Abstract:
Japanese writing system is composed of hiragana, katakana and kanji characters. The number of kanji characters which elementary school children need to learn reaches approximately one thousand. The selection of kanji character is based on the total understanding of sound, form and meaning. The wrong selection of kanji characters interferes with the correct representation of things in Japanese. We examined the types of kanji errors observed in the fourth grade children, because the writing errors of kanji sharply increase at this grade. We discuss the causes of the errors based on working memory, planning and executive function in the handwriting process.

Introduction:
Japanese kanji writing is performed through three steps, recall of homonyms, specification of the meaning based on the context and character selection corresponding to the meaning. That is, in order to recall the appropriate kanji character, the three elements of sound, letterform and meaning have to be considered. Error rate of handwriting of kanji characters is rapidly improved in the fourth grade (Figure 1). In order to obtain a basis for the development of better learning support method, we need to clarify the types of errors that are observed at this grade and to explore the causes.

Purpose:
The purposes of this study were to classify the writing error types found at this grade and to explore the causes of the errors by corresponding to the kanji writing mechanism.

Methods:
One hundred seventeen fourth grader of elementary school participated in this study. A kanji test of 50 words was carried out at the end of the school year. In this test, the words were presented as questions by phonograms. The participants were asked to write the words with kanji characters. Three raters identified the types of errors independently. The types contained the character with each error of sound, form and meaning, different character, character that only partially written, nonexistent character, and combinations thereof (Table 1).

Results:
Out of the total number of questions, no answer was 11.6% and error writing was 14.0%. Looking at the breakdown of the errors (Figure 2), the errors by sound (a) were 31.1%, by form (b) were 8.7%, and by meaning (c) were 2.6%. The errors by sound (a) were significantly greater than those by form (b) and meaning (c) (z=11.0, p<.01; z=16.0, p<.01), and the errors by form (b) were also significantly greater than those by meaning (c) (z=5.2, p<.01). Additionally only partially written characters (d) were 42.1%, different characters (e) were 12.0% and nonexistent characters (f) were 5.1%.

Conclusions:
It is necessary to integrate information of sound, meaning and letterform when we recall appropriate kanji characters (Figure 3). The most common error is type (a) error to select another character with the same sound. This error is related to the process of character selection. It indicates that it fails to extract a semantically matched character from several homonyms when the sound is collated with the engram of the crystallized systems in working memory. In other words, it shows difficulty to inhibit the recall of wrong characters by meaning or past writing experience. Inadequate development of executive functions is suggested.
The next common error is type (b) error to write a morphologically similar character. This error indicates difficulty to select a semantically correct character among the characters with similar shape. Problems of inhibition in executive functions are also suggested in this type of error. Error type (c) is a relatively rare type of error to misuse a semantically similar character. When the semantic network in memory system is too tightly formed, some semantically similar characters are recalled at the same time and it become difficult to select an appropriate character among them. Children sometimes notice these errors, but it is usually difficult for them to correct it by themselves. This indicates that the functions of evaluation and correction in the planning of the writing are not adequate yet at this grade.

Sample of Japanese Sentence
Tokyo Olympic Games will be held in 2020.

(kanji) きょうと みつげんけいかく が は siti ます。