

USECUES IN THE DELFT DESIGN COURSE

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For designers, featural and functional characteristics of a product are the obvious means to express its functionalities. Usage as intended in a design may be conceived as being mediated by product semantics or affordances. These concepts primarily involve scientific generalisations. Usecues are introduced as a pragmatic design tool. There is a brief discussion of experience with the notion of usecues in the Delft design course.

Introduction

In user product interaction, user activities (perception, cognition, actions, effort) involve the formulation of meanings for featural and functional product characteristics. Apart from documentation on paper, these featural and functional product characteristics are the obvious means for designers to express

a what functionalities a product has, i.e. what possibilities to support, protect, replace, extend human activities, and also, in as far as desirable,

b how these functionalities can be activated.

Observational studies (e.g. Kanis, 1998) show that, whatever the effort of designers, the intended communication frequently fails; that is, meanings in product characteristics preconceived by designers, are not properly recognised by users. See Table 1 for an overview of reasons found in empirical studies why perception/cognition may be inadequate. In such studies, it has also been found that perception/cognition as intended in the design does not necessarily accommodate anticipated use actions – users may prefer their own way of operating or postpone the action at issue. Occasionally use actions anticipated in a design are carried out smoothly without users noticing or understanding designed characteristics of a product, (equally so in using a product for the first time).

Obviously, better insight into the mediation between users and products by designed product characteristics could be of great help for designers in anticipating future usage. This subject is considered by dealing with the possible role of the concepts of product semantics and affordances in describing user-product interaction, and by discussing the notion of usecues.

Product semantics

In terms of semantics, products often tend to be discussed as ‘wholes’, representing cultural, aesthetic or general functional values and information. In summarizing a study by

Table 1 Perceptions/cognitions by users different from intended by the design

<i>featural and functional product characteristics</i>	
<i>why not noticed</i>	<i>why not understood</i>
not observable directly by user (e.g. on/off control on the back of video recorder)	
missed (not conspicuous, escaped attention, such as icons on a screen)	
unaware of something perceivable (functionality unknown, such as 'mute' on a remote control, so there is no search for information ¹)	
indicated functionality not recognised (functionality as such is known, e.g. the possibility to select program on a remote control of more than one figure ¹)	
<i>noticed</i>	too much effort + obvious alternatives (e.g. icons on nozzles ¹)
<i>noticed</i>	misinterpreted (e.g. the term 'AUTO' as 'car' on display of electronic suction power regulation ¹)
<i>noticed</i>	meaning given to characteristic(s) not meant to be meaningful in the design (e.g. parting lines)

¹ Kanis, 1998

Klöcker, Vihma (1995) points to the contrasting tendencies in product design: “the optimization towards a reduced and easily perceivable form and the informative tendency with various details added to the form.” (p.35). “‘Messages’ for the user must be designed”, this author adds (p.38) in discussing “semantics of product language”. Product semantics can be thought of as meanings associated with product characteristics, e.g. form, dimensions, colour, graphics, texture, transparency, fragility, grouping of product parts etc. In observational studies carried out at Delft (Kanis, op.cit.), graphics can be denoted as frequently occurring product semantics, indicating product functions (*a* above) rather than ways of usage (*b*), compare the references to icons and words in Table 1. In studies like Vihma’s, attribution of meaning tends to be discussed on a general, more theoretical level, rather than empirically, on the basis of the observation of user activities. One way to think of the role of product semantics in design is in terms of information processing. A combination of product characteristics, supposed by designers to have a particular meaning, are encoded in a design, subsequently to be decoded by users. In this view, communication primarily consists of the exchange of mental representations in a perceptive/cognitive process, which somehow thrives on experience and learning. Vihma points to the alternative of ‘self-explanation’ of a product, exhibiting its practical function in relation to a user (p.39). Comparing this to the absence of cognitive mediation between users and products referred to in the introduction leads towards the concept of affordance.

