Chapter five

The Power of Tastes
Reconciling Science and Subjectivity

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> ‘She uncorked it and put it to her lips. 'I know something interesting is sure to happen, she said to herself, whenever I eat or drink anything, so I'll just see what this bottle does'.’
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> (Lewis Carroll, *Alice in Wonderland*, Chapter IV)

However complicated and puzzling philosophers may appear when talking about wines, they don't depart that much from ordinary people : both feel concerned by the same range of issues, raising questions and doubts about the way we come to perceive and characterise wine, the reliability of our evaluations and the relative importance of the art of tasting. Am I objective when I say that this wine tastes like ripe pineapple, or do I just indulge in association of memories, condemned to remain purely personal? Do I try to find rare tastes or fine adjectives to conform to a social ritual, in an arbitrary and perhaps pretentious way? But, even if socially codified, do these practices and ways of talking about wine transform the experience we have of it? And what about so-called experts and other impressive connoisseurs that influence our judgments – and purchases – by convincing us to take their opinions as a reference point?

These questions are raised by philosophers as much as between friends or colleagues at the end of a dinner party. The philosophers' answers will probably differ on the kinds of arguments they accept and the kinds of conclusions they expect to reach. Yet both groups, when questioning the way we perceive, appreciate, and come to know wine, take for granted 'what there is' to perceive, appreciate and know – i.e. an alcoholic beverage obtained from fermented grapes. This idea might be complemented by additional knowledge and information, gathered sometimes by chance, sometimes through the itinerary of the amateur, from vineyards, salons or brief talks with professionals. Cellar-men, talkative wine-makers or passionate friends may all be eager to share their

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knowledge. Thus one comes to know that differences in wine are explained by differences of grapes or that fermentation, even if it is a 'natural' process, occurring sometimes without external intervention, requires controlled conditions, great care and expert assistance to produce a drinkable wine that satisfies ‘appellation’ standards. In the end, without expecting too much, we can attribute to anyone with a minimum knowledge about wine the default opinion that wines taste as they do because of their composition; or more precisely, because of their chemical composition.

The wine connoisseurs’ knowledge appears to be a refinement of this – the ability to name various grape varieties and identify different primary aromas, distinct from secondary and tertiary ones added by *vinification* and *élevage*. Mourvèdre, Carignan, Barbera or Zinfandel contribute differently to a wine’s taste: one of the numerous interests about wine is to appreciate these differences, to be able to identify specific characters and discover more of them. What it means to make progress in our wine tasting, and what it is to know the difference made by makers, labels, vintages or Parker points, are subjects worthy of inquiry but not ones I wish to discuss here. Instead of observing the way wine knowledge develops, I am interested in the basic assumptions on which most of its development relies – namely, that everything is explained by the chemical composition of wine.

What do we really mean by saying that taste is in the wine? Is it *located* in it? Does it then *impress* us? Whether we simply receive it or react to it in a specific way makes a huge difference to what tasting reveals. And if taste is a property of a wine’s chemical composition, why should it be distinguished from it? However, if taste occurs in us, as it seems, shouldn’t it be located in us, and treated as a property of us? How can taste be

really shared then? Perhaps taste lies somewhere 'in between' a wine's chemical properties and the taster? But what strange sort of property could it be? Are there laws of taste than account for the way this or that wine tastes to anyone in every possible circumstance?

The problem here reminds us of the long philosophical quarrel about the so-called 'secondary qualities', i.e. colours, smells, tastes, feelings of cold and hot, famously distinguished by John Locke from the 'primary qualities' of shape, extension and solidity. The latter characterise physical reality, independent of us, and the corresponding ideas are thus considered to be objective and the proper domain of science, whereas the former are linked to our subjective impressions, and correspond only to the powers things have relative to us. They are 'secondary' for they depend on the way we react to things that are there first.[1]

This distinction, all the more fundamental since modern science is built on its assumption, raises important questions about our knowledge, and challenges our opinion about the objectivity of taste[2]. But it also concerns the proper object of our tasting: what is there in the wine that corresponds to, or causes, our tasting experience? Is there a way

[1] This is ambivalent: 'first' may mean 'necessarily', for no experience of secondary qualities is possible in their absence, and 'essentially', as they account for what the thing really is, whereas secondary qualities are accidental and may vary without the identity of the thing being lost. The Lockean distinction (*Essay Concerning Human Understanding*, esp. vol. II, viii, 10) has given raise to numerous discussions and interpretations.

[2] On these issues, see Barry Smith's chapter, this volume.

to decide whether wines really have the distinctive properties that they appear to us to have? And what sort of properties are they?
These are important issues for discussion, and quite new ones, given that smells and tastes have been noticeably despised by philosophers and aesthetes. A better understanding of their complexity has much to teach us about sensory qualities. But first, I would like to see why these questions can be raised specifically in relation to wine.

