This study investigated the effects of age and cognitive ability on preschoolers’ understanding of the generality of their kindergarten script. Four- and 5-year-old kindergarteners (N = 106) were asked to produce their own kindergarten script and a fictional person’s kindergarten script at regular intervals. In Experiment 1, it was found that only the 5-year-olds reported fewer acts in the fictional person’s script condition than in their own script condition, and a measure of theory of mind (ToM) and vocabulary test were associated with the difference between the two conditions. In Experiment 2, we replicated the results of Experiment 1 by comparing a friend in their kindergarten condition with the fictional person’s kindergarten condition. The findings suggest that 5-year-old children are capable of understanding the generality of their script among individuals, and their ToM is closely associated with the understanding of that generality.

Key words: script, generality, theory of mind, fictional other

INTRODUCTION

People who go out to eat in a restaurant go through a stereotypical sequence of events: they enter the restaurant, order food, eat, pay, and then leave. As in this example, the knowledge contained in this sequence of acts or routine events that we all learn in everyday life is called a script (Schank & Abelson, 1977). A script is organized along temporal-causal order and hierarchical organization. Previous studies have examined the script formation process from infancy to early childhood (Bauer, 2006; Nelson, 1986). It is apparent that scripts formed in childhood are not only used to forecast the future but also for pretend play and communication (Furman & Walden, 1990; Seidman, Nelson, & Gruendel, 1986). Yet very little attention has been given to the extent to which the scripts formed by kindergarten children are generalized. Here, we address this issue by exploring how preschool-age children produce the kindergarten scripts in both a self condition and a fictional other condition.

Previous research has dealt with the formation of scripts by children from around age 3 regarding events that the children have actually experienced (Fivush, 1984; Fivush & Hudson, 1990; Hudson & Nelson, 1986; Hudson & Fivush, 1991; Hudson, Shapiro, & Sosa, 1995; Nelson & Gruendel, 1981). All of these studies were based on interviews in
which the researchers asked the children about some routine events (e.g., “What do you do when you go to a restaurant?”). In response to these questions, it was found that even 3-year-old children were capable of producing highly generalized temporal sequences of events that correctly reflected their experiences (Nelson, 1986). As the criteria for scripts, a large amount of studies (e.g., Nelson, 1986) employed the use of impersonal pronouns (i.e., you and we) and the time present tense (i.e., “you do x” or “we do x”). Following the criteria, Kuebli and Fivush (1994) demonstrated that even 3-years-old children could report what generally occurs (e.g., “you eat food”), not what happened on a specific occasion (e.g., “I ate some food”). This finding has been replicated in a Japanese kindergarteners sample (Fujisaki, 1995, 1998).

To date, it is well known that our scripts are based on our own experience and are applicable to other people because we use impersonal pronouns in reporting scripts. However, Schank and Abelson (1977) and Schank (1982) suggested that people do not have all the same event sequences because scripts represent not only the frequent acts that are common to most people but also the infrequent acts that are specific to some people; thus scripts are generalized among not only events but also individuals. For example, Muto (1982) asked four-and five-year-olds how both their friend and they usually spend time from morning to night. The result indicated that they reported similar actions, but the reports in the self condition were more than the friend condition in which they excluded less important actions from their own scripts. In short, as Schank and Abelson (1977) and Schank (1982) suggested, four-and five-year-olds realize that their own scripts cannot simply be applicable to others as they are; thus it is necessary to examine the extent to which their own scripts are generalized. However, the use of impersonal pronouns, namely the index of scripts, only indicates that most people generally do some activities and does not reflect the extent to which their own scripts are applicable to other individuals. It is important to examine the generality of the scripts because scripts learned in one situation are employed in a variety of activities such as comprehending sentences (Hudson & Slackman, 1990), promoting smooth communication (Furman & Walden, 1990) and predicting how others might act (Zalla, Labruyère, Clément, & Georgieff, 2010). Nonetheless, as far as we know, except for Muto (1982), no studies have focused on the extent to which kindergartners’ scripts are generalized in each developmental stage.

In this study we examined the developmental process of the generality of scripts. First, unlike the findings from Muto (1982), we assumed that younger children regarded what they usually do in an event as what others usually do in the event, and this typically results in over-generalization. The accumulating evidence from “theory of mind” supports this assumption. Theory of mind is the ability to attribute mental states to self and others (Premack & Woodruff, 1978) and is traditionally measured by performance in the false belief task (Wimmer & Perner, 1983). Most three-and four-year-olds cannot pass the first-order false belief task and they answer the questions based not on the other person’s mental representation but their own mental representation (e.g., Koyasu, Hattori, & Goshiki, 2003). Hence, it is possible that younger children have overgeneralized scripts due to their insensitivity to the distinction between their own and another person’s knowledge.

Moreover, as Muto (1982) demonstrated, we hypothesized that older children
gradually acquire generalized scripts. In particular we would anticipate that older children extrapolate just central acts that are most likely to fit others. This is because an important developmental transformation occurs when children realize that their own scripts cannot simply be applied to others as they are. Indeed, five-and six-year-olds make a clear distinction between their own and others knowledge and beliefs and pass the false belief task (e.g., Koyasu et al., 2003). Hence, it is possible that older children have generalized scripts that are flexibly applicable to others.

