

## **AR Cinema: Visual Storytelling and Embodied Experiences with Augmented Reality Filters and Backgrounds**

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### **Abstract**

Through the simultaneous presence of graphically composed and materially existing elements, augmented reality (AR) offers ephemeral digital content that is the result of the momentary and, thus, unrepeatable alignment of a physical body and world and an augmented reality system.

Capturing the performative and embodied angles of screen-based augmented reality through a combined film-analytical and cognitive lens, this paper focuses on how interfaces, content, and AR-manipulated bodies serve as apparatus for cinematic composition as well as storytelling and user engagement. Observing interactions with AR filters and backgrounds, we reflect on how users' bodies and expressions that are mirrored on screen are translated into an immersive digital

storyworld that exists in the temporal and spatial context of the AR experience and the related technology. AR filters and backgrounds' affective quality, thus, lies in bodily control and in the creative act of choosing and moderating body characteristics, postures, and positions in real-time in relation to the surrounding digitally manipulated or recorded environment. By moderating the representations of bodies and spaces as well as their interplay, AR users actively shape the visual composition of the on-screen space and, thereby, the visual narrative.

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### **1. Introduction**

Augmented reality (AR) platforms afford interactive experiences that integrate real-world and digitally created objects and bodies. By this, AR presents tangible experiences that modify the sensory attributes of the physical world. For instance, AR-capable applications can digitally change the appearance of a user looking into their smartphone's camera or project digital figures into physical spaces. AR offers a variety of opportunities for altering the presentation of physical reality as well as the freedom of inventing one's own virtual bodies and surroundings that may be used as part of digital (inter)actions—for instance, through chat or telecommunication applications (e.g., Messenger, Zoom) or on social media platforms (e.g., Snapchat, Instagram). While AR functions on various tools from see-through head-mounted displays to monitor-based systems with a range of purposes from gaming to on-the-job training (see Von Itzstein, Billingham, Smith, & Thomas, 2017), the AR capacity of ubiquitous mobile devices, such as smartphones and tablets, is perhaps the most significant factor responsible for AR's pervasiveness in the early 2020s' digital media landscape. By being available on touch-screened and handheld appliances, AR is not only within reach for a significant proportion of the global population, it is also literally within reach: manual control to move the screen and command the touch-sensitive display generates unique embodied virtual experiences and sensory configurations.

From a technological point of view, augmented reality systems imply either a perceived reality with overlaying computer graphics or a digital (virtual) reality juxtaposed with unmediated elements (Milgram & Kishino, 1994; Milgram, Takemura, Utsumi, & Kishino, 1994). Further, AR systems register motor input (position and motion tracking) and by this, augment physical world actions with

computer-simulated feedback in real-time (Azuma, 1997; Milgram et al., 1994). These points draw attention to two key aspects of AR from which this paper proceeds. On the one hand, AR's ephemeral nature—the fact that digital content is the result of the momentary and, thus, unrepeatably alignment of a physical body and world and an augmented reality system. On the other hand, AR involves the simultaneous presence of graphically composed and materially existing elements that stand in continuous interaction. We argue that AR experiences are powered by a user's continuous bodily involvement and that interactions generate specific aesthetic contexts, which may include character(s), set(s) and location(s), sensory frameworks, a simpler or more complex storyline, and a perceiver or audience. Building on these notions, the paper scrutinizes AR's aesthetic frameworks and the interactivity of experiences through the combined lenses of film analysis and embodied cognition. In particular, we analyze screen-based AR experiences with a specific focus on their narrative capacities, visual language, and user/viewer involvement. In addition, we make observations, inferences, and propositions for visual storytelling based on the various functions of AR-capable platforms, such as video-conferencing and social media applications.

### **1.1 Background and Aims**

In terms of AR use and usability—aspects that dominate AR literature—research commonly draws on health- (Moro, Štromberga, Raikos, & Stirling, 2017) and education-related fields (Garzón, Pavón, & Baldiris, 2019), as well as communication and entertainment (for overviews, see Dey, Billingham, Lindeman, & Swan, 2018; Parekh, Patel, Patel, & Shah, 2020). In the case of arts, entertainment, and leisure activities, studies cover a broad range of phenomena including games for mobile and stationary platforms (e.g., Pokémon Go) and social media (e.g., Snapchat filters) (see Von Itzstein et al., 2017). Indeed, much of the discourse resurfaced during the Covid-19 pandemic, when theater companies and performers tried to rapidly adapt to the challenges of the lockdowns by making pre-

recorded or Zoom-based productions (e.g., Big Telly Theatre Company's production of Shakespeare's *The Tempest*), where performers' bodies and backgrounds were modified by AR filters (Chen, 2022; Karam & Naguib, 2022; Worthen, 2021).

According to previous findings, the use of body and face filters for AR-based communication has skyrocketed in the most popular social media platforms with users applying them on a regular basis (Bhatt, 2020). Others have explored AR filters' roots in photo editing features (see Vendemia & DeAndrea, 2018) and content curation during social interactions (Javornik et al., 2022). What AR is praised for in these cases is bringing an extra dimension to experiences—either for added user experience or information. In addition, a fairly extensive corpus deals with AR platforms used in the art world and aesthetics; for instance, museum guides and cultural heritage applications (Karadimas, Somakos, Bakalbasis, Prassas, Adamopoulou, & Karadimas, 2019; Li, Ch'ng, Cai, & See, 2018), AR fashion applications (Bonetti, Warnaby, & Quinn, 2018), or applications to discover details about publicly available examples of architecture and other art products (Von Itzstein et al., 2017).

Beyond entertaining and informing, AR can be used for creative practices in digital media and film arts, however, research on the matter is limited and so is recorded content that would be circulated to the general public. The reason may lie in the fact that unlike some other narrative extended reality experiences, such as cinematic virtual reality that can be treated in terms of narrative units with a defined temporal structure and a display medium, AR experiences, due to their momentary and plastic frameworks are rarely distributed as standalone, non-ephemeral media content or have a temporal structure. It is nevertheless important to note that while AR content is often experienced only by those who watch it live and it does not endure beyond its initial projection, many platforms with integrated augmented reality functions like Snapchat, Instagram, or Zoom offer options for recording, saving, and sharing the footage. Yet, even then, actions are generally considered as improvised ones that unfold in the present and are delineated by the affordances of technology and

specific applications in terms of, for example, duration, aspect ratio, or quality. Augmented reality functions in what Ceuterick (2021) calls *transitional spaces*. Transitional spaces not only exist between the digital (fictional) elements and physical reality but also between the recorded past and unfolding present, as well as between memory and real-time interactions.

While AR's applications in the fields of arts and entertainment are growing, little attention has been paid to the frameworks of performance and visual storytelling; an aspect that would highlight the aesthetics of augmented reality interfaces at the crossroads of film and media arts and embodied interactions. To address this gap, this paper aims to capture AR's position on the broad spectrum of immersive arts and storytelling media and to provide a framework to assess AR and other immersive and ephemeral audiovisual content with attention to aesthetics and user experiences. By demonstrating the relevance of theoretical concepts from film studies and history to various uses of AR, we highlight the value of screen studies for analyzing AR experiences. This accentuates an aesthetics- and user-centered approach that, in previous research, has often been overlooked in favor of technology-oriented approaches. Hence, it reflects on the following areas of inquiry: (1) How do augmented reality interfaces relate to cinematic visual composition and how can virtual backgrounds function as film sets? (2) And how do users' AR-manipulated bodies act as vessels of storytelling and receiving?

## **1.2. Methodology**

The research questions above define the paper's structure: after outlining a media archaeological account (a filmic pre-history) to visual storytelling in AR, we analyze the cinematic and cognitive aspects of framing and composition, inspect the roles of AR users' bodies and their virtual representations, and present the affordances of cinematic AR experiences through a set of case

studies that use virtual backgrounds and body filters created and recorded using Snapchat (Snap AR solutions) and Zoom.

As explained above, for the respective analyses of framing, composition, and users' (captured or observed) bodies, we borrow theoretical and methodological frameworks from film theory and embodied cognition. In these sections, on the one hand, we reflect on how visual storytelling for AR can be described through concepts and techniques used in filmic storytelling, such as the *mise-en-scène*, composition and film sets, acting, and digital effects, which are often reworked in a range of social and digital media environments. And, on the other hand, we present the affective qualities of these on viewer/user engagement. We analyze the case studies using phenomenological–autoethnographic methods (Pitard, 2019; Wilde, 2020), through which we reflect on lived experiences of the creation and engagement with the respective AR experiences while presenting their affordances and the role thereof in creating moving-image narratives.

