The impact of gender-inclusive methods on design decision making

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ABSTRACT

Many assumptions regarding gender biases in design have been raised in recent decades, such as that gender stereotypes can be ingrained in products and services (Akrich, 1992; van Oost, 2003) and that the gender imbalance in technology affects design solutions (Fountain, 2000; Wajcman, 2000). To explore the influence of gender on technology development it was necessary to understand whether there are differences in decisions taken by women and men in the design process that could support such claims. In a previous study with computer science students (Lopes & Vogel, 2020) we used two gender-inclusive methods for designing the user experience (UX) to assess the effect on decision making. Here we used the same methods with design students. Similarly to the first study, some statistical gender differences were disclosed. However, it also revealed that the absence of gender was mostly unnoticed, indicating the feasibility of using gender-inclusive UX methods to address gender fluidity to the design process.

KEYWORDS: Gender, Inclusive Design, Gender Fluid User, UX methods.

1. Introduction

The user experience (UX) of services and applications is shaped by decisions made during the design process. Those decisions generally reflect requirements defined for the project, which should be based on data collected from users, in order to meet their needs. However, each designer makes decisions in their own way, as they have different experiences, beliefs, backgrounds, and will understand users' needs in a particular manner (Bath, 2014; Oudshoorn et al., 2004).

In previous research (Lopes & Vogel, 2020), we wanted to know whether men and women would make different design decisions when developing a dating application for a genderless user (with no explicit gender) and whether they would tend to perceive the user more as a man, as argued in the literature (Bradley et al., 2015; Friedman, 1996). That research with computer science students revealed gender differences in the prioritisation of user needs but no tendency to consider the user a man. In this new study, we focus on design students, adopting and extending the method of Lopes & Vogel (2020). We also wanted to know whether the absence of gender in the UX methods used (*persona* and *scenario*) was perceptive.

The fact that the vast majority of participants reported not realising that the persona presented had no gender supports the viability of using gender fluid user descriptions in the design of the user experience. The results of the investigation set the stage for the development of a gender-inclusive design process and user experience methods that mitigate gender stereotypes in the early stages of design projects, even though unconscious gender bias may emerge (as indicated by the results of this research).

2. Research method

2.1 Participants and recruitment

The research design was independently reviewed and approved by an institutional research ethics board, and participants engaged with informed consent, voluntarily, receiving token rewards. Participants (n=49; 22 women and 27 men; mean age 23 years, sd=4.22) were recruited from a national third-level educational institute for art and design. Design students that volunteered to participate were taking interaction design (BA or MA) or product design (BA) courses at that institution. Participants were recruited through a face-to-face approach inside the institution, during their classes break. Participants who completed the tasks received a €20 voucher for their participation.

2.2 Procedures

Participants received a textual explanation about the *persona* (user description) and *scenario* (service description), which are traditional UX methods, and performed three tasks. The tasks involved setting design requirements for a new dating app based on the descriptions provided. Participants were informed of the procedures but not told that gender differences were being analysed, to not encourage an inclination to consider gender as a design factor (since we wanted to specifically analyse that). They took about 15-20 minutes to complete the tasks.

The persona presented had no gender and, accordingly, no name and no picture, as in the image below (see Figure 1). The scenario, which explains the context of use and the purpose of the service was provided in text form, with the following description: *"I met some friends for a drink the other evening. One of them told me about their experience with this new dating app. I'd never used one before and so had some questions about how it works. My friend opened it there and then, to show everybody the main features. I was curious to try it out but not so confident about installing it. My friend let me use it for a few minutes just to get a feel for it. I enjoyed the experience, so when I got back home, I decided to install the app on my own phone, to give it a go. I used the application for half an hour or so and matched with some interesting people. I've been using the app every night since, to look for new people to match with and to keep the conversation going with some of those I connected with previously. Everything really seemed to click with this one person, and we have a date coming up next Friday. I'm really looking forward to it."*

Design tasks included sorting elements of the interaction through an adapted card sorting method, which was used to define the hierarchy of user needs during their experience on dating applications (see figure 2); rating personality traits that would define the application behaviour through an adapted desirability cards method (see figure 3); rating dating applications features throughout the user journey (see figure 4). The first task measured priorities assigned to the user experience through sorting elements from the most important to the least important. Both the second and third tasks measured priorities through a likert scale. After the design tasks, participants were asked to indicate the persona perceived gender and the level of difficulty ("easy", "medium" or "difficult") in designing without taking into account their own preferences. The tasks were developed based on feedback from dating app users (Lopes & Vogel, 2017; Lopes & Vogel, 2019).

