are examined. The intent here is to provide a basic understanding of the phenomena.

A distinction must be drawn between pastoralism, which is a form of agriculture based on raising animals, and nomadism, which relates to the movement of a community that may practice arable farming or depend on hunter-gathering, rather than raising animals. Although many pastoralists are or have been nomads, many are not. Writers such as the medieval Arab historian Ibn-Khaldun characterise societies as *sedentary* or *desert*, but while sedentary societies are, by definition, not nomadic, desert societies can include both sedentary and nomadic groups.

The characteristics of a pastoral nomad society are largely governed by the animals that are kept and by the climate in which they are kept. Nomadism can support only a relatively small population on a given area of land, and this population has a need for arable products to supplement its own pastoral and other goods. Since such arable products are expensive in terms of the input energy required for production, it is attractive to seek to acquire them by some other means, such as trade, taxation, raids or paid service. Because nomadic communities tend to be less centralised than sedentary communities, it is difficult for the sedentary state to develop universal relationships with their nomadic neighbours. Individual groups may, of course, elect to be an exception to the prevailing relationship. In short, interactions where one party has a nomadic lifestyle tend to be highly asymmetrical in nature. The two parties conduct their affairs in different ways, and their response to environmental fluctuations is not the same.

Holy wars, like most wars, are rarely conducted for just one reason. Regardless of the reason for any war, its fighters need to eat, and the potential profits, political and economic, that may be obtained from such a war are usually included in its planning. However, cultural thinking about holy war varies, with distinctions between *jihad* and *crusade*. Jihad was integral to Islam from the very start,<sup>2</sup> whilst the concept of crusade developed in Christianity almost a thousand years after its beginning, in the context of an established hierarchy. In both religions, the language of those preaching holy war was fiercer in the context of those regarded as heretics rather than unbelievers. Those deemed to be wilfully rejecting the truth were taken to be worse than those

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<sup>2</sup> E.g., the comment of the seventh century caliph Umar bin al-Khattab that “if you become clustered on the land, you will leave the *jihad*”. See Katbi, G. (2010) *Islamic Land Tax – Al-Kharaj from the Islamic Conquests to the Abbasid Period*. Translated by: Ali, R. London: Centre for Arab Unity Studies & IB Tauris Publishers, pp.12-13.

merely ignorant of it. Conflicts where one party is pursuing something that they chose to regard as a holy war are thus highly likely to be asymmetrical in nature. One side has an additional motivation, whose structure and strength are variable. It is, of course, possible for both parties to consider themselves as waging a holy war, in which case the war is likely to be pursued with particular ferocity.

### 14.3 OTHER INFLUENTIAL FACTORS

The manifold interactions between climate and society have also been considered as a potentially important influence on any group's relationship with other groups. Matters as diverse as the human impact on climate, climatic change (Section 4.5), the El Niño phenomenon (Section 4.6) and the relation of civilisation's need for water to its development are relevant here. Studies have been carried out at the macro- and micro-levels, with sometimes controversial hypotheses such as a widespread climatically driven collapse in the eleventh century BCE eastern Mediterranean, and abundant work that examines the effect of the Little Ice Age on European and Asian societies (Section 4.8). The impact of climate change on the availability of cultivable land, and the impact of climatic deterioration on mobility are of particular concern and it has often been suggested, if not without controversy, that there is a link between climate and violent conflict,<sup>3</sup> or between climate and cultural history. The literature identifies links between El Niño and historical developments,<sup>4</sup> and between climate and the European monetary system.<sup>5</sup>

More broadly, the interaction of environment with economy and strategy was also deemed a critical area for exploration in this thesis. It is of course quite desirable not to start a war without the resources needed to prosecute it. A wide range of variables were thus considered for their potential relevance, including: the El Niño Southern Oscillation (ENSO), temperature, precipitation, potential evapo-transpiration, growing days, aridity, primary vegetation production, water availability, biocapacity, soil quality, desert, altitude, relief (e.g., ruggedness) and terrain. Information on long-term climatic fluctuations was also deemed necessary. As per the literature, the immediate impact of climatic variation can be taken as greater for arable farmers than

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<sup>3</sup> E.g., Tol, R.S.J. and Wagner, S. (2011) 'Climate Change and Violent Conflict in Europe over the Last Millennium', *Climatic Change*, 99(1-2), 65-79; Zhang, Z., Tian, H. and Cazelles, B. et al. (2010) 'Periodic Climate Cooling Enhanced Natural Disasters and Wars in China during AD 10-1900', *Proceedings of the Royal Society*, 277B(1701), 3745-3753.

<sup>4</sup> Caviedes, C. N. (2001) *El Niño in History: Storming Through the Ages*. Gainesville: University Press of Florida.

<sup>5</sup> Loveluck, C. P., McCormick, M., Spaulding, N. E., Clifford, H., Handley, M. J., Hartman, L., Hoffmann, H., Korotkikh, E. V., Kurbatov, A. V., More, A. F., Sneed, S. B. and Mayewski, P. A. (2018) 'Alpine ice-core evidence for the transformation of the European monetary system, AD 640–670', *Antiquity*, 92(366), pp. 1571–1585.

pastoralists, since the crop yield is directly sensitive to the limiting effects of water, light and warmth (Section 4.9). By contrast, a pastoralist's herds provide some immediate buffer against the harmful effects of bad weather, but these herds can still be severely affected by drought, blizzard and frost, which can impact on short term availability of food and water for the animals. Long term availability of fodder sets a ceiling on the number of animals that can be supported in an area, and this ceiling varies with the climate and the fodder requirements of the livestock in question (Sections 4.10-4.11). Any army making much use of animals is limited by the quality of the pasture, unless it is able to substitute grain produced by arable farmers.