What we label as AR storytelling or AR cinema in this paper is rooted in cinematic narrative techniques that were developed for engaging viewers of rectangular screens and pre-defined temporal structures. However, given the distinct nature of AR experiences in terms of temporal and sensory frameworks and a user's embodied involvement, we reflect on narration as the process of guiding a user along a system of actions, characters, locations, and other sensory elements. This implies that AR cinema does not necessarily involve narratives with a linear structure and a clear beginning, climax, and resolution, but is often limited to exhibiting impressions, sensations, or attractions and serving as a spectacle to draw attention, inform, or entertain users. In other words, AR cinema generally lends itself better to short, episodic vignettes rather than traditional feature-length narratives. In some cases, the links between film and AR experiences can depend on the shared use of visual markers to signal archetypal characters or generic positioning, wherein users' responses to AR elements can depend on existing familiarity with media and pop cultural

iconography. We argue that AR narratives lead to individual experiences that are intertwined with a user's reactions to sensory information and interactions with the AR system. As such, our notion resembles Bamberg and Georgakopoulou's accounts of small stories that divert from canonical storytelling techniques to highlight subjectivity and a story's position within a context of interactions along with temporal and spatial constructs and the storyteller's and receiver's personal experiences (Bamberg & Georgakopoulou, 2008; Georgakopoulou, 2007). Moreover, it resonates with a constructivist account of narrative theory (Bordwell, 1985; Grodal, 2009) by underlining how a perceiver builds the multitude of sensory information into semantic structures that inform their eventual interactions and perception of a coherent narrative (see Szita, 2019, forthcoming).

### **1.3 A Filmic Pre-History for Visual Storytelling in AR**

In order to assess the cinematic uses of AR at the present, and to speculate on further uses of these technologies in the near future, we argue that it is necessary to look to the past and consider how earlier iterations of screen technologies allow us to develop a kind of pre-history to AR. For this, we apply broader media archaeological approaches and highlight relevant theories and historical debates to connect screen history to digital media technologies (see Elsaesser, 2019; Haslem, 2019; Strauven, 2013). Examining precisely what AR cinema is, or could become, first requires reflecting on elements of early cinema history, particularly debates around cinematic formats (plot or spectacle-based) and cinema's medium specificity and theatrical influences.

Sontag (1966) explains how "the history of cinema is often treated as the history of its emancipation from theatrical models," including what she terms the "theatrical frontality," that is, capturing the fixed point-of-view of a theater audience member from a stationary camera (p. 24). Indeed, this frontality can be present in screen-based AR media, where content is recorded using an inbuilt web camera, though AR works produced via smartphone apps can facilitate more movement. And yet, as



Sontag notes, film evolved to create illusions—a term that is equally fitting of screen-based AR. Georges Méliès is perhaps the most notable pioneer of screen-based illusions based on the “disjunctive presentation of time and space” and his “treatment of persons as things (physical objects)” (Sontag, 1966, p. 25)—despite his use of theatrical elements, including a mostly still camera, situated in front of the action. Méliès is also one of the filmmakers discussed by Gunning (1986) in his influential account of early cinema as cinema of attractions that foregrounds spectacles and visual curiosity over compelling narratives. With their focus on novelty, and on showing rather than telling, such attractions often relied on effects such as reverse motion, substitution and multiple exposures. As our subsequent analysis will reveal, a similar impulse to combine AR-based illusions with theatrical screen-based setups is often on display in AR cinema—the appeal of which can similarly rely on visual novelties and manipulation rather than fully-developed narratives. Therefore, AR may be added to the list of media content labeled as the “new cinema of attractions,” along with YouTube or other short digital media content (Broeren, 2009; Rizzo, 2008).

In the contemporary media landscape, the ephemeral and interactive nature of AR cinema can also be positioned as overlapping with elements of live cinema, mobile cinema, and socially layered cinema (see Atkinson, 2014). This highlights AR experiences’ parallels with the collaborative–interactive nature and transmedia aspects of some new forms of cinema, such as *The Wilderness Downtown* (2010), *Inside* (2011), and *Artificial* (2018–2019), where viewers are involved in shaping the story or aesthetics through audience polls, personal data entry, and social media-based interactions. Applying the aesthetics of personal devices, such as laptop or smartphone cameras, is not inherently uncinematic either: *Host* (2020), a film made during the pandemic, was recorded entirely via Zoom, a strategy that recalls various forms of desktop cinema, including *Unfriended* (2014), whose narrative takes place on a Skype call between friends.

## 2. AR Mise-en-Scène

To consider AR as a form of visual and interactive storytelling, we conceptualize AR contents' visual configurations through the concept of *mise-en-scène*. *Mise-en-scène* is generally used in screen studies to capture how all visual elements, such as performance, setting, costume, and lighting, are presented within a given shot, scene, or frame to control viewers' attention (Bordwell & Thompson, 1979). The relevance of *mise-en-scène* to AR partly relates to its screen-focused presentation that creates a visual frame. AR technologies predominantly involve some kind of screen, for instance, that of a portable device, through which the interactive digital content is displayed, perceived, and potentially recorded. In line with traditional understandings of *mise-en-scène* in cinema and other screen media, meaning is communicated via a combination of staging, composition, and the presentation of on-screen spaces and bodies. In narrative cinema, this traditionally involves the careful design of characters' appearances and positions in the fictional spaces of the film world. In an AR setting, these same elements can be at play, but they are mostly determined by the affordances of an AR system and the user who chooses the ways to interact with it.

*Mise-en-scène* is a foremost, but still debated and somewhat ambiguous, concept in film studies (see Gibbs, 2013; Martin, 2014; Perkins, 1972; Watter, 2019). Importantly, these debates include that traditional understandings of *mise-en-scène* (for instance, by Bordwell & Thompson, 1979) can overlook the role of technology including that of camera work or post-production editing techniques, such as dissolves, which can nonetheless define the visual impact of a given shot, sequence, or frame. As Martin (2014) notes, there is a slippery relationship between *mise-en-scène* and the camera, since “*mise en scène* is staged for the camera, but does not itself include the work of the camera, beyond the rather static notion of pictorial composition” (p. 14). Notably, Martin has argued for a reimagining of the *mise-en-scène* concept using the notion of the *dispositif* initially developed in relation to cinema by theorists including Jean-Louis Baudry (1975) and Jean-Louis

Comolli (1980), referring to the system of “an apparatus, arrangement, or set-up of interrelated pieces or elements” (Martin, 2014, p. xiii).

Such an interpretation of *mise-en-scène* allows for acknowledging the role of the apparatus and other technological elements, which are key to augmented reality’s mix of real-world and digitally layered content. Significantly for our approach, although Martin does not discuss AR, he makes a forceful case for reworking concepts of *mise-en-scène* for digital media content: “*mise en scène*, as a conceptual and analytic tool, ( ... ) no longer encompasses *only* what happens in front of a camera, on a set or in a field, but also what happens, dynamically, within a synthetic video or digital frame (Martin, 2014, p. 163).” In this paper, we take into account the traditional *mise-en-scène* concept focusing on composition, costume, and the behavior of human figures alongside Martin’s (2014) revisionist approach presented above. We argue that in examining AR backgrounds as a form of digital set and AR filters as a form of digital costume, a strong case can be made for understanding the visual storytelling potential of AR in relation to theories of filmic *mise-en-scène* and interactive experiences. For this, beyond the bodies of the captured AR users and their body language, gestures, and facial expressions, we also consider the acts of selecting and curating filters, backgrounds, and behavior within the frame of an AR storyworld.

As *mise-en-scène* defines the frameworks for an observer (viewer, user, etc.) to experience and comprehend information based on the visual elements’ alignment, it serves as a key component for visual storytelling. As introduced above, in the case of AR, this is extended by technological affordances and habits of use: the parallels of visual composition and a user’s momentary decisions regarding screen content can define meaning in various ways. By moving the AR-capable appliance in relation to the physical space, bodies and objects can enter, exit, or move within the frame telling a story through their presence, absence, and position. Moving it closer or further away from them can even change the size of objects of interest—for instance the user’s own face or body—making

gestures, moves, and visual characteristics less or more pronounced. Some of the most popular platforms for using AR backgrounds and filters are social media and communication apps which often conform to a single user. This entails that digitally created elements can only be juxtaposed to a single face or body, where others may become hidden or are presented in the way a camera captures them. For instance, out of two users within the frame, only one of them may be enhanced by an AR filter, which divides the two bodies' fictionality status. In other cases, an AR background, which may have a similar storytelling function as a movie set (see below), disguises certain objects, bodies, or even body parts, such as hands or hair. But even the choice and timing of digital elements in themselves can serve as storytelling instruments, which we highlight below by analyzing AR-manipulated backgrounds and bodies.