In this study we also aimed to demonstrate the correlation between the generality of scripts and theory of mind. A previous study involving typical children and children with autism spectrum disorders (Loth, Happé, & Gómez, 2010), observed a correlation between passing the theory-of-mind task and the generality of scripts only for the children with autism spectrum disorders. However, this research only focused on children aged 8 years and older; thus the correlation in the preschool period will not be considered, although preschoolers’ understanding of other’s perspective drastically develops. We believe that delving into this issue of the relation between how children’s scripts are generalized and their self/other development could yield novel theoretical perspectives that would extend previous findings about scripts (e.g., Nelson, 1986).

One of our goals was to examine the extent to which young children’s kindergarten scripts are generalized. To attain this goal, we focused primarily on manipulating the subject of kindergarten scripts. In Experiment 1, we asked four-and five-year-olds the same questions used by Fivush (1984) to define kindergarten scripts, then set up two subjects—the child participant in the study and a fictitious-other child who goes to a different kindergarten—and finally tried to determine to what extent the participant’s script can be applied to the fictitious other. The reason for setting the fictional-other condition was that the participants were not familiar with the fictitious-other child and did not share the experience in the same kindergarten with him or her. In our prediction, four-year-olds would respond that their scripts are similar to that of the fictitious-other child and did not share the experience in the same kindergarten with him or her. In our prediction, four-year-olds would respond that their scripts are similar to that of the fictitious-other child; this would indicate that their own script is overgeneralized to the unfamiliar child. On the other hand, five-year-olds would state that their own scripts and the fictitious-other child’s script are different in content, then this would suggest that they differentiate their own scripts from the unfamiliar person’s script and their scripts are generalized appropriately.

Our second goal was to establish the relationships between the generality of scripts and theory of mind. In Experiment 1, four-and five-year-olds performed the script construction task in both self and the fictitious-other condition. In our prediction, the differences in reporting kindergarten scripts between the self condition and the fictitious-other condition are associated with the performance of the false belief task. We assumed that this correlation would remain even after controlling for age and vocabulary competence.
Experiment 1

Method

Participants

A total of 58 preschool-age children (27 boys and 31 girls), who attend a private kindergarten in the city of Kyoto, took part in individualized experiments. These participants comprised 29 four-year-olds (14 boys and 15 girls, average age 4.5 years, age range 4.0–4.9 years) and 29 five-year-olds (13 boys and 16 girls, average age 5.3 years, age range 5.0–5.10 years). None was reported as having any developmental abnormalities. The socioeconomic background of the participants was largely middle class. Informed consent was obtained from parents and kindergarten staff members for all children prior to the conduct of the study.

Procedure

The individualized experiment was divided into two sessions. To put the children at ease, both sessions were conducted in a quiet room at the kindergarten. The experimenter visited the kindergarten for several days prior to the experiments to establish rapport with the children. For both the first and second sessions of Experiment 1, script construction tasks were carried out while changing the within-participants design conditions. We conducted two tests to assess individual differences among the participants: the Japanese version of the picture vocabulary test to measure vocabulary competence (Ueno, Nagoshi, & Konuki, 2008), and the false-belief task as a theory-of-mind task (Wimmer & Perner, 1983).

In the first session, after asking the child’s name, age, and birthday, we proceeded with the script construction task and 1 out of 2 tasks for measuring individual differences. This took 10 minute. In the second session, one week after the first session, we conducted the second task for measuring individual differences and a script construction task under conditions different to that in the first session. These tasks also took about 10 minutes. The order in which the 2 tasks for measuring individual differences were conducted was counterbalanced among the children. The order among conditions for the script construction task was also counterbalanced.

Measures

Picture Vocabulary Test (Ueno et al., 2008)  This test was designed for children ranging in age from 3 years to 12 years and 3 months, and was developed to assess children’s vocabulary comprehension. It is a multiple choice test in which the experimenter points to 1 of 4 pictures while asking “what is this?” Scope of testing is determined by the child’s capabilities. If a child gets less than 3 correct answers on a page and less than 2 correct answers on the next page, the test is terminated.

False-Belief Task (Wimmer & Perner, 1983)  The false-belief task involved a brief animated story that was presented on a laptop computer. The entire sequence consisted of a main story, a belief question, a reality question, and a memory question as described below:

Main story: “This is a bear’s house. The bear took a ball from the shelf and played with it. Then the bear put the ball on a shelf and went out. Then a monkey came to play when the bear was not in the room. The monkey took the ball from the shelf and played with it. The monkey put the ball into a basket and went out. The bear then came back into the room to play with the ball.”
Belief question: “Where does the bear think the ball is?”
Reality question: “Where is the ball now?”
Memory question: “Where did the bear put the ball?”

The children were allowed to respond by pointing if they were unable to respond verbally. Children who answered all three questions correctly passed the task.

Script Construction Task

In the script construction task we examined kindergarten scripts by asking the children what they do all day at the kindergarten. In order to investigate how children’s kindergarten scripts are generalized among individuals, the study employed a within-participants design comparing the self and fictitious-other conditions.

