

## THE TRUE TASTE OF A WINE?

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### ABSTRACT

Psychologists and neuroscientists tell us that flavour is the result of multi-sensory integration of olfactory, tactile and taste impressions, modulated by tasting's dynamic time course and the location of sensory stimuli in the mouth. According to this definition, the flavour of a wine is a psychological construct that can vary from subject to subject as a result of different threshold sensitivities tasters have to acid, tannin, sugar, alcohol, CO<sub>2</sub> and sulphur. To this description we could add the hedonic values that get painted on to particular sensations. Lighting conditions, mood, and even sounds can affect our experience of tasting, and wines can be enhanced or distorted by accompanying food choices. All of this suggests that wine makers have very little influence over the resulting experience drinkers of their wines will have. However, we must distinguish between the experience of drinkers and the flavours of wines. The relationship between them is far from simple and in spite of the careful findings of psychologists and neuroscientists, and the wilder claims of wine writers, there is still room for the idea of flavour as a multi-dimensional, objective property of a wine that depends both on its chemistry and the needs and interests of those who make and consume it.

### INTRODUCTION

Is there such a thing as the true taste of a wine? Many people will tell you that there isn't. The common opinion of both sensory scientists, novice tasters and wine writers is that tastes are created by how we respond to a wine rather than residing in properties of the wine itself. For example, if you like a wine and I don't, it is often assumed that the way it tastes to you must be different from the way it tastes to me. However, this either assumes that how a wine tastes to someone includes their liking or disliking of it, or that if the wine tasted the same way to both of us we would both like it (or dislike it). And yet a more plausible explanation is that it tastes similar to both of us but that you like that taste and I don't. For this reason we should distinguish how a wine tastes to us from our hedonic reaction to it. Work in neuroscience shows that different brain areas are involved in recognizing a taster's intensity and responding to it hedonically. Moreover, our judgements of the identity and intensity of a stimulus stay constant when its hedonic value changes, as is shown in the case of stimulus-specific satiety. (Kringelbach and Stein 2010). These findings enable us to separate how a wine tastes to someone and their liking (or disliking) of it. But how a wine *tastes to me* or *to you* at a time is still quite different from talking about the taste of the wine itself. Not all experiences of a wine provide an accurate guide to the wine's true characteristics. We know that if we consume lemon juice in a salad dressing when drinking a white wine, the wine will taste flat, and yet, we also know, as practiced tasters, that our experience of the wine at that time does not reflect the true taste of the wine.

### TASTING AND FLAVOUR PROFILES

We need to distinguish between a wine's tastes, on the one hand, and the sensations and reactions people have to a wine's tastes, on the other. A taster's experience of a wine at a time depends not only on the condition of the taster and the condition of the wine, but also the taster's level of perceptual acuity, knowledge and understanding. There is no guarantee that all the tastes a wine has will be equally accessible to just anyone who tastes it. The way a wine tastes to different people, on different occasions, will depend on the context in which they taste, *how* they taste the wine, their expectations, what they know about the wine, and their previous experience, if any, with wines of this type from this region. Even then, how a wine tastes to someone at a given moment is only a snapshot of a complex and evolving flavour profile that extends far beyond that moment, showing to those who can interpret the signs, the distinctive characteristics of the wine. From these signs they may come to know the state of the wine's development, its evolution in the bottle, and in the glass, its quality, and any defects it may have. It is these more enduring flavour properties that we try to get hold of and attend to by noticing the effects wines have on us on us while tasting. They are the true tastes of wines.

The failure to map out the complex territory from how a wine tastes to individuals at certain times, to the wine's more extended flavour profile creates a formidable challenge for anyone seeking to understand the relationship between a wine's chemistry and tasters' perceptions of its flavour. For there is little chance of mapping the underlying molecular compounds to the varying and fluctuating sensory perceptions of different tasters at different times. But this is not what we should be attempting to do.

The proper goal is to understand the chemical basis for the more enduring, emergent properties of flavour profiles that we try, as experienced tasters, to identify through the repeated series of snapshots tasting provides.