The population and power, government, culture and religion of a group (Chapter 5) also all impact on its ability to undertake and sustain particular activities and policies, and (importantly) the way it is likely to undertake or enact those. There are a number of modern quantitative measures of culture and work by Ellsworth Huntington over a century ago (see Appendix 7) appears to have generated a measure of civilisation that correlates well with other, more recent, approaches to the measurement of culture,<sup>6</sup> notwithstanding other controversial aspects of his work. Intra-cultural conflicts may result in warfare, but this is likely to be more regulated by the participants than inter-cultural conflicts. Potentially least regulated are sub-cultural conflicts, in which sub-groups within a (nominally) single culture find themselves opposed by their perceived perversity as "heretics" and "traitors".

The wealth or poverty of the parties to an interaction additionally colours their responses. As noted above, where nomads are less wealthy than their neighbours, this provides them with an incentive to secure some of their neighbours' wealth by one means or another, from paid service and trade through extorting tribute and conducting raids through to outright conquest. On the other hand, these neighbours can divert some of their more abundant resources to secure the rest of their wealth through a range of policies. When the interaction of choices results in war, the damage to economies can (as many historical cases attest) be severe. Data gathered and presented in this thesis (see Chapter 6) quantify the production levels of various economies; price variations (Appendix 1); the damage done by the Mongol invasions of the Middle East; and the level of inequality in the societies under consideration. Inequality is likely to impact on the ability of a society to cope with problems, in more than one way. Those who produce, but are unable to

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<sup>6</sup> As noted in Appendix 7, references to culture are "not an estimate of the degree of adaption of the cultures in such areas to surviving in their environment, but rather an attempt to assess the cultures in terms of complexity and development, which some have sought to express terms of 'highest elements of civilisation'. Whether or not such 'highest elements' can serve as a legitimate measure of the *worth* of other cultures, it is reasonable to conclude the assessment does serve as a measure of the level of *differences* between cultures."

consume much beyond bare subsistence, may form a group that is unwilling to make further sacrifices to secure the wellbeing of their society. On the other hand, to secure wealth extraction which usually generates inequality, but allows the targeted use of the society's power, both a relatively high level of wealth and an organised society are required, both of which are an aid to securing the wellbeing of a society.

Warfare is an important means for the conduct of group interactions, and factors of relevance are strategy, troop effectiveness, friction and numbers; the relationship of warfare to society; indirect and direct violence and nomad warfare, cavalry and mobility (see Chapter 7). All of these topics are addressed by scholars, and numerical representation of such aspects of societies and their capabilities in conducting warfare is possible, allowing assessment of the impact of their military strength on their interactions with other societies. Excursus E7 and various appendices provide further details on specific measures. The advantage accruing to smaller groups due to Clausewitzian friction is addressed in Appendix 2, while issues relating to the estimate of army numbers are dealt with in Appendix 3. The morale of forces can be considered in both strategic and tactical terms and can be crucial in determining the outcome of a conflict (Appendix 4).

Because the leadership of a community has an effect on its policies and their outcomes, quantification of leader competence is desirable to facilitate further analysis (Chapter 8). This, however, is difficult to undertake without arguing in circles. Competence of leaders is, for example, attributed on the basis of their recorded success (rather than any direct assessment), and yet that success is itself deemed to be due to the competence of those leaders (rather than the many other possible causes including "pure blind luck"). This thesis thus explores (in Excursus E8) an alternate approach using the frequency of reign change,<sup>7</sup> which can cause stress to a society (not only when the identity of the new leader is contested through violence) and limits the time spans available to leaders in which to exercise their skills. Nomad societies were, on the basis of this analysis, subject to more frequent reign change than Chinese dynasties, and some religious groups were associated with less change than others (e.g., Shia compared with Sunni). The gender of the leader might also prove relevant to the experience of the groups, with a group led by a woman potentially appearing more vulnerable to outsiders. Excursus E8 also examines this aspect of leadership. Excursus E10 suggests a more general measure of "realm stress", based on civil conflict, external war, famine and pestilence which may also be relevant.

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<sup>7</sup> Initial results exploring such an interpretation of the reign change data are presented in C Morris, C. (2018) 'May the King Live For Ever: A Statistical Analysis of Stress from Reign Change in Imperial and Non-Imperial Polities', *Ex Historia*, 10, pp. 1-19.

In Chapter 9, the thesis undertakes a broad qualitative examination of a series of interactions, over a wide range of environments and a long time period, which confirms the general pattern already well recognised by scholars in more locally targeted work. In this, relatively primitive but militarily effective nomadic peoples in relatively deprived areas encounter richer sedentary peoples in relatively advantaged areas, often resulting in conflict. Other factors, appearing in previous chapters, are also confirmed as relevant. Excursus E9 summarises the options and outcomes for those involved.

