A Conscious Body

An Experientialist Approach to Interactive Product Design

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ABSTRACT

What do we stand to gain by employing an experientialist approach to the design of interactive products and systems? Cognitive psychology has informed interaction design since its inception. This article argues a phenomenological approach to design, informed by theories of embodied and extended cognition as well as cognitive linguistics. Examples are given that exhibit particular regard to underexplored facets of the human body and sensory apparatus. The designer is encouraged to employ a phenomenological approach to the design of complex interactive products framed in embodied realism and conceptual metaphor.

KEYWORDS: Interaction Design, Embodied Cognition, Phenomenology, Cognitive Linguistics

My assumptions about the role of the body as the locus of perception, thought and consciousness [...] have been strengthened and confirmed.
(Pallasmaa, 1996, p. 11)

1. INTRODUCTION

Cognition is the starting point for most discussions of interaction design (Langdon, Persad, & Clarkson, 2010, Mahut, Bouchard, Omhover, Favart, & Esquivel, 2018). How people relate to and approach interfaces in systems, services and products is often described using the nomenclature and theories of cognitive psychology.

Traditionally, much emphasis in interaction design has been put into graphical user interfaces for computers and smartphones (McKay, 2013). In later years, however, more and more developers and designers have explored the possibilities of incorporating a greater spectrum of the human sensory, pragmatic and cognitive faculties in developing products, systems and architecture that can facilitate or enhance experience (Novich & Eagleman, 2015).

A lot of effort is being put into developing functional, safe and satisfying interactive physical systems, and much work is being done to understand cognitive architectures and implementing them in computers (Richards, 2015, Dyachenko, Nenkov, Petrova, Skarga-Bandurova, & Soloviov, 2018). However,

it is debated whether the approach we are using to address machine cognition is coherent with how we understand human cognition, and whether we can even make truly intelligent systems within frameworks that don't have physical bodies or don't consider their physical, cultural and social environments (Dourish, 2004). This article attempts to appropriate an embodied branch of cognition and cognitive linguistics to the field of product design.

Leaning on review of literature, the article will propose two lenses through which a phenomenology of experience may be constructed - extended mind theory and conceptual metaphors. Cases are considered that in the eyes of the author manifest this approach. Emerging from this is a proposal to designers to employ a phenomenological approach to the design of complex interactive products framed in embodied realism and cognitive linguistics.

2. METHODOLOGY

The article employs the methodology of literature review to provide a brief overview of some of the dominant theories in phenomenological inquiry.

2.1 Literature Review

Webster and Watson (2002) state that a review of relevant literature is an essential feature of any academic project. The merits of the literature review lies in how it creates a foundation for advancing knowledge, by closing off areas where much research exists and uncovering where it is needed. A thorough literature review of a mature topic may aid in the synthesis of the subject matter or, in the attempt, uncover inconsistencies amongst established theory. On the other hand, continuous review of emerging fields of interests can propose theoretical foundations for further research and suggest areas that are not sufficiently explored.

Literature review is time-consuming, often more so than other academic writing as it requires locating a number of sources, reading the material, analysing it and proposing a synthesis as opposed to reporting on a research project and its results. It can, however, aid other agents in the field in saving time when doing preliminary research. A successful review informs the reader about what has been learned prior, identifying patterns in the literature and makes sense of the accumulated knowledge. (Webster & Watson, 2002)

Structure thus becomes imperative in writing a literature review. Good reviews are usually concept-centric in their structure and employs a point of view throughout or even a concrete aim. This approach will imbue the review with a narrative arc and coherency. (Bem, 1995)

Sources were primarily chosen within the fields of cognitive psychology, philosophy and design theory. There are advantages to approaching leading research journals and conference proceedings first. They are usually up to date, and are easy to search within. However, the review should not be confined to one research methodology, one set of journals or even one type of literature. Most fields also straddle other disciplines, and as such a review should include relevant theory from outside of the field in question. This goes double for design research, which delves into matters of psychology, biology, engineering, philosophy etc. It should be noted that as the review is often intended for readers who study the field in question, language, nomenclature and presentation should adhere to the conventions of the field without betraying its source material. (Webster & Watson, 2002)