The following instructions were given for the self condition: “(Child’s name) can I talk to you? (Child’s name) you always get up early, have breakfast, put on your clothes, and come to kindergarten, right?” “(Child’s
name) tell me what you do all day at kindergarten in the order you do them.” The child was prompted if he or she paused or broke off in the middle of the narrative: “And then what do you do?”

For the fictitious-other condition, pictures were presented of the fictional character and the kindergarten that he (or she) purportedly attends. These pictures were the same for every participant. Then, pointing to the pictures, the experimenter said: “Can I ask about Tom (or Naomi if the participant was a girl)? Tom (Naomi) goes to this kindergarten (pointing at the picture). Tom (Naomi) gets up early, eats breakfast, gets dressed, and goes to kindergarten.” “Tell me what Tom (Naomi) does all day at kindergarten in the order he (she) does them.” Note that the fictional character was assigned a name (either Tom or Naomi) that matched the gender of the child being interviewed. As in the case of the self condition, if the child paused or broke off in the middle of the narrative, we prompted the child by asking: “And then what does he (she) do?”

**Script Construction Task Coding**

A record of the child’s responses was created based on a transcript of a video-recording of the interview. The children’s reports were then divided up into action units, with each action associated with a particular verb. However, if the child continued to use the same verb to describe a sequence of acts—“play with blocks, play with origami, play outside”—this would be regarded as 1 action. But if the child interjected a different verb in describing a sequence of acts such as “play with building blocks, eat lunch, play outside,” these would be treated as 3 separate acts. All data was then coded based on this criterion by the experimenter and an undergraduate psychology student with an inter-coder consistency rate of 92% \(k = .89\) and a high reliability coefficient. The two resolved any coding disagreements through discussion.

**Script Construction Task Scoring Method**

In this study, we employed two indexes to measure the differences between conditions in the script construction task. The first index was the number of different acts, which was derived by subtracting the number of fictitious-other condition acts from the number of self condition acts. Note, however, that in cases where different types of acts were mentioned in the self and fictitious-other conditions, one could not discuss differences between the conditions in terms of number of acts alone. This called for a second index. In addition to the number of different acts between the conditions, the second index was the number of different types of action. This was derived by subtracting the number of common acts between the two conditions from the number of acts for the fictitious other condition, then adding that number to acts between the two conditions. So, for example, assuming the self condition included “play outside, eat lunch, go home” and the fictitious-other condition included “eat lunch, work,” this yielded 1 point for number of different acts and 2 points for number of different types of action.

**RESULTS**

**Vocabulary test and false belief task**

Results for the vocabulary test are shown in Table 1 as a function of the child’s age. We conducted a one-way analysis of variance (ANOVA) to examine age-related changes in the vocabulary test and found a significant effect of age, \(F(1, 56) = 48.94, p < .001, \eta_p^2 = .47\).

Next, we analyzed the false-belief task. Here we found that 12 out of 29 four-year-olds were in the correct answer group, and 17 out of 29 five-year-olds were in the correct answer group. We conducted a Chi-square test to examine the age-related effect, and found there was no significant main effect, \(\chi^2(1) = 1.72, \text{n.s.}\).

**Script Construction Task**

**Use of present tense** First, following Nelson (1986), we verified whether the reports produced during the script construction task had the nature of scripts to confirm whether they could differentiate between scripts and episodes. Nelson (1986) demonstrated that the
criteria for scripts were the use of impersonal pronouns and the present tense. However, in this study we manipulated the subject of scripts, so instead of using general impersonal pronouns, here we used the timeless present tense. In all reports, including the self condition and fictitious-other condition, 547 acts were mentioned, and only 13 acts were stated in the past tense. The four-year-olds reported 8 acts and the five-year-olds reported 5 acts in the past tense. These acts were excluded from subsequent analyses. Thus, in most cases, the children reported in the timeless present tense, and their reports are not episodes and appeared to have the nature of scripts (e.g., Nelson 1986).

Number of acts

Table 1 shows the number of acts reported in each condition by age group. A mixed-design ANOVA was conducted using age group (between: four-year-olds or five-year-olds) and condition (within: self or fictional other) as factors to examine differences in the number of acts for each condition. There was a significant main effect of condition, $F(1, 56) = 36.42, p < .001, \eta^2_p = .39$, but no significant main effects of age group, $F(1, 56) = 2.10, p > .56$. The number of acts mentioned in the self condition was more than in the fictional-other condition. There were significant interactions between factors, $F(1, 56) = 12.92, p = .001, \eta^2_p = .19$. According to the post-hoc analyses, the five-year-olds mentioned more acts in the self condition than the four-year-olds, $F(1, 56) = 9.99, p = .003, \eta^2_p = .15$, but there were no differences between age groups in the fictional-other condition, $F(1, 56) = 0.39, p = .87$. These results suggest that only the five-year-olds mentioned more acts in the self condition than in the fictitious-other condition, and the four-year-olds mentioned almost the same number of acts under both conditions.

