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Does user-driven design drive design-driven users?

Reflections on the conceptual framing of user informed design processes

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Abstract: During recent years much has been said concerning the qualities of a user centered approach to design. Obviously, use is of key importance to designers, and obviously an open, searching and negotiating attitude to complex problems is of value. But the products and places that are most treasured by culture, the most popular, often are not the more usable. Clearly, 'user-driven' is in itself neither a necessary, nor a sufficient condition for success in design. How, then, is the concept of user involvement to be framed in the context of design?

The design problems that many user-involving processes are designed to adress, are those of making complex and hidden functionality comprehensible for users. In other words, the design of use-signifying properties or affordances. As a basic taxonomy of affordances, this paper suggests applying Peirce's three characteristics of signification: The index, the icon and the symbol. This allows us to see the parts of the material world where shared human understanding rules. Where it is not a question of 'making sense of things', since they already make sense. Denotations are accounted for.

Examining examples of indexical, iconic and symbolic areas of design, it is argued that connotations, in all their richness and multifacetted misbehaviour, are the primary operators af design language. Furthermore, referring to philosophy of art, the characteristics of cultural significance is discussed. Cultural significance - one among many possible design virtues - is identified as a certain syntactical and semantic *density*. A manifold web of denotations and connotations, wherein a tight and rich set of coordinated connections constitutes complex meaning. The implications of these notions for both user-driven innovation and design-driven innovation are outlined.

The main argument of the paper supports a negative answer to the question posed by the title.

Key words: Design philosophy, design theory, aesthetics

1. Introduction

The notion of user-involvement in processes of design and innovation has become the dominant strategy of industrial product development. A number of techniques have been put to use, e.g. videorecording users, ethnographic inquiry etc. Concepts like user-led, user-driven and human-centered have flooded industrial and governmental innovation-strategies [1] and made any other strategy appear old-fashioned and anti-democratic. Anthropological techniques of user inquiry has entered design schools previously defined solely in terms of artistic approach. The designer as a facilitating servant for the public good [2] has replaced previous emphasis on the designer's authorship and artistic authority.

Obviously, it is of value that contemporary design culture takes an interest in use, users and participatory modes. Clearly, it is one way of enriching and developing artefacts and the material world. But is it the only appropriate strategy? Can it stand alone, or do the techniques of user inquiry have flaws and blind spots? Is user inquiry equally applicable to all fields of design and to all classes of design assignments and design products?

Examples seem to suggest that this might not be the case. Material culture is rich on examples of highly treasured objects that are not results of any user-driven process or any preoccupation with use as such. In many cases they are not the more useful at all. Examples are collective memory of monuments, vintage cars etc.

Culture is rich on artefacts that are very meaningful yet not the result of inquiry into users' behaviours, values or understandings. Artefacts that have authenticity, self-embodiedness, seem to have been here for ever - and are rather nodal points of material culture than transformable concepts negotiable with users. How, then, are we to understand the notion of user centeredness? This paper discusses the appropriateness of user centeredness for different types of design tasks.

The paper sets out from a premise shared with one of the influential books on user centeredness, 'The Semantic Turn' by Klaus Krippendorf. By applying the triadic distinction introduced by C. S. Peirce to Gibson's notion of 'affordance', artefacts are sorted into 3 categories. It is then shown that in at least one of these categories, basic assumptions (the idea of 'the semantic layer' introduced by Krippendorf) pertaining to user centeredness do not apply. This, in turn, allows for a critique of the user centered approach to how meaning is embedded in artefacts.

2. Affordance and design as the construction of meaning

In the famous and often referred works of Gibson [3] it is argued that humans (as well as animals) tend to perceive objects and environments in terms of what opportunities for action or use they offer. Gibson coins the word 'affordance' to define this intricate relation between user and object. However, it is what the user actually perceives and understands that eventually becomes usefulness or the opposite, not objectively measurable, context-free qualities in the object. We measure things relatively to our bodily and mental capacities as well as to our intentions.

In the case of human beings and our relation to artificial objects, it follows that 'humans do not see and act on the physical qualities of things, but on what they mean to them' [4]. Objects are interpreted by humans in terms of affordance. A landscape can be beautiful or hostile depending on whether we brought appropriate clothing. The size of a brick is determined in relation to the human - the mason's - hand. A brick twice the size would require two hands to handle. How, then, would the mason hold the trowel? The task of design is therefore to create meaningful and useful affordances. To design for human capacities in order for things to mean something relevant to somebody.

So far, this is in line with the premises presented in 'The Semantic Turn' [4].

3. Taxonomy of affordances

Different objects are useful to humans in different ways. Naturally, they also signify their usefulness - or intended meaning - in different ways. As a way of ordering artefacts with respect to the way they signify their primary affordance, I suggest applying Peirce's basic triadic distinction of sign functions [5]. This is a scheme that has been used by many authors - e.g. Susan Vihma [6] and Alvise Mattozzi [7] - to analyze affordances of objects, but where these authors analyze the many features of one single object, I will use the categories to sort all objects into three rough categories.