### **3. AR Backgrounds as Film Sets**

The pervasive use of AR is commonly found in the form of virtual backgrounds on video-conferencing platforms, such as Zoom and its competitors, that became a near ubiquitous part of daily life, work, and education for a significant portion of the Western population during the Covid-19 pandemic. During this time, people gradually became familiar with the interfaces and decorum of these screen-based social spaces, for example, video-conferencing applications' default grid-based structure whereby users see everyone and themselves in small rectangular frames on-screen. In addition to AR filters that have been popular on social media platforms, virtual backgrounds introduced AR to professional and educational settings. However, the labeling of the AR background function as *virtual background* meant that many users may have been experiencing or experimenting with augmented reality without even being aware of the technical term for it. During the pandemic, the line between personal and professional settings blurred and video conferencing followed this: backgrounds provided a sense of privacy to those working and learning from home by masking the

view of their physical environments and providing a virtual curtain in front of a personal space, which may have been one of the most immediately obvious benefits. Reflecting on AR-based virtual backgrounds, in this section, we discuss their cinematic counterparts, their aesthetic frameworks, and the effects of the current technological limitations.

### **3.1 Virtual Backgrounds: Green Screen or Rear Projection?**

Besides uses in remote communication settings, virtual backgrounds' creative aspects began to emerge in tandem with analyses of the similarities between the use of these backgrounds and cinematic aesthetics (e.g., O'Meara, 2020; Rose, 2020; Rosenblatt, 2020). These analyses signal strongly toward the visual storytelling properties of AR backgrounds and their links to a filmic sense of mise-en-scène. For example, Amanda Garrity (2020) encourages users to “disguise [their] space with ( ... ) virtual green screens,” underlining the similarities between AR backgrounds and green screen technologies used for filmic special effects. Garrity's piece also reflects on using virtual backgrounds from film franchises or popular television shows like *The Office* and *Golden Girls* for Zoom calls. Similarly, the official websites for *Star Wars* and the Pixar animation studio, among others, provide curated high-definition images to be downloaded for this purpose.

Rose (2020) places virtual backgrounds front and center, suggesting that users can stand out during video conferencing by learning from the aesthetic styles of arthouse filmmakers such as Jim Jarmusch and Andy Warhol. O'Meara (2020) also draws out comparisons with the arthouse cinema world, including similarities between the Swedish filmmaker Roy Andersson's use of direct address and tableaux-like sets and individuals communicating within Zoom spaces. Additionally, she directly compares the distorted depth perception of virtual backgrounds with the production design and mise-en-scène in Michael Haneke's *Caché* (2005; see Figure 1), itself a mediation on viewing technologies. She notes that like video-conferencing platforms' options for users to replace their

background with a virtual one, the main character's television show positions him in front of 2D wallpapered bookshelves in a way that encourages viewers to “recognise his television persona as a facade” (par. 12). In these examples, we can see a range of commentators begin to tease out the links between AR composition and more traditional forms of screen media and storytelling.

Figure 1 here

While Garrity's (2020) reference to AR backgrounds as a kind of virtual green screen is understandable (and in keeping with Instagram and TikTok AR filters' use of the term “green screen effect”), we argue that they are perhaps better understood—and their visual storytelling potential imagined—in comparison to rear projection, a much earlier form of composite screen technology than the green screen. To understand why, it is necessary to outline the dynamics of both. As the name suggests, a green screen is a green backdrop placed in the background of a shot to allow for digital effects to be added in post-production. This visual effects technique composites two image or video streams into a final screen output. It emerged alongside blue screens in the 1970s and gained mainstream traction after director George Lucas employed it in the original *Star Wars* (1977–1983) trilogy. As detailed by scholars like Laura Mulvey (2011) and Julie Turnock (2012), prior to blue and green screens, rear-projection technology was adopted widely by Hollywood studios, becoming the primary special effects composite technology used between 1935 and 1970. It became standardized in response to the emergence of synchronized sound in the late 1920s and early 1930s, when the cumbersome equipment prevented on-location shoots. Rear projection entails that the set is filmed first on location and then, after adapting the footage for rear projection, projected in a studio space as a background for live action. This allowed for recording actors' actions and emotions separate

from the dramatic settings, and facilitated their familiar bodies to be highlighted in close-up shots (Mulvey, 2011).

Figures 2(a–b) here

Mulvey and Turnock explored the limitations of the widely used technology, perhaps most famously deployed in sequences where characters drive in cars in films such as *Written on the Wind*, *Carmen Jones*, and *To Catch a Thief* (Figures 2[a–b]). As Mulvey explains, owing to the flawed visibility of rear projection, it has been mocked by audiences for generations. More specifically, she notes how the images produced by rear projection were out of step with Hollywood norms for transparency and realism. She discusses rear-projection as a form of modernism that was smuggled into film, albeit with “the clumsy absurdity of the device” (p. 208) that distracts the viewer from the narrative, and with the requirement for actors to stay precisely in front of the rear projection screen, evoking a Brechtian-style of tableau effect.

From here, we articulate a number of similarities between AR backgrounds and rear projection filmmaking processes to argue that AR backgrounds are a fitting reworking of rear projection for the contemporary hyper-real era—one marked by a technological dependence on digital technologies and by growing trends for deceptive media, where reality and the validity of the media objects are often questioned. Firstly, both are dependent on pre-recorded or pre-existing footage and exist in a transitional space. In the case of rear projection for films, the projected footage is generally of moving images appearing behind actors in the studio (termed as process shots), though still images called transparency shots were sometimes used too (Turnock, 2012). In the case of AR backgrounds, this footage is either a still image or a digital video that appears behind a user replacing or modifying their physical backgrounds. Secondly, perceiving the remediation of the pre-recorded background in a movie or in an AR application behind the actors or users may lead to an uncanny experience due to

the visual contrasts between these two layers. These contrasts in perception can be based on discrepancies between resolution and quality or the perspective, which can seem forced due to the mismatched angles of the planes in the foreground and background. Thirdly, both rear projection actors' and AR users' screen performances must be contained in front of the pre-existing image or footage as the background cannot expand. Fourthly, both can be described as efficient solutions to challenges faced when creating screen media outputs, by removing the need for the bodies or characters to perform in the physical space presented in the background. Fifthly, in both cases, the camera captures the background and the characters simultaneously—unlike with green screens where the background layer is added later.

There are some notable differences between the two setups, however. With rear projection, the actors are constrained within a designated area in front of the rear projection screen, and their movements on set are guided by the director who likely consults with the camera person and playback screens. With AR virtual backgrounds, the figures are constrained by the camera lens on the recording device: to appear in front of the selected background, they must position themselves within its range. Furthermore, their presence in the shot also depends on the camera combined with body recognition technology picking up their figure in order to present it on screen. These aspects of the technology can depend on self-monitoring: users can see themselves live on screen, unlike the actors in front of rear projection.

### **3.2 The Aesthetics of Technological Constraints**

While there are more recent production techniques to provide backdrops for a scene, such as virtual production where a digitally created environment is projected on screens in a studio, rear projection is one example that can be compared to the incidental aesthetics of AR backgrounds. So, in the following, we present how technological limitations or specificities create an aesthetic framework.



AR backgrounds can have a distinct set of technical issues from that of rear projection, where the on-set technologies exaggerate flaws in the projected background plate, which technicians tried to resolve by boosting projector lights (Turnock, 2012). In AR, moving too much or too quickly can result in visual glitches where the user's body appears incompletely as a result of corrupted digital data (see Figure 3). Notably, in such instances, it is the user's body in front of the camera that shows signs of glitching, such as pixelation errors, rather than the virtual background. Thus, the user's on-screen body is marked with signs of digital intervention even without using a filter: parts of their body may temporarily disappear or become scattered randomly with blotches of pixels. Writing on the presentation of human characters within low-quality digital cinematography, Rogers (2013) similarly identifies what she terms a "disintegration aesthetic," which can provide "an aggressive address to the viewer, who must struggle to discern the images—and who is thus compelled to participate bodily in the experience of disintegration portrayed" (p. 178). While such technical flaws may be deployed creatively for storytelling or artistic effects—in keeping with the practices of glitch artists (see Menkman, 2011)—they also create a kind of distancing effect for both movie viewers and the AR user whose real body becomes virtually distorted. Indeed, these kinds of flaws with AR backgrounds recall how rear projection was often "distractingly obvious" and fake-looking (Turnock, 2012, p. 159), even when it appeared in the widely acclaimed work of filmmakers such as Alfred Hitchcock, Douglas Sirk, and Vincente Minnelli.

