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AN APPROACH ON DESIGN, USER AND GESTURES: NEW RELATIONSHIPS FOR NATURAL INTERACTION

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Summary: To interact with an element, the user must first perceive the object, analyze or inspect it for understanding through their already pre-established knowledge and, based on their previous understanding, perform gestures and actions to properly use the object. system - product. But for this, the product must have a user-friendly and recognizable procedure, through a search of the individual's memory so that they can make associations on how to execute types of display, lever, button, etc. And for this, their physical and cognitive restrictions must be taken into consideration, to which this article presents interpretations by different authors and there is only a brief discussion of some aspects of the relationship between the human product system and/or computer. Based on the analysis of human cognitive perception, which brings to light gestural interactions through interpretations of signals emitted by computers.

Keywords: Interaction, Design, User, Gestures.

1. INTRODUCTION

Surely you have smiled at actors playing the roles of people known for their simple gestures when they imitate them. The repertoire of gestures is quite broad: facial expressions, hand movements and entire body movements, all following the reasoning of a conversation, conveying a message. The interactive force of gestures is so intense and natural that, for example: when an individual speaks on the phone, what is said is often accompanied by supporting movements, which, in practical terms, is useless for the receiver of the message, since he does not have visual contact with the sender of the message. However, even if you are present and just looking at the person's reaction, you know from their look or expression what is going on, whether they are worried, happy or angry (BUXTON, 2011).

Gestures and signs are among humanity's most remote forms of understanding and to this day constitute an evident supporting bodily aspect of communication. Mulder (1996), in his studies on hand gestures for Human Computer Interaction (HCI), questions the use of the word “gesture” to refer to posture and vice versa, and explains that the tendency is to see the gesture as a dynamic movement and, posture as static. McNeill (2005) attributes gestures as a real-time dialectic in speech, as a dynamic extension of language.

It is through natural gestures that sometimes verbal communication becomes unnecessary, as gestures are sufficient to understand the message. This everyday practice is defended by the conclusions of McNeill (2005), stating that gesticulations are active participants in speaking and thinking, acting as elements in a dialectic of language images, providing speech and thought. He also adds that significant gestures are everyday occurrences – the spontaneous, involuntary, are regular accompaniments of speeches that we see in our fingers, hands and arms in movement. Gestures vary according to the context in which they are used and cultural aspects, but they are still linked to communication (KITA, 2009).

Currently, the potential of gestures is being studied and applied to the interaction between man and computer, seeking a way to make interactivity with the computer interface more intuitive and with effective usability, involving the user more intensely in the data entry process. in the product system.

This article was based on authors who analyzed human cognitive perception, focusing on gestural actions linked to computers and virtual devices. In which the search focuses on the reception and investigation of new ways of presenting information in products with interfaces, disseminated with the introduction of interaction technologies.

2. AFFORDANCES

Gibson in the book The Ecological Approach to Visual Perception (1986) writes that: "The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill". When linked to the possibilities that an environment or object offers to a particular individual, probabilities arise that need to be perceived. Thus, when analyzing the information that helps us understand a possible action, we can determine degrees of intensity. An adult is able to deduce many more affordances than a child, due to their capacity for abstraction and perception. The more knowledge, the more possibilities are perceived, leading to the exploration of affordances at levels ranging from the environment to objects, shapes, materials, textures and spatial arrangement.

Gibson (1986) in his theory states that the perception of affordance is holistic. What we perceive in an environment are its affordances, not its priorities or dimensions. The environment means to the agent only what he perceives (ZHANG and PATEL, 2008). Thus, an affordance is the product of relationships between physical structures of the environment and the intellect of living beings. The action resulting from this relationship is also committed to the scale and physical capabilities of the agent, such as strength, movement production and others. But this does not mean that an affordance depends on an agent. They exist as opportunities, whether used or not. Like the purpose of a knife is to cut food, but it can serve as a weapon, even if the person is peaceful. Affordances do not disappear when your eyes close, they are not physically easy to display, yet they are perfectly real and noticeable.

For the author, life forms and the environment make up a mutually integrated ecosystem. Both are limiting and complementary. In this sense, when the agent perceives affordances, he perceives himself, that is, when he perceives possibilities for action within a given environment, he also becomes aware of his physical and, being human, intellectual capabilities. The type of action resulting from this interaction of beings with the environment, that is, the way in which these factors adjust and organize themselves, determines the habits, forms and tendencies of this ecosystem, forming an identity (OLIVEIRA E RODRIGUES, 2006).

In functionalist objects, affordances are directly related to what Lobach (2001) called practical functions, that is, the physiological aspects of use, arising from organic-corporeal relationships between a product and a user. In this sense, when a product is created, its design is conditioned, firstly, by its main and specific use. According to Gomes Filho (2006), the

main use is the very reason for the product's existence, its obvious designation, while the specific uses concern the modes of use where, eventually, other secondary uses take place.