Important considerations in conducting the analyses presented in this thesis and interpreting results include the existence of Contingent Events (unassessed systematic variables, regionally significant variables and random events) are noted in Chapter 10. The possibility of biases in model emphasis is also noted. Appendix 5 suggests that given the three key factors in determining the outcome of battle (Morale, Manoeuvre and Material), the measures gathered in this study give greater emphasis to Material factors, to an extent that falls between modern German and US army practice. Further consideration of this bias suggests that it is unlikely to invalidate the results of the thesis, but indicates where further improvement of the modelling might be obtained in future work.

#### **14.4 GROUPING OF INFLUENTIAL FACTORS**

In Chapter 11, the thesis summarises the variables held on the database. It also groups these variables using Principal Components Analysis to generate thirteen composite variables.<sup>8</sup> The thirteen composite variables can be further grouped into five statistically significant associations. These are: Culture & Land; Troop Quality & Bio-Productivity; a more general dimension;<sup>9</sup> Jihad & Cohesion; and Temperature & Drought. A possible explanation for the grouping of Troop Quality with Bio-Productivity (Soil Quality is also included in the grouping) is that the proportion of cavalry in the armies of the parties, particularly the Initiators, has statistically significant correlations with the variables of Troop Quality, Pasture and Soil Quality. Given that the proportion of cavalry in an army is dependent on the availability and cost of horses, it is likely that a party based in an area

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<sup>8</sup> These being: Relief, Terrain, Temperature, Precipitation, Climate Variation, Biocapacity, Bio-Productivity, Soil Quality, Culture, Jihad & Cohesion, Economic Production, Troop Quality, Military Sophistication.

<sup>9</sup> None of the variables align strongly to this general dimension, and the dimension itself has no clearcut alignment to any of the variables.

with much pasture and good soil, factors which are conducive to horse rearing, will have more cavalry. This improves overall Troop Quality, since cavalry tend to be more highly rated as troops.

#### **14.5 ANALYSES OF DATABASE**

The analysis looks initially at the average circumstances of the GIPPs of the database, and then applies more sophisticated statistical techniques. These techniques are intended to explore the inter-relations of the variables held.

Climatic influences are, in general, likely to affect human activities, and the El Niño Southern Ocean (ENSO) anomaly, with its global climatic influence, is particularly likely to have an effect. The frequency of extreme states (ENSO events) falling on either side of the ENSO hydroclimatic “see-saw” is very variable through time. The annual probability of El Niño events (representing one side of the see-saw) was seen to have doubled in five particular centuries (i.e., 8<sup>th</sup> BCE, 7<sup>th</sup> CE, 11<sup>th</sup>, 12<sup>th</sup> and 14<sup>th</sup>), with an important initial observation being the correspondence of these centuries (see Chapter 13) to periods of notable nomad and holy war activity (Cimmerians/Skythians; Arab Conquest; Turks/Berbers; Berbers and Mongols/Turks). In fact, over the entire study period of more than three thousand years, the likelihood of having experienced the effects of an El Niño or La Niña event in the previous decade was markedly greater for those years in which GIPP database interactions began than for the generality of years.

The alignment of ENSO event peaks (whether El Niño or La Niña events) of climatic variability with periods of nomad and holy war activity suggests a human-environmental linkage with marked impacts on human society. This is enacted, at least in part, through ENSO-driven extremes of drought or flooding (ENSO can impact in other ways as well). The type and severity of these impacts vary with location and the analyses undertaken in this thesis indicate that GIPPs are associated, in broad terms, with a climatic configuration wherein the polities concerned, particularly Respondents, experience cold and dry conditions. The role of climate in human conflict, with studies often focused on the modern era, which is both short and atypical (see Chapters 2 and 4), still remains highly contested. The modern era is (thus far) quite limited in terms of the scale and severity of the climatic changes experienced, and so there is good reason to look at the longer-term history. This result alone provides support for those arguing that there is a linkage, and that climate is relevant.



The range of variables, seventy-four in total, captured in the database on 120 GIPPs (describing 240 parties, but fewer cultures than that, since some are represented more than once) shows that Initiator polities were mostly larger in area than Respondent polities, but with lower densities of population, so that their population was on average less than a fifth of the Respondents. In general, the GDP per capita of Initiator polities is estimated as 8% less than Respondent polities (\$GK 450t compared with \$GK 483). Initiators were thus generally weaker in material terms, being both smaller and poorer than Respondents (having about one sixth of their wealth on average).

Initiators, nonetheless, tend to exhibit more effective armies with more cavalry than Respondents, though their artillery is usually weaker. This pattern was observed as being most marked in zones that included steppes (e.g., Mongolia, Pontic and Turkestan) where horses are easily raised in large numbers at little cost. Given the general military value of the horse in movement and battle, this changes the relationship between military power and material wealth, allowing more military power to be secured by poorer groups. Steppe Initiators could afford to equip their entire adult male population as light cavalry and often did so, although evidence suggests that nobles might opt for heavier equipment and mounts. Scholars have long been aware of this, but the thesis database now captures this dynamic in numerical form, also making the data available for further analysis.

