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Effects of Repeated Retrieval with Touching the Area of Self-Body on the Performance of Human Figure Drawing in Children with Mild Intellectual Disabilities: A Longitudinal Study

Chie HOTTA

Department of Special Education, Kansai University of Social Welfare, Kashiwara, JAPAN

ABSTRACT

The aim of this study was to examine the intervention effect of repeated retrieval with touching the area of self-body on the performance of human figure drawing in preschool children with mild intellectual disabilities. Especially, this study applied the retrieval practice task to improve the performance of drawing in preschool children. In the intervention group, firstly, children with/without mild intellectual disabilities took the pre-test immediately before intervention session. Second, immediately after they were asked to remember with touching the area of self-body, they were asked to draw a picture of themselves at quarterly interval in preschool. Finally, they took the post-test. In the non-intervention group, children with/without mild intellectual disabilities were asked to take the pre-and post-tests. As a result, I indicated that year-long intervention could have dramatic effects on the performance of human figure drawing, even if children with mild intellectual disabilities. I discussed in terms of the testing effect that the remembering the area of self-body can lead to enhanced memory for the retrieved area of body.

Keywords: human figure drawings, repeated retrieval, preschool children, mild intellectual disabilities, a longitudinal study

INTRODUCTION

A long tradition of research into children's drawings of themselves has emphasized on human figure drawings as an index of their intellectual development (e.g. Goodenough, 1926) and emotional disturbance (e.g. Koppitz, 1968; Machover, 1949). The typical development of human figure drawing was follows (see also, Goodenough, 1926). The first phase is the squiggle period. Toddlers after 1 year old become drawing frequently the squiggle. The second phase is the symbolic period. The period consists of two phases. Especially, as a typical development, children in 5 years old become drawing about what they know. But, according to recent research, it appears that the Japanese young children showed a low score, especially, lag was 6 months during the symbolic phase (e.g., Kawagoshi et al., 2010). The delayed development of human figure drawing could have a bad influence on more broader development such as kinetism, eye-hand coordination, language, imagination, social interaction and so on (e.g., Hotta, Hanasaki, Tajika, & Hotta, 2013). Unfortunately, many children, especially with intellectual disabilities, don't enjoy drawing and avoid drawing in their daily life and many kindergarten teachers are stumped about how to teach the way to drawing in everyday life of preschool (e.g., Hotta et al., 2013). We need to do something in order to improve their abilities. Thus, the aim of this study was to examine the intervention effect of repeated retrieval with touching the area of self-body on the performance of human figure drawing in preschool children with milder intellectual disabilities.

Utility of Repeated Retrieval Task to Improve the Performance in Preschool Children's Drawing

Earlier findings for normal preschool children have demonstrated that retrieval promotes long-term retention of learning material compared to rehearsal or elaboration (e.g., Fritz, Morris, Nolan, & Singleton , 2007; Gates, 1917; Hotta, Taijka, & Neumann, submitted). Similar results were also obtained for elementary school children (e.g., Morris, Fritz, Jackson, Nichol, & Roberts, 2005).

Address for correspondence:

chie_hotta@yahoo.co.jp

As a typical procedure, firstly, for the same amount of studying time, we set out reading condition and retrieval condition. Some participants in the reading condition were asked to keep reading, whereas the other participants in the retrieval condition, after just one reading, were asked to keep remembering the target response. After that, they took the immediate and delayed tests. As a result, in immediate test, memory performance of the reading condition was better than that of the retrieval condition, whereas in the delayed test, memory performance of the retrieval condition was better than that of the reading condition. To summarize, an intervening retrieval leads to a better memory performance on a delayed test than rereading the materials for the same amount of time. According to Hogan & Kintch (1971), this phenomenon is called the testing effect. Moreover, Roediger & Karpicke (2006a, 2006b) emphasize the repeated retrieval as an effective learning tool.

