The Application of Psychology in Human-computer Interaction

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ABSTRACT

Human-computer interaction is developing with the continuous development of science and technology. Since the emergence of computer technology, the human-computer interaction has undergone tremendous changes. Today, the field of human-computer interaction research has not only limited to the technical level, but relied on psychology to make human-computer interaction better. This study first discusses the importance of psychology for human-computer interaction based on the concept of human-computer interaction. Then this paper studies the application of anthropomorphism in the human-computer interaction research. Anthropomorphism refers to the attachment of human characteristics to non-human subjects so that it is seen as a person with life, feeling and thought. There have been more researches about anthropomorphic in the area of human-computer interaction so far. We introduce the theoretical background of anthropomorphism and elaborate on the psychological significance of anthropomorphism in terms of the application of human-computer interaction.

KEYWORDS

Psychology; Human-computer Interaction; Application.

INTRODUCTION

Human-computer interaction is a kind of science that studies how to design, evaluate and implement the interactive computing system for people to use and other phenomena related. There are voice interface, fingerprint recognition, gesture control, virtual reality, enhance the reality and so on. These are shown in the Hollywood films repeatedly, which is considered “impossible task” of human-computer interaction technology. But they have been achieved one by one nowadays. Apple iPhone, Amazon Kindle, Microsoft Xbox360 and so on are very successful business myths of human-computer interaction technology. But these are only small branches of the human-computer interaction technology. Now, the interaction object of human-computer interaction is no longer just a computer, but also the whole environment around us. And the transmission of information is no longer limited to the operation between our fingers, but also the transmission of different muscle conductions in our body, eyes and tongue, the rotation of the sound waves in the air, and even the transmission of the brain waves generated by the brain working, which can all be used as information transmission process to achieve human-computer interaction.
The emergence of human-computer interaction does bring revolutionary changes to human life. At the beginning of people's understanding or in view of the narrow sense, human-computer interaction technology mainly studies the exchange of information between people and computers, mainly including the information exchange from people to the computer and from computer to person. In general, human-computer interaction is essentially a cognitive process. Human-computer interaction theory is based on cognitive science. Human-computer interaction is based on information technology as the technical basis of user interface. We can make use of information system modeling, formal description, the integration of algorithms, evaluation methods and software frameworks and other information technology to achieve the ultimate realization and application of human-computer interaction theory. Today, the research of the human-computer interaction field has not only limited to the technical level, but relies on psychology to achieve the human-computer interaction better. So how can psychology be applied to the study of human-computer interaction? What will bring to the practice of human-computer interaction? This paper aims to study this problem. First of all, it discusses the importance of psychology to human-computer interaction based on the concept of human-computer interaction. Then it studies the application of anthropomorphic in human-computer interaction research, introduces theoretical background of the anthropogenic and elaborates the psychological significance of anthropomorphism from the application of human-computer interaction.

**THE IMPORTANCE OF PSYCHOLOGY TO HUMAN-COMPUTER INTERACTION**

Why does the human-computer interaction need psychology? It is easy to answer this question. Let’s take Apple iPhone which is a successful human-computer interaction commercial case for example. If it is not well aware of the user's mind, it is unable to produce such a "user-friendly interface" product. It is related to the fields of the computer science, sociology, psychology, graphic design and industrial design, which is a veritable science with interdisciplinary characteristics. His research aims to the harmony between man and machine and to change the human life through technological means [1]. In fact, the initial methods and principles of human-computer interaction are based on the psychology. Until today, a lot of human-computer interface design principles we use are also derived from the most basic principles of psychology. So psychology has laid a lot of theoretical foundations for human-computer interaction [2].

Although psychology has laid a lot of theoretical foundations for human-computer interaction, it does not mean that computer science and design are less important. When people solve some specific problems not only from the view of computer science but also from the perspective of psychology to understand the problem, there will bring a lot of breakthrough progress. For example, from the beginning of the DOS command to the subsequent graphical interface, human-computer interaction psychology has played a significant role. Twenty or thirty years ago, the study of the psychology was how to operate the interface. Take the case that people use the Office software as an example, what is the most commonly used function? How will the designers organize the structure of information when they organize these functions into the menu layer by layer? These all need psychology to understand the functional
behaviors of people. Psychology can understand their needs through their behaviors, and then designers and computer engineers can really make more exquisite products in line with the needs of people. The emergence of social network and microblog illustrates this point. People don’t complete tasks through social networks and microblog, but it is easier to achieve the interaction between people and to meet more needs of people.

The psychology in the human-computer interaction seems simple, but it will directly affect the results of human-computer interaction applications. Only with a full understanding of the psychology of the "people", can we understand their needs more clearly and make human-computer interaction flow more freely.