Figure 1: Textual presentation of the target user in the form of a genderless persona.

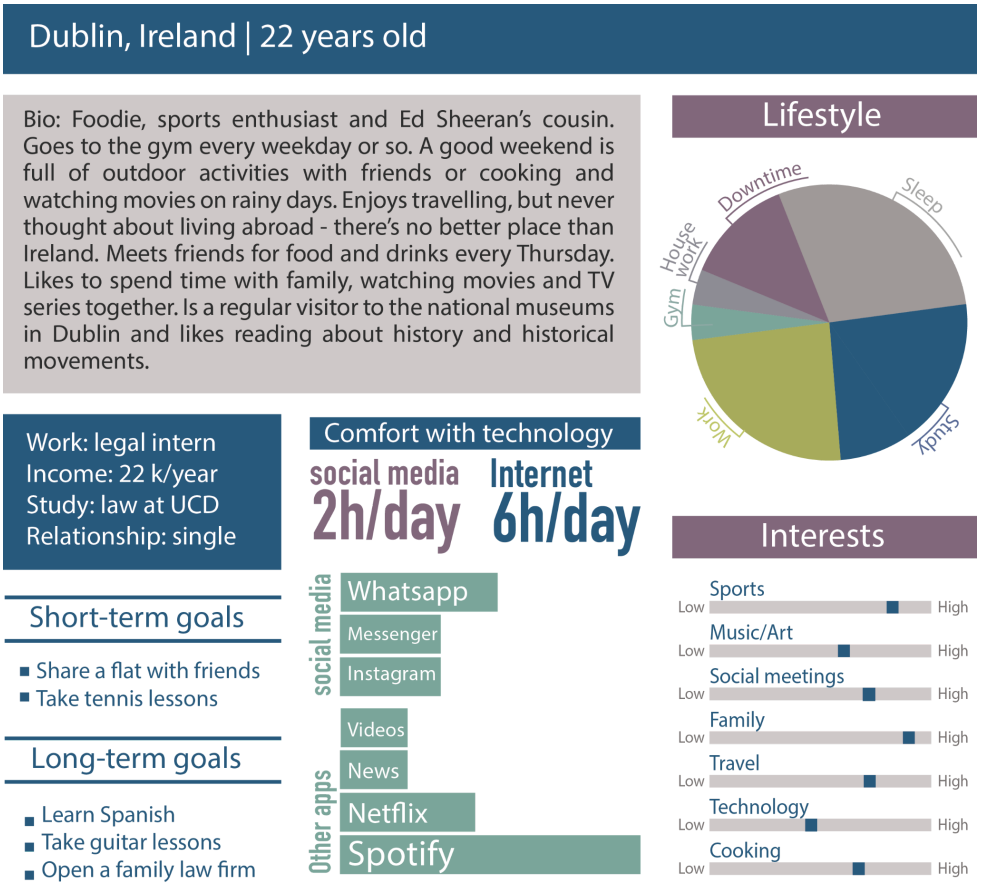

Figure 2: First task about prioritisation of user needs.