In Peirce's scheme a sign can manifest its meaning via three basic means. In any real sign, he says, one of them will be dominant, but the others will be there too.

3.1 The index

The first category is the index. A sign is said to be indexical if it is a physical connection from the signifier to the signified. Examples of this could be smoke signifying a fire or traces in the snow signifying a specific animal. A saw, an axe or a knife are artefacts with (dominantly) indexical affordance since in their case, affordance follows from their physical form and physical properties. In the case of the axe, for example, a short handle for one hand or a long one for two hands would afford chopping small or large pieces of wood, respectively. In case of the knife, one sharp edge means a knife for cutting, two sharp edges means a knife for stabbing. A chair - a simple one, not an office chair - is an indexical object. Its affords sitting and it does so by alignment of its physical properties to those of the human body. A high, hard chair is for dining and a low, soft one is for relaxing.

The violin (figure 1) or the drums (figure 4) are also objects with indexical affordance. You need to know how to play. But the eventual result relies on physical connections.

3.2 The icon

The second category is the icon. A sign is said to be iconic if the signified shares properties with what it signifies. Examples could be photos - like the one in my passport - or diagrams - like an electrical wiring diagram. An object can be said to have iconic affordance due to it being *like* what it *does*. Motorized or in other ways amplified products might be examples of this. If we consider the electric violin (figure 2) or the electronic drums (figure 5) we see that the sound from these instruments depends on electric amplification (the electric violin) or electronic generation of waveforms (the electronic drums). Despite the multiple possible ways of generating input for these technological generators of sound we see both instruments adapting elements from from the acoustic 'originals'. The electric violin features one curved side of the well-known contour of a violin. It is important to note that this is not a simple gesture of visual recognition. It is the contour where the violinist - trained with the acoustic instrument - feels the position of the bow relative to the strings when playing. Without it the violinist would be lost. Similarly with the electronic drums, impulses for the generation of electronic drum-sounds could be made with and configured around many other possible input devices. Yet the drummer needs a drum-like interface. Otherwise he or she wouldn't really be drumming.

The concept of the icon has been criticized for being vague and unprecise, for example by philospher Nelson Goodman [8]. The implications of this debate, however, are not important for the line of argument presented here. We can live with the icon covering several different stages between that of the physical index and that of the symbol (see below).

3.3 The symbol

The third category is that of the symbol. A sign is symbolic if signification relies on law or convention. The letters of the alphabet is a common example of this. Many electronic objects manifest their meaning in this way. In the personal computer, or any computer for that matter, there is no perceivable connection between input and output. Any way of (meaningful) input as well as output is designed and subject to the construction of 'interfaces' - layers establishing perceivable connections between technology and user. The complete openness of this design situation can be illustrated with the MIDI- interface (figure 3) or the electronic glove (figure 6). The MIDI interface for the computer can generate any sound imaginable and imitate any physical instrument desired. Inputs can be generated with any known tools for managing the computer plus a few ones offering

specific features for musical applications. The electronic glove is designed for virtual reality, but the sensors in the finger-tips could easily be configured to control the sounds of a drum set - or in an other configuration a violin.

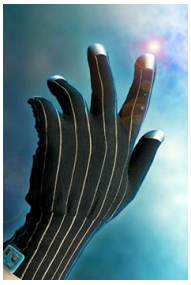
index	icon	symbol
physical affordance	relational affordance	symbolic affordance
mechanics	amplified, motorized	electronic
'archetype'	'hybrid'	'alien'
 figure1: violin	 figure 2: electric violin	 figure 3: midi interface
 figure 4: drums	 figure 5: electronic drums	 figure 6: glove with sensors

Figure 7: Schematic ordering of affordances and related artefacts

4. Semantic layers

The way a user perceives the affordance of an axe, a knife or a saw as useful, and realizes its relevant modus operandi, largely depends on the physical properties of the artefact. On the contrary, the usefulness and mode of operation of a laser cutter need to be explained. In other words, in order to operate a laser-cutting machine we need a semantic layer [4] between technology and user, but with the saw we don't need such a layer. In fact there is hardly any room for such a layer. In the case of the saw, a direct connection from form to function actually exists. In the case of the laser cutter, invisible, imperceivable means like electrons and the like ensure the function, and use depends on semantics.

This means, then, that the idea of a 'semantic layer' - as introduced by Krippendorf i 'The Semantic Turn' - does not apply to objects in the indexical category. And thereby, that one of the basic assumptions of user centeredness is questioned.

In the following we shall examine some further implications of this.

5. Archetypes, hybrids and aliens

The category of ‘chair’ is rather stable. Chairs have been part of material culture for centuries, even millenia, and are basic inventory. So has the knife, fork and spoon. Computers, on the other hand, have not been around for very long. Their affordance and the way they are operated and used is not shared human knowledge, but raise an issue of communication between technology and user. Several semantic layers laminate the space between them.

