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The Relationship between Listening to Sounds and Expanding Semantic Knowledge

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It is widely believed among researchers and the general public that a close relationship exists between listening to sounds and language acquisition. However, few studies have presented evidence of this relationship, and none have focused on the effects of collaboration with and among children, which might improve their language-learning abilities. This study tried to determine the extent to which nursery school children could expand their semantic knowledge in their first language by collaborating in a small group after listening to sounds. Twenty-four nursery school children participated in this study. They were divided into eight groups and were asked to listen carefully to two sets of previously prepared sounds, each consisting of four distinct types of sounds. Both sets were developed to tell one story. After listening to all the sound sets, the children were asked to discuss and recall the order and content of each set. They were allowed to speak freely in a peer group and occasionally received positive feedback from the researcher. The results show that all the groups actively discussed and then clearly recalled the order and content of the story by working together. This finding implies that preschool children will likely also expand their semantic knowledge in a second language if input is properly delivered.

Keywords: environmental sounds, listening, semantic knowledge, attention, noticing

Introduction

Study shows that babies may listen to their first language while they are in their mother's womb. Marno, Farroni, Dos

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Santos, Ekramnia, Nespor, and Mehler (2015) reported that "a sensitivity to speech sounds is already present in newborns". According to Oates (2004), even before the first-word stage, children pay attention to the sounds and images around them and try to categorize them. From birth to twelve-years-old, they develop their first language at an amazing speed. In learning their first language, children are supposed to proceed through several steps. The steps include (1) babbling, (2) the first word, (3) two words, (4) phonological, syntactic, and lexical norms, (5) syntactic and lexical complexity and riches, and (6) conversational skills. By the third and fourth years, children construct sentences that largely observe the norms of the adults around them.

As children get older, they become more able to understand another person's perspective and get better at using persuasive arguments to get what they want. Isomura and Suzuki (2018) stated that five-year-old children can derive joy from their interaction with other children. At this stage, although their language is still not fully developed, they try to interact with their peers, identify what they have seen or heard around them, and suggest an alternative in the context of the interaction. The relevant sounds in this context are not only speech sounds, but also environmental sounds. Although many studies (Brewster & Ellis, 1992; Cameron, 2001; Oates & Grayson, 2004; Paul, 2003) have implied a relationship between heard sounds and language acquisition, none have shown whether sounds stimulate language acquisition and to what extent they affect children's language.

The present researchers hypothesized that children would pay attention to given stimuli and employ them to expand their semantic knowledge. If children can listen to sounds around them more carefully (paying attention to the sounds), they will be more aware of sounds which they otherwise might not have noticed, which might in turn lead them to construct more concepts and fill out their semantic maps.

This study focused on five-year-old children because this age is the period when most children start interacting extensively with their peers and start reliably listening to others. Studies have shown the importance of discourse, interaction, stories, and rhymes in children's linguistic and cognitive development. Children at this age are best seen as social beings rather than individual explorers as previously assumed.

The present researchers focused on the importance and role of interaction among five-year-old children. The ultimate goal was to gather evidence on how interaction works among five-year-old children. In this study they tried to

find a most preferable stimuli which would draw children's attention. The research questions were as follows:

(1) Was there agreement in the evaluation of the children's interaction among the five raters?
(2) Was there agreement in the evaluation of the children's recognition and categorization of the sounds among the five raters?
(3) Was there agreement in the evaluation of the children's hypotheses and confirmation of their concepts among the five raters?
(4) Was there agreement in the evaluation of the children's ability to recall the order of the sounds among the five raters?
(5) Did the children construct semantic mapping through interaction?

Ethical considerations

This study was conducted using interviews with young children. It was fully planned and carefully examined by teachers and researchers to ensure its appropriateness. Informed consent was obtained from the children's teachers and their school administrator. After deliberation, the proposal was submitted to Okayama Prefectural University's Ethics Committee, and the study was approved.

Method

Participants

A total of 24 five-year-old children attending a private nursery school in the western part of Japan participated in this study. Among them, six were male and 18 were female.

