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THE WOMEN'S MAKING



PAD. Pages on Arts and Design

International, peer-reviewed,
open access journal
founded by Vanni Pasca in 2005

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Publisher**Aiap Edizioni**

via A. Ponchielli 3 – 20129 Milano – Italy
aiap@aiap.it
www.aiap.it

PAD © ISSN 1972-7887

#18, June 2020

www.padjournal.net

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The Women's Making: a Historical Review

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Keywords

Women's Making, Design History, Technology, Women's Role Historical Path, Gender Sensitive Approach.

Abstract

This article proposes an analysis of the relationship between women's creative practices in the context of Western world design history. The study, based on a review of the literature, highlights the evolution of the role of women in design, considering the relationship with technology. The result is an excursus of the women maker culture growing through design from the 18th century up to the current times. During this path, despite the social constraints deeply affecting their life and work, women acquired skill and ability for the gradual achievement of a new individualism, and modernity of behavior for women. The changing role of women making culture was more incisive in the first development of consumption in the 19th century to the consumer society and the breakdown of gender barriers as a very recent history. Due to history, which has profoundly shaped the behavior of women, to date, they tend to have an artistic approach to technology. Current times are characterized by a series of positive processes and actions that reveal social radical change and the emerging of the gender sensitive design approach to pursue.

For the first time in history, women have the opportunity to play a major and visible role in a social transformation of potentially monumental proportions. The rich and extensive penetration of information technology into virtually every area of society creates enormous opportunities for women.

(Fountain, 2000, p. 3)

1. Introduction

Today's attention to women's empowerment, female making within the indie crafting practices and the opportunities that communication technology opened pushes us to analyze the women's practices to trace a historical path. Through literature, we try to accomplish this task not without difficulties. All twentieth-century modernity has put women's role in art, craft, and design on the sidelines, which is almost ignored by historians and design theorists. In Europe, this phenomenon of exclusion has been denounced by many scholars (as a key feature of the gender power relations) starting from the second wave of feminists of the late 1960s encouraging historians to seek out the women artists, architects, and designers (Rubino, 1979; Pollock & Parker, 1981; Bukley, 1986, 2020). Women's absence and marginalization from spheres of influence have been due to societal norms generally accepted by the entire society, also by women, with consequences on gender relations at home, work, and excluding them from impacting technological change and management. On this topic, Connell (2005, p. 1801) states:

Gender inequalities are embedded in a multidimensional structure of relationships between women and men, which, as the mod-

ern sociology of gender shows, operates at every level of human experience, from economic arrangements, culture and the state to interpersonal relationships and individual emotions.

Today, after a long discovering work, it is not more uncontroversial that women play significant roles in many fields.

In many areas of arts, craft, and design they are active agents in creating living spaces, kinds of everyday objects, wearable objects, and technology. Much of the actual knowledge about women's role in the past, mostly related to design in the Western world, is due to the research of historians of technology and design in the frame of the *social construction of technology* (Pinch & Bijker, 1984).

Moreover, in the last decades of the 20th century, the sociological and feminist literature on technology has been being reviewed, giving a more complex understanding of the “mutual constitutive relationship” between gender and technology (Wajcman, 2000). Authors as Judy Wajcman challenge the common assumption that technology is gender-neutral, looking at whether technology can liberate women or whether the new technologies are reinforcing sexual divisions in society, marginalization, and the perpetuation of stereotypes.

In this sense, design and designers play a fundamental role in the development of a *gender sensitive approach*.

With attention to avoiding a radical feminism-based theory, we propose a brief analysis of the relationship between women and technology in the design culture discourse in the context of the Western world. We consider the influence played by other disciplines like Women History, History of Economy (particularly women's labour history), History of sociology,

and History of Design. Without having any claim to present a systematic study of history, we are interested in highlighting the evolution of the role of women in design, considering the relationship with technology.

To correctly present our analysis, it is useful to refer to a historical frame based on the thesis of economic historians who speak of three phases of the industrial revolution – from the second half of the XVIII century up to the current times – and read, albeit briefly, the different design manifestation, theoretically and practically, in the different phases. During this path, the changing role of women making culture was more incisive in the first development of consumption in the XIX century to the consumer society and the breakdown of gender barriers as very recent history. The reconstruction of this historical path would help to understand how socioeconomic and technology achievement effects are interconnected and strictly related to design practices and expressions. The historical frame allows us to talk about design the connection among social, cultural, economic, technological transformation and the women's roles, defining continuity factors for design but also its different expression with some different focus along the whole process of design, which include the project, the fabrication, marketing & retailing, and consumption, as Renato De Fusco defined it (1985).

