

# The Spirit of Cocktails: On the Conceptual Structure of Cocktail Recipes

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## ABSTRACT

In this paper, we discuss the conceptual structure of cocktail recipes. This topic involves engaging questions for philosophers and food theorists due to some peculiar characteristics of cocktail recipes, such as the fact that they are standardised by international associations but, nonetheless, vagueness in some elements of the recipes introduces a degree of variability between cocktails of the same type. Our proposal is that a classical theory of concepts is unable to account for such peculiar features. Thus, only a hybrid theoretical approach, combining definitional and prototypical aspects, can capture how cocktail recipes are usually conceptualised among bartenders and mixologists: while the spirit is usually a necessary (though not sufficient) condition for establishing whether an individual cocktail falls under a specific cocktail concept, all the other ingredients and procedures listed in recipes may vary to a certain extent. In order to assess whether variability in prototypical elements of cocktail recipes has any limitations, we exploit the notion of conceptual scheme applied to cocktail recipes and argue that, as long as the quality dimensions of a specific cocktail are respected, its identity remains unchanged regardless of changes in the ingredients or in its preparation.

## 1. Introduction

In a 2015 paper, Borghini discussed four theoretical approaches to the ontological status of recipes, namely, realism, constructivism, existentialism,

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and naïve theory, each of which reflects a different understanding of the identity criteria of recipes (Borghini 2015). According to the author, among such four approaches, constructivism seems to better reflect the typical role of recipes in culinary practices. In this view, the identity of a recipe depends on social and pragmatic aspects, such as collective judgments of its authenticity, rather than on the ingredients and procedures required for the preparation of the related dish.

Although this view might account for a wide variety of recipes, other theoretical approaches seem to have nonetheless some range of applicability. For instance, some forms of realism seem to be able to account for recipes of foods protected by a geographical indication or intellectual property rights, such as that of *Parmigiano Reggiano* cheese and the *Pesto alla Genovese*'s recipe used in the Genoa Pesto World Championship (Borghini 2015, p. 724). Indeed, in such cases, the identity of the recipe tends to be fixed by a core of ingredients and procedures.

A comprehensive understanding of the ontological status of recipes requires to address a related—although independent—theoretical question: What kind of conceptual structure do recipes have? Does the same conceptual structure characterise all the existing recipes? If not, what conceptual structure characterises different types of recipes?

Generally speaking, some recipes seem to have a definitional structure, meaning that they are represented in terms of necessary and sufficient conditions, in accordance with the classical theory of concepts.<sup>1</sup> This seems to apply, for instance, to the recipes of foods protected by intellectual property rights (see above), which are defined by a list of ingredients and procedures. However, many recipes seem to admit a degree of variability as regards their ingredients and procedures, and thus arguably fall outside the classical theory of concepts.

For example, the *Minestrone alla Genovese* recipe is a soup that includes many vegetables (e.g., potatoes, courgettes, carrots, onions, celery, cabbage, beans, and parsley) but none of them is individually necessary; moreover, the recipe can include pasta or pesto sauce (or both), and the quantity of each ingredient may vary, too. In cases of this sort, recipe concepts seem to have a prototypical structure, meaning that something falls under a given recipe

<sup>1</sup> For an introduction to classical and non-classical (or prototypical) theories of concepts, see Margolis & Laurence (2019).

concept only if it satisfies a sufficient number of features encoded by the recipe prototype.

In this paper, we analyse the case of cocktail recipes and investigate what kind of conceptual structure accounts for their main characteristics. As we shall show, cocktail recipes represent an ideal place to raise engaging questions for philosophers and food theorists.

At first sight, cocktail recipes closely resemble recipes of foods protected by a geographical indication or intellectual property rights, where a definitional structure seems to apply. Indeed, cocktail concepts seem to be defined by the list of ingredients (including the decorations), the recommended glass, and the sequence of repeatable actions required for the realisation of the associated cocktail. In other words, cocktail concepts seem to be represented by a list of individually necessary and jointly sufficient conditions. For instance, as a first approximation, it seems that an individual Negroni belongs to the category *Negroni*, or falls under the concept NEGRONI, if and only if it is made of gin, red vermouth, and bitter (30 ml of each ingredient), which should be poured into a tumbler glass containing ice cubes, stirred gently, and garnished with a slice of orange.<sup>2</sup>

However, a careful analysis of standard cocktail recipes will reveal that things are not that easy: although the conceptual structure of cocktail recipes exhibits some definitional elements, it displays prototypical features, too. Thus, we propose that only a hybrid approach, combining both definitional and prototypical aspects, can capture the way cocktail recipes are conceptualised among bartenders and mixologists. Here below is the structure of the paper.

In Section 2, we introduce three key aspects of cocktail recipes: a) their relative *simplicity*; b) the fact that they are *standardised*, and c) their wide *intra-category variability*.

In Section 3, we consider what theory of concepts has the potential to meet the expectations and feelings of the experts in the world of bartending. We will argue that the conceptual structure of cocktail recipes involves definitional or prototypical elements depending on the recipe's ingredient under analysis: on the one hand, some ingredients are necessary for a cocktail to belong to a specific cocktail category; on the other hand, there are other ingredients of the recipes that can change without affecting the category membership.

<sup>2</sup> We shall use *italics* to denote a cocktail category or its recipe (e.g., *Negroni*, *Manhattan*, or *Margarita*), UPPERCASE to denote a cocktail concept, and plain text to denote an individual cocktail or an instance of the concept.

In Section 4, we consider some case studies that exemplify the definitional component of cocktail recipes. We will argue that, the spirit is the only necessary ingredient in the determination of a cocktail's identity (in a few particular cases, a wine can step into the spirit's role in such a determination). This, however, does not imply that the spirit is the *only necessary element* of a cocktail recipe.<sup>3</sup>

In Section 5, we focus on prototypical aspects of cocktail recipes and consider the question of whether variability in the non-spirit ingredients has any limitation. We shall argue that it does and that the question has a potential non-arbitrary answer involving major qualitative dimensions characterising each cocktail. In this view, some dimensions (e.g., sweetness, bitterness, and sourness) play, like the spirit, a necessary role in determining the identity of a given cocktail. However, there is a degree of acceptable variability as to *what specific ingredient(s)* can provide such dimensions. Thus, as long as some distinctive major dimensions are respected, a cocktail's identity remains unchanged regardless of changes in the ingredients or in its preparation.