The large number of relevant variables available raises challenges for statistical analysis. Composite variables, computed from a range of these variables (see Chapter 11), linked to geomorphology, climate, biogeography, social, economic and military factors, suggest that Initiators mostly experienced more unfavourable or less developed circumstances. Thus, the thesis found that there was generally an asymmetric situation wherein the Respondents were in more favourable or more developed circumstances, but Initiators had better quality troops and higher cohesion. This conforms to the pattern of disadvantaged Initiator against advantaged Respondent, as noted earlier. China and Europe/Balkans experienced the most favourable circumstances throughout the study period, while the desert areas of Africa and Asia experienced the least favourable. Broadly speaking, this was true for both cultural and physical measures. There was, moreover, a clear statistical correlation between cultural and physical measures, with cultural advantage generally associated with physical advantage. The qualitative distinction proposed in the existing literature of disadvantaged areas with greater military strength in conflict contrasting with more advantaged areas with lesser military strength was observed in quantitative form.

When analysed by broad GIPP Group, i.e., bringing together GIPPs involving similar environs or origins such as Sub-Saharan Africa, Turks, Chingisid Mongols or the Arab Conquests, all Groups save the European (effectively the Crusades) showed that the Initiator tended to have a low composite score, indicative of worse, less developed conditions, while the Respondent had a higher score. Crusades (originating in Europe) were associated with high average composite scores while, by contrast, other Holy Wars (originating in a wide range of regions) had lower than average scores. General conflicts, including purely nomad-sedentary interactions, tended to lie between Holy Wars and Crusades. Holy wars were linked with the disadvantaged, crusades with the more advantaged (Europe). The lowest scores, which are linked to harsher climate and more difficult terrain, were recorded for conflicts involving Islamic Sunni Sectaries and Pagan Shamanism.

Where the Respondent power had a nomad ally, on average, it was found that the Respondent tended to have a higher average composite score, implying that the Respondent was advantaged. It is not perhaps surprising that more advantaged powers found it easier to secure for themselves the additional boon of a nomad ally, but conversely, having a nomad ally may have assisted the Respondent to secure its advantages. Furthermore, the need to secure such an ally was also greater when the Initiator was stronger. Good physical conditions and more effective armies were positively correlated with measures designed to measure propensity for ethnic formation.<sup>10</sup>

Across the study period, for both the Initiators and Responders examined, higher populations were also seen to be significantly correlated with lower scores for terrain, temperature and precipitation. Given the meaning of lower scores for these variables, this suggests that the most numerically strong Initiators were found in cooler and drier environments, with cultivated and meadow land rather than forest and mountain. Those Initiators located in warmer or wetter environments, in forest or mountains, tended to be less populous.

Inner Asia and Arabia were observed to be the lowest scoring areas for Culture & Land whilst India, Egypt and China have the highest scores. For all Groups of interactions save the European (i.e., the crusades), the Initiator was observed to have a low Culture & Land score, while the Respondent had a higher score. From these results, it again seems that Initiators tended to be

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<sup>10</sup> Possibly, a certain level of wealth and military capability are required before ethnicity becomes a matter of deep concern to a community e.g. Slavic villages were perhaps too poor and militarily weak to risk offering explicit resistance to the Bulgar (or Avar) nomads who incorporated them into their own realms, but in the longer run, the polity became predominantly Slavic in language.

polities that experienced disadvantages in culture and land. In all six geographical zones examined, the Respondent polity scored more highly on Climate & Land, and the Initiator (with the exception of Maghreb and Iberia) scored more highly on Troop Quality & Bio-productivity.

Measures of Material, Manoeuvre, and Morale were computed for each of the parties in all interactions, combined and then analysed using regression to determine their relative contribution to the overall advantage of the Initiator. The Initiator source measures were more important than the Respondent source measures in terms of contribution to the intermediate measures for both Manoeuvre and Morale, but they were less important as regards the measure for Material. The Respondent contributions were much more evenly balanced between Manoeuvre, Morale and Material. Again, this is consistent with the traditional view, from Edward Gibbon onwards, of a nomad attacker, strong on manoeuvre and morale, facing a sedentary power with a greater dependence on material resources for advantage.

A range of strategies were available to both Initiators and Respondents.<sup>11</sup> Those Initiators that adopted strategies of Raid or Total Attack were observed to enjoy the largest average Initiator advantage, while the least advantage was enjoyed by those seeking alliance. Limited Attack and Extort are also associated with lesser advantage. This is consistent with the weak seeking alliance, the strong unleashing full war or raids, and those of intermediate strength applying intermediate approaches. For the Respondent, the policy of paying tribute tended to be adopted when the Initiator had a relatively low advantage while the strategies Defend, Counterattack and Attack were associated with ever greater levels of Initiator advantage. This is consistent with a situation where weak neighbours were bought off with subsidies and alliances, while stronger threats required an escalating response. These general findings are very much in line with the generality of observations made by historians on particular historical cases, as reviewed in Chapter 9.