2. The relationship between Women and Technology Through the History of Design

Since the second half of the XVIII century of the industrial revolution (about to 1770), industrialization, market diffusion, and globalization required society to face profound changes,

that had both negative and positive impacts on women, their work, and experience. Confined within a patriarchal framework, as daughters, wives, and mothers in a farming economy, women have been in their home producing a variety of goods mainly consumed at home (food, soap, candle, yarn, cloth, etc.). The mechanization increased the women's path from home to factory constructed by industrialization from agricultural farms to the industry. This created challenges and opportunities for them.

In the XIX century, the level of technology and the organization of production and management in the factory has profoundly affected women's labour. Lower classes women constituted the hidden part of the workforce that has been produced the technologies. Young, single women's low wages played an important role in the growth of agricultural, household, textile, clothes, and shoe industries in many countries. The social constructions of femininity in a time of patriarchy determined the kind of work for women at home and the workplace, and the value attributed to them. In fabric, their role was structured in many areas as extensions of the position in the home, although this often ran counter to the rationalization of trends in industrial work. Their desire for marriage and taking care of the family, as well as the weakness, legitimized their low wages, helping to determine the workplace and relationships with employers, affecting also the relations between women and men in the working, and outside. The first effort to legitimize wage labour for women took place in the textile industry in the United States. In this sector, the work of women has been appreciated for their precision and manual detail skills.

The more relevant and impacting technologies in women's life were the mechanical loom for fabrics and the sewing machines. These innovations have had a disruptive impact on the modernization of many areas of the world, contributing first to the birth of the textile and clothing industry in England and the United States of America, then in many countries and parts of the world.

Although factory work was considered the least respectable job a woman could take outside home, acquiring a technical competence with the consequent growth of a culture of female work and economic independence have been instruments for the gradual achievement of a new individualism, and modernity of behaviour for women (Helmbold & Schofield, 1989) creating about a new class, the women factory weavers. In the USA, working in the industrial textile Hannah Wilkinson, wife of the entrepreneur Samuel Slater, was the first woman to receive a patent in 1793 for the two-ply cotton sewing thread (Thorne, 2019).

In many cases and countries where factory installation was slow or delayed, work opportunities for women were largely confined within the traditional household family economy. Textile and clothing production or craft involved women working at home. In the work in the home setting, creativity emerged with major expressions in connection to art.

Developing artistic creativity and technical perspective, happened more in bourgeoisie family where women were allowed to be engaged in activities like ceramic decorations, embroidering, textiles, and clothing making. From these activities, work activities happened to be born in sectors historically influenced by women's consumption, like fashion and home textiles with strong relationships with decorative arts.

2.1. The Arts and Crafts Movement

Women artistic expressions were embedded in the British Arts and Crafts Movement starting in the 1880s in the time of the crucial transition from applied arts to product design. Arts and Crafts Movement was a concerted socio-political stance against the Industrial Revolution, the mechanization of labour, the alienating conditions in the industrial factory. Inspired by Victorian idealism and the Utopian Socialism of William Morris, the movement greatly influenced its members' philosophies on the moral of work and ideas that the relationship between arts and crafts was a guaranty of the designer freedom. The movement fast became an international trend and acted a revival of traditional in the decorative and fine arts, highly valuating the vernacular.

Actually, the creative work of this movement, which included ceramics as well as furniture, textiles, jewellery, and metalwork, merged into elitist productions, expensive and available only for the upper social classes. Moreover, the association Arts & Craft Society, formed in 1887 in London, excluded women from the 'guilds' and the best that women could get was the benevolent tolerance from male leaders, helping their artisan father or husband. Women could contribute to the decoration of the pieces (Wolf 1989) and often only in the name of the male. Women's marginalization from spheres of influence has been due to societal norms generally accepted by the entire society, also by women, with consequences on gender relations at home, work and excluding them from impacting into technological change and management.