CULTIVATING TASTE WITHOUT SCIENCE

'Wine is regarded by the French nation as a private good, as its 360 kinds of cheese. It is a totem-beverage, analogous to the milk of the Dutch cow or to the tea ceremoniously absorbed by the English Royal Family.' (Roland Barthes, *Mythologies,* 1957*)*

Although we know that taste is a 'chemical sense'[3] or are aware that the wines we now enjoy owe much to chemistry (so that we fortunately drink wines very different from those consumed in Classical times, by monks in the Middle Ages or by eighteenth-century aristocrats), science has almost no role in *our* tasting. We care not at all that the slight mushroom aroma of the Vosne-Romanée Méo-Camuzet 1994 we drink may be due

[3] Smell and taste are chemical senses, meaning that they are reactive to molecular determinants (the exact nature of which is still debated). The linking or interaction of molecules and our sensors induces a complex chain of reactions, leading finally to their encoding and producing information in the relevant perceptive areas of the brain (the olfactory cortex but also the higher cortex). Complex models have of course been elaborated, but for our purposes a basic picture will suffice, as agreed by scientists and common sense. For a more detailed account of olfaction and taste, and a glimpse at competing interpretations, see Doty (2003) , Shepherd (2005) and about wine, see Goode ((2005) and this volume).

to the presence of 1-octen-3-ol and its cherry taste to benzaldehyde. Actually, the question that is worth posing about wine and science would rather be : why do wine amateurs show so little interest in chemistry?

Our practices may be so conservative and traditional that we prefer to ignore the more modern aspects of wine-making. Are we so self-deluded to suppose images of *terroir* and oak barrels are more picturesque than those of chromatographic analysis and aluminium tanks? The former are clearly more popular with the public and are exploited by wine advertising, but they also enjoy a cult-like devotion among wine aficionados. Choosing wine instead of garish cocktails gives us the feeling that we are participating in a deeply-rooted culture, instead of running after a febrile and hyped modernity. But there is a kind of conflict here. If wine is such a natural product, then it doesn't need science or improvement. But if it is so natural, then it should also obey scientific laws, and be less richly surprising.

Contradictions and tensions in our images of wine may be the sign that there is something going on that has to do with the 'mythology' or 'totem' worshipping Roland Barthes pointed out in French culture. But there may be more to it than that. Our ignorance and putting aside of wine's technical aspects is acceptable provided we do not need chemical analysis[4] to enjoy drinking: what we taste and enjoy are indeed flavours, smells and aromas, not molecules. And not only does it seem irrelevant to our pleasure, it also seems to conflict with it. Chemistry breaks the charm of surprises in tasting, reducing it to the

[4] This is a distinct and more restrictive question than the one raised by Kent Bach about whether we need *any kind* of knowledge or even any *resort to language* to enjoy wine. Yet the two may be related.

causal mechanism of shapes of molecules and sensitivity of receptors. Who could bearably substitute for the stream of epithets and metaphors, so delightful and specific to our half-poetical drinking moods, the barbarian names of molecules, all in –yde and –ol endings?

Chemical knowledge is not needed to taste wine and is not even of the first importance to make or 'grow' it, as Paul Draper nicely puts it, by an analogy with the education of children (see his chapter in this volume). What is needed is mainly patience and care, and scientific expertise seems quite external to the matter. It is required only as a check or when problems occur. Chemists, as much as educational specialists, are not supposed to tell people what to do but to help them to perform what they are trying to do. Chemists can confirm that the alcohol by volume of a wine is less than 16%, that no dangerous bacteria are developing and they may, at best, suggest hypothetical solutions to solve problems noticed by tasting or previous analysis. They cannot substitute for the art of winemakers, which remains irreplaceable in at least two respects. First, there is the *art of appreciating*, by which the ripeness of fruits, the tastes of fermentation, the way the young wine develops and other relevant qualities are estimated and on which processes are finally decided. Second, there is the *ability to form an idea of the future of the vintage*, of the kind of wine it could be, where this influences selection, *assemblage* and growing choices.

Chemists can neither substitute for the inexhaustibly surprising wealth of *terroir*s, soils and climates – otherwise fine wine would already be being produced in laboratories and wine flavours obtained by synthesis. Thus, when Château Rieussec, a Sauternes, is poured into your glass and smells of ripe pineapple and honey, it is not because it

happens to contain some ethyl butyrate and phenylethylic alcohols; it *contains* ethyl butyrate and phenylethylic alcohols because they have smells of pineapple and honey, and the wine-maker has cultivated them. A proper account of wine could not do without the subjectively perceptible qualities, which science and positivism ignore and elsewhere try to eliminate. Chemical indicators are taken into account afterwards and only as a confirmation or negative assessment. In France public health bodies and the Appellation Commission[5] exist to check the *absence* of any undesirable elements or the *minimal agreement* with a range of criteria (being less than 16% alcohol by volume, for instance) but they have nothing to say about the positive qualities of the wine, such as the qualities of taste or balance. In professional tasting sessions and competitions, chemical analysis plays only a secondary role, being used to confirm expert's judgements. No chemical diagnosis can decide in itself the quality of a wine. Wine thus comes with serious ambitions – putting our pleasure before science, and trying to submit the laws of chemistry to the edicts of our sensitivity.

Rating the art so high above the science thus does not rely only on a romantic or picturesque idea of wine growing, however pleasant and central this idea may be. For instance, a wine cannot be modified too many times without acquiring a recognisable taste that suggests it has been 'over-worked'. For this reason, some laws forbid the selling as 'wine' of a beverage that has been worked on more than three times. Inscribed then in

[5] The INAO (Institut National des Appellations d'Origine) formed in 1947 is the successor of the Comité National des Appellations d'Origine (CNAO) created in 1935. It states the standards for the famous AOC (Appelation d'Origine Contrôlée). The concept of AOC and the juridical assessment of the regional quality standards are not that recent : they were launched to protect the wines of Porto in the middle of the eighteenth century. For a more detailed account, see Hinnewinkel (2004)

our *definition* of wine, related to its essence and part of our experience of it, is the fact that wine results not only from technology and synthesis, but also remains a natural product. We appreciate the matter, not just the form or style of making.

