The characteristics of the pencil grip of 6–7-year-old children in Japan

Satoshi Sasada

School of Rehabilitation, Kanagawa University of Human Services

Abstract: The purpose of this study is to clarify the patterns of 6–7-year-old children’s pencil grip in Japan, and to clarify the relationship between grip pattern and gender. The participants were 80 first graders in the regular class of an elementary school (40 boys, 40 girls). Of the 80 children, 20 percent implemented a standard pencil grip. Additionally, 60 percent of the children held their pencil with three fingers, and 70 percent held their pencil near the tip. Analyses were conducted to determine factors related to gripping the pencil near the tip, and this practice was found to significantly differ with respect to thumb IP joint flexion. There was no significant difference regarding the position of the thumb, gender, and the number of fingers that touch the pencil. The data revealed that about 20 percent of 6- and 7-year-old children implemented an average pencil grasp.

Keywords: pencil grip, handwriting, position of holding a pencil

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Corresponding to: Satoshi Sasada, School of Rehabilitation, Kanagawa University of Human Services, Heiseicho 1-10-1, Yokosuka City, Kanagawa Prefecture, Japan
e-mail: sasada@kuhs.ac.jp
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Introduction

In Japan, the educational system for children with physical and mental disabilities was converted from “Special Education” to “Special Needs Education,” starting in 2001. Ministry of Education, Culture, Sports, Science and Technology (MEXT) [1] is described as follows. Formerly, special schools had been established separately by type of disability, such as “Schools for the Blind,” “Schools for the Deaf,” and “Schools for the Intellectually Disabled, the Physically Disabled and the Health Impaired.” However, the number of children with multiple disabilities has been increasing, and in order to appropriately meet their needs, the School Education Law was partially amended and enacted in 2007. Under the new “Schools for Special Needs Education” system, one particular school can accept children with several types of disabilities. “Special Needs Education” is for students with disabilities, in consideration of their individual educational needs; it aims to fully develop each child’s capabilities, independence, and social participation. “Special Needs Education” is carried out in various forms, including resource rooms and special classes within regular schools, and in special schools named “Schools for Special Needs Education.” “Special Needs Education” provided in regular schools serves children with many disabilities, including speech impairments, autism, emotional disturbances, low vision, hearing impairments, learning disabilities (LD), and attention-deficit/hyperactivity disorder (ADHD). With the “Special Needs Education” system, research in school-based occupational therapy settings has increased [2, 3]. Handwriting is indicated as an example of a topic requiring consultation between occupational therapists and teachers [4, 5]. From the author’s experience, requests from teachers for occupational therapy services for handwriting involved more boys than girls. This is due to the fact that many boys are writing characters by gripping the point of the pencil. As was exhibited in a previous study, there is research that has analyzed how typical children and children who exhibit a developmental delay hold a pencil [6–15]. There are, however, few prior studies in occupational therapy that involve how a Japanese child should hold a pencil [16, 17]. Therefore, the purpose of this study is to clarify the pattern of pencil grip of children from 6- to 7 years old in Japan, and to clarify the relationship between grip pattern and gender. This study also seeks to obtain fundamental data for developing a handwriting intervention program in
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**Method**

**Participants**

The participants were 80 first graders from the regular class of an elementary school (40 boys, 40 girls). The age range was from 6- to 7 years old. Consent for research was obtained from the school’s principal and teachers.

**The criteria for pencil grip**

The criteria for optimal pencil grip were based on the model in a Japanese textbook, and are shown in Fig. 1.

- Three fingers are used to hold the pencil.
- These are the thumb, index finger, and middle finger.
- The pulp of the thumb presses down on the pencil.

**Hold position (distance from pencil tip)**

When the hold position was 1 inch from the tip of the pencil, it was judged as being suitable. Two unsuitable hold patterns were also identified. If the cone part of the pencil was held, it was judged as proximity. When the pencil was held from the core at more than 1 inch from what is considered suitable, it was judged as distality (Fig. 2).

**Protocol**

Each child sat in a chair and wrote a line on A4 paper with a pencil. As the children wrote, each child’s hand was photographed with a digital camera.

**Survey Items**

The following aspects were noted for each child during the handwriting task:

1) The number of fingers holding the pencil
2) The position of the fingers holding the pencil
3) The position of the thumb on the pencil

- The position of the thumb was checked, and it was noted whether or not the pulp of the thumb pressed down on the pencil.
- It was also noted whether the angle of the IP joint of the thumb was flexed too much.

