In this paper, we propose Taste Language. In the first place, the reason why Taste Language is necessary is that it is very difficult to make taste. This is because of the fact that dishes can not be disassembled and can be accidentally completed. Anyone can make a dish by looking at the recipe, but in order to make a good and delicious dish, it is necessary to meet the rules of making good taste. If you just follow the recipe, this rule cannot be satisfied. Conversely, a dish that fulfills the rules of delicious tastes can be cooked with or without a recipe. Experts learn the rules empirically and practice them. However, many people are trapped in recipes, and the rules of good taste are invisible. Therefore, the Taste Language supports delicious flavoring rules by describing them in pattern format. Japanese Soup Stock Patterns is introduced as an example of Taste Language. And some examples of dishes that use these patterns to think in terms of seasoning are introduced. As a result, creative cooking can be done with or without recipes, by treating it as exploring the taste of daily cooking.

ACM Reference Format:

1. INTRODUCTION

Have you ever thought about taste when cooking? For instance, do you imagine what kind of soup will be made when you cook tomato soup? Have you ever cooked while think about how to finish it? Many people might have never been conscious. In many cases, we look at the recipe, prepare the ingredients, and cook them either according to the process written in the recipe or according to previous experience. The recipe does not say much about the taste. However, behind the good taste there are some rules lurking and filling them will result in a delicious dish. That is the same thing as Christopher Alexander said there are rules and patterns in spaces and buildings that have certain quality. By describing clearly those rules as pattern language, you can use them to make your taste and analyze the reason why these are delicious when you find a delicious dish.

In this paper, we first explain about taste centered cooking and propose "Taste Language" to support it. After that, we will introduce "Japanese Soup Stock Patterns" which is a specific example of "Taste Language" with its usage examples.

2. TASTE CENTERED COOKING

In taste centered cooking, you don't just go along the recipe, but also create taste. Cooking isn't just for taking nutrients from food, but for feeling good flavours and making your life rich. The most important element in the dish is the taste. Therefore, we positioned the essence of cooking as an act of enriching taste. The recipe describes the procedures of cooking and we will do it. However, recipes have various limitations and are discussed in a 2015 study (Isaku, 2015). The study finds the following commonalities in the limits of cooking recipes and master plans criticized by C Alexander who proposed pattern language.

In efforts to optimize production with low costs and less labor, they have lost somewhat an important idea behind houses and food. If people were just taught to read and follow directions on how to cook, the essential principles behind the design process will become lost.

Simply following the recipe may not be able to produce a delicious dish because the essential principles of good taste behind the cooking process are lost. Conversely, if you understand the principle of creating a good taste
behind the process, you can make a delicious dish with or without a recipe as shown on following a figure(fig. 1).

![Diagram of Recipes vs. Without Recipes]

fig.1. Relationship between recipes and essential principles in cooking

The principle of creating a good taste is the cornerstone of delicious dish, but cooking while maintaining the principle is not easy. This is because cooking is not a stack of parts, but a complex one that exists as a whole. A dish is not a collection of ingredients but it exists as a whole. For example, no one sees a hamburger as lettuce, tomatoes, meat with ketchup, and pickles sandwiched between buns with sesame on top. Everyone recognizes it, as "a hamburger". Only when all ingredients are mixed and influential on each other, can they exist as a dish. This is in common in definition of architecture with a wholeness. According to Alexander, a view of the building as a whole means that we see it as part of an extender and undivided continuum. (Alexander, 2002). When a dish is perceived as a whole, it should be designed while maintaining the wholeness. However, many of the existing recipes suggest making a dish by piling up the parts (adding the ingredients). The same goes with taste. Feeling the deliciousness does not mean decomposing every taste like sweetness and saltiness, but it means feeling the overall taste. The richness expressed by the taste of dish is one example. Richness do not have a definitive definition, but it is a harmonious and complex taste. In order to realize this richness, the amount of experience is essential.

Delicious dishes can also be made unexpectedly. The dish that are cooked in everyday life is made in a short time of 10-30 minutes and changes depend on various situations such as time, environment. Even if you don't use recipes, you can cook something with any food in the refrigerator. It rarely finishes deliciously. However, I do not know the original one is delicious until you have done.

