A Study of Eating Styles with Spoons, Forks, and Hashi by the Extended Function Diagram and the Extended Function Analysis

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Biography

Keiko Ishii is a merchandiser at a leading organic vegetable delivery company in Japan, where she has been working since graduating with a B.S. in biochemistry. Her work consists of developing food products through logistics planning and quality control of farms and food factories, as well as being in charge of multiple aspects of production, from planning and manufacturing, to sales. As a FA-Trainer at Functional Approach Institute Co., Ltd., Tokyo, she conducts VE studies on daily meals and their related things. Her VE articles include ‘Study by the VE Application to Quality Control in the Distribution of the Egg’ ‘A New Method to Apply VE for Use Function and Esteem Function in Yakiguri’.

Abstract

Every day, a variety of eating utensils are used over the world. Two typical examples of such utensils with which people carry food to the mouth include spoons and forks. What are their functions and achievements? In the author’s country of Japan, people use hashi, or chopsticks, another popular utensil for the same purpose. Starting from childhood, Japanese people go through rigorous practice, in order to be able to use these two mere sticks. To truly understand the function of hashi, a function analysis of hashi alone may not be enough. Employing a VE to analyze these three popular eating utensils – ‘spoons, forks, and hashi’, one can find each relation between the mono (or shape) function and the koto (or use) function. Furthermore, the author has developed a technique to clarify their effects on the entire functional theme. In this paper, the author would like to share their significant findings.

Keywords: spoons, forks, hashi/chopsticks, radar chart analysis, mono/shape function, koto/use function, Extended Function Diagram, Extended Function Analysis

Introduction

As a food-distribution merchandiser, I have an array of duties, ranging from product development to purchases and sales. Being a food expert, I am currently developing food products with a special focus on both what food customers would want, and how they would want to eat it. To this end, I frequently get to meet with many farmers and food factory workers throughout Japan. While I was performing these duties, a nagging question began to form in my mind: “Does the mother/father really think of what utensil she/he wants her/his family to eat with at each daily meal?” In other words, I pondered if people would imagine even ‘eating styles’ of the food they had prepared, let alone the food itself.

Statistics show that roughly 40% of the world population eat with hands, 30% of them eat with chopsticks, and another 30% of them eat with knives, forks, and spoons. In Japan, over 90% of people use hashi, or chopsticks, at even two or three meals a day. To give another example of the world’s famous French cuisine, it was not until the Italian Catherine de Médicis had married Henry II, King of France in 1533 that French cuisine made a great leap. After their marriage, not only chefs and recipes, but also various silverware and table manners were brought to France from Italy. Later, sophisticated French cuisine was developed. This causes the question to arise – “Did food develop utensils? Or did utensils develop food?” To blend ‘daily eating styles’ into food development, one must think of the functions of eating utensils. Therefore, I conducted a VE study to help in clarifying the functions and achievements of three popular utensils with which people carry food to the mouth – spoons, forks, and hashi.
2. VE analysis

2.1. Defining functions

I assumed that each function of ‘spoons’, ‘forks’, and ‘hashi’ would resemble one another. I then compared their functions by shape (mono). Judging from their shapes (mono), both spoons and forks can be divided into two parts: the ‘handle’ and the ‘tip’. Furthermore, the tips of spoons can be divided into the ‘thin-surface’ tips and the ‘oval’ tips, while the tips of forks can be divided into the ‘thin-surface’ tips and the ‘split-tip’ tips. Meanwhile, hashi possess three shapes (mono): ‘two-piece’, ‘thin’, and ‘long’. I defined each function of the three components of spoons, forks, and hashi (Figure 1), in the scenario that their users were the average household dwellers.

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<tr>
<th>Component</th>
<th>Function</th>
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<tbody>
<tr>
<td>Tip</td>
<td></td>
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<tr>
<td>A: Oval</td>
<td>Gain indent</td>
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<td></td>
<td>Extend contact length</td>
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<td></td>
<td>Taper tip</td>
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<td></td>
<td>Help move</td>
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<td>B: Thin-surface</td>
<td>Gain surface</td>
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<td>Increase handgrip area</td>
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<td>Enhance strength</td>
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<td>Handle</td>
<td>Gain distance</td>
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<td>Gain grip</td>
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<td></td>
<td>Receive force</td>
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<td>Gather force</td>
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<td>C: Long</td>
<td>Gain distance</td>
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<td></td>
<td>Gain grip</td>
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<td>Receive force</td>
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<td>Gather force</td>
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<td>Tip</td>
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<tr>
<td>A: Split-tip</td>
<td>Extend contact length</td>
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<td>Reduce resistance</td>
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<td>Increase resistance</td>
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<td>Help move</td>
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<td>B: Thin-surface</td>
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<td>Increase handgrip area</td>
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<td>Receive force</td>
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<td>Tip</td>
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<tr>
<td>A: Two-piece</td>
<td>Divide force</td>
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<td></td>
<td>Gain independent-motion range</td>
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<tr>
<td>B: Thin</td>
<td>Taper tip</td>
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<td>Reduce contact area</td>
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<td>Reduce resistance</td>
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<td>Gain grip</td>
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<td>Receive force</td>
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<td></td>
<td>Increase handgrip-area range</td>
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Figure 1: Definitions of shape (mono) function