Figure 3 here

Despite the limitations and technical personnel's discontent with rear projection, film directors like Hitchcock reportedly saw the technology's potential to contribute to visual storytelling by supporting other elements of a film's narrative, tone, or aesthetic (Turnock, 2012). This aligns with Denson's

(2020) discussion of “seamfulness” in relation to the presentation of glitching bodies in contemporary sci-fi films such as *Blade Runner 2049* (2017). Denson notes that while the video effects team had the power to present a seamless union for a scene involving a composite woman (merged from the bodies of two actors/characters), instead a visual spectacle is made of their intentionally “imperfect alignment” (p. 114). Making a visual spectacle of the flaws of technology can equally be noted of AR backgrounds, along with the fact that users may embrace the fakery of the composite technology rather than aiming for realistic representations. We can see this in users’ explanations of the appeal of using virtual backgrounds during the pandemic: they offer detachment from physical reality, and the unreal, or surreal, aspects of AR seem to align with the broader sense of everyday strangeness. As Twitter user David Saff explains, “I think it’s ridiculous to act like this isn’t a strange situation, so calling attention to it [through filters and virtual backgrounds] honestly kind of makes the whole process easier for everyone” (Rosenblatt, 2020, par. 23). Saff, who is quoted alongside a screenshot of him against an AR background featuring *Uncut Gems* (Figure 3) comments further that “it’s absurd to just go on with life as if nothing has changed when so much has changed around us, and I think it’s really nice to be able to make a joke about it and laugh every so often” (par. 5). We can draw a parallel from these descriptions and practices to the way that directors like Douglas Sirk used *mise-en-scène* (including rear projection) to reflect on characters’ inner turmoil and confinement by social norms in his domestic focused melodramas (see Elsaesser, 1972). This also links to Denson’s observation that the seamfulness of an imperfect composite body in *Blade Runner 2049* serves to underline the film’s thematic investigation of the boundaries between human and artificial beings and between the real and the fake. In the case of the pandemic, users of video-conferencing platforms (communicating from domestic settings, similar to Sirk’s characters) could apply AR backgrounds to present a *mise-en-scène* that externalizes their own feelings of unease, strangeness, and confinement: trapped both in their own home, and within the new

work/educational/social environment of a screen. As everyday life attempts to proceed as normal, despite the radically different reality of the pandemic world, mixed emotions and a sense of bizarreness were displaced onto the AR background. Furthermore, we can tie the use of playful AR backgrounds into the much longer history of audiences using film and media as a form of escapism from everyday struggles. Acknowledging this longer history allows us to signal the potential appeal for virtual backgrounds and other forms of AR beyond their initial mainstreaming during the pandemic period, as well as capturing the interconnectedness of aesthetic and affective elements on users and viewers.

### **3.3 Virtual Backgrounds as Media Escapism**

Caetlin Benson-Allott (2022; see also, 2020) considers escapism as a mode of engaging with audiovisual media to endure global or personal crises. Indeed, following on from the analysis of virtual backgrounds, we argue that the close ties between the pandemic, video-conferencing platforms, and increased AR use can be partly explained by media escapism. In this case, creative uses of virtual backgrounds—including those extracted from existing film and media content—allows for a more immersive way to escape into fictional storyworlds, for example, by casting oneself alongside a film character as in the aforementioned *Uncut Gems* example, or in a familiar and thematically resonant storyworld setting like of *The Cabinet of Dr. Caligari* presented later in this paper. In these cases, the visual storytelling may seem limited in that an explicit narrative is replaced by an abstract commentary through the combination of the user with their chosen background. Moreover, in keeping with Benson-Allott's description of escapism tending to be applied to popular media works that lack artistic merit, the aesthetic flaws of AR backgrounds align them with the lowbrow associations of escapist media. This implies that the AR user can achieve more artistic effects by coordinating their costume or appearance in relation to the background for increased coherence.

Lessons can be learned here from directors like Sirk, Minnelli, and Hitchcock, not purely in relation to the use of rear projection, but in the way that formal and graphic elements such as color and shape are used to create increased coherence between characters and their setting, even if the space appears as too constructed or theatrical to be real.

Based on the above analysis of AR backgrounds as a form of film set, we now apply the *mise-en-scène* concept to offer a summative evaluation. In his study of film settings, Watter (2019) draws some useful distinctions between cinematic *space* and *settings*, including how they relate to character development (an aspect that he notes to be lacking in preceding accounts of the *mise-en-scène*, for instance, that of Perkins, 1972). For him, a setting should not simply be a passive backdrop but should be “charged with meaning for the figures within it” becoming a human-centered sphere (p. 72). He distinguishes that “space is full of bodies, or things that have mass; setting is full of characters, or things that have feeling” and narrative contexts (p. 72). It is interesting to consider these distinctions in respect of virtual backgrounds. For example, in the virtual space of a Zoom room, we argue that users who choose not to add an AR background are positioned in a naturalistic *space*, while those who apply AR backgrounds are more closely aligned with Watter’s concept of *setting*. Even though it is virtual, it is counterintuitively more humanistic than the naturalistic space, by virtue of the AR user’s decision to select their own background (now becoming a setting), thereby allowing their background to become charged with meaning for the figures within it. This sense of the background being charged with meaning is in keeping with the aforementioned examples of AR backgrounds helping to serve as media escapism and to express the AR user’s emotions and experiences—for example, in terms of the pandemic or other crises.

This is not to say that Watter would necessarily consider AR backgrounds to be a good application of the concept of setting. Watter surmises that setting must periodically fade from the audience’s attention, or else its expressive capacity is quickly exhausted. Indeed, AR backgrounds are often

conspicuous and potentially distracting when being used in everyday (as opposed to overt storytelling) settings. That said, there is a continuum of AR backgrounds ranging from realism to the absurd or surreal. Many of us have had the experience of meeting with someone in a large Zoom meeting (meaning small individual Zoom frames) for months before suddenly noticing body flickers and glitches against their now familiar backgrounds. This jarring moment may evoke a distancing effect, as one realizes that the familiar image was not a representation of the person in their actual *space*; it was a representation of the person in their chosen *setting*. This distinction underscores how even the casual selection of AR backgrounds by internet users can signal an inherent understanding of how properties of *mise-en-scène*, such as the presentation of character backgrounds, can convey meaningful visual information to audiences in screen-based contexts.

#### **4. AR Bodies**

In films, characters serve a variety of purposes: aesthetic representations, storytelling agents, as well as vessels for conveying cultural elements, social roles, and emotions. Their extended-reality counterparts are avatars or digital personas that are digitally created or modified figures to represent a user in virtual or augmented reality spheres. Although augmented reality use relies less on avatars than virtual reality, body representation and embodied interactions are key in this medium as well (Genay, Lécuyer, & Hachet, 2021). Rosa (2016), for instance, notes that a user's body (specifically in AR game applications) has a role in perception, interaction, as well as storytelling and it may contribute to the sensation of realism (c.f. Rosa, Hürst, Vos, & Werkhoven, 2015). In this way, as pointed out earlier, the embodied interactions that AR systems afford can increase the impression that the user is involved in creating and even living a narrative that unfolds in this multimodal setup. This section approaches bodies in AR from two main angles: from a storytelling and a perceptual angle. We introduce the ways in which bodies modified using AR filters can serve as characters in a

narrative context. We observe these characters as pre-designed, but also through their functions to incorporate the user's own body and create a transitional entity. In addition, we discuss the affective qualities of embodied involvement in storytelling and the functions of AR bodies for perception and engagement.

#### **4.1 Switching Bodies as a Narrative Tool**

An inherent characteristic of AR is that it places the user's body into the continuum of a constructed and mediated environment and a physical-world presence. Moreover, the user's augmented body is mirrored back to them in real-time and this liveness is key to the ways in which AR allows everyday users to feel temporarily transformed into a character through the process of visual augmentation: they can respond instantly to their transformed self on screen, updating their body language or facial expressions as a reaction to it. In this spontaneous embodied interaction, seeing oneself as a cyborg, witch, animal, or other characters may inspire them to act like one.