Finally, in the conclusions, we delineate potential connections between our analysis of the conceptual structure of cocktail recipes and the study of their ontological status. We also explain that our theoretical proposal can help assess whether a non-standard cocktail belongs to a category or another.

It should be noted that our analysis does not rely on an empirical investigation of the intuitions of bartenders, mixologists, or expert consumers. Rather, the analysis is an attempt of providing a theoretical framework capturing the current consensus on cocktail recipes as reflected by the cocktail list of the International Bartenders Association (see Section 2). Moreover, our analysis is only in part descriptive, that is, it is not limited to clarify how experts understand cocktail recipes. Rather, there is a normative component in our proposal concerning how uncertain and borderline cases should or could be conceptualised and framed within a wider theory.

<sup>3</sup> We use the term 'element' to denote a generic component of a cocktail, such as a sweet or acid element. By contrast, the term 'ingredient' denotes a specific ingredient of a cocktail, such as gin, vermouth, or bitter. This distinction will be of central importance for our analysis in Sections 4 and 5, where we will explain that a given ingredient (e.g., lime juice) can be replaced by another one with similar characteristics (e.g., lemon juice) with no consequences for a cocktail's identity, but an acid ingredient might still be a necessary *element* of a cocktail recipe.

## 2. The Peculiarities of Cocktail Recipes

Cocktails can be broadly defined as alcoholic drinks made of one or more spirits (e.g., brandy, cachaça, gin, rum, tequila, vodka, or whiskey) or wine and a variable mix of ingredients, such as sugar (which can be supplied by liqueurs, honey, or syrups), bitter, dairy products (milk or cream), herbs, eggs, and *mixers* (i.e., non-alcoholic ingredients such as soda, coke, and fruit juice).<sup>4</sup>

Why are cocktails so interesting for investigating the conceptual structure of recipes? In this section, we consider three peculiar characteristics of cocktail recipes: 1) their relative *simplicity* in comparison with other recipes; 2) the fact that they are *standardised* by international associations; and 3) the existing degree of variation within each category of cocktail (a characteristic that we call *intra-category variability*).<sup>5</sup>

The first aspect that we would like to consider is that, if compared with other recipes, cocktail recipes are *relatively simple*. Many food recipes require lots of knowledge and ability involving how to craft and cook a dish. For instance, even relatively simple dishes like Pizza Margherita require a lot of practice to learn how to calibrate the amount of some ingredients, such as the salt inside the dough (the locution ‘q.s.’, standing for ‘a sufficient quantity’ is not very beginner-friendly), but also to acquire the movements for kneading and to get the perfect leavening and cooking point. Moreover, many recipes include a great variety of ingredients and provide vague instructions as regards their amount and combination, as in the case of the *Minestrone alla Genovese* recipe discussed in the introduction.

By contrast, cocktails usually require a small number of ingredients, and the recipe for a cocktail specifies exactly the amount of such ingredients and the actions required to prepare it. Moreover, the background knowledge and ability

<sup>4</sup> See the Merriam-Webster Dictionary (<https://www.merriam-webster.com/dictionary/cocktail>) and the Oxford English Dictionary (<https://www.oed.com/viewdictionaryentry/Entry/35499>). In this paper, we will not consider mocktail recipes (namely, recipes for non-alcoholic drinks) as they are not as standardised as cocktails recipes.

<sup>5</sup> These characteristics may not be exclusive of cocktail recipes. For instance, some classical sandwich recipes (e.g., the ham & cheese toast, the BLT sandwich, and the classical hamburger) might have (some of) such three features, such as simplicity and stability (we thank an anonymous reviewer for suggesting this). However, as we shall discuss, cocktails recipes involve very peculiar collective judgements about membership criteria and normative questions, which are mostly due to their regulation by international organisations.

required to create a decent cocktail are nearly zero. For instance, let us consider the *Dry Martini* recipe:

- a) Pour 60 ml of gin and 10 ml of dry vermouth into a mixing glass with ice cubes
- b) Stir well
- c) Strain into a chilled martini cocktail glass
- d) Squeeze oil from lemon peel onto the drink or garnish with a green olive<sup>6</sup>

So, anybody can prepare a good version of the iconic Dry Martini by just pouring the right amount of gin and dry vermouth into the right type of glass (jiggers do all the job, and there is very little chance to use the wrong glass), stirring them (you just need a spoon), and garnish with a green olive (squeezing a lemon peel is not even necessary). It is also worth noticing that the only background knowledge required for preparing the cocktail is that ingredients *should not be hot*. Of course, practice can help achieve dexterity and precision (shaking perfectly, for instance, requires a bit of training) but, basically, a cocktail recipe appears very much as an algorithm, i.e., a sequence of successive steps with nearly no degree of freedom.<sup>7</sup>

The second interesting feature of cocktail recipes is that, apart from a few special cases,<sup>8</sup> they are quite stable in both geographical and temporal terms. The stability of most cocktail recipes is mostly due to the fact that they are *standardised* by a sort of international agreement that is promoted and regulated by the International Bartenders Association (IBA), a world authority that sanctions a list of official cocktails to be used in the annual World Cocktail Competition (WCC).<sup>9</sup>

<sup>6</sup> See <https://iba-world.com/iba-official-cocktails/dry-martini>.

<sup>7</sup> It can be noted that preparing a homemade spirit, instead of just buying it, would make the preparation of any cocktail a very difficult task. In this sense, the simplicity of cocktail recipes is not a necessary feature of cocktails, but rather depends on some characteristics of the contemporary market.

