Kendo vocalization by Japanese and Chinese

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Abstract

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Aim The purpose of the present study is to investigate the accuracy of Japanese and Chinese kendo vocalization. **Methods** Sixteen healthy Japanese (21.9±0.8 (21–23) ys) and Chinese (21.9±0.8 (15–33) ys) participated in this study. Five of the word, including the designation of a strike part of Kendo, was carried out speech recognition using the application for voice recognition. Evaluation was made based on whether the recognized word was accurate, and the correct answer rate of each word was calculated from five trials for each word. **Results** Significant greater answer rates were shown in Japanese compared with Chinese ($p < 0.05$). Comparing five words among Japanese, there was a significant difference between "MEN" and "KOTE" ($p < 0.05$). Comparing five words among Chinese, there was a significant difference between the "MEN" and "KOTE" pair and the "MEN" and "TSUKI" pair ($p < 0.05$). **Conclusion** It was suggested that Chinese could not vocalize the designation of a strike part of kendo naturally, and that there was a difference with Japanese in the part of Ki(mind) that is the condition of become Ippon.

日本人と中国人による剣道の発声

目的 本研究の目的は、日本人と中国人による剣道の発声の正確性を調査することである。**方法** 16 人の健康な日本人(21.9±0.8 (21–23) 歳)と中国人(21.9±0.8 (15–33) 歳)がこの研究に参加しました。剣道の打突部位呼称を含む 5 つのワードを、音声認識アプリを用いて音声認識を行った。認識されたワードが正確であるか否かで評価し、正答率を計算した。**結果** 日本人の正答率が「メン」「コテ」「ドウ」「ツキ」において、中国人と比較して有意に高かった($p<0.05$)。日本人の中での 5 つの言葉では「メン」と「コテ」に有意差が見られた($p<0.05$)。中国人の中での 5 つの言葉では「メン」と「コテ」のペアと「メン」と「ツキ」のペアに有意差が見られた($p<0.05$)。**結論** 中国人は剣道の打突部位呼称を自然に発声することができず、有効打突の条件である「気」の部分に日本人との差があることを示唆した。

日本人和中国人的剑道发声

目标 本研究的目的是研究日语和中国剑道发声的准确性。**方法** 参加这项研究的有 16 名健康的日本人(21.9±0.8(21–23) 岁)和中国人(21.9±0.8(15–33) 岁)。使用该语音识别应用，其中五个词（包括剑道的罢工部分的指定）得以实现。根据识别出的单词是否正确进行评估，并计算出每个单词的正确答案率。**结果** 与中国人相比，"MEN"，"KOTE，"DOU"和"TSUKI"对日本人的正确回答率明显更高（$p<0.05$）。比较日本人中的五个单词，"MEN"和"KOTE"之间存在显着差异($p<0.05$)。比较中国人中的五个单词，"MEN"和"KOTE"对与"MEN"和"TSUKI"对之间存在显着差异（$p<0.05$）。**结论** 有人认为中国人不能自然地发出剑道罢工部分的名称，而在日本人的气（mind）方面，与日本人有所不同，这就是成为有效攻击的条件。

Introduction

In 1970, the International Kendo Federation (FIK) was established, and initially 17 countries / regions joined, but as of September 2018, 59 countries / regions have joined (International Kendo Federation, 2019). In recent years, the world kendo championships have seen excitement in countries other than Japan, and the internationalization of kendo has developed. Although it is not an Olympic competition, there is the fact that Japanese athletes are overwhelmingly stronger than foreign athletes in the competition "Kendo". Looking at the result of the world championship, Japanese men's team have won 16 times out of 17 times, Japanese women's team have won all eight times. In men's individual match the Japanese won all the tournaments and in girls' individual match Japanese won all time (FIK, 2019). When it was held in Chinese Taipei in 2006, the Japanese male organization was third prize. It was only one time that Japan could not win (FIK, 2019). Although the strength of Japan is clear as mentioned above, it is not clear what kind of Japanese kendo skill is the secret of strength.