Instruments

Environmental sounds were created by one of the researchers (Komatsu, 2017). They were used in two tasks. Each set had its own context: Set 1 "at the seaside" and Set 2 "after school." Each set included four kinds of sounds. Children listened to each set of sounds for to six minutes. Table 1 shows the contents of the two sets.

Table 1. Description of sets

Set	Context	Number of the sounds	Flow of the sounds
1	At seaside	Four	Wave – gull – children's laughter – fishing boat
2	After school	Four	Bouncing a ball – chime – melody (Yuyake-koyake) - crow

As described in Table 1, two kinds of sounds were prepared, matching the

different scenarios. Set 1 consisted of four kinds of sounds: waves, gull's cries, children's laughter at the seashore, and finally the sound of a fishing boat. Children were given sound stimuli only.
Set 2 included sounds of children bouncing a ball, an elementary school chime telling children to go home, the traditional melody of "Yuyake-koyake" ("Sunset Glow"), and crow's calls reminiscent of early evening in Japan.

Procedure

The children were divided into eight groups of three: either two girls and one boy or two boys and one girl. One of the researchers attended all the task sessions, encouraged children to talk, and asked questions (see below). Children were video-recorded during the task sessions. They were asked to listen to the sounds carefully, and were told they would be asked about the sounds after listening to each set.

After children listened to each set, the researcher (the observer) asked them what they had heard, in what order they had heard the four sounds, and what place they thought the sounds were from.

Evaluation by the raters

Five raters watched the recorded film and evaluated the children's discussions by completing a questionnaire sheet. The questionnaire sheet and the evaluation criteria had been prepared before the evaluation. The questionnaire sheet consisted of questions (including some yes/no questions and some Likert-scaled questions).

The following questions were yes/no questions.

- Did children pay attention to the sounds?
- Could they imitate the sounds?
- Could they state the order of the (four kinds of) stimuli correctly?
- Did they speak up?
- Is there a key person?
- Does every member speak up?
- Are they willing to do the task?
- Did they interact well?

The prepared Likert-scaled questions ranged from 1 (not good at all) to 4 (very good). The questions were meant to cover four categories: children's interaction with their peers, their recognition and categorization of the sounds, their hypotheses on and confirmation of the concepts, and their recall of the order of sounds in each set.

Results

Inter-rater reliability among the five raters

Kendall's Coefficient of Concordance test was used to confirm inter-rater reliability regarding children's interactions, their recognition and categorization of the sounds, the children's hypotheses and confirmation of their concepts, and their ability to recall the order of sounds among the five raters.

The null hypothesis was that there was no agreement among the raters' evaluations. Table 2 shows the results for inter-rater reliability among the five raters regarding children's interaction.

Table 2. Inter-rater reliability regarding children's interaction

Set	*W*	*p*
1	.347	n.s.
2	.706	< .0001

To interpret the coefficient, the value *W* was converted into a chi-squared statistic. When the *W* value was .7 or above, the null hypothesis was to be rejected. For Set 2, but not Set 1, it was confirmed that the scores of the five raters were similar.

The same procedure was conducted regarding the children's recognition and categorization of the sounds among the five raters. Table 3 shows the results.

Table 3. Inter-rater reliability regarding children's recognition and categorization of the sounds

Set	*W*	*p*
1	.402	n.s.
2	.703	< .001

The scores of the five raters were again similar for Set 2, but not Set 1.

The same procedure was conducted regarding the children's hypotheses and confirmation of their concepts among the five raters.

Table 4. Inter-rater reliability regarding the children's hypotheses and confirmation of their concepts among the five raters

Set	*W*	*p*
1	.499	n.s.
2	.753	< .0001

The scores of the five raters were again similar for Set 2, but not Set 1.

The same procedure was conducted regarding the children's ability to recall the order of the sounds. Table 5 shows the results.

Table 5. Inter-rater reliability regarding the children's ability to recall the order of the sounds

Set	*W*	*p*
1	.878	< .001
2	.753	< .0001

For order of sounds, raters' evaluations were similar for both Set 1 and Set 2.

