



Cooking recipe system

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Summary

The article "Systemic View of Cooking Recipes" applies General Systems Theory (GST) to cooking, approaching recipes as complex systems. Consider factors such as ingredient selection, preparation techniques, use of equipment, and accurate recipe execution. In addition, TGS concepts such as synergy, homeostasis, and holistic approach are explored, demonstrating how these principles are reflected in the kitchen. Phenomena such as the butterfly effect, chaos, entropy, and communication are also discussed, underlining the importance of organization and precision at each stage of the preparation of a dish.

Introduction

The systemic approach has made it possible to analyze various fields from a comprehensive perspective, and cooking is no exception. Cooking recipes are complex systems in which every element, from ingredients to techniques and equipment, plays a fundamental role in the final result. This article explores how General Systems Theory (TGS) can be applied to recipe creation, providing a deeper understanding of how components interact to achieve a successful dish. From ingredient selection to final presentation, this analysis allows recipe preparation to be optimized and the quality of results to be improved.

General objective

The objective of this article is to apply the principles of General Systems Theory to the analysis of cooking recipes, understanding the interactions and relationships between its components to optimize the culinary process and improve results in terms of flavor, texture, presentation, and efficiency.

Systemic View of Cooking Recipes

Seeing cooking recipes in a systemic way involves considering all the elements and processes involved in the creation of a dish. This includes the ingredients, preparation techniques, cooking equipment, and the interaction between these elements to achieve a consistent and quality result.

Cooking recipes can be seen as complex systems where each component and process play a crucial role. Here's how cooking recipes work in general and how a person can carry them out systematically:

Ingredient Selection: The quality and freshness of the ingredients are critical to the success of a recipe. For example, using fresh tomatoes instead of canned ones can significantly improve the flavor of a sauce.

Preparation of Ingredients: Before you start cooking, it is important to prepare all the ingredients. This includes washing, cutting, measuring, and organizing ingredients according to the recipe. This stage is known as "mise en place".

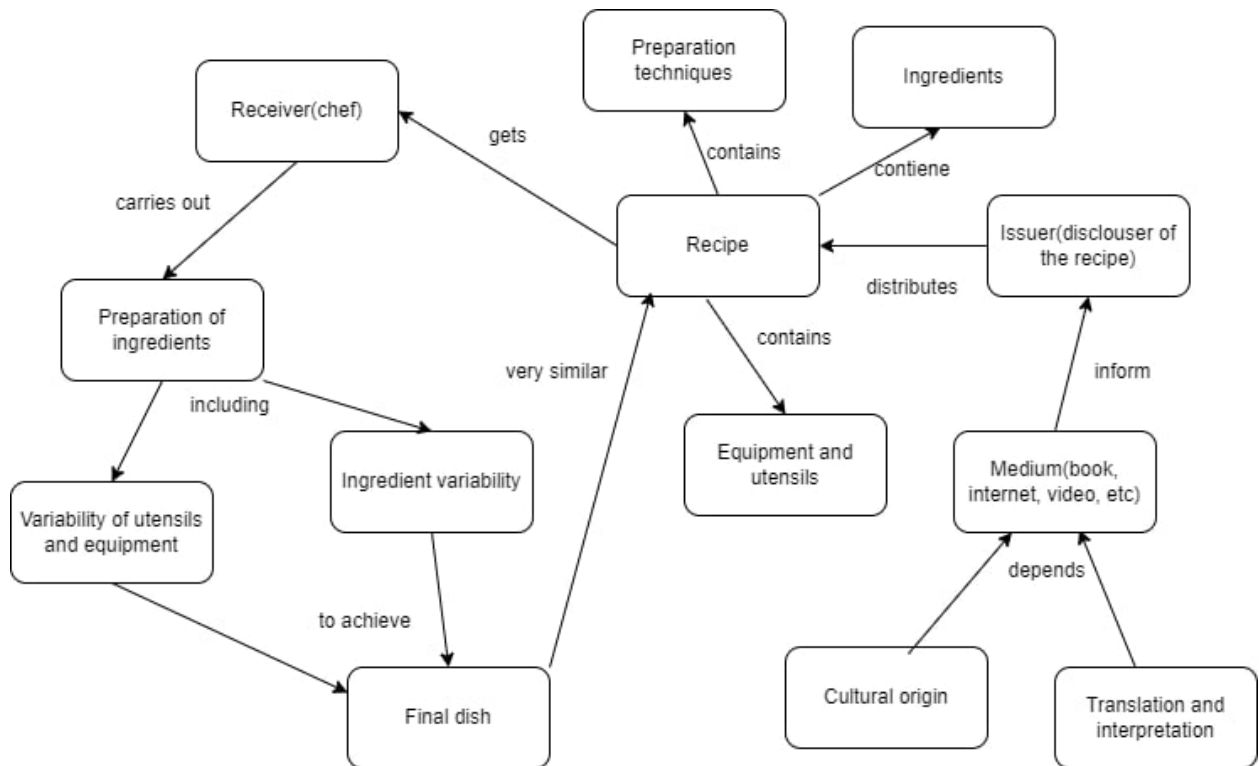
Cooking Techniques: Cooking techniques, such as baking, frying, boiling, etc., directly affect the result of the dish. Each technique has its own specific rules and times that must be followed for the best results.