<sup>8</sup> For instance, the *Spritz* recipe is geographically variable and the history of the cocktail uncertain. Moreover, some *Spritz* recipes are not very informative with respect to the relative quantity of the various ingredients. In this sense, this recipe is more difficult than most cocktail recipes.

<sup>9</sup> See <https://iba-world.com>. See also Manzo (2017, 2019).

Although the IBA list is regularly updated, it does not exhaust, of course, all the existing cocktails or potential combinations among cocktail ingredients.<sup>10</sup> However, the cocktails included in the list tend to be reproduced in the same way nearly everywhere. In this sense, such cocktails have precise and internationally recognised identity criteria.<sup>11</sup> Note also that the IBA list explicitly involves some normativity: one of the aims of the Association is “to encourage the standardization of mixed drinks recipes.”<sup>12</sup>

Notably, the fact that many cocktails are standardised implies that, in contrast to many kinds of recipes, cocktail recipes are not open-ended entities in the sense described by Borghini (2015, p. 736)—not anymore, at least—because it is unlikely that, in the future, recipes of official cocktails will change.

One may wonder whether cocktails are always reproduced in *exactly* the same way. The short answer is no, but the problem deserves to be articulated further.

Although cocktail recipes are codified and standardised, they are by no means comparable with other standardised recipes, such as recipes for food and drinks produced through industrial processes (e.g., the *Coca-Cola* and *Barilla Spaghetti* recipes). In these cases, mass production is aimed at making every instance of a product *qualitatively identical* to the others of the same kind, and this requires algorithmic instructions that can be easily understood by a machine. In this sense, standardised recipes work as *blueprints*.

The case of cocktails is rather different, and this introduces a third important aspect characterising cocktail recipes, that is, that there is some degree of freedom in their preparation and thus variability between different instances of the same category (e.g., variability between two Negroni). This *intra-category variability* is because every recipe involves some vagueness regarding its preparation and the precise ingredients to be used.

For instance, many recipes require a *splash* of soda or a given number of *dashes* of some bitter, which both are vague quantities that can vary widely depending on how one understands them. As another example, cocktail recipes

<sup>10</sup> The latest update of the IBA list dates to February 2020, when the number of official cocktails was increased from 77 to 90.

<sup>11</sup> The same applies to other less canonical cocktails, like *Negroski* (vodka, sweet red vermouth, bitter), that are not in the current IBA list but, nonetheless, have standard recipes around the world.

<sup>12</sup> See <https://web.archive.org/web/20110811074257/http://www.iba-world.com/english/history/const.php>.

do rarely specify what ingredient is to be used among the many existing of the same type. For instance, most recipes just mention red vermouth, although two different red vermouths (e.g., Martini and Punt & Mes) can be very different with respect to their chemical characteristics, and thus in taste, flavour, and intensity.

Thus, professional bartenders usually adapt cocktails to their preference or to the available ingredients, which often lead them to make subtle variations to a recipe (see Dietsch 2012). For instance, a bartender may decide to prepare a Daiquiri with lemon instead of lime juice due to a shortage of the latter or because she wants to put less acidity into the mix. Likewise, one may prefer to put Cointreau instead of Triple Sec in a White Lady, based on the assumption that the substitution will bring little difference to the final product (both are orange liqueurs).<sup>13</sup>

In the next section, we assess what theoretical approach to concepts can account for the aspects discussed above.

### 3. What Sort of Concepts are Cocktail Recipes?

In Section 1, we introduced two potential ways of understanding the structure of recipe concepts. On the one hand, recipes can have a definitional structure, in accordance with the classical theory of concepts (see Margolis & Laurence 2019); this may be the case of foods protected by a geographical indication or intellectual property rights. On the other hand, recipes can have a prototypical structure, like in the case of the *Minestrone alla Genovese* recipe. In this section, we argue that none of these structures is completely reflective of common intuitions about cocktail recipes, nor it seems consistent with the IBA classification. In our understanding, only a hybrid approach, combining both definitional and prototypical aspects, can describe the conceptual structure of cocktail recipes.

As we explained in Section 2, the IBA classification provides standard recipes including all the ingredients, quantities, decorations, glasses, and

<sup>13</sup> This freedom in the preparation of cocktails might suggest that there can be many equally valid taxonomies of cocktails. However, it is plausible that there are some limitations to the changes that can be made to a cocktail without making it lose its identity. For instance, one may wonder whether a Margarita with no salt on the rim of the glass is still a *Margarita*, or whether a Negroni prepared with a spirit other than gin is still a *Negroni*. In Sections 4 and 5, we shall return to this problem and argue that pursuing a single, unified taxonomy of cocktail recipes is very reasonable given the conceptual structure of cocktail recipes. Interestingly, such a taxonomy seems to be implicitly pursued by international organisations like the IBA.

procedures required to reproduce each official cocktail. In this sense, it might be reasonable to believe that each cocktail recipe provides a set of individually necessary and jointly sufficient criteria that a cocktail must satisfy for belonging to a given category and falling under a certain cocktail concept.

Within this interpretation, for instance, to fall under the concept **NEGRONI**, a cocktail should satisfy a set of individually necessary and jointly sufficient conditions, namely its ingredients (30 ml of gin, 30 ml of red vermouth, 30 ml of bitter, a slice of orange, ice cubes), a tumbler glass, and the so-called build-in procedure (i.e., pouring all the ingredients directly into a chilled old fashioned glass filled with ice, and stirring gently).<sup>14</sup> In this view, nothing can be an instance of **NEGRONI** without all the ingredients and procedures above, and everything made up of all these ingredients and procedures is a **NEGRONI**.

Notably, the fact that cocktail recipes involve some vagueness (see Section 2) does not rule out, by itself, a definitional characterisation of cocktail concepts. Indeed, ingredients and procedures may still be regarded as individually necessary and jointly sufficient to determine the category membership of a cocktail, even though some of such elements are expressed in vague terms. For instance, although *splash* is a vague term, having a splash of soda water might still be a necessary characteristic of, for instance, an *American* cocktail. As another example, although two different red vermouths (e.g., Martini and Punt & Mes) can be very different from each other, red vermouth might nonetheless be a necessary ingredient of *Negroni*.

