

# Research on the Performance of Three Tea Whisks of “The Way of Tea” with Different Experience

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**Abstract.** In this paper, three kinds of Japanese tea whisks' influence on bubble form in “the way of tea” process were investigated. The bubble form and distribution state by each whisk after 30 %, 50 %, 80 % and 100 % of tea making finishing time were recorded and analyzed through numerical processing. In order to verify the quality of tea whisk, two tea masters were employed as expert and non-expert, and three kinds of tea whisks' performance were evaluated and compared during the whole tea making process. The expert can controlled three tea whisks very well.

**Keywords:** The way of tea · Tea whisk · Bubble form · Japanese tea

## 1 Introduction

Japanese tea ceremony is developed based on “daily after-meal”. “The Way of Tea”, also called the “Japanese tea ceremony”, is a special ceremonial art preparation and presentation of “Matcha” (a kind of green tea powder) to entertain the guests, through the tea ceremony people will achieve temperament, improve the cultural quality and aesthetic view. The essence of “The Way of Tea” is meant to demonstrate reverence and respect between host and guest, both of them can truly experience the artistic conception and taste the most primitive taste of green tea during tea-tasting activity and service process with the tallest state of the etiquette.

“The Way of Tea” is consisted of many specific and strict procedures, whose basic skill just only handed over by oral instructions by expert. Furthermore, the spirit of modern Japanese tea ceremony extends to the exterior and interior decoration of the “Tea house”. Appreciating the painting and calligraphy decorated in the “Tea house”, enjoying the gardening design and tea pottery are also the important parts in the “The Way of Tea”. Among them, using Japanese Tea-whisks stir the tea powder to mixing uniformity and make sure the infusion of the tea leaves combined with the water is the

highest technique and important process, which directly affected was directly affected the taste of tea.

As an important tool for “The Way of Tea”, there appeared some genre of tea whisks with distinguishing shape features and many representative “The Way of Tea” arts masters during the long course of its development. Different genre of tea whisks exhibit has great influence on the development of Japanese tea ceremony. However, the different shapes of tea whisks have different mixing effects and impacts in the whole process of tea making. Basically, tea’s mixing uniformity is characteristic by bubble size and distribution attached on the tea surface.

Different tea whisks have different use skills caused by its special shape. Therefore, in order to obtain a delicious cup of tea mixed homogeneously between the green tea power and the hot water the tea masters have to study and practice for a long time to master and understand the performance of tea whisk very well. However, until now the scientific evaluation for the quality of tea whisk is limited. But above all, it’s very difficult for every master to inherit the essentials of tea whisks using method to the next generation without an effective way.

In previous research, an excellent tea master from Kyoto was selected as a unique participator called expert. 3 types tea whisks with different shape were investigated as the subject, they were called “Yabunouchi”, “Kankyuan”, “Ensyu”. According to the record of investigation during tea ceremony process, each process’s point of degree of mixing and bubble distribution were focused, relationship between timeliness and different tea whisks were extracted and analyzed according to each process, 30 %, 50 %, 80 % and 100 % of tea making finishing time.

In this research, expert and non-expert with different experience years were employed as the behavior subject. The three types of different tea whisks as the same with previous research, “Yabunouchi”, “Kankyuan”, “Ensyu” were paid attention. During test performance, the difference of formed bubbles distribution on the tea surface and temperature variation with different 3 types were inspected and recorded. The characteristic of bubble distribution and the performance of tea whisks were discussed. The bubble form and distribution state after 30 %, 50 %, 80 % and 100 % of tea making finishing time described by recording photos were transferred by numerical processing. Finally, understanding and knowledge of three types of tea whisks by expert and non-expert were observed and compared according to the bubble distribution situation.

As well known, no matter use what kind of tea whisks, the final bubble distribution was one of most important features for a tasty tea, which depend on the bubble size, distribution and so on. On the other hand, the bubble forming process was also reflected the characteristics of the tea whisks’ performance.

In a word, this study was focus on the bubble distribution situations of three types tea whisks between expert and non-expert. Through numerical processing and analyzing, the performance characteristics of three types tea whisks during the whole making process were summarized and compared. It is notify that expert can master the performance of three types of tea compared with non-expert, and made excellent cups of tea with small bubble. The expert’s differences and characteristic of bubble forming process on the way of tea were revealed and also delivered to non-experts and beginners consequently (Fig. 1).