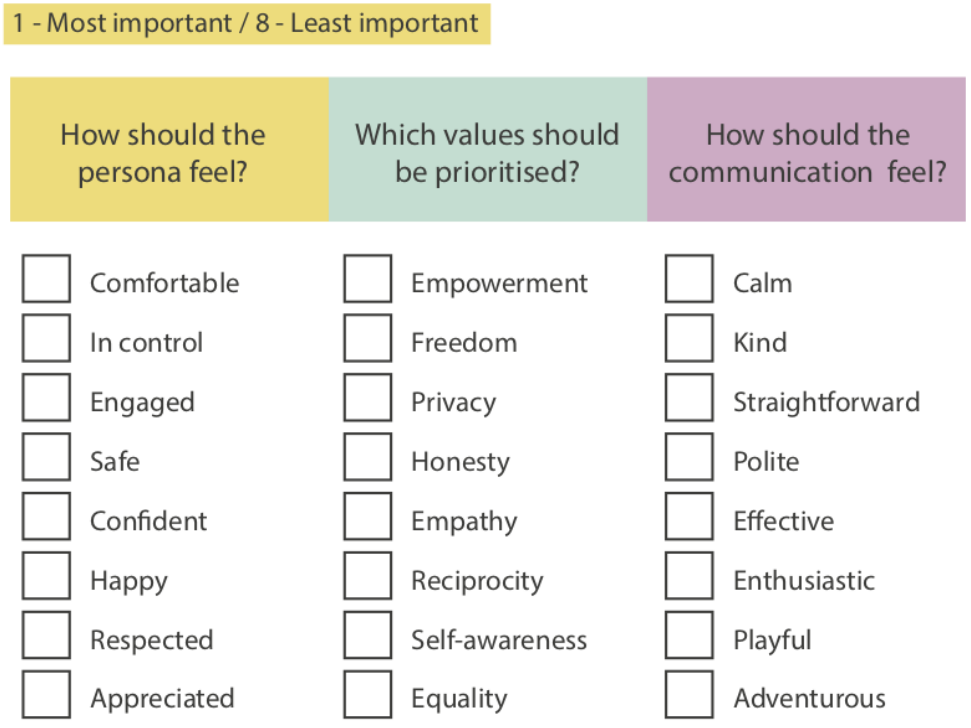

Figure 3 and 4: Second task about the app personality and third task about features.

	Definitely NOT	Probably NOT	Neutral	Probably YES	Definitely YES
Discreet					
Caring					
Easygoing					
Cheerful					
Open-minded					
Honest					
Creative					
Intriguing					
Down to earth					
Polite					
Flexible					
Straightforward					
Committed					
Reliable					
Engaging					
Proactive					
Spontaneous					

Feature	Function
Join a group	Users can find all those with one common interest in the same place.
Relationship mode	Users can filter by motivation and quickly find those looking for a relationship.
Time is ticking	Users have to engage more with their matches or lose them due to inactivity.
Gift voucher	Users can help a friend who needs an extra push by giving them a voucher for paid features.
Stay safe	Users can find protocols and features that help them to stay safe during encounters.
Self-awareness	Users can get statistical reports to better understand what they're doing wrong and well.
Chemistry	Users can enable video and voice features to get to know their matches better before meeting.
Match boost	Users can define their preferences and let the system give likes on their behalf.
Smart move	Users can get tips to improve conversation and keep matches interested in them.
Flirting tips	Users can get tips to improve their confidence and approach.
Rate users	Good behaviour gets more visibility; bad behaviour gets penalties.
Common interests	The more they have in common, the more visible their profiles will be to each other.

2.3 Analysis

Table 1. Summary of ranking scales and values for the three tasks.

Task	*Greatest priority*	*Least priority*
Task 1: feeling	1	8
Task 1: value	1	8
Task 1: communication	1	8
Task 2: personality	5	1
Task 3: features	5	1

Considering the nature of the data analysed and the study goal, a nonparametric Mann-Whitney Test (Wilcoxon) was used to detect significant differences between design decisions made by men and women. Participants were asked to make choices for a new dating application and it was possible to analyse their choices for each task. Each element was analysed separately. The null hypothesis was that there was no difference between the values assigned by men and women. In discussing the results, emphasis was given mainly to the effects that are statistically significant ($p < 0.05$).

The data sets were tested for independence in four different ways: differences by participants' gender, differences by the persona's perceived gender, differences by participants' gender when designing for a persona perceived as a woman and differences by participants' gender when designing for a persona perceived as a man. In each of these cross classifications of responses, median responses to items were analysed in order to detect which group assigned priority to each element analysed. In the first task, three elements were analysed: feeling, value and communication dynamic. In the second task the app personality was analysed and in the third task the app features. The summary of ranking scales and values for each task is provided below (see Table 1).