Interestingly, although there is some degree of acceptable intra-category variability for each cocktail, it is very plausible that some changes to official recipes would turn up one's nose and affect the perceived authenticity of a cocktail. For instance, can one prepare a Negroni with rum instead of gin? Would a Margarita with grapefruit juice instead of lime still count as a *Margarita*? Intuitively, each cocktail recipe is characterised by some core ingredients and procedures that cannot change (otherwise the cocktail will lose its identity), plus others that can change. This suggests that the conceptual structure of cocktail recipes involves both definitional and prototypical aspects.

In the following, we shall contend that cocktail concepts are characterised by some necessary (although not individually sufficient) conditions, which represent the core of the concept, plus a set of further conditions, which are encoded in the cocktail prototype and must be satisfied to some degree.

<sup>14</sup> See <https://iba-world.com/iba-official-cocktails/negroni>.

Which ingredients of a cocktail recipe are necessary to determine the category membership, and which of them can instead change to some extent? In the next section, we argue that the spirit (or the wine, in a few particular cases where it is the primary base) is the only *ingredient* that cannot change without altering the identity of the cocktail. By contrast, as we will discuss in Section 5, all the other *ingredients* are neither necessary nor sufficient for determining the category membership. Still, they are important to determine how close an individual cocktail is to the related prototype concept. Importantly, this does not mean that the spirit is the only necessary *element* of a cocktail recipe. Indeed, many *elements* of a recipe (including other ingredients, but also the preparation method) contribute to some quality dimensions that, if taken in combination, define the category membership of a cocktail. In this sense, very much like the spirit, such dimensions play a necessary role in determining a cocktail's identity. However, there is freedom as to what specific ingredient(s) can provide such dimensions.

#### 4. Necessary Ingredients of Cocktail Recipes

An interesting aspect of the hybrid nature of cocktail recipes is that some of their ingredients seem to be consistently necessary (though not sufficient) to determine the membership criteria, while others seem to behave prototypically. As we will discuss shortly, among the former are usually the spirits. Among the latter, instead, are all the other ingredients. This view is inspired by the observation that, in many cases, the spirit seems to be the ingredients that, *ceteris paribus*, determines the category membership of cocktails concepts. By contrast, certain changes to the other ingredients and procedures are conceivable with no apparent consequence for the category membership.

As a first example, we would like to compare one classical IBA cocktail, *Negroni*, to one recent addition to the list: *Boulevardier*. While these cocktails both contain the same amount of bitter and red vermouth, they differ from each other as regards the spirit: *Negroni* requires gin, but *Boulevardier* needs Bourbon or Rye Whiskey. There are also other elements for which the two cocktails differ from each other, namely, the glass, the method of preparation, and the garnish (see Table 1).

	Ingredients	Method	Garnish
Negroni	30 ml Gin 30 ml Bitter (Campari) 30 ml Sweet Red Vermouth	Pour all ingredients into a chilled tumbler glass with ice  Stir gently	Half orange slice
Boulevardier	45 ml Bourbon or Rye Whiskey 30 ml Bitter (Campari) 30 ml Sweet Red Vermouth	Pour all ingredients into a mixing glass with ice  Stir well  Strain into a chilled cocktail glass	Orange zest (optionally a lemon zest)

Table 1: A comparison between the *Negroni* and *Boulevardier* recipes.

Intuitively, the spirit (gin versus whiskey) is an important difference-maker between the two recipes. By contrast, the other elements that differ between the two recipes do not characterise strongly the cocktail's identity. Indeed, we can conceive of a Negroni that still counts as a *Negroni* even if served in a different glass or if garnished with lime zest instead of an orange slice. Likewise, it is unlikely that a Boulevardier served without any garnish (or a different one, such as a maraschino cherry) will cease to be a *Boulevardier*. As regards the conceptual structure, the concept NEGRONI would have gin as a necessary feature, where all the others may or may not be present; the concept BOULEVARDIER, in turn, would have bourbon or rye whiskey as necessary features, where all the others may or may not be present.<sup>15</sup>

Of course, as we noticed in Section 2, not every change would sound as equally acceptable to the bartender community. For instance, a Negroni prepared into a highball would turn up noses more than a Negroni served with no ice cubes. Likewise, a Boulevardier garnished with a slice of pineapple would be less recognisable than a Boulevardier with a maraschino cherry, although both depart from the official recipe.

<sup>15</sup> One may wonder whether variations in the spirit (e.g., between one gin or another, or between bourbon and rye whiskey) would change the cocktail's identity (we thank two anonymous reviewers for pointing at the question). We will return to this problem in the conclusions.

It is precisely in this sense that all the ingredients of cocktail recipes but the spirit seem to behave prototypically: apparently, none of the changes above would *objectively* modify the cocktail's identity—at most, there would be differing *subjective* judgements about its authenticity. Thus, the prototypical Negroni is served in a tumbler with ice cubes and an orange slice, but a degree of variability between individual Negroni would be acceptable for these elements. By contrast, a Negroni with a spirit other than gin would arguably cease to fall under the concept NEGRONI. This is testified, for instance, by the fact that a Negroni with vodka instead of gin takes a different name ('Negroski') and thus belongs to another category, which depends on a different recipe (the *Negroski* recipe) and falls under another concept (NEGROSKI).

There are many other similar cases on the IBA list. For instance, the recipes of *Sidecar* and *Between the Sheets* only differ from each other in terms of one spirit, namely white rum (as regards the other elements, they both contain cognac, triple sec, and lemon juice, to be shaken with ice and strained into a chilled cocktail glass). *Dry Martini* and *Vodkatini* only differ in terms of their core spirit (gin versus vodka). Nearly every Sweet & Sour cocktail contains the same ingredients but for the spirit. And the list could go on. Overall, we could not identify any counterexample where a cocktail would remain the same cocktail with the introduction of a spirit that was not included in the original recipe.<sup>16</sup>

Notably, we identified some cases that appear to falsify our hypothesis. However, at a closer look, they only reinforced our intuition that the spirit tends to be the major determinant of a cocktail's identity. An interesting case is that of *Daiquiri* and *Margarita* (see Table 2).