3. INTUITIVE USE

According to Naumann (2007), it is the attribution to the interaction involving an individual and a machine in a given context. This interaction aims to accomplish something. However, there are some aspects that must be considered when creating a system or product, so that it is more intuitive to use. For the authors, users can interact with an effective and intuitive system by applying their previous knowledge to a given situation. Still for the authors, this prior knowledge can originate from repertoire. Finally, they point out the correct use of the term "intuitive use", to the detriment of the term "intuitiveness", which according to them, was being commonly used.

Unlike Naumann (2007), Cybis (2003) uses the term intuitiveness in agreement with the foundations of Kieras and Polson (1991). The authors present Cognitive Intuitiveness Inspection as a type of heuristic evaluation where evaluators aim to analyze the cognitive processes that occur the first time a user performs a task. In addition, the subsidies offered by the product are evaluated so that humans can learn quickly.

This intersection of intuition in design has also been worked on from different approaches. Some are more theoretical (Norman, 2010; and Bürdek, 2006), associated with product designs and intuition (Rutter, Becka and Jenkins, 1997; and Frank and Cushcieri, 1997) and based on usability tests (Blackler, Popovic and Mahar , 2003).

Intuitive use was addressed by Hsiao-chen You and Kuohsiang Chen (2007) in the development of a study that verified the application of affordances based on semantics. This verification was carried out based on the interaction between people and the physical product. In total, three design dimensions were considered for the research: affordance, perceptual information and symbols. As a result, the authors identified that affordances, in fact, positively influenced the direction of action for users. However, they alone did not prove to be self-explanatory in communicating and understanding the action.

4. NATURAL INTERACTION

Natural interaction is worked on by Norman (2010) as an opposition to so-called modern equipment. In which products generally feature a set of lights, beep signals that have the function of alerting you to something or serving as an alarm, drawing the attention of those around you to what has happened. The author states that isolated, each one proves useful. However, people tend to have several of them in their homes, each with its own different signaling system. Therefore, if we use several at the same time, we will have several light signals flashing or lighting up, sounds indicating different stages and tasks, among other things.

In this context, natural interaction emerges as a possibility that can be more effective and, at the same time, less disruptive (NORMAN, 2010). Thus, for the author, the most important thing for this approach is that the signals are presented, inform, without disturbing the user, providing a continuous and natural assimilation, without appearing intrusive, as occurs nowadays. Then, a parallel is made between nature and the built world, claiming that human beings tend to do well in nature, processing signals from the environment and its inhabitants. To understand the situation of ready-made "modern equipment", it is important to return to the design phase to understand why the designer seeks this type of signage. Norman (2010) points out that these tones and flashes of white and colored light can perhaps be an easy way for designers to add signals to such equipment. However, according to him, these signals may prove to be less informative and less natural. As a suggestion, the author proposes that a better

way to design everyday products is to use richer, more informative and less intrusive signals, such as natural signals.

As an example, he suggests the sound of water boiling in a kettle as an example of natural signaling. It is a sound produced by pockets of heated water, in movement, creating sounds that naturally change in intensity until the fastest boil, where a natural and continuous sound is emitted. From this sound composition, a user with minimal experience in using the kettle is able to identify the boiling stage of the water.

In natural interaction, the authors (NORMAN et al, 2010) also propose that some aspects be considered. One of them is implicit signals and communication, as an important element in the development of intelligent things since they inform without interruptions, nuisances or the need for conscious attention. Therefore, if we are naturally led and involved by the products, there is no need for abrupt and/or eye-catching interruptions. Another aspect addressed was affordances as communication. For the author, they guide behavior and, sometimes, they do this without individuals realizing that they are being guided, since the process appears natural and simple. The next aspect worked on by the author is natural safety, as a possibility of reducing the accident rate by modifying users' perception of safety. In it, the author considers mechanical accessories to be relatively primitive examples of a natural collaboration between humans and machines. Furthermore, with advances in electronics, it is possible to evolve further in this area.

Finally, the authors present six succinct rules on how designers and engineers can consider natural signals, in order to provide effective communication, so that they can be inserted into the internal mechanisms of the machines to be designed. The rules will be presented in the table below:

Design Rules	Statement
1	Give abundant and complex natural signals.
2	Be predictable.
3	Provide a good conceptual model.
4	Make the result understandable.
5	Provide continuous attention, without disturbing.
6	Explore natural mappings to make interaction understandable and efficient.

Table 1 - Design Rules (Source: NORMAN, Donald; NIELSEN, Jakob. Gestural Interfaces: A Step Backward in Usability. Interactions. Vol. 17, issue 5, sept-oct. 2010. p. 46- 49.

5. INTERACTION DESIGN

The use of gestures when interacting with devices must meet the cognitive demands of the task to be performed and observe the best movement to be performed, according to the specificity of the task, leading the user to act naturally in controlling these devices. Perform gestures intuitively, recognizing their functions from previous experiences or observations, providing support for creating a mental map for carrying out the task. Thus, gestures emerge as an effective possibility in Human Computer Interaction, in order to provide a closer interface between these parties.

