

Proposal on Electronic Application for Writing *Kanji*

Focusing on Producing Sound Based on the Various Handwriting

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Abstract. Chinese character (*Kanji*) is thought as very complexity to person who just started to learn *Kanji* such as a primary schoolchildren or a foreigner. Especially, almost of these beginners are looked like to draw *Kanji* than to write it. It means, almost of the all beginners think *Kanji* is difficult to write. Therefore, in elementary school in Japan, the exercise to write *Kanji* repeatedly using a paper sheet is conducted for primary schoolchildren. However, it was clarified that many primary schoolchild don't like the exercise to write *Kanji* repeatedly is conducting. Moreover, there are many applications to learn *Kanji* in Japan, however almost of all applications are made for a practician to write *Kanji* tidily and quickly. Based previous backgrounds, we address that beginners in learning *Kanji* can get enjoyment of pleasant experience of writing *Kanji*. The purpose of this research is to propose a pleasant handwriting exercise application using each one's handwriting as individuality and sound information. Therefore, experiment to quantify value of each one's handwriting was conducted with 50 Japanese who were from 6 years old to 80 years old. As the results of the analysis, it was clarified that these handwritings as input information are effective to produce a coordinated sounds as output information in an application of electronic device. "*KanjiOn*" was proposed based on the results of the experiment. In using "*KanjiOn*", user writes various *Kanji* many times with various handwritings then they can hear various sound based on the each handwriting. The experiment conducted with 48 participants including primary schoolchildren at *Hakodate Chuo* library. Almost of participants evaluated "*KanjiOn*" is very pleasant application to write *Kanji*, they wanted to use "*KanjiOn*" more. We hope that not only primary schoolchildren but also foreigners who want to learn *Kanji* become to enjoy writing *Kanji* and can understand more *Kanji* by using "*KanjiOn*".

Keywords: Kanji, Application, Sound, Characteristics, Handwriting.

1 Introduce

Chinese character (*Kanji*) is thought as very complexity to a primary schoolchildren or a foreigner who just started to learn *Kanji*. Especially, almost of these beginners are looked like to draw *Kanji* than to write it. It means, almost of the all beginners think *Kanji* is difficult to write. Therefore, the primary schoolchildren in Japan exer-

cise to write *Kanji* using a paper sheet repeatedly. However, it was clarified that many primary schoolchild don't like the exercise to write *Kanji* repeatedly. Therefore, there are many applications to learn *Kanji* in Japan, however almost of all applications were made for a practician to write *Kanji* tidily and quickly. Based on the previous backgrounds, the purpose of this research is to propose an electronic application to exercise *Kanji* using each one's individuality of handwriting as input information and to listen a sound information as output information depend on the written each one's handwriting. We aim that the beginners in learning *Kanji* can get enjoyment of pleasant experience of exercising *Kanji* using the proposed electronic application.

2 Investigation

To affirm the current situation of the relationship with primary schoolchildren and exercising *Kanji*, we visited 3 elementary schools in Hakodate-city in Japan, and had conducted an interview with 13 teachers of 3 elementary schools. As a result from the investigation, it was cleared that almost of primary schoolchildren are not interest in exercising *Kanji*. Especially, they don't like writing *Kanji* using the learning material which is printed in a paper. It means the beginners like primary schoolchildren need a new motivating way to write *Kanji*.

As a next step, we had conducted an experiment about a lot of Japanese's handwriting by using some *Kanji* like 犬 (*INU* : means a dog), 猫 (*NEKO* : means a cat), and 鳥 (*Tori* : means a bird). The purpose of this experiment was to extract some objective characteristics as input information for the electronic application from each one's handwriting. This experiment was had conducted with 80 participants who were from 9 years old to 73 years old in Hakodate city.

The results of 80 participants' handwriting were quantified using the method that was used in previous Kang's research about quantification of physical quantity in a design field. As a result of the analysis of quantification, degree of density, largeness, and aspect ratio of the three *Kanji* were extracted as input information on electronic application. The figure 1 shows the results of a participant's handwriting of three letters. And the table 1 shows the results of the quantification of 3 handwritings.