For these reasons, it is very difficult to make a good taste. Cooks have overcome this through experience. Therefore, we propose a Taste Language that supports daily taste centered cooking.

3. TASTE LANGUAGE

Taste language is a term for expressing the taste and the way to achieve it. Focusing on tastes that have not been consciously focused on during cooking, will make cooking more creative.

Taste language is written in pattern format. By describing with context, problem and solution, and give names it could be a practical support tool for creating the taste. This allows you to connect the taste you want to achieve with the actual cooking way.

Taste Language is expected to have three effects. Firstable, by designing taste with patterns, you could have clear image about the taste of the cooked food even before cooking, as well as could think about things which enhance the quality of dishes that you have never challenged before. Second, for each dish, a variation of taste could be created while keeping the basics. You can create a variety of flavors without having to worry about recipes. Third, you can create a comfort taste even if the menu is different. Grasping characteristic of dish through patterns, you could recreate it with using them.

In the taste centered cooking, combining patterns could enhance the main character of each dish. Before introducing Japanese Soup Stock Patterns, we make the position of our research clearly by comparing previous researches.

For example, if you want to make thick and punching affect taste you could use some patterns which make strong and stimulating taste. Not only straightforward taste, you could make taste that have ambiguity like thickness and gentleness are coexisting with patterns. In this paper, we will propose "Japanese Soup Stock Patterns" as an example of Taste Language.

The patterns are practical even in short-term cooking because the principles of taste are clearly explained and named. If you use them as a component of thought (Iba. 2016), you can have a concrete image of taste before or during cooking, and when you use them as a glasses of recognition (Iba. 2016), you can analyze delicious dishes and take their delicious rules in your own cooking.

3.1 PRIVIOUS RESEARCHES ABOUT COOKING IN THE PATTERN LANGUAGE CONTEXT

So far, Previous researches on pattern language related to cooking have been carried out from various viewpoints as shown on the following table (table 1). One is to improve the quality of human behavior through cooking. For example, Creative CoCooking patterns, Patterns describing collaboration through cooking (Isaku & Iba, 2015), Cooking Patterns to improve individual cooking skills (Akado, et al, 2016), and Cook-That-Dish Patterns for Tacos (Yoshikawa, et al, 2017), a recipe-like collection of patterns that function as a participation-inducing tool in collaborative cooking sessions. These patterns assist designing human behavior on cooking. In parallel, research is being conducted to explain the function of food ingredients using the pattern format. By describing the functions of ingredients, Cooking Language (Isaku, 2015) deepens understanding of recipes and cooking, as well as guidelines of decision making during cooking.

However, there has been no discussion about the design on the “taste of dish”, which is a product of cooking. Therefore, we support to create the taste that each individuals want to practice by creating patterns using pattern language method. Unlike recipes, pattern language that can describe the effect each action has, is used as a building block of thought to facilitate the customization of taste.

<table>
<thead>
<tr>
<th>Title of Pattern Language</th>
<th>Theme of Pattern Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creative CoCooking patterns (Isaku &amp; Iba, 2015)</td>
<td>supporting collaboration through cooking</td>
</tr>
<tr>
<td>Cooking Patterns (Akado, et al, 2016)</td>
<td>improving cooking skill</td>
</tr>
<tr>
<td>Cook-That-Dish Patterns for Tacos (Yoshikawa, et al, 2017)</td>
<td>inducing collaborative cooking</td>
</tr>
<tr>
<td>Cooking Language (Isaku, 2015)</td>
<td>function of ingredients</td>
</tr>
</tbody>
</table>

3.2 PRIVIOUS RESEARCHES ABOUT COOKING IN THE PATTERN LANGUAGE CONTEXT

In cooking, making a firm base of taste is a fine way to practice a delicious taste. In Japanese cuisine, dashi is the basis of cooking, therefore refining it is very important. Dashi is a Japanese soup stock, a liquid that extracts umami from hot water and water from ingredients. Soup stock exist in all kinds of cuisines. The typical Japanese dashi ingredients used are kombu and bonito. Kombu is a large Japanese seaweed. Making dashi varies depending on the material and how it is extracted. In dashi material, both umami and miscellaneous taste exist together. It takes a chef’s skill to extract just umami. Toru Fushiki, who studies the taste of dashi, explains how to make dashi as following.