Affordances

This notion denotes self-evident environmental possibilities/opportunities for living organisms (animals, humans) in being supported, protected or threatened, whilst these possibilities/opportunities are directly perceivable on the scale of an organism involved, i.e. by a direct coupling between this organism and its environment in [...éactingé

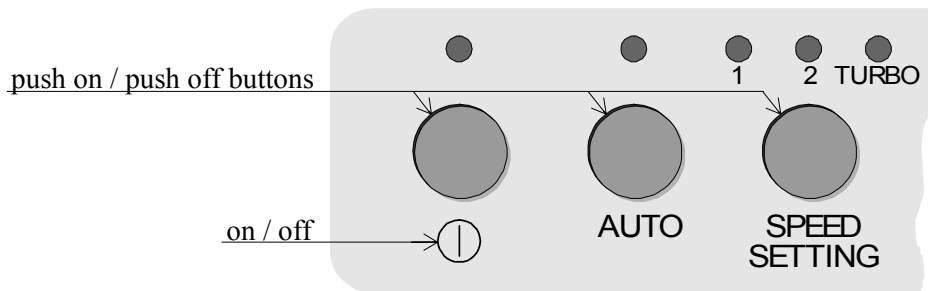
perceivingéactingé...], without a specified mental mediation. A key-characteristic of the concept of affordance as introduced by Gibson is its simultaneous foothold in the agent as well as in the environment. To some extent, this 'linking character' appears to 'explain away' interaction between constituents which are distinguished as separated entities, i.e. as agent and environment in their own right. This may be one reason why it appears to be so difficult to come up with elucidating examples of affordances. Another reason seems the claimed self-evidence of the direct coupling between agent and environment, working out in smooth, automatic human-environment behaviour, that is: in essence pre- or non-linguistic. Compare new terms such as 'walk-onableness' of surfaces, or 'sit-onableness' of chairs, which often feature in attempts to clarify what an affordance is. A third reason for the absence of good examples may be the evolutionary character of the notion, addressing general human behaviour in natural environments, rather than activities of users interacting with artifacts.

Why would a concept, which is operationally so evasive, have become so popular, at least in some design circles, see e.g. Amant (1999) and Norman (1999)? Is it the claim that affordances specify actions (e.g. Michaels & Carello, 1980)? For sure, a notion shedding light on the diversity of users' actions and reducing their unpredictability would be of great help for designers. Affordances as such tend not to be seen as sufficient for this job, since usually human characteristics, in terms of effectivities or capabilities (Michaels & Carello, op.cit.), are resorted to in order to 'co-explain' variety in user activities. However, our studies have shown (Kanis, op.cit.) that the relevance of human limitations and capacities is largely constrained to setting boundary conditions. How users act within these boundaries may have little to do with their limitations and capacities (cf. Green et al., 1997).

Whatever the reason for its attractiveness, the term affordance has surmounted its questionable conceptualisation, not unexpectedly by being given alternative interpretations. Norman (op.cit.) complains about the misuse of the term in the graphical world, for featural characteristics such as icons on products; that is, on a one-sided basis with the agent (user) unrecognised. An extreme and opposite interpretation is given by Vera & Simon (1993), who view affordances as "carefully and simply encoded internal representations of complex configurations of external objects, ..." (p.41). This appears some way off Gibson's mark.

Usecues

The origin of both product semantics and affordances primarily involves theoretical concepts expressed as scientific generalisations, rather than pragmatic notions as design tools. The popularity of the notion of affordance in particular, despite its resistance to operational demonstration, suggests that designers could do with a conceptual anchor to monitor ongoing design efforts in terms of possible future user activities. The term 'usecue', introduced in the Delft curriculum some years ago, seems to work in this way for industrial design students. Usecues are conceived as meanings, given to product characteristics, in terms of what functionalities a product has (see a above) and how these possibilities can be activated (b). Usecues involve primarily a pragmatic, bottom-up notion, rather than departing 'top-down' from cognitive, ecological or other 'fundamental' processes. Usecues can be seen to resemble what Vihma calls 'indices' (op.cit., p.114). Whether conceived as product semantics or as affordances, usecues are more 'down to



- led above on/off control is red when on;
- automatic adjustment of airvolume to be cleaned by on/off control on and 'auto' control on;
- led above 'auto' control blinks red during measurement air quality (3 min.), then switches to green (clean air) or to steady red in combination with one of the leds '1', '2', 'turbo' as the level of airvolume to be cleaned given the measured pollution;
- operation by hand with on/off control on, 'auto' control off, 'speed setting' control on, addressing the levels '1', '2' en 'turbo', which are set by repeated pushings.

Figure 1 Part of the control panel of an aircleaner

earth': the actual 'voice' of a product in practice in terms of its functionalities, see Figure 1 for an example.

