Is Fashion technology – where are the limits of emerging technological design thinking?

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Abstract. Designing intelligent technologies is a multidisciplinary process. From this perspective, fashion has continued to be an under explored dimension of technology design. While there persistently are connections between the term fashion and the clothing design industry, and historical and sociological approach to fashion reveals a much deeper and permeating understanding of the notion and its implications across the technological world. During recent popular developments, the interrelationship between fashion as a concept and technology as components and proponents of fashion – technology as fashion promoter (think of Tiktok, Instagram, Facebook and even LinkedIn for example), and technology as fashion constituent, come to light. To stand back from social media and examine not only technology branding and culture building as seen in Apple and Google for instance, but also user interface design, system logic and algorithms as constituents of fashion, a more profound comprehension of the interplay between culture, technology, emotions and cognition may be developed. This paper seeks to lay the grounding of a semiotic, social-experiential understanding of fashion as technology. It draws on recent technological examples, which are then enriched with theory from fashion research and cognition and provides insight for how fashion thinking can enrich the design of intelligent technology.

Keywords: Human Factors · Cognition · Fashion · Social Experience · Design Thinking

1 Introduction

Fashion is predominantly associated with catwalks, magazines and clothing as these are the embodied representation vehicles of design. It may seem challenging to consider the relationship between information technology (IT) and fashion – from cat-

walk to algorithm. It is perhaps easier to believe that concepts such as fashion and fashion thinking are irrelevant for designing emerging technologies. Here, the authors pose two questions pertaining to both fashion and emerging technology design. Firstly, is it really so that fashion and its socio-cultural, as well as socio-emotional dimensions are not considered in technology development? Secondly, how should the dimension of fashion be conceptualized in technological development discourse?

In technology design, the main concern has often been how to apply the natural sciences to create, enhance and enable working products. Physics, chemistry, electronics and mathematics in particular, have been seen as both necessary components, yet great challenges for the realization of solution ideas [1][2]. However, in terms of human-based sciences and the humanities themselves, the uptake in technology development has been considerably slower. When considering for example, the most popular games or successful ICT-brands such as Tiktok, Instagram, Facebook, Apple and Google to name some, it is clear that the mere capacity to develop effective electronics through means such as mathematics cannot give the answers to all questions relevant to the development of emerging technology. New phases of human-technology interaction design seen in artificial intelligence (AI) development and implementation, as well as social integration mean that ever more increasingly, sociological, cultural, psychological and indeed, cognitive scientific understandings of the mental and interactional dimensions of human beings are becoming ever more pertinent. A part of this socio-cultural, socio-emotion and individual in interaction with the collective network – or systems – way of understanding the human dimension of emerging technology is fashion. For this reason, during the paper, the authors will refer to 'fashion thinking'. Here, *fashion thinking* is defined as the means of understanding design, aesthetic and logic-based (algorithms, system logic, consumption and brand logic etc.) trends as constituents of fashion and its dimensions – social, cultural, communicational (symbolic and semiotic), experiential, interactional and dynamic.

Thus, a key informant on the levels of how emerging technology constitutes fashion, how its logic is built, and how it exists in relation to human users, is in fact the human mind. This has been known for decades, and arguably centuries, in relation to AI development. Yet, this socially connected and networked element of the human mind has been relatively ignored in traditional AI discourse, that treats intelligence as bound to one mind, brain or computer. Only now is it truly coming to the fore with developments in innovations such as cognitive computing and blockchain for instance. This renders one question as an underlying challenge for the authors of this paper – can fashion studies and understanding technological development through the lens of *fashion thinking* enhance design and development insight for emerging technological systems?

2 Thinking through fashion

What can thinking through fashion mean in terms of technology? The concept of fashion can be understood in various ways. It is not limited to clothing (see e.g., [3][4][5]), although the term may naturally be attributed to wearable technology and smart clothing. Classical theorists such as Blumer [6] and Simmel [7] suggested that fashion operates in many diverse areas. Blumer realized that fashion may vitally influence the central content of any field, also in areas where it is intentionally avoided

or not necessarily identified (p. 276). At present, hardly any area of contemporary social life is not subject to fashion [8]. Mostly, the concept of fashion is approached through Western systems (see e.g., [9][10][11]). However, it may be treated as a cultural form of life that could apply to many areas of the human experience, "virtually to the human experience in its entirety," and as a universal manifestation "rooted in the very nature of the human being as such" [12] (introduction). Fashion is thus a multidisciplinary hybrid topic [13] that provides a rich platform to understand, e.g., socio-cultural dynamics, intangible systems of signification, as well as individual and collective agents [14] that are related to cultural 'things' (such as technological artefacts).These 'things' only become meaningful in interaction with and between humans (e.g., [15]). As the literature illustrates, fashion has a social program and an operational role in culture. It can be utilized as a strategy of analysis as well as a specific way of thinking [16]. This mode of thinking refines strategic design practices from user-driven to user-to-user and group-driven. I engages the holistic dimension of the human experience to design thinking. Besides, like the term 'design', 'fashion' has two meanings: a noun and a verb. As such, because the very nature of design thinking is related to a refusal to separate cognition and action [17], fashion may in turn be understood as an augmentation of both design and cognition.