### **TASTING AS SENSATION OR PERCEPTION**

So far we have said enough to reject a pure sensation view of tastes, according to which taste sensations are not about anything beyond themselves. On this view the way something tastes is immediately known to us and is exactly as it appears. This is because sensations are properties of our experience. But the taste properties of wines that we attend to are not just aspects of our experience; they include properties like the silk or satin texture of a wine, which are not properties of our sensations but properties of the wine.

Tasting is not just about sensations. It produces perceptual experiences, which, with understanding and practice, reveal how things are with respect to properties - flavour properties - of foods and liquids themselves. We learn about a wine's properties through sensations, but sensations are not the objects of perception: these are flavours. In saying this we face some difficult questions. Why are flavours so difficult to identify and why are they so hard to explain?

### **TASTING AND FLAVOUR PERCEPTION**

A more sophisticated challenge to the view that wines themselves have tastes or flavours comes from recent findings in cognitive psychology and neuroscience about the nature of tasting. It is now widely accepted that the senses do not operate in isolation but typically interact to combine inputs from different sensory channels into single, unified experiences. This is especially true in tasting. We do not taste with our tongues alone. The experience of tasting results from the multi-sensory integration of information from touch, taste, and smell, modified at times by our expectations (Yeomens et al. 2008). Touch provides information of how creamy a sauce is, or how oily a wine is. The remainder of what we ordinarily call *taste* is actually a mixture of taste and smell. People are mostly unable to separate these components in experience, since the type of smell involved is retronasal olfaction, which occurs when we exhale and odours travel from the mouth to the olfactory receptors at the bridge of the nose. Retronasally detected smells provide the largest part of what we call taste, which is why people who lose their sense of smell often think they cannot taste anything. When questioned, patients will admit they can taste basic gustatory qualities like salt, sweet, sour, bitter, savoury and metallic, but everything else, missing from their taste experiences, is due to retronasal olfaction. It is because what we ordinarily call *taste* involves olfaction, gustation and oral-somatosensation that food scientists prefer to use the word *flavour* to describe what we experience. Flavour perception is, arguably, one of our most multisensory experiences, drawing as it does on several senses including, according to some, audition and vision (Zamprini & Spence 2004).

Multi-sensory perception is wide-spread. We do not just hear with our ears, we use our eyes to locate the apparent sources of sounds, as happens in the cinema when we 'hear' the sounds of voices coming from the actors' mouths on the screen although the sounds are actually coming from the sides of the theatre. This is known as the ventriloquism effect. (Alais & Burr 2004). Similarly, retronasally detected odours are experienced as tastes, and thought of as occurring in the mouth even though they are produced by olfactory receptors in the nose. They get re-located to the mouth, just as the sounds of cinema actors' voices get re-located to the mouths on the screen. This location illusion is due to oral sensations capturing our attention and making it seem as though retronasally produced olfactory experiences are occurring in the same place: the mouth. As well as these multi-sensory integrations of different inputs, there are cross-modal effects where activity in one sense boosts activity in another. Manufacturers know that certain odours in shampoos can make hair 'feel' softer; and drinks manufacturers know that liquids coloured red appear to taste sweet, while liquids coloured green appear to taste sour. (Spence et al. 2010). Odour-taste interactions, such as the sweetness enhancement effect, occur where combining a liquid with the aroma of vanilla makes what we sip 'taste' sweeter than it does when tasted on its own (see Stevenson 2009 for a summary).

### **FLAVOUR AS PSYCHOLOGICAL CONSTRUCT OF REAL PROPERTY?**

The way perceptual processes unite disparate elements into single percepts have led psychologists and food scientists to think of flavours as psychological constructs, something manufactured by the mind in response to different sapid and odorous substances. (Prescott 1999). However, the psychological findings concern the manufacture of *flavour perception*, not the manufacture of *flavours* themselves.

We need to distinguish flavour and flavour perception just as we distinguish sound and sound perception, colours and colour perception. Flavour perception arises from the integration of separate sensory inputs: flavour does not. The sapid, odorous and textural properties of flavoured substances give rise to sensory inputs in tasters that get fused into unified percepts of flavour. Unlike sounds and colours, flavours can only be experienced through the combined workings of several sense modalities. Multi-sensory integration unites information from different sensory inputs into perceptual experiences of flavour, where the exact nature of those experiences depends on the precise arrangements of textures, odours, tastants (and irritants perhaps) that generate the sensory inputs. These fused multi-sensory experiences enable us to track emergent properties of the precise chemical configurations in wines that produce such integrated experiences. It is the delicate configurations of a wine's compounds, and their desired characteristics, that tasters respond to, and wine makers aim to produce. In terms of chemistry, flavours arise from multi-dimensional clusters of odorous, sapid and textured substances that affect our olfactory, gustatory and oral-somatosensory systems. In terms of psychology, flavours are the relatively stable properties of foods or liquids we latch on to through a varying set of tasting responses. The task of the flavour perception system is to track the presence of flavours in foods and liquids in order to guide successful food choice.

