Gender differences in design creativity

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Abstract

Gender is a crucial factor for creativity in design. Although the participation and recognition of successful and prominent women in the field of design seems to be increasing, many more men are still recognised and regarded as creative. This paper analyses the gender differences in design creativity. First, a summary of studies on gender differences in creativity in general is presented. It then discusses three critical aspects of gender differences in design creativity. Finally, some ways in which women's creativity can be encouraged and supported are outlined.

Keywords: design creativity, gender differences, human behaviour

1. Introduction

'It is 1991. The women's movement began in the 1960s and is almost thirty years old. Why have we not begun to see a more equal ratio of successful women to men in creative fields?' Unfortunately, these words and the question posed by Jane Piirto (1991) are still relevant more than 30 years later. Many people might argue that the environment for creative women today is much better than in the past. However, until women and men are equally able to develop their creative potential, much still needs to be done (Reis, 2002). Although everyone, both women and men, seems to have the potential to be creative, it is assumed that this potential can be stimulated to amplify the creative process and transform it into the design of products and services for society.

In design, in particular, both gender and creativity are linked and represent essential themes. Creativity is considered an integral part of design and a crucial element in new product development that contributes to problem solving and the development of innovative products (Han, Forbes and Schaefer, 2021). Studies show a strong correlation between creativity, design and innovation. Hollanders and van Cruysen (2009) found that the countries with the best performance in creativity and design are the innovation leaders with the highest design activities and also a strong overall innovation performance. Creativity and innovation are considered critical to the success of any organisation (Anderson et al., 2014), while design creativity and design innovation are key factors in the success of new products and systems. In contrast to other disciplines that are concerned with analysing and describing existing realities, design is about conceiving and communicating new realities (Askland, 2010). Organisations have addressed the importance of gender equality and it is seen as core to development (World Bank, 2012). Promoting gender equality is one of the 17 United Nations Sustainable Development Goals (SDGs) to be achieved by 2030 (United Nations, 2021).

The relationship between gender and creativity is a topic that has been studied by many researchers; a considerable number have also explored the relationship between design and creativity, and others have studied gender and design. However, little attention has been paid to the impact of gender differences on design creativity. Specific studies on gender differences in design creativity are important. This is because design creativity is seen as a separate field from scientific and artistic creativity, as the outcome

in design requires a use value (unlike in art) and "it cannot be deduced by a step-by-step manner by pre-existing rules as in scientific creativity" (Lazar, 2018). Furthermore, studies have shown that there is a difference in the brain due to the overlap of brain networks underlying design creativity compared to other types of creativity (Lazar, 2018). In addition, gender is very important in design. Considering gender in the design of solutions ensures that more balanced outcomes are promoted overall and relevant designs are implemented (Hentschel et al., 2017).

This paper aims to analyse gender differences in design creativity. It takes the form of a literature review of studies that link these three main themes, or at least two of them: Gender, creativity and design. The literature review was conducted using the 'problematising review' approach: reading broadly but selectively, problematising the objective, avoiding the mere reproduction and reinforcement of conventions, and rethinking the existing literature to generate new ways of thinking (Alvesson and Sandberg, 2020). This paper first provides a summary of studies on gender differences in creativity in general and an analysis of gender differences specifically in the design context. It then discusses three critical aspects of gender differences in design creativity. Finally, ways in which women's creativity can be empowered and promoted are outlined.

2. Gender and creativity

Gender and creativity have long been linked in the literature by many researchers. It is not the aim of this review to examine studies on gender differences in creativity. Several comprehensive reviews have already been published on this topic (Abraham, 2016; Baer and Kaufman, 2008; Pagnani, 2011; Runco et al., 2010). In this study, reviews and other studies on gender differences in creativity are presented, centred around two questions: whether there are gender differences in creativity and what these differences are.