BLENDING SCIENCE AND WINE

At this point, it is important to distinguish between two things: on the one hand, the fact of knowing chemistry, which seems quite irrelevant to having a proper experience of wine, and, on the other hand, the facts described by this knowledge, which may be less easy to ignore in the determination of this experience. I can live without knowing how blood circulates and without being aware of the way the immune system works, but I cannot live without my blood circulating and my immune system working properly. I can enjoy wine without being aware of wine chemistry, or even chemistry in general, but this does not mean that chemical molecules do not play any role in my experience.

Which science?

By 'the science of wine', we do not mean the knowledge possessed by sommeliers and expert tasters, who aim at deference toward the wine, but rather that of laboratory scientists whose analysis involves treating wine roughly, both in the handling and in their reductionist account of it.

A scientific account of wine has it as a liquid composed of molecules, and molecules are no more sweet or perfumed than they are white or red. They are characterised by their shape and structure, analysed in terms of forces exercised between atoms and sub-

particles. The micro-particles combine in the wine and then combine with the sense receptors to cause the taste we experience. The proper task of chemical analysis is to separate and classify molecules, and this can now be performed minutely for wine. The history and progress of oenological science is a fascinating topic, running from Pasteur's experiments in the 1850's to Emile Peynaud's works on malolactic fermentation in the 1950s, and going on with the latest research in departments of the most prestigious universities.[6] The content of a glass is not only the result of the history of the land, but also of the history of science and technology.

The study of the sensory and cognitive mechanisms involved in taste and olfaction also undergo constant change and leads to astonishing progress. It reveals how wrong we were to conceive these senses as more primitive than sight or hearing. Wine constitutes an exceptional field to explore. The experience it gives is incredibly rich, integrating smells and tastes into complex flavours. Moreover, it has always appeared worthy of discussion, over and above its purely nutritive aspect, so that it offers a fantastic repertoire of sensory reports and of linguistic resources we use to characterise smells and taste. Perhaps "no other food but wine has such an intimate relationship to language (…) It is the only product that *demands* people to comment on it"[7]. Being so 'spiritual', wine is a good subject for the sciences of mind.

What can we ask of science?

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[6] On history of wine and its production, see Johnson (2004); on contemporary science of wine, see Goode (2005).

[7] Châtelain-Courtois, 1984, p. 5. About the development of wine vocabulary, see also Coutier, 1994.

The fact that science evolves quickly in these areas, and still has much to explain about how wine tastes should not be taken immediately as a sign of any weakness or limit in competence. It is true that it has limits : for instance, whereas having reached a causal account of the differences in the colour of red wines by mechanisms implying molecules called 'anthocyanins', present in grape skins, scientists still have difficulties in explaining differences of colour in white wines. The skins are not macerated and thus cannot contribute to colouration. (Anyway, as is known, white wine is not made just of white grapes.) It doesn't mean that there is no physical property that explains it but rather that this one is still unknown to science.[8] One may reasonably hope that in the near future, colours and hues of white wines will be related to physical properties of molecules or to the property of their composition. After all, it has taken time to discover that colours relate to surface reflectance. Colours of non-opaque liquids like wine constitute a special case and theories have only just recently enabled us to deal with the case of red wines. There is great confidence that the soft yellow hues of Chardonnay and Sauvignon wines will be explained in turn.

Is what we say about hues the same for everything else? Does this raise hopes that for *any term* used to describe wine, we can assume that there is a physical correlate that science will be able to account for in its turn? Not at all. Scientific accounts are legitimate and illuminating, but it doesn't mean that we will ask them to explain everything. We have to be clear which properties we are talking about and how we identify them, before we look for their true nature and turn to them in our scientific hypotheses about wine.

[8] Actual investigations seem to expect explanations involving phenol or iron components, but no definite result has yet been reached, at least as far as I know.

First, our description of wines are sometimes *erroneous*, misplaced or metaphorical, as Adrienne Lehrer points out (this volume). Some odours or characteristics are purely imaginary or verbal, and nothing real can be expected to correspond to them in wine. For instance, science will not look for, nor find, some objective property of 'feminine' wines. There is no way to believe, in an Aristotelian scientific fashion, that they would have 'more wet' or 'more fragile' links. A philosophical lesson can be drawn here: it is dangerous to draw an inference from an occurrence of a word, or predicate, to the existence of a property. This reminds us that the world is not merely a reflection of what we say about it. Thinking that the wine gets to be what I say or think it is would be as great a miracle as its turning it into blood just by claiming it is blood.