The following featural characteristics can be indicated as presumed usecues: contrasting colours of the controls; the on/off sign; the terms 'auto', 'speed setting'; the graphics '1', '2' and 'turbo' under the leds as a scale (whatever 'turbo' may mean); the position of the leds above the controls, which simultaneously may be a source of confusion since the scale is addressed by two controls. Functional characteristics as presumed usecues may be the highlighting of the leds, and the blinking of led 2, followed by its switching to steady green or red.

As can be seen in this example, the identification of presumed usecues goes along with the indication of possible deficiencies and flaws, e.g. the meaning of 'turbo', the scaled leds addressed by two controls, and the meaning of the 3 min. blinking of led 2.

User trials usually make very clear that usecues should not be seen in a positivistic way, as radiated messages just waiting to be discovered and understood by the user. There is no 'the user'. There are many users, known to vary greatly in their perceptual and cognitive processes, dependent upon expectations and experience in different situations. In this respect, the designed 'voices' can best be seen as opportunities, to be realised conditionally in relation to the individual, situated predispositions of people. Users may have already learned the messages from these 'voices', may accept them as naturally self-evident, may be unaware of some or all of the processing, may be unknowingly guided by a fortuitous combination of the message and circumstance, or may actually recognise and accept the conscious attempt at guidance. The notion of usecues is meant not to be burdened by theory focused dialectic which has no significance or impact on designers, hence this 'new' term.

Usecues in the Delft design course

What may make the term usecues attractive to industrial design students is its articulation of something from which designers cannot escape: the creation of featural and functional product characteristics which are or can be transmitters of messages (voices) for users. Even if only used by hindsight, thinking in terms of usecues has been found to facilitate

the identification of possible deficiencies in a design underway, such as lacking ‘directions for use’ in a prototype, or ambiguous or misleading cues (compare Figure 1). The popularity of the term has its other side. Once recognised, the articulation of usecues as possible meanings of design characteristics sometimes may trigger the unwarranted feeling of design students being ‘in charge’ of directing usage, which is then no longer a complete gamble, since the design has been ‘usecued’! In extreme cases, any distinguishable featural or functional product characteristic is denoted as a *designed* usecue (in the case of a self developed model/prototype), or a *presumed* usecue (in the case of an unknown design history). Then, the notion of usecues tends to degenerate into a panacea and this degeneration may accompany and reinforce the misconception of a reductionistic user-product interaction: this cue for this, that one for something else. Such thinking in terms of isolated cues may give some indication of reasons why user activities differ from those anticipated in a design (see Table 1). This approach exhibits a bias against the way in which users may actually attribute meaning, namely contextually, rather than in a behaviouristic way with a product reduced to the sum of a series of distinct usecues which may end up in misguided design remedies. A neat, ‘one-to-one’ picture is further blurred by the difficulty of delineating what is, and what is not, a usecue. Clearly, speaking of a usecue seems to be warranted when a particular featural or functional characteristic results in the rejection of alternative ‘messages’ by a new design. However, such a ‘design story’ is no prerequisite. Users, in deciding what to do or not to do next, make sense of obvious characteristics e.g. the sound a product makes when functioning, or that it has become warm. Such characteristics, which are usecues by definition, can be seen as passive incorporations - not obscured (as opposed to deliberately introduced) by designers, who may accommodate their designs implicitly to (presumed) current habits, practice, customs, cultural conventions. It appears inevitable that designers will give their own delineation of the term. Unacceptable as this may seem in a scientific context, there is nothing wrong with it, provided that usecues (designed, presumed) can be made explicit, i.e. capable of articulation, and can turn out to be a pragmatic and effective tool for drawing due attention to the consequences of all kinds of decisions made during the design process.

References

- Amant, R.S. 1999, User Interface Affordances in a Planning Representation, *Human-Computer Interaction*, **14**, 317-354
- Green, W.S., Kanis, H. and Vermeeren, A.P.O.S. 1997, Tuning the design of everyday products to cognitive and physical activities of users. In S.A. Robertson (ed.) *Contemporary Ergonomics*, (Taylor & Francis, London), 175-180
- Kanis, H. 1998, Usage centred research for everyday product design, *Applied Ergonomics*, **29**, 75-82
- Michaels, C. and Carello, C. 1980, *Direct perception*, (Englewood Cliffs, New Jersey, USA)
- Norman, D.A. 1999, Affordances, Conventions, and Design. *Interactions* (may/june), 38-42
- Vera, A.H. and Simon, H.A. 1993, Situated action: A symbolic interpretation, *Cognitive Science*, **17**, 7-48
- Vihma, S. 1995, *Products as representations*, (University of Art and Design, Helsinki)