Semantic mapping through interaction

In some groups (three out of the eight groups), children were observed to construct semantic mapping through interaction. For example, the following utterances were excerpted from one group's interaction: this group consisted of two girls and one boy.

(Girl 1) It's a crow.
(Girl 2) A crow is singing.
(Girl 1) I heard a bell.
(Boy) A bell rings when school is over.
(Girl 1) A bell rings when a class starts or at lunchtime.
Here, we can see that one child made an utterance, the others then referred to that utterance and /or added new information.

Discussion

Answers to the research questions

Research questions 1-4 were concerned with inter-rater reliability for the following respective items: children's interaction, children's recognition and categorization of the sounds, children's hypotheses and confirmation of their concepts, and children's ability to recall the order of the sounds. Except for order of sounds, inter-rater reliability was acceptable only for Set 2. Evaluations were significantly similar in both Set 1 and Set 2.

This finding clarifies that the raters' evaluations were more dispersed for Set 1, which implies that Set 1 might not be suitable as an instrument. The context dealt with sounds at the seashore. If the children had not heard the gulls' singing or the engine of boats in their lives, it was obvious that they would not recognize the sounds nor imagine what they had actually heard. In contrast, Set 2 was full of sounds (bouncing a ball – chimes – melody of Yuyake-koyake – crow) which the children were familiar with. The children often played in the park, and could recognize the sounds of the park. They attended a nursery school located next to an elementary school, and knew the chime which rang at the school. They had learned the melody just before the study. Last, they remembered the crow's calls. Everything reminded them of scenes after school in late afternoon. As Oates (2004) stated, recognize etymologically means "cognize again": usually, children easily recall sounds which they have heard before. The intention of this study was to have the children listen carefully and pay attention to the stimuli. Set 1 might have been difficult for the children because they had not experienced the sounds.

Thus, it was confirmed that the children would construct semantic mapping through interaction. They were seen to do so by, for example, confirming each other's utterances and adding some new information. Their vocabulary seemed to expand during the interaction by collecting words and phrases from each other, and sentence length increased. It was observed that correct utterances were sometimes denied by peers in the group. For example, one girl correctly answered the researcher's question, but her utterance was dismissively rejected by the other group members, and the question received an incorrect answer. However, this also happens in the real

world.

Limitations

On limitations related to the children, first, the sample size should be increased; second, in order to confirm children's listening process, more focused qualitative observation is needed. Also, children's seating arrangement during the study seemed to be important: three children were seated in a line, and the ones at the left and the right hardly saw each other's face. This might have influenced their ease and frequency of speaking up in a group. Seating location should be planned to help everybody see everybody face to face.

As for the raters, they needed further training in evaluation. Since they were professionals in this field, they had prepared evaluation criteria and an evaluation manual beforehand. Still, they should have been made more familiar with the evaluation process itself.

Implications for future research

The general goals of language learning include not only learning to use a language but also developing sensitivity to and awareness of foreign languages and cultures. In this study, the researchers focused on the relationship between listening to sounds and first language learning. They confirmed that five-year-olds can accomplish tasks with their peers that they would not be able to accomplish alone. It was found that five-year-olds could pay attention to sounds, interact with their peers, and expand their semantic knowledge by collaborating with their peers. In further study, the researchers hope to apply an approach similar to that used here in a second language setting.

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環境音と意味知識の発達との関係：5 歳児がインタラクションを通して学ぶもの

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要旨

音と言語獲得との関係は深いと信じられているが、実際には、そのエビデンスを示すものはほとんどない。本研究では、5 歳児らが、環境音に耳をすませ、注意を向け、小グループでの話し合いの中で、言語力を伸ばしていくことを確認した。5 歳児らは、ピア（仲間）とのインタラクションの中で、聴いた音を再確認し、聴いた音に対して発話する力を高めていくことができた。この研究は、母語のみならず、第二言語における習得にも応用できるかもしれない。

キーワード

環境音、学習、意味知識、注意、気づき