**Fig. 1.** The way of tea

## 2 Experiment

### 2.1 Participants

Two Japanese tea masters from Kyoto were employed as the participants. One of the participants had more than 30 years experience in “the way of tea”, who can keep the motion of scooping water and ensure the added water weight in the bowl nearly the same for each tea making process, which was called as expert in this paper. Other participant had 20 years experience as called non-expert.

### 2.2 Subjects

Three types of Japanese tea whisks were selected for proceeding the experiment called as “Yabunochi”, “Kankyuan”, “Ensyu”, which were the three tea whisks in Japan as shown in Fig. 2.

### 2.3 Experimental Process

1.5 g of “Matcha” tea power and approximate 56 g of hot water were dumped into the bowl, and the moisture content of tea was controlled at approximately 97 % steadily.

Four time stages including 30 %, 50 %, 80 % and 100 % of tea making finishing time were focused and investigated for the tea made by three kinds of tea whisks. And bubble form and distribution state after 30 %, 50 %, 80 % and 100 % of tea making procedure were also recorded and illustrated by single-lens reflex camera (D40x Nikon CO. Ltd). Especially, in order to obtain high-quality photographs a camera device was employed to support and fix the camera as shown in Fig. 3.



Fig. 2. Three types of Japanese tea whisks

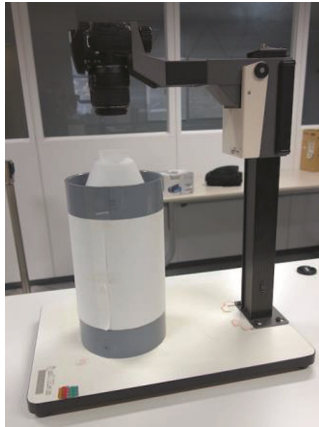


Fig. 3. Camera device

## 2.4 Image Processing

In this research, all the photos were transformed into the same size as the size of the bowl (Diameter: 12.6 cm) firstly. Afterwards, circle region of all bowl were analyzed and transferred by numerical processing from Fig. 4(a) to (b). It should be mentioned that only bubble forms larger than  $0.02 \text{ mm}^2$  area was marked. Furthermore, marked bubbles were transformed by the binarization processing method into a white and black two colors as shown in Fig. 4(c). The outlines of bubble form and bubbles' distribution state were also sketched on the processed image. Finally, the areas of the bubbles were calculated and converted to the area unit.

