The Cooking Language: Applying the Theory of Patterns into Cooking

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This paper will introduce a new concept that we call the Cooking Language. This is a new method to understand cooking, derived from the idea of patterns, which provides its users with a new approach to cooking. The Cooking Language is a collection of sublanguages that each focuses on a certain food item, which contains cooking words that describes the food item's functions in a pattern-like manner. Users can use the cooking words as sources for ideas, guidelines for making decisions while cooking, and as a tool to understand recipes and dishes made by other people. As our first set of a Cooking Language we will present the Egg Language with 19 egg words. In the course of creating the language, we have made further discoveries which include the possibility for Cooking Properties and using the cooking words as a tool for scribing out and understanding culture.

Pattern language, cooking, creativity, recipe, culture

1. Introduction

TIn this paper we will introduce a new concept that we call the *Cooking Language*. This is a new method to understand cooking derived from the idea of pattern languages. Cooking, though a widespread conception as a profession exists, is the simplest form of creation that we can experience in our daily lives. If more people become able to cook, it should raise the creative level of the whole society.

When we cook, in many cases we start with a recipe. However, cooking often requires an aesthetic sense, and this kind of knowledge is rarely written in recipes. The *Cooking Language* is a more flexible method to capture this knowledge for a creative and dynamic cooking process. As our first set of a *Cooking Language* we will present the Egg Language that shares the knowledge of cooking with eggs.

2. Background

Cooking has always been a part of the human culture as we flourished on this planet. With both the aspect of survival and pleasure, food and cooking has always been something that us humans were attracted to. Through cooking was how we learned how to use tools, and some even argue that it is our ability to cook that separated us from the rest of the animals [1]. A few thousand years later today, we have a much different view on food and cooking. Though it still continues to be an essential part of our daily lives, thanks to industrialization, much less people cook today than we used to. In our highly organized and sophisticated culture, many food preparations are done inside factories where most of us do not know what happens. Here, every ingredient is perfectly controlled and measured, bringing us the same taste that we love every time. Cheap and tasty (but not necessarily healthy) food has become an essential part of the human culture, excluding more and more people out from the kitchen.

Otherwise, many people consider cooking in the kitchen as a household chore, a profession, or a hobby. It is an activity for someone who is highly concerned about their health, someone who is in need of a sustainable way of feeding themselves and their family, or someone who can purely enjoy the joy of cooking. Nonetheless, many of us still understand the importance of cooking for ourselves from nutritional and economical reasons, but are faced with the challenge of skill in the kitchen. In these situations, the most useful and convenient aid that they can find will be the recipe. But recipes themselves face many difficulties in increasing the literacy for cooking.

2.1. Previous Work

This is part three of our series of papers that explore for a new methodology for cooking. In a previous paper [2] we have applied the method of pattern language into cooking to accomplish a similar challenge of supporting people's creative processes in the kitchen. To explain briefly, the paper introduced a method using patterns called the Generative Cooking Approach, which writes patterns that capture the condition of the dish using one or more of the five senses, and then provides the cook with actions that she can take to take the dish to a different condition. The chain action of the patterns will guide the dish through a process of piecemeal growth, ultimately resulting in a tasteful dish.

Though this method is useful to some extent, we found out that the approach alone was not sufficient to gain the skills of cooking. The patterns in this collection were focused too much around the actual actions that are being taken while cooking (for example, "stir the ingredients so they don't stick to the pan"). These patterns were useful in knowing when to do what while cooking on a technical aspect, but it would not give ideas to its users on what to cook based on the ingredients available, nor how to make the dish tastier from its current condition. Therefore, it was helpful for its users to better understand a certain recipe on why a certain step should be done, but the patterns itself were not sufficient for people to put down the recipe book. And besides, most of these techniques that were captured with these patterns already had their own names that many recipes used as common language. These findings were important for us to take the next step in our inquiry for cooking patterns.

In a different paper [3] we introduced a pattern language for a collaborative cooking session. These patterns focused more on the social aspects of cooking, and contained patterns that would enhance communication and ideas in the kitchen. This was due to our decision that the Generative Cooking patterns focused too much on the mere ingredients, and we needed a system of supporting the human side of cooking. We feel these patterns were successful in creating a social environment that would help people cook more easily and more often. However, the fundamental problems we faced in the first paper were not resolved in the sense that we left teaching cooking skills to the beginning cooks in the hands of skilled cooks, and did not give a systematic methodology of doing so. Hence, we are back to technical side of cooking again in this paper.