“If you boil dashi ingredients for a long time, many taste components will come out, but unfortunately, so do unpleasant tastes and flavors too” (Fushiki, 2006, p32, translated by authors in this paper)

“Unnecessary things become impurities in laboratories, and miscellaneous taste in kitchens. If the temperature is low, there will be no extra components coming out, but it will also be difficult to produce important substances, and it will take too much time. The adjustment of temperature and time relies on years of experience. (Fushiki, 2006, p34, translated by authors in this paper)
There is a part that heavily relies on years of experience, in order to eliminate the miscellaneous taste as much as possible and make a sophisticated dashi. Also, how it is used in cooking changes depending on the way of making dashi. Dashi which has emphasis on aroma with little miscellaneous taste is used for delicate dishes such as soup, and dashi that includes miscellaneous taste but with strong umami is used for dishes with rich and heavy taste such as deep boiled food (also called as “nimono”). Merely adding dashi to the dish is not enough, it is necessary to change how it is made and used according to the taste. Taking dashi as an example, using these characteristics of dashi, we created a pattern that enables people to design taste.

3.3 PRIVIOUS RESEARCHES ABOUT COOKING IN THE PATTERN LANGUAGE CONTEXT

Japanese Soup Stock pattern is a collection of fourteen patterns that describes how to design the taste of cooking using dashi. It is classified into 3 categories, “choose the dashi material”, “make the dashi” and “use the dashi”, configured to support the design of taste comprehensively, from selecting materials to actual use(fig.2).

The implementation of the patterns creates a clearer understanding on how to use the dashi. You can realize the taste changes by the choice of dashi and ways of making dashi. Therefore, when an individual cook, dishes that feel satisfaction and happiness can be made by not changing the menu but changing the taste itself. It can also widen the range of daily cooking, by knowing ways to practice the taste suitable for the individual. These patterns are listed on appendix.

4. EXAMPLE OF TASTE CENTERED COOKING WITH JAPANESE SOUP STOCK PATTERNS

In this section, for showing how these patterns could be used we present three practice examples, cold Japanese risotto (called “hiya-jiru”) and simmered eggplant and pork with dashi, which are cooked using Japanese Soup Stock Patterns.

First, this is an example of making comfort taste. Cold soup risotto is the dish shown in figure.3. It is a dish with cold dashi on top of ingredients such as leek, cucumber, and steamed chicken. It is easy to eat even when there is no appetite in hot summer season. When making this, it was hot but had the appetite to eat something heavy and filling, so by using 【Boil out the Umami】 and 【Squeeze out Umami】it enhanced the taste of the dashi itself. In order to suppress the odor and miscellaneous taste, it was seasoned with 【Cover with Miso】.

Secondly, simmered eggplant and pork with dashi is the dish shown in figure.4. This is made without the recipe. Eggplant is fried with pork and then boiled in dashi. Eggplants are easy to absorb fluids, so by not only just frying, but they become more delicious when boiled in dashi. In addition, it can be enjoyed as soup with melted flavor of ingredients into dashi. Using 【The Basic Combination】,【Combination of Richness】and 【Extra Bonito for Re-Scent】it made the dish with strong umami and aroma. In order to take advantage of the animal flavor from pork, vegetable dashi was taken with kombu which goes well with animal dashi. The umami and dashi flavor from the ingredients are intricately intertwined, creating a rich and tasty dish.
5. CONCLUSION

In this paper, we introduced Japanese Soup Stock Patterns as an example of Taste Language, a tool that not only completes the process according to the recipe but also refines the taste. Thinking of everyday cooking as exploring taste is a creative cooking process that is different from following familiar procedures. By using the patterns introduced in this paper, you can capture the principles behind delicious dishes and create dishes of attractive quality. In addition, you can analyze the tastes provided by a nice restaurant, and then you can reproduce them at home.

In this study, only Japanese Soup Stock patterns are created, but Taste Language may be made with other seasoning ingredients. We hope that many people will use this language to enrich their daily dishes.

ACKNOWLEDGEMENT

We would like to thank Norihiko Kimura who gave many valuable comments on this paper during shepherdig process.