Two therapists, employing the above criteria, analyzed each photograph to determine whether the standard pencil grip was used.

**Statistical analysis**

The number and rate were computed for each item. A chi-squared test and multiple linear regression were applied to the data.

**Results**

**Grip pattern and gender**

As shown in Fig. 3, about 20 percent of the children used a standard pencil grip.

A non-standard pencil grip was observed in almost 80 percent of the children, regardless of gender (Figs. 4 & 5).

There was no significant difference between boys and girls in regard to pencil grip ($\chi^2(1) = .478$, ns).

**Three- and four-finger grip**

Sixty-two percent of the children held the pencil with three fingers (Fig. 6).

More girls than boys gripped the pencil with four fingers (Figs. 7 & 8).

The use of a three- versus four-finger grip did not significantly differ between genders ($\chi^2(1) = .471$, ns).

**Position of fingers holding the pencil**

Seventy-four percent of the children gripped near the tip of the pencil (Fig. 9).

The position of the fingers did not significantly differ with respect to gender ($\chi^2(2) = 1.898$, ns). The
Fig. 3. Pattern of pencil grip (n = 80).

Fig. 4. Pattern of pencil grip for girls (n = 40).

Fig. 5. Pattern of pencil grip for boys (n = 40).

Fig. 6. Number of fingers used to hold pencil (n = 80).

Fig. 7. Number of fingers used to hold pencil for girls (n = 40).

Fig. 8. Number of fingers used to hold pencil for boys (n = 40).
frequency of holding a pencil too close to the tip did not significantly differ in regard to the position of the thumb, gender, and the number of the fingers touching the pencil. However, it significantly differed with respect to thumb IP joint flexion ($p < .05$).

**Position of the thumb**

The position of the thumb did not significantly differ with respect to the number of fingers touching the pencil ($\chi^2(1) = 1.083$, ns).

**Discussion**

For the first grader, handwriting is a skill that must be mastered [18]. Regarding the relationship between pencil grip and gender, anecdotally, it appears that boys are more likely than girls to exhibit an immature pencil grip. During the course of this study, it was observed that the rate of girls exhibiting the correct pencil grip was slightly higher than that of boys. When analyzed statistically, however, the data revealed that pencil grip and gender are not related. Pencil grip, therefore, cannot be judged by gender in the sense that “boys have a tendency, more so than girls, toward exhibiting an immature pencil grip.” We need to warn school personnel and others against judging an awkward pencil grip as simply a gender difference. Regarding the developmental progression of pencil grip, 3–4-year-old children use a static 3-finger grip, and gain a dynamic 3-finger grip by 4- to 5 years. Therefore, it seems logical to assume that most children should have mastered the 3-finger pencil grip by the age of 6 or 7 years. However, the data revealed that only 21% of the children studied were implementing the dynamic three-finger grip, which was a low rate compared to what was expected. As is shown in Fig. 6, about 40 percent of the children held the pencil using four fingers; these children were not fully capable of holding the pencil with three fingers. Schneck and Henderson [7] point out that about six- to seven-tenths of 6-year-olds use a dynamic three-finger grip. On the other hand, the dynamic three-finger grip is not used among 6- to 7-year-old children. It is speculated that the three-finger and four-finger grips are intermingled among 6- to 7-year-old children. Factors related to holding a pencil near the tip were not clarified in this research. Future studies should investigate conduct longitudinal investigations from the first to sixth grade. About 70 percent of the children were holding the pencil too close to the tip. This shows that the child is writing such that the characters and the fingers are very near. Proximal hold of the pencil was related to bending the IP joint of the thumb. This is due to the fact that when the cone part of a pencil is held, in order to write well, children have to press down on the cone part by the finger pad of the thumb. Furthermore, the child may lean the body in order to write a character. It is said that it has a pencil in 1 inch of distance from the core of a pencil [19]. But, the influence by hold of the cone part of a pencil is not described. A limitation of this research is that it was not able to clearly describe the relationship between grip method and posture. Handwriting is influenced by not only finger motion but also the position of the trunk and legs. Therefore, for future research, it is necessary to investigate the relationship between the method of gripping a pencil and body posture.

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**References**