Second, we also use *subjective* terms, for which it seems difficult to find an objective correlate. This may be said of evaluative terms, as when we claim that 'this Volnay Les Santenots 2001 is delicious', 'The Charmes Chambertin 1998 is better than the 1997' or that 'Gruaud Larose suits red meat very well'. It is difficult to assume an objective property of 'being good' that would be a common characteristic present in every chemical structure of these fine wines, let alone a characteristic that could be measured and quantified so as to provide the objective truth of comparisons such as 'be better than', or that would allow refinements, as in 'being good with red meat'. Could there be a chemical characteristic correlated with 'being good' and another one with 'being good with red meat'? Would it be the same as 'being good with cheese'? This does not mean that our evaluations do not refer to objective characteristics of the wines but that, if they do, these cannot be accounted for in terms of basic chemical analysis. They deserve a

distinctive and careful examination[9], as do many words we use about wine such as 'clean' or 'sharp'.

We all agree that we do not expect science to explain straightforwardly our evaluative practices. Yet, in the case of wine as in many others subjects, it is quite hard to say when the evaluative stops and when the purely descriptive starts. We often use half-descriptive, half-evaluative terms for which we both expect and yet cannot easily find objective correlates. What counts, objectively, as 'overripe' or 'too young'? There is, it may be argued, an objective quality (ripeness, or age) for which there exists a precise account in terms of chemical compounds, and this one is qualified by an evaluative term. What is problematic here then is not the existence of an objective phenomenon, for instance, the increase of sugars in ripe grapes, but the subjective distinctions introduced over and above these when deciding on qualitative differences. The fact that our personal evaluations of ripeness differ does not entail that there is no real phenomenon they refer to. They target the same thing, albeit in different ways.

Doesn't all this leave too little room for scientific expertise? Not at all, considering that smells and tastes, the most important characteristics of wine, remain fair objects of inquiry. Being qualities does not prevent them from being quantitatively or scientifically assessed. Yet oenological science has a lot to do here, in combination with philosophy, to provide a finely grained approach to qualitative aspects of experience. This extends to more specific features of wine, which are treated as objective and descriptive: this is the

[9] On the objectivity of the notion of 'fine wine', see Barry Smith's and Steve Charter's arguments in this volume.

case of basic ones such as ‘long’ or ‘balanced’, or, more controversially, ones such as being ‘closed’. Different questions may therefore be addressed by science: is there any systematic and reliable correlation between our most objective judgements about wine and a quantifiable compound in the wine? How are the differences in perception to be explained: by elements in wine, or by the individuality of tasters?

WHAT CAN BE OBJECTIVELY RETRIEVED FROM OUR IMPRESSIONS?

Some examples may help us to get a better grasp on what is going on when a predicate is said to capture an objective feature of the wine. It relates something that occurs in us to something in the wine, but not necessarily in a simple or crude way, as if a definite state of the wine, or its chemical profile as captured by scientific analysis, was solely responsible for our experience.

What a ‘closed’ wine may be?

The term ‘closed’ is perhaps one of the most puzzling ones we use about wine : it takes time to understand what it means and even more time before daring to use it. It seems (at least to me) a sort of prophetic judgement, reserved to sibylline viewers of wine, to be able to know (or guess) that ‘there is something here that isn’t here yet’. This is also the kind of adjective which it seems easy to mock. It is more polite to our hosts to say of a renowned wine that it is ‘closed’ instead of disappointingly flat. People kindly engage in such prophecies: ‘Things will be better tomorrow’, ‘Oh, I am sure that your daughter will be pretty when she grows up’. In these cases, we do not simply say something about the way things actually are, but we claim to sense *now* how they will or could be *later*. Many

will agree that we overstep the bounds of prudence here and go beyond what we can legitimately claim to know. This could be Humean lesson about our tendency to predict things we cannot really know.

In fact (and Hume wouldn't disagree here), even if our use of the adjective 'closed' is a case of such a tendency, it does not condemn it. We gamble on everything, everyday, so why not wines? When people fill their cellar with five or six cases of a 2002 Bordeaux, after tasting it either being 'closed' or 'very promising', are they not gambling on what it will be like in ten years' time? Wine is often associated, in popular imagery or arts, with gambling houses and games. Latour or Cezanne's card players would not look credible without a bottle of wine on the table. There may be something deliciously adventurous in thinking that when we taste a wine that seems closed today, we take a chance on it improving further, and gamble on when it is time is to open it. We enjoy the risk.

However there may be a need to enter into apology, or into the vindication of drinking as a aesthetic of life. We do not bet on wines, at least not as such, and our purchases, as much as the use of predicates for describing the future of wines, are underwritten by objective facts. This suggests that there could be an objective correlate when someone truly judges a wine to be 'closed'.

Imagine, for the sake of the argument, that Jane and Paul are tasting a 2002 Saint Emilion. They disagree on whether it is closed, in other words, they both *agree* that it is dull now but *disagree* on how it could evolve. Paul thinks that it will remain as dull as it is now. It is just flat and dull. There may be every reason to side with him: after all, what reasons are there for us to think that it will change, as Jane claims?

Despite a proverbial tolerance for the subjectivity of tasting, we tend to be unhappy about disagreement over a wine. We would rather give a plausible reason to someone when they say things about wine, and not just negative ones as given by Paul. After all, this could also help us to reject the pretentiousness of the adjective 'closed', and to say something objective about wine.