Use of Equipment and Utensils: Tools such as knives, pans, mixers, etc., are essential for the preparation of food. Choosing the right equipment can make the cooking process easier and improve the quality of the dish.

Recipe Execution: Following the recipe step by step is crucial. This includes respecting cooking times, temperatures, and ingredient quantities. Precision at this stage ensures that the dish comes out as expected.

Presentation of the Dish: The way the dish is presented is also important. A good presentation can make a dish more appetizing and appealing.

Evaluation and Adjustments: After preparing the dish, it is helpful to evaluate the result and adjust if necessary. This may include modifying the recipe to improve the flavor or texture in future preparations.



General Systems Theory

General systems theory (GST) is an interdisciplinary approach that studies systems in general, seeking to discover principles applicable to any type of system in any field. A system is

defined as an entity with boundaries and interrelated and interdependent parts whose sum is greater than the sum of its parts.

General systems theory was proposed by Ludwig von Bertalanffy and has had a great influence on various disciplines. Here's how important it is and how it applies to systems analysis:

Fundamental Principles: TGS is based on the idea that systems are sets of interrelated elements that function. These systems can be open (they interact with their environment) or closed (they do not interact with their environment).

Interdisciplinarity: TGS is applied in multiple fields such as biology, psychology, economics, sociology, and more. This allows for a broader and deeper understanding of complex phenomena.

Isomorphism: One of the key concepts of TGS is isomorphism, which suggests that the principles governing one system can be applied to other systems of a different nature. This allows knowledge and solutions to be transferred from one field to another.

Homeostasis and Adaptation: Systems can maintain their internal balance (homeostasis) and adapt to changes in their environment. This is crucial for the survival and efficient functioning of the systems.

Importance in Systems Analysis: The TGS provides tools and concepts to analyze and understand complex systems. This includes identifying the parts of the system, their interactions, and how these interactions affect the behavior of the system as a whole.

Application in the Kitchen: In the context of cooking recipes, TGS can help to understand how different components (ingredients, techniques, equipment) interact to produce

a final dish. This allows the cooking process to be optimized and the quality of the result to be improved.

1. Holistic Approach

The holistic approach is a perspective that seeks to understand the relationships and interconnections between the parts of a system or situation as a whole. Rather than analyzing elements in isolation, the holistic approach considers the system as an integrated, global whole. This approach allows for a more complete and accurate understanding as it focuses on how the parts interact and affect each other.

Ingredients: The quality and freshness of the ingredients are essential. For example, using fresh tomatoes instead of canned ones can significantly improve the flavor of a sauce.

Preparation Techniques: Culinary methods such as cutting, mixing, baking, etc. Each technique affects the result. For example, the braising technique can make meat more tender and flavorful.

Equipment and Utensils: Tools necessary for preparation, such as knives, pans, and mixers. Choosing the right equipment can make the cooking process easier.

Chef/Cook: The person who executes the recipe. Their skill and experience influence the quality of the dish.

Presentation: How the dish is served, including garnishes and decoration. A good presentation can make a dish more appetizing.

2. Synergy

Synergy refers to the action of two or more elements that, when working together, produce an effect greater than what would be obtained with the sum of the individual effects. In other words, synergy is the result of cooperation and coordination, where the whole is greater than the sum of its parts. This concept is fundamental in many fields, as it allows more effective and efficient results to be achieved through collaboration.

Ingredient Combination: How different ingredients work together to enhance flavors. For example, the combination of garlic and onion in many recipes creates a robust flavor base.

Complementary Techniques: Using complementary techniques, such as marinating and then roasting, can improve the texture and flavor of food.

Equipment and Technique: The synergy between the right equipment and the right technique. For example, using a cast-iron skillet to seal meat can improve flavor and texture.