<sup>16</sup> Note, however, that spirits cannot be considered individually sufficient conditions for cocktails' identity and category membership. Indeed, cocktails with the very same ingredients (including the spirit) can sometimes belong to different categories depending, for instance, on differences in the glass, the preparation, or even their history. For instance, *Daiquiri* and *Mojito* are two very different cocktails but have the same spirit (white rum). *Gin Fizz* and *John Collins*, instead, only differ from each other in terms of very small details, and there has been much disagreement about their difference and history (see, e.g., <https://cocktailsmelbourne.wordpress.com/2012/07/21/collinses-fizzes-difference>). Moreover, as we anticipated, the spirit might be the only necessary *ingredient* for each cocktail category but is probably not the only necessary *element* (see Section 5).

	Ingredients	Method	Garnish
Daiquiri	60 ml White Rum 20 ml Lime Juice 2 Bar Spoons Superfine Sugar	Shake and strain into a chilled cocktail glass	N/A
Margarita	50 ml Tequila 15 ml Lime Juice 20 ml Triple Sec or Cointreau	Shake and strain into a chilled cocktail glass	Half salt rim (optional)

Table 2: A comparison between the *Daiquiri* and *Margarita* recipes.

At first sight, one might argue that the difference between these two cocktails is not only determined by the spirit, because there is also a difference in the third ingredient (superfine sugar versus an orange liqueur). Is such an ingredient necessary, too? The short answer is no. More precisely, if we reduce the two recipes to their fundamental elements, we can see that the sugar and the orange liqueur contribute to their respective cocktails in a very similar way, that is, by providing a sweet component (note that all liqueurs contain a high concentration of sugar). Thus, we might substitute Triple Sec with simple sugar (and *vice versa*) without altering the identity of the two cocktails. This example highlights very clearly that some ingredients of cocktail recipes behave prototypically: substituting Triple Sec with sugar, for instance, would make a Margarita an *atypical* MARGARITA, but still a MARGARITA. By contrast, putting white rum into a Margarita would transform it in a DAIQUIRI—an atypical one, though.

Another interesting example is a group of Prosecco-based cocktails (*Bellini*, *Puccini*, *Rossini*, and *Tintoretto*) that only differ from each other in terms of their fruit juice (peach, mandarin, strawberry, and pomegranate juice, respectively).<sup>17</sup> This seems to suggest that, in some cases, the actual difference-

<sup>17</sup> This is one of small group of cases where a cocktail recipe does not include any spirit, but rather a wine. In the IBA list, only about 6 cocktails are wine-based, namely, *Bellini*, *Champagne Cocktail*, *Kir*, *Mimosa*, *Negroni Sbagliato*, and *Spritz*.

maker between different cocktails is not the primary base of the cocktail, namely, the spirit or the wine. However, it should be noted that the IBA has classified these cocktails as *variants of the very same cocktail* (i.e., variants of *Bellini*).<sup>18</sup> This suggests that the IBA—and the bartender community more generally—might agree with us that a given spirit (or, in the case of *Bellini*, a wine) is a necessary condition of a cocktail's identity, while major changes introduced in the other elements can generate intra-category variants.

To summarise, while the spirit usually appears to be the major determinant of a cocktail's identity, variations in the other ingredients are somewhat acceptable.

At this point of the discussion, one might wonder whether it is possible to remove an ingredient, instead of just replace it, without altering the identity of a cocktail. So, for instance, what if one removes Triple Sec from a Margarita without replacing it with any other sweet ingredient?

In the next section, we shall turn to prototypical elements of cocktail recipes and analyse whether there are limitations to the variability that can be introduced in such elements without altering a cocktail's identity. We shall propose a non-arbitrary criterion (i.e., one that is not based on subjective judgements) to address the question and a representation of cocktail concepts based on the idea of *conceptual schemes*.

## 5. Prototypical Elements of Cocktail Recipes

As we mentioned above, most ingredients of cocktail recipes tend to behave prototypically, so that they are neither necessary nor sufficient for determining the membership of a cocktail to a category. These ingredients include, for instance, the vermouth (white or red, sweet or dry), bitters, fortified wines (e.g., sherry, marsala, port), sparkling wines, liqueurs, creams, dairy products, syrups, fruit juices, and ice. In contrast to the spirits, such ingredients can change to some extent with no consequence for the identity of a cocktail. Thus, while a given spirit is usually a necessary (though not sufficient) condition for falling under a certain cocktail concept, all the other ingredients seem to determine *how close a given cocktail is to the prototype of its category*.

For instance, the case of *Margarita* versus *Daiquiri* discussed above tells us that tequila is, *ceteris paribus*, necessary for belonging to the category *Margarita*: indeed, if we substitute tequila with white rum, for instance, the

<sup>18</sup> See <https://iba-world.com/cocktails/bellini>.

cocktail becomes a member of the category *Daiquiri*; by contrast, if Triple Sec is replaced with simple sugar, the cocktail still falls under the concept MARGARITA (even if it is an atypical instance of MARGARITA). As another example, the prototypical NEGRONI contains Martini red vermouth, but a Negroni with white sweet vermouth will still fall under the concept NEGRONI, and the same seems to apply to the *Boulevardier* recipe.