Fashion is an innovative and inclusive activity in which exploiting the temporal dimensions is the key to fashion thinking. In the first place, fashion represents ideas, desires, and beliefs circulating in society [18] and, as Blumer [6] states, "presupposes that the area is in passage, responding to changes taking place in a surrounding world" and thus, is open to new social forms (p. 286). Fashion is an active agent of change [23] as well as a sociocultural force and mirror of the evolution of society (see e.g. [8][20]) in situations where different stimuli serve as activators and, on the other hand, widespread imitations initiate further inventiveness [21]. For example, according to Gronow [3], fads–the more extreme phenomenon of fashion—are present especially in the gaming world as they are closer to innovations. As 'real' novelties, they have to create a social place of their own, as well as the habits, routines and new meanings attached to them. As Nixon and Blakley [22] emphasize, fashion thinking values flexibility, responsiveness, and open source solutions, qualities that more sectors need to embrace, for example in digital disruption. That is, fashion is a modern, contemporary phenomenon (see, e.g., [23][24][3]) that constructs the boundaries of past and present, always striving to stay up-to-date and anchor a certain period of time (see, e.g., [5][25], which also indicates the readiness to weaken older forms. Fashion may sometimes be revived, but the revivals are never quite the same as the originals [26], albeit they can represent nostalgic value and arouse intense emotional reactions (e.g., [27]). For example, currently many old gaming devices and consoles are sought-after, the popularity of retro mobile games on smartphones is a growing trend, and retro arcades are making a comeback [28].

Secondly, without the act of adoption, the cultural product of fashion cannot happen (see e.g., [24][29]). This makes fashion genuinely a human-oriented practice. Wider communities ultimately decide what, where, when and how is in fashion. As Nixon and Blakley [22] point out, fashion gives meaning to the user while the 'inherent feedback loop' links producers and users together, for example, in different innovation and development processes, such as the design of new technologies. According to the authors, fashion thinking can be framed in terms of emergent systems (p. 157).

Fashion thus, refers to the manner in which certain forms of culture are disseminated and valued at a given point in time [30][31]. Fashion diffusion processes influence how adaptation processes progress (e.g., [32]). Pan et al. [33], utilize a deeper understanding of the complexities of fashion and how each particular act could become fashionable to a larger community, as a means of promoting more sustainable practices in human-computer interaction (HCI). Consequently, fashion represents social movements, behavior and cohesion, bringing innovation into areas of social life. In this way, 'cultural creativity" continues to a wider audience and user groups (e.g. [34]) and where this phenomenon, fashion, occurs in "people's imaginations and beliefs," [10]. It is thereby about group mentality (e.g., [35]). One might think that fashion is a large-scale 'collective event,' and to implement a group-level experience, identification within one's own group is a critical element in this process [36]. For something to be in fashion, it is imperative that the related cues and codes can also be recognized, comprehended and received, which in turn integrates individual thought processes and interpretations into social interactions and cultural processes [29].

3 Semiotics and culture

Intelligent products, as with fashion, operate in and through semiotic systems [37][38]. They have many aspects, which refer to or signify other phenomena (objects, meanings, relations) and are mutually referred to by other phenomena. This signification process exists in a phenomenological relationship between the minds and discourse of users, consumers, designers, technology and its layers (i.e., historical, cultural, political etc.) (see e.g., [39][38]). Thus, the communicative aspects of products make these semiotic systems and causal relationships important [40][41]. Building on this, there is constantly tension between the instrumental and symbolic or signifying elements of design. That which can be used and serves a tangible function on material levels, and that which plays a role in terms of the immaterial – i.e., value-based, experiential and even socio-cultural affordance levels [42]. Even stone axes or totems had features, such as head figures, which were unnecessary from the utilitarian point of view, yet vital from the perspectives of culture, society and religion [43][15]. For these elements, combined with the utilitarian elements, encode emotional messages that were and are parts of societal cultural semiotic systems, or communication. This is important to remember when approaching the study of fashion.

Research in semiotics, or the *science of signs*, has its roots in the study of logic [44][45]. The English philosopher John Locke (1632-1704) coined the term 'semiotike' in "An Essay Concerning Human Understanding" [46]. Locke adapted the term from the Greek work 'semeoin', meaning sign, token or mark. Locke's intention was to theorize science itself. Within his theorization, Locke established three distinct categories of science. These included: 1) the science of human understanding – phenomena, relationships of phenomena and how phenomena work; 2) human responsibility – what needs to be done; and 3) means of collecting and communicating knowledge about the first two categories. This third category was what Locke referred to as semeoin, or the 'doctrine of signs' – the communication of human-based knowledge. In addition to Locke and amid many more, there were three notable influencers of the field of logic and semiotics - Charles Sanders Peirce, Ferdinand de Saus-

sure and the earlier philosophy predecessor René Decartes. These philosophers spent their lives attempting to account for the nature and conditions of thought. They struggled with the larger questions relating to consciousness and intentionality. Decartes and Peirce in particular were both mathematicians who continuously tried to understand thought through mathematical formulae. Both came to the conclusion that conscious thought and experience could not be reduced to a mathematical formula due to one simple yet extremely complex factor – emotions [47][39][38]. Emotions, due to their subjective, multi-layered, dynamic and qualitative nature were already centuries ago understood as being a cloud or fog that tainted the purity and calculability of thought [48]. For this reason, both mathematicians pondered over the significance of this 'fuzzy *feeling* area of logic', and Peirce especially, turned towards the in-depth and systematic study of sign systems (semiotics) instead.