Thus, a number of preliminary conclusions could be drawn, even in advance of more detailed statistical modelling undertaken in the thesis. Firstly, the interactions held on the GIPP database proved to be significantly biased towards years of ENSO activity (El Niño or La Niña). Given that the interactions were selected independently of any such foreknowledge, this supports the (still-debated) contention that climatic variability had a meaningful effect on historical conflicts. Secondly, GIPP interactions were generally initiated by polities that were poorer and less populous

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<sup>11</sup> In full, the options (see Excursus E9 for full details) are:  
Initiator: Ally, Peace, Endure, Raid, Extort, Limited Attack, Total Attack  
Respondent: Ally, Peace, Endure, Pay Tribute, Defend, Counter-attack, Attack

than the respondents that they confronted. The availability of numerous cheap horses in the steppes (at about one hundredth of the cost of horses in the sedentary lands) did, however, alter the balance of military strength to wealth in the steppes, allowing many more to be equipped for war as cavalry. Islamic sectary groups and pagan shamanism were associated with (i.e., tended to be present in regions with) harsher climate and poorer conditions. Wealthier respondents found it easier to secure nomad allies. Interactions occurring in social and cultural environs deemed conducive to ethnic formation<sup>12</sup> were linked to better physical conditions and more effective armies. Larger populations were associated with greater levels of cultural development, as scored using the system described in Chapter 5. Nomad attackers, strong on manoeuvre and morale, usually, over a wide range of times and places, faced sedentary powers with a greater dependence on material resources. As regards strategies, weaker Initiators (measured by Initiator advantage) tended to seek alliance and strong Initiators often tended to unleash full war or raids. Respondents sought to buy off weak neighbours with subsidies and alliances, while stronger threats were met with a range of escalating responses.

With the clearest exception being the apparent association between El Niño and la Niña frequency and the date of GIPP interactions, many of the above observations are of course already recognised or at least hypothesized in qualitative historical studies. Even so, it is useful to have a quantitative corroboration of these observations, as well as comparative quantitative estimates that, for example, the assessed level of social coherence for Shia Islam is not just greater than that of Sunni Islam, but perhaps more than three times greater, whilst Sunni Islam sectaries have social coherence double that of Shia Islam. Even beyond this study, such conclusions may have relevance to historiographical debates such as the continued survival of Safavid Iran in the face of Ottoman attacks, a little after the period of the thesis, or the ability of the Kharajites, a fairly small Sunni group, to exercise considerable power in the tenth century throughout Middle East and North Africa.

## **14.6 MODELLING**

On the basis of the extensive literature reviews of influential factors and the subsequent analysis of the thesis database, an initial model is proposed in Chapter 13 to test the relationship between the independent variables (Military, Population, Land, Culture and Religion, State and Climate) for

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<sup>12</sup> i.e., a high score on Turchin's MetaEthnic Index. This is likely to be driven by the presence of religious or linguistic difference, warfare, unfair trade, and the interaction of nomads with sedentary agriculturalists. The last of these factors is associated with more effective armies (nomads) and better physical conditions (sedentary agriculturalists).

both parties (i.e., Initiators and Respondents), the intermediate variables of the parties' strategy choice, and the final dependent variable of Duration and Outcome for the interaction. This draws together nomadism, holy war, climatology, biogeography and geomorphology with agriculture, population, government, culture, religion, economics, warfare and leadership in order to represent the frequently recurring asymmetric pattern of relatively primitive but militarily effective nomadic peoples in relatively deprived areas, and on the other side, richer sedentary peoples in relatively advantaged areas.

Because the explanatory variables are by no means independent of one another, stepwise regression was used to separate their effects. A succession of such regressions suggests first that culture, climate, troop quality and bio-productivity, jihad and cohesion explained nearly half of the variance in Initiator Strategy, and next that this may be refined to more specific variables of culture, production, terrain, soil, biocapacity, and military sophistication. When Initiator religion, good soil, culture, percentage of desert and desert terrain and Respondent military sophistication were used as explanatory variables, they continued to explain almost half of the variance. The final version of the model, with some additional variables, after testing for stability and bootstrapping,<sup>13</sup> suggested that 58% of the variance of Initiator Strategy could be explained by the available (quantified) variables. Holy war, higher Initiator culture rating and more frequent occurrence of La Niña events,<sup>14</sup> were associated with more intense attacks. On the other hand, warmer Northern hemisphere temperatures, higher respondent military sophistication, and a higher proportion of good soil or a higher proportion of desert in the Initiator's region all increased the likelihood of raiding and/or extortion. Nomadism *per se* had no significant effect.

On first examination, Respondent Strategy appears to have been driven by just five of the available quantified variables (which proved statistically significant), but in total, only 14% of variance was explained. More aggressive Initiator Strategy (on the spectrum from "Raid" to "Total War") and more skilled Initiator armies,<sup>15</sup> together with larger Respondent units (i.e., more Respondent friction in the operation of their forces) were linked with more assertive defensive policies. Higher levels of Respondent economic extraction and higher levels of Initiator artillery were linked with less assertive defensive policies. These are scarcely implausible conclusions, but stability testing

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<sup>13</sup> As explained in Section 13.2, these techniques explore the likely impact of sampling on the results.

<sup>14</sup> The converse of El Niño in the Southern Ocean oscillation – i.e., warm and wet in monsoon areas and cool and dry in western Europe.

<sup>15</sup> i.e., more cavalry, more artillery, greater sophistication, assessed higher quality, assessed greater aggression.

raised questions about the robustness of two of the variables,<sup>16</sup> and bootstrapping suggested that none of the variables should be considered robust results. It may be reasonably assumed, given the low level of variance explained, that other variables, as yet unidentified, are more important in determining Respondent Strategy. This raises questions addressed below.