Number of types of acts

As shown in Table 1, we examined the number of acts which were specific to the fictional other condition by age group. These acts were calculated by subtracting common acts under both conditions from the number of acts reported for the fictitious other condition. A one-way ANOVA was conducted using age group (between: four-year-olds or five-year-olds) as factors. There were no significant main effects of condition, $F(1, 56) = 1.10, p = .36$. Thus, both age groups reported almost the same number of acts for the fictitious-other condition.

Table 1 also shows the number of types of acts by age group. The number of types of
acts was calculated by adding the number of differences between conditions to the acts specific to the fictitious-other condition. The same analysis was conducted for the number of types of acts by age group. There were significant main effects of condition, $F(1, 56) = 9.37$, $p = .003$, $\eta^2_p = .14$. These results suggest that the five-year-olds mentioned more different types of acts than the four-year-olds when they were asked to describe scripts for the two conditions.

**Category of acts in each condition** All the acts mentioned by at least two children in their reports are shown in Appendix 1, along with the number of children who reported the acts. One can see that 14 types of acts were mentioned by two or more children, and “the other” category which was mentioned by only one child included 21 types of acts. In the self condition, more than half the children reported “study inside,” “play outside,” “lunch,” and “meeting before going home.” In the fictional-other condition, more than half the children also reported “study inside,” “play outside,” and “lunch.” It is thus apparent that half the children mentioned common acts for both conditions.

**Relationship between the script construction task and the false belief task**

Next we considered whether the same relations between the script construction task and false-belief task would remain after we controlled for age. As shown in Table 2, both the number of different acts and the different types of action were significantly related to the false-belief task. Note that, even after partialling out the children’s vocabulary test

| Table 2. Correlations among measures |
|-------------------------------------|
|                                  | 1 | 2  | 3  | 4  | 5  | 6  |
| **(a) Partial correlations controlling for age** |  |  |  |  |  |  |
| 1. Number of acts (self condition) | — |   |   |   |   |   |
| 2. Number of acts (fictitious-other condition) | .47*** | — |   |   |   |   |
| 3. Differences in number of acts | .52*** | —.50*** | — |   |   |   |
| 4. Differences in types of acts | .55*** | —.38* | .77*** | — |   |   |
| 5. False-belief task | .16 | —.15 | .34** | .45*** | — |   |
| 6. Vocabulary test | .30* | —.07 | .38** | .35* | .21 | — |

**(b) Partial correlations controlling for age and vocabulary**

|                                  | 1 | 2  | 3  | 4  | 5  | 6  |
|-------------------------------------|  |  |  |  |  |  |
| 1. Number of acts (self condition) | — |   |   |   |   |   |
| 2. Number of acts (fictitious-other condition) | .51*** | — |   |   |   |   |
| 3. Differences in number of acts | .46*** | —.52** | — |   |   |   |
| 4. Differences in types of acts | .37* | —.38* | .74*** | — |   |   |
| 5. False-belief task | .10 | —.14 | .29* | .41** | — |   |

* $p < .05$ ** $p < .01$ *** $p < .001$
scores, these relations were retained. It was found that the correlations of false belief task with the differences of the number of acts and the types of action were not significantly different, \( t(55) = 1.40, p = .16 \).

**Regression analysis**

To determine the specific contribution of the false-belief task to the script construction task when age and vocabulary were controlled, we carried out a series of hierarchical multiple regressions. The overall regression model was found to be significant, \( F(3, 54) = 10.12, p < .001 \). The independent variables explained 32% of the variation in performance of the script construction task. In the first phase, with the number of different acts in the script construction task as the dependent variable, we included the control variables (age and vocabulary test) in the first block. Age was not a significant predictor (\( \beta = .13, t = 0.88, p = .38 \)), but the vocabulary test was a significant predictor (\( \beta = .14, t = 3.08, p = .003 \)). Next, the false-belief task was entered in the second block, and the variable explained a further significant 5.9% of the variance in the script construction task, \( F \text{ change } (1, 54) = 4.97, p = .030 \). Consistent with the partial correlation analyses reported earlier, both false-belief task and vocabulary test were significant predictors of the number of different acts between the self condition and the fictitious-other condition, respectively (false-belief task: \( \beta = 1.08, t = 2.23, p = .030 \); vocabulary test: \( \beta = .12, t = 2.65, p = .011 \)).

The same analyses were conducted for the number of different types of acts in each condition. The overall regression model was also found to be significant, \( F(3, 54) = 9.34, p < .001 \). The independent variables explained 37% of the variation in the performance of the script construction task. In the first of phase, with the number of types of acts in the script construction task as the dependent variable, we included the control variables (age and vocabulary test) in the first block and the false-belief task was entered in the second block. The false-belief task explained a further significant 13% of the variance in the script construction task, \( F \text{ change } (1, 54) = 11.14, p = .002 \). It is thus apparent that only the false-belief task is a significant predictor of the number of different types of acts between the self condition and the fictitious-other condition (false-belief test: \( \beta = 2.08, t = 3.34, p = .002 \)).