Visual and auditory elements that are composed digitally are brought to life by the presence of the participating user. For example, beauty filters or props that are superimposed on the user's recorded face or body, as well as music or voice-altering tools exist only in the context of a user's bodily presence. They only appear when the user is visually present on the screen or when their voice is recorded. In this way, digital elements that are involved in storytelling and that create characters and signal their characteristics are idle and absent until the user enters the screen. This also means that whenever the user's body is present, the digital details will assimilate with it in a unique and unrepeatable way. The transitions between mediated and physical dimensions create a sphere where digital content links to a human body. This sphere is the AR-device's screen, where digitally-created and automated elements, such as a filter, co-exists with the photorealistic reflection of a human body that is animated by the user themselves. The case introduced here reflects scenarios where a user's

bodily capacities and explicit physical characteristics appear and are altered on the screen of an AR-capable device. These alterations may build a narrative context by themselves or as part of a character framework—the latter of which we return to below.

Just as in the physical world, human bodies can be visual storytellers through their appearances, body language, gestures, and facial expressions, and in this sense, AR filters and self-avatars that alter one's appearance function to enhance or modulate these stories. This phenomenon may be accessed through the taxonomy Genay et al. (2021) propose: the *body avatarization continuum*. Body avatarization highlights the extent to which a body appears in its physical manifestation or as a digitally created object. In AR's case, interactions and experiences can be classified based on whether the physical body is visible without modifications or is present partially or fully modified by an AR system. The four main stages of the continuum are real-body presence (maintaining real-life characteristics), body accessorization (body enhancement with accessories or filters), partial avatarization (changing physical characteristics), and full avatarization (the user embodies a virtual character).

Using Genay et al.'s (2021) taxonomy, we approach AR-modified or enhanced bodies and their transformation from a film analytical point of view. We acknowledge that body avatarization in AR exists in a continuum and that every AR platform and experience has its own position on such a scale. Yet, we take the following examples as cases for illustrating the cinematic perspective of AR bodies: body accessorization using beauty filters or pieces of clothing and partial and full avatarization of virtual personalities that are presented as fictional (human-like or non-human-like) characters.

Beauty filters generally involve airbrushing and basic photo-editing functions that enhance a user's on-screen face or body—often used to make them look similar to beauty standards of the time related to age, body shape, or fashion (Kozłowska, 2021). Similar effects are involved in using AR filter accessories or clothing. The motivations, social effects, and moral dilemmas of using body-

enhancing AR filters are outside of the present paper's scope (see Vendemia & DeAndrea, 2018 for an overview). But it is nevertheless important to note that, as Javornik et al. (2022) highlight, these filters emerge from similar societal trends or self-expectations as wearing make-up or adhering to dress codes and can serve social acceptance and thereby mental well-being. This approach—and its similarities to the functions of make-up and costume in films—places body accessorizing AR filters into a context where a user would play a role that is somewhat true to themselves but is carefully curated for a specific audience. This is a form of self-expression to convey a narrative in a way that is relatable to those that are watching or interacting. Thus, body accessorization in a cinematic and character-based context generally serves integration into social frameworks dictated by an audience and telling a story in a manner that is accessible and credible for its members.

Whereas body accessorization follows assimilation to an audience while maintaining personal integrity, partial and full avatarization may be understood as a user's incorporation of a character that may or may not have a physical resemblance to their real-life selves and is partially or completely based on a fictional entity. In these cases, assimilation of a user applying AR filters may be less tied to the desire for personal acceptance, that is, that others would admit them into certain social networks, as the represented figure is independent of one's real-life appearance or personality. In the case of partial avatarization, the physical characteristics of a user are adorned by or hidden behind computer-generated elements, for example, a drag-queen style of make-up and wig or Batman's mask (see Figures 4[a–c]). While the human component is maintained and the user's physical appearance is partially or fully detectable, they appear as a character, which changes the contexts or dynamics of social interactions. For instance, an AR-masked user would play a similar role as an actor in a period film: viewers may detect the actor, but they appear in clothes and make-up that would place them into the narrative context of the depicted era, personality, social status, etc.



In full avatarization, the human body is invisible and is replaced by a virtual character that is displayed in the recorded and screened environment. As mentioned above, avatarization is understood on a spectrum, so full avatarization can involve a range of representations. But examples can include the infamous cat face filter on Zoom—where the user’s head is replaced by a cat’s head with synced lip movements (see Gabbatt, 2021). Full avatarization also extends to fully computer-represented virtual influencers like the fictional social media persona Lil Miquela, who appear in physical-world environments together with physical-world humans in still and moving-image posts (Drenten & Brooks, 2020) or VTubers, who use virtual avatars and real-time motion capture when creating content shared on YouTube or other video-sharing services (Nagata, 2018).

Figures 4(a–c) here

Even though body accessorization and partial or full avatarization (just as any AR-based body modifications) are frequently used in mediated communication or on social media involving parties in personal relationships such as friends or family members, in the framework of film and audiovisual media it may signal parasocial (non-reciprocal) links like in the case of an audience’s connections with on-screen characters. This is confirmed by the fact that digital representations of human-like figures would induce social behavioral patterns otherwise directed towards other humans, even if these figures do not act like humans (Jun & Bailenson, 2020; Miller, Jun, Herrera, Yu Villa, Welch, & Bailenson, 2019). Parasocial relationships with characters are defined by judgments based on narrative schemata (e.g., whether a character is good or evil) and emotional links similar to real-life social behavior (Bonus, Matthews, & Wulf, 2021). This means that AR characters would be perceived in similar roles as film characters with similar persuasive powers or social stimulation qualities. We will return to the affective elements of AR characters, but first, we devote

space to identifying the links between computer-manipulated AR bodies and fictional characters on film.

#### **4.2 AR Costumes and Characters**

Film scholarship positions costume as a crucial element of visual storytelling, and one which ideally contributes graphic and textural components to a given shot (see DelGaudio, 1993; Street, 2001).

Take, for example, the way that Douglas Sirk's Technicolor melodramas, such as *Written on the Wind* (1956) carefully align the colors of characters' costumes with their broader setting and props (Peacock, 2010). Scholarship on costume, both within screen studies and in the performing arts more broadly, argues that wearing a costume supports a performer's transformation into another (fictional) character, and is significant to an audience's perception of the performing body as a character. As Adrienne Munich (2011) suggests, costumes are carefully crafted to be integrated into characters' identities and contribute to storytelling by providing visual cues and narrative meaning.

Such generic approaches to costume as an efficient means of visual storytelling can equally apply to AR filters. As noted above, filters frequently take the form of masks or extreme make-up, through which only some of the user's facial features are visible, and that can build on the visual iconography of media genres. Filters can mimic the terrifying looks of horror films (for example with evil clowns, haunted children, or skulls), the futuristic worlds of science fiction (robots, cyborgs), or the whimsical innocence of children's pictures (with cute or animalistic faces) ranging from analogue to dynamic animated ones that adjust and change over time. On dominant AR platforms, such as SnapChat and Instagram, filters are grouped and tagged according to keywords that allow users to search for desired content, which are often labeled as film genres, such as horror, film noir, or cartoon.

The significance of visually transforming into a character is supported by professional actors' descriptions of seeing themselves in a mirror when using costumes and prosthetics. Gary Oldman, for example, describes the experience of seeing his transformed self during the filming of the *Darkest Hour* (2017), in which he plays Winston Churchill: "There's something very special when you're in the makeup chair, and about two hours and 45 minutes in, you start to look in the mirror and you see the spirit of the man" (Chi, 2016, par. 2). Oldman also describes the impact of more incidental glimpses of himself in costume: "Sometimes I would walk to the set and pass a mirror. I'd catch myself in the mirror and go, 'Ahh!' It was stunning" (par. 2). While there are parallels between actors' depiction of characters and the appearance of AR-filter users, this is not to suggest that the AR filters, at least in their current technological specifications, can match or replace the highly skilled manual processes of costume and make-up. Yet, reflections on wearing costumes can help us understand how AR users can feel and be motivated to act differently when exploring virtual costumes via AR while their bodies are mirrored on the screen. Like a film actor looking in a mirror and feeling aligned with their character as a result of an outward transformation, it seems intuitive that AR users' engagement with virtual costumes can bring out their inner performer.