We could thus start inquiring into each taster's reputation and experience, to see whether they are expert in the use of vocabulary. But, still for the sake of the argument, we could learn that Jane has tasted lots of Saint Emilion from many different vintages. We could thus believe that in her 2006 tasting she is able to compare the 2002 with another one, let's say a 1996. She might remember than the 1996 was better after five years than after two, and she could project that idea onto the 2002. It is dull in 2006 but should have nicer aromas in 2009. She comes thus to look for signs or precursors of them, swirling her glass in an expert way. "Closed" – she says, and we may come to trust her.

But we should be prudent here about relying on reputations, memory and claimed expertise. First, and especially for wines, reputations may easily be dismissed as socially constructed and not that reliable[10]. Second, if we turn to the core objective skills and experience, olfactory and gustatory memory is shown to be highly complex and fragile, probably unable to warrant in itself such complex comparative judgements. To perform Jane's, we must assume that (1) she remembers the taste of the 1996 St Emilion, as it was in 2000 when she first tasted it, (2) that this memory was vivid enough in 2003 when

[10] On this point, see the rich account by Origgi, this volume.

she tasted it a second time and (3) is still the same one she remembers today when she tastes the 2002. This is a complex relational judgement, difficult to engage in. She has also to perform a broad comparative judgement, deciding among all the memories of wines her tasting evokes which one is really the closest to this 2002. Experiments[11] have shown that our comparisons about wine are highly unreliable: most people have difficulties in distinguishing not only between many vintages but between only three glasses, not even memorised but all present and available for tasting. Presented with three glasses of red wine, they cannot say whether they are all different, or the same wine poured in different glasses (try the experiment at home).

Perhaps Jane has exceptional judging skills, and is gifted at taking careful notes and remembering. Experience of wines is complex, and developed in many ways. And remarkably, some people come to develop an amazing memory of wines, together with the art of comparing and ranking them.[12] But the problem with them, as with Jane, could be that they do not explicitly or consciously make the comparisons or judgements we reconstitute. When Jane says that the wine is closed, she does not make an inference or complicated, comparative judgement. She does not open her notebook: she just feels the wine to be closed and knows it the moment she says so.[13]

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[11] See Brochet experiments (2001) and Goode (2005).

[12] Is there a reliable method of developing olfactory, and, more specifically, wine memory? Obviously we try, by keeping labels, writing personal tasting notes, or remembering bottles that accompanied a particular meal . The question is worth asking, and its solution would be of interest both for scientists and amateurs eager to develop their skills.

[13] Of course, she may proceed to unconscious inferences. There is an important issue here, to know what the judgement implies and on what it relies. However I think that one has to be careful with such charitable principles, that give too much to tacit process and unformulated characterisations.

In the case of ‘closed’, there is a common way to decide that also seems more objective and reliable. It does not assume exceptional skills, and does not require professional wine tasters (even if they often agree on which wine is closed and which is simply dull, with their agreement supporting the idea that there is something objective here). Nor is it a matter of blind tasting, usually chosen so as to eliminate questions of politeness and prestigious labels. Instead, it consists in violently shaking the glass of controversial wine (with the hand covering the top: wine stains) to see whether it gives off new, stronger smells. In doing so, the oxygenation is enhanced. On this basis, one decides whether the wine is closed or not. If this is what ‘opening’ a wine is, then ‘closed’ is more accurately defined as ‘not having a sufficient reduction-oxygenation balance’. Yet, science shows that wine maturation consists mainly in reduction processes, whereas the role played by oxygen is still controversial (see the cork versus caps issue). There is thus some objective correlate to judgements about closed wines that science helps to establish. This also suggests that Jane can taste a real difference between this closed wine and another one to which Paul may be insensitive. ‘Closed’ judgements detect something about wine; yet they don’t close questions. Speaking of closed wines in that sense, we may actually consider that the wine is promising, siding therefore with the champions of cork who consider that oxygen plays a role in the ageing of fine wines. Or we may be simply critical that the making has not managed to get a good redox potential. Taken as a prophecy, our judgement about the closed wines are somewhat ambivalent.

‘First notes, second notes’: does the order of our tasting reveal something about wine ?

Another example may help us weigh up the advantages of a scientific approach. Science teaches us that aromas and smells are correlated to structural, spatial properties of molecules within wine and in sensory receptors. But our experience of wine does not result in a juxtaposition of tasting spots, but rather in a kind of musical line, characterised by a harmonious succession of aromas and flavours, each with its own way of developing, lasting and fading.

This is particularly true in smelling wine and less for smelling in general, where differences in intensities are interpreted (as it may be the case for sounds) as differences in spatial localisation and distances. I may be guided by the growing intensity of a bread smell to the bakery. When I smell a glass of Pinot Gris, the difference in intensity between notes of faint lime, pine and rose petals is not interpreted as signs of their being more or less distant. The glass remains obviously at the same distance from the nose. The image of a wine given by its smell is rather bi-dimensional and dynamic, something more like drawing a curve, than a three-dimensional picture - even if the latter may correspond to some of our experiences of perfumes or to animal orientation by olfaction.

Wine amateurs speak about 'first' and 'second' notes in smells, or ‘attack’ and ‘finish’ in taste, but is this translation in successive terms objective? Does it correspond to some genuine successive phenomena in wine or is it only the correlate of the way our perception proceeds?