3. Results

The tables with the results of the study display the number of the task in the first column, the elements with statistical significance in the second column, the median values for participants' gender or the persona's perceived gender compared in the third and fourth columns, and the result of that difference that leads to the prioritisation of that element in the fifth column.

3.1 Perception of gender and personal bias

Among the 49 students that participated in the study, 35 believed the persona was a man and 11 believed the persona was a woman. Of the women, 5 believed the persona was a woman and 17 that the persona was a man. Among men, 6 believed the persona was a woman and 18 believed the persona was a man (see Table 2). Thus, a $\chi 2$ test of the independence of participant gender and judgements of persona does not reveal a significant difference within the design group: χ 2 = 2.6367, df = 3, p = 0.4511. One may not reject the null hypothesis that there is no interaction between participant gender and perceived persona's gender. However, a binomial test revealed that participants, in general, were significantly more likely to perceive the persona as a man. Considering that participants were expected to guess the persona's gender in a balanced way (50% women / 50% men), the binomial test reveals a significant proclivity to identify the persona as a man within this group: number of successes = 35, number of trials = 46, p = 0.0005356.

Table 2. Perception of the persona's gender: participant gender vs. perceived gender. From the original sample (N=49), 2 did not answer this question.

Participant's gender	*Persona: Woman*	*Persona: Man*	*Persona: No gender*	*Total*
Women	5	17	0	22
Men	6	18	1	25
Total	11	35	1	46

With regard to the perceived difficulty of making design decisions for a persona without taking personal beliefs into account, 4 women found it easy, 14 were neutral (medium), and 6 found it difficult. Among men, 2 found it easy, 14 were neutral, and 11 found it difficult (see Table 3). The interaction between participant gender and perceived difficulty is not significant: χ 2 = 0.97049, df = 2, p = 0.6155. Therefore, it is not safe to reject the null hypothesis that there is no interaction between participant gender and reported difficulty in designing for a specific user.

Table 3: Perception of the level of difficulty in designing without personal biases.

Participant's gender	*Easy*	*Medium*	*Difficult*	*Total*
Women	2	14	6	22
Men	2	14	11	27
Total	4	28	17	49

It seemed useful to know whether students perceived the absence of gender in the persona and scenario descriptions. This idea only came to light after conducting the

study with computer science students, which is why it was not posed in the previous study. These results indicated that, among women, 15 did not notice the absence while 7 did so. Among men, 23 did not, and 4 did, notice the lack of gender in the description of the persona and scenario. In total, 38 participants did not notice the absence of gender and 11 did so (see Table 4). The interaction between participant gender and the perception of the lack of gender is not significant: χ 2 = 1.1549, df = 1, p = 0.2825. Moreover, the interaction between perceived difficulty and noticing the absence of gender in the persona and scenario descriptions is also not significant: $\chi 2 = 1.9859$,df = 2, $p = 0.3705$.

Table 4: Perception of the lack of gender definition in the persona's description.

Participant's gender	*Did not noticed*	*Noticed*	*Total*
Women	2	14	22
Men	2	14	27
Total	4	28	49

3.2 Test 1: Differences by participants' gender

By analysing gender differences according to participants' gender (see Table 5), it was revealed that men were more likely to embed the app with a value of "honesty", and to prioritise the "time is ticking" and "self-awareness" features compared to women, while women were more likely to embed the app with an "easygoing" personality when compared to men. Women gave higher priority to comfort, privacy and politeness in task 1, to the easy going personality in task 2, and to the "common interests" feature in task 3. The lowest priorities were given to feeling "appreciated", "reciprocity", and "effectiveness" in task 1, to the "committed" personality in task 2, and to the "gift voucher" feature in task 3. Men, in turn, rated the feeling of "comfort", "honesty", and "playful" communication higher in task 1, an "honest" personality in task 2, and the "common interests" feature in task 3. Men rated feeling "appreciated", the value of "empowerment", and a "straightforward" form of communication lower in task 1, a "committed" personality in task 2, and the "gift voucher" feature in task 3.

