Enhancing Intuitive Interaction by Using Embodied Affective Movements

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Abstract: The topic of 'intuitive product-use' is defined from a user-perspective and contrasted with automatized behavior. Attribution theory and embodied cognition theory is presented as a theoretical framework to understand and design intuitive interfaces. More specific, this paper proposes to enhance intuitive user-product interaction by applying affective embodied behavioral motor knowledge to the interface design.

1 Introduction

Intuitive behavior can be commonly defined as behavior based on non-inferential knowledge [Au99]. In psychology, intuitive decisions often are operationalized by the classic Remote Associates Test [Me62]. In this test viewers intuitively decide correctly on the coherence between a triad of words (i.e. TIME, HAIR, STRETCH) without consciously knowing the common concept (i.e. LONG). In behavioral terms, intuitive interface interaction would be defined as accurate interaction performance with little awareness of decision making process.

With regard to interface design, intuitive behavior facilitates ease of use for first-time users. In theory, after a certain amount of learning, practicing and general usage it could be stated that the intuitive experience of all interfaces will increase – even Nokia menu structures. However, given the short life-cycle and increasing multi-functionality of some products, e.g. digital products, one might legitimately wonder if this (intuitive and behavioral automatized) end-stage in product interaction is ever achieved: product users might be non-intuitive users for a long time. Therefore, intuitive interfaces, increasing ease-of-use, might have some advantages over non-intuitive interfaces. One class of advantages is an increase of affectively positive user experiences. This is achieved by failure reduction during the interaction process, that generates a positive self-esteem of the user *and* makes the cognitive processing more fluent. Fluency of interaction *and* of cognitive processing is generally considered as a cause for a positive affect experience [TS08; WC01].

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In this paper I'll describe processes of automatic meaning attribution, which might incline intuitive behavior when applied to interfaces. The main focus of the paper will however be on embodied affective knowledge that might generate intuitive interaction behavior. The argument is that affective knowledge, including distinctive motor behavioral components, is embodied knowledge. When this knowledge is activated and part of the product interface, the user will experience an intuitive product-interaction.

2 Attribution and embodied cognition

In the past years, I studied attribution processes to abstract perceptual movements and found evidence that subjects are very consistent in the attribution of basic and automatized concepts, such as *animacy* or *emotions*. Moreover, the experiment showed than even high-order concepts like *fictionality* were consistently attributed to the abstract stimuli [VT09]. The automaticity of attributions might be of interest for designers, since knowledge of activated concepts by a design can form a base for the prediction of user behavior. Features from an automatically attributed concept may be used to guide the interaction process. For instance, a crystal wineglass might activate an attribution of 'fragility' by its form and transparency, evoking a user behavior that avoids a power grip. This behavior, caused by a fairly automatic attribution process, might be experienced by the user as intuitive since non-deliberate knowledge is used to guide the interaction process, grabbing a glass properly, i.e. without breaking it.

Although automatic attribution processes can guide and predict product-user behavior to a certain extent, the link from concept attribution to behavior can be made more explicit by integrating embodied cognition theories. Since the 90's a growing body of research gains more and more evidence that cognition is more tightly bound to action and perception than was thought before (eg. [Ba09; FZ08]). Moreover, a mutual influence of bodily experiences and cognition is supposed. On the one hand, body feedback theories present evidence that bodily experiences influence cognitive processes directly: a hill is judged as being steeper when the observer carries a heavy backpack than without a backpack [Pr06], cartoons are judged as being more comical when the observer forces a smile than without a smile [SMS88]. On the other hand, simulationist theories [Ba09] and neurological mimicry research proclaim that cognitive processes are for a large part grounded in experience. Moreover, bodily experiences are *simulated* during a perception in order to classify/respond accurately to the perception (cf. emotion recognition: [GS05]). Empirical research can be found in neurological research (cf. [Ki08] showing that reading of the word 'telephone' activates an auditory area of the brain) or in empathy [DM08] and pain research: subjects seeing a picture of a needle in an index finger after which they have to press a key with the index finger show larger reaction time than subjects who are primed by a picture of a sponge on a finger [Mo06].

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3 Intuitive affective motor knowledge

In my current experiment I want to demonstrate how user-product interaction can be made more intuitive by relying on (embodied) emotional states that are effective during the interaction. It is hypothesized that: *Congruency between embodied motor expression and task related motor behavior facilitates user-product interaction whereas incongruency inhibits interaction.* This means that emotions that arise, or are perceived, during the interaction process will favor specific user movement – cf. when someone is happy, his arms tend to go up. When this information is used in the interface, the interaction can be experienced as intuitive for two reasons. First, the emotional movements are not learned but embodied (every user knows how express emotions). Applying embodied knowledge in product design adheres to an intuitive impression of the interaction. Secondly, the user does not have to restrain his emotions in order to control the interface, making the interaction more intuitive on an ecological level. Apart from making the interaction more intuitive and increasing the *ease of use*, the usage of embodied movements in interface will increase the understanding and control of *user experience* as well. By integrating predictable emotions in interactive products, the product experience will be richer and better enjoyed [DH07; VRH08].

An example of a non-intuitive interface, as understood in the aforementioned manner, is the traditional car brake-pedal. A brake is used in dangerous situations. In dangerous situation people are likely to experience anxiety. Anxiety experience will favor contraction movement [SE07; De89] instead of pushing movements. As a result, the hand-brake can be expected to function much more intuitively for an anxious user as the car brake will do. Applying intuition in brake interfaces can change the interaction result from death to life.

Fig. 1: Left picture presenting a non-intuitive brake interface, right picture presenting an intuitive brake interface.

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