The duration of an interaction is of great interest, in defining events. Some events were short, others quite long. Duration of the GIPP was linked to five variables,<sup>17</sup> and the percentage of variance explained is 39%, nearly half of it derived from the Initiator Strategy. GIPPs tended to last longer when associated with less aggressive Initiator Strategy, and lower state efficiency of the Respondent. Respondents with nomad allies or Initiators with stronger artillery were also related to longer conflict durations. Holy wars tended to be shorter, while Nomadism had no significant effect on duration. Stability testing and bootstrapping did not eliminate any of these variables, the explanatory validity of which must thus be regarded as relatively robust.

The net Outcome of the interaction for the two participating parties, considered together, can vary from beneficial (highest positive results) where they enter an alliance to their mutual advantage, to harmful (lowest negative results) where they engage in ongoing balanced warfare, probably destructive, or one party is ultimately destroyed. The Outcome was found to be strongly associated with three variables,<sup>18</sup> and these account for 75% of variance in the observed outcomes. When the strategies of both parties were more aggressive, the Outcome was less benign, with the Initiator Strategy being the more critical factor of the two strategies. The greater the level of Respondent wealth extraction and inequality, the more benign were the overall Outcomes observed, suggesting that greater economic inequality within these societies had a positive result through providing them with greater ability to secure alliances, pay tribute or to fight on. Again, stability testing and bootstrapping eliminated none of these variables. Nomadism and Holy War had no observably significant effect on the actual outcomes.

#### **14.7 METHODOLOGICAL DEVELOPMENTS**

The study required a number of adaptations to existing methodologies. Sometimes this was no more than applying standard techniques of analysis to areas where they had not previously been applied, e.g. the use of regression in estimation of Clausewitzian friction from data presented by Dupuy (Appendix 2). Some needed the extension of an existing measure, e.g. the Otterbein Index

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<sup>16</sup> The two variables are Initiator army value and Respondent extraction level.

<sup>17</sup> Initiator Strategy, and artillery, Respondent state efficiency and nomad allies, and the level of ENSO variability.

<sup>18</sup> Initiator Strategy, Respondent Strategy and Respondent Wealth Inequality.

of Military Sophistication to take more account of engines of war, thereby reducing clustering of cases at the upper end of the index range (Excursus E7.2), or adding famine and pestilence to the Monson Index of Instability, thereby including a wider range of realm destabilisers (Excursus E10.) Conversely, some indices needed reduction e.g. the exclusion from consideration of steam engines and internal combustion in the Murdock and Provost Index of Cultural Complexity (Excursus E5.4). Novel coding frames were devised for Polity Power (Excursus E5.2), Social Cohesion and Social Effectiveness (Excursus E5.3), Religion Rating (Excursus E5.7), terrain (Excursus E7.3), strategic options and outcome (Excursus E9). The robustness of results was assessed using an extension of bootstrapping methodology to work round the constraints of the analytical computer program in order to provide a view on stepwise regression, through comparison of output from random sub-samples (Section 13.2).

Other issues required more work e.g. the development and application of a Reign Change Index (Excursus E8), or the use of the Geary-Khamis Dollar to introduce a measure of commonality to the pricing of a great range of commodities more usually expressed in terms of the currency of the time and place (Appendix 1). A provincial estimation of the loss of tax revenue in Iran gave a basis for assessing the economic impact of the Mongol invasion of that region (Excursus E6). A military ratio was devised to compare the integrated impact of manpower, friction, mobility, territory and combat effectiveness for both parties in an interaction (Excursus E11). The most important methodological development was the simultaneous inclusion of explanatory variables drawn from several fields (e.g. climate, agriculture, geography, population, social issues, economics, warfare and leadership) including some data collected in 1913 (Appendix 7), allowing their relative importance to be assessed (Chapters 11 to 13). A method was devised to assess the level of the bias in the mix of variable types selected, comparing this with the bias in two comparator sources from the mid-twentieth century (Appendix 5).

#### **14.8 FINDINGS AND CONCLUSIONS**

Over a period of more than three thousand years, the likelihood of having experienced the effects of an El Niño or La Niña event in the previous decade was markedly greater for those years in which the GIPP database interactions began than for the generality of years. This alignment of ENSO event peaks (whether El Niño or La Niña events) of climatic variability with periods of nomad and holy war activity suggests a human-environmental linkage with marked impacts on human society.

Of the wide range of variables examined, the only variable that proved relevant to more than one of the four dependent variables (these four being Initiator Strategy, Respondent Strategy, Duration and Outcome) was Holy War, which tended to give rise to more aggressive Initiator strategies and shorter wars. Initiators with higher culture rating or that had experienced more frequent La Niña events in the previous ten years were likely to launch more intense attacks. On the other hand, a higher proportion of good soil and a higher proportion of desert in the Initiator's region were both factors associated with a greater tendency to choose raiding and extortion as policies, as were a more militarily sophisticated Respondent and times with warmer Northern Hemisphere temperatures. As noted previously, Respondent Strategy could not be robustly explained by the current range of quantified variables, although the analysis did provide some indications of what may be relevant e.g. Initiator Strategy, strength of the Initiator army value, Respondent wealth extraction and Respondent army size). The Duration of an interaction was usually reduced by more aggressive war and a more administratively efficient Respondent.<sup>19</sup> The presence of stronger auxiliaries, such as Initiator artillery or Respondent nomad ally, which can remedy traditional weaknesses, were seen to prolong the interaction.