This problem may seem specific to smells. When I hear noises or sounds, my sense of hearing enables me to know whether they were contemporary or successive (as in polyphonies or symphonies). Conversely, I interpret two successive views taken of a

building, for instance a front view and a side view, as being of coexisting parts of the same object. Naturally, I correlate the successive order of images with the limitation or conditions of my perspective. For both hearing and viewing, we seem to possess an immediate non-problematic interpretation of whether the temporal order of our sensations has an objective correlate in the world.[14]

Going back to smells, it thus seems legitimate to ask whether the successive order of smells that makes them so easily describable as musical lines, is actually a reliable source of information about an objective ordering of phenomena. As in previous examples, what is questioned is not the fact that I smell (or hear, or see) X and then Y, but whether the object of my perception is really 'X, then Y' or rather 'X+Y' , which I cannot grasp simultaneously. After all, the notes of lime and rose I smell, if they correlate with spatial properties of the molecules in wine (especially as it is reasonable to consider that no *new* molecules appear in the wine when I turn the glass) all coexist in the wine. This Alsace wine has flavours of lime, rose petals *and* flavours of pine that I come to appreciate successively. Thus our speaking about 'first' and 'second' notes would be simply a matter of *our* access to wines.

But a further inquiry into the chemistry of wine may change our conclusions: the differences of time are explained by scientists in terms of volatility. First smells

[14] Things are a bit more complex however: I modulated my interpretation of two sounds heard simultaneously according to the distance of the supposed sources, and, as shown by the famous example of a moving train next to ours,passing from the order of my perception to the order of events relies on a complex set of hypotheses.

correspond to the more volatile molecules, which, once dissipated, may let the less volatile ones express themselves - at a 'second' time. So the frequent first smell of alcohol, sometimes very strong in high degree, powerful wines from the Languedoc, South Africa or Chile, invite patience. The subtler, fruity smells are to come. A molecule is all the more volatile when its temperature for evaporating, or getting in a gaseous stage, is low, and these differences in volatility are mainly explained by atomic weight. The ordering of smells has thus a kind of objectivity, and getting smells of lime before the pine ones is the sign of a more expert nose, closer to the real properties of the wine.

What 'acidic' and 'balanced' wines may be?

One may start to understand the difficulties we have in correlating the usual predicates with objective properties. When people say that a wine is closed, or firm, it is difficult to know what they refer to, even when they use the same words as the scientist. To say for instance that a wine is acidic, may not mean that the absolute Ph balance in the wine is lower than normal (i.e. less than 7) but may refer instead to its manifest acids. The Ph acidity will not capture the acidity that is tasted. We could think that we have to find another way to measure the latter. Yet this supposes knowledge of the individuality of a taster, which is highly complex.

A supplementary difficulty is that perceptual judgements, being complex, are also relational: how acidic or tannic a wine is depends on how much alcohol it contains, and how high the quantities of the other elements are. We judge a wine to be less tannic if it has high alcohol and high acidity; the same wine appears more tannic when cooler, and more acidic at higher temperature; it tastes surprisingly different depending on what we

eat: compare tasting a Sauternes with a Roquefort against, say, a crème brûlée. This makes it very difficult to get a unique stable experience of a wine.

One has to be careful here. The fact that our judgements are relative does not conflict with their having objective correlates. They may rely on intrinsic properties that constitute firm features of reality, as previously seen, but not necessarily some definite state, or exactly the same ones that are accessed by chemical analysis. The problem is even more complicated when dealing with properties of wine that are, in themselves, relational. By relational properties we mean (by contrast with simpler properties or 'qualities') a property whose definition implies the existence of a relation and mentions the different things it relates. In wine, properties like balance are obviously like this: it amounts to a relation between acidity, sweetness and alcohol in the wine. These elements may be separately measured and assessed, but there is no unique chemical profile to say at what relative point or strengths of acid, tannin, alcohol, a wine reaches balance. This is not a linear phenomenon, and thus cannot be predicted or looked for uniquely by chemical analysis.

These three cases show how careful one must be in tracing the correlation between common predicates and chemical properties. They also suggest what role science can play within our practices of tasting. It need not challenge them, but offers a way to filter and classify them.

What about flavours ?

Are things simpler when we turn to tastes and smells? We know that these are correlated with the structural properties of molecules.[15] But how, and in what sense ? Philosophy and the cognitive sciences have for long addressed such questions about our experience of colours. Yet even if colours can be accounted for in relation to – to put it crudely - surface reflectance,[16]the debate continues. Are colours properties of objects or of our sensations? Do objects really have them, or are they relative to us? If they are no more than surface reflectances, how do we explain that the same red colour is caused by different types of reflectance? Why should some kind of reflectance, such as the one responsible for red, be felt closer to the ones correlated with orange than with blue? After all, they are all different. And why does the same object appear in different colours in different circumstances?

All the questions about colours must also be *addressed* about smells and taste. But they must be *adapted,* in two different respects: first, it is *scientifically necessary* to modify them as smells and taste do not exactly match the optical phenomena; and second, it is *philosophically essential* to question the domination of colour perception in accounts of perceptual or secondary qualities. Debates focused on colours have been used to decide the status of all kinds of secondary qualities, perhaps as an effect of the early

[15] Given the difficulties raised by this theory, doubts about it have been expressed, but they remain marginal. See Turin and Yoshii (2003).