**Discussion**

One of the main objectives of this study was to investigate the extent to which young children’s kindergarten scripts were generalized in each developmental stage. To this end, we established two sets of conditions by individually questioning young preschoolers: one set of conditions defining what the child himself or herself usually does at his or her kindergarten and a second set of conditions defining what a fictitious-other child usually does at the child’s kindergarten. We then examined the differences in the kindergarten script conditions described by the preschool children.

**Script Construction Task Results**

First, in the examination of the use of the timeless tense, which is an index of scripts proposed by Nelson (1986), most preschoolers responded in the present tense, not the past
tense. In other words, they described scripts as routine events rather than as episodes. This tendency was the same for both the self condition and the fictitious-other condition. These findings suggest that preschool-age children report routine events at their kindergarten as scripts, just as stated by Nelson (1986). This result is consistent with the finding from some Japanese studies (Fujisaki, 1995, 1998).

Turning to the differences in the self condition based on age, we found that the five-year-olds mentioned more acts than the four-year-olds. This is consistent with findings that the number of activities reported tends to increase with age (e.g., Hudson & Nelson, 1986). While not addressed in previous studies, we also found a positive correlation between the number of acts reported for one’s own condition and vocabulary competence that was also controlled by age. It will be apparent that tasks employed in previous studies have relied largely on vocabulary competence (e.g., Fivush, 1984).

On the other hand, we did not observe any significant differences between the 4- and 5-year-olds in the fictitious-other condition; that is, among 5-year-olds, the number of acts mentioned in scripts for the fictitious-other conditions was significantly fewer than for self conditions. We also found little disparity between 4-year-olds and 5-year-olds when we considered whether any special acts were included in only the fictitious-other condition. Moreover, regarding the number of types of acts mentioned, the results were little different than the results for differences in the number of acts. As we expected, this suggests that 5-year-olds acquire the generalized kindergarten scripts among individuals; thus they realize the differences their own scripts from the unfamiliar person’s script. It is thus very likely that the various elements they report in one’s own kindergarten script cannot be directly extrapolated to the script of the fictional child with which they are not familiar. By contrast, typical 4-year-olds mention virtually the same things in describing self- and fictitious-other conditions. It is thus very likely that self- and fictitious-other scripts will be represented the same way, so their own script is overgeneralized to the unfamiliar child.

This raises the question of what sorts of acts were attributed to fictitious-other conditions. Our analysis revealed that over half the preschool participants reported several acts that were included in both self- and fictitious-other conditions. We can assume that these acts occur frequently or are considered very important in the kindergarten context by the majority of preschoolers. It is thus likely that preschoolers mention typical activities that occur in their own kindergarten in scripts for children who attend other kindergartens.

**Script Construction Tasks and Theory of Mind**

A second objective of this study was to investigate the relationship between theory of the mind (ToM) and the development of the generality of scripts. Analysis demonstrated that false-belief task results and higher vocabulary competence scores were good predictors of the number of different acts described in fictional-other scripts and self scripts. The difference in the number of acts between self and other increased with vocabulary competence, and was clearly dependent on vocabulary competence. However, only the false belief task results predicted the number of types of acts between the self condition and the fictitious-other condition. When different types of acts served as an indicator, there were quite a few cases in which different types of acts were mentioned even if
the number of reports in both conditions is small. Based on the results the false-belief task predicted the difference between conditions independent of vocabulary competence, number of types of acts was a reasonable index considering its ability to capture the difference between conditions.

It is likely that acquiring the generalized kindergarten script among individuals derives from an awareness of the differentiations their own scripts from the unfamiliar person’s scripts. In order to pass the false-belief task, one must speculate about the other person’s belief based on awareness that one’s own beliefs differ from those of others. What both have in common is awareness of the range that one’s own knowledge and beliefs can be directly applied to others.

However, it is not possible to examine in any detail the factors involved in what factors associated with the generality of children’s kindergarten scripts based on the finding we presented here. This is because it is possible that children would experience difficulty in predicting what others do at kindergarten or they would not know what children do in unfamiliar kindergartens. Experiment 2 was thus conducted to probe the factors involved in how young children’s kindergarten scripts are generalized.

**EXPERIMENT 2**

**PURPOSE**

Experiment 1 revealed differences in the number and types of acts mentioned by 5-year-olds in scripts for self- and fictitious-other conditions, suggesting that their kindergarten scripts are generalized among individuals. Yet these differences could be attributed to two different factors. First is the factor of *otherness*. This essentially means that the preschoolers think that directly applying their own scripts to others is difficult. And the fact that theory of mind was also related in Experiment 1 suggests the possibility that otherness somehow causes difficulty in speculating about the fictional child’s script. Second is the factor of *non-shared experience*. In this case, children believe their scripts apply perfectly well to their own kindergarten, but it might be difficult to directly apply their own scripts to a fictitious-other with whom they do not share the experience in the same kindergarten. If we could determine which of these two factors plays the greater role affecting the differences between conditions, this would provide a guideline for understanding how children’s scripts are generalized. In fact, the children offered two explanations when giving their introspective reports in Experiment 1: I reported less in the fictitious-other condition because “the other kindergarten is different, so I don’t know” and “... because I don’t know Tom, but I think he plays in the playground.” So in Experiment 2, we asked young children for *their friend scripts*—scripts for friends who attend the same kindergarten and thus share the same experiences—which we then compared with the fictitious-other condition used in Experiment 1. If the otherness affects the generality of the kindergarten script, then we should obtain approximately the same results for the friend condition and the fictitious-other condition. On the other hand, if the non-shared experience
affects the generality of the kindergarten script, as Experiment 1 demonstrated, we would
expect to see differences between the friend condition and the fictitious-other condition.