2.1. Are there gender differences in creativity?

More men than women are recognised, well-known and considered more creative in various fields, suggesting a correlation between gender and productivity. However, this does not explain the causes (Abra and Valentine-French, 1991). Piirto (1991), in her research on why few talented women are recognised in the visual arts, mathematics and music, claims that many studies have found no significant personality differences between creative men and women. Instead, differences emerge in the choices creative people make after graduation in terms of their engagement and regular creativity-related endeavours. In contrast, Csikszentmihalyi (2013) states that creative people have cross-gender characteristics. He believes that creative women tend to be far more assertive, self-confident and overtly aggressive than ordinary women, while creative men appear to be more sensitive than ordinary men.

Baer and Kaufman (2008) provided a comprehensive overview of the literature on gender and creativity. They focussed on general aspects of gender differences in creativity - rather than a specific area - and showed that there are no gender differences in creativity. However, the authors note that although many studies have been conducted on gender differences in creativity, this issue has not become a relevant topic. Furthermore, they consider the empirical results of many studies to be inconsistent - among other things - because they focussed on divergent thinking that did not reveal consistent gender differences. Baer and Kaufman (2008) emphasise the need for further studies on this topic, as there are still large gender differences in creative productivity.

Later, Abraham (2016) conducted a literature review of psychological and neuroscientific findings. According to her, gender differences in creativity have been actively investigated in behavioural studies, but few studies have focused on gender differences in creativity in the brain. The author concludes that women and men do not differ in their intellectual abilities, but possibly in cognitive strategies, functional tasks or cognitive styles to which both are physiologically predisposed.

The myth that women and men have different minds was debunked by cognitive neuroscientist Rippon (2019) through an extensive literature review that led to a proposal about gender differences in the brain. She claims that there is currently no evidence of relevant differences in the brains of men and women or in the behaviours that support these brains. However, the author does not deny that gender differences may play a role and affirms that it is not enough to focus on biological sex to uncover the reasons for the gender imbalance. The inconsistency in the results of empirical studies on gender and creativity

could be related, among other things, to how researchers measure creativity (Baer and Kaufman, 2008; Bender et al., 2013; Stumpf et al., 2020). In addition, it must be emphasised that great caution must be exercised when generalising empirical results with regard to gender differences, as this can lead to misunderstandings (Fine, 2010; Rippon et al., 2014).

2.2. Explanations for gender differences in creativity

The results of studies on gender differences in creativity are contradictory and suggest that the causes of the differences are diverse and confusing and relate to different areas. Abra and Valentine-French (1991) describe 17 reasons for gender differences in creative performance, noting that creativity depends on biological and environmental factors and that the potential of innate talents depends on experience. Furthermore, creativity can occur in areas that require different skills, with men and women differing not in the quantity of talent but in the favoured areas.

Environmental factors play a crucial role in influencing gender-specific creativity performance. Baer and Kaufman (2008) argue that women and men live in environments that lead to inequalities in creative performance. Men's work environments are generally more conducive to creative development than women's, allowing men to express their creative abilities more often than women. There are also discriminatory barriers that women face. In particular, if they work in a male-dominated environment with only a moderately accommodating culture/climate, their ability to contribute to innovation is likely to be hindered or blocked (Cropley and Cropley, 2017).

Creative climate is one of the environmental factors and refers to the 'perceptions" of how an organisation approaches creative problem solving to generate new and valuable ideas, a key element in stimulating innovative performance (Hunter et al., 2019). Kossek et al. (2017) point to the need for a climate for gender inclusion that encompasses three dimensions: fairness, harnessing talent and support in the workplace. Other environmental factors include different social constraints, possible biases in expert judgement and different access to resources (Baer and Kaufman, 2008).

There are also cultural aspects that can cause young women to abandon creative activities, such as expectations of marriage and family life, cultural values and role expectations (Runco et al., 2010). Due to the separation of gender roles, innovation becomes a male code and the innovative potential of women is not utilised (Foss et al. 2013). Reis (2002) believes that the difference in creativity between men and women may lie in the fact that women are more diverse in their creativity without following a single clear path, whereas men are more focussed on a creative goal. She theorises about the divergence of female creativity in different domains and argues that women express their creativity differently and seem less able or interested in focusing on just one aspect of creativity.