According to the All Japan Kendo Federation, Ippon means *' with fulfilling mind and proper posture, a strike with the proper part of blade of a bamboo sword and has zan-shin '* (All Japan Kendo Federation, 2019). Fulfilling mind is vocalization and spirit, and zan-shin is the posture and mental attitude after stroke. Therefore, it is necessary to match the KI (mind), KEN (sword), (TAI) body, and zan-shin to the requirement Ippon.

According to the research on the quality, frequency and length of vocalization in a kendo game, it is said that 88.4% of the strike motions vocalized the designation of a strike part (Hashizume, K., Katsuki, T., Sasaki, H, 1992). It is studied that when it became Ippon, the designation of a strike part was always vocalized. Because Kendo has the background that it is a budo (martial arts) originated in Japan (All Japan Kendo Federation, 2018), the

face guard (MEN), the gauntlet (KOTE), the plastron (DOU) and the throat (TUSKI) of the strike part of the kendo are Japanese language. Therefore, those who are not native speakers of Japanese must play kendo while they speak the language that are not familiarized. Here, it can be seen that Japanese and people from countries other than Japan players are greatly involved in their native language from the viewpoint of vocalization. After all, for those who are native speakers of Japanese, there is a sense of incongruity in vocalizing kendo by people from countries other than Japan. So far, there has been no research focusing on pronunciation in research on vocalization of kendo.

Take Chinese as an example of countries other than Japan. The Chinese team lost 5-0 to Japan in the first round of the World Championship final tournament held in September 2018 (All Japan Kendo Federation, 2018). Each other is fighting on behalf of the country in the world convention, but such a difference in power is manifested. In terms of language, kanji notation is common to both Japanese and Chinese, but there are major differences between Japanese and Chinese in terms of pronunciation.

The purpose of this study is to investigate the accuracy of Japanese and Chinese kendo vocalization. In Japanese pronunciation, there are vowels and consonants that people in countries other than Japan are not good at (Jin, 2017). In addition, unique pronunciation such as special morae (long vowels, double consonant, syllabic nasal) must be careful when learn Japanese (Toda, 2003). For example, there is a phenomenon of vowel devoicing among the features of Japanese speech, and this phenomenon is related to Japanese speech rhythm and naturalness (Yasuda, Hayashi, 2011). Japanese can speak natural Japanese by devoicing vowels, and people outside of Japan struggle with Japanese by this law. From the law of this phenomenon, the “TSUKI” of the striking part applies to the devoiced words. It is estimated that Japanese speakers can naturally vocalize “TSUKI”, and Chinese speakers

cannot naturally vocalize “TSUKI”. Therefore, it is assumed that it will affect the vocalize of “TSUKI” by Chinese.

Materials and Methods

Participants

Eight Japanese (21.9±0.8 (21–23) ys, 5 males and 3 females) and Chinese (21.9±0.8 (15–33) ys, 4 males and 4 females) participated in this study. Japanese were targeted for those whose native language was Japanese, and Chinese were intended for those whose native language was Mandarin (Putonghua). The Japanese level of the Chinese was set to a level where conversation in Japanese including the contents of the experiment was not possible. The participants in both groups were informed that the purpose of participating in the study and the data on the experiment were used only for this study.

Experimental design

By using the speech recognition application, the participants were vocalized “MEN” “KOTE” “DOU” “TSUKI” and to two letter Japanese words based on the hypothesis. “SUSHI” was selected as the two-letter word based on the hypothesis. “SUSHI” is a Japanese language that is well-recognized and is easy for Chinese people to speak as Japanese. Because of the difference in language sense, Romaji notation is suitable for letting Chinese speak the correct pronunciation of Japanese, and all the paper was presented to the participants in Romaji notation. Romaji was written as “MEN”, “KOTE”, “DOU”, “TUKI”, and “SUSHI”, and “TUKI” was used for “TSUKI” to simplify Chinese pronunciation. Mandarin speakers cannot speak Japanese just by showing Roman letters because they speak based on Pinyin. Therefore, before the actual performance, I listened to the correct Japanese

pronunciation of each word and practiced it several times. The same procedure was followed when it has a native Japanese speaker vocalized. In the actual performance, each word was given 5 times, and a total of 25 times word were presented to the participants at random, and the words that came out were vocalized by the participants. In addition, the words that were vocalized and recognized were recorded each time. The procedure was after bringing the device close to the participant's mouth and starting the recording function, the procedure was to show the participants the word written in the sketchbook and let the participants vocalize. The experiment was conducted in a quiet room without noise.