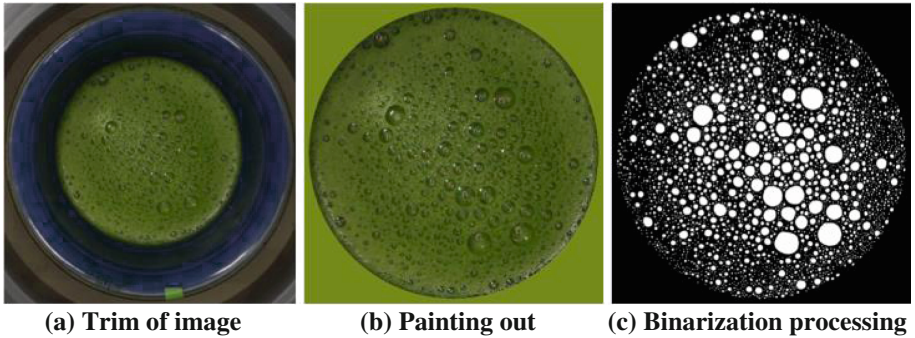


Fig. 4. Procedure of image processing

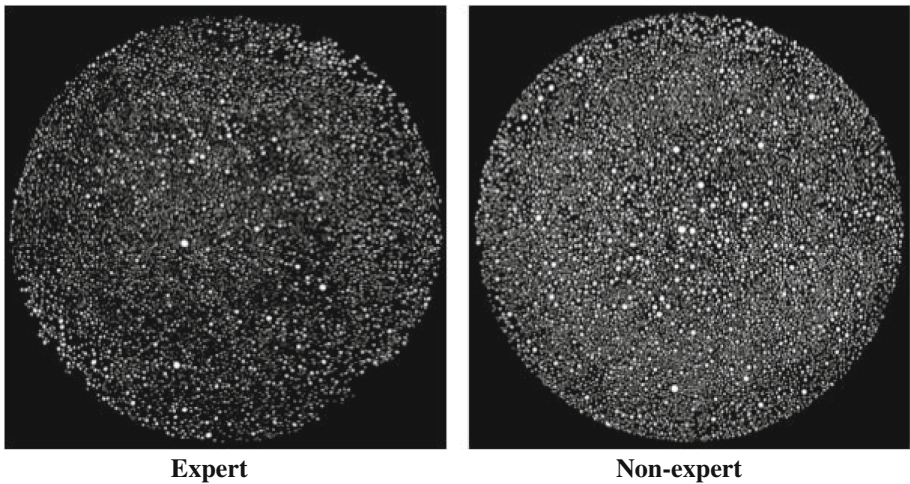
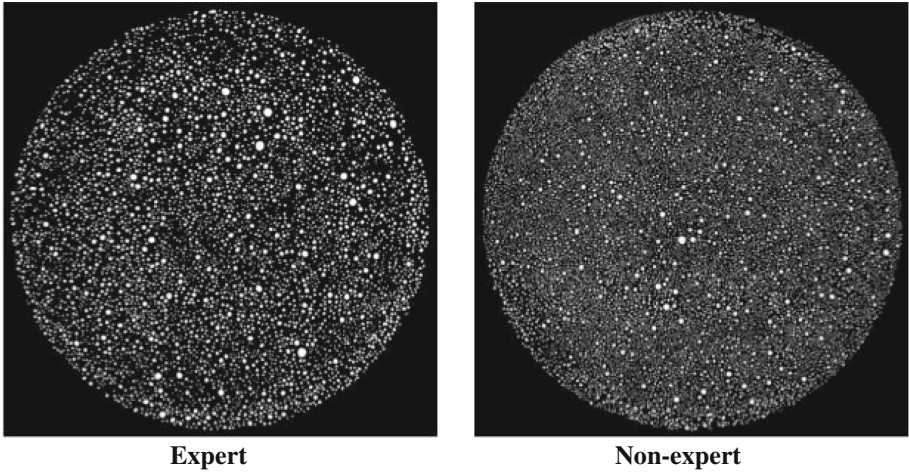


Fig. 5. The 100 % stage bubble distribution of expert and non-expert made by “Yabunouchi”

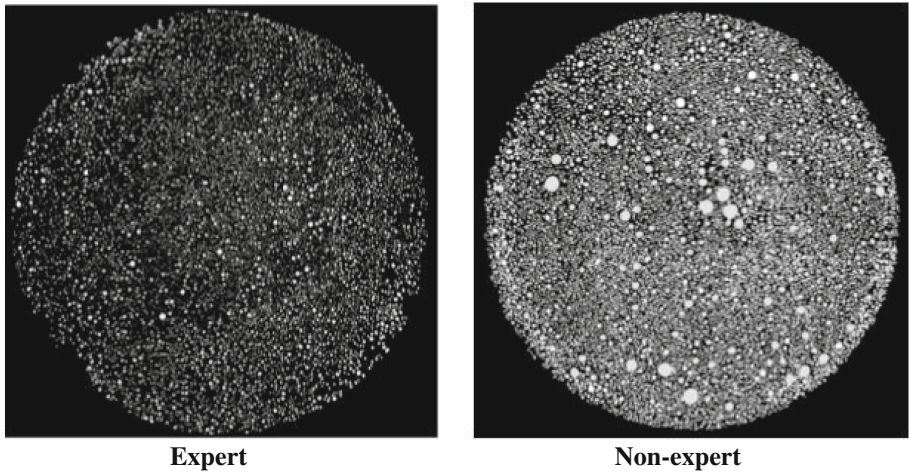
### 3 Results and Discussions

The final proceeded products of expert and non-expert at 100 % stage by expert and non-expert was illustrated on Figs. 5, 6 and 7. The bubbles sizes of expert and non-expert after mixing by three tea whisks were concentrated in the  $1 \text{ mm}^2$ . However, all the bubbles of expert made by three tea whisks were presented smaller sizes, which had more bubble's size closed to the range of  $0.02 \text{ mm}^2 - 0.1 \text{ mm}^2$ . On the contrast, the non-expert's bubbles showed few larger sizes after mixing by applying “Ensyu” tea whisk.

Because expert can controlled the three types tea whisks to obtain the excellent final tea products. Therefore, the Bubbles' size and the distribution made by expert for “Yabunouchi” tea whisks in four time stages including 30 %, 50 %, 80 % and 100 % of tea making process were presented as example in Fig. 8. The Bubbles' size and the distribution made by non-expert for three tea whisks, “Yabunouchi”, “Kankyuan”,



**Fig. 6.** The 100 % stage bubble distribution of expert and non-expert made by “Kankyuan”



**Fig. 7.** The 100 % stage bubble distribution of expert and non-expert made by “Ensyu”

“Ensyu”, in four time stages including 30 %, 50 %, 80 % and 100 % of tea making process were presented in Figs. 9, 10 and 11.