Bender et al (2013) claim that creativity in women is associated with internal incongruence and a lack of satisfaction and internal cohesion. In contrast, men are self-reliant, internally cohesive and reject feedback from the environment. This is consistent with Charyton and Snelbecker (2007) who, when analysing the selection of self-descriptive adjectives as potential indicators of creativity, found that men correlate positively with creative personality, while women show a negative correlation.

Other gender differences in creativity could be related to self-confidence, threat and self-evaluation. Pesout and Nietfeld (2021) claim that women show less self-confidence than men in certain creative thinking tasks, and this gives women a distinct advantage in generating more innovative solutions. Kemmelmeier and Walton (2016) found that women performed better at creativity than men when the task was beneficial to others and there was no threat, unless the threat was competitive. The authors also found that women were slightly better than men at self-assessing the objective degree of originality of their creative performance.

3. Gender and creativity in design

Few empirical studies look at gender differences in design creativity. However, there are some studies on design creativity that address gender differences, as well as studies on gender and creativity in related fields (e.g. advertising, engineering and innovation) that could be useful for the field of design creativity. Based on the literature review, three key aspects related to gender differences in design creativity are discussed: gender differences in innovative design, gender differences in the creative design process, and gender differences in design fields.

3.1. Gender differences in innovative design

Innovative design has the potential to promote the competitive advantage of nations and regions (Reimer, 2016). The importance of innovative design for society is recognised by scholars (Taura and Nagai, 2017) and organisations (The Work Foundation, 2013). In this sense, Lindberg et al. (2012) argue that creative behaviour is a crucial aspect of innovation, which in turn is crucial for economic growth. However, the construction of innovation is associated with masculine connotations (Alsos et al., 2013; Pettersson & Lindberg, 2013).

Studies suggest that some masculine characteristics play a normative role in innovation policy and networks. Pettersson and Lindberg (2013) explain that this means that "top-quality" male researchers are often seen as fundamental to public endeavours to create an innovative society. Pecis (2016) also emphasises the importance of gender in innovation, pointing out that innovation is a social gender practise in which there is no such thing as gender-neutral innovation.

The stereotype that women are not innovative also seems to imply that their ideas are not initially heard or considered inferior to male ideas and therefore not implemented (Alsos et al., 2013). Alsos et al. (2013) argue that the problem is not that women are not innovative, but that organisational practises inhibit and condition women's innovative behaviour. This idea is also supported by Foss et al. (2013), who found a link between creativity, implementation, and gender. This study shows that creativity and the implementation of new ideas in women and men are influenced differently by the organisational structure and work environment. While women work predominantly in customer service, internal service, accounting and research and analysis, men work predominantly in management, technical and operational work and technical and research planning. Although scholars have studied the relationship between innovation and gender, Alsos et al. (2013) point out that most innovation studies do not focus specifically on gender, but include it as a variable or only hint at it. Innovation is critical to competitive advantage and is a gendered phenomenon. Therefore, it is important to optimise resources and include the contribution of women (Alsos et al., 2013).

3.2. Gender differences in the creative design process

There are many different creative design processes in the literature, such as: the divergent thinking method (Guilford, 1975), the Descriptive Model of Design Process (Cross, 1997), the creativity process associated with a creative outcome (Sarkar and Chakrabarti, 2011). Gero et al. (2019) argue that to better understand the role of creativity in design, it is important to determine whether there are specific processes that produce creative outcomes. The way in which male and female designers approach the design process may differ. Although this is a very important topic because the gender differences in the design process can impact the final product, it has been little researched.