With the lack of other studies apart from Fritz et al. (2007) and Hotta et al. (submitted), however, the robustness of the effects of repeated retrieval on long-term retention for preschool children remains unclear. In particular, little is known about learning in human figure drawing for preschool 3- and 4-year old children with mild intellectual disabilities.

Aim

In summary, repeated retrieval promotes long-term retention of learning material compared to repeated reading, listening, and looking. Therefore, we applied the repeated retrieval procedure to improving the performance of drawing in toddlers. Especially, teachers asked children with/without mild intellectual disabilities to remember the self-body and draw the self after touching the area of self-body at quarterly interval in preschool.

METHODS

Participants

In this study, fifty-four children participated. Age ranged from 38 to 48 months at that stage of pre-test session. Six of fifty-four children were excluded from analyses because they changed their address or was absent from preschool during session. As a result, forty-eight children were included in analyses. Moreover, all children took the Tanaka-Binet Intellectual test (Tanaka Institute for educational research, 2003) immediately after pre-test session. Participant's information showed Table 1. Participants in intervention and non-intervention groups were matched for age and IQ score.

Design

The variables were Group (Mild ID/Normal), Intervention (Intervention/Non-intervention) and Test (Pre/Post). Group and Intervention were the between-participants factors and Test was the within-participants factor. The dependent variables were the human figure drawing score. The human figure drawing score was coded by using the Goodenough's standardized scoring. For example, a human figure drawing consists of the 5 features, which are the shape of their face, eyes, mouth, ear, and hair. In this case, the total score was five.

Materials

The procedure on intervention group consisted of three phases, which were pre-test, retrieval, and post-test sessions (Figure 1).

First was that in pre-test session, children were asked to draw a picture of them freely with no time limit, within 1 week before retrieval session and we coded by using the Goodenough's human figure drawing test. Each participant was supplied with a plain white sheet of B4 size paper, a pencil and an eraser. The experimenter said: 'Draw a picture of yourself'.

After that, as a second session, the long-year intervention from May to March were conducted. This retrieval session consisted of two phases. First was Instruction session. This session included that kindergarten teacher instructed preschoolers to touch the area of self-face and body. For example, teacher said: 'where are eyes? Let's touch. OK? Do you understand?' In this case, if there are children who do not touch their eyes, another teacher guided and instructed where eyes are, near the children. Thus, they were asked to touch any area of their face and body from top to bottom. Second was retrieval session. They were asked to draw a picture of themselves. This session included that teacher asked children to draw a picture of them with remembering where any self-body is.

Third was that in post-test session, all children were asked to draw the self-figure freely within 1 week after retrieval session 5. In the non-intervention group, children took the pre-and post-tests sessions.

Table1. *Participant's information*

	N	Chronological age		Intelligence Quotient	
		M	SD	M	SD
Non-intervention					
Normal	10	42.20	3.52	102.60	8.36
Mild ID	10	43.10	3.81	65.10	2.60
Intervention					
Normal	16	41.00	2.73	102.63	8.05
Mild ID	12	43.31	3.40	66.00	3.25