Different was the case of the Arts & Craft Movement in the USA (Kaplan, 1991) and in New Zealand (Calhoun, 2000) as a

major factor in changing the status of middle-class not married women affording a profession which was considered respectable and a path into the art community at large. In North America in the late nineteenth century, women could study and establish independent small studios and shop where they were free to pursue their creative interest in production as potters, metalsmiths and bookbinders: examples are the works of the ceramist Robineau Perry and Elizabeth Overbeck (Cumming, 1991, p. 101).

In most instances, however, crafts production concentrated women in a labour-intensive environment, providing a meagre income for long hours of work. In some settings, handicrafts were a means of increasing income for women, but only under certain conditions as economic help of the family, and husband collaboration since crafts are specialized activities that have limited markets and offer limited market potential, or where income is not the main objective.

Woman sensibility and technical ability of embroidering, weaving, sewing, mixing colours, painting, composing forms, choose the right materials for each piece started to be appreciated as a dominant craft sensibility, the woman's touch. With this craft's long-standing roots in women's work, it is perhaps not surprising that women were elevated as tastemakers. Their sophisticated perception of goods has been appreciated in the service sector during the first development of consumption in the XIX century and then in the XX century in many sectors.

2.2. Toward the Modernity

Across Europe, the bourgeois families have gradually accepted the possibility for non-married women to study and be en-

gaged at home in art and craft activities in sectors historically influenced by women making and consumption, like home textiles and decoration, and fashion. Crafting was often an opportunity to outlet the oppression of their domestic roles and less often to develop a passion. Women's craft sensibility and maker culture have been appreciated but underestimated in economic and entrepreneurial terms.

The First World War has acquired a central place in the birth of the *new women*. Wartime due to the absence of men, pose a challenge to the traditional role of women as homemakers in the private sphere. In all sector, women have been carried out the job. Invested with a new greater responsibility, they have gained awareness of their usefulness and their value, always carving out a margin wider independence from husbands, fathers and brothers. At the same time, the family rigid structure patriarchy based weakened.

The *Roaring Twenties* represented a promising time for the *new female* challenge of modernity in connection with the renewal of the arts and industrial expansion. While in the Bauhaus Walter Gropius renews aesthetics and qualities model to industrial manufacturing processes to propose the new ethical function *Art into Industry for mass production*, the rationalist language was developed by the students of the Bauhaus laboratories, included the textile by the female students. Elementary forms, abstract compositions, and references to primitive arts replaced the traditional repertoire of the domestic interior. The renewal coming from the cinema, theatre, and ballet pass into everyday life proposing new female attitudes. Sober and soft lines innovated fashion, freeing the female body from the 19th-century busts and heavy fabrics that mortify its

forms. In Paris, where feminism became a political movement since the 1890s women wore trousers, coloured socks, clothes soft lines that make their body move, overcoming the preconceptions about female sexuality. The first models of reference for women start to appear from this time. Among these, there were the artist and designer Sonia Delaunay (1885-1979), the American interior designer Elsie de Wolfe (1865-1950), the British Vogue management editor Dorothy Todd and the fashion editor Madge Garland, the Irish architect and furniture designer Eileen Gray (1877-1976), the French fashion designer Coco Chanel (1883-1971), the textile design Gunta Stölzl (1897-1983), Marianne Liebe Brandt (1893-1983), and Margarete Schütte-Lihotzky (1897-2000) coming from Bauhaus. All these dedicated creative and critical energy to the modernist reconfiguration of domestic spaces products for the new woman. In Italy, in the time of the autarky promoted by the Fascism (1930s-40s), national politics of artisanal processes defence encouraged female entrepreneurship, linking the experience of many *protodesigners* in the textile and fashion sector, called *artists of thread* capable of incorporating *avant-garde* trend. The enhancement of the feminine dexterity, the updating of traditions, the experimentation with 100% local fibres as well as new synthetic fibres nationally produced, and the optimism confident with ideas marked the production in support of a modern Italian 'industrious' rather than exclusively industrial handicraft. Among the many, Fede Cheti (1905-1979) founded her company of artistic fabrics in Milan in 1936. Starting to collaborate with Gio Ponti, during the II World War she patented her synthetic straw, called Lin-Lan, hand-woven by Cremonese rural craftsmen. Then shifting in the 50s toward industrial

manufacturing combining innovation in textile and design and patented the *tessuto cinese* a composition of nylon fibres. She rapidly gained international resonance exposing in Paris and New York (Lecce & Mazzanti, 2018).