Given that the Outcome of an interaction is mostly dependent on the strategies of the two parties, particularly that of the Initiator, with more aggressive strategies, whether Initiator or Respondent, resulting in less beneficial outcomes, it is worth considering the Outcome in terms of the factors influencing Initiator and Respondent Strategy, which are themselves both dependent variables. In relation to Initiator Strategy, it is thus arguable that the Outcome of an interaction was also being partially driven by factors such as Holy War, higher levels of La Nina events in the previous ten years, and higher levels of Initiator culture which were likely to produce less beneficial Outcomes. More beneficial Outcomes are likely to be produced by factors such as higher levels of Initiator good soil, more Initiator desert, warmer Northern Hemisphere temperature, greater Respondent military sophistication, and greater Initiator wealth inequality. This is reinforced by the further direct impact of Initiator Strategy on Respondent Strategy (the more aggressive the Initiator, the more likely that the Respondent will make a more aggressive response, again resulting in a less beneficial Outcome). Respondent Strategy is also driven by factors such as greater Initiator army strength, which tends to produce a less beneficial Outcome, and by greater Initiator artillery strength (an alternative measure of military sophistication), greater Respondent (Clausewitzian) friction from large armies and higher Respondent wealth inequality, which are likely to result in more beneficial outcomes.

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<sup>19</sup> This is based on an assessment of decision making and implementation of the civil government and army.



Since a high level of wealth extraction and inequality was indicative of a society both wealthy and organised, it may be concluded that GIPPs involving wealthy organised parties, both Initiators and Respondent, tended to result in more beneficial aggregate outcomes. This may be plausibly interpreted as a situation in which a wealthy organised Respondent was better able to defend itself, and a wealthy organised Initiator had both less to gain from an attack and more to lose from it.

Holy war, unstable climate, army strength and sophistication, wealth and social organisation were thus key factors in how Group Interactions with Polemogenic Potential were conducted across the long period under consideration, and their outcome. The measure employed in this thesis to assess state efficiency rates bureaucracy more highly than dependence on community action; mercenary and professional armies more highly than militia and conscripts, and centralised decision-making more highly than forum debate. In effect, it defines a centralised and professionalised state. To run such a state required an economy with considerable wealth and the ability/willingness to extract that wealth for use by the authorities, i.e., high wealth extraction. The higher the Respondent was rated on these measures, the more benign the observed outcome and the shorter the duration of the interaction.

Initiators with a more highly rated culture were more likely to engage in formal warfare than to undertake raiding and extortion, while the military sophistication of the Respondent (as measured through the use of shock weapons, fortifications and cavalry) discouraged the pursuit of wars rather than raiding. The presence of an auxiliary (either a nomad ally for a Respondent or Initiator artillery) was apt to reduce the asymmetry of the interaction, and tended to prolong it. A region with good soil offered local targets for raiding by a smaller group, thereby reducing the need to venture further afield, which required more strength. On the other hand, large tracts of desert within the region reduced the ability of a group to wage war and launch an attack. Both situations tended to reduce wars and increase raids. Warmer weather encouraged raiding. Unstable weather conditions encouraged war. Holy War gave rise to more wars, but shorter.

In general, most of the independent variables only individually explained about 2-6% of variance in those of the four dependent variables where their explanatory power was deemed statistically significant, with the only variables that may be regarded as more important being Holy War, Initiator desert, Initiator good soil, Initiator Strategy, Respondent Strategy, and Respondent state

efficiency. Because Initiator Strategy and Respondent Strategy both figure in the first instance as dependent variables, they are driven by other independent variables. Taking this into account, it is arguable that the most powerful drivers are Holy War, Initiator desert and good soil, and Respondent state efficiency, supported by a further three climatic variables, five military/diplomatic variables and three cultural/economic variables. Nomadism *per se* is not one of these supporting variables, but it is closely linked to Initiator desert and good soil, and it cannot be altogether discounted as significant.

When grouped together, Military variables were least important for Initiator Strategy, but they were most important for Overall Outcome. Climate and physical geography primarily influenced Initiator Strategy, while Culture, Economics and Holy War affected all dependent variables, Initiator Strategy most strongly. When the relative levels of explanation of the models are converted to an average over all four groups of variables, it became clear that the culture, economy and diplomacy variables (which include Holy War) provided very nearly half of the explanatory power of the models, while climate and geography variables provided somewhat over a quarter and military variables contributed a little under a quarter. Holy War alone supplied a little over a quarter and the other cultural, economic and diplomacy variables in aggregate explained a little under a quarter.

The above suggested that in aggregate, the climatic and geographic variables; Holy War; other cultural, economic and diplomacy variables and military variables were all of fairly similar significance in explaining the characteristics of GIPPs. Nomadism did not figure directly in the final model, but it clearly remains relevant, since the statistical technique that was used does emphasise environmental factors known to be relevant to nomadism, if not nomadism *per se*.

