

Effects of Childcare Workers' Years of Childcare Experience on Their Situational Awareness of the Conditions of Children's Activities

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1. Introduction

The purpose of this study was to clarify the effects of childcare workers' years of childcare experience on their situational awareness of the conditions of children's activities. This study especially focused on visualizes the abilities the childcare workers' had acquired through their childcare experience, which has been one of the major issues of childcare studies.

Only a few studies of proficiency have targeted Japanese childcare workers investigated the effects of different years of childcare experience on the way children's conditions are recognized, on the method of understanding small children, and on the feeling of childcare efficacy [2, 7, 8] .

For example, Takahama [8] asked participants to mention difficult young children from their experience and to answer questions freely on about nine items such as the children's problems and the existence of their comprehensive abilities. As a result, it has become clear that, if a childcare worker has long experience, he or she tends to understand the child from various aspects. Additionally, it was suggested that long childcare experience enabled the workers to widen their interest in the individual differences of children and that the change in interest could bring a different view of children and different childcare behaviors. Furthermore, in the study by Nishiyama [7] , who investigated the relationship between the years of childcare experience and the feeling of childcare efficacy, it was suggested that, through the accumulation of childcare experience, the feeling of childcare efficacy would improve, and the childcare worker would reach a mature stage in which he or she would have sufficient comprehension and confidence. In the study by Asakawa et al. [2] investigating childcare workers with more than 10 years of experience and students enrolled in childcare school regarding what they were watching during childcare by asking them to write freely, it has become clear that childcare workers with more than 10 years of experience tend to look at children from broader viewpoints.

Therefore, it could be said that, through the accumulation of childcare experience, the childcare workers were able to establish professional knowledge about the children, to observe and handle them with wider and deeper views, and to acquire a feeling of childcare efficacy.

However, these previous studies [2, 7, 8] did not investigate the problems stemming from the proficiency of situational awareness, although they visualized the abilities acquired by childcare workers from their childcare experience by conducting interviews or using questionnaires. The proficiency of situational awareness means the structuration of knowledge along with its increase through experience in a specialized area [1, 3] .

For example, a study of proficient experience and situational awareness of chess investigated whether

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participants could answer correctly the location of chess pieces on the board after they observed them for five seconds [3]. The results showed that, if the locations of the pieces were related to the game (i.e., the relevant memory task), the proficient players showed significantly higher results in correct answers than chess novices. On the other hand, if the location of pieces had nothing to do with the game (i.e., the peripheral memory task), there was no difference in the proficiency between them. The results were similar in the study of Allard et al. [1], who applied a similar experiment to basketball under dynamic conditions. As a reason for these results, it was suggested that, because participants understand structurally and memorize the location of the chess pieces or basketball players, linking them to games based on their experience, it has nothing to do with their memory capacities [1, 3]. Judging from the above arguments, it was anticipated that childcare workers would understand and memorize children's activities structurally through the accumulation of their childcare experience.

It would also be possible to review the studies investigating the effect on the way of recognizing children's conditions, on the method of understanding small children, and on the feeling of childcare efficacy [2, 7, 8] from a cognitive aspect. This is not to say, however, that it would be possible to explain the whole cognitive aspect of the previous studies. As childcare activities are not implemented for a consecutive period in a stable way, there would be limitation to any experiment. In fact, by eliminating unnecessary conditions to control the experimental conditions, it would be impossible to comprehend the whole of childcare activities, and it would only explain partial results. However, at least it was decided that it would be important to focus on situational awareness as a part of specific proficiency of childcare workers improved by the childcare experience.

Based on the above points of view, the difference in situational awareness was investigated by categorizing childcare workers into groups according to their childcare experience and making them observe still images of children's daily activities.

2. Method

2-1. Participants

Participants were 83 childcare workers with normal eyesight (average years of childcare experience 6.40 ± 7.56 years). The method of categorization could vary according to researchers; however, in this study, based on the previous studies investigating the knowledge of proficiency through professional experience in the field of cognitive psychology, participants were categorized into four groups: ① Beginners, ② Unskilled people, ③ Skilled people, and ④ Experts [6]. As a control group, a group of inexperienced people who did not have any experience at all was added, and these five groups participated in the experiment.

Briefing for the experiment was given before the start of experiment, and consent from the participants was obtained.