The evolution of women's perception increased also trough in the service sector during the first development of consumption in the XIX century and then in the XX century. In the footwear sector, in retail sales and after in office work, the alleged tolerance of women for tedium and their nimble fingers adapted to them to the tasks to be performed.

About technologies, the sewing machine has been a strong impact on women making. Despite rigorous criticism of domestic environment technologies that was produced in a world dominated by men and used by women¹, if the sewing machine has been used under comfortable material working conditions for women, represented a powerful means to women self-expression.

After the introduction into the industry, as soon as it became cheaper, this entered homes as a tool for women to participate in the family economy, sewing clothes for themselves, the family or for selling, and a means could feel a sense of accomplishment, expressing creativity and dexterity as entrepreneurship.

1. The feminist criticism of the sewing machine includes arguments about socio-political and structural factors that generate and maintain the power structures in which women live. Many of the criticisms are addressed to the various large claims made by the burgeoning *happiness* and *better life* industries, according to which domestic life-saving devices did not actually make the family easier to manage or free women for other activities. At the contrary sewing could have been generating of exploitation of the poorly paid woman who worked at home; sewing machine has formed extra-duty housework reducing women's free time; compared to manual sewing that could be done chatting in places of interaction, the sewing machine relegated the woman to her home by favouring the isolation and reducing the possibility of interacting with others.

It happened already in the last decades of the XIX century and the second phase of the industrial revolution when many technologies entered the domestic environment radically changing activity for large numbers of women.

The diffusion history of the sewing machine is particularly interesting for the relationship between production, gender accepting and reception of technological innovations in the nineteenth-century history. The sewing machine had to be re-designed, communicated, and promoted in new ways to enter in the domestic environment, so did the household appliances or plastic items, widening the sector of the women perspective in design (Coffin, 1994). Singer company, the most famous maker of sewing machines, organized courses or other events that proposed sewing machine in the experience of interaction which succeeded in improving women's appreciation of this technology.

Even if this machine did not answer in itself women's emotional and intellectual needs for companionship and exchange of information, in an improved condition of use has become a symbol of women's aesthetics practices in many countries and cultures. Even after the diffusion of the *pret-a-porter* fashion industries, many women continued to sew for the pleasures such activity can bring such as tactile, creative, technical artistic pleasure, image control, personal expression and independence from manufacturers (Kramarae, 1988). Even in more recent times, in developing countries such as Ecuador, Iraq and Pakistan this machine has become a development strategy with the benefit of giving women resources to generate economies, and a mean of creating and transforming their clothes into forms of art and expression of politics, as in the case of the *molas* and the *cuna* women from Panama. In such path of reception and appropriation of the tech-

nology, the function of sewing machines has changed dramatically over the years and joined the activity of the hand-woven textiles field in which women have ventured.

Histories as this show that when a technology's or a technique appropriation allows a pleasurable experience of personal expression, women's interaction with it is positive and full of innovative potentiality. To be engaged in a creative activity by hand, or by the help of technology as well as providing women with a means of personal expression and link to their cultural heritage, is a source of empowerment.

2.3. Consumption and Technology Reception in the Mature Industrialization

The evolution of women's perception has been more evident in the service sector during the first development of consumption in the XIX century and then in the XX century. This was a complex history too. In the footwear sector, in retail sales and after in office work, the alleged tolerance of women for tedium and their nimble fingers adapted to them to the tasks to be performed.

The historian Alice Kessler-Harris (1982) has been exploring the complex nature and contradictions of the social conflict in an arena where class, gender, and the emerging culture of consumption all came together. Even in the service sector, the female was attributed to much less qualified, less paid, less work safe. But, again, through the work cultures developed in the workshop relationships, women started to supplant many of the restrictions socially ascribes to them. Writing about department store clerks, Susan Porter Benson (1986) who insisted on the culture of work acquired by women, described a complicat-

ed work culture that subverted the hierarchy and rules of work, infused workers with a more positive sense of themselves and their work, forming an awareness of the work.

