CHAPTER 6

Conclusions and Future Directions

There are three main findings of this study. In this chapter, I will summarize these findings and address future agent-based applications with personified interfaces.

Conclusions

The Effect of Having a Face

The first finding is that having a face is considered more likable, engaging, and comfortable to see in a poker game environment. It is encouraging that people are favorable to having a face in an interface regardless of their opinion about personification. People said that they were not distracted by the presence of a face or facial expressions. Moreover, people tried to interpret faces and facial expressions, which makes the users pay attention to the face and engage in the task. Walker [Walker 94] describes the advantages and disadvantages of per-

sonification as follows: “This can lead to improved performance if the task is not very complex or to degraded performance if the task is complex.” It is clear that faces are useful for entertainment purposes, since engagement is essential for games and people don’t care about taking more effort for entertainment. Hence it may also be useful for applications which require an engaged user for success, such as education and training. An example of a training system might be Picard’s “the effective piano teacher” [Picard 95]. In her paper “affective computing”[1], she addresses the possibility of making a computer piano teacher which reads users’ emotions while practicing the piano through the users’ gestural input and facial expressions. The teacher tries to encourage the users when they are frustrated or gives them more challenging exercises when the users are motivated. By attaching a face and facial expressions to the tutor would help the user engage in the training.

Need for Understanding the Context of an Application

The second finding is that people’s impressions of a face are different when they see a face in isolation versus when they interact with a face within a task. People evaluate a face not based on appearance but its competence or performance. For example, though people attributed different levels of perceived intelligence, likability, and engagingness to the Human face and the Dog’s face, or Smiley, the Caricature, and the Realistic face when they evaluate the faces based on their appearance, there were no differences when they rated the same faces in the poker game. Most psychological HCI studies use static facial images separately from applications. Considering what we understand from this study, we have to evaluate

1. Affective computing is “computing that relates to, arise from, or deliberately influences emotions” [Picard 95] by equipping a computer to detect human emotions and express emotions by itself.

effects of personification within a context--software agent applications. Of course not all software agent applications require personified interfaces. The goal of HCI work should be to understand when a personified interface is appropriate. One example of the nature of the task or context is whether people are used to do a task with other people. In the poker game, the nature of the task is social. People accept seeing their opponents' faces in a computer poker game as they see in a real poker game. On the other hand, people might be annoyed to see a face in an automatic teller machine.[1]

When attaching a face in an interface, the face should not be "the icing on the cake." The face should provide useful information which helps us understand the content better. For example, weather forecast on TV uses "personified weather", such as an image of a person who has an umbrella when it rains or a image of a person with sunglasses when it is sunny. There is a translation process between seeing a image and knowing the content of the image. As Norman says [Norman, D. 86], good interfaces should make this translation process easier and encourage users to develop a mental model of the application that is similar to the model of the task domain. This is also true in agent-based interface. Lieberman [Lieberman 96a] says, an agent-based interface must support forming a user's corresponding mental model of the application to that of the agent.

1. However, the author feels comfortable with seeing a caricature face in an ATM. In Japan, a female caricature face in an ATM vows, smiles, and advertises while users are waiting for a transaction to finish. However, in the states, people who have been using non-personified ATMs for more than 30 years, don't expect to see a face while interacting with an ATM (through discussions and observations). We should also consider cultural differences when applying a personified interface.

Need for Understanding the Users

The third finding is that there is a dichotomy between user groups which have opposite opinions about personification. Differences in facial features--such as character's gender, humanity, expressiveness--cause opposite evaluations to these two subject groups. For example, the Dog's face is preferred by those who are in favor of personification, while the Human face is preferred by those who are against. Another example is that those who are in favor of personification attributed more intelligence to the expressive face, while those who are against thought the stoic face has higher level of intelligence. Some of the experiments performed indicate that there is also a potential difference in evaluation of a human face and a non-human face between the subjects' gender. The answer for the question--"what kind of facial features makes the agent look intelligent, likable, and comfortable to be with?"--is not the only one. We need to consider the target users when designing a personified interface. The future personified interface should be flexible so that it can provide options to choose a preferred face for each user.

Toward Making More Efficient Personified Interface

Though the focus of computer graphics work on faces is on making more realistic faces [Essa 95, Lee 95, Takeuchi 93], realism might not be the main issue to affect people's evaluation about the face in making a personified interface. This study shows that realism does not affect people's evaluation of faces. Thorisson's humanoid agent [Thorisson 96] at MIT Media Lab has a caricature face with smooth animation. Thorisson argues that realistic syn-

thesized faces look abnormal and repulsive, and a caricature face represents an attractive alternative to a synthesized realistic face for animating software agents.

Instead of realism, smooth animation and audio feedback would make a personified interface more natural and engaging. Gonzalez's study [Gonzalez 96] suggests that smooth animation makes people's decision making more accurate than abrupt animation. Elliott [Elliott 94a] suggests music is more effective in conveying the emotions of an agent than facial expressions. Thorisson [Thorisson 96] argues the importance of giving a computer some command of human multimodal facilities--speech, gesture, facial gesture, and gaze--to enable natural and realistic face-to-face communication with a user. He also suggests that such a computer with a multimodal interface should explicitly be modeled as an interactive agent. The poker players would look more natural if they moved their heads, eyes, and make utterances at the right time. There is a need for further study to understand how effective animation and multimodal interaction would function in an personified interface.

Future Directions

This study raises many fundamental questions about the future of agent-based interface. As stated above, there is a need to evaluate the effects of personification in a different application domain, such as information filtering agents or decision support agents. One good test application might be "Kasbah"--selling and buying agents [Chavez 96] developed by the Autonomous Agent Group at the MIT Media Laboratory. This application requires an agent with a more complex decision making process. Currently Kasbah agents do not have a personified interface. A selling agent could report to a user when it succeeds in selling a car at a

desired price with a satisfied expression. While a buying agent could ask a user what to do with a confused expression when it cannot find an affordable car to buy.

Subjects' computer expertise, age range were not taken into consideration when the data was analyzed in this study. To make a flexible interface, we should consider user diversity other than gender and opinion about personification.