Actors are more likely to be asked about the importance of costume to their process in roles where their appearance is entirely transformed via prosthetics, padding, or extensive makeup. Yet prominent performers, such as Nicole Kidman and Meryl Streep, have articulated the significance of small nuances in costume design to get into *any* character. Both have talked on various occasions about their long-standing working relationship with costume designer Ann Roth. Streep highlights the seamless fit of Roth's costumes into particular narrative worlds when creating characters (Herman-Cohen, 2003). Kidman worked with Roth on *Margot at the Wedding* (2007) and detailed how clothing and accessories such as glasses and a hat were crucial to her feeling more connected to the titular character: "[Roth]'s able to find pieces of clothing and helps me with the walk and all of things

that you need to change and she gave me the pair of wool socks and that cardigan and I was able to walk around when we were rehearsing and somehow triggered the whole feeling for the whole movie for me” (Douglas, 2007, par. 3).

A notable difference in how film costumes versus AR filters function is that, while film costumes and make-up are typically chosen or designed with a given performer (i.e., actor) in mind, for example by paying attention to their body type or facial features, AR filters often provide more of a “one size fits all” approach. The AR software is trained to identify a user’s bodily or facial features in the frame, and to then adapt it according to a prescribed algorithm. Unlike in film production, where the costume designer, wardrobe assistants, and director may confer on the suitability of the costume, the success (in terms of achieving the desired effect) of AR costumes is determined by the user who is encouraged to “try on” a range of filters or effects. Yet, in keeping with Martin’s (2014) *dispositif* approach to the *mise-en-scène* which acknowledges the role of the technological apparatus, the historical design of film costume and make-up often had to take into account how color, in particular, was impacted by screening technologies. In the 1930s, make-up artists such as Max Factor engaged in detailed testing and reporting on precisely what kinds of make-up shades should be used for black and white film stock (see Kehoe, 1991), leading him to publish technical reports and guidelines on screen makeup, for example in the *Journal of the Society of Motion Picture Engineers* (Factor, 1937). Standard approaches to film make-up would change again with the introduction of color film technologies, such as Technicolor, which required a change both in techniques and the production of make-up itself (see Neale, 2002). Thus, like with AR masks and make-up, earlier forms of film costuming equally depended on processes of trial and error, with creative and technical personnel experimenting with how a given screen effect is impacted by the recording and exhibition technologies.

### 4.3 Affective Qualities

The affective qualities of AR body and face filters lie in the duality between experiencing (receiving) and participating in (telling) a story as well as the simultaneous presence of computer-generated or modified and physical-world elements, such as objects, overlaying graphic elements, or the user's body motion that controls on-screen motion. To approach this, we identify different layers that engagement with AR-modified bodies employ. First, engagement is based on the affective qualities afforded by fiction storytelling as one observes characters that appear in a fully fictional or manipulated context. Second, in the case of self-representation, a user experiences, experiments, and interacts with their own manipulated body on screen that has embodied links to their physical body: it mirrors its movement and certain (untouched) physical characteristics, or it highlights the discrepancies between the physical and on-screen bodies. And third, in both cases, filters may provide emotional impacts, such as self-acceptance or playfulness.

Engagement with fictional characters—as introduced earlier—is based on parasocial relationships or empathic links that include a viewer's emotional connections to the represented actions and assessment of a protagonist's position in a narrative context (Shackleford, 2021; c.f., Shaw, 2011 for the case of video game characters). This is what prompted Roger Ebert to famously label film as an “empathy machine,” which enables a peek into a fictional world by actively engaging with characters through emotions (Ebert, 2005; cited in Jones, 2021, p. 83). While a viewer may be aware of their fictionality either from the source (fiction content), narrative (fantastic elements), or sensory attributes (non-human or artificial looks), these characters may influence their lives and beliefs, and evoke emotions (see Oatley, 2021). The basis of this phenomenon is a general engagement with and transportation into the fictional world which induces comprehension of characters' actions and goals and, thus, empathy toward them (Green, Chatham, & Sestir, 2012; Oatley, 2012).

Based on the train of thought introduced earlier, we argue that AR-modified bodies may induce emotional effects similar to movie characters. Several examples of AR filters are drawn from movies or movie-related franchises, such the ones that turn a user into a black-and-white film noir or horror character, one of the Disney princesses, the Joker, or Batman. These and other examples highlight the place of film culture in AR-based digital communication, but—more importantly—also the fact that users can engage with modified bodies and faces based on their existing knowledge of fictional characters. This means that a user can trace non-verbal cues from them through narrative schemata, such as mimicry, body language, and fictional elements tied to specific characters. Additionally, AR filters generate a narrative context based on modifications; a context where human bodies look in certain ways and appear in certain alliances with backgrounds or the recorded physical-world elements and AR technology. If the rules of causality in this fictional world are perceived as plausible and coherent (Beach & Bissell, 2016), AR-filtered faces and bodies will be assessed through similar parasocial links to that of movie characters. That is, a viewer or user comprehends the narrative context of the fictional world (its characters, environments, behavioral or communication formulas, etc.), and they engage with AR characters as storytelling and information-transmitting agents. For example, if an AR Batman mask is placed on a user's face in a way it is expected based on anatomy and one's previous encounters with Batman content, and if it moves with the head as the laws of physics would dictate, the depicted person may be perceived to be adorned with characteristics Batman encompasses. Or, as we illustrate in the case studies below, a horror witch character filter would incline a user to certain movements and body language to present and perceive themselves as scarier.

In the case of self-representation through AR filters, a user observes their modified body—a body that may have different skin color, age, or body shape than their own, or is adorned with fantastical elements. The created digital body corresponds to the user in its body language and motion but can

represent apparent characteristics that no longer conform to their real-life appearance or demographic markers. So, while the embodied experience may enhance awareness of one's own body on the screen, the disparate characteristics may also distance the user from their on-screen representation. We propose that such detachment from the physical reality that encompasses embodied links may lead to a user perceiving their own body as a character and engaging with them accordingly.

The sense of embodiment in virtual spheres is explained as the amalgam of self-location, agency, and body ownership (Kiltner, Groten, & Slater, 2012). This means that the sensation that links a physical body with its virtually appearing counterpart is based on the sense of identification with one's own body as a physical mass that authenticates the specific movements as well as the correspondence between what is physically sensed and what is displayed on a screen. This, as argued above, eventually leads to the feeling that one owns the digitally displayed or modified body.

Identification with fictional on-screen characters in film and other narrative audiovisual media is based, on the one hand, on assessing a character's aesthetic, social, cultural, and symbolic features, and their roles in a narrative, and on the other, on understanding their thoughts, motives, experiences, and emotions (Eder, 2010; Smith, 1995). Moreover, following the neuroecological and neurophenomenological approach of the embodied simulation theory, bodily and neural processes are involved in recognizing and eventually mirroring on-screen characters' actions to contextualize meaning (Gallese, 2005; Gallese & Sinigaglia, 2011). This implies that the comprehension of on-screen actions and objects is nested in the observer's body. However, while a character's body is disparate from the viewer's body in movie watching, in the case of AR self-representation the two perform corresponding motor actions. This connects representation and comprehension in film to simulation (as in, for instance, video gameplay); a sort of intersubjectivity with corresponding actions, but different sensory representations (c.f., Schröter & Ton, 2014). Accordingly, we argue that

embodied control (the awareness of one’s own on-screen body) effectuates a sensation of assimilation with the represented body (the sensation that “this is my body”), even if the represented body is different from the user’s own in terms of appearance. Thus, the dual function of an AR user’s body—as both a character and a physical body—and the correspondence of physical motion and its sensory representation on screen is what characterizes the affective engagement with AR-modified self-representation.

## 5. Case Studies

While AR-based costumes are not materially felt by their “wearers,” their character-building effect is nevertheless impactful—although in different ways. For instance, as we argue above, when getting into character using AR filters, a user may sense the filter’s impact on their behavior. To illustrate this point and demonstrate how the bodies interact with virtual backgrounds to create specific narrative contexts, we now analyze a selection of curated AR experiences created by one of the authors. These experiences include uploaded still images and SnapLens AR filters and were recorded using Zoom. For the analyses, we apply phenomenological–autoethnographic methods (Pitard, 2019; Wilde, 2020) to assess personal observations through the affordances of the used AR applications. This is necessary on account of the uniqueness of AR experiences and the wide range of combinations of human body representations, which, for our case studies, are summarized in Table 1. By using this method, we argue for the relative generalizability of these experiences based on the frameworks of use these applications enable. Correspondingly, we note that while in each of these examples the AR user is positioned in the center of the frame, there is no reason why one cannot experiment with placing their body/character in a whole range of spaces that are captured by a laptop or smartphone camera.