After the Second World War, along with the second industrial revolution, a general breaking down of work barriers by women has been widening industrial production impacts on life. Women were welcomed in industrial production, related professions, department stores².

With the improvement of socio-economic conditions in many countries' women became a major seller of mass-consumer goods and users of technologies. A general craftsmanship anti-climax emerged. Due to the high level of quality and performance of industrial products in comparison to the low costs, the craft couldn't compete with industrial manufacturing due also the power played by media in the promotion of brand image and modern style of life design. As a result, craft has gradually lost consumer interest, its cultural capital, perceived value, and legitimacy.

Gradually more complex technologies and tools made their way into the household and office following a path started since the interwar years, firstly in the USA.

Appliances were a profound impact on women's life house-ware activities and were instrumental in the construction of qualities self-consciousness, private spheres as well as the

2. Writing about department store clerks, Susan Porter Benson (1986) who insisted on the culture of work acquired by women, described a complicated work culture that subverted the hierarchy and rules of work, infused workers with a more positive sense of themselves and their work, forming an awareness of the work.

private and public spaces³. Obviously, the class made a difference for access to new technology, with many differences between countryside and cities. In the spirit of functionalism, connected to the mechanization and rationalization of work, women had to professionalize their role as housewives. Many promotional activities were organized to teach women how to rationalize their work, make it more efficient and raise their qualities. Household technology and living standards were to women an important part of the making of the modern industrial society, named Americanization, but the new technology preserved the masculine value, not to change social relation between genders. (Landström, 1998) In general, since male engineers and designers designed appliances, this technology was conservative in their views on what home and women's place in modern society should be⁴. This was clear in the study of the design of the microwave oven in the UK (Cockburn and Ormond, 1993).

A parallel story shows that in consumerism times, once again firstly in the USA, the home becomes an important market outlet for a thousand products, and the woman becomes for the first time in history responsible for purchase for an ever-growing range of products. Enterprises and the distribution sector started posing major attention in women as consumers.

3. Electricity first made all systemically changed in the mid-class interiors. After the electric iron, the electric sewing machine was the first technology to become common, following by vacuum cleaners and then by washing machine and refrigerator.

4. For more than two centuries in the design history – as denounced by many feminist scholars as Judy Wajcman – the young, white, standard male has conformed product design. It happens in the different stages of the social process of shaping technology, (fabrication, marketing retailing, and deployed) starting with the representation of the customer, the construction and control of the consumer up to the approach by users.

This happened when the home economist and marketing expert Christine Frederick published *Selling Mrs Consumer*, a popular book that instructed manufacturers and advertisers in the art of launching products to American women. Women were welcome in advertising agencies, industry, and selling fields to service female interest accounts as the number of agencies increased⁵. Female industrial designers added the feminine touch to automotive design suggesting a broad-based demand for women's sensibilities to reach the expanding women's market (Sivulka, 2008). In the process, women contribute to stereotyping their role in society (Sivulka, 2008).

This greater outlet of female domestic work as an acquisition of modernity and technological appropriation has led to an unconditional diffusion of the consumption of the industrial product and the almost disappearance of craftsmanship in many countries and the associated loss of importance of the craftsmanship.

The women entrance in the job continued for decades, as women created jobs in designing, producing and selling for women, organized associations, and utilized networks as expressions of solidarity and support. After the USA, the focus on women consumer moved to Europe. This increased outlet of women's domestic work as a modernity acquisition, technology appropriation and has accompanied the almost disappearance of craftsmanship in many countries and the associated loss of importance of the craftsmanship.

5. Women start to work as writers, artists, merchandising experts, research workers, media analysts, administrators, models and spokespersons, graphic designer radio, and television production. Women proved effective in direct sales to the women's market.

Craft happens to reappear in the 1970s and 80s as a subversive form used both as a method of feminist expression and critique of the male-dominated art world, with artists such as Judy Chicago and Joyce Wieland. They created textile, crochet, knitting, and embroidery works attempting to unsettle the ease with which expectations of domesticity and child-rearing were imposed on many female artists (Robertson, 2011, p. 8)⁶.

3. The Female Perspective and the *Gender Sensitive Design Approach*

The entry in contemporary times has been marked by the counterculture, an anti-establishment cultural phenomenon that widely developed, and rapidly spread in the western world between the mid-60s and mid-70s.