Table 5: Median responses to items. Statistical significance as assessed using the Wilcoxon test is indicated with asterisks (* − $p < 0.05$; * * − $p < 0.01$; * * * − $p < 0.001$).

Task	*Element*	*Women*	*Men*	*Prioritised by*
Task 1: value	Honesty*	3	2	Men
Task 2: personality	Easygoing*	5	4	Women
Task 3: feature	Time is Ticking*	2	3	Men
Task 3: feature	Self-awareness*	2	3	Men

3.3 Test 2: Differences by personas' gender

By analysing decisions made when designing for the persona perceived as woman or man, participants, in general (both men and women, together), were more likely to consider that women would like to feel "safe" and to use an app that emulates an "honest" personality.

When the persona was perceived as a woman, the elements judged as more important by participants in task 1 were feeling safe, the value of honesty, and a playful form of communication. The elements rated lower in task 1 were feeling appreciated, the value of reciprocity and a playful form of communication. In task 2, an honest personality was the most highly rated element and a committed one was the lowest. For task 3, "common interests" was the feature rated higher and match boost rated lower.

Participants who perceived the persona as a man rated feeling "comfortable", the value of "privacy", and a "playful" form of communication higher in task 1, an "easygoing" personality in task 2, and the "common interests" feature in task 3. The lowest values were given to the feeling of "appreciation", the value of "reciprocity", and an "effective" form of communication in task 1, a "committed" personality in task 2, and the "gift voucher" feature in task 3.

Table 5: Median response to items, according to personas' perceived gender. Statistical significance in the difference as a function of perceived persona gender, assessed using the Wilcoxon test is indicated with asterisks (*− p < 0.05;**−p < 0.01;− p < 0.001).***

Task	*Element*	*Persona: woman*	*Persona: men*	*Prioritised by*
Task 1: feeling	Safe*	1	4	Persona: woman
Task 2: personality	Honest*	5	4	Persona: men

3.4 Test 3: Differences by participant's gender for the persona perceived as a woman

Among participants, men were more likely to prioritise a "playful" form of communication while women were more likely to embed the app with an "easygoing" personality when designing with a persona perceived as a woman in mind (see Table 6).

Table 6: Median responses to items for a persona perceived as a woman. Statistical significance as assessed using the Wilcoxon test is indicated with asterisks (*− p < 0.05;**−p < 0.01;− p < 0.001).***

PERSONA: WOMAN				
Task	*Element*	*Women*	*Men*	*Prioritised by*
T1: communication	Playful*	5	1	Men
T2: feature	Easygoing*	5	4	Women

3.5 Test 4: Differences by participant's gender for the persona perceived as a man

In the group, men were more likely to embed the application with a value of "honesty" value and women with a value of "empowerment" value when the persona was perceived as a man (see Table 7).

Table 7: Median responses to items, according to the gender of participants, when the persona was perceived as a man. Statistical significance as assessed using the Wilcoxon test is indicated with asterisks (*− p < 0.05;**−p < 0.01;− p < 0.001).***

Task	*Element*	*Woman*	*Men*	*Prioritised by*
Task 1: value	Empowerment (value)*	6	7	Women
Task 1: value	Honesty (value)*	4	3	Men

4. Discussion

With regard to gender biases, this study not only revealed differences in how men and women establish requirements for a project but also in how the perception of the persona being either a man or a woman lead to different requirements, even when the user was described in a gender-inclusive manner. That is, given one single genderless user, different requirements can be defined depending on the designer's/developer's gender or on the persona's perceived gender. Moreover, this study also revealed that some gender differences depend on participants' background.

4.1 Gender neutrality and personal bias

As previously explained, the gender of the persona was left unspecified in these design sessions. Participants were provided a genderless persona which was created with the help of a design team, in light of the feedback of a gender expert, and validated in a pilot session with PhD students before the study was conducted with participants. Some students expressed being surprised with the disclosure of the absence of gender in the last question since they did not realise that they had assigned a gender without specific information in that respect.

Of participants, 78% reported not noticing the absence of gender. Those who noticed still perceived the persona as either a man or a woman, with the exception of one participant who disclosed that no gender came to his mind. This is the reason why the classification of these results is binary in nature. Participants read the user description and assigned a gender to the persona according to their understanding of women's and men's personalities and their own biases.