2.2 A Phenomenology of Interactive Products

This article favours a phenomenological approach to the design of interactive systems, as opposed to conventional perception theory or semiotics (O'Neill, 2008). Phenomenology refers to a philosophical method for investigating experienced phenomena. It differs from positivism or empiricism by explicitly considering both acts of consciousness and their correlated experienced object (Gallagher, 2018). One of its central figures is Edmund Husserl, who is concerned with intentionality as a fundamental of psychological phenomena. Specific kinds of objects correlate with specific kinds of acts, and Husserl understands this intentional correlation as part of the constitution of the object, that is, the reality of an experienced phenomena is correlated with the intentional, conscious actions that may be enacted upon it. (Sbisà, Östman, & Verschueren, 2011)

Martin Heidegger, who was very indebted to Husserl, was concerned with human coupling with tools and equipment (Gallagher, 2018). He theorised that we tend to grab objects for our pragmatic use. Objects for Heidegger were either zuhanden or vorhanden, translated to "ready at hand" and "present at hand" respectively. *Zuhanden* denotes the tool as extension of the body, to be used in a pragmatic way without directing the consciousness explicitly towards it, like skilled writing on a keyboard. *Vorhanden*, on the other hand, is the state in which something becomes the object of conscious acts, like searching for the right symbol on the aforementioned keyboard (Dourish, 2004).

Design research that is phenomenological in nature is intent on uncovering the experience of designed systems (i.e. Svanæs, 2000) rather than the technical details of the system's function (O'Neill, 2008). The synthesis of reviewed literature suggests two lenses through which we propose to assess the phenomenology of interactive products: theories of embodied cognition and ecological psychology, and experientialism in cognitive linguistics.

3. RESULTS

3.1 Embodied Cognition

Merleau-Ponty (1945) emphasizes the body in a greater way than we see in Husserl or Heidegger (Gallagher, 2018). Differing from the western traditional philosophy, the body is treated at once as perceiver, knower and agent, as opposed to a vessel for enactment of considered mental activity. We engage with the world as agents rather than observers, with our intentionality being primarily connected with our motor skills. Merleau-Ponty gave great importance to the learning of skills - his "intentional arc" denotes a tight connection between body and world. Here, the body learns skills that are stored not as mental representations but rather as embodied dispositions to situations in the world. Studies of skill acquisition show that expertise is experienced as perceiving a finer discrimination of situations combined with more appropriate or specialized responses mediated through the body. Thus, successful action does not require propositional or semantically interpretable images (Dreyfus, 2002, Hoel & Carusi, 2018).

3.2 Ecological Psychology

Clark and Chalmers (Clark & Chalmers, 1998) introduces the extended mind theory, which argues that cognition does not occur solely in the mental or the body, but relies on elements that lies beyond the borders of the bodily neural network. Technical instruments supports our mental activities, like how a calendar relieves our biological memory of keeping track of appointments, or how a calculator lets us externalize our abilities to do "computational" math. Thus, physical environments and product may be designed to facilitate (or deprecate) our

cognitive faculties. Examples include the layouts of computer applications, operating halls or airplane cockpits (Dourish, 2004).

Gibson, 1986, in his theory of ecological psychology, introduces the term affordances as what the environment offers, provides or furnishes for an animal, which is later discussed and reevaluated by Norman, 1988, as a three-way conversation between user, product and interaction. It relates to extended theory by way of the complementary relationship between animal and environment (Gibson, 186), earning affordances a seat in the phenomenological canon.

In summation, we mention Rowlands, 2010, who argues that cognition is all at once embodied, embedded, enacted and extended. His *New Science of the Mind* is a synthesis of the highlighted theories in the phenomenological school of thoughts:

- Mental processes are embodied, as they are made up partly by extraneural bodily processes.
- They are embedded, that is, designed to work in tandem with the environment.
- They are enacted; they are often constituted by action and potential for action.
- They are extended, meaning they are located and distributed in the environment.