Table 1. Breakdown of the experiment participant

Group	Years of Childcare Experience (SD)	N
Control group	0 st year (0 ± 0)	16
Beginners	1-2th year (1.59 ± 0.50)	22
Unskilled people	3-5th year (3.56 ± 0.78)	18
Skilled people	6-10th year (7.64 ± 1.28)	14
Experts	11th year or more (19.12 ± 6.74)	18

2-2. Materials and Procedure

As an experimental material, still images of children's activities in the nursery school yard and nursery rooms were selected by co-researchers referred to in the previous study [3]. It was considered to be particularly important that the childcare worker watch children in order to comprehend their activities. Therefore, some image processing was conducted, and the original number of children in the images was modified to either increase or decrease. The subjects relating to children were called relevant memory task (Figure 1). On the other hand, the subjects that were indifferent to understanding children's activities, such as the colors of childcare worker shoes, were defined as the peripheral memory task (Figure 2). Using a projector (made by EPSON, EMP-400), these still images of children's activities were randomly shown for 10 seconds each on 100-inch slides. After the image was switched off, participants were asked to choose one answer out of four within 30 seconds. The software application used was PowerPoint (made by Microsoft, PowerPoint 2007). In order to make sure participants understood the experiment, two practice trials were conducted before the 20 main trials.

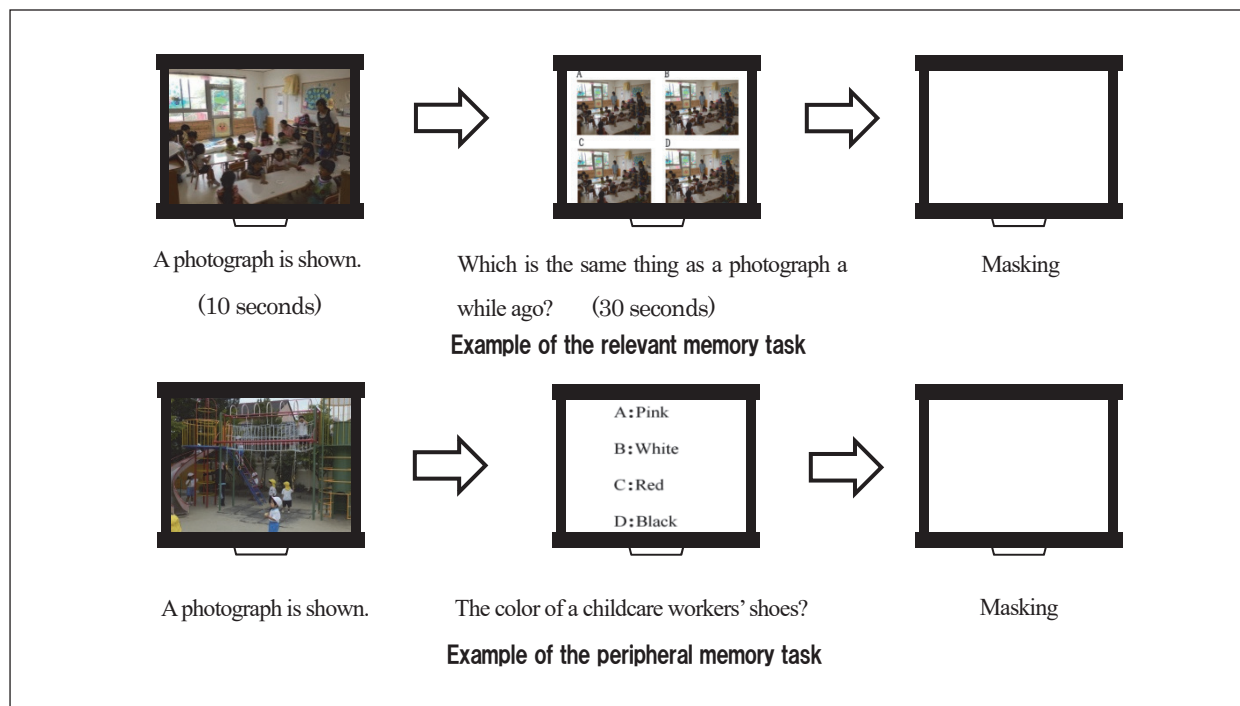


Fig 1. Presentation example of relevant memory task and the peripheral memory task

2-3. Data Analysis

The average scores for the relevant and peripheral memory task were calculated, and one-way ANOVA was conducted for each year group of childcare experience. Excel 2012 was used for the

statistical analysis. As a verification method, the Bonferroni method was used, and when the main effect was significant, multiple comparison analysis was conducted.

3. Results and Discussion

The purpose of this study was to clarify the effects of different years of childcare experience on the situational awareness of the conditions of children's activities. Therefore, one-way ANOVA was conducted for each relevant and peripheral memory tasks. The results showed that the main effect between groups in the relevant memory task was highly significant ($F(4, 82) = 4.69, p < .05$). According to the multiple comparison analysis, the groups of unskilled people, beginners, skilled people, and experts showed highly significant scores compared to the group of inexperienced people; however, the experienced groups did not show a significant difference (Figure 2). On the other hand, the main effect between the groups was not observed in the peripheral memory task (Figure 3).