Within this, second-wave feminism helped increase equality conditions for women in the workplace, starting a strong critique of patriarchy and male-dominated society and, consequently, began to improve personal life and professional skills, allowing generally a greater level of social emancipation and inclusion of all minorities, obviously with many differences in the various areas of the world.

6. Robertson and Parker (2010, p. 205) have been pointed the crafts as political history, as means of resistance and activism, citing crafts' important role in numerous political actions as a part of feminist activist organizing, already since the last decades of the XIX century when British suffragists appropriated women's domestic embroidery skills to militant ends.

The social perception of women, awareness of their role as well as an interest in women as customers, have evolved in most fields and manufacturing sectors⁷.

Continuing the commitment started with the development of the consumer society and global competition, the companies have reoriented their market strategies towards woman as responsible for purchasing decisions for the house is made by women⁸. This has always not happened with good results. Many product categories have been only superficially directed to women, using a different appearance as female product differentiation with more rounded shapes and constant *pink* color, and generating products or visual communication artifacts that have become the symbol of stereotypes, since today.

The advancement of the female perspective in design, named *gender sensitive approach*, has increased with the user studies in the field of digital technologies and interaction design for the development of advanced electronic products such as services for social networking and products such as mobile phones, HiFi-systems, etc.

Although in the ITC and digital technologies scenario in general, unlike past technologies, physical power, command-and-control authority system, as well as hierarchy –

7. Nonetheless, the under-representation of women in high-level positions is a pattern that still occurs in several professions, including education, science and technology, business, and urban/corporate governance. The EU Commission Equality Challenge (2014) underlines that women and ethnic minorities are marginalized in the best universities: 8% of professors, 72% of senior managers and about 80% of vice-chancellors and principals in the UK they are men. Most women still receive lower salaries and statuses. According to the latest official data, the gender pay gap in Europe is 16%. Besides, women face the so-called glass ceiling effect, the invisible but unattainable obstruction, which prevents minorities and women from climbing to the top rungs of the corporate ladder, regardless of their qualifications.

8. In the Western World countries, about 80% of the purchase decision for the house is made by women.

including gender hierarchy – have less power⁹, the first product categories related were dominated by men and did not reflect women's expectations, as regards the use and ways of interacting. These products were scarcely considered useful and attractive for women. But, the extensive penetration of information technology into virtually every area of society created enormous opportunities for women.

In the nineties, in the USA it was noted that women were the predominant users of ICT in the workplace. This fact was related to the benefits that women obtained, like the opportunities of increasing social communication, strengthen interconnections, combining them with family life, allowing greater flexibility to combine work and family, and creating independent networks. Then the Xeros, the major American IT companies, started to consider the need for women to strengthen their participation as experts, owners, and designers of information technologies.

The XeroxParc Institute for Women and Technology started a co-designing process engaging female users in the development of new IT product design. They opened a consultation process, with the result that throughout the United States between 1998 and 99 much of its technical work arose from the ideas generated in community meetings. Among them: the development of a full-size view of another room or other place, allowing distant family members to virtually connect their

9. As technology is a social construction and part of our culture, in a male-dominated society and culture, technologies have been reinforced male supremacy. About the today technologies, scholars in various fields warn us that oppressive and inequality forces are still strong in controlling technology. The goal of including more women in the economic and political control of technological change is fundamental. Enhanced capabilities for technology is one of the factors to reshape society, fighting the inequality in human development in the coming decades (UNDP, 2019).

living spaces, and a centralized timer that can integrate the schedules of an entire family. Non-technological users, especially women, have participated in brainstorming sessions on technological development. The goal was to involve and equip non-technologists, through participation in the design phase in order to exercise more effective influence on technological and product innovation and increase the probability of meeting user needs (Fountain, 2000). They have shown that women tend to hold different perspectives from men than from the perception that affects the technological needs of society. This fundamental step takes place in relation to the evolution of design that in those years began to guide, also in the USA, a user-centered approach, and then move on to a user-experience approach to push innovation by combining production innovation and social.

A similar approach was recently developed in Denmark in the sector of the interaction design and advanced electronic interactive products both wearables and for home-setting. The “Female Interaction” research links the gender dimension of interaction and user experience identifying values, motivations (feature/benefit, interactive dimension both physical and digital and multi-sensorial, aesthetics and communicative), and also barriers for women use (Schroeder, 2010)¹⁰.