[16] There is obviously a problem about the way these are to be interpreted: does it mean that tastes are purely identical to the structural properties of molecules, are nothing over and above them, and thus *eliminable*? Or does it mean that they may be 'reduced' and explained in terms of these properties? The distinction could be refined, but there is no need to enter in such technicalities here.

development of optics, or perhaps because of the privileging of visual information. However, we can and should also account for the rich experience smell and taste give us, no matter how complicated they are. Indeed, as Aristotle warned us:

'It is less easy to give a definition concerning the sense of smell…for it isn't clear what sort of quality odour is, in the way that was clear what sort of quality sound or colour was'. (Aristotle, *De Anima*, 421 a 7-11)

Since Aristotle, a strong scientific interpretation has been given to odours or tastes. Basically, it could be summarised by the phrase: "to each molecular structure its odour, to each odour its molecular structure". This statement is actually a 'two in one' thesis, each part of which raises difficulties.

Let us consider the first part of the thesis. 'To each molecular structure its odour' is contradicted by the fact that some molecules are odourless, although they cannot be shapeless. Having a shape is a *necessary but not sufficient condition* for being odorant: the molecule has also to be volatile enough and not to weigh more than 300 daltons. Each odour is indeed correlated with numerous properties of matter and cannot be simply eliminated and replaced by the mention of a single chemical aspect, like spatial arrangement. This makes the scientific analysis all the more complex, and all the more modest in its ability to offer a clear, firm and definite basis for telling what is really going on in wine.

This is just an actual limit and the physicist could trust in further progress to provide answers. But what it more seriously attacks is a certain way of doing or conceiving of

physics, that we could call the mechanicist view. According to this perspective, all properties are reducible to shapes and arrangements of molecules. This may be an attractive view: shape is a structural or categorical property that remains constant through time, and can be *measured once and for all*. When a general change is observed, it must be reduced to changes of composition or chaining between basic particles whose shapes remains constant.

But weight and volatility vary: variation may be subtle but they vary nonetheless. They depend on conditions. Temperature, for instance, greatly influences the taste wine has, without necessarily changing its molecular constitution.[17] We experience different flavours, or the same flavours in different ways, when Pouilly-Fuissé is fiercely chilled or cool. The changing smells cannot just be attributed to us, nor eliminated and explained by unchanging definite states of matter. They cannot be measured once and for all.

Yet, this is not the only point against the mechanistic slogan: the second part of the thesis, 'to each odour its molecular structure' also needs to be qualified. The smell of vanilla, for instance, may be *realised* in different ways, i.e. obtained via different molecules: either by vanilline, or ethyl vanillate, or vanillic acid[18]. It is a case of what philosophers call 'multiple realisability' : the possibility of the same property being implemented or realised in different structures. This is more common than the technical definition

[17] Temperature of course plays a role in some molecular transformations, as in those occurring during fermentation and later in maturation. That's why cellar temperature matters so much and explains how wines can be damaged by irregular or high temperatures.

[18] See Casamayor and Moisseeff (2002) for a fascinating catalogue of aromas in wine, explaining their sources and characteristics and giving methods for recognising them.

suggests: we ‘multiply realise’ all the time. For instance, ‘playing chess’ may be realised in different ways: on a 3D chessboard, mentally, or on a piece of paper, or a screen. The way the play is realised does not change the game itself. It is always playing chess. In the same way, the way an odour is realised does not make it a different odour, it does not change it.

Let us go back to the case of vanilla. Pure vanilline is the molecule present in vanilla pods, and develops also in wood – noticeably oak. Yet it is not really the one responsible for the tertiary vanilla aromas you can appreciate in some wines, especially in Rioja or certain Californian wines. The molecule present in wood cannot easily be present, as such, in wine for it reacts with it and results in vanillate ethyl. It is this second molecule, of a different shape, that seems mainly responsible for the ‘vanilla smell’ in wines.

One may then say that this is a problem for theoretical chemistry, not for wine tasting and wine chemistry. From the presence of the vanilla smell one cannot *in general* safely infer the presence of a specific molecule. But one can in the case of wine : it is ethyl vanillate. The identity thesis between smells and molecular arrangement seems still valid within the enclosed, protected domain of wines. This suggests how careful we have to be when, by developing specialised sciences, and narrowing the object of our inquiries, we actually look at some principles or theses that are not true of nature as a whole.

Anyway things are not so simple: vanillic acid also smells of vanilla. More importantly, it can be present in wines. This acid may even occur naturally in wines made in aluminium tanks as it develops from the wooden fibre present in grape stalks. Thus a vanilla smell is

not necessarily the sign of a wood *élevage*, and the claim 'it smells vanilla, thus it has spent time in oak' is *often but not always* true.

One may start to understand why this all matters to our judgements about wine, and to appreciate the other consequences that follow from it. First, we are able to acknowledge that the 'vanilla smell' is something different from the 'smell present in vanilla' The smell of vanilla pod is a specific instance of a vanilla-smell. It is just more important because the name of the plant has been adopted as a generic term. This happens with many technical devices where a specific brand name is taken for a generic. Wine may thus have a real vanilla smell, without having to contain the molecules present in vanilla. Smells and flavour are named after substances, but are not absolutely attached to them in a 'one to one' correlation. This paradoxically makes our recognition of smells in wine less metaphorical or imaginative than people have supposed. It is a supposition with which I disagree, hopefully, with good reasons. I may detect a vanilla odour in a wine, but this should not be mistaken for getting at something that is equally present in vanilla itself. This is not what I propose when saying "it smells of vanilla". Finding 'vanilla smells', 'rose petals smells' is not a matter of being pretentious.