Note: *N= Number of Participants, M = Mean, and SD = Standard Deviation*

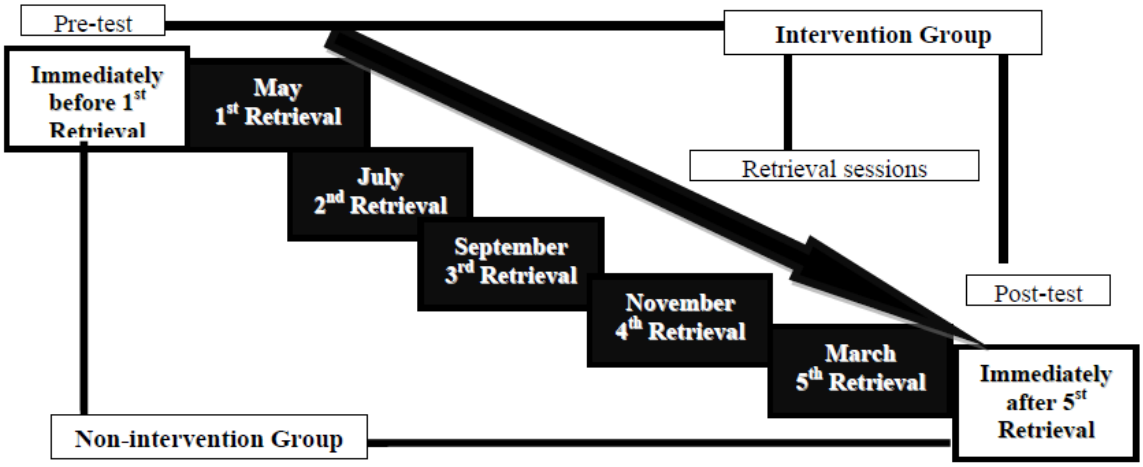

Figure1. *The flow of Intervention*

RESULTS

Overall Analysis

Figure 2 showed the mean drawing score of the pre-and post-tests in intervention and non-intervention groups. A 2 (Group: Mild ID vs. Normal) X 2 (Intervention: Intervention vs. Non-intervention) X 2 (Test: Pre vs. Post) mixed factorial ANOVA was conducted. Mean drawing performance in the normal children was better than that in the mild ID children (F (1, 44) = 33.95, MSe = 6.47, p < .001). Moreover, the drawing performance in the pre-test was worse than that in the post-test (F (1, 44) = 124.93, MSe = 4.02, p < .001). Also, the performance of the intervention group was better than those of the non-intervention group (F (1, 44) = 16.24, MSe = 6.47, p < .001). More importantly, the drawing performance of pre-test in the intervention group did not differ from those in the non-intervention groups (F (1, 88) < 1, *n.s.*), whereas the drawing performance of post-test in the intervention group was better than that in the non-intervention group (F (1, 88) = 37.65, MSe = 5.24, p < .001). These trends were obtained by both the mild ID (F (1, 44) =6.48, MSe = 4.02, p < .05) and normal (F (1, 44) = 18.00, MSe = 4.02, p < .001) groups. The results showed a powerful effect for the importance of repeated retrieval on learning retention.

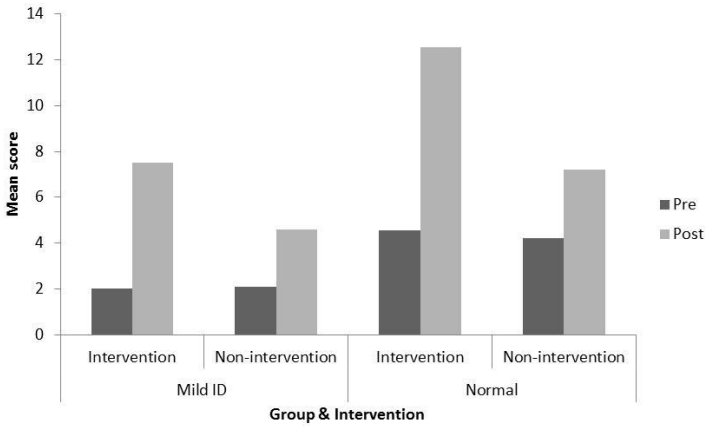

Figure2. *Mean score of drawing as a function of Intervention and Test in the normal children and those with mild intelligence disabilities*

The Intervention Effect of Year-Long Repeated Retrieval on the Performance of Human Figure Drawing