APPENDIX

1. Roasted for Umami, Fermented for Richness

Dashi made by dried bonito plays a role adding strong umami and aroma.

▼ In this context

If the dashi do not match with other ingredients, the good quality of the dashi will not appear in the dish, or the dashi will erase the good quality of the other ingredients. There are two types of bonito dashi, roasted dried bonito (called as “arabushi”) and fermented dried bonito (called as “karebushi”)

▼ Therefore

If other ingredients have enough umami, use roasted dried bonito, and if you want to add umami or aroma to dashi, use fermented dried bonito. The roasted dried bonito is finished with roasting, and the fermented dried bonito is further molded and fermented after roasting is done. There is spiciness and richness in roasted dried bonito, and fermented dried bonito has a rich aroma and mellow depth.

▼ Consequently
By using different dried bonito, you can clarify the characteristics you want to add to the dish. In addition, the richness and aroma added by dashi supports the taste of other ingredients and gives the dish a sense of unity.

〈Example of use〉

Roasted dried bonito goes well with miso soup and fermented dried bonito goes well with Japanese clear soup (called as ‘osumashi’). Using fermented dried bonito in miso soup which enjoys the aroma of miso itself, will offset the aroma.

2. **Kombu as a Foil**

Dashi has a role of enhancing the taste of ingredients and putting together the whole dish.

▼In this context

If the aroma and umami of dashi are too strong, it drowns out flavor and aroma of the ingredients which you want to make use of. If the main flavor is weak, only the flavor of seasoning will be felt and it will not taste delicious.

▼Therefore

Use kombu dashi with umami that do not stand out. Kombu dashi adds umami without erasing the taste and aroma of ingredients, allowing you to have a cohesiveness in your dishes.

▼Consequently

The ingredients you want to enhance stands out and, at the same time, the synergistic effect with the kombu dashi and the ingredients enhance the umami and makes a delicious dish.

〈Example of use〉

Kombu dashi is particularly suitable for dishes with delicate-taste ingredients like, boiled tofu (yudofu), unthickened stew of chicken (mizutaki) and fish with sweet and startchy sauce (shiromizakna-no-ankake).

3. **Combination of Richness**

Dashi has a role of adding richness to dashi.

▼In this context

Richness is not born by only extracting umami. Richness is made by various umami intertwined.

▼Therefore

Mix dashi made from multiple ingredients to make a rich dashi. Components included in each material are different. In addition to combining materials with same components, try combining various types of materials such as vegetable dashi and animal dashi to add special characteristics to the dishes.

▼Consequently

The rich dashi with a variety of flavors is the basis for a delicious meal.
Chicken stew with taro (chikuzen-ni) is finished in a mellow and moist taste by melting the umami of various vegetables and meats in addition to the base dashi of dried bonito and kombu. Potov is a soup with a delicious flavor of a mix of dashi from various vegetables and meats.

4. The Basic Combination

Dashi with various umami ingredients has complexity.

▼In this context

Complexity will not be created unless the dashi material creates a synergistic combination with each other. Even if the materials are combined with similar ingredients, umami will not appear strong.

▼Therefore

Make dashi based on the combination of vegetable dashi and animal protein dashi. Kombu and dried bonito or kombu and chicken are examples of ingredients that are compatible with each other.

▼Consequently

You can make good dashi with compatibility of glutamic acid and inosinic acid, which are umami ingredients. Vegetable materials contain glutamic acid, and animal protein contains inosinic acid. The taste is the strongest when the ratio is 1:1.

〈Example of use〉

For the sobas and udon noodles, use a dashi that has a strong umami made by the synergistic effect of kombu and dried bonito. For Japanese mixed rice (takikomi gohan), when chicken is added to the kombu dashi, the umami increases due to a synergistic effect with the dashi from the chicken.

5. Taking Time for Umami

Dashi supports the taste of the ingredients and gives the dish a unity.

▼In this context

When umami is extracted, odor and miscellaneous tastes that comes out with umami can greatly impair the quality of the dish. In particular, when boiled at high temperature, many kombu slime components, miscellaneous tastes, and astringency (called egumi) appear from dried bonito. Kombu's slime component also contains umami, but it causes miscellaneous taste.