### **SINGLE FLAVOURS**

The stability of flavours is often questioned because of individual differences in the thresholds sensitivities of tasters. And yet beyond the range of basic tastes – salt, sweet, bitter, sour, savoury and metallic – there is a large class of single (not simple) tastes that people can easily recognize and agree upon on: strawberry, coconut, peppermint, banana, onion, raspberry, aniseed, cinnamon (Sibley 2001). We do not regard such singular tastes as combinations of other flavours, but as distinctive flavours in their own right. We name them by the items that have those flavours. By contrast, wines of any interest have distinctive but complex flavours that result from combining several single elements into a harmonious whole. The more successfully they combine, and the more unified our experience of the wine's overall flavour, the more difficult it is to discriminate the component parts without training. A wine's flavours may be precise and distinctive but lack a name. Although with experience we learn to name particular flavour constellations. We speak about a wine having the taste of a Mersault or a Volnay, even though we expect there to be room for variation within these categories. With enough experience, the category may become well enough fixed for one to classify a wine sample as being uncharacteristic for a Mersault, or to think of this uncharacteristically robust Volnay as more like a red Chassagne-Montrachet. Dividing up wine flavour space in this way on the basis of perceptual experience and prior knowledge can provide categories that make sense to ourselves and to others. Here we value, accurate and perceptive tasters whose insightful descriptions can bring something we are trying to fix on into sharper focus.

### **FLAVOURS AND COMPOUNDS**

The flavours that human tasters can appreciate depend on the precise configuration of textural, odorous and sapid properties in foods and wines that affect our gustatory, somatosensory, orthonasal and retronasal systems, leading to unified perceptions of flavours. These unified perceptions are produced by cross-modal effects and multi-sensory integration, but that doesn't make the flavours we perceive any less real. Substances with a single flavour can produce several effects on us at once. Take menthol notes, which we sometimes detect in wines. Here we have a mint-like flavour that is slightly bitter and cool in the mouth. It is produced by a bitter taste, a mint-like odour, and irritation of the trigeminal nerve, producing what is perceived as a 'cool' sensation without any change in temperature. Gustatory, olfactory and trigeminal systems are all required to produce the unified experience by which we perceive *accurately* the menthol flavour of a single substance. As for the sweetness enhancement effect, its robustness means that the resulting taste experiences count as genuine perceptions of the flavour of a wine, provided the effect is due to a taste-inducing odour from the wine rather than something external to it. In this case, it is not an illusion, like the ventriloquism effect mentioned above, but an example, unlike menthol, where more than one substance produces the perception of a singular flavour.

Chemical explanations may be straightforward where we are dealing with single flavour ingredients. Yet in wines of any interest there will be numerous flavour ingredients that make up the wine's overall flavour. The less integrated the flavour ingredients, the easier they are to detect and explain. This is why it is easier to describe and identify the parts of an imperfect wine whose components stand out and do not come together either in the wine or in our perception of it. It is conditions like these that enable oenologists to develop a small but technically accurate tasting vocabulary to describe wine faults.

However, the more complete and harmonious a wine, and the more integrated the various sensory inputs it gives rise to, the more difficult it will be to discern its various flavour ingredients and trace its chemistry. Something happens with such a desirable coming together of elements to give a great wine a complete and precise flavour; which we recognize it without being able to say very much about it.