As noted above, the modelling provided a broad and fairly robust explanation for Initiator Strategy, Duration and Outcome. It was much less successful in providing an explanation for Respondent Strategy from the factors examined. Respondent cultures, tending to be more wealthy, sedentary, structured and urban, seem to have their strategy determined by factors that were not monitored. Given the breadth of factors that were considered, this is itself a noteworthy result that implies something important, if difficult precisely to define at this time. It is likely that the balance between the effects of factors linked to the concept of “civilisation” and the effects of factors linked to the concept of “environment” is not a constant. As suggested by a re-analysis of the 1913 data of Huntington, high perceptions of the level of civilisation in the power with which

they are dealing seem to inhibit morale levels among the neighbours. The splendour of an imperial *darbar* or Byzantine throne room may prove cheaper than either armies or subsidies, at least until someone declines to be impressed and starts to test what lies beneath the splendour. Given the demonstrated emphasis of the analysis on “material” factors (Appendix 5), there is seems a need to explore “morale” linked factors in greater detail in order to develop understanding, particularly of Respondent cultures, but probably of all cultures.

It might be posited that Respondent cultures have more (materially, at least) to lose and potentially less to gain in their interactions than Initiator cultures, for whom there is less to lose and more to gain. For Respondents, the profit/loss balance must then be assessed through amore complex system (e.g. in terms of bureaucracy), where the values and vested interests of court officials, soldiers, and civil service officials; eunuchs, celibate clerics and mandarins often took priority, perhaps leading to decisions and strategies (including apparent inaction) that are counter-intuitive or hard to rationalize or understand from an outside perspective.<sup>20</sup> Future research might well benefit from seeking to unravel and quantify such matters as the relative power of internal groups in such states, the potentially paralyzing effects of vested interests in decision making, and the change over time.

Further analysis, using the GIPP2 database, suggested that when sedentary non-holy war societies acted in the initiator role of an interaction, they tended to adopt less aggressive strategies, but did so over a longer period, than a model whose parameters, calculated from the analysis of behaviour in nomad and/or holy wars, would suggest. A policy of “slow and sure” thus seemed more attractive for sedentary groups, unless holy war considerations intervened. Additional study including a substantial number of GIPPs (ideally, at least another 80 cases) featuring sedentary societies which are not engaged in holy war as initiators is an attractive proposition in allowing more robust analysis and extension of the model.

These results suggest that whether it is nomads pursuing the desire for cattle (*gavisti*) to the point of battle, or believers attacking the followers of heresy or unbelief, the full range of factors influencing the circumstances of such interactions with others must be taken into account. The factors included in the model developed in this thesis model have a clear and measurable impact on the nature of interactions, arguably a greater impact than all those other factors that are

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<sup>20</sup> For instance the 11<sup>th</sup> century Byzantine tensions and intrigues chronicled by Michael Psellus can have done little to assist the state in its handling of relations with Cumans and Seldjuk Turks. Psellus, M. (1966) *Fourteen Byzantine Rulers*. Translated by: Sewter, R. Harmondsworth: Penguin Classics.

affecting the interaction, but which were not included in the model: probably in the ratio 60:40. Broadly grouped, military factors; social and cultural factors; climatic and geographical factors and Holy War seem to be all of nearly equal importance in providing this level of explanation from the model. Thus, it would be prudent in further analysis of historical interactions that concentrate on a particular one of these broad factors or aspects, to remember that there are probably three other broad factors or aspects which are of nearly equal importance. The results demonstrate in numeric form that an “either/or” approach to historical debate is likely to be productive of heat rather than light. The behaviour of societies and cultures are rarely driven by a single factor, and current scholarly debate would benefit from seeking to extend awareness of the full range of relevant factors, and to identify the balance between these factors, which is likely to differ between various kinds of society.<sup>21</sup>

The thesis proposes, but does not always pursue to a conclusion, a number of new computational and coding techniques. These relate to matters such as monetary equivalents, reign length, realm stress, Clausewitzian friction, terrain, morale, and leadership. Others may wish to take these techniques further, as they are likely to impact the generality of cultures, not simply those which are nomadic or engaging in holy war.

The variables included in the analysis were largely identified or inferred (sometimes reverse-engineered) during detailed reviews of existing qualitative work. Without this background of understanding, based upon the qualitative inputs of others, it would not have been possible to select a suite of variables that were likely to provide quantitatively valid explanations. Contrary to the views expressed by some,<sup>22</sup> coding of data for quantitative analysis is not (or at least, should not be) a purely arbitrary exercise or one that supplants qualitative understandings. It requires refinement in line with qualitative insights. The two approaches are not competitive, but complementary.<sup>23</sup> Thus, as Moroney (first quoted in Chapter 2) has it, “*Whoever you are, if your work calls for the interpretation of data, you may be able to do without statistics, but you won’t do so well*”.<sup>24</sup>

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<sup>21</sup> Rich societies, like rich people, are better able to protect themselves from changes in the physical environment.

<sup>22</sup> Such as Selby, J. (2014) ‘Positivist Climate Conflict Research: A Critique’, *Geopolitics* 19, pp.829-856.

<sup>23</sup> In addition to the Seshat database, there are a number of other quantitative databases

See: ArchaeoGlobe: <https://archaeoglobe.com/>; see: SESMAD (Social-Ecological Systems Meta-Analysis Database); <https://sesmad.dartmouth.edu/>; see: HRAF (Human Relations Area Files Human Relations Area Files); <https://hraf.yale.edu/about/>

<sup>24</sup> Moroney M.J. (1990) *Facts from Figures*. London Penguin, p.463.