3. System Sensitivity

System sensitivity refers to the ability of a system to respond to changes in its initial conditions or environment. A sensitive system can experience large variations in its behavior due to small alterations in its parameters. This concept is crucial to understanding how small changes can have a significant impact on the final outcome of a system.

Measurement Accuracy: Small variations in the amount of ingredients can alter the result. For example, adding too much yeast can cause bread to deflate.

Temperature Control: The cooking temperature affects the texture and flavor. Cooking at too high a temperature can burn food, while too low a temperature may not cook it properly.

Cooking Time: The exact cooking time is crucial. Cooking a cake for too long can make it dry, while cooking it for too little time can leave it raw.

4. System Interactions

System interactions refer to how the different components of the cooking recipe system interact with each other to achieve a common purpose³. These interactions can be:

Ingredient Interaction: How ingredients combine and react with each other. For example, the acidity of the lemon can "cook" fish into a ceviche.

Interaction between Techniques and Equipment: How preparation techniques and kitchen equipment complement each other. For example, using a mixer to mix cake batter can result in a more even texture.

Chef-Recipe Interaction: How the chef's skill and experience influence recipe execution. An experienced chef can adjust a recipe on the fly to improve the end result.

5. Chaos Theory

Chaos theory studies how complex dynamical systems, which are highly sensitive to initial conditions, can experience unpredictable and seemingly random behaviors. In the context of cooking recipes, this can be applied as follows:

Sensitivity to Initial Conditions: Small variations in ingredients or preparation techniques can lead to very different results. For example, a slight variation in the amount of yeast can cause a loaf to rise too much or not at all.

Unpredictable Behaviors: Despite following a recipe to the letter, the result can vary due to factors such as humidity, altitude or the quality of the ingredients.

Chaotic Attractors: Chaotic attractors are points or areas towards which a system tends to move in an apparently random manner⁵. In the kitchen, this can manifest itself in the variability of a recipe's results despite following the same steps. For example, a soufflé may rise differently each time it is prepared, due to small variations in technique or ingredients.

6. Butterfly Effect

The butterfly effect suggests that small actions can have big repercussions. In the context of cooking recipes, a small mistake in measuring an ingredient can affect the entire dish. For example, adding too much salt can ruin the flavor of a soup.

Small Modifications: Minor changes to the recipe can have big effects. For example, adding a pinch of salt to a dessert can enhance its sweetness.

Minor Mistakes: A small mistake, such as forgetting an ingredient, can ruin the entire dish. For example, forgetting yeast in a bread recipe can result in dense, non-fluffy bread.

Adjustments to Technique: Changing a technique slightly, such as whisking longer, can affect the texture of a cake.

7. Domino Effect

The domino effect in cooking recipes refers to how an action can trigger a series of events. For example, if a portion of the dish is burned, the entire process may need to be redone, affecting preparation time and quality of service.

Preparation Sequence: The order in which the ingredients are prepared can affect the final result. For example, adding cold ingredients to a hot mixture can alter the texture.

Impact of an Error: An error in one step may require adjustments in the following steps. For example, if a portion of the dish is burned, the entire process may need to be redone.

Cascade of Changes: A change in one ingredient may require adjustments in others. For example, using a different type of flour may require adjusting the amount of liquid in the recipe.

8. Entropy

Entropy in cooking recipes refers to the mess and loss of quality that can occur if the instructions are not followed correctly. Without proper organization, ingredients can lose freshness, and dishes may not turn out as expected.

Kitchen Clutter: Lack of organization can lead to errors and loss of quality. For example, not having all the ingredients ready can cause important steps to be forgotten.

Loss of freshness: Ingredients that are not used in time can lose freshness and quality. For example, fresh herbs that are left too long can wilt.

Errors in Execution: Failure to follow instructions correctly can result in a failed dish. For example, not preheating the oven can affect the baking of a cake.

7.1 Neguentropy as a Solution to Entropy:

Neguentropy, also known as negative entropy, is the process by which an open system maintains its order and structure by importing energy and matter from the environment to counteract the natural tendency toward disorder (entropy). This concept is crucial to understanding how living and other complex systems can maintain their organization and functionality over time

Organization and Preparation: Have all the ingredients and utensils ready before starting to cook. This helps to maintain order and avoid mistakes.

Recipe Review: Follow recipes to the letter and review each step. This ensures that no important steps are skipped.

Equipment Maintenance: Make sure all kitchen equipment is in good condition and working properly. This avoids problems during preparation.