**METHOD**

**Participants**
A total of 48 preschool-age children (23 boys and 25 girls), who attend a private kindergarten in
Wakayama city, took part in the individualized experiments. These participants consisted of 23 four-year-olds
(11 boys and 12 girls, average age 4.6 years, age range 4.0–4.10 years) and 25 five-year-olds (12 boys and 13
girls, average age 5.5 years, age range 5.0–5.10 years). The socioeconomic background of the subjects
was largely middle class. These children had not been diagnosed with any developmental or language
delays. Informed consent was obtained from parents and kindergarten staff members for all children prior
to this study.

**Procedure**
The individualized experiment was divided into two sessions. For both the first and second sessions of
the survey, script construction tasks were carried out while changing the within-subjects design conditions. In
the first session, after asking the children’s names, ages, and birthdates, we proceeded with the script
construction task. This took about 5 minutes. In the second session, the children took the script construction
task under different conditions from the first session. This task too took about 5 minutes. During the script
construction task, the order of presentation was counterbalanced.

**Script Construction Task**
In the script construction task young children were asked what they do all day at the kindergarten to
examine their script development. In order to investigate the nature of the children’s kindergarten script, the
study employed a within-subjects design comparing friend and other conditions.

The following instructions were given for the friend condition: “(Child’s name) can I ask you about
your friend in your own class? Your friend gets up in the morning, has breakfast, gets dressed, and comes to
kindergarten, right?” “Tell me what your friend does all day at kindergarten in the order he or she does them.”
The child was prompted if he or she paused or broke off in the middle of the narrative by asking: “And then
what does he (she) do?” The fictional-other condition was prepared by the same procedure as in Experiment 1.

**Script Construction Task Coding**
A record of the child’s responses was created based on a transcript of a video-recording of the interview,
the same as in Experiment 1. All data was then coded by the experimenter and an undergraduate psychology
major with an inter-coder consistency rate of 90\% (k = .86), and a high reliability coefficient. The two resolved
any coding disagreements through discussion.

**RESULTS**

**Use of present tense** First, according to the same standard of the generality of scripts
(Nelson, 1986) as used in Experiment 1, we analyzed all reports produced in the script
construction task. The reports for both the friend- and the other condition included 337
acts, only 7 of which were stated in the past tense. The four-year-olds reported 5 acts and
the five-year-olds reported 2 acts in the past tense. These acts were excluded from
subsequent analyses. Thus, as in Experiment 1, the reports appeared to have the nature of
scripts (Nelson 1986).

**Number of acts** Table 3 shows the number of acts reported in each condition by age
GENERALITY OF THEIR KINDERGARTEN SCRIPT

A mixed-design ANOVA was conducted using age groups (between: four-year-olds or five-year-olds) and conditions (within: friend or fictional other) as factors to examine differences of the number of acts for each condition. There was a significant main effect of condition, $F(1, 46) = 30.72, p < .001, \eta^2_p = .40$, but no significant main effects of age group, $F(1, 46) = 2.62, p = .45$. The number of acts mentioned in the friend condition was more than in the fictional-other condition, and there was significant interaction between factors, $F(1, 46) = 13.26, p < .001, \eta^2_p = .22$. According to the post-hoc analyses, the five-year-olds mentioned more acts in the friend condition than the four-year-olds, $F(1, 46) = 5.10, p = .029, \eta^2_p = .10$, but there were no differences between age groups in the fictional-other condition, $F(1, 46) = 0.34, p = .56$.

Number of types of acts

As shown in Table 3, we examined the number of acts which were specific to the fictitious-other condition by age group. A one-way ANOVA was conducted using age groups (between: four-year-olds or five-year-olds) as factors. There was no significant main effects of condition, $F(1, 46) = 1.20, p > .29$. Thus, both age groups reported almost the same number of acts only for the fictitious-other condition. Table 3 also shows the number of types of acts by age group. The same analysis was conducted for the number of types of acts by age group. There was a significant main effect of condition, $F(1, 46) = 13.07, p = .001, \eta^2_p = .22$. These results suggest that five-year-olds mentioned more different types of acts more often than the four-year-olds when the preschoolers were asked to describe scripts for the two conditions.

Category of acts in each condition

All the acts mentioned by at least two children in their reports are shown in Appendix 2. In the friend condition, more than half the children reported “study inside,” “play outside,” and “lunch.” In the fictitious-other condition, more than half the children also reported the same three activities. It is thus apparent that half the children mentioned common acts for both conditions.

