論文題目

The Differentiation of Early Word Meanings from Global to Specific Categories:
Towards a Verification of the "Semantic Pluripotency Hypothesis"

（言語発達初期における語の意味の未分化性と可塑的変化：「胚性詞」仮説の検証
に向けて）

氏名

Hiromichi Hagihara

（萩原　広道）

論文要約

In most languages, early nouns that semantically correspond to object categories (e.g., "shoe") dominate young children's vocabulary when compared to early verbs that correspond to action categories (e.g., "put on"). Many developmental scientists have been trying to investigate why such object words, rather than action words, are advantageous for learning. In considering this issue, some researchers argue that children's early words consist of label-meaning connections, which are characteristically different from those of older children and adults. In particular, Werner and Kaplan (1963) theoretically posited that the initial meanings of early words do not sufficiently differentiate into specific categories, but rather, correspond to holistic and global event categories as a total situation, in which multiple components, such as objects and actions, are intimately fused. Thus, it is important to ask whether early noun meanings are inherently specific object categories from the very beginning of learning, or if they are at first undifferentiated event categories and subsequently differentiated into specific categories. However, an observational approach alone cannot directly address this question, because even if the meanings of children's early words are not differentiated, they might not be reflected in their phonetic features; hence, the undifferentiated and specific word meanings could not be distinguished based only on their corresponding labels.

This thesis proposes, as a revision of Werner and Kaplan's (1963) theoretical assumption, the "semantic pluripotency hypothesis" to experimentally investigate the semantic contents of early words and their development. This hypothesis consists of two

sub-hypotheses: First, the initial meanings of children's words are pluripotent in nature, as they correspond to the context-bound fusion of various factors that emerge from children's experiences related to the word. Second, such word meanings have plasticity, as they dynamically differentiate into specific, discrete, and more decontextualized categories with later development. This thesis investigates and discusses these sub-hypotheses with a focus on early nouns through five chapters. Specifically, it is posited that (1) the initial meanings of object words are undifferentiated global event categories that include both objects and actions as a fusion, and (2) they subsequently differentiate into specific object categories that are independent of actions.

Chapter 1 provides an overview of the general characteristics of early vocabulary and how young children learn words. After reviewing theoretical, observational, and experimental studies, we focus on the uniqueness of young children's words. We discuss how these words differ from those of older children and adults with reference to Werner and Kaplan's theoretical approach, and the experimental findings that support, though not directly, their theory. We then propose the semantic pluripotency hypothesis, a new and experimentally verifiable hypothesis on the flexibility and plasticity of early word learning, and present an outline of this thesis.

Chapter 2 provides the first experimental findings that the initial meanings of object words do not sufficiently differentiate into specific object categories. Using a two-alternative forced-choice task, we preliminarily investigated whether and how object word meanings changed with development. Japanese monolingual toddlers aged 19–35 months ($n = 36$) watched two juxtaposed video stimuli, in which a girl was performing an action using certain objects, and were then prompted to choose one of the stimuli according to questions about familiar object words (e.g., which ones are shoes?). Statistical modeling demonstrated that even young participants were able to select the apropos stimulus when objects and object-specific actions were compatible on one side (e.g., "putting shoes on" vs. "rubbing two baskets in front of her"). However, when objects and object-specific actions were incompatible (e.g., "rubbing shoes in front of her" vs. "putting on two baskets as if they were shoes"), the probability of selecting a stimulus that included target objects remained at chance level for participants less than 21 months of age or with a fewer than 140 words vocabulary size; whereas the probability steeply increased for older participants or those with a larger vocabulary size. These results suggest that both objects and object-specific actions are entwined in the initial meanings of object words and, only later, object word meanings are differentiated into specific object categories independent of actions. Although the robustness of these results was unclear, due to a preliminary study, the results supported the semantic pluripotency hypothesis.

Chapter 3 describes the extent to which looking and pointing responses are equivalently interpretable in forced-choice tasks, to prepare for the replication of the findings in Chapter 2 in more children around the critical period when the semantic differentiation of object words likely occurs. In the preliminary study, we observed that toddlers under the age of two often did not provide clear pointing responses in the forced-choice task, although they appeared to spend more time looking at one of the stimuli presented simultaneously. Therefore, it was necessary to measure both pointing and looking responses in subsequent studies to reduce data loss. However, so far, the validity of treating these different indices as equivalent has not been attested. Thus, we aimed to investigate how accurately pointing responses (i.e., left or right) could be predicted from concurrent preferential looking. Using part of the video data of toddlers aged 18–23 months ($n = 48$), which were obtained in the experiments in Chapter 4, we developed models that predicted pointing from looking responses. The results showed that the prediction accuracy for the proposed models was substantial (85.8–89.7% agreement), indicating that looking responses would be reasonable alternative indices for pointing responses. However, further exploratory analysis revealed that looking responses without pointing responses would be qualitatively different from those with pointing responses. These findings suggest the need of using both pointing and looking indices for analysis, so that the obtained data can be interpreted in more detail. The models proposed in this chapter enable us to apply the same forced-choice task used in Chapter 2 to younger toddlers without increasing missing data. They also allow us to conduct the same statistical analysis for both pointing and looking measurements, and make a direct comparison of the results from these different indices.

Combining the findings obtained in the previous chapters, Chapter 4 examines the semantic pluripotency hypothesis more thoroughly. In addition to confirming the robustness of the previous findings, we further investigated whether toddlers could appropriately understand object word referents solely based on object-specific actions, and how developmental changes in object word meanings were related to concurrent and later vocabulary growth. Using both cross-sectional ($n = 69$) and longitudinal ($n = 16$) data of 18–23-month-old toddlers, we found that only younger participants could not choose the correct video stimulus that matched object words when objects and object-specific actions were presented separately (e.g., "rubbing shoes" vs. "putting on two baskets"), despite the success when objects and object-specific actions were matched. Older participants were able to select the appropriate stimulus for both conditions. Although the detected critical period of when the semantic differentiation of object words occurred was a few months earlier than in the preliminary study, it was certain that object word meanings developmentally changed steeply during the latter half of the second year of the children's lives. The results from

additional conditions demonstrated that participants of all age ranges failed to judge object word referents solely by object-specific actions (e.g., "putting on two baskets" vs. "rubbing two baskets"). These results are robust for both the pointing and preferential looking measurements. Taken together, these results indicate that the initial meanings of object words are global event categories comprising both objects and actions as a fusion (e.g., "putting shoes on"), and they later differentiate into specific object categories that were independent of actions (e.g., "shoes" alone). Moreover, the degree of semantic differentiation of object words was positively related to both concurrent and subsequent vocabulary sizes of action words in particular. This suggests that the differentiation of object word meanings encouraged toddlers to develop new label-meaning connections that can be used for specific action categories, apart from objects.

Finally, Chapter 5 summarizes the key findings and refines the semantic pluripotency hypothesis based on them. Our findings corroborate the semantic pluripotency hypothesis, provide the first experimental support for Werner and Kaplan's (1963) theoretical hypothesis, and set the stage for future research on children's early word learning. Additionally, the semantic pluripotency hypothesis can contribute to the integration of interrelated, but separately explored, research topics such as event categorization, contextual effects on word learning, and cross-situational statistical word learning. We discuss such theoretical implications as well as practical implications for caregivers, educators, and clinicians. Overall, although the semantic pluripotency hypothesis is still in its nascent stage, the experimental exploration of this thesis demonstrates semantic flexibility and plasticity with development and will contribute to illuminating more aspects of the uniqueness of children's early words.