Prototypical elements of cocktail recipes also include the decorations, the glass, and various elements of the preparation. For instance, a Sidecar served in a tumbler instead of a cocktail glass will unlikely cease to fall under the concept SIDECAR. Likewise, if a Sidecar is prepared directly in the glass and not shaken, it will probably have a stronger or unpleasant taste but, still, it will be well recognisable as an instance of SIDECAR.<sup>19</sup>

So far, we have assumed that any modification in prototypical parameters of cocktail recipes is somewhat acceptable. However, this is true only as a first approximation. Indeed, we can conceive of a variety of cases where certain modifications would push a cocktail too far from its prototype, with the consequence that its membership to the original category would be at risk. For instance, while putting white sweet vermouth into a Negroni would be acceptable, many experts would probably not accept a Negroni with dry vermouth as an *authentic Negroni*. Likewise, while preparing a Margarita with orange juice might be acceptable, using apple juice would probably not.

Thus, an interesting aspect of cocktail recipes is that there seems to be a sort of *continuum*, for each cocktail, between changes that are clearly acceptable to others that would be considered as ‘heretical’ or even ‘identity-changing.’

This raises the question of how wide the range of acceptable modifications in prototypical parameters is, and whether there is any non-arbitrary or non-conventional way to address the question. Indeed, one might believe that deciding whether or not something belongs to a certain cocktail category is ultimately dependant on conventional or pragmatic aspects, such as whether an expert would assert that “this is an authentic *Negroni*” or that “a Margarita with apple juice is not a *Margarita*.”

In the remainder of the paper, we would like to suggest that there is, in fact, some sort of limitation to which changes in prototypical aspects of cocktail

<sup>19</sup> Note that the main aim of shaking is adding air to the mix, which is particularly important when citrus ingredients are used. “Without the lightness that shaking imparts to the drink, the acidity of the citrus can be unpleasant and intense instead of light and refreshing. And citrus juice and alcohol are very different densities, which means they don’t mix easily” (Henry 2014).

recipes are acceptable and which not. However, importantly, this is not something that is established by mere social convention or agreement, but rather largely depends on the chemical characteristics of prototypical, standardised cocktails.

Our hypothesis is that changes in some ingredients are acceptable as far as they do not *introduce* new characteristics into the cocktail, or *eliminate* some of its important characteristics, along distinctive quality dimensions. To illustrate this, we will refer to the notion of *conceptual space*, introduced by Peter Gärdenfors for providing a geometrical framework for concepts representation (see Gärdenfors 2000, 2004, 2014).<sup>20</sup>

Conceptual spaces (CSs) are metric spaces in which entities are characterised in terms of a set of quality dimensions. For instance, in the case of cocktails, such dimensions would relate to perceptual or sensory information, such as sweetness, sourness, and bitterness, that can be quantified and measured by some sensor. Arguably, each type of cocktail is characterised by some dimensions representing major tastes and flavours. For instance, Cheng-Chang et al. (2010) and Keppler et al. (2014) suggested models of cocktails' composition including the following five dimensions:

- *Bitterness* represents the number of components that bring in flavour, like bitters.
- *Sourness* can be measured by the concentration of ascorbic acid, which is supplied by mixers like lemon and lime juices.
- *Strength* can be measured by the alcohol concentration (if we extend this analysis to mocktails, the value of the Strength dimension in mocktails is zero).
- *Sweetness* can be measured by the concentration of sugar, which is supplied by syrups, liqueurs, creams, and juices, but also from sweet vermouths, sweet fortified wines, and sweet sparkling wines.
- *Weakness* represents the non-alcoholic component, which is supplied by soda water, coke, milk, and fruit juices, but also the amount of ice. The method of preparation can contribute to the Weakness dimension, too. For

<sup>20</sup> For an application of conceptual spaces to wines, see Amoretti & Frixione (2020).

instance, shaking a cocktail instead of stirring it will add more water into the mix.

In order to capture the complete profile of a cocktail, other dimensions can be introduced. Many cocktails, for example, have some herbal flavour that enriches the aromatic spectrum of a cocktail (supplied, for instance, by vermouths and liqueurs, but also by some garnishes). Some cocktails are characterised by astringency, which is determined by the amount of tannins (the value of this dimension would be positive for cocktails prepared with wine, tea, or herbs), as well as by sapidity (determined by savoury elements, e.g., the salt crust in *Margarita*, the Worcestershire Sauce in the *Bloody Mary*, and the olive in the *Dirty Martini*), and spiciness (e.g., the red chili pepper in the *Spicy Fifty*). Finally, cocktails can also be more or less dry, which is a particularly important dimension for cocktails like *Dry Martini*.<sup>21</sup>

Interestingly, if taken together, such dimensions can account for the typical profile of a cocktail of a given category. As we shall explain shortly, CSs provide useful theoretical tools for representing the multidimensional profile of each cocktail recipe, and thus to categorise different kinds of cocktails according to their major quality dimensions. To clarify this, let us consider CSs in more details.

In CSs, concepts are represented as regions of space, and regions with different geometrical properties correspond to different kinds of concepts. Individuals, in turn, are represented as points in such a space. For instance, individual cocktails (e.g., a particular Negroni, a particular Margarita, etc.) are points in a CS. Within this framework, an individual falls under a concept *C*—say, the concept NEGRONI—if and only if the point representing such individual lies inside the space region corresponding to *C*.

The geometrical structure of CSs allows one to calculate the similarity among concepts and prototypes through classical topological or metrical techniques. For instance, the distance between two points—which can be expressed through some metric function—is a measure of the perceived similarity between the two corresponding entities (e.g., between two individual Negroni).

Another interesting aspect of CSs is that they can help assess how close an individual is to the prototype of the concept, and thus why certain members of a

<sup>21</sup> Note that some ingredients contribute to more than one dimension at the same time. For instance, liqueurs contribute to both Strength and Sweetness; some fruit juices contribute to both Sweetness and Weakness. Note also that spirits themselves can contribute to some of the quality dimensions.

category are judged to be more representative of the category than others. Thus, CSs are particularly well suited to describe typicality effects because, in CSs, one can describe positions as being more or less *central*—in other words, a *degree of centrality* can be attributed to each point that falls within the region of a concept. So, in a CS, a prototype will correspond to the geometrical centroid of a convex region, and the degree of centrality of a point (which represents an individual object, like an individual Negroni) can be interpreted as a measure of how close an object is to the prototype concept (in our case, how close an individual Negroni is to the prototype of the concept NEGRONI).<sup>22</sup>

Let us now see, in brief, how CSs would do with the characterisation of specific cocktails.