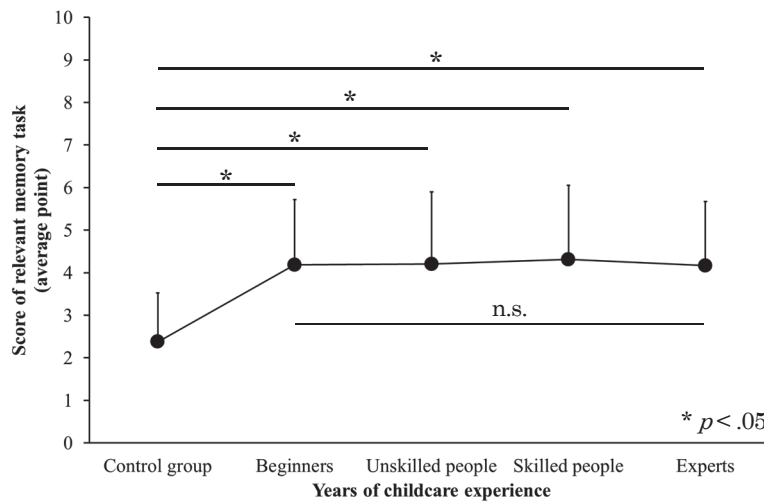


Fig 2. Scoring average according to the group of the relevant memory task



Fig 3. Scoring average according to the group of the peripheral memory task

The results showed a difference between the group of inexperienced people and the groups of experienced people in the relevant memory task but no difference in the peripheral memory task, similar to the results of previous studies of situational awareness, although these studies were not about childcare [1, 3, 10]. However, the results showing no difference in the relevant memory task between experienced people were different from the previous studies.

We are now going to consider the results that showed a difference between inexperienced and experienced people in the relevant memory task but not in the peripheral memory task. In this respect, Williams [10] investigated the different proficiency of situational awareness using soccer games as a dynamic environment. He reported that the ability to recognize the structured aspects of the play was one of the important factors of comprehension, and, in order to predict effectively, it was necessary to focus on the part that had the most important information in the informational context. He concluded that the accumulated experience of proficiency would make a difference in the attending behavior. In addition, unlike the relevant memory task, the peripheral memory task do not have important context and, therefore, would bring no difference. Based on this discussion, it is considered that, because the actual childcare workers could recognize the important information of children's activities such as their positions, they could focus on the information differently and could extract different information.

However, why was there no difference between the groups of the various experienced people? As reasons for this, two points can be speculated. One point is that the situational awareness of children's activities would not improve as much after three years of childcare experience. The second point is that, although there seems to be no difference in the recognition of children's positions, there would be a difference in varieties of extractions of activity-related information from the scenes of children's activities. Regarding this second point, Takahama et al. [8] commented that the longer childcare experience enabled childcare workers to acquire information from several aspects. In the studies of cognitive psychology about the structure of experts' knowledge, it was suggested that the experts' knowledge was abundant and linked to various meanings compared to that of beginners, and if they were not able to access a certain concept, there would be a stratified structure where they could deduce the information from the lower levels [3]. Therefore, it would be necessary to investigate the difference in the extraction of information of childcare workers on children's activities from the qualitative point of view. In order to make this difference clear, the next series of experiments will be made by using movies showing approximate situations of dynamic environment of children and childcare workers. Moreover, in the field of cognitive psychology, there were studies investigating proficiency difference by measuring eye movements using eye-mark recorders [4, 5, 9, 11]. The common characteristics in these studies are that experts and non-experts watched different parts and extracted different information. Therefore, it would be also necessary to investigate the things that they were watching.

4. Conclusion and Future Work

The purpose of this study was to clarify the effect of different years of childcare experience on situational awareness of the conditions of children's activities. In order to achieve this purpose, we categorized participants into five groups (Table 1), randomly showed the participants the relevant and peripheral memory task of children's activities, and compared the number of correct answers. As a result, regarding the relevant memory task, the experienced people showed significantly higher scores than the

inexperienced people, but there was no difference among the experienced groups. On the other hand, there was no difference between groups regarding the peripheral memory task. From these results, as in previous studies [1, 3, 10], it was suggested that childcare experience would affect and produce structured knowledge as well as different attentional behavior. However, because there was no difference between various groups of experienced people, it could be suggested that further areas for investigation would be to measure a qualitative index from deeper aspects such as observational capability of childcare workers and a physiological index such as eye movement.

We would like to continue to study the proficiency of childcare workers to clarify the professional knowledge acquired through childcare experience.

5. References

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