2.2. Refining functions and evaluating FAST diagrams by the radar chart analysis

I refined the functions, previously defined from each of the three components. As a result, the higher order functions of spoons, forks, and hashi turned out the same, that being <<Hold things>>. The basic functions of the three utensils are five, which, except for the critical function logic path, are exactly the same among them. Each critical function logic path of spoons, forks, and hashi is <<Put things>>, <<Poke things>>, and <<Pinch things>>, respectively. Except for these differences, the three utensils have common functions: <<Reduce falls>>, <<Divide things>>, <<Reduce deformations>>, and <<Reduce stains>>. I created each FAST diagram with the five basic functions of spoons, forks, and hashi (Figure 2). Also, I visualized these three FAST diagrams in one radar chart via the radar chart analysis (Figure 3).

![Figure 2(a): FAST diagrams Spoon by shape (mono)](image)
From these results, spoons and forks have very similar functions and achievements. By comparison, hashi have lower functions in <<Reduce falls>> and <<Divide things>>, and have a slightly higher function in <<Reduce deformations>>. Without much thinking, people tend to use different utensils for different cuisines. Having said that, I had not imaged how different the functions and achievements of the three utensils were before I conducted this study. People may not feel such differences when eating them. I felt that with a ‘mono or shape’ function analysis alone, the true functions of the three utensils were not fully utilized in people’s daily life. Therefore, I tried to extend their ‘koto or use functions’.
3. New technique with mono/shape function and koto/use function

3.1. Extended Function Diagram with mono/shape function and koto/use function

While I was analyzing the ‘mono/shapes’ of the three utensils, I noticed that a mono/shape function analysis influenced the effect of functional themes differently. Therefore, I thought that it would be useful to extend the scope of functions to peoples’ movements by adding the koto/use functions of the utensils. I named this technique the Extended Function Diagram. I divided the koto/use definitions of the utensils into two components – the ‘hand’ and the ‘arm’. I then defined each koto/use function of the 3 utensils (Figure 4).

3.2. Refining extended functions of the ‘hand’ and conducting a radar chart analysis

From the functions defined in each component, I refined both mono/shape functions and koto/use functions, considering users’ ‘hands’ as well, and created FAST diagrams of spoons, forks, and hashi (Figure 5).

From these results, I found that the higher order function for each of the three utensils still remained as <<Hold things>>; and each basic function of them still remained as the five functions mentioned before. However, several new functions were added to the original FAST diagrams with shape (mono) only. I questioned whether these changes might trigger subsequent changes in the basic functions and achievements of the utensils.
Figure 5(a): FAST diagrams Spoon by mono/shape and koto/use of the hand

Put things
- Convey force
- Convey motion
- B: Gain surface
-B: Increase handgrip area
-B: Gain indent
-D: Fix handgrip position

Reduce falls
-A: Gain indent
-B: Enhance strength
-C: Gather force
-D: Increase force
-A: Help move
-A: Extend handgrip length
-A: Fix handgrip position

Hold things
-A: Taper tip
-B: Increase handgrip area
-C: Gain distance
-D: Gain grip

Divide things
-A: Gain indent
-B: Reduce handgrip width
-C: Gain grip
-C: Gather force
-B: Enhance strength
-D: Increase force
-D: Extend handgrip range

Reduce deformations
-A: Taper tip
-B: Increase handgrip area
-C: Gather force
-D: Increase force
-A: Help move
-A: Extend handgrip length
-A: Fix handgrip position

Reduce stains
-A: Escape force
-B: Reduce handgrip width
-C: Gain grip
-D: Increase conveyed force
-D: Extend conveyed-force range
-D: Reduce conveyed force
-D: Reduce force

Figure 5(b): FAST diagrams Fork by mono/shape and koto/use of the hand

Poke things
- Convey force
- Convey motion
- A: Help move
-A: Extend contact length
-A: Taper tip
-B: Increase handgrip area
-A: Escape force

Reduce falls
-A: Increase resistance
-B: Gain indent
-D: Fix handgrip position
-D: Extend handgrip range
-A: Extend handgrip length
-D: Increase handgrip range

Hold things
-A: Taper tip
-B: Increase handgrip area
-C: Gather force
-D: Gain hold
-D: Extend handgrip range

Divide things
-C: Gain distance
-B: Enhance strength
-C: Gather force
-D: Increase force
-A: Extend contact length
-D: Gain grip

Reduce deformations
-A: Taper tip
-B: Increase handgrip area
-C: Gather force
-D: Increase conveyed force
-D: Extend conveyed-force range
-D: Reduce conveyed force
-D: Reduce force
-D: Reduce force

Reduce stains
-C: Gain distance
To answer my suspicion, I visualized each new FAST diagram in radar charts through use of the radar chart analysis. I made a comparison of the three utensils with each 'mono/shape function' and each 'mono/shape function plus koto/use function' (Figure 6).