From the analysis, it was clarified that the characteristics of handwriting can be quantified, and the quantified data has a potential as objective input information for new electronic application. The following figure 1 shows that how to quantify the each one's individuality of handwriting as input information for replaying a pronunciation sound as output information on the electronic application.

The pronunciation on the electronic application is sounded based on the quantified degree of density, largeness, and aspect ratio. The figure 2 illustrates the algorithm of replay a pronunciation based on the input information.

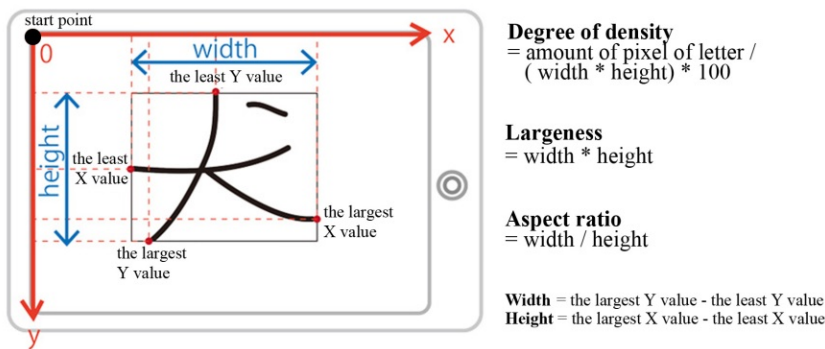


Fig. 1. Quantification method from handwriting of *Kanji* on the electronic Application

Table 1. The results of quantification of three different handwritings of *INU*(means a dog)

degree of density 25.783	degree of density 22.546	degree of density 19.358
largeness 20.309	largeness 69.662	largeness 85.244
aspect ratio 0.965	aspect ratio 0.877	aspect ratio 1.042

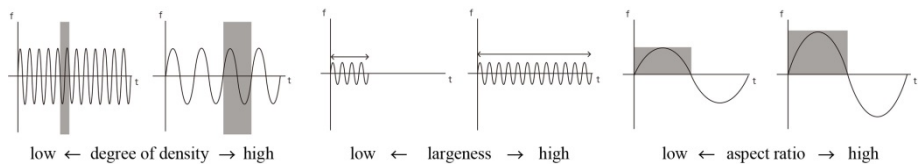


Fig. 2. Algorithm of replay a pronunciation based on the quantified information

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Proposal “*KanjiOn*”

“*KanjiOn*” was proposed based on the results of the previous experiment (Fig.3). The concept of this “*KanjiOn*” is to accelerate the drive for writing *Kanji*. On(音) of the application name means sound. The name “*KanjiOn*” means, a user can enjoy various pronunciation sound depend on the written *Kanji*. Using this “*KanjiOn*”, a user can enjoy and delight from writing *Kanji* with various pronunciation sounds depend on different handwriting of the written *Kanji*.

The figure 4 illustrates the design of the main screen of an example *Kanji* on “*KanjiOn*”. A user can write a *Kanji* on the empty big area freely using his/her own finger. In that time, he/she can adjust the weight of line of letter using adjustment lever. Moreover, he/she can erase his/her written letter by the way side using the gray icon. The red icon is for listening a pronunciation sound depending on the handwriting of the written *Kanji*. If he/she mistake to write *Kanji* rightly, he/her can’t listen the pronunciation sound.



Fig. 3. KanjiOn



Fig. 4. Each function of *KanjiOn*

4 Evaluation Experiment of “*KanjiOn*”

To verify the efficacy of the “*KanjiOn*”, the evaluation experiment was conducted with 30 primary schoolchild and 18 parents of the primary schoolchild at Hakodate *chuo* public library from 11th Mar. to 13th Mar. 2014. Especially, the experiment was conducted using the following different 3 device conditions to clarify the validity of “*KanjiOn*” and effect of sound,; 1) A participant writes *Kanji* using “*KanjiOn*” with sound function (“*KanjiOn*” with sound condition), 2) A participant writes *Kanji* using “*KanjiOn*” without sound function (“*KanjiOn*” without sound condition), and 3)

A participant writes *Kanji* using a paper (paper condition) (Fig. 5). In the experiment, 3 *Kanji*, 舌 (*SITA* : a tongue), 虎 (*TORA* : a tiger), and 牛 (*USHI* : a cow) were requested to write repeatedly and freely for 90 sec. And, the 3 *Kanji* were separated in random order into the each 3 device conditions.