▼Therefore

Kombu is boiled for 30 to 60 minutes, and dried bonito is boiled for 10 to 15 minutes at 60 to 70 degrees Celsius where small bubbles come out. By slowly raising the temperature, moisture penetrates into the tissue of ingredients and a lot of umami is extracted.

▼Consequently
Dashi with less odor and miscellaneous taste while firmly holding umami, serves as a base for dishes that enhance other ingredients. Dashi with less miscellaneous taste and odor can be used in a wide range of dishes from simple dishes to dishes that use many ingredients.

〈Example of use〉

Use dashi with less miscellaneous taste for dishes that are mild, such as Japanese omelette (dashi-maki) and Japanese steamed egg custard (tyawan-mushi) and dishes like boiled seasoned vegetables (ohitashi) that use dashi as a base for taste without adding other seasonings.

6. Cold Brew Clear Dashi

Kombu dashi that has no miscellaneous taste and odor is suitable for delicate ingredients.

▼ In this context

When heat is applied, extra ingredients like odor and slime components come out with umami and aroma. The optimum temperature to be extracted depends on the component making it difficult to control and extract the taste.

▼ Therefore

Apply to room temperature water for about 90 min to make dashi. The umami component of kombu is crystallized during the process and because it is attached near the epidermis of kombu, the umami ingredients themselves can be removed by extracting the crystallized umami component.

▼ Consequently

It is time consuming to extract umami with room temperature water than applying heat, but with room temperature water, it is easily made with little miscellaneous taste and odor. Although it does not produce unpleasant odor found in seaweed, it becomes a convenient dashi, but it does not give a good aroma.

〈Example of use〉

It has almost no odor and slimy components, so it can be used for any dish. If you put kombu in room temperature water the day before, you can save the trouble of taking dashi on the next day.

7. Boil out the Umami

Dashi with a strong umami can be made by extracting umami components from the surface to the core of dashi material.

▼ In this context

By extracting umami using [Taking Time for Umami], many other components are left in the material. The amount of extractable components is related to the boiling temperature.

▼ Therefore

Simmer the dashi material in boiling water. The taste of dashi increases by extracting minerals and polysaccharide with boiling water. The aroma and odor that come out at the same time evaporates when boiled.
Consequently

Dashi that match with dishes like deep boiled food (nimono) and hot pot (nabe) that soak the taste of the ingredients can be made. However, the miscellaneous taste unique to the dashi material comes out.

〈Example of use〉

Beef and potato stew (niku-jyaga) and hot pot (motsu-nabe) are seasoned, so it is easy to ease the miscellaneous taste found in dashi and make dishes with strong taste of dashi.

8. **Squeeze out Umami**

Umami is contained from the surface to the core of dashi material.

▼In this context

After transferring to a strainer, merely waiting for the dashi to filter leaves many other components in the material.

▼Therefore

Wrap the dashi material with a paper towel and press it against a strainer and squeeze out the components.

▼Consequently

Components that were not extracted by boiling can be extracted, and creates a thick dashi. Components with umami are extracted and other components like miscellaneous taste, uncomfortable sourness and bitterness can also be extracted.

〈Example of use〉

The use of dashi with a strong umami is recommended for dishes that have a strong taste like braised pork belly (kakuni) or curry udon noodle. Deep seasonings, condiments and spices alleviate miscellaneous taste. This method is also used when using all the flavors of ingredients.

9. **Filter Swiftly for Aroma**

Clear aroma is an important element of fine dashi.

▼In this context

Boiling dashi material for a long time evaporates the aroma, and creates miscellaneous taste.

▼Therefore

Boil with water of 60℃ to 70℃ which starts to create small bubbles and without squeezing, filter the dashi quickly. By swiftly filtering the dashi, you can leave the aroma without evaporating.

▼Consequently

The good scent of dashi creates an impression and an aftertaste, making a memorable cuisine.
〈Example of use〉

The aroma is the decisive factor of dashi for soup-type appetizer (wan-mono) and noodles.

10. **Extra bonito for Re-Scent**

   The rich aroma of dried bonito dashi promotes appetite.

   ▼ In this context

   Dashi with rich aroma is boiled with a short time which makes it hard to extract umami completely. On the other hand, to extract enough amount of umami it needs time to boil, which means the evaporation of aroma.