With the combination with these past works, we believe the *Cooking Language* will provide a better and holistic approach to cooking that would overcome the difficulties that recipes face, which we will describe in the next section.

3. Limitation of Recipes

Our challenge is to make a new system of sharing knowledge of cooking that would replace the recipe. A recipe looks somewhat like what is shown in Figure 1. It tells its users the name of the dish they are about to make, ingredients and their amounts that they would need to collect, and the steps they would need to follow. When done exactly as instructed, the cook should end up with a dish somewhat close to that pictured in the photograph.

Figure 1: A typical recipe.

Though recipes seem to be the perfect and only way to scribe out the knowledge about how food is made, the method still faces some challenges. The first is that when many of us cook, we often don't actually use a recipe. Experienced cooks can open the refrigerator to see what's inside, and start to imagine what can be cooked from it. Even while cooking, they use their five senses to capture the condition of the dish, and take necessary acts to drive the dish to a completion. This on-the-spot knowledge is based on experience, and is rarely written down. Though recipes may guide a beginning cook through a series of steps to make a certain dish, it is up to them to make connections with other recipes and to transpose the knowledge to other situations. Below we will highlight some aspects of recipes that cause this to happen in detail. These points of argument are already made in our work in 2014 [2], but we saw the need to recap some arguments since they are important background information for explaining the need for the *Cooking Language*.

3.1. Rigid Contexts

There is one inevitable flaw that all recipes have: they cannot accommodate for each specific circumstance. You forgot to buy butter; you only had two eggs in the refrigerator while the recipe requires three; you want to use up all the milk today before it expires. Recipes

often implicitly demand that the kitchen be in a somewhat perfect condition where supplies and ingredients are sufficiently provided. If a chef cannot meet the right conditions, then it is only up to him to overcome these difficulties.

3.2. Unwritten Tacit Knowledge

Another thing that recipes require us: perfection. Situations occur when we put too much of a condiment into the pot, or when we mistake the order which to cook the ingredients. Ways to overcome these mistakes are rarely addressed in the recipe itself. Experienced cooks have knowledge from the past, so usually these situations do not become too much of a problem for them. However, this knowledge from experience is mostly tacit and rarely are they written down. Seen from a beginner, it is these unwritten parts that are making cooking seem hard and mystical for them.

3.3. Possibilities of Variations

When a chef cooks a recipe, very often he makes some alterations to it. The very simplest form of this may be scaling a recipe to make the right amount needed for the night. Advanced variations of the meal can occur at all kinds of levels: using a different kind of meat, adding an extra vegetable, baking the dish instead of frying it, etc. There are an infinite number of variations that a single recipe could have, but ideas for it all depends on the chef's inspirations. These ideas are based on the chef's past experiences of cooking and eating different kinds of foods, and, again, is something that is tacit and unwritten.

3.4. Knowledge Beyond Recipes

One last point of consideration as a limitation of recipes: many of us, when we cook, do not need a recipe. There are many people who can just go shopping, buy ingredients, and cook their favorite dish all without any form of a written recipe. There are others who can open the refrigerator to see what's inside, and then image what can be cooked from it. This kind of cooking often results in a delicious yet nameless dish. It may be the first time that the person cooks the dish, and also the last. The specific ingredients that were available at the time had lead to the one-time-only dish. And of course, a written recipe does not exist for this specific dish.

3.5. The General Problem

These aspects suggest one simple idea: totalitarian order may not be the only answer to good taste. Christopher Alexander, the father of pattern languages, makes a similar argument in his books by criticizing the master plan [4]. Both the master plan in architecture and the recipe in cooking can be said to be representative of the modern industrialized society.

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.

This may be bringing up something more than just a problem in architecture or cooking. Reading and following manuals is something that is done widespread in business and educational contexts. If the mere following of directions is what becomes valued, then we are left with people who do not think for themselves. Efficiency is definitely one important factor in the growing economy, and recipes and manuals will continue to have its importance in many ways. However, we would like to pose another approach to cooking where efficiency is not necessarily the best approach to design and the happiness of living.
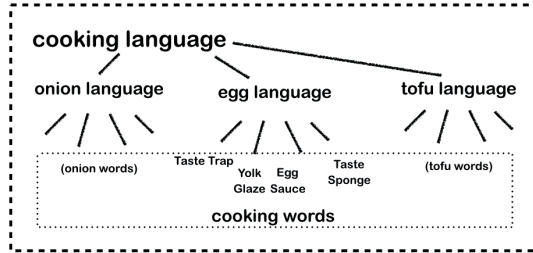
Though recipes are important sources for inspiration on what and how to cook, just following its directions would be meaningless. What a good chef has in his mind is not the teaspoons memorized, but is a framework that allows them to cook on the spot. We believe the *Cooking Language*, along with our past pattern works on cooking, will provide such a framework.

