Chapter XV
Mapping Hybrid Agencies Through Multiagent Systems

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ABSTRACT

In this chapter, we give an overview of the results of a Human-Robot Interaction experiment, in a near zero-context environment. We stimulate the formation of a network joining together human agents and non-human agents, in order to examine emergent conditions and social actions. Human subjects, in teams of three to four, are presented with a task–to coax a robot (by any means) from one side of a table to the other–not knowing with what sensory and motor abilities the robotic structure is equipped. On the one hand, the "goal" of the exercise is to "move" the robot through any linguistic or paralinguistic means. But, from the perspective of the investigators, the goal is both broader and more nebulous–to stimulate any emergent interactions whatsoever between agents, human or non-human. Here we discuss emergent social phenomena in this assemblage of human and machine, in particular, turn-taking and discourse, suggesting (counter-intuitively) that the "transparency" of non-human agents may not be the most effective way to generate multi-agent sociality.

INTRODUCTION

One strand of research in Artificial Intelligence (AI) in general and multiagent systems (MAS) research in particular has been concerned with the simulation of extant life–genetic algorithms, neural nets, ethological simulations like swarming, etc. Another strand (less popular since its zenith in the early 1990s) explores the possibility that artificial agents might themselves constitute a kind of life (Helmreich, 1998; Langdon, 1995). There have been countless insights over the past three decades in AI and cognitive science in general that have hinged upon isomorphisms between these two "phyla": the biological, on the one hand, and the machinic, on the other, with great insights into, say, mirror neurons (on the biological side) and genetic algorithms (on the machine) side, generated by cross-experiments.

All of these, however, ignore the extant to which humans and non-humans together are imbricated in a kind of "second-nature" where nature, machine and human are connected together in complex, mutually constitutive ways, precisely what Deleuze and Guattari (1980) invoke in their conception of "machinic assemblage," the temporary coming-together of heterogeneous elements linked not by filiation but by transformation, an "unnatural participation" that links the human and the non-human.

In other words, defining "humans" and "machines" so as to emulate one with the other may be ontologically problematic when the two are multiply interpenetrated in the first place. In Human-Computer Interaction (HCI) and Human-Robot Interaction (HRI), researchers attempt to accommodate machines to human needs, creating, for example, "socially acceptable" robots for future, human interaction (Koay et al, 2006). But these kinds of interventions are premised on an unchanging human to which non-human agents might be compared.

Our research looks at our cyborg present–a world where acting "human" always already involves machinic practice (Collins, 2007; Trajkovski, 2007). For us, the question in HCI is not to better accommodate non-human agents to humans by more effective "interfaces" better emulating human behavior but to maximize our existing cyborg lives–the bodily hexis, communications, socialities and cultural schema that proliferate in the interstices of the human and the machine.

BACKGROUND

In the following chapter, we report on a series of ongoing experiments involving human agent-non-human agent interaction. In these, we consider the human-robot as our proper object, and the actions of all involved agents as formative of a temporary, shifting, cognitive, social and cultural network. These interactions, we argue, can be considered properly social and, in the Durkheimian sense, emergent, that is, not explicable at the level of the individual agent (Sawyer, 1991). In this, we draw upon synergistic insights from a variety of academic disciplines–AI, cybernetics, cognitive science, science studies, cultural studies and anthropology, each examining the cyborg from a slightly different perspective. All of them, though, might be said to engage cybernetics, and in particular the "second generation" cybernetics of Humberto Maturana and Francisco Varela (1980). Looking to "autopoietic" systems (literally, systems that make themselves), Maturana and Varela undermined dichotomies of subject and object by focusing on the way that organisms "structurally couple" to their environments, that is, not so much adapting to them as producing them in the course of recursively producing themselves. It is the system itself that is generative of change, rather than some objective reality outside of it. By the 1990s, Varela (1999:48) had extended these insights into autopoeitic systems to more open systems, including human perception itself, describing, for example, vision as "emergent properties of concurrent subnetworks, which have a degree of independence and even anatomical separability, but cross-correlate and work together so that a visual percept is this coherency."

Applying this to HCI means, ultimately, questioning the extent to which action should be most usefully considered first and foremost a product of human intention and, instead, leading us to a model of cognition and social life that arises out of the interaction of a heterogeneity of agents. This is what Michael Woolridge (2002:105) means when he reminds us that "There's no such thing as a single agent system." The strength of cybernetics and multiagent systems research is precisely this radical deconstruction of the Leibnizian monad for models of life that focus less on the "molar" than on the traffic between agencies.

This, we believe, has its philosophic appeal, but this is not our primary reason for enjoining this research; moving to this dynamic, networked model of HCI promises to move us beyond unproductive abstractions ("the human") to real, empirical understandings of humans living in and through their machine worlds (as well as machines "machining" through their human worlds). That is, ultimately (and contrary to the etymology), these approaches gesture towards a more anthropological (and sociological) approach to the study of cyborg lives, implicit in Gregory Bateson's (1972:318) parable: "*Consider a man felling a tree with an axe. Each stroke of the axe is modified or corrected, according to the shape of the cut face of the tree left by the previous stroke. This self-corrective (i.e., mental) process is brought*