3.3 Cognitive Linguistics: Metaphors

Cognitive linguistics as a branch of psychology describes how language interacts with cognition (Robinson & Ellis, 2008). Lakoff and Johnson (1980), highlight metaphor as a conceptual cognitive phenomenon rather than purely rhetoric, and argue that we largely understand the world through metaphors (understanding one concept through the terms of another), more often than not ones that relate to the physicality of our body or our environments.

In discussing metaphors, Lakoff and Johnson (1980) propose that not only are the metaphors we use to understand the world highly connected to physical properties like orientation (HAPPY is UP, TIME is a MOVING OBJECT), but they are also intrinsically connected to our cultural and social identity and history. On some appliances, like lawnmowers, speed is symbolized by a hare and a tortoise, employing the metaphors HARE is FAST, TORTOISE is SLOW. We know that speed is but one of many characteristics of either animal - their juxtaposition, however, invokes the classic fable of Aesop, in which the hare loses the race against the slower tortoise due to arrogance. The cultural heritage of the metaphor is that the hare is not necessarily better (faster might mean less thorough, for instance, or too forceful), and that a setting must be chosen for its appropriateness as related to the task. Metaphor has since become an integrated part of the academic discussion of interaction design (Mahut, Bouchard, Omhover, Favart, & Esquivel, 2018).

3.5 Summary

We have looked at a number of theorists who emphasize the body (and the body in the environment) as the primary site of experience and cognition. Johnson and Lakoff (2002), argue that we understand concepts using the terms of other experiences (metaphor) and that these terms require embodied realism. An experientialist approach to cognition is argued (Lakoff and Johnson, 1980), in which reality is constituted by experience and understanding.
A synthesis of the literature reviewed thus gives ground to propose two factors to be mindful of when designing interactive systems:

- Understanding is metaphorical in nature, with the cognitive linguistic terms of understanding emerging from direct experience.

- The body and its environment is at once a primary site of experience and cognition.

4. CASES

Embodied approaches to product design abound, and there are many examples of innovative applications in non-visual UI (Komninos, 2018, Ishii et al., 1998), tangible interaction (Ishii, Leithinger, Follmer, Olwal, & Hogge, 2013), control systems (Cho, Cho, & Jeon, 2016, Wolf, Mayer, & Meyer, 2016), prosthetics design (Paneta, 2016), among other fields. This section highlights two projects that consider the human body in ways that goes beyond traditional HCI design.

4.1 Haptics and Touch

Several entities are developing haptic feedback systems that rely on our sense of touch to convey information (Lindeman, Page, Yanagida, & Sibert, 2004, Richter & Paschew, 2009). Haptic perception combines cutaneous information with kinesthetic perception (Challis, 2018, Freberg, 2018)).

Novich & Eagleman (2015) demonstrate how touch receptors in the skin can relay abundant forms of abstract information, including but not limited to words, directions or stock-market data. Their findings indicate where (on the body, with sufficient spacing between vibrotactile motors) and how (encoded in space, time and intensity) information is best relayed. Their seminal work (Eagleman, 2018) details the translation of language inputs into haptic output on the body, as demonstrated in the Neosensory *Vest*, a wearable for the hearing impaired that translates language into vibrotactile information (Neosensory, 2017). This translation constitutes a conscious assessment of the experience of hearing and of haptic feedback that is embodied. It also opens a discussion on how we understand metaphorically the meaning of information conveyed through touch experience and kinesthetics, explored also in the sophistication of haptics in gaming controllers (Bala, 2016), where vibration coincides with, for example, in-game collisions or the RPM of a virtual car engine.

4.2 Olfactory Interfaces

The olfactory sense (smell) is often neglected in interaction design, but we are seeing more and more research into its potential (Radvansky & Dombeck, 2018, Lin, Wei, & Chen, 2018, Albastaki & Albalooshi, 2001). Olfaction is highly connected to memory and emotions, but is subject to habituation - receptor cells stop responding to continuous, unchanging stimuli (Freberg, 2018).