### **ANALYSING FLAVOUR**

The two obstacles to identifying the ingredients, and from there, the chemistry of a wine's flavour are the inherent difficulty of tasting, and the fact that the more complete and harmonious a wine, the less easy it is, even for experienced tasters, to identify its flavour ingredients. Also, experience is required to recognize the stage a wine has reached: how it is evolving in the bottle and in the glass. The flavour profile of a wine is not immediately recognizable even by experienced tasters, and not always recognised by all tasters. Tasters need to explore a wine with certain ideas in mind. In this way, tasting is a demanding exercise, as different from drinking as listening to music is from merely hearing it. Tasting requires skill, attention and active search. We need to concentrate on what the wine shows us, noting how it travels across the palate, how its flavour changes from start to finish, how it combines high and low notes, and how its acidity balances the sweetness of the fruit. Knowledgeable tasters will register the presence or absence of qualities at certain stages of tasting: the purity of fruit at the beginning, the depth of the mid-palate, the persistence in the finish. Special analytical tasting skills are needed to separate out each aspect of flavour while retaining the ability to tell synthetically how well they combine as a whole. We cannot concentrate too much on any one element without distorting our perception of the others. Tasting is thus a balancing act between receptivity and probing, and is always at risk of missing its target.

### **A QUESTION OF BALANCE**

But what we set out to recognise – the flavour profile of a wine – is something that comes about through a series of decisions of the wine maker that govern the expression of those vines from that soil in that season. Wines are not merely ways to produce agreeable sensations in us. We should see them as achievements of wine makers who aim at certain characteristics and qualities in the wines they produce. They aim for harmonious and balanced wines, and often for wines that will only come into balance several years hence. If we know wines from that region, vineyard or domain, we may know what the wine maker is searching for and aiming to express, and we may be able to tell how close he or she is to achieving that aim in this vintage. The wine makers themselves will always know whether they achieved their aims in a given year. Understanding and experience will provide knowledge of how the wine is developing in the glass, how it has developed in the bottle, under what conditions it will reveal its best, and when it is likely to peak; all of which guides our choice of when to drink it. Many of these characteristics and choice points will be a matter of human judgement and values, but that does not make the facts of flavour subjective. The property of balance in a wine, depending as it does the *perceived* harmony of elements by human tasters, cannot be reduced to the chemical sum of its parts. But it is none the less objective for that reason. It still depends on a relatively stable configuration of odorous, sapid and textured elements that that we, as human tasters – or the majority of us at any rate – find balanced, and prefer to other configurations, whether we have the concept of balance or not. The better integrated the fruit and the acidity, the oak and the alcohol, the more likely the wine is to give rise to an integrated perception of flavour that tasters find pleasurable. Balance is hard to achieve in wine making and it is not merely a matter of personal opinion. Successful wine making produces balanced wines and in trying to bring this about wine makers are interested to know why things turned out less well under some conditions than others. They are keen to know what role the decisions they made in the vineyard, or during fermentation, or throughout the *elevage*, or at bottling, may have had on the wine's resultant flavours. Here the sciences of oenology and chemistry are invaluable. At every stage, careful wine makers will be aware of, or will learn the effects of, any decision on other attributes of the wine. Much is known about good practices in the vineyard, but more remains to be learned about the subtle interactions in the winery.

We are finally in a position to say why we should speak of the true taste of a wine rather than speaking of the many ways it tastes depending on who is drinking it, or its temperature, or the glass in which it is served, or the food with which it is consumed. The way a wine tastes will vary under all these conditions but what allows us to say that there is one true or correct taste for a wine is the flavour profile that results from the aims and achievements of the wine maker. Good wine makers search for something from grapes grown in particular soils. They intervene to guide the process of growing and fermentation and do so because of what they are trying to achieve, aspiring to make wines that express certain qualities of place. Year by year they learn how best to capture what is given by nature and how

to channel it towards the production of a wine of a certain style characteristic of the domain or the region. The characteristics they search for provide continuity from one vintage to the next. Each vintage they know, or come to discover over time, how close they were to meeting their aims, or whether there is any weakness or dilution in the wine. And in learning what they have achieved in those wines, we come to know this too. Such knowledge will teach us at what temperature the wines should be drunk, or in which kind of glass they will show at their best. We will know when a food masks or flatters the flavours found in wines of that year. Through long experience, wine makers know what their vines can produce and how this can be affected by the weather, and so they act to guard or promote certain flavours. Human values and preferences will occur at each stage to set the goals for nature, science, and the skill of the wine maker. But in each new season there will be facts about a wine's emerging flavour profile that determines whether those goals were met.

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