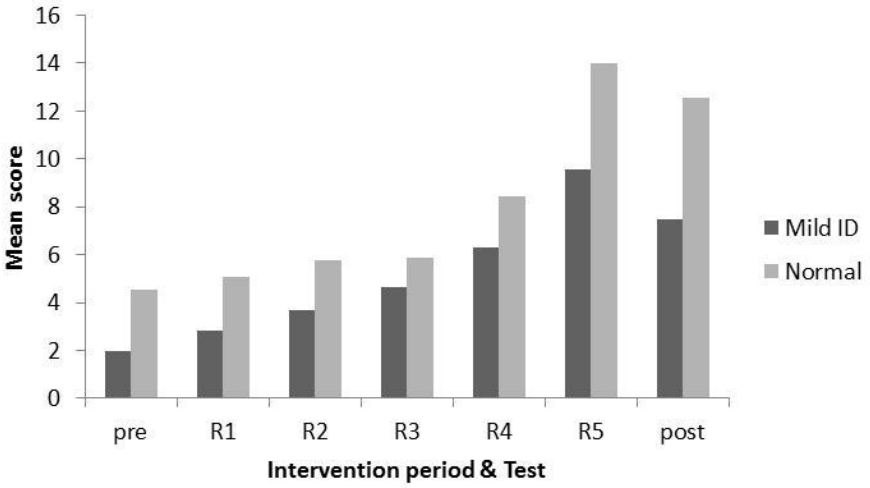

Figure3. *Mean score of drawing as a function of Intervention period and Test in the normal children and those with mild intelligence disabilities*

Figure 3 showed the mean drawing score of each intervention period, pre- and post-tests in mild ID and Normal groups. A 2 (Group: Mild ID vs. Normal) X 7 (Intervention: pre/R1/R2/R3/R4/R5/post) mixed factorial ANOVA was conducted. Mean drawing performance in the normal children was better than that in the mild ID children (F (1, 26) = 22.79, MSe = 16.63, $p < .001$). Moreover, the drawing performance between the pre-test and R1 (t (156) = 1.34, *n.s.*), R2 and R3 (t (156) = 1.53, *n.s.*), and R3 and R4 (t (156) = 1.13, *n.s.*) did not differed, whereas with the increasing number of retrieval was gradually better than last intervention period (F (6, 156) = 82.03, MSe = 3.46, $p < .001$). These trends were obtained by both the mild ID (F (6, 156) = 29.29, MSe = 3.46, $p < .001$) and normal (F (6, 156) = 57.59, MSe = 3.46, $p < .001$) groups. This referred to the significance of the interaction (F (6, 156) = 3.85, MSe = 3.46, $p < .01$). The performance of the intervention group was better than those of the non-intervention group (F (1, 44) = 16.24, MSe = 6.47, $p < .001$). The details of multiple comparison analyses showed Table 2. The results showed a powerful effect for year-long repeated retrieval on drawing performance.

Table2. *The details of multiple comparison analyses for the drawing score of children with/without mild intellectual disabilities in intervention group*

			Normal (t value)	Mild ID (t value)
R1	-	Pre	.76	1.09
R2	-	Pre	1.81	> 2.20*
R3	-	Pre	> 2.00*	> 3.52***
R4	-	Pre	> 5.90***	> 5.71***
R5	-	Pre	> 14.36***	> 10.00***
Post	-	Pre	> 12.18***	> 7.25***
R2	-	R1	1.05	1.09
R3	-	R1	1.24	> 2.42*
R4	-	R1	> 5.14***	> 3.52***
R5	-	R1	> 13.60***	> 8.90***
Post	-	R1	> 11.41***	> 6.15***
R3	-	R2	.19	1.32
R4	-	R2	> 4.09***	> 3.52***
R5	-	R2	> 12.56***	> 7.80***
Post	-	R2	> 10.37***	> 5.05***
R4	-	R3	> 3.90***	> 2.20*
R5	-	R3	> 12.37***	> 6.48***
Post	-	R3	> 10.18***	> 3.73***
R5	-	R4	> 8.47***	> 4.28***
Post	-	R4	> 6.28***	1.54
Post	-	R5	> 2.19*	> 2.75**