   ▼ Therefore

   Start by taking time extracting umami and to the finished dashi, add pieces of dried bonito to re-scent. You can also add aroma to dashi that were made a few days ago.

   ▼ Consequently

   It becomes a dashi that has both strong umami and strong aroma. Also, a rich aroma can be added by adding pieces of dried bonito right before the dish is completed.

〈Example of use〉

We use dashi with both flavor and aroma for dishes that use starchy sauce. Sprinkle dried bonito flakes to simmered vegetables (nibitashi) in order to add flavor and aroma of dashi.

11. **Easy Adjusting Seasoning**

   Adding Japanese seasoning to dashi can make an all-purpose seasoning.

   ▼ In this context

   Adding saltiness and sweetness will merely make the taste strong. A flavourful taste requires a balance of not only saltiness and sweetness but also umami.

   ▼ Therefore

   Adjust the seasoning by the amount of umami in the dashi. Dashi with strong umami requires salt and sugar that contains weaker umami and dashi with weaker umami requires soy sauce and sweet sake that contains stronger umami.

   ▼ Consequently

   With sweetness, saltiness and umami combined in dashi and seasoning, it becomes an all-purpose seasoning. You can adjust the taste by changing the sweetness, saltiness and umami.

〈Examples of use〉

This pattern can be used for pickled fish and as a seasoning for deep boiled food (nimono). You can adjust the taste according to your likings and dish by using dashi seasonings which is easy to adjust the flavor.
12. Cover with Miso

Dashi with strong umami can be made by heating with high temperature or boiling for a long time.

▼ In this context

A miscellaneous taste and a strong odor come out when extracting umami. The odor evaporates after boiling but the miscellaneous taste remains in dashi. Even though a firm tasted dashi is necessary for a filling dish, the miscellaneous taste and the odor makes it difficult to use.

▼ Therefore

Ingredients with strong flavor like miso can cover miscellaneous tastes and odor. Miso, which contains ample saltiness, sweetness, umami and aroma, is used when cooking ingredients with strong taste.

▼ Consequently

Miscellaneous taste and odor alleviate, and a complex taste is made by umami and seasoning combined. Because all kind of smell weakens, adjust the type of seasoning to use and the amount of usage.

〈Example of use〉

For the cold soup (hiya-jiru), add a small miso after the umami of the dashi is fully applied. By adding miso as a secret ingredient, miscellaneous taste and odor alleviate.

13. Balancing Umami

Dashi play a role as a seasoning to add umami

▼ In this context

The taste of dish becomes blur or heavy when there is a gap in the heaviness of taste between ingredients and dashi. When you match a heavy tasted ingredient and a bland tasted dashi, the taste of dashi hide behind the ingredients and make the dish blur and bland. Also, when you match a delicate tasted dashi with a heavy tasted ingredient, the taste of dashi becomes heavier than the ingredients, making the dish taste heavy.

▼ Therefore

Use dashi and ingredients with similar strength of taste. For a delicate dish use a clear dashi and for a rich taste dish use a heavy flavored dashi.

▼ Consequently

Umami from ingredients and the umami of dashi harmonize and creates a mild and gentle dish.

〈Example of use〉

For delicate tastes such as soup-type appetizer and seasoned vegetables (ohitashi), use a clear dashii. For strong tasted dishes such as curry udon noodle and chicken stew with taro(chikuzenni), use dashi with a strong umami.
14. Gradual Boiling

The flavor of ingredients melted into dashi has a satisfactory feeling to drink.

▼ In this context

When protein foods are boiled in hot dashi, flavor in ingredients do not transfer to dashi. By boiling protein foods with high temperature it cooks from the outside, locking the umami inside.

▼ Therefore

Heat the ingredients in dashi at 20°C to 35°C. By slowly increasing the heat, dashi will soak through ingredients extracting more umami.

▼ Consequently

The taste will become rich with the flavor from ingredients. Dashi melted from ingredients mixed with the original dashi creates a 【Combination of Richness】. However, the flavor in ingredients will be lost.

〈Example of use〉

Ingredients for Arajiru and Takikomi-gohan are boiled from cold dashi. With rich taste from ingredients melted, it becomes a filling cuisine.

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