Either you perceive the affordance directly - the very physical form is all there is, and all that is necessary, to immidiately state its intended purpose. Such objects (of indexical affordance) I will refer to as ‘archetypes’. Or you perceive some black box - and everything depends on your sharing of codes with the designer. Such objects (of symbolic affordance) I will refer to as ‘aliens’. The category in between we can call ‘hybrids’ and leave out of the following discussion.

The examples above seem to suggest that the indexical category is rich on archetypical, architectonic and culturally old object categories [9], whereas the symbolic category is rich on examples of highly technological, complex artefacts, e.g. objects loaded with information technology. Surely, this is not the full picture. Ancient cultures had lots of symbolic objects, for example. But these instances belong to a different discussion. What is the point here, is the fact that material culture contains lots of objects - e.g. the archetypes - that do not depend on semantic layers to mediate between technology and user. Objects, where use, form and technology have a tight fit.

6. Objects in contexts

So far we have discussed artefacts only as detached objects. Now, let’s address aspects of the many contexts artefacts operate and exist within. These include contexts of other artefacts as well as social contexts. Context of other artefacts may include operational interfaces between different artefacts - like that of the pitcher and the cup - or the positioning or identity of a specific product in relation to competing products in the market. These, we could say, render different orders. Vertical and horizontal order, respetively. Contexts are layered, but sum up to an ‘ecology of the artificial’ [4]. Objects help or oppose other objects in the cultural realm and new artefacts enter the ecology in search for a niche.

For the archetypical, indexical objects our appreciation of their meaning and affordance is very simple and shared by (nearly) alle humans. Therefore, what mark such artefacts as belonging to a particular niche (i.e., what distinguishes them from other artefacts of the same type) does not pertain to their basic function or affordance. Basicly, the concept of the chair makes sense. The problem is to imbue it with more meaning. To have it say more. To question the way it is in the world. To make it convey unexpected, novel meaning.

For the aliens this is different. The comprehension of a new function mediated in electronics and invisible rays is hard to grasp, is often complex and has numerous possible variations. Mobile phones, digital cameras etc. are common examples.

Therefore, these categories of artefacts communicate with users and culture in different ways and through different means and rules. The task for for the alien is to be understood. The task for the archetype is more than this, since it already makes sense. It has to become meaningful.

It is preoccupation with the category of ‘aliens’ that has led Klaus Krippendorf to say that ‘design is making sense of things’ [4]. But to ‘make sense’ is a much lower demand than to ‘be meaningful’. And hereby we arrive at the heart of my critique: That the user centered movement and its underlying theory is unable to grasp the poetics of design. The remaining part of this text contains some notes on that.

7. Connotation and denotation in design language

The different means of design for these two aspects of tasks - archetypes and aliens - I will call denotation and connotation, respectively. The denotation is the primary perceived affordance of an artefact; as expressed by the way you would immidiately name it - a dining chair, a laptop computer and so on. This, according to Czikszentimaly [10], is the way people in general assign first meanings to objects.

In a discussion of photography, John Fiske suggests that "denotation is what is photographed, connotation is how it is photographed" [11]. With this statement as inspiration, we can say that denotation is what the object means - what it is. Connotation is the specific way in which the object is formulated. Since, as we have seen, there are objects in the world that need no further explanation - where denotations are straigtforwardly accounted for - such archetypical artefacts are distinguished from each other solely through their connotations. The tight fit of technology, form and use leaves little room for semantic layering.

Verganti [12] has investigated design language of archetypical artefacts and found that innovations in design language - the connotative aspects - has the possibility of stepping beyond known categories. To place an artefact with a well-known purpose outside the frameworks of known connotational categories. Verganti makes a point of noting that such innovation in general is not the result of user-studies.

Verganti's analysis suggests that meaning in design is not restricted to being constructed in a kind of negotiation with a potential user. In fact, radical new approaches to the connotations of artefacts seem to require the commitment of few people destined to follow an idea. Interestingly, the examples mentioned by Verganti - lighting fixtures, furniture and kitchen utensils - are mainly taken from the archetypical category of objects. The category where articulation of the artefact is all there is.

Maybe the tight semantic fit of these tasks challenge the designer to develop rich connotations. This could explain why many artistically oriented designers seem to prefer tasks like furniture, kitchen utensils and similar archetypical objects.

8. Conclusion: Cultural significance and meaning in culture

In culture in general the construction of meaning goes two ways. Readers and users perceive and interpret. Authors, designers and other producers present what they find meaningful. Some contributions fail, some stand for ever and become nodal points of culture.

In his essays on the language of art, Nelson Goodman frames the culturally significant as that which has extra 'semantic density' [8]. That, we could say, which is loaded with meaning. Rilkes poems are like that. Jorn Utzons architecture is like that. And Bertoia's chairs are like that.

These examples belong to basic categories of human culture. And they share the fact that they are individual contributions based on deep inquiries into form. Solitary journeys from where rich sets of connotative meaning are brought back and proposed.

Just as the best poems of the past were the work of a single author, so the poetry of design is not likely to become a collective enterprise in the future.

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