Note: * = $p < .05$, ** = $p < .01$, *** = $p < .001$

DISCUSSION

This study indicated that year-long repeated retrieval intervention could have dramatic effects on the performance of human figure drawing for normal children and children with mild intellectual disabilities. There was a reason why we obtained the dramatic and powerful effects. The reason was the expanding schedule of retrieval with the presence of feedback through the year (e.g., Butler & Roediger, 2007; 2008). Many researchers reported the expanding schedule of retrieval, but not massed schedule promoted long-term retention (e.g., Pyc & Rawson, 2007; for young adults; Fritz et al., 2007; for young children). The above idea is related to the mechanisms explaining the reason why repeated retrieval could lead to long-term retention. More specifically, a possible reason that repeated retrieval could lead to long-term retention is the amount of retrieval effort and desirable difficulty required (e.g., Bjork & Bjork, 1992; see also, Pyc & Rawson, 2009) when tests of recall are used instead of recognition (e.g., Kang, McDermott, & Roediger, 2007). Retrieval effort with desirable difficulty might lead to elaboration of the subsequent encoding and retrieval (e.g., Carpenter, 2009) and produce mediators between cue questions (e.g., the eyes in this study) and target answers (e.g., shape, size, and position of the eyes and how to draw)(e.g., Pyc & Rawson, 2010). Retrieval effort could thus promote the utilization of organization (e.g., Zaromb & Roediger, 2010) and elaboration (e.g., Carpenter, 2009), even in preschoolers. If we conducted the massed retrieval intervention with only one time, we could not have any benefits of retrieval.

As stated before, although the literature on testing effects is extensive, and the effects have been conclusively established for a wide range of materials, test formats, and learners (e.g., Karpicke & Roediger, 2008; Karpicke & Blunt, 2011), a notable gap concerns testing effects for very young children. However, Fritz, et al. (2007) and Hotta, et al. (submitted) showed an interesting finding that preschoolers as young as three to six who learned the names of toys were dramatically better at recalling the names after expanded retrieval practice than after expanded re-presentation or massed elaboration both after 1 min and after 1 day. Fritz et al. (2007) also noted that children enjoyed and kept their attention on the task in the retrieval condition much more than they did in the repeated study condition. Similarly, this study were found not only enjoying drawing but also the reduction of some children's challenging behavior such as walking about the room and just standing there by interviewing the teaches after intervention, even if children with milder intellectual disabilities. These findings might show promise for the application of developmental disabilities beyond intellectual disabilities. For example, previous study suggests that a lack of differentiation among the human figure drawings of children with autism could be expected on the basis of a domain-general impairment in generative ability (Lewis & Boucher, 1991) or a lack of self-representation (e.g., Lee & Hobson, 2006). In the future direction, it is necessary to examine the effectiveness for the children with not only milder intellectual disabilities but also any other developmental disabilities such as autism spectrum disorder.

REFERENCES

[1] Bjork R.A., & Bjork E.L. *A new theory of disuse and an old theory of stimulus fluctuation. In A. Healy, S. Kosslyn, & R. Shiffrin (Eds.), From learning processes to cognitive processes: Essays in hono*r of William K.Estes. Hillsdate, NJ: Erlbaum.1992, Vol.2, pp. 35-67.

[2] Butler A.C. & Roediger H.L., III Feedback enhances the positive effects and reduces the negative effects of multiple-choice testing. *Memory & Cognition*, 36, 604–616 (2008).

[3] Butler A.C. & Roediger H.L., III Testing improves long-term retention in a simulated classroom setting. *European Journal of Cognitive Psychology*, 19, 514–527(2007).

[4] Carpenter S.K. Cue strength as a moderator of the testing effect: the benefits of elaborative retrieval. *Journal of Experimental Psychology; Learning, Memory, and Cognition*. 35, 1563–1569 (2009).