One difference between the genders in the creative design process appears to be the need for users in the design process. Researchers argue that female designers appear to be more sensitive to user needs than men (Ng et al. 2013; Oudshoorn et al., 2004; Souto et al., 2015). In a study of digital designers, Souto et al. (2015) found that for men, the three most important factors in designing a good digital product are: usability, innovation and the use of appropriate tools for product development, while for women they are: user needs, project goals and technological aspects. This means that more women than men mentioned the importance of understanding user needs and the technological aspects of an interface during the design process. They also found that more women than men conducted research with users during the design process. In line with this study, both Ng et al. (2013) and Oudshoorn et al. (2004) found that female designers have a greater sense of user needs than male designers.

The diversity of users (e.g. by gender, by age) in participatory and user-centred design approaches is also seen as an important aspect to avoid stereotypical and homogeneous images being incorporated into technology projects (Oudshoorn et al., 2016). User preferences and needs are central aspects of successful designs (Still & Crane, 2017), and user involvement is crucial for the development of insights and practises in approaches such as design thinking and user-driven innovation (Robertson & Simonsen, 2012). When investigating gender differences in the dynamics of design teams, Milovanovic and Gero (2019) found that heterogeneous teams have significantly more co-design activities compared to all-male teams. They also found that men in heterogeneous student teams tend to be more quantitative in

design processes and dominate design activity. These studies show that gender differences in the creative design process can have an impact on the final product and that this should be investigated further.

3.3. Gender differences in specific design domains

Looking at a specific domain is important to better understand the specifics of each domain. As in other disciplines, there are subfields in design where women are overrepresented (e.g. fashion) and others where men are overrepresented (e.g. games). These differences can lead to a dichotomy in which men are "hard": they are associated with modelling nature and technology, while women are "soft": they are associated with the decorative and the body (Clegg & Mayfield, 1999). It is important to understand whether there are gender differences in certain types of knowledge and skills, as this may impact on how different skills are valued (Reimer, 2016). As early as 1985, Bruce argued that the fact that women are not well represented in the industrial design profession has two important consequences: women's "tacit knowledge" is not utilised during the design process and women-oriented projects are not sufficiently developed.

To understand why there is a different gender distribution in the design fields, it is important to explain how women and men are attracted to the different areas of design. Clegg and Mayfield (1999) have attempted to explain this problem. They interviewed design students from different study programmes (product design, furniture design, interior design and graphic design). Their results show that the most striking cross-gender pattern was the use of the term "always" in relation to "the pleasure of doing or drawing things". The authors explain that the students used these experiences to explain why they decided to become designers. Furthermore, the frequent use of "always" suggests that a practically minded person is closely associated with creativity as something that is part of "nature' and not just something that can be acquired. The authors conclude that men's and women's personal creativity and practical experience are the most important motivating and encouraging factors in design choices.

Another gender issue in relation to areas of design domains is the fact that different types of competences can be gender-orientated. Clegg and Mayfield (1999) claim that this gender stereotype causes difficulties for women who are interested in areas that are seen as predominantly male. The authors found that gender differences were most frequently cited in product, furniture and interior design. In contrast, graphic design was generally not perceived as gender-biased. The authors claim that the two most important issues in choosing design degree programmes are: mentors and pressure.

The researchers also found that different roles within the same design domain can also be gendered. Okudan and Mohammed (2006) argue that perceptions of mastery of the design task can lead to gender bias and should therefore be considered when interpreting the results of project performance. They found that the reasons for these perceptions were mainly due to task or domain aspects (e.g. products, experience) and only in a few cases due to personal aspects (e.g. interest level, gender).

The problem of women not being recognised is also evident in other creative fields, such as architecture, film and music. UNESCO (2014) found that while women are actively represented in the creative sector, there are "glass ceilings" (i.e. women's career progression declining before they reach senior levels) and "glass walls" (i.e. segregation into certain jobs) that prevent women from realising their full potential and taking advantage of the opportunities that the creative industries offer. They claim that women face various difficulties in entering some creative sectors due to stigmatisation, stereotypes, exclusion from male networks and the unequal division of domestic responsibilities. The absence of women in the field of architecture is illustrated by the fact that only two women have won the prestigious Pritzker Architecture Prize since its inception in 1979 (UNESCO, 2014).