HUMAN-COMPUTER INTERACTION ANTHROPOLOGICAL APPLICATION FROM THE PERSPECTIVE OF PSYCHOLOGY

In the daily life, with the development of science and technology, a variety of robots, computer interface and lives of people are related more and more closely. They have the appearances of human beings or have the human psychological ability, and can interact with people to provide people with the necessary information to play their roles in various fields. This is anthropomorphism. Anthropomorphism is inseparable from the social cognitive development of mankind, which refers to giving human beings characters to nonhuman agents to make them viewed as human beings with sensations and thoughts [3]. In recent years, the application of anthropomorphic in the field of human-computer interaction is increasing day by day. By summarizing the literature published, anthropomorphic applications are mainly shown in the social cognitive level and social emotional level.

Social cognitive level

Studies have shown that objects with human facial features or overall appearance are more likely to be anthropomorphic. In fact, not only the characteristics of the appearance, for any individual with human nature, people will show a social response. For example, Lee (2003) found that female subjects showed more affection for computers with male characteristics [4]. In addition, Moon (2000) found that when the computer provided more information, the subjects were more willing to participate in intimating self-disclosure. When a computer showed its speed limit and asked the subjects to share the most disappointing things in their lives, the subjects would reveal more information [5]. In a recent study, the researchers used images of three different humanoid robots (Asimo, Kojiro, Telenoid). The experimental stimulus included head tilting left and right 20°, 10°, and 0° (upright), requiring subjects to evaluate the perception of the robots. The results shown that the robot whose head was tilting (10° or 20°) has a higher human similarity than the robot whose head was upright, and looked more cute [6].

The consciousness state when people perceive anthropomorphic individuals is also the focus of study. Some researchers believe that in the human-computer interaction, people show an unconscious social response. They designed a 2 (humanized individual: presence / absence) × 2 (interaction: high / low) experimental design of the subjects by setting virtual characters and interaction with high level and low level to control anthropomorphic clues. The results show that the subjects will
unconsciously treat the anthropomorphic individual as a person, and enhance the interaction with the anthropomorphic individual [7].

In addition, some researchers are concerned about the role of anthropomorphic social perception in social media. When people are communicating online, they can use the media information for self-expression, for example, buddy icons are the visual images of showing themselves people often use. The buddy icons people choose may be cartoon characters, objects, realistic or virtual characters. Previous studies have shown that the perception of anthropomorphism affects the perception of buddy icons. Nowak (2013) also believes that anthropomorphic buddy icons can predict the users' physical or psychological characteristics. Therefore, he points out in his study, people will choose highly anthropomorphic buddy icons to express their physical selves because the anthropomorphic buddy icons are similar to their own. In addition, those who tend to show the psychological selves will choose more realistic objects as buddy icons. They will be attributable to the objects and give buddy icons special significance [8].

**Social Emotional Level**

Social emotion is one aspect that must be considered in the human-computer interaction anthropomorphism. By combing the previous literature, it is found that researchers are paying more and more attention to the influence of empathy on the attitudes of anthropomorphism. Empathy can be broadly defined as "a more appropriate emotional response to people in the context of others rather than in their own" [9].

Bickmore and Picard (2005) pointed out that when interacting with a virtual individual, the designer usually chooses a pre-set program to better understand the user's emotional state. In the interaction with the robot, the form tends to be more open, and it was more challenging for the robot to perceive the user's emotional state. However, these problems have been improved, such as helping the robot to identify the user's emotional state through the visual, voice or physiological clues [10].

At present, most studies suggest that robots have the ability to imitate the user’s emotional state. For example, in the study researched by Hegel, Speared, Vogt, Horstmann, and Wrede (2006), anthropomorphic robots recognized the user's emotional state through intonation and facial expressions and made corresponding emotional feedbacks. The result was that the user thought the anthropomorphic robot was better in the social emotional support and seizing the moment [11].

In a recent study, the researchers devised a program in which the robots having the ability of empathy watched several groups of subjects to play chess and used emotions and language to response to the performance of the players, in order to verify that the robot can establish a positive social relationship with users. However, in each game the robot had empathy for only one of the two players, and expressed neutral face to the other player. An interview with players after the game showed that the robot’s empathy behavior, including facial expressions and intonation, would increase people's perception of robot’s friendship. The subject who was neutralized believed that the behavior of the robot was more supportive of the other, but that the robot’s feedbacks were still valuable. The subject who was encouraged by empathy not only believed that the feedbacks of the robot was valuable, but also the robot's supportive feedbacks made them more confident [12].
CONCLUSION

In this paper, we first discuss the important meaning of psychology to the human-computer interaction based on the concept of human-computer interaction. Then we study the application of anthropomorphic in the human-computer interaction, and introduce the theoretical background of anthropomorphism as well as elaborate the psychological significance of anthropomorphism from the perspective of the application of human-computer interaction. The psychological researches of human-computer interaction directly affect the results of applications of human-computer interaction. Only in a full understanding of the psychology of human, can their needs be identified more clearly to make human-computer interaction flow more easily.

REFERENCES