Through this new radar chart analysis, I discovered that for all the three utensils, their low functions, based on their mono/shape analysis, could be improved by adding their koto/use functions. Above all, I was able to improve hashi’s functions <<Reduce falls>> and <<Divide things>> significantly more than that of the other two.

With these analyses, I came to know that one could only learn a narrow range of a tool’s functions by its mono/shape function analysis alone; contrarily, one could learn a wider range of its functions by its mono/shape and koto/use function analysis combined.

**3.3. Refining functions through an analysis extended to the ‘arm’**

What if the scope of koto/use function analysis was extended further to the arm? To find out, I refined each function of spoons and hashi (Figure 7).

By extending the analysis scope to the arm, I was able to make <<Carry things>> the higher order function. This applies to forks as well. If we can achieve the functions of <<Hold things>> and <<Change position>> of spoons, forks, and hashi with which people carry food to the mouth, we do not have to cook within the limitations of their use.
4. Study results

In this paper, I revealed the true function "<Hold things>" of ‘spoons’, ‘forks’, and ‘hashi’ by their shapes. This is the common function among the three utensils. Then, I discovered five functions to achieve the above true function of each utensil. Furthermore, I found that except for the critical function logic path, the other four functions were the same among the three utensils, while the critical function logic path differed most prominently among the three. The basic functions of each were as follows: "<Put things>, <Poke things>, <Pinch things>, <Reduce falls>, <Divide things>, <Reduce deformations>, and <Reduce stains>.

After gathering this data, I evaluated each FAST diagram with the five basic functions in order to satisfy each of the three utensils' function "<Hold things>" and to see which functions were high or which functions were underachieved. The results showed clear differences in achievement among the three utensils. Therefore, I extended my analysis scope to ‘the hand’s movements’. ‘The hand’s movements’ mean the...
'koto/use functions' of the utensils. I developed a technique named the Extended Function Diagram with mono/shape and koto/use functions, and was able to achieve the basic functions of the utensils. I found out that an extended use of eating utensils could widen cuisine availability, while different cuisines require different eating utensils. For cuisines to achieve functions such as <<Divide things>> and <<Reduce deformations>>, one can exploit an extended use of eating utensils such as spoons, forks, and hashi. By adding 'koto/use functions' to them, one can achieve higher functions of these utensils. Among them, 'hashi' showed the higher potential in 'koto/use function'. Hashi is worth a try even if it may take time to master how to use them. To extend the analysis scope of these utensils further to the 'arm', I found that they possess the function <<Carry things>>, derived from their functions <<Hold things>> and <<Change position>>. The soup cup is a good example of a method in which one does not have to depend entirely on spoons to have soup. The Extended Function Diagram makes it possible to find a tool’s effectiveness by gradually extending its subject scope. I named this set of analysis the Extended Function Analysis.

5. Conclusion

In this study, I described the following:

- Success in making FAST diagrams of the functions of eating utensils and visualizing FAST diagram evaluations by the radar chart analysis
- Success in developing the Extended Function Diagram by adding eating utensils’ koto/use functions with the hand and arm to their mono/shape functions
- Success in developing the Extended Function Analysis to evaluate FAST diagrams by each subject scope by gradually extending the subject scope of the Extended Function Diagram

When we analyze a tool itself, we can only improve its mono/shape functions. By extending its analysis scope to the hand’s movements, we can improve the tool more. For example, it is difficult to cut food with the thin-surface of a fork’s tip by one hand’s movements alone; however, we can easily cut it with a knife, together with a fork, by both arms’ movements. In contrast, we can cut food, if it is not so hard, with hashi by one hand; we do not have to use arms to do so.

Unless we extend their analysis scope to the arm, we cannot generate an idea to compare forks and hashi. It is useful to consider an eating utensil’s functions with the addition of the arm’s functions. Note that I found it only by gradually extending the analysis scope from ‘a tool itself’ to ‘the hand’ and furthermore to ‘the arm’; in doing so, I clarified its hidden functions. With adding the hand’s movements, hashi, originally with very simple functions, were improved significantly for their function <<Reduce deformations>>. It goes without saying that hashi’s delicate movements developed and dispersed Japanese food. With hashi, Japanese people can pick up wasabi, put it on sashimi, dip sashimi into soy sauce, and eat it. Also, they can pinch long, thin ramen with the two sticks of hashi and eat it. These facts show that hashi have higher function in <<Reduce deformations>>. Through the functions <<Hold things>> and <<Change position>> only, this unique function could not be achieved. Food changes eating utensils and eating utensils change food.

Similarly, we can apply this combination of a tool’s and hand’s movements to any other tools. One example is a toothbrush, which uses a combination of its own movements and the hand’s movements. An electric toothbrush was developed by focusing only on the toothbrush’s mono/shape functions. Another example is pruning scissors, which enlarge their power by ‘leveraging’ human arms. I found that my VE techniques for improving eating utensils are applicable to other tools in other fields. I will continue my VE studies on functions behind food and its history and culture.

References

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