There are also gender-specific aspects in the field of information technology that influence the lower proportion of women in these professions (Clegg et al. 1999). Clegg et al. (1999) found that fewer women are interested in this field in both IT and industrial design programmes. They claim that women can pursue these programmes, but that their decision is related to the gendered definition of technical competence. The underrepresentation of women is also evident in Science, Technology, Engineering and Maths (STEM) fields (Wang et al., 2013). However, researchers claim that women's performance in STEM subjects is not only no worse than men's, but that they also perform better in mixed teams (Nielsen et al., 2017).

4. Gender differences in design creativity: what to do?

The above studies show that gender plays an important role in design creativity. Furthermore, researchers argue that a person's creative output should be encouraged and supported so that creative potential can grow (Runco et al., 2010). So what can promote the creativity of women in particular? Possible measures to promote creativity are discussed below in three thematic areas: research on gender differences in design creativity, combating stereotypes against women designers to take on leadership roles and exert influence.

4.1. Research on gender differences in design creativity

The denial of the existence of gender differences in design seems to be one of the main issues that needs to be addressed in realising gender equality in design. "The barriers are no longer overt, but covert", i.e. instead of explicit discussions about equality, there are implicit discussions with silence and low representation of women in leadership positions, as Acaroglu (2016) recently claimed. Reimer (2016) notes that while the field of design and other creative fields are heavily dominated by men, they are often evaluated through theoretical frameworks that rely on gender-neutral understandings of learning, creation and social interaction.

Many authors believe that more research is needed on gender differences in design. Research on this can clarify whether and how gender differences in design creativity occur and can suggest solutions to improve the participation and recognition of women in design. In addition, design educators can encourage the study of women designers, such as the list of over 300 notable architectural writings authored by women compiled by Harriet Harriss' tutor at the Royal College of Arts (Frearson, 2017). Such initiatives can help women become more confident, feel represented and recognise the work of women designers. In addition, there should be more debates, panel discussions and seminars to discuss the gender gap in design and promote it as a critical issue in the field.

4.2. Combating stereotypes against women designers

Bias and stereotypes claiming that men are more creative than women seem to be another important issue leading to gender differences in design (Alsos et al., 2013; Runco et al., 2010). Stereotypes serve as ground rules that allow us to process information more efficiently, but they are often inaccurate, and when we learn a person's gender, gender biases are automatically activated, leading to unintentional and implicit discrimination (Bohnet, 2016). Gender stereotypes in design decisions are consciously or unconsciously embedded in users' social worlds and help to shape their perceptions and identities (Stumpf, 2020).

The fact that traits considered masculine, such as strength and articulation, are associated with the design of creative and innovative products and systems has many consequences, such as less confidence or interest in creating innovative products. As mentioned earlier, Pesout and Nietfeld (2021) found that women show less confidence than men in certain creative thinking tasks, giving them a significant advantage in generating more creative solutions. So, depending on the context, less confidence can be an advantage in the creative process.

Furthermore, the stereotype that male characteristics are associated with leadership implies that most leaders are male and therefore have the prerogative to have the final say and choose the end product and system. This also implies that men can be biassed in the selection of male designs and that women are therefore underrepresented in the selection of end products.

In addition, the stereotype that characteristics considered masculine are related to leadership qualities implies that most leaders are male and therefore have the prerogative to have the final say and select the final product and system. This also implies that men may be biassed in their decision in favour of male designs and that women are therefore underrepresented in the selection of end products.