[5] Fritz C.O., Morris P.E., Nolan D., & Singleton J. Expanding retrieval practice: An effective aid to preschool children's learning. *The Quarterly Journal of Experimental Psychology*, 60, 991-1004 (2007).

[6] Gates A.I. Recitation as a factor in memorizing, Archives of Psychology, 6 (40). (1917).

[7] Goodenough F.L. Measurement of intelligence by drawings. Harcourt, Brace and World. Inc. New York. (1926)

[8] Hogan R.M. & Kintsch,W. Differential effects of study and test trials on long-term recognition and recall. *Journal of Verbal Learning and Verbal Behavior*, 10, 562–567. (1971).

[9] Hotta C., Hanasaki N., Tajika H., & Hotta I. Effects of remembering with touching the area of self-body on the performance of human figure drawing in toddlers: A Longitudinal Study, *Asian International Conference on Psychology and Behavioral Science, oral presentation, Osaka, JAPAN*. (2013).

[10] Hotta C., Tajika H., & Newmann E. Effects of repeated retrieval on long-term retention in learning verbal and nonverbal tasks in younger children. Submitted.

[11] Kang S. H. K., McDermott K. B., & Roediger H. L., IIITest format and corrective feedback modify the effect of testing on long-term retention. *European Journal of Cognitive Psychology*, 19, 528-558. (2007).

[12] Karpicke J.D. & Roediger H.L., III The critical importance of retrieval for learning. Science, 15, 966–968. (2008).

[13] Karpicke J.D., & Blunt J.R. Retrieval practice produces more learning than elaborative studying with concept mapping. *Science*, 331, 772. (2011).

[14] Kawagoshi N., Goma H., Ushiyama M., Ikeda T., & Goma A., A Study on Drawing Development of Present-day Children Using Goodenough-Drawing-Test, *The Journal of Child Health*, 70 (2), 257-261 (2010).

[15] Koppitz E.M. *Psychological evaluation of children's human figure drawings*, Board of Cooperative Educational Services, Yorktown Heights, N.Y. (1968).

[16] Lee A., & Hobson R.P. Drawing self and others: How do children with autism differ from those with learning difficulties? *British Journal of Developmental Psychology*, 24, 547–565 (2006).

[17] Lewis V., & Boucher J. Skill, content and generative strategies in autistic children's drawings. *British Journal of Developmental Psychology*, 9, 393–416. (1991).

[18] Machover K. *Personality projection in the drawing of the human figure*. Springfield, IL: Thomas(1949).

[19] Morris P. E., Fritz C. O., Jackson L., Nichol E., & Roberts E. Expanding retrieval practice, meaning and imagery. *Applied Cognitive Psychology*, 19, 779–798. (2005).

[20] Pyc M. A., & Rawson K. A. Why testing improves memory: Mediator effectiveness hypothesis. *Science*, 330, 335. (2010).

[21] Pyc M.A. & Rawson K.A. Testing the retrieval effort hypothesis: does greater difficulty correctly recalling information lead to higher levels of memory? *Journal of Memory & Language*, 60, 437–447. (2009).

[22] Pyc M.A. & Rawson K.A. Examining the efficiency of schedules of distributed retrieval practice. *Memory & Cognition*, 35, 1917–1927. (2007).

[23] Roediger H. L., III, & Karpicke J. D. The power of testing memory: Basic research and implications for educational practice. *Perspectives on Psychological Science*, 1, 181-210. (2006a).

[24] Roediger H. L., III, & Karpicke J. D. Test-enhanced learning: Taking memory tests improves long-term retention. *Psychological Science*, 17, 249-255. (2006b).

[25] Tanaka Institute for educational research. *Tanaka-Binet Intellectual Test- V*, Taken-shuppan, Tokyo (2003).

[26] Zaromb F.M., & Roediger H.L., III. The testing effect in free recall is associated with enhanced organizational processes. *Memory & Cognition*, 38, 995-1008. (2010).