In following figure, the horizontal axis shows the area of the bubble by the logarithm scale and the vertical axis shows the bubble size frequency. According to Fig. 5, in case of expert, it can be found that expert was able to produce larger area of bubble at the beginning of tea making procedure as shown in the case of 30 % time. And areas of bubble produced by three kinds of tea whisks were showed similar distribution in the case of 50 %. And it is easy to find that the bubbles existed in the 50 % case was decreased significantly compared with 30 % case. All bubble size was concentrated in less than 1 mm<sup>2</sup>.

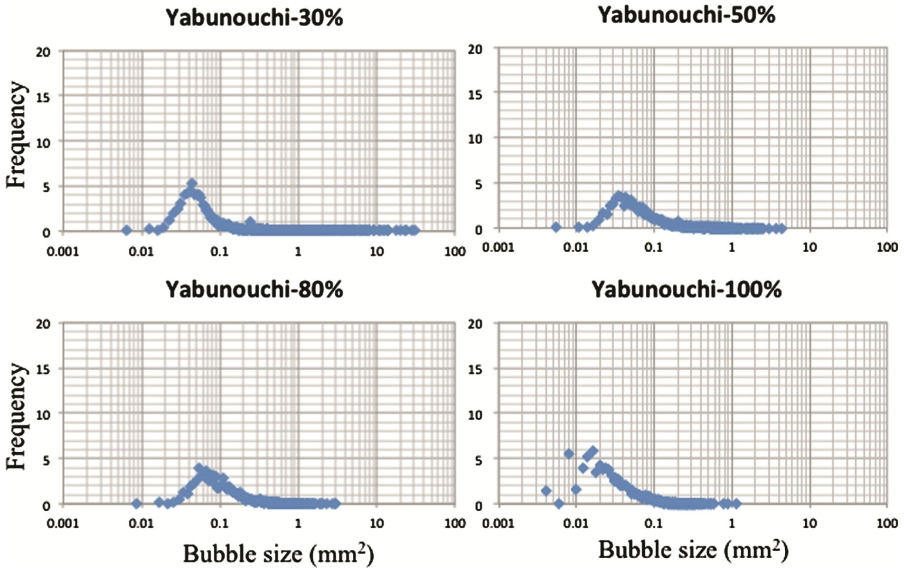


Fig. 8. The bubble distribution of “Yabunouchi” made by expert

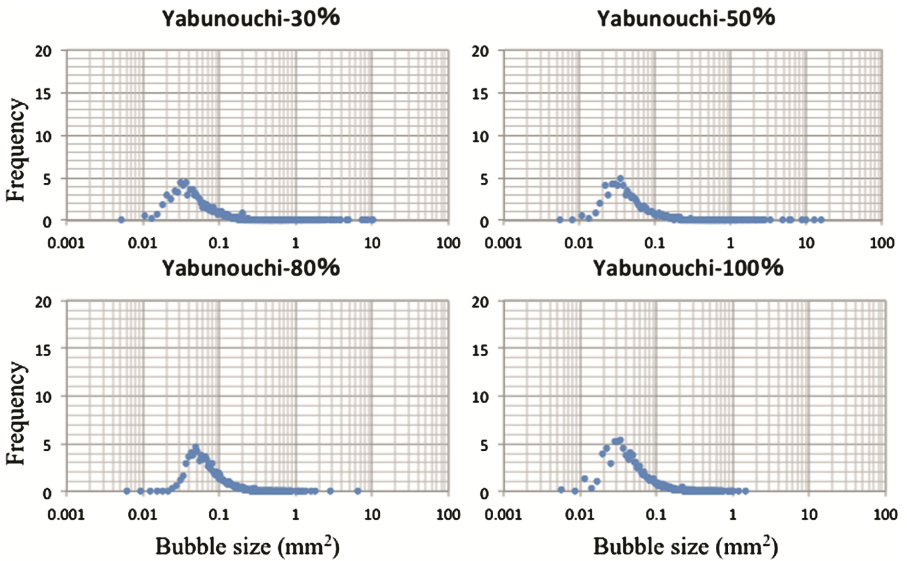


Fig. 9. The bubble distribution of “Yabunouchi” made by non-expert

However, in case of non-expert, the large bubble only can produce by tea whisk of “Ensyu”. And the medium sized bubbles were appeared intensively for the same 30 % time case for “Yabunouchi” and “Kankyuan” as shown in Figs. 6 and 7. In additionally, the areas of bubble by all tea whisks, “Yabunouchi”, “Kankyuan” and “Ensyu”, were