4. The Cooking Language

The *Cooking Language* is a method similar to patterns in the sense that it captures relationships that the ingredients inside a dish make with unique names. The *Cooking Language* is composed by a subset of languages that each focus on a certain ingredient e.g. *Egg Language*, *Onion Language*, *Tofu Language*, etc.. Its ontology is described in Figure 2 below.

Inside each subset language, there is a collection of *cooking words* for the specific ingredient. Here, the parallel can be made where [Cooking Language] is to [Cooking Words] as [pattern language] is to [patterns]. Each *cooking word* captures an aspect of how the ingredient can be used in a dish, and how it interacts with other ingredients. For example, from the *Egg Language* introduced in this paper, there is a *cooking word* that refers to when eggs are added to a spicy or strongly flavored dish to make its taste milder, and is given the name Taste *Mitigation*. Similarly, the few dozen *cooking words* in the language each capture attributes of eggs within a dish.

The Ontology of the Cooking Language

cooking language

onion language   **egg language**   **tofu language**

| (onion words) | Taste Trap | Yolk Glaze | Egg Sauce | Taste Sponge | (tofu words) |

cooking words

**The cooking language is a set of sublanguages,
each a collection of "cooking words"**

Figure 2: The ontology of the Cooking Language.

Each *cooking word* is written in a rather simple format: it has the *name*, the *context* that the word can be used in, and the *idea* or the actual actions that can be taken to change the state of a dish. Along with this there is a list of sample dishes that use the ingredient in the way it is described in the *cooking word*, an photo of a dish that shows the *cooking word* being used, and an *image illustration* that gives an iconic image of the idea described. A sample page spread from the *Egg Language* we will introduce in the next section can be seen in figure 3 to get an idea how the *Cooking Language* will be like in print. Unlike Alexander's patterns [5], the *cooking word*s are written in a short and simple format since cooking is rather a rapid action, and requires multiple *cooking word*s to be used in a short period of time. Each *cooking word* must be easily understandable and memorable.

Figure 3: Sample page spread of the Cooking Language book.

4.1. Creating the Egg Language

As our first attempt at creating a *Cooking Language*, we have made the *Egg Language*. The *Egg Language* consists of 19 *cooking word*s (or egg words) regarding the use of eggs in cooking. This language was made by analyzing several recipes using eggs by writing out how the egg was used in the recipe, or how it was contributing to the dish, whether taste-wise or function-wise, on index cards. The few dozen index cards were then organized and categorized by similarity using the KJ Method (also known as the Affinity Diagram), a method somewhat similar to the Grounded Theory. This resulted in 19 functions that eggs serve dishes. Each of these 19 categories were described in the *cooking word* format, and then was given a name, an illustration, and a picture to go along with it. A similar process can be taken for any particular food item to create a language for the item.

4.2. The Egg Language

Figure 4 shows the list of the 19 *egg words* from the *Egg Language*. In addition, Table 1 lists the description of all 19 *egg words* in an abstract.

Figure 4: Sample page spread of the Cooking Language book.

Name	Explanation	Sample Dishes
Simple Star	Eggs can become a simple but tasty main plate by itself.	Scrambled eggs, Boiled eggs, Sunny-side up, etc.
Wild Card Ingredient	Eggs go along well with any other ingredient.	Omelets, soups, etc.