Yet, as seen with the lounge chair example, design and fashion are both objects and symbols. Not only do they serve a function on a utilitarian level, they also always refer to something else. This matter has been studied from the perspective of branding and brand value, for instance, in marketing studies for decades [49]. To understand what this means from the perspective of seemingly individual subjective emotional experience outward to that of collective semiotic expression and experience and emotion is still relatively lacking in terms of research attention. To understand the multiple functions of fashion in a collective semiotic system, how it is contextualized, promoted and even manifested through the emerging technologies of the times we need to step back from the technology to critically and carefully study human thinking itself. As the developments and logic of intelligent systems demonstrate, understandings of human thinking and technological design show the interplay between individual and shared consciousness.

4 User psychology of fashion thinking

All signs get their meanings in the minds of people [50]. Consequently, it is necessary to pay attention to mental phenomena such as emotions and cognitive information processing when investigating the role of fashion in technology design. Psychology can explain why people encode product messages as they do [15][51]. The analysis of products and how people experience them are eventually psychological phenomena. It is necessary to rely on psychology to explain the intricate mechanisms of fashion as its properties.

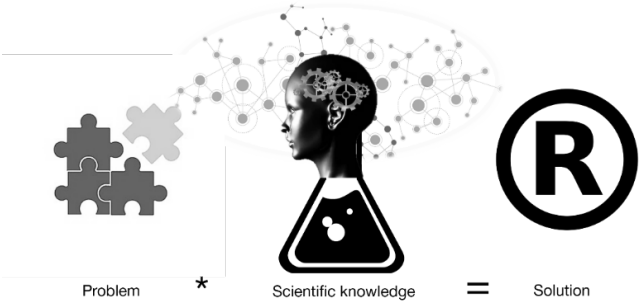

Fig. 1. User psychological explanatory framework in design

The core concept in user psychology is the establishment of an explanatory framework [51]. User psychology and its explanatory framework can tangibly be connected to the operands of design thinking. Design thinking begins with problems. Design problems can be of different types, and these days during times of ever increasing complex systems, more and more often professionals of all areas are speaking of wicked problems [52]. From a psychological point of view, these are problems that are difficult to define or grasp within any simple question. In order to dig deeper into the cause and potential solution, researchers have observed that by digging deeper into human thought and logic for instance, scholars may arrive at the root of the problems. Thus, psychology, its theories, methods and results are useful. The explanatory framework binds each question to psychological knowledge. Depending on the nature of the question, the solution can be grounded on valid and reliable knowledge. Typical psychological frameworks from the past and present include biological, cognitive or information processing psychology, emotions, mental contents, individual differences, groups, and socio-cultural theories. The list is only one possible cross-section of vast volumes of work. The list illustrates two points: 1) that there are many domains of general psychology outside cognitive psychology that are in fact already being applied in contemporary HCI; and 2) that the internal logics of the frameworks are highly varied.

When thinking *fashion*, the role of semiotics is vital. Symbolic meaning can be transformed into expressively shared ideas and understood through explanatory frameworks. When associating psychology with general fashion issues such as brand popularity, explanatory frameworks afford insight into both explicit and implicit knowledge involved in technological syntax and experience. A popular emotional design error was evidenced by Coca-Cola and its 'new coke' in the mid 1980s. It tasted better, but its packaging did not have the Coca-Cola red color and consequently the sales flopped. The company had not analyzed the relationship between Coke's visual presentation and symbolic American value [53]. Psychologically, the company had neglected the sensorial emotional schema attributed to their fashionable product.

4 Fashion in designing intelligent technologies

Product design is a constructive thought process. Design teams create technological systems to satisfy the needs of users and other stakeholders [1][2][54]. Design processes pursue new solutions or create new applications for old solutions, which enable ordinary people to improve quality within life systems, turning design insight into practical innovation [55]. In this paper, the focus has been on the role of fashion discourses in terms of understanding technology – its design and systems – as collective cognition and experience. In engineering, for historical reasons, the connection between natural sciences, computing and mathematics is traditionally well specified, as these sciences have been important in technological design and development during times of industrialization. Areas of human research have often times been dismissed and regarded as less relevant. Issues relating to innovative and large industry are contingent on fashion, both in their own logic and design and how they exist within human society. Overlooking this fact leads to numerous mistakes both in relation to the human dimension of e.g., end-users and consumers, as well as the structure and make-up of the organizations themselves [53]. Semiotics is not simply about symbolism and

signification. It is an explanatory vehicle for understanding the mind. This paper has scratched the surface of how fashion thinking enables a broader, more detailed understanding of human-design relationships in the development of intelligent systems. The answer to the original question of this paper (its title) is programmatic.

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