Table 1. AR and other visual components of case studies

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| Case study           | Background               | Face  | Body   |
|----------------------|--------------------------|---|--|
| 1. Witch             | Still image              | AR—partial avatarization  | AR—full avatarization                                |
| 2. Surrealist horror | AR—partial avatarization | AR—partial avatarization (almost full avatarization; user’s blinking is the only <i>real</i> element) | AR—partial avatarization (including augmented hands) |
| 3. Doll              | Still image              | AR—full avatarization)  | Real-time recording                                  |

In the first example, a Halloween-themed witch SnapLens filter is combined with a screenshot from Robert Wiene’s 1920 expressionist horror film, *The Cabinet of Dr. Caligari* (see Figure 5). The filter blacks out the user’s own body with a cloak-like structure and projects a dark headdress with a headband and white eyes surrounded by dark rings on their face. Observing their modified self on screen, a user may find themselves instinctively adapting their body language to create a better fit with both the filter costume and the background. With the whited-out eyes the most striking element of the filter, excessive blinking can enhance the haunting effect. The shadow-like body shape can incline the user to move and align their body with the iconic set of *The Cabinet of Dr. Caligari* behind them, which features sharply pointed shadows and black lines. The experience evokes an impression of a body that has an oblique shape and distorted facial features and in combination with the aesthetics of the background, leads to an eerie sensation. This sensation is based, on the one hand, on the striking contrasts of fictional and physical-world personas and spaces and, on the other, on the discrepancies between not only the looks but also the movements of the physical and on-screen bodies.

Figure 5 here

The second case study, a surrealist horror-themed SnapLens, incorporates the user's body and physical space, which are rendered abstract through the painterly effect that converts them into shades of yellow, pink, orange, and red (Figure 6). Thus, instead of combining a body filter and a separately uploaded background, this experience involves a filter that modifies the entire mise-en-scène into a coherent visual scheme irrespective of its content and the included element's shape, size, or position. By this, the user's body is represented by a wavy head with a slender face approximating that of the Ghostface mask in the *Scream* slasher film franchise (1996–present) and by dramatically elongated fingers, similar to the kind associated with the semi-human monster, the Slender Man appearing in films, video games, and other media. This filter highlights hand gestures that showcase the dramatically extended fingers, which seem to extend further with movement. The shapes and their references to generally dark-color-themed horror-content stand in apparent contrast with the bright pastel colors that evoke a resemblance with Edward Munch's painting *The Scream* (1893), which is itself an influence on the Ghostface *Scream* mask.

Figure 6 here

The third example involves a doll-like head SnapLens filter and a screenshot from Keiichi Matsuda's 2016 experimental short film, *Hyper-Reality* (Figure 7). Through the filter, the on-screen figure mirrors the user's facial expressions, but by presenting an enlarged head, obscures their own facial features. The size of the head relative to the user's actual body stimulate interactions that explore the perceived head–body inconsistencies and attempt to create cohesion between the two, for example, by gesturing touching the enlarged head or resting their chin on their hands—a movement that seems useful for creating the impression of the head being stable, given that the user's actual neck completely disappears behind the doll head. The difference in proportions between the user's actual

and virtual bodies leads to the impression of a disembodiment effect, whereby the user appears to be touching their face on-screen, even though their hands are inches away from their face in reality.

Figure 7 here

The latter example also incorporates another character, in the form of a woman appearing in the virtual background. The woman's positioning relative to the user's own AR-modified body lacks cohesiveness; their scale and positioning suggest they are not occupying the same space. This creates a *mise-en-scène* that centers the user as the only fictional figure that moves on screen against a still background. However, aligning the spatial dimensions of the background and the user's on-screen body can build a visual framework with an impression that they are part of and simultaneously control the narrative. For instance, when a user's body masks parts of a virtual background, which, when revealed, provides a narrative cue or creates a surprise effect. Examples include the use of popular background images from the psychological horror film, *The Shining* (1980) depicting the ominous corridors of the haunted hotel with the twin girl characters standing in the center. Due to their position, the characters are blocked by the user's body and there is an illusion that the user is present in the fictional world, but when moving to either side, the characters appear and create a similar surprise effect as the film itself does when introducing these characters.

## **6. Filmic Inspirations For (Future) AR Cinema**

This approach to visual storytelling recalls the early cinema illusions of Georges Méliès and what Julian Hanich (2014) terms as “complex staging” when analyzing the works of filmmaker Roy Andersson. Hanich outlines how Andersson often creates hidden dimensions to his static longshots by combining a fixed camera with carefully choreographed combinations of figures, props, and sets.

In certain cases, this means that someone or something that was originally concealed in the shot suddenly comes into view, for example when Andersson hides characters behind walls or doors or other props within the storyworld before unexpectedly having them appear in the scene. We argue that, as with the films of Méliès, Andersson's body of carefully-staged and darkly comedic work provides a useful source of inspiration for AR users developing effective strategies for storytelling.

Figure 8 here

Matsuda's film *Hyper-Reality*, which appears in our third case study, is another fitting illustration, signaling what AR cinema could look like as the technology develops and filmmakers begin to embrace augmented reality visual frameworks (see Figure 8). Matsuda describes his film as a work of design-fiction, which represents "a provocative and kaleidoscopic new vision of the future, where physical and virtual realities have merged, and the city is saturated in media" (Matsuda, n.d., par. 1). As part of its aim of presenting a future where mixed reality technologies are experienced throughout everyday life, the film's *mise-en-scène* is a complex mix of real-world settings and composite technologies as layers of imagery and symbols appear for the viewer as well as the main character (the film is shot from a first-person perspective). This film, along with our case studies and examples of experiences created via Zoom, provide strong support for Martin's (2014) aforementioned argument that *mise-en-scène* can be better understood as a form of *dispositif*, one which acknowledges that technologies of the apparatus should be examined alongside the elements of visual storytelling which are staged for the screen.

As we illustrated, there are already tendencies of creative practitioners and digital media users deploying AR in cinematic ways. Recalling the early special effects illusions of Méliès, teenagers on TikTok have playfully deployed AR backgrounds featuring themselves, in order to appear to be

paying attention (while not having to actually stay attentive in front of their webcam) during Zoom classes (Cole, 2020, par. 4). Filmmaker Graham Woods also attained viral attention when he created a Zoom background video where he brings himself a cup of tea, thus creating a playful relationship between a pre-planned, pre-recorded version of himself and his subsequent real-time presence in front the same camera lens. Woods explained how he was inspired by a scene with actors interacting with themselves in *Back to the Future Part II* (1989) (Storyful, 2020, par. 1). This resonates with our earlier point about AR cinema working as short stories or spectacles, though with clear potential for how similar approaches could be extended to longer works, particularly short or experimental films. Indeed, Woods' work could also be compared to the meta uses of both a theatrical *mise-en-scène* and compositing technology in independent filmmaker Jim Jarmusch's compilation *Coffee and Cigarettes* (2003). One of the film's vignettes uses a split screen and composite video techniques to allow actress Cate Blanchett to interact with herself when performing two roles; she plays herself and her fictional cousin, with the differences in character also signaled via costume.

## 7. Conclusions

This paper aimed to investigate the cinematic contexts of augmented reality interfaces and AR-modified bodies—more specifically the ways in which AR experiences can be understood in terms of cinematic composition, characters, and movie sets. We observed the disparities between visual representations on film and in AR and their transitional dimensions between physical and mediated realities (c.f., Ceuterick, 2021). Regarding AR characters, this transitional dimension reflects on the embodied experience of a user, whose body and expressions are mirrored on screen but are translated into a digital representation that only exists in the temporal and spatial context of the AR experience and the related technology and apparatus. Other AR-based visual setups like virtual backgrounds further enhance such embodied experiences by transposing users into a liminal space

that corresponds to the spatial dimensions of the recorded physical space (e.g., in its size or objects' placement) albeit in a distorted or masked form. AR filters and backgrounds' affective quality, thus, lies in bodily control and in the creative act of choosing and moderating body characteristics, postures, and positions in real-time in relation to the surrounding digitally manipulated or photographic environment. By moderating the representations of bodies and spaces as well as their interplay, AR users actively shape the *mise-en-scène*, the visual composition of the on-screen space and, thereby, the visual narrative. Often, these forms of visual storytelling are truncated—sharing certain qualities with the short spectacles associated with the cinema of attractions in silent film (see Gunning, 1986)—but can rely on the visual iconography of genre conventions and character archetypes.