Fig. 5. There device conditions on evaluation experiment

After using all of the three different device conditions, all participants were requested to evaluate the order of the 3 device conditions based on 'pleasant' and 'wish to use more' using order evaluation method. As the results of order evaluation method of 'pleasant' and 'wish to use more', 'KanjiOn' with sound condition' was evaluated highest than other conditions on the not only child participants group but also parents group (Fig. 6).

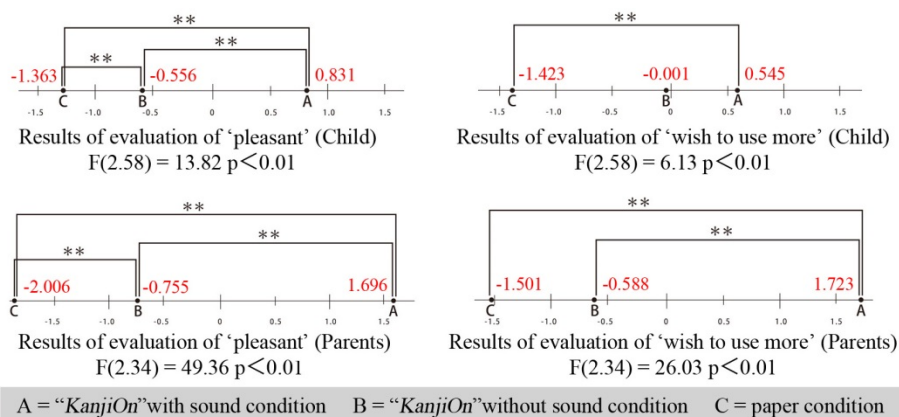


Fig. 6. Results of the evaluation of three device conditions

From the results of behavior protocol analysis, it is cleared that almost of all child participants were more started over to write *Kanji* and used the adjustment lever for changing the weight of line of letter on 'KanjiOn with sound condition' than 'KanjiOn without sound condition' (Fig. 7). The result means the various pronunciation sounds depend on different handwritings of *Kanji* help to motivate to write *Kanji* repeatedly with different handwriting.

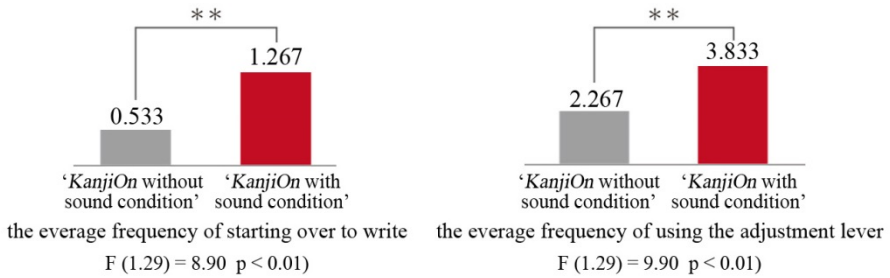


Fig. 7. Results of behavior protocol analysis

5 Conclusion

In this research, we addressed to propose a new electronic application for writing *Kanji* using each one's handwriting and various different pronunciation sounds depend on the handwritings of written *Kanji*. As a result, the following findings were clarified in this research.

Firstly, using each one's individuality of handwriting as input information on electronic application, and to listen a sound information as output information depend on the written each one's handwriting are useful to motivate writing *Kanji*.

Secondly, our "*KanjiOn*" help to motivate to write *Kanji* repeatedly with pleasant. Especially, the various pronunciation sounds help to motivate to write *Kanji* repeatedly with different handwriting.

From these results, it is cleared that users can write *Kanji* with pleasant using "*KanjiOn*" for a long time. We hope that not only primary schoolchildren but also foreigners who want to learn *Kanji* become to enjoy writing *Kanji* and can understand more *Kanji* by using "*KanjiOn*".

Reference

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