In the previous study, women and men assigned gender identities (man and woman) to the persona in a balanced way. However, among design students, 71% thought the persona was a man and 22% thought it was a woman. Friedman (1996) has indicated that people would tend to imagine the user of technological developments as a man and here there was a tendency to think of the user as a man, indeed.

The fact that 78% of the design group did not notice the absence of gender in the persona indicates the feasibility of designing with a gender-inclusive persona; a persona who is not named and not pictured. This is evidence against the hypothesis that gender is important for establishing the "believability" of personas (Burnett et al., 2016; Grudin, 2006) and that it should be an integral part of their descriptions (Pruitt & Adlin, 2006; Nielsen et al., 2015)

Nevertheless, there is a strong indication of participants' biases towards their own preferences in decision making, since 35% of participants found it difficult to make decisions for a user without taking their own preferences and experiences into account, even when the user is defined. From the total sample, only 8% found it easy to avoid personal bias. Hence, the assumption that there is gender bias in the design process even when a user-centred design approach is adopted (Williams, 2014) as well as the tendency to design for oneself (Rommes et al., 1999; Oudshoorn et al., 2004; Akrich, 1995; Fleming & Koman, 1998; Pruitt & Adlin, 2006) is supported in this study, by means of the self-assessments of participants.

A brief subjective discussion of statistically significant differences is provided below. This is a subjective attempt to contextualise the results of differences based on previous findings and literature review. In-depth interpretation of these differences would require

follow-up studies and the use of other methods such as focus groups to encourage a rich discussion of the findings that goes beyond the scope of this study.

4.2 Differences by participants' gender and persona's perceived gender

By analysing the data, the value of "honesty" was more likely to be assigned by men than by women. Yet, a closer look at the differences assigned to each persona's perceived gender reveals that participants were more likely to embed the application with an "honest" personality when the persona was perceived as a woman. Men were also more likely than women to prioritise "time is ticking" and "self-awareness" features, although median ratings for both men and women do not highlight that feature as important. "Time is ticking" refers to a feature that encourages users to start a conversation with those people already matched and "self-awareness" refers to a feature that would provide feedback on the user's dating statistics. Women were more likely than men to embed the application with an "easygoing" personality, which was considered important by both women and men. Taking a closer look at the decisions made with respect to the persona's perceived gender, "easygoing" appears more likely to be embedded as a trait in the app by women when the persona was perceived as a woman.

Apart from the results already discussed above, men were more likely to prioritise a "playful" interaction when designing for a man (median 1 - most important), which did not seem a priority for women designing for a woman (median 5 on a scale from 1 – most important – to 8 – least important). However, "pastime" was indicated as a motivation for using Tinder by 12% of the women users of Tinder (Lopes & Vogel, 2019) and by none of the men users. When designing for a persona perceived as a man, men would prioritise the value of "honesty" more than women, who would in turn prioritise the value of "empowerment" more than men. The value of empowerment, however, was ranked low by both women and men (median 6 and 7, respectively), and thus, not considered an important value when designing for the persona perceived as a man.

4.3 Pooled data: comparison with the previous study

We provide here a brief comparison between results revealed here (design students) and results of the previous study (computer science students). It was possible to understand that many differences that emerged depended on participants' background. Computer science students were more likely to facilitate an "effective" form of communication, to embed the app with a "creative" and "intriguing" personality and to prioritise the "self-awareness" feature, in comparison to design students. Design students, in turn, were more likely to embed the app with a value of "empathy", a "polite" communication style, and an "honest" and "respectful" personality, in comparison to computer science students. These results reveal that design students were more committed to providing an interaction that would enhance good behaviours among users while computer science students were more committed to designing a more effective and appealing interaction.

The number of statistically significant gender differences found in the four tests conducted was greater in the computer science group (16 differences) compared to the design group (10 differences). Furthermore, the gender differences in the design group were limited to a significance level of 0.05, which indicates an estimated probability of

95% of rejecting the null hypothesis that there were no differences between the two genders. Within the computer science group, however, the significance levels in differences varied from 0.05 to 0.001, indicating an estimated probability of 95% to 99% of rejecting the null hypothesis. In other words, the number of differences is greater in the computer science group and some differences are more significant.