Measurement

We used the application for voice recognition (Dragon Search, NUANCE, Massachusetts, The United States of America) on iPhone5 to evaluate the voices (Fig. 1). The speech recognition software (Dragon NaturallySpeaking, NUANCE, Massachusetts, The United States of America), the base of Dragon Search, can automatically and accurately deliver speech developed for personal, home, professional and business use (Jaehwang, Kyung-Whan, 2005). In addition, the application for voice recognition (Dragon Dictation, NUANCE, Massachusetts, The United States of America), based on Dragon NaturallySpeaking, is also used in the practice and verification of pronunciation in German, which recognizes and clearly texts the clear pronunciation of native speakers (Iwai, 2012). The distance between the iPhone 5 and the subject was set within 5 cm from the mouth. The recognition language is set to Japanese, and search results are displayed in Japanese. We investigated whether the search results were accurately searched in Japanese for “MEN”, “KOTE”, “DOU”, “TUKI” and “SUSHI” (Fig. 2). Evaluation was made based on whether the recognized word was accurate, and the correct answer rate of

A. Press the center button to start recording.

B. Vocalize when “Recording” appears.

Fig. 1 The actual voice recording screen of the Dragon Search application.

Fig. 2 The actual recorded results are displayed in Japanese.

each word was calculated from five trials for each word.

Statistics

All data are provided as mean and SD. In this study, nonparametric analysis was used for non-normal distribution data. The five words “MEN”, “KOTE”, “DOU”, “TUKI” and “SUSHI” were compared between groups using the Mann-Whitney U test. In addition, the Friedman test was used to compare the five words between the Japanese people and the five words between the Chinese people, followed by each pairwise comparison. The level of statistical significance was set at $p < 0.05$. Statistical analyses were performed using SPSS software (version 25.0; SPSS, Tokyo, Japan).

Results

Comparison between groups by Mann-Whitney U test showed the following results.

Significant differences between groups were observed for “MEN” vocalize ($p < 0.05$). Both groups had very high correct answer rates, but it was confirmed that the rate of correct answers was slightly higher in Japanese (100%) and Chinese (85%) (Fig. 3).

In the “KOTE” vocalize, a significant difference was observed between the groups ($p < 0.05$), and there was a considerable difference in the correct answer rate between Japanese (65%) and Chinese (2.50%) (Fig. 3).

In the “DOU” vocalize, a significant difference was observed between groups ($p < 0.05$), and a slight difference in correct answer rate was seen between Japanese (97.50%) and Chinese (65%) (Fig. 3).

In the “TUKI” vocalize, a significant difference was observed between Japanese (90%) and Chinese (15%)