### DISCUSSION

Experiment 2 was intended to shed light on the factors affecting how their scripts are generalized among individuals. By comparing friend and fictitious-other conditions, we...
obtained virtually the same results as we did earlier in Experiment 1. Looking at age-based differences for the friend condition, it was found that the 5-year-olds mentioned more acts than the 4-year-olds. As we saw earlier in Experiment 1, this suggests that the number of reported acts in friend scripts—“my friend always does this, always does that, etc.”—tends to increase with age. Also consistent with the findings of Experiment 1, it is highly likely that preschool-age children report routine events at kindergarten as scripts from the perspective of their friend.

Regarding the fictitious-other condition, we found no significant difference between the 4- and 5-year-olds, just the same as we observed in Experiment 1. However, analysis of the number of different acts between the two conditions revealed that the 5-year-olds mentioned fewer acts for the fictitious-other condition than the 4-year-olds. The same tendency applied regarding the number of types of acts. In other words, the findings from Experiment 2 suggests that the 5-year-olds become aware that they cannot directly apply their own scripts to the unfamiliar child if they are not based on shared experiences. Furthermore, in the fictitious-other condition, just as we saw earlier in Experiment 1, it was only those elements of a child’s script that were most likely to be applied that were mentioned. Yet, in the 4-year-old scripts for friend and fictitious-other conditions, no difference could be observed in the number of acts and the number of types of acts in the scripts. It is thus apparent that friend- and fictitious-other scripts will be represented the same way, so the friend-scripts are overgeneralized to the unfamiliar child.

As a result of Experiment 2, we can find that 5-year-olds acquire the generalized kindergarten script among individuals and non-shared experience affects the generality of scripts.

**General Discussion**

The first objective of this study was to investigate the developmental process of the generality of kindergarten scripts among individuals. More specifically, we sought to establish two conditions, namely the self or one’s own friend and fictional other conditions, employing the script construction task (Fivush, 1984). A second objective of the study was to demonstrate the correlation between the generality of scripts and theory of mind, and this relationship was confirmed in Experiment 1. Here we will consider these two objectives in light of the findings obtained through the study.

*Formation of kindergarten scripts during childhood*

Previous studies have shown that children begin to form scripts of routine events that happen in their lives as early as age 3 (Fivush, 1984; Nelson & Gruenfeld, 1981; Hudson et al., 1995). Nelson (1986) has observed that virtually all 3-to-4-year-old preschoolers use the present tense when referring to familiar events. We also found, in agreement with an earlier study (Nelson & Gruenfeld, 1986), that the number of acts mentioned in scripts tended to increase with age. This result presented here on the formation of scripts thus replicated results from a number of other studies (Fivush, 1984; Fivush & Hudson, 1990;
Nelson & Gruendel, 1981; Hudson & Nelson, 1986; Hudson et al., 1995). Experiment 1 also revealed that, especially for the self condition, the number of acts mentioned in scripts is related to individual differences in vocabulary competence. Although previous studies have sought to control the school age and how frequently events are experienced (e.g., Farrar & Boyer-Pennington, 1999), we would suggest that individual differences in vocabulary competence should be given greater emphasis in future work.

The generality of kindergarten scripts among individuals

Earlier studies have established that scripts learned in childhood and beyond are employed in a wide range of activities because scripts are generalized (Furman & Walden, 1990; Hudson & Slackman, 1990; Seidman et al., 1986). However, very little attention has been given to the question of what extent kindergartners’ scripts are generalized in each developmental stage. Therefore, the present study clarifies the developmental process of the generality of scripts. As we expected, 4-year-olds were quite content to apply their own scripts or their friends’ scripts at kindergarten directly to fictional others. In other words, the contents of the scripts remain virtually unchanged even though the subject is markedly different, so it is highly likely that their own scripts are overgeneralized among individuals. However, in the case of 5-year-olds, they described their own scripts and their friends’ scripts at kindergarten quite differently from the scripts of fictional others. This suggests that around the age of 5, children start to acquire the generalized kindergarten scripts among individuals. Indeed, previous studies have demonstrated that older children also begin to acquire the generalized kindergarten scripts among events (Fivush, 1984). For example, older children were found to be able to distinguish between activities that are central to an event from those that are variable (Hudson, 1988). Kuebli and Fivush (1994) also indicated older children often used conditional expressions (if X, then Y) and optional expressions (either X or Y) because they understood the variable aspects of daily lives. Taking these findings into consideration, we can expect that children’s scripts develop from the stage of the overgeneralization to the stage of the generalization among individuals and events.

Our results from Experiment 2 also indicated that whether the other person shares in one’s experience affects the generality of one’s kindergarten script. It is most likely that, in situations where another person clearly does not share the same experiences, participants realize that they cannot possibly know what he or she does very well. The earlier literature (Muto, 1982) has also examined the generality of scripts by manipulating the subject of scripts, but little is known about which the factors, namely either otherness or non-shared experience, has an influence on the generality of kindergarten scripts. Therefore, our findings allow for the deeper understanding of the script development.