Silvia Ghirotti and Carlos Morimoto (2010) point out two main reasons for using gestures as an interaction interface:

- The use of a large vocabulary of gestures in everyday life, in addition to the easy learning of new gestures through observation;
- Natural use of gestural phrases, which segment the dialogue into parts with simple meaning, easy to be learned by computer systems.

Direct manipulation through gestures provides more precise control of objects on the device's screen, the most basic gestures of moving objects on the screen with the fingers, zoom control, the act of swiping a page in a virtual book, among others, are done intuitively. This transition is opening paths for discussing new interaction paradigms, such as Natural User Interfaces - NUI (Natural User Interfaces), proposed by Wigdor and Wixon (2011) who define it as an interface where the human is directly connected to the system , through naturally human means of communication such as gestures and voice, without the need for a graphic metaphor controlled through peripherals (CABREIRA AND MÜLLING, 2012).

The authors discuss possibilities for more natural forms of interaction, evoking the cognitive character of the individual who will operate and manipulate the system. Dan Saffer (2009) classified gestural interfaces into:

- *Touchscreen:* the user interacts by touching directly on the device screen. This change in the interaction paradigm, according to Agner (2012), generates new interaction constraints, which presupposes a different way for designers and developers to analyze solutions and enhance the resources of their applications;
- *Free form*: as the name suggests, its interaction is freer, three-dimensional, without needing to be in contact with an interface surface, it uses a larger and more complex gestural vocabulary, in addition to enabling a richer interaction between the user and digital interfaces, providing a greater level of immersion, enabling you to manipulate the system in a more natural way. It requires peripherals such as certain types of controls, sensory gloves or just the human body as an input device.

However, Norman and Nielsen (2010) warn of the fact that interfaces that interact through gestures have been developed without precise observation of consolidated Interaction Design concepts and standards, such as:

- Visibility of affordances: clear communication through signs or graphic representations, which provide guidance on what to do at certain times to start or continue the interaction;
- Feedback: system response to inputs;
- Consistency: refers to the system standards that guide and signal following formal coherence;
- Reversibility of actions: possibility for the user to return an executed action when he/she deems it necessary;
- Function discoverability: ability to find functions or aspects of them through menu exploration;
- Scalability of screen resolutions: work on all screen sizes;
- Reliability of operations: credibility in the system regarding the actions developed, encouraging the user to interact.

6. CONCLUSION

The relationship between agent and object shows the designer how to overcome restrictions on the usefulness of certain products and also, as highlighted by You and Chen (2003), it can open doors to still unexplored territory, for a more interactive design. The concept of affordance not only helps to understand how people use artifacts to fulfill their intended purpose, but when applied explicitly in design, it can suggest ways to expand the usefulness of new products.

The observation by Norman and Nielsen (2010) leads to reflection on the changes produced due to the marketing uproar over this recent technology, which brings new possibilities for interaction and prominently influences people's behavior - mainly in the way they communicate and handle information.

Interpretations regarding interactive gestures are of great importance due to the communicative perspective they have. When performing a certain task using gestural interfaces, the individual will be able to achieve greater success in a reduced time, in addition to ease in learning the interaction and satisfaction during the operation, if the gestures used make sense in the context of the task, the environment in which the task is performed and to the user himself, as he will perform movements in a natural way, seeking a more intuitive interaction with the machine, reducing the distance within this system.

If already established interaction design concepts and usability heuristics are not taken into account, contextualizing them to the nature of gestures, as an HCI tool, the natural interactive process may be compromised, putting the human being in uncomfortable situations of difficulties and longer practice in using the devices, which occur due to slow learning of the interaction.

In the current process of developing interaction systems, the needs and prerogatives of users are highlighted. To this end, aspects such as the individual's perception of control of the device; consistency in the use of gestures during interaction; coherence between the semantic meaning of the gesture and the task to be developed through this interactive gesture; reduce the human's memory load, making them recognize interactive gestures instead of remembering; among others, they are relevant to the user's best psychological comfort and must be observed to create an effective gestural interface.

Although the market generates open possibilities for new devices, Norman and Nielsen (2010) point out that the recent software races to develop gestural interfaces do not have a keen interest in the principles and analyzed patterns of Interaction Design. And the current problem recalls the beginning of the internet, where image mapping resources were used incoherently by designers.

The urgency of reading practices mediated by iPads, notebooks, Kindle, etc. is clearly perceived. In which they were focused on reading information, the internet, social interaction and games – which are being inserted into our everyday culture and the publishing market, with great impact and speed. Touch screens are now widespread not only in the workplace, but also at home, in transport and even in bank account transactions. The computer is increasingly inserted into the most varied products, it is related to mobility, agility and precision; never before seen by our ancestors.

The promise of new interaction leads to the integration of people with reduced physical capabilities or disabilities. There will be a new human language, not so new for those who know the gestures, the pounds. Interaction also appears as inclusion, in which it is essential to analyze these parameters not only in the context of leisure, but also educational and work contexts. In which the user interacts more and more with machines and less and less with humans. And machines, as Norman (2010) states, are still uninformative, confusing, intrusive and unnatural. In which usability is not linked to technology, as there are still errors to be corrected, whether by engineers or designers.

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