For example, in a CS, the prototype of the concept DAIQUIRI would have high values in the dimensions of Dryness and Sourness. If a particular Daiquiri will have more sugar than required (for instance, due to the substitution of lime juice with mango juice), the point that represents such an individual cocktail in the CS will be very distant from the region centroid representing the prototype of DAIQUIRI, because scores in Dryness and Sourness would be very low or even zero. In other words, the sweeter the Daiquiri is, the farther it is from the DAIQUIRI prototype. Beyond a certain threshold, the cocktail would not fall under the concept DAIQUIRI anymore.

This suggests that a positive value of Sourness, for instance, is a necessary (though not sufficient) condition for a cocktail to belong to the category *Daiquiri* and to the concept DAIQUIRI. This does not imply that lemon juice is a necessary *ingredient* of the recipe; rather, it means that an *element* providing ascorbic acid to the mix is necessary, no matter what ingredient will provide it.

As another example, putting pink grapefruit juice in a Daiquiri would introduce a positive value to the dimension of Bitterness (which, in this cocktail, is typically zero); again, this would make such a cocktail belong to a different region of space than the one identifying the concept of DAIQUIRI, and it would not fall under the concept DAIQUIRI anymore. Likewise, putting lime juice in a Negroni would introduce a positive value to the dimension of Sourness (which, in this cocktail, is typically zero). As a consequence, such a cocktail would belong to a different region

<sup>22</sup> In a convex region, “for every pair of points  $v_1$  and  $v_2$  in the region all points in between  $v_1$  and  $v_2$  are also in the region. The motivation for the criterion is that if some objects which are located at  $v_1$  and  $v_2$  in relation to some quality dimension (or several dimensions) both are examples of a concept  $C$ , then any object that is located between  $v_1$  and  $v_2$  on the quality dimension(s) will also be an example of  $C$ ” (Gärdenfors 2004, p. 18).

of space than the one identifying the concept of NEGRONI and thus would not fall under the concept NEGRONI anymore.

To summarise, through CSs it is possible to determine the prototype of a cocktail concept and assess the typicality of each of its instances. As regards the identity of a cocktail recipe, our proposal is that changes in its ingredients are acceptable as far as they do not modify the profile of the cocktail by: a) *introducing* new characteristics in the cocktail by setting at a positive value a dimension that is typically zero for such cocktail; or b) *eliminating* a characteristic of the cocktail by setting at zero the value of a dimension that is typically positive.

In the conclusion, we will discuss the implications of the approach above, including the fact that it would allow one to assess—in a non-arbitrary way—what range of variability is acceptable in the elements of a cocktail to preserve the identity of such a cocktail.

## 6. Concluding Discussion

In this paper, we assessed what theory of concepts does better capture the status of cocktail recipes. We argued that cocktail recipes exhibit both definitional and prototypical features: on the one hand, the spirit represents a necessary—though not sufficient—condition for establishing whether an individual cocktail falls under a specific cocktail concept; by contrast, all the other ingredients and procedures listed in cocktail recipes may vary to a certain extent without altering the membership of a given cocktail to its category, and are thus neither necessary nor sufficient for determining the identity of a cocktail (i.e., they tend to behave in a prototypical way). However, such variability in prototypical aspects of cocktail recipes has some limitations as regards the removal and replacement of the ingredients.

In order to determine, in a non-arbitrary way, the degree of acceptable intra-category variability of cocktail recipes, we proposed to identify some possible quality dimensions of cocktail recipes and represent cocktail concepts through conceptual spaces (CSs). In this context, CSs would allow one to determine how close an individual cocktail is to the concept prototype. We argued that changes in the ingredients of a recipe are acceptable as far as they do not introduce new characteristics into the cocktail or eliminate one or more of its typical characteristics. Thus, some quality dimensions are, like the spirit, necessary for determining the identity of a given cocktail. However, unlike the spirit (which usually is a necessary ingredient of cocktail recipes), the presence of other ingredients is not necessary as the quality dimensions can be provided by a

variety of different ingredients. In other words, the replacement of ingredients other than spirits is usually possible, but removal is not.

An aspect that is yet to be discussed is the relationship between cocktail concepts and their ‘metaphysical correlates,’ so to speak, i.e., cocktail recipes. Although it is beyond our aim to discuss this thoroughly, it is worth delineating some potential lines for future research.

If cocktail concepts have the hybrid structure we delineated in this paper, which involves both definitional and prototypical elements, a theory of cluster kinds would represent a very palatable option for describing the ontological status of cocktail recipes.<sup>23</sup> However, determining what precise cluster kind theory does better capture such status needs a bit of figuring. Indeed, there is general disagreement about whether cluster theories of kinds should admit the existence of essentialist plus prototypical elements or no essentialist elements at all. A hybrid structure, like the one we identified in cocktail recipes, seems to characterise Richard Boyd’s original Homeostatic Property Cluster theory (HPC; see Boyd 1991), where he hypothesised the existence of properties that tend to be statistically associated to each other and essentialist elements, such as an homeostatic mechanism (for an essentialist interpretation of HPC, see Samuels 2007).

This hybrid interpretation, combining one (or more) necessary homeostatic mechanism(s) and a cluster of statistically associated properties, is widely held among scholars (see Lipski 2020; Onishi & Serpico, forthcoming). However, Boyd also accepted that properties in cluster kinds can sometimes ‘stick together’ without the involvement of any homeostatic mechanism (Boyd 1999). Since then, many cluster kinds theories (e.g., Jantzen 2015; Khalidi 2013, 2018; Slater 2014) have put much emphasis on the association of properties (which, at the conceptual level, would correspond to prototypical aspects of cocktail concepts) but have ruled out essentialist elements like a homeostatic mechanisms (which would correspond to definitional aspects of cocktail concepts). This makes it not straightforward the correspondence between cluster kinds and hybrid conceptual structures.