Moreover, to investigate the process of script generality development among preschool-age children, we focused on both differences in number of acts and differences in types of acts. Adapting the two indexes helped us in analyzing the quantitative and qualitative aspects of two sets of conditions. We consider it a valuable methodological innovation helping other researchers in examining how children’s scripts are generalized.
The generality of kindergarten scripts and theory of mind

The second objective of this study was to explore the relationship between the generality of kindergarten scripts and ToM. Koyasu (2009) suggested that younger children do not acquire “theory of mind” and are unable to separate their own beliefs, thoughts, and ideas from others; thus we can assume younger children directly apply their own scripts to others. Indeed, Experiment 1 demonstrated that the difference between a fictitious other and self conditions is consistently related to theory of mind. This result is contrary to the findings of Loth et al. (2010) in children who were 8 years and older. By contrast, our study focused on preschoolers and the generality of kindergarten scripts among individuals manipulating the subject of scripts. The discrepancies between two studies might attribute to the difference of age or the index of scripts generality. Our findings offer novel insights regarding how the children’s scripts are generalized among individuals.

However, it is possible that other cognitive abilities may mediate the relationship between the generality of scripts and theory of mind. Recently, non-script-related research has begun to suggest that even preschoolers have the ability to introspect on their sense of certainty (uncertainty monitoring; Chouinard, Harris, & Maratsos, 2007; Lyons & Ghetti, 2011). These studies give a suggestion that a sense of uncertainty about a fictional child might offer the cue for acquiring the generalized scripts among individuals. Specifically, from the perspective of uncertainty monitoring, we can assume that since participants can recognize that they “don’t know” a fictitious other (Lyons & Ghetti, 2011), they demonstrated a great preference for only mentioning typical activities that they all shared in common. Moreover, the latest findings regarding established the relationship between metacognition and theory of mind (e.g., Lecce, Demicheli, Zocchi, & Palladino, 2015). Therefore, it is likely that development of uncertainty monitoring is closely related to both the generality of scripts and theory of mind. In this study we did not conduct the tasks measuring uncertainty monitoring, so it is not clear to what extent uncertainty monitoring have an influence on the generality of scripts. In future studies, this is an issue that should be investigated further.

Despite these limitations, the findings of this study can provide an opening for a broader exploration of individual differences in script development that so far has been lacking. Especially when focusing on factors that constitute a stumbling block to people with frontal lobe injuries (Allain et al., 2007; Zanini, 2008) and autism spectrum disorder (Loth et al., 2010), thoughtful consideration of individual differences is essential.

CONCLUSIONS

This study illuminated various aspects of the developmental process of the generality of kindergarten scripts that have been largely neglected up to now. Younger children’s scripts tend to be overgeneralized to other persons; however older children become increasingly hesitant in applying their own scripts to other persons with whom they do not share the same experiences. This suggests that only very typical and highly probable acts from their personal script are generalized. The findings of this study also indicate that
the generality of kindergarten scripts and theory of mind are related, which suggests that our script development interacts with the understanding of different perspectives, beliefs and contexts.

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### Appendix 1

Types of actions in children’s reports ($N = 58$)

| Action                      | Self condition | Others condition |
|-----------------------------|----------------|------------------|
| Changing clothes            | 13 (22.4)      | 4 (3.4)          |
| Prayer                      | 7 (12.1)       | 7 (12.1)         |
| Attendance card             | 5 (8.6)        | 3 (5.2)          |
| Meeting                     | 18 (31.0)      | 9 (15.5)         |
| Study inside                | 47 (81.0)      | 43 (74.1)        |
| Exercise                    | 11 (19.0)      | 8 (13.8)         |
| Play outside                | 41 (70.7)      | 37 (63.8)        |
| Lunch                       | 37 (63.8)      | 30 (51.7)        |
| Play with blocks            | 22 (37.9)      | 6 (10.3)         |
| Reading                     | 10 (17.2)      | 7 (12.1)         |
| Rest room                   | 6 (10.3)       | 3 (5.2)          |
| Preparation for going home  | 29 (50.0)      | 13 (22.4)        |
| Go home                     | 25 (43.1)      | 16 (27.6)        |
| Other                       | 15 (25.9)      | 12 (20.7)        |

### Appendix 2

Types of actions in children’s reports ($N = 48$)

| Action                      | Friend condition | Others condition |
|-----------------------------|------------------|------------------|
| Preparation in the morning  | 3 (6.3)          | 1 (2.1)          |
| Prayer                      | 7 (14.6)         | 2 (4.2)          |
| Attendance card             | 3 (6.3)          | 2 (4.2)          |
| Study inside                | 39 (81.3)        | 29 (60.4)        |
| Play outside                | 44 (91.2)        | 40 (83.3)        |
| Lunch duty                  | 5 (10.4)         | 4 (8.3)          |
| Lunch                       | 27 (56.3)        | 13 (27.1)        |
| Changing clothes            | 8 (16.7)         | 5 (10.4)         |
| Preparation in the afternoon| 15 (31.3)        | 7 (14.6)         |
| Go home                     | 21 (43.8)        | 10 (20.8)        |
| Talks by the director, teacher | 4 (8.3)         | 0 (0.0)          |
| Other                       | 11 (22.9)        | 5 (10.4)         |