Richness Addition	Eggs add richness to the taste of a dish.	Carbonara sauce
Solidity Gradient	The stiffness of an egg can be controlled based on the cooking time.	Boiled eggs of different stiffness
Fluffy Material	Eggs can be used as an ingredient with a fluffy texture	Scrambled eggs
Golden Yolk	The golden color of the yolk adds a visual specialty to the dish.	Sunny-side up
Taste Mitigation	By adding an egg, spicy or strong tastes can be made mild.	Sun Du Bu (a spicy Korean chili soup where raw eggs are added to make it less spicy)
Clinging Veil	Eggs add a veil with a soft texture to a larger ingredient.	Tonkatsu Bowl (a Japanese dish where pork cutlets are cooked with eggs)
Egg Clay	Since eggs start as a liquid and then solidify, it can be molded into any shape.	Omelets, scrambled eggs, etc.
Taste Trap	A liquid condiment can be mixed into the egg before it is cooked and hardened.	Puddings (milk, vanilla, etc. are trapped inside the egg)
Ingredient Pocket	Small pieces of meats and vegetables can be mixed into the egg to be cooked together. The resulting dish will hold in the ingredients inside the cooked egg.	Omelets with other ingredients inside
Taste Sponge	When boiled eggs are cooked in a soup, some of the taste from the soup gets sucked into the egg.	Boiled eggs cooked in soup
Egg Sauce	Eggs can be used as a sauce for bread, pasta, etc.	Mayonnaise
Yolk Capsule	Eggs can be cooked so that the outside is hardened but the inside yolk is still a liquid.	Poached eggs
Oil Cotton	Eggs suck in oil to make the surface browned and crunchy when cooked.	Omelets
Taste Jellifier	Eggs can be used to set liquids to a soft solid.	Puddings
Moist Cake	Eggs add the soft and moist texture to pastries	Cakes
Glazing Yolk	By painting a layer of yolk on top of pastries, it adds a glazing effect when baked.	Pies
Egg Glue	Eggs can be used as a "glue" that holds several ingredients together	Meat patties

Table 1: List of the 19 egg words from the Egg Language

5. Using the Cooking Language

There are several ways that the Cooking Language can be used in. Its uses are listed in the subsections below. Note that rather than just the *Egg Language*, the Cooking Language will have the best outcome when there are multiple languages that for several different food items.

5.1. Source of Ideas

By having the *cooking word*s in mind, a person will be able to cook in a more creative and dynamic matter. For example, if I open the refrigerator to find some eggs and bell peppers, I can combine *cooking word*s from the *Egg language* and the *Bell Pepper Language* to imagine what I can cook from what's available.

5.2. Guideline for Making Kitchen Decisions

During the actual cooking process too, the *cooking word*s will become a source for ideas to add an extra ingredient. For example, I could be cooking a totally different dish that usually doesn't use eggs, but if I feel like the taste is too bold, I can get the idea "oh I can add an egg to this dish as a *Taste Mitigation* to adjust its taste." Likewise the *cooking word*s will become a source for help to prevent or solve any problems that come up during cooking.

5.3. Decoding Recipes and Understanding Completed Dishes

In addition to this, the *cooking word*s will also become a tool to understand recipes and dishes by other people. When a person with the *Cooking Language* in mind reads a recipe, she would be able to recognize some *cooking word*s used in the recipe. This would help her understand the recipe better by realizing why a step or an ingredient exists in the recipe. Based on this, she would become able to make some alterations based on her needs. Also, when a person with who knows the *Cooking Language* eats a dish that someone else has made for her, she will be able to recognize some *cooking word*s existent in the dish. In other words, she would become able to understand why the dish tastes good. By understanding the dish better, she would be able to learn from it and use the same techniques when she cooks a similar dish in the future.

6. Referring Back to Alexander

Up to this point, we have made our discussions on the Cooking Language based on Alexander's method of pattern languages. Before we end the paper, we would also like to take a look at Alexander's other important concept: the theory of *Wholeness* and *centers*.

6.1. The Idea of Wholeness and Centers

Alexander described his ideas of *Wholeness* and centers in his later work *The Nature of Order* [7]. According to the book *Wholeness* is a "system of centers enforcing one another through connection and overlap," where centers are defined as "a physical system that occupies space with a specially marked coherence." Alexander says that centers exist chiefly in relation to the Wholeness. This *Wholeness* is what Alexander used to call the *Quality Without a Name* (QWAN) that is existent among architecture that gives humans a comfortable feeling. Though Alexander had concluded that the QWAN couldn't be directly captured and scribed out, physical patterns of objects that occur when the quality exists can be. By cutting these elements out as patterns, a collection of patterns that are interrelated as a language can be made. By practicing and applying the patterns properly, the quality can be approached again.

6.2. Application to Cooking

Like pattern languages and the fundamental properties by Alexander, the Cooking Language is a method to approach some quality - in this case, a dish that tastes good. Hence, in the context of cooking, we can interpret the *Wholeness* as the dish and the centers as the ingredients, where the ingredients exist chiefly in relation to the dish. This is visualized in Figure 5 with the case of beef stew. Here we can see the ingredients defining the dish, while the dish is defining the roles of the ingredients.
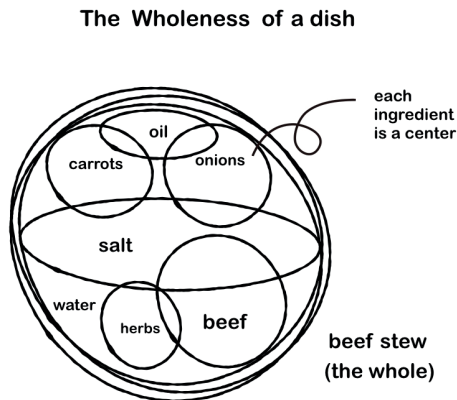
The Wholeness of a dish