The *Olfoto* (Brewster, McGookin, & Miller, 2006) is a smell-based system for digital image sorting. Participants in the study were given the opportunity to tag their photos by with smells, harnessing the emotional potential of smell and coupling it with memory and the visual impression of the photos. An exploratory design, they highlight the fact that smell is less well understood than vision or audition.

Olfaction as an embodied channel of experience is interesting for its connection with our memories, and gives rise to conceptual metaphors in our understanding that are more closely connected with emotions. Projects like Paterson's *Homesickness Kit* (2014) employ this to better the emotional-psychological milieu of astronauts in space habitats.

5. DISCUSSION

5.1 Critical Views on Theory

Criticism of the theoretical framework does exist. Rupert (2004) presents a challenge to the theory of extended cognition. His criticism centers primarily around the ontology of extended cognition. He argues that while it may be demonstrated how objects and the environment form tools to the aid of cognitive

activity, there is not enough reason to consider the environment as a mereological part of cognition. As interesting as this distinction is, a designer or design theorist might content herself with the implications of the extended cognition for her pragmatic use.
Dale's critique (2010) of Chemero's *Radical Embodied Cognitive Science* (2009) tries to resolve the apparent dichotomy of embodied cognition theory in confrontation with computational-representational forms of behavior, p 12:

'One may argue that the complexity of the human cognitive system, nonlinearly embedded in its ecological context, has evolved to produce the so-called emergence of new, diverse cognitive characteristics.
And an obvious emergent property of the human cognitive system is computational-representational forms of behavior.'

Taking a stand for 'taking complex systems seriously' (Dale, 2010), he opens for the possibility that neither approach will yield a satisfactory unified theory. Once again, for the pragmatic designer, this constitutes an opportunity rather than an obstacle.

5.4 Designing Intelligent, Embodied Systems

This article ventures to argue that designers stand to gain a lot by analysing successful interactive products with particular regard to how it lends itself to bodily interaction and what conceptual metaphors it invokes. If we cede that the human, her body and her environments constitute a unified cognitive system (Clark, 2008), products in this system are imbued with cognitive properties. As products are infused with artificial intelligence, such as digital assistants, these products become more active agents. Dourish (2004) argues that truly intelligent systems will need to be embodied, and that embodiment is a feature of interaction. As we develop systems with advanced semiotic and cognitive architectures, we argue that these should be informed by theories of embodied and extended cognition, complementary to cartesian or positivist theories that are still the norm (O'Neill, 2008).
An interesting field to explore in this regard is that of prosthesi. These devices constitute countermeasures to a loss or deficiency of function, and their perceived success seems to be indebted to the embodiment they are able to achieve (Marasco, Kim, Colgate, Peshkin, & Kuiken, 2011). As patients seem to prefer prosthesi that provide even rudimentary sensory feedback over more advanced, motorized ones, we argue that an experiential approach should be first in line when addressing these design issues.
Embodiment becomes central also as technology seeks to enhance or amplify our senses or actions, even constituting new senses as exemplified by Neosensory (Neosensory, 2017). Making sense of perceptions that have hitherto been unavailable to humans is perhaps best achieved through the conscious evaluation of what "normal" experiences they invoke metaphorically - and even as they evolve we might develop a new cognitive "language" of experience. In the realm of performance-sensitive activity, this also frames performance as bodily dispositions as opposed to enactment of mental representations (Merleau-Ponty, 1945), allowing us to evaluate and enhance performance in more appropriate ways.
The implication is that the conscious designer can design with the whole 'bodymind' in mind, addressing the right facet of experience and the right sense for the intended purpose - if touch is the right sense for conveying softness, what good will a picture of a kitten do?

6. CONCLUSION

In conclusion, carefully considering the mediation of information, emotion and action in terms of embodiment and conceptual metaphor when designing interactive products

represents a viable alternative to conventional representations of the user-product relationship. An experientialist approach with a watchful eye on emerging technology as it relates to the body is suggested to the designer to achieve products that lend themselves to successful, meaningful experiences.

ACKNOWLEDGEMENTS

Thanks are directed to Trond Are Øritsland for guidance and supervision, Sue Fairburn for inspiration, and the ID class of 2019 for diversion.

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