One way to counteract stereotypes seems to be empathy, as suggested by Acaroglu (2016). She argues that empathy is a way to counteract the implicit bias and stereotype that leaders have masculine characteristics. As she explains, empathy is a "visceral experience" that can be designed to "rapidly build an empathetic understanding of others—to help people to be able to understand, without judgment, and to see the inherent value of a person different than oneself."

Another initiative to promote equality could be to establish a more generalised gender balance among judges of competitions and contests. Although there are initiatives to change this pattern, the figures show that in many design awards the judges are predominantly men (Fairs, 2018; Peña, 2018). Although women can also be biassed towards men (as both may believe that men are more creative than women), a more balanced competition with judges of both genders could make a difference in the awards and selection processes. While it has been shown that the gender of the person being judged is more important than the gender of the judge (Bohnet, 2016), male judges are more lenient with men than women, while women judges tend to treat men and women equally (Bowles & Gelfand, 2010).

4.3. Empowering women designers to be leaders and influencers

Political design can help narrow the gender gap in design. It is crucial that governments, together with the business sector, take action to improve career development opportunities for women (Rincón, González, Barrero, 2017). According to UNESCO (2014), many countries have changed their cultural policies to include a gender equality approach, such as the establishment of councils and committees in programmes to ensure women's participation (e.g. in France and New Zealand). Although these initiatives are very important, much more should be done.

One way is to encourage women to apply for financial support to develop projects specifically tailored to them. However, instead of segregating by gender, it seems better to include gender. For example, one initiative could be to fund half of the best projects led by women and the other half by men. This measure is not about gender quotas, but about gender balance, including representativeness and equality. This would encourage women to apply, be more confident and take on leadership roles because they would know that they have a real chance of making it.

Other important initiatives to reduce the barriers for women in design development are those proposed by Bruce and Lewis (1990). They suggest some measures of a cultural nature: campaigns to make girls aware of working in product design; encouraging all designers to undertake management training that incorporates gender issues and stereotypes; design institutions and journals ensuring that employers recognise the potential talent that is lost by discouraging creative women.

5. Final remarks

Gender equality in design is a hot topic. The participation and recognition of successful and prominent women in design seems to be increasing. Yet the steps are small and slow, leading to the question: 'When can we say that the gender gap in design is not related to the stereotypes, inequality of choice and lack of opportunities women face in their lives?'

Gender plays a role in creativity in design. One of the main conclusions of this study is that it is a complex and sensitive topic. There is a great need for more empirical and theoretical research and debate on gender in design creativity. As many authors emphasise, it is not only women who lose out when they are unable to express their full capacity and creativity as designers. Society loses out on products, systems and solutions that could have been designed for a better and more equal society in terms of rights, opportunities and pay. As Kaufman (2019) explains in his book 'The Time Has Come. Why Men Must Join the Gender Equality Revolution', gender equality is also a revolution for men. Studies show that men's health is better in countries with lower gender inequality (e.g. lower mortality rates, fewer mental and physical symptoms and better self-rated health) (World Health Organization, 2018). It is important to include men in movements to change common stereotypes about women in order to achieve gender balance (Pandey and Chhabi, 2019).

This review of literature found studies that focused on binary categorisation of male and female in gender studies. Future studies should move beyond the binary categorisation of male and female in gender studies and develop approaches to further the debate. As Keener (2015) notes, the nature of gender in research is complex due to the multidimensional nature of gender (identity, expression, sex and attraction), the limitations of the binary gender system and intersecting factors. Therefore, gender research needs better measures to assess gender identity and gender expression and to account for the complexity of gender (Keener, 2015). The measures proposed in this study to address gender in design creativity seem to indicate what specific actions could be taken in design education, design organisations and design companies to create a society where men and women have more equal opportunities to

explore their creativity in design. A better understanding of the behavioural differences between women and men in the field of design creativity, breaking down prejudices and stereotypes and promoting equal opportunities for both genders to embark on and lead creative design projects will lead us to a more egalitarian, better and more creative society.

Acknowledgement

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