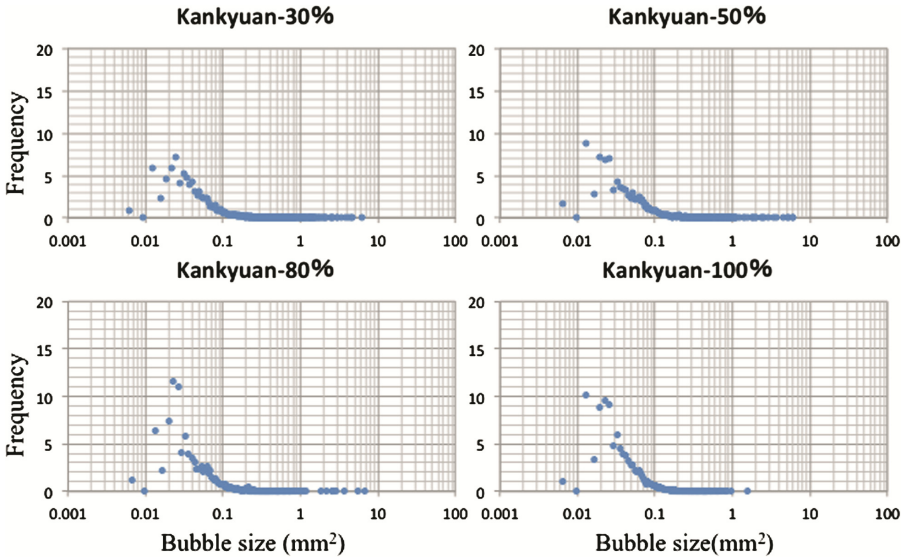


Fig. 10. The bubble distribution of “Kankyuan” made by non-expert

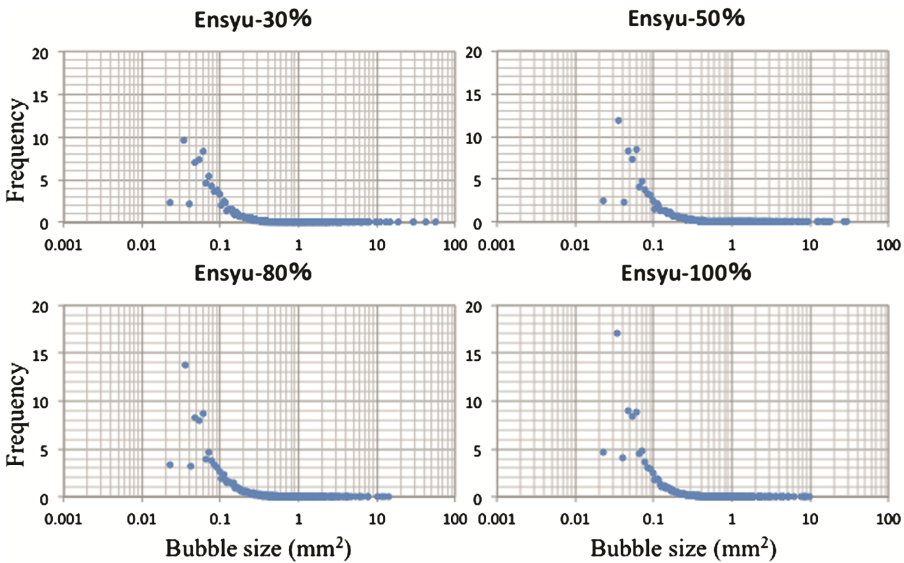


Fig. 11. The bubble distribution of “Ensyu” made by non-expert

just showed a slight decreasing trend in the case of 50 % and 80 %. It is deserved to find that the majority of bubbles existed in the non-expert’s tea whisk produced by all three kinds of tea whisks are almost below 1 mm<sup>2</sup> when time stage increased to 100 %. Comparing non-expert’s final product made by three tea whisks, the tea whisk of “Yabunochi” was presented the wider distribution of small bubbles even if can not reach



the level of expert. The performance of “Kankyuan” was close to “Yabunouchi”, which the tendency of 100 % stage was similar with “Yabunouchi”.

## 4 Conclusions

In a word, the expert can controlled the three tea whisks very well, which all the bubble distribution of final products was concentrated on the small size. All final tea products were better than non-expert. However, expert can obtain the ideal final tea products by tea whisks of “Yabunouchi” and “Kankyuan”. The final tea product of non-expert made by tea whisk of “Ensyu” was not shown a good surface in the end.

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