2-2 Study of Emergent Communication Mechanisms

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Information and communication environment should evolve toward an enriched cyber society in which people will be able to find individual and social values in their lives through their spontaneous information sharing. The human being wishes for relationships with others and hopes to find meaning in these relationships. Postulating communications as "forms of relationships with others," we are conducting research on emergent communication mechanisms. The objectives are not only to activate social interactions between people and information but also to enable people to find diverse relationships in a cyber society.

1 Introduction

With the popularization of computers, digital networks have been rapidly spreading, continually connecting more and more computers. This has caused the paradigm shift in information communication environments, from "space/time-savings" to "the creation of diverse space and time environments." In reality, a sort of cyber society is emerging on networks. Such a society will not merely be a "means for transmitting information" but is expected to provide "new spaces" or "new worlds" where people can meet, live, work, and perform social activities. Moreover, a kind of new information-driven culture is expected to arise from the co-habitation of people and computers.

The above cyber society should be a new, intellectual space in which people can make the most of their intellects and experiences, independent of their physical capabilities. The rapid changes of the information society are giving people more chances to encounter other people and/or information and to take part in a cyber society. However, it seems that people feel not only isolation and alienation but also a lack of psychological well-being.

Providing only an infrastructure for communications will not answer the problem. Attention must be paid to enriching communications within cyber-society. To this end, it is important to urge people to reach out and actively join the cyber-society and to activate their social interactions beyond the network and into the real world. For this purpose, it is necessary to consider the meaning and significance of communications from the viewpoint of understanding people. Our aim is to achieve such enriched-communications, providing a sense of well-being to people as they discover individual and social values in their lives through their spontaneous information sharing, as we both arouse and satisfy their intellectual curiosity[1].

2 View of communications

The human being, as a social entity, wishes for relationships with others and hopes to

find meaning in these relationships. Postulating communications as "forms of relationships with others," we are conducting research on emergent communication mechanisms. The objectives are not only to activate social interactions between people and information but also to enable people to find diverse relationships in a cyber society.

One idea is to first consider why human beings need communications. Communications must be regarded as a sort of instinct that human beings have inherited. In other words, we should take a look at the instinctive desires and habits of human beings in their communications with others. People want to know more about themselves, to express themselves, to ensure the significance of their existence, and to determine their social value and position within a group. We are devising new primary mechanisms to arouse people's instinctive desires and support them in expressing themselves so that they could be motivated and enticed to spontaneously take part in cyber society.

We are also working on the creation of secondary mechanisms that allow for the emergence of various types of relationships between humans and computers, and make such relationships meaningful. While interacting with people, computers will be able to autonomously develop relationships with people, and understand the significance of those relationships. In this study we look into a new possibility of communications between human beings and computers with such mechanisms, and between humans and information through networks connected by such computers.

As an example of the primary mechanisms, we will discuss a communication robot. As for the secondary mechanisms, we will introduce research on artificial emotions. For these mechanisms, we employ methodologies for evolutionary and emergent systems that we have studied to create a new information processing system rich in autonomy and creativity[2].

3 Communication robot

In our study we consider a communication robot to be an entity with aspects both of a pet and of a communicating device[3].

A human being seeks involvement with living things, in part by keeping pets and raising plants. In one sense, we can understand this need as a manifestation of our urge for existential expression; we want to express our presence by giving form to the involvement in, and effects on, the world. People may become positively involved with a robot that can either be raised by its user or grow, develop, and evolve along with its user. Sometimes unexpected robot behaviors may stimulate people's imagination, and may encourage people to further interact with the robot.

Because humans can relate at a corporeal level to a robot that they can touch directly, these robots are qualitatively different from other robots or electronic pets that exist solely within electronic space or as software agents. Within the fast-paced cyberization that is underway today, the existence of robots able to share bodily sensations and corporeality will only increase in importance.

Humans and robots in their ultimate form could share the sense of being in the same body. We can easily imagine the development of pet-form robots as wearable devices whereby humans and their robots are in constant direct contact. Humans would naturally communicate their physical and mental states to the robot, and the robot could adapt itself smoothly to its user.

With robots connected to networks, there will be a dramatic expansion of a new world of communication between humans and robots. These kinds of robots will be able to traverse freely between the real world and cyberspace existing simultaneously in both worlds, at times as physical entities, at times as software-like network agents. Their physical bodies (their hardware) are something akin to open vessels; on the road you can call up your own robot's mind (its software) by borrowing another vessel to connect to it over a

network.

A communication robot with aspects both of a pet and of a communicating device is the most promising tool imaginable for widespread individual use. Such a robot would need to have functions to enable comprehension of the significance of its own body and actions. These functions may be feasible, thanks to artificial emotions, as described below.

4 Future creation of artificial emotions

There is a large problem when a human being and computer develop diverse relationships and find meaning in their relationships in communication between them. What is crucial here is whether a computer can distinguish itself from others. In addition, some mechanism for values and evaluative judgment is necessary, to find meaning in relationships.

We define "emotions" as senses of values and evaluative structures that emerge out of relationships with others. To enable diverse, enriched communications between people and computers, not only intentional functional interactions but also interactions based on "emotions" are indispensable. Artificial emotions are mechanisms by which a computer itself cultivates, as an internal structure, "emotions," or "senses of values and evaluative structures that emerge out of relationships with others." The point is not to enrich interactions by incorporating human's superficial emotions into a computer. We intend to create mechanisms with which a sort of evaluative space and structure could emerge and become differentiated in a computer, through a process of interactions between human beings and computers[4].

As described above, it is important for a computer to distinguish itself from others and, further, to arbitrarily establish a set of self-others boundaries. We humans freely and dynamically set up and adjust this flexible boundary depending on the situations and times we find ourselves in. In accordance with the senses of values and the evaluation mechanisms that correspond to each of the boundaries, we recognize and interpret information from the environment, and then select and determine what we say and do. For example, we locate ourselves not only as physical entities but also as part of a family, a party, an affiliated organization or group, a nation, and a race, whenever we think, speak, and act. We then evaluate the significance and effects of our thoughts, speech, and actions in accordance with the sense of values corresponding to this self-identification. As another example, we objectify ourselves within our own individuality before reflecting on what we have done. Sometimes, we are caught between our senses of values as individual entities and as members of an organization.

In summary, we are aiming to develop new types of communications between humans and computers by pursuing mechanisms of artificial emotions within the computer, to enable dynamic setting of flexible self-others boundaries between the computer and others as well as the formation and development of a value spaces corresponding to these boundaries.

5 Conclusions

Postulating communications as "forms of relationships with others," in relation to the emergence of communications between human beings and computers, we discussed research on mechanisms that arouse instinctive habits of human beings and entice them to spontaneously take part in cyber society. We also described the future development of research on those mechanisms of artificial emotions that form and develop a value space within computers corresponding to dynamic self-others boundaries between the computer and others. Creating such mechanisms of emergent communications, we intend to pursue the possibilities of forming diverse relationships between people and computers to qualitatively enrich communications.

References

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