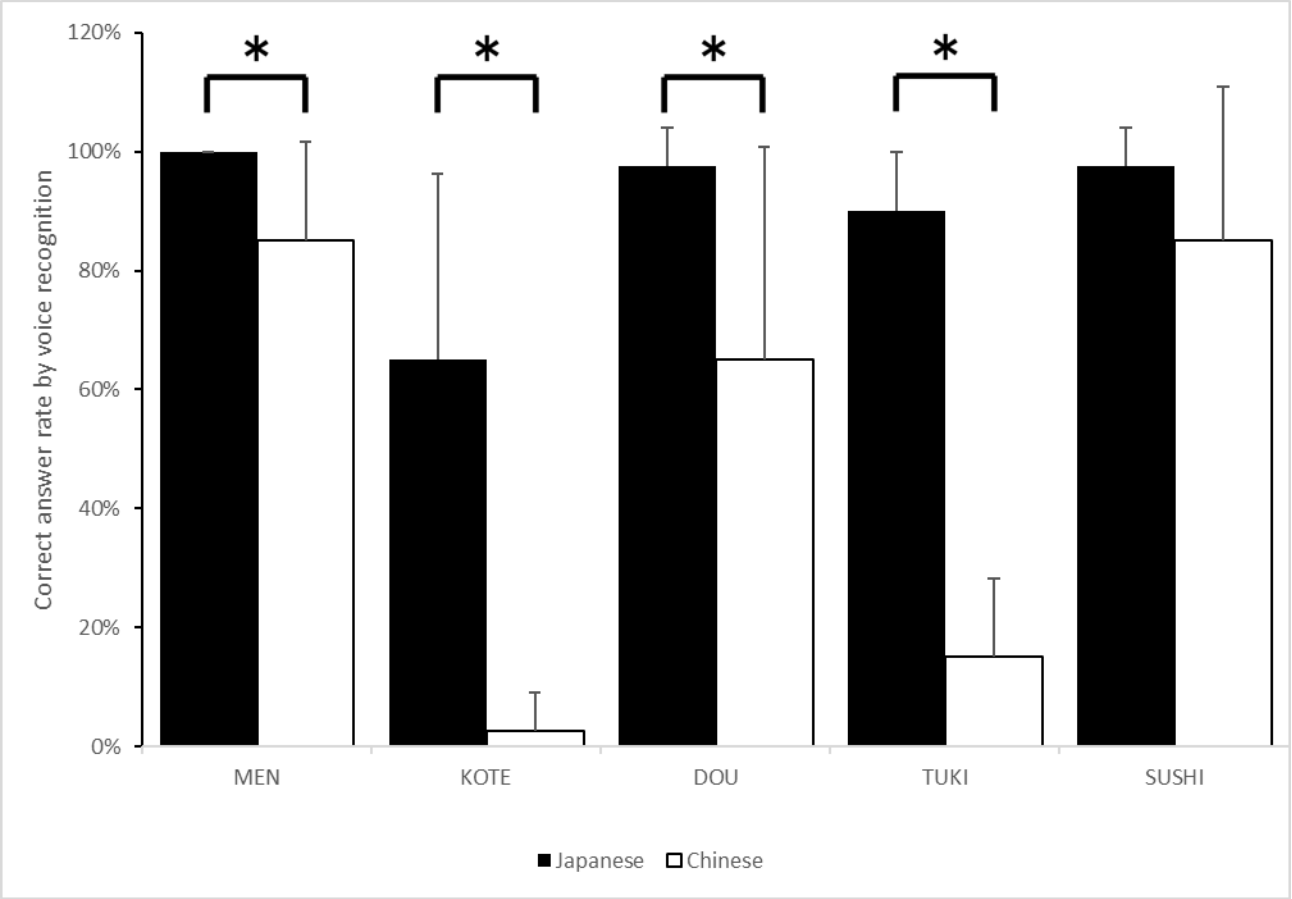

Fig. 3 Correct answer rate of vocalize of "MEN", "KOTE", "DOU", "TUKI" and "SUSHI" by Japanese and Chinese.
*$p < 0.05$ between Japanese and Chinese

($p < 0.05$), and a considerable difference in correct answer rate was observed between groups (Fig. 3).

There was no significant difference between Japanese (97.50%) and Chinese (85%) in the "SUSHI" vocalize ($p > 0.05$).

"MEN", "KOTE", "DOU", and "TUKI", which are the designation of a strike part of kendo, show significant differences between groupings ($p < 0.05$), and "SUSHI" shows no significant difference between groups. ($p > 0.05$).

A comparison of the five words in the Japanese people by the Friedman test and the five words in the Chinese people showed the following results.

In the case of Japanese, there was a significant difference between "MEN" and "KOTE" ($p < 0.05$). In the case of Chinese, there was a significant difference between the pair of "MEN" and "KOTE" and the pair of "MEN" and "TUKI" ($p < 0.05$).

Discussion

In this study, as a result of focusing on the vocalize of "TSUKI", the vocalize of "TUKI" was significantly different between groups ($p < 0.05$). In addition, the correct answer rate of "TUKI" was low overall for Chinese (Fig. 3). In Chinese, "TSUKI" is pronounced "cì", which is thought to have led to a low correct answer rate due to the dissimilarity of pronunciation. However, the word "SUSHI" based on the hypothesis was not significantly different between groups ($p > 0.05$) (Fig. 3). This indicates that the correct answer rate by voice recognition was not significantly different between the two groups. During the experiment, it was confirmed that the Japanese word