Another aspect that remains unaddressed regards the variability among the possible spirits characterising cocktail recipes. Although a given spirit is a necessary condition for the conceptual status of a cocktail, it is unclear whether variations in the spirit (e.g., between one gin or another, or between bourbon

<sup>23</sup> We thank an anonymous reviewer for suggesting this.

and rye whiskey) would change the cocktail's identity. In our understanding, the spirit can determine the identity of a cocktail regardless of any possible variations as to its characteristics. To justify this, it is important to clarify that cocktail recipes (like many other types of recipes) require some reference to the level of abstraction of the analysis. In this sense, a cocktail can require some given kind of spirit (e.g., simply gin) rather than a specific gin (e.g., Tanqueray Gin).

The reference to a certain level of abstraction is important to avoid inconsistencies like the following. At higher levels of abstraction, the *Negroni* and *Boulevardier* recipes will result in the very same cocktail, because their recipes will just require putting a spirit, a vermouth, and a bitter in a cold glass—notably, at very high levels of abstraction, many cocktail recipes would end up being the same recipe (for instance, “put a spirit, something sweet, and something acid”). By contrast, at lower levels of abstraction, the recipes will result in two different cocktails, because each of them will require to put *this* spirit.

Notably, the appropriate level of abstraction can be cocktail- or spirit-relative. For instance, most recipes in the IBA list seem to assume a level of abstraction that categorises rye whiskey and bourbon as the same spirits (maybe because they both are cereals distillates and have very similar characteristics). By contrast, three classical IBA recipes (*Casino*, *John Collins*, and *Tuxedo*) require Old Tom Gin, instead of simply gin. In cases of this sort, some conventional or historical elements might be at play.

Finally, let us stress that our proposal has a normative component that will be hopefully appreciated by the IBA community (remind that providing normative criteria for cocktail recipes is among the aims of the IBA itself, see Section 2). In particular, further investigation of the conceptual spaces of cocktail recipes could allow us to determine to what category any given atypical cocktail belongs, if any. So, the analysis opens the possibility to generate prescriptive requirements for identifying a cocktail  $x$  as a cocktail of *that* kind.

Moreover, representing the prototypical structure of cocktail concepts can be useful to understand how the same cocktail recipe can be prepared—at different times, in different places—with different ingredients. From a practical point of view, this may facilitate communication among bartenders from different communities and allow personal interpretations of the very same cocktail recipes.

## REFERENCES

- Amoretti, M. C., & Frixione, M. (2020). Representing wine concepts: A hybrid approach. *Applied Ontology*, 1-17. <https://doi.org/10.3233/AO-200239>
- Borghini, A. (2015). What is a Recipe?. *Journal of Agricultural and Environmental Ethics*, 28(4), 719-738.
- Boyd, R. (1991). Realism, anti-foundationalism and the enthusiasm for natural kinds. *Philosophical Studies*, 61(1-2), 127-148.
- Boyd, R. (1999). Homeostasis, species, and higher taxa. In R. A. Wilson (Ed.), *Species: New Interdisciplinary Essays* (pp. 141-85). MIT Press.
- Cheng-Chang et al. (2010). Evaluation Teaching Cocktail with the Instructional Module of Cocktail. *International Business Management* 4(2), 57-66.
- Dietsch, M. (2012). Cocktail 101: Cocktail Making in Theory and Practice. Serious Eats: <https://drinks.seriouscats.com/2012/07/cocktail-101-cocktail-making-in-theory-and-practice-what-is-balance.html>.
- Gärdenfors, P. (2000). *Conceptual spaces: the geometry of thought*. Cambridge, MA: MIT Press.
- Gärdenfors, P. (2004). Conceptual spaces as a framework for knowledge representation. *Mind and Matter*, 2(2), 9-27.
- Gärdenfors, P. (2014). *The geometry of meaning: semantics based on conceptual spaces*. Cambridge, MA: MIT Press.
- Henry, A. (2014). When to Shake and When to Stir a Cocktail. *Lifhacker*: <https://lifhacker.com/when-to-shake-and-when-to-stir-a-cocktail-1586123018>.
- Jantzen, B. C. (2015). Projection, symmetry, and natural kinds. *Synthese*, 192(11), 3617-3646.
- Keppler, M., Kohlhase, M., Lauritzen, N., Schmidt, M., Schumacher, P., & Spät, A. (2014). Goetheshaker-developing a rating score for automated evaluation of cocktail recipes. *Computer Cooking Contest Workshop*, Cork, Ireland.
- Khalidi, M. A. (2013). *Natural Categories and Human Kinds*. Cambridge University Press.
- Khalidi, M. A. (2018). Natural kinds as nodes in causal networks. *Synthese*, 195(4), 1379-1396.
- Lipski, J. (2020). Natural diversity: A neo-essentialist misconstrual of homeostatic property cluster theory in natural kind debates. *Studies in History and Philosophy of Science Part A*.

- Manzo, L. (2017). *International IBA Cocktail Book: A journey through the 77 cocktails that every barman should know*.
- Manzo, L. (2019). *How to taste cocktail and spirits like a pro: IBA official cocktail*. Albino: Sandit s.r.l.
- Margolis, E. & Laurence, S. (2019). Concepts. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy*. <<https://plato.stanford.edu/archives/sum2019/entries/concepts/>>.
- Onishi & Serpico (forthcoming). Homeostatic Property Cluster Theory without Homeostatic Mechanisms: Two Recent Attempts and their Costs. *Journal for General Philosophy of Science*. <https://doi.org/10.1007/s10838-020-09527-1>
- Samuels, R. (2007). Is innateness a confused notion? In P. Carruthers, S. Laurence, & S. Stich (Eds.), *The innate mind: Foundations and the future* (Vol. 3, pp. 17–36). Oxford: Oxford University Press.
- Slater, M. H. (2015). Natural kindness. *The British Journal for the Philosophy of Science*, 66(2), 375–411.