Study on displacement of language by graphical communication task

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One important feature of human linguistic communication is to communicate about absent objects. This feature is called “displacement,” to be able to talk about things that are remote in space or time (or both) from where the talking goes on (Hockett, 1960). Displacement is essential for the acquisition of knowledge, which is not based on direct experience of a listener. Human is unique in being able to create, share, and utilize knowledge through linguistic communication. To reveal displacement as a feature of human language is important from the perspective of knowledge science.

However, it has not been revealed that which aspect of displacement is unique to human language. In this research, we regard displacement as a feature which is gradually seen from nonhuman animal’s symbol communication to human linguistic communication. We aim to reveal displacement unique to human language from the perspective of language evolution.

Our purpose of this research is to reveal displacement in human linguistic communication. To achieve the purpose, we set three objectives.

1. Classify displacement in communication to reveal displacement unique to human beings
2. Setup an experimental framework to see displacement within the framework of communication, which assumes a speaker and a listener.
3. Conduct preliminary experiments to investigate displacement not based on listener’s experience and propose hypotheses

Displacement has been studied as “displaced reference” or “displaced speech” in the fields of cognitive or language development (Hurford, 2007; Liszkowski et al., 2009; Morford & Goldin-Meadow, 1997). In these studies, displacement of a speaker’s side has been focused on but displacement of a listener’s side has not been focused on. We focus on displacement of a listener’s side, and see displacement within the framework of communication, which assumes a speaker and a listener.

We classified displacement in communication and found that distinction between “displacement based on memory” and “displacement not based on experience” is important to distinguish displacement in human linguistic communication from that in nonhuman animal’s communication. We claim that “displaced understanding” not based on listener’s direct experience is the key factor to realize the displacement unique to human beings. “Displaced understanding” is displacement which works on a listener’s side, to understand the absent target object of communication by references of a speaker.

We proposed an experimental framework to investigate displacement in communication by modifying the framework of Fay (2003)’s graphical communication task. The experiment assumes two roles, each corresponding to the speaker and the listener: a “drawer,” who expresses assigned objects by drawing, and a “answerer,” who identifies the references of drawer’s drawings. Two subjects are paired, and communicate using electric drawing pads in separate rooms, exchanging the two roles in turn.

We set two kinds of graphical tasks each corresponding to displacement based on memory and displacement not based on experience. Difference between these two kinds of tasks is that displaced understanding not based on listener’s direct experience works or not. Pairs are given two graphical tasks, one is a graphical task based on memory and another is a task not based on experience. The order of the two tasks is counterbalanced.

We conducted preliminary experiments to investigate differences between graphical tasks based on memory and tasks not based on experience. The result of preliminary experiments leads to two hypotheses. One is that “feature abstraction” and “expression using action” operate as the mechanisms that enable displacement in communication. The other hypothesis is that feature abstraction and expression using action are used more in graphical tasks not based on experience than in graphical tasks based on memory.

“Feature abstraction” is to express the features of the absent object using another object that has the same features. A subject expressed the task “sour boot” by drawing pictures of “lemon” and “boot” in combination. In this example, the subject expressed that “boot” had the feature “sour,” the same possessed by “lemon.” “Expression using action” is to express the features of the absent object by drawing movements that typically cause the feature. A subject

expressed the task “bitter fire” by drawing pictures of a person eating fire. In this example, the subject expressed that “fire” had the feature “bitter,” by drawing a picture of “eating,” which typically causes the feature “bitter.”

In the experiment, significant differences of the number of correct answers were observed between graphical tasks based on memory and the tasks not based on experience. Significant differences of scores were also observed. This confirms that these tasks are different in quality. In addition, there was no significant difference between scores and the number of correct answers of the tasks given firstly and the task given secondly. This confirms that the effect of learning is not too strong to see the difference between graphical task based on memory and the task not based on experience.

The result of experiment shows that feature abstraction and expression using action are used to communicate about absent object. Feature abstraction used more in graphical tasks not based on experience than the tasks based on memory and this difference showed a significant difference. Expression using action also used more in graphical tasks not based on experience than the one based on memory, but showed no significant difference.

These results suggest that feature abstraction and expressions with movements operate as mechanisms that enable displacement in communication not based on experience. However, despite many devices for expression, scores and the number of correct answers of graphical tasks not based on experience are significantly lower than that of tasks based on memory. This shows that feature abstraction and expression using action do not work effectively for the listener’s understanding. We should examine which condition is needed for these devices to work effectively, or there are other devices for expression which works better.