While such levels of embodied interactions are generally absent from cinema, we conclude that moving images as prevalent forms of art and communication can offer aesthetic, narrative, and cognitive frameworks that correspond to augmented reality and can aid its analysis as a creative medium. As we demonstrated throughout the paper, the parallels between cinema and AR primarily appear in visual composition defined by a screen or field of view and an observer's engagement with the unfolding visual stimuli. However, analogies can also be drawn along longitudinal dimensions, such as the evolution of screening and capturing technologies and the practices these technologies afford. We argue that cinematic storytelling and reception have been shaped by technological developments, which have also altered viewer engagement along with psychological and physiological impacts. For example, rear projection as a technological apparatus was perceived as distracting, but it led the way to technologies, such as the blue and green screen or virtual productions, that enable more realistic representations. The comparison of contemporary uses of AR to historical trends for adopting new technologies and visual storytelling demonstrates that AR as a form of visual storytelling may be uncanny due to overly conspicuous technological limitations. Yet,

there is considerable potential for technology and practices of use to facilitate creative content that moves past the demonstrative and novelty-focused content creation that also marked film history with the introduction of Technicolor, 3D projection, and other technologies with effects on both production and spectatorship.

Comparing AR to cinematic visual storytelling inherently disregards certain aspects which may also be subject to future studies. These include the use of sound and augmenting speech or music through digital tools, such as voice filters. In addition, our approach—with an entry through the *mise-en-scène* concept—has limited capacities for observing augmented reality experiences that exclude rectangular screens, such as AR glasses. What, however, signals the need for cross-disciplinary analyses of the cinematic capabilities of AR technology is its potential presence in film production from pre-production to distribution: AR may be used for remote casting or even filming against pre-recorded backgrounds, and filters matching movie characters' looks or outfits can be used for promoting upcoming blockbusters (Bhatt, 2020; Russo, 2020).

At present and in the near future, we see the AR cinema techniques considered in this paper as being useful and popular even among amateur and emerging film and media-makers, including those who distribute media predominantly through social media and digital streaming sites. AR effects might thus be viewed as a new set of low-budget creative tools, through which less established media makers can develop works or experiment with narrative and aesthetic elements and involve immersive and extended reality technologies in their creative practices. In this respect, AR cinema might continue on from King's (2014) conception of "Indie 2.0," wherein the advent of low-cost digital video and a range of internet platforms and social media networks facilitated new ways to fund, distribute, and promote independent cinema in the 21<sup>st</sup> century.

AR's cinematic and affective qualities—as summarized above—open new ways for immersive and interactive film- and content making. This trend has been demonstrated by earlier collaborations

between the creative and tech industries, such as in the examples of interactive works mentioned earlier that involve the audience to shape the narrative or aesthetic frameworks. These include *Wilderness Downtown* (2010; based on interactions through Google Street View), *Inside* (2011; made in collaboration with Intel and Toshiba), and *Artificial* (2018–2019; where the audience is involved live through Twitch). Another example is *National Geographic's* first AR-enabled cover (launched for Earth Day in 2020): the AR interface projects climate data for some of the world's major cities using an Instagram filter that creates a non-fictional storyworld to give a sense of how those places will look or feel like in 2070 (National Geographic, n.d.).

Regarding the contributions summarized above, the present study primarily aids the following areas where screen-based AR is prevalent: the creative industry, application and user experience design, and research and evaluation of experiences. Content makers (be they everyday app users or creative professionals) can benefit from our findings when evaluating the potentials of character positioning and motion and the combinations and balance of digitally created and real-time captured backgrounds and figures. For app and user experience design, the study offers conclusions on how certain digital elements and their textures, sizes, placement, and motion can potentially influence how users engage with them. Based on our findings, future research areas and questions include empirical testing of AR users' embodied experiences and the effects thereof on narrative comprehension. It may also include theoretical explorations of how ephemeral and personalized narrative experiences can impact immersion into fictional storyworlds and empathy toward fictional characters (see the “empathy machine” debate in social and demographic contexts in Nakamura, 2020).

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*Figure 1.* Still from *Caché* in which the character's television show set includes two-dimensional bookshelves.



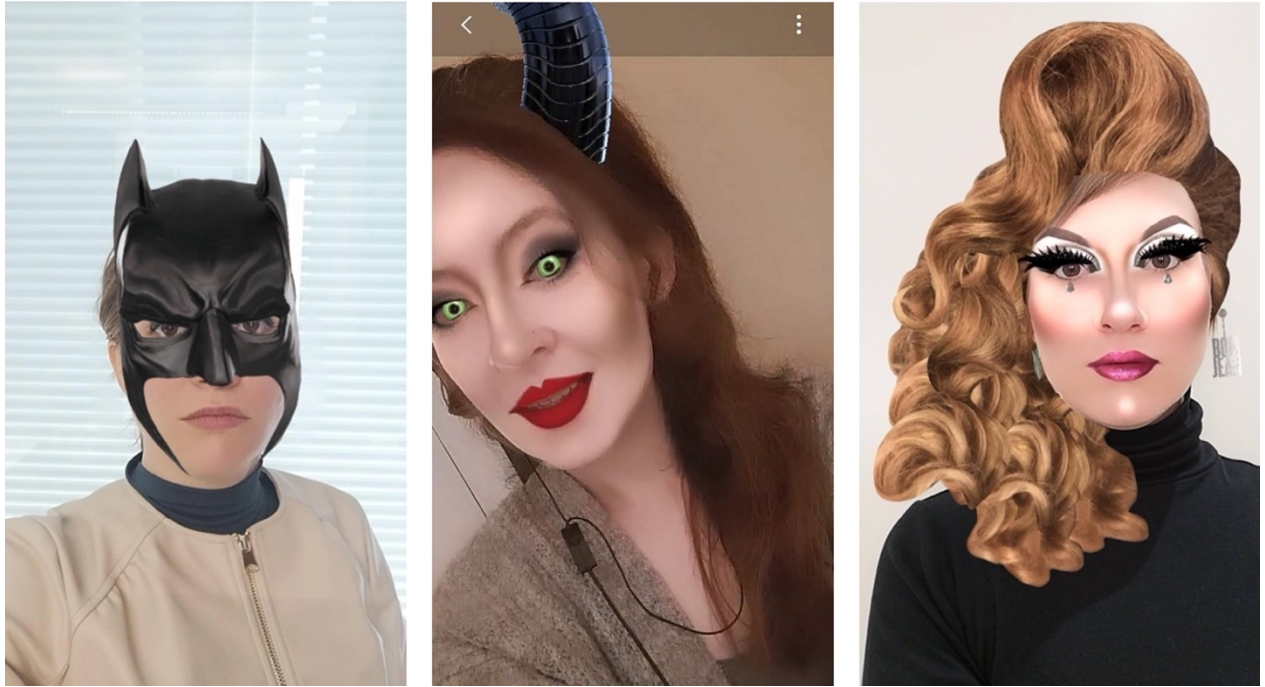
*Figures 2(a–b)*. Stills of rear projection backgrounds in *To Catch a Thief* (Hitchcock, 1955).



Figure 3. Twitter user @David\_Saff in front of a virtual background from the film *Uncut Gems* (2019) in Zoom. Image source:

[https://twitter.com/David\\_Saff/status/1242123063908589568?s=20&t=Kmyi4b\\_2P2gUV4r2frRg-](https://twitter.com/David_Saff/status/1242123063908589568?s=20&t=Kmyi4b_2P2gUV4r2frRg-)

A



*Figures 4(a-c)*. Examples of AR filters for partial and full avatarization. Screenshots by the authors.





*Figure 5.* Witch SnapLens filter in front of a virtual screen from *The Cabinet of Dr. Caligari*. Screenshot by the authors.



*Figure 6.* Surrealist horror-themed SnapLens filter. Screenshot by the authors.





Figure 7. Doll SnapLens filter in front of a still from *Hyper-Reality*. Screenshot by the authors.



Figure 8. Still from the design-fiction concept film *Hyper-Reality*.