Continuous Training: Stay up to date with new techniques and culinary trends. This improves the skills and quality of the dishes.

9. Stochastic Processes

A stochastic process is a collection of random variables that depend on a parameter or variable, usually time. These processes make it possible to model dynamic phenomena in which there is a certain randomness, such as the evolution of prices in the financial market or the number of telephone calls over a period of time.

Experimentation: Testing new combinations of ingredients and techniques. This can lead to the creation of innovative new dishes.

Adaptation to Variations: Adjust recipes according to ingredient availability and personal preferences. For example, using local and seasonal ingredients.

Response to Uncertainties: Handling unforeseen events in the kitchen, such as ingredients that are not available or changes in the number of diners.

10. System Hierarchy

System hierarchy refers to the organization of the elements of a system at different levels of complexity and control. Each level of the hierarchy can be a subsystem of the higher level and a metasystem of the lower level. This hierarchical structure allows for better management and understanding of the system.

Complexity Levels: Organize the recipes according to their difficulty. For example, basic recipes for beginners and advanced recipes for experienced chefs.

Skill Progression: Develop culinary skills gradually. Start with basic techniques and work your way up to more complex techniques.

Menu Structure: Organize a complete menu, from appetizers to desserts, ensuring a logical and balanced progression of flavors and textures.

11. Communication Theory

Communication theory studies how messages are transmitted, received, and processed between senders and receivers. In systems analysis, this theory is used to understand how information flows within a system and how different components of the system communicate with each other. Communication theory includes concepts such as sender, receiver, message, channel, code, and noise.

In the context of cooking recipes, communication theory is reflected in how the instructions of a recipe are transmitted from the creator (sender) to the cook (receiver). Here's how this theory is applied and how the "noise" manifests itself in the system:

Sender: The creator of the recipe, which can be a chef, cookbook, website, etc. The sender is responsible for encoding the message (the recipe) in a clear and understandable way.

Receiver: The person who receives the prescription and interprets it to carry it out. The receiver must decode the message and follow the instructions to prepare the dish.

Message: The recipe itself, which includes the ingredient list, quantities, preparation steps, and cooking techniques. The message should be clear and detailed to avoid misunderstandings.

Channel: The medium through which the recipe is transmitted, such as a cookbook, website, video tutorial, etc. The choice of channel can affect the clarity and comprehension of the message.

Code: The language and symbols used in the recipe. This includes culinary terms, measurements, cooking times, etc. It is important that the code is known by both the sender and the receiver to avoid confusion.

Noise: Any interference that distorts or hinders the communication of the message. In the context of cooking recipes, noise can manifest itself in several ways:

Interpretation Errors: When the receiver misunderstands an instruction due to the ambiguity of the message or lack of clarity. For example, if a recipe says "cook over medium heat" and the receiver doesn't know exactly what temperature that implies.

Translation Problems: If the recipe is in a different language than the recipient, translation errors may arise that affect the understanding of the message.

Lack of Knowledge: If the recipient is not familiar with certain cooking terms or techniques, they may misinterpret the instructions. For example, if a recipe mentions "blanch" and the recipient doesn't know what it means to boil briefly and then cool in ice water.

External Interference: Distractions or interruptions during the reading or execution of the recipe that can lead to errors. For example, if the receiver is cooking in a noisy environment and can't concentrate on the instructions.

Imagine a recipe says "add a pinch of salt." The term "pinch" can be interpreted in different ways by different people. One cook may add a very small amount, while another may add a larger amount, resulting in a dish that tastes different than expected. Here's an example of how noise can affect the end result of a recipe

Conclusions

The application of General Systems Theory (GST) to cooking recipes allows us to understand how each component and process involved in the creation of a dish is interrelated. The chef's ingredients, techniques, equipment, and skills work together synergistically, proving that small changes in one aspect can have a significant impact on the final result of the dish.

Organization has been shown to be a key factor in the success of any recipe. Pre-preparing ingredients and following instructions accurately minimize chaos in the kitchen,

ensuring that all steps are followed correctly and reducing the likelihood of errors affecting the quality of the dish.

In addition, systems analysis highlights the importance of adaptability. The ability to adjust to variations in ingredients or external conditions, such as available equipment or diner preferences, is critical to optimizing results and continuously improving recipes.

Finally, the relevance of clear communication in recipes is highlighted. Ambiguous or ill-defined instructions can lead to errors in execution. Therefore, ensuring that recipes are accurate and easy to understand is essential to achieving consistent, high-quality dishes.