Gender in its plurality and complex nuances of masculinities and femininities can play a role in how gender differences are more or less evident in certain groups. As indicated by Faulkner (2006; 2011) engineering and information and communications technologies (ICTs) are fields in which the expression of "masculinities" and suppression of "femininities" configure women and determine their success to adapt to an environment dominated by men. The same was brought to light by Williams (2014) in relation to the computer science workplace culture: some women in technology claimed that they learned to think like a man. Some gender blending women decided to express more masculine traits because in a dominant patriarchal scheme men are treated with social superiority, more respect and less vulnerability (Devor, 1989). Technology fields may attract women that are more masculine and feel more comfortable in a masculine environment. However, gender differences would be less perceptive in the design group than in the computer science group. More specific research would be necessary to understand whether this is the reason for the differences that emerged in this study and which gender group is flexibilizing the boundaries of traditional gender roles, men or women. Thus, it is also possible that the opposite is also happening in design groups: that men are more fluid in expressing femininities that lead to less differences.

4.4 Gender-inclusive design and gender fluid UX methods

There are some mechanisms considered to lead to gendered design (Bath, 2014), among which two are connected to problematic definitions of users: the tendency to designing for oneself (Akrich, 1995) and the inscriptions of gender stereotypes (Oudshoorn et al., 2004). These issues are possibly caused by a lack of user research (Rommes, 2014), and bias in development (Friedman & Nissenbaum, 1996). Given that fact and that technology is field dominated by men, the assumption that developers would tend to normalise gender by developing for the men's norm becomes more plausible.

Approaches such as user-centred design and participatory design put the user at the centre of design projects and should help to mitigate gender bias in design. Personas, for example, are used in the early stages of the design process to help the development team to engage and empathise with users (Marsden & Haag, 2016; Pruitt & Adlin, 2006; Nielsen et al., 2015), in order to understand their needs and expectations (Cooper, 1999). The use of personas encourages designers to avoid designing for their own needs or for the stereotyped ideas they have of users. This tool also facilitates communication between team members and with stakeholders, who can refer to a "person" when making decisions instead of using the generic term "users". However, Williams (2014) draws attention to barriers in user centred design (UCD) and explains that even when tools are used to reduce bias, there are still many design decisions influenced by personal opinions of the members of design teams that affect the development of products (Oudshoorn et al., 2004). In fact, participants in this study disclosed that they found it medium difficult or difficult to make decisions without taking into account their personal opinions.

In this study we explored the use of a genderless persona and a genderless scenario, and the results indicated the feasibility of approaching gender fluidity in UX methods in the future as a tool to retain focus on users' needs rather than on gender. However, the genderless persona used here study had no gender traits and did not represent the user needs of different groups. The idea here was to test the perception and the effect of gender, the reason why the description was as neutral as possible. Ideally, in a real case scenario, a genderfluid persona would be more realistic, in which different gender needs could be merged in a single persona. Persona and scenario are widely used for designing the user experience, but the traditional elements of a persona such as gender, picture and name will inevitably reinforce gender stereotypes. Unconscious biases, in turn, will probably occur even when gender-inclusive methods are used, as indicated by the results of this study.

5 Conclusion

The goal of this study was to understand the impact of designers' gender in the design of the user experience. The results revealed here indicated the existence of inherent gender biases in design even when a persona and a scenario with no gender traits were provided. Comparing this novel study with the previous one, differences between computer science and design students also emerged, indicating the influence of participants' backgrounds that may lead to different design outcomes, regardless of gender. However, this exploration also revealed that the majority of participants did not notice the absence of gender in user description, indicating that it is possible to engage with user needs without emphasising gender. Thus, approaching gender-inclusivity may be a feasible approach to UX methods in terms of "realism"and lead to solutions that mitigate gender stereotypes. Further discussion on how to approach gender inclusivity and to develop gender fluid UX methods will help to improve the design process as a whole.

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