Figure 5: The relationship between the dish (the whole) and the ingredients (the centers)

6.3. A Different Definition of the Cooking Language

Extending on the parallel between patterns and *cooking word*s, we can provide a different approach to understanding the Cooking Language. In the context of *Wholeness* and *centers*,

Alexander redefines *patterns* as "rules for creating a new living center to enforce the Whole." Applying the parallel we made in 6.1, we can re-read for our new definition of *cooking word*s: *rules for creating a new living center (of ingredients) to enforce the Whole of the dish*.

7. Future Work

The application of the concept of *Wholeness* and *centers* brings up a potential for some future work. We would like to finish off by elaborating on these possibilities for future work.

7.1. Possibility for Cooking Properties

In the *Nature of Order*, Christopher Alexander also defines an idea called *Properties*, which are "structural features that are recurrent among things with a Wholeness that show how centers enforce one another." He lists the *15 Fundamental Properties* that he has found in the Architectural world. Making the parallel again, we come to a new concept which we can call the *Cooking Properties* with the definition: *structural features that are recurrent among delicious dishes that show how ingredients enforce one another*.

As we can see the simplest form of future fork for this study as making more sublanguages of Cooking Languages (the *Onion Language, Tofu Language, Soy Sauce Language*, etc.), the idea of *Cooking Properties* gives us an insight for even further work. When several sublanguages start to exist, we should start to see structural similarities among the cooking words in the different sublanguages (described in Figure 6). We can abstract these similar *cooking word*s to get our *Cooking Properties*.
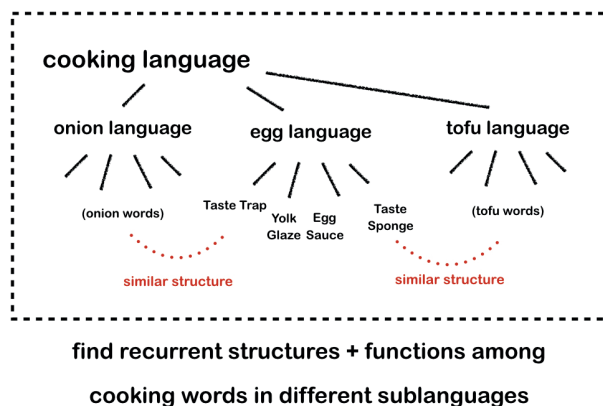

Figure 6: Recurrent structures can be found among different cooking sublanguages.

7.2. Exploring Cultural Aspects

When creating the Egg Language, all of the recipes that we have referenced were Japanese recipes. Hence, many of the *egg words* we have found were also cultural and characteristic of the Japanese cuisine. We saw a similar phenomenon when we have created the *Generative Cooking Patterns* where in many cases we run into patterns that do not have a significant problem section. This is because cooking is highly dependent on culture, and cultural traditions in many cases result from historical backgrounds that do not necessarily have a scientific reasoning. What people say is delicious differ from culture to culture, and people cook in some ways „because it tastes good." Thus, we can say that the Egg Language presented in this paper is an "*Egg Language* for the Japanese Culture." This isn't necessarily a bad thing. As described in 7.1, we have the potential for a *Cooking Properties*. If the *cooking word*s are cultural, then the properties must have strong cultural aspects too. There fore we can create *Cooking Properties* for the Japanese cuisine, Italian cuisine, Indonesian cuisine, German cuisine, etc.. These rather abstract descriptions of features of a particular cuisine will provide a whole new set of language for understanding the culinary of a certain culture. These cultural *Cooking Properties* have many possibilities in teaching cooking and for people who are visiting and joining a new culture.

8. Conclusion

This paper introduced the method of the Cooking Language, along with its first prototype the *Egg Language*. This is a new system of knowledge sharing that could possibly replace the role of recipes by resolving its problems. In the course of its creation and by taking a parallel between Alexander's theories about Architecture and cooking, we saw many possibilities for future work that could potentially change the way people look at cooking. Our inquiry on cooking and patterns continues with our future work to come.

9. Acknowledgements

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PURSUIT OF PATTERN LANGUAGES FOR SOCIETAL CHANGE

Designing Lively Scenarios in Various Fields