The aims have been to define international guidelines to develop new product concepts, their functions and gender advantages, the user interaction with the products in partner-

10. The project was carried out by experienced product and interaction designers at design-people.dk together with specialists in production design, user-led innovation, interaction psychology and marketing.

ship with enterprises such as B&O, Danfoss (climate indoor), and GN Netcom. The project was carried out by experienced product and interaction designers at design-people.dk together with specialists in production design, user-led innovation, interaction psychology and marketing. The concept of alternative female interaction was undertaken with the following activities: co-creation with users, refinement of design and visualization, international feedback on the user market, analysis and evaluation of user tests (Schroeder, 2010).

These two research projects and many others have been contributing to understand the traits and female preferences that are generally most overlooked by male developers, pointing out that both men and women have the same qualifications for technical performance but may not perform equally because lack of the motivation. A lot of technology is designed with men in mind not offering women the benefits they seek. Although men and women share equal abilities to operate tech products it does not mean we are equally motivated to engage ourselves in technology. As highlighted in 2004 by the Consumer Electronics Association, “Only 1% of women thought consumer electronics manufacturers had them in mind when developing products.” Recognizing the importance of developing researches projects in a more inclusive way, and fragmenting the *glassceiling*, many actions has been carried out in the last decades and many are in progress to promote women empowerment, equality and social coherence.

If in the recent past research has mainly dealt with women in the role of consumers and users of products, today a fundamental role acquires the combination of women and technology not only us users but in designing focuses (Fountain 2000).

About the relationship women and technology, we can add that the literature on men's and women's identity made it clear that the biological differences of the sexes do not affect intelligence, creativity, and thinking ability (Maccoby & Jacklin, 1974; Agarwal & Kumari, 1982). As we traced to demonstrated, it was the historical cultural path, characterized by the social role constraints, that profoundly shaped the attitude and behaviour of women to respect the job and the relation with technological out of the home setting actions. Some theorists have explained this phenomenon with the idea of *dependency*. According to this view, “[Women] are not trained for freedom at all, but for its categorical opposite, dependency” (Dowling, 1981, p. 3).

Sherry Turkle (1984), in her fascinating study of the cultural and psychological world of computers and computer science, confirms that the different genders' attitudes to these fields are due to cultural values. Men and women are equally likely to use a computer in the school and office, but usage styles differ markedly. Women tend to have an *artistic approach* to technical practices, instead of master the technology overwhelmingly as males. She asserts that the women's *soft mastery* on negotiation, compromise, and give-and-take – as psychological virtues – are due to their gendered cultural development path, while the model of male behaviour stresses decisiveness and the *imposition of will*, a control on material and social world (Turkle, 1984). The gender differences are utilized by Turkle to redefine computer science and the gender categories associated with many scientific fields, rather than to reify them.

Other gender identity development scholars provided evidence of the cultural association of sciences and scientific ways of

thinking (reasoning, facts, objectivity) with males and masculinity. Men were habits to work outside the home, and always more likely to discuss and be attracted to hands-on possibilities like building, trying out ideas in the real world. Instead, feelings, values, and subjectivity are associated with female femininity and domestic spaces. Stereotypes propose masculine dominator – men have been taught to define their identity in terms of domination and control – and feminine socialization. If in history the social system functioned to suppress, control, and exclude women historically, now it is needed to combat the blockages that women still suffer during their journey into work and technology. Internal and external blocks to technology have been identified by John Hayes (1981) in his study of problem solver skills as follows: i) The culture tends to undermine the confidence of women in their ability to compete in certain creative fields, ii) The culture discourages women from taking an interest in science-related fields, iii) There are relatively few female role models in creative fields, iv) Social pressures and gender roles encourage women to retain the primary responsibility for the family (Hayes, 1981).

Even the underrepresentation of women in design professionals and technology – now considered as one of the primary social goals – is due to cultural values, stereotypes, and socialization processes that tend to undermine the confidence of women in their ability to compete in certain creative and technological fields.

This is why today many projects at the level of government promote women's empowerment to affecting technology, enterprise, and society with the ultimate goal of giving society a new impetus for all innovation.

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