Chapter 1.7
Agents and Social Interaction
Insights from Social Psychology

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ABSTRACT

Social interaction represents a powerful new locus of research in the quest to build more truly human-like artificial agents. The work in this area, as in the field of human computer interaction, generally, is becoming more interdisciplinary in nature. In this spirit, the present chapter will survey concepts and theory from social psychology, a field many researchers may be unfamiliar with. Dennett's notion of the intentional system will provide some initial grounding for the notion of social interaction, along with a brief discussion of conversational agents. The body of the chapter will then survey the areas of animal behavior and social psychology most relevant to human-agent interaction, concentrating on the areas of interpersonal relations and social perception. Within the area of social perception, the focus will be on the topics of emotion and attribution theory. Where relevant, research in the area of agent-human interaction will be discussed. The chapter will conclude with a brief survey of the use of agent-based modeling and simulation in social theory. The future looks very promising for researchers in this area; the complex problems involved in developing artificial agents who have mind-like attributes will require an interdisciplinary effort.

INTRODUCTION

As our technologies become more interactive in nature, the necessity of building in a social component has become more important than ever. The present chapter will review and discuss a variety of theories that have been used to guide academic research and development in the area of multi-agent interaction. Of particular interest are those models specifying an underlying theory of the character and development of social interaction, as well as those that have focused attention on the affective components of human-agent and agent-agent interaction.

As originally conceived (e.g., Maes, 1995), software agents were to carry out tasks on our behalf such as seeking out information that we might be interested in, or finding the best prices for products, or even carrying out negotiations on our behalf. The

notion that we would have a relationship with an agent and how that relationship would unfold, and even how the agent could be designed with social capabilities in mind seemed somewhat far removed from the issues related to the design of an autonomous search agent.

In order to develop more life-like agents that are capable of interacting in a believable way with humans, it is necessary to imbue them with some of the same attributes that are thought to underlie human social interaction. Otherwise, the agents may be thought of by users as dumb or simply annoying (e.g., the Microsoft Office Paperclip). The development of simulations of an agent's interactions with humans (or with other agents) thus could be guided by some underlying theory of social interaction. If so, then which theories of human social interaction, particularly theories of mind and social cognition, could play a role in the development of multi-agent systems and in human-agent systems? The overall goal of this chapter is to introduce selected theory and research in the area of social psychology to others who may not be familiar with the concepts and theory in this field. Thus, though portions of the chapter will review instances where social psychological concepts have been applied to actual systems, the focus will be on surveying concepts and ideas, not on the practical application of such ideas to system development.

The chapter will begin with a look at the question of what guides our social interactions with others, whether they are human or artificial. Dennett's (1978, 1989) concept of the intentional stance will be examined in some detail, and will be used as a basis for understanding interaction at a basic level. The search for relevant concepts and research findings that could be applied to deepen our understanding of agent interaction will continue with a review of selected concepts from the ethological and animal behavior literatures, including the concepts of fixed action pattern, imprinting, and imitation.

The next section will include a brief review of theories and evidence from social psychology that are applicable to multi-agent systems research. Social psychology represents a rich source of theory and insights into the nature of social interaction in multi-agent systems, and the review will include the areas of social perception and impression formation, selected portions of the interpersonal relationship and social exchange literatures, as well as examples of research in the agent-human literature that have built on these underlying ideas. The aim here is not to provide a comprehensive review of these research areas, but to point out their relevance as we go forward with research in the field of agent interaction, particularly agent-human interaction.

Affective components have played a guiding role in research in the area of human-agent interaction, as exemplified in the work of Rosalind Picard and her group at MIT. Thus, Picard's work and its application to the area of social interaction will be discussed, along with that of Cynthia Breazeal and her efforts to build interactive robots.

The final section of the chapter will include a brief survey of the work in agent-based modeling, as well as a look into the future of this research. Of particular interest is the potential contribution this research can make to our overall understanding of social interaction. For example, can it provide confirming evidence for models of social behavior emerging from the human experimental social and developmental laboratories, as well as ethnographic and field research? Also, what types of interactive systems will emerge from this research and how will they change the way we use computing technology?

ISSUES, CHALLENGES, PROBLEMS

Social Interaction Between Agents, Both Human and Artificial

What is it that seems to guide our interactions with other agents? Whether these agents are

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