

Symbol communication systems integrate implicit information in coordination tasks

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Introduction

Much information is expressed implicitly by behavioral patterns, such as gaze, gestures, and turn taking in communication. It is important to clarify the correlation between implicit information and explicit symbol usage in order to understand symbolic communication systems[1].

Galantucci[2] conducted an experiment to observe the formation of symbol communication systems in which participants communicated through a medium that restricted the use of standard communication means such as utterances and letters. He observed that implicit information conveyed through routine behavior and the temporal order of messages was built into communication systems. This indicates an advantage of this type of experimental approach. We can observe the effects of implicit behavior on the formation of symbol communication systems under a restricted communication medium (see also [3]).

However, this previous research failed to provide adequate and clear evidence. Therefore, we designed an experiment to analyze implicit behavior quantitatively and to verify its effectiveness with regard to the formation of symbol communication systems.

Methods

Participants: Twenty-one dyads, consisting of graduate students and university researchers, voluntarily participated in this study. They were aged between 22 and 37 years(mean age = 25.5, SD = 3.0).

Task: The dyads engaged in a coordination game from different sites using interconnected computers. The game environment contained two agents and four intercommunicating rooms. The game was composed of several repeated rounds. At the beginning of each round, the agents were randomly located in two different rooms. Each player, who was unaware of the location of the other, aimed to bring her/his agent to the same room. To accomplish this, each player could send a symbolic message to the other before moving the agent. The message was created by composing two figures whose meanings and usage were not shared with participants in advance. The messages were displayed on the partners' screen immediately after they were sent. Therefore, the second sender could see the first sender's message and manage turn taking.

Procedure: The experimental procedure consisted of one trial session and three test sessions. In the trial session, participants attempted to develop a communication system within a time limit of one hour. The test sessions were conducted subsequently. TEST1 restricted any message exchange. In TEST2, messages were exchanged simultaneously to prevent turn tak-

ing. TEST3 was conducted under the same condition as the trial session.

Results/Discussions

We compared performances among the three tests to assess features of the formed communication systems. Consequently, we confirmed that the performance in TEST2 and TEST3 was higher than that in TEST1. This difference indicates that players could develop communication systems with effective symbol usage. We also found that they performed better in TEST3 than in TEST2. This indicates that players developed communication systems including an effective management of turn taking.

Next, we investigated correlations between the performances of the three tests and behavioral indexes of the trial session to detect implicit information related to the formation of communication systems. Consequently, first, we found significant correlations of the performance in TEST2 with three behavioral indexes: bias towards using a specific set of symbols, bias towards moving to a specific room, and temporal differences in message exchange. Second, these behavioral indexes did not correlate with the performance in TEST3. This suggests that implicit behavior helps inference in a situation where turn taking is restricted, whereas these implicit behaviors cannot contribute to form a role division using turn taking.

Conclusions

This study explored how people initiated to coordinate by forming communication systems under a condition where no rule on symbol usage was shared. The results suggest that communication systems can develop effectively if participants have implicit behavioral tendencies, such as using small number of symbols, meeting at the usual place, and smooth turn taking. However, these behavioral tendencies did not appear to contribute to the division of roles using turn taking. In the future, we will explore factors influencing role division in communication systems.

References

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