“sushi” was highly recognized by the Chinese. In Chinese, “SUSHI” is pronounced as “shoùsī”. Because the Japanese word “SUSHI” is recognized all over the world, there may be no difference. And it has been reported that the vowels devoicing of Japanese learners is affected by speech rate, accent type, and surrounding consonant environments (Yasuda, Hayashi, 2011). Since the occurrence rates of devoicing is higher at the sentence level than at the word level (Yasuda, Hayashi, 2011), it is possible that the devoicing could not be observed in this study. In order to conduct detailed experiments to confirm devoicing, it is necessary to incorporate acoustic analysis of speech and obtain the occurrence rates of devoicing. In this result, it is necessary to investigate the cause of whether the vowel devoicing did not affect the word. When conducting more detailed experiments, it is necessary to consider more various parts.

Regarding the vocalize of “MEN” and “DOU”, the same significant difference was observed between the groups ($p < 0.05$). The correct answer rate of Japanese “MEN” is 100%, and that of Chinese is 85%. It can be assumed that both groups are able to vocalize very accurately (Fig. 3). As for “DOU”, the correct answer rate for Japanese was 97.5% and that for Chinese was 65% (Fig. 3). In Chinese, “MEN” is pronounced “miàn”, and “DOU” is pronounced “dòng”. Similarities are seen, which may have led to a high correct answer rate. The correct answer rate of “MEN” and “DOU” have high results, but it can be seen that there is a difference between groups because a significant difference can be confirmed.

In the “KOTE” vocalize, a significant difference was observed between the groups ($p < 0.05$), and the correct answer rate was low in both groups (Fig. 3). In Chinese, “KOTE” is pronounced “Lóngshǒu”. There is a possibility that the pronunciation of “KOTE” also has non-similarity with Chinese. Regarding the low correct

answer rate of Japanese people, in experiments, the Japanese vocalize was often recognized as “kote i”. In the evaluation in this experiment, since the data was sorted depending on whether or not the vocalized word was correctly recognized, also small vocalize mistakes were recorded as inaccurate. It has been reported that the consonant part “t”, which is the “te” part of “kote”, has a short duration and is one tenth of the duration of the vowel part “e” (Nakao, Kishimoto, & Hamada, 2005). From this, it can be assumed that “KOTE” could not be clearly vocalize.

Significant differences between groups in the vocalize of “MEN”, “KOTE”, “DOU”, and “TUKI” ($p < 0.05$) revealed that Japanese people had a higher percentage of correct answers than Chinese people. And since there was no significant difference between the groups for the word “SUSHI” ($p > 0.05$), it can be assumed the level of recognition of the word “SUSHI” in Japanese significantly affects the correct answer rate.

Comparing five words among the Japanese, there was a significant difference between “MEN” and “KOTE” ($p < 0.05$), it can be assumed that the Japanese could not vocalize “KOTE” most naturally. In the case of Chinese, there was a significant difference between the pair of “MEN” and “KOTE” and the pair of “MEN” and “TUKI” ($p < 0.05$). It can be assumed that the word “KOTE” and “TUKI” could not be vocalize naturally compared to other words. Furthermore, there was no significant difference in “MEN” and “TUKI” among the Japanese, and there was a significant difference in the correct answer rate of “MEN” and “TUKI” between the groups. Based on these facts, it is considered that the Chinese could not vocalize the word “TSUKI” most naturally compared to the Japanese.

In conclusion, we compared the accuracy of Japanese and Chinese kendo vocalize using a speech recognition application. It was confirmed that the accuracy of Kendo vocalization was different between Japanese and Chinese in all words. Furthermore, the vocalize of “TSUKI” was the most different between Japanese and

Chinese. From these results, it was suggested that the Chinese could not vocalize the designation of a strike part of kendo naturally, and that there was a difference with the Japanese in the part of “KI” (mind) that is the condition of become Ippon.

Based on this research, the future task will be to calculate the ratio of Japanese and Chinese scores in actual games and to see the relationship with vocalization. I hope that the results of this study will be used to study in detail the differences in pronunciation between Japanese and people from other countries in Kendo vocalize. And, as Kendo is becoming more internationalized, I would like to share the greatness of Japanese Kendo further and return it to strengthen the world standard.

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