Another consequence follows: if there were a strict cause and effect correlation between smells and the structures of molecules, I could, as a taster, always infer from the presence of a smell to the presence of a molecule. I could track its origin or trace the history of its presence. As a wine-maker, I could make wine by selecting a kind of molecule and be sure of obtaining the corresponding smell. I could be certain to eliminate any vanilla smell by choosing not to mature in oak. But as we have seen it is not so simple.

Some further factors tell against what we may call this 'reductionist' perspective. Take the effects of alcohol on taste. You taste a 1997 Chateauneuf du Pape and find it has wonderful tannins and a nice raspberry flavour. If it was distilled, and you had to taste the residue that contains the odorant and tasting elements, you will find it disgusting and will not recognise raspberry at all. The part of the experience we get by our discriminative tasting and attention may not correspond to the parts obtained by chemical decomposition. Nothing says that what is possible for us to distinguish through perception and attention necessarily exists in actual separate states.

Raison d'être of our tasting practices

However troubling the factors just dealt with may be for a reduction of smells to molecular structure, they help in justifying our tasting practices. Thus, it is normal that we are so often surprised by the taste of wine from one moment to the next. At other times we will experience different sensations and another bouquet. It makes our experience a legitimate source of discussion and sharing. As a conclusion, I would like to suggest how the previous inquiry into the scientific aspects of wine and the objectivity of our judgements combines with the rich subjective aspects of our tasting.

Bouquet and emergence

As we have seen, tasting the residue separately from the alcohol has nothing to do with tasting both of them together. And appreciating a wine's balance is not like appreciating its distinct acidity, sweetness and bitterness. This suggests that appreciating a wine is *global* rather than *analytic*. What we smell or taste is not just the sum of distinct smells

and atomic tastes, but their integrative transformation into a whole. Thus when we speak of a harmonious 'bouquet' of flavours, we mean a continuous and integrated taste which can't be reduced to any juxtaposition or succession.

But how can we account for this character of a wine's taste, while agreeing on the relevance of a scientific account of distinctive smells? Probably by acknowledging another property, namely the 'wine taste' that emerges from the different properties of wine, revealed either by chemical analysis or analytic tasting practices. We say something 'emerges' here because it an irreducibly new property of the whole beverage, over and above the properties of its components. Science can at times deal with emergent properties, and does so in the case of biological properties emerging from the physical ones.

This conclusion about wine may seem hazardous : it states an *a priori* limit to analytical methods of judging wine and challenges as much the compositional analysis in terms of molecules as the amateur analysis in terms of distinct smells of fruits and flowers, sweet and acid tastes and other discrete features. But this may be the wrong way to state the problem. What is challenged is not the *local relevance* of analysis but its *ambition to exhaust* the nature of what there is to a wine. This may be the ambition of scientism, yet it is not necessarily the one of science itself. It is certainly not the wine-lovers' desire either. By contrast, they do not want to have an exhaustive grasp of a wine's composition, nor wish to be sated by experimenting on a single sample.

A related point, that gives reason to our coming back again and again to a wine we like, is that we do not experiment on 'states' of wine but on its dynamics. Wine is a highly

evolutionary substance that changes throughout its life : in the fermentation tanks, in the oak barrels in which it takes on tertiary aromas, in bottles while kept in dark cellars, and when oxygenated and poured in a glass, wine keeps on changing. Tasting, by contrast with 'having a drink', is a question of taking time and attending to what wine is doing at a certain moment, not what wine it is, what qualities it could possess, whose wine it is. I guess that many people would be more comfortable with the wine lexicon, if they realised that what the words track are evolutions, changes, directions and possibilities. As Alice would say, we look for 'what this wine is doing', rather than what it is. Wines, no more than people, have definite characters[19] that we come to know about. This depends on the circumstances and their deeds.

Strangely, this is the point where scientific accounts and wine tasters share a common perspective against accounts provided by appellation commissions, commercial labellings and certain kinds of expertise. Some descriptions have to state what there is in the wine, some can state what it does. Contrary to what we think at first, the latter characterises a wine more objectively whereas the former give at most a partial grasp of it and lead to many *clichés*.

WINE POWERS AND NORMAL TASTES

There is an immediate problem in considering what wine does (its 'powers') instead of its stable properties. The question will naturally be 'it does what to whom?'. There seems to

[19] Despite what our vocabulary suggests : many wine words compare wine to people (they are strong, feminine, have tears, legs, etc.). But, as the idea of people having definite characters is challenged and qualified by current psychology, so should the idea about wines.

be an indissoluble tension between the claim for objectivity and the characterisation of properties as powers. Powers require reference to an experimenter on whom the power acts, and thus may reintroduce the threat of subjectivity.

However, the apparent tension is overcome by referring to 'normal' perceivers, i.e. to perceivers whose sensory apparatus works and is not damaged. Just as we do not take the colour-blind as guides to define the colours of things, or as guides to matching shirts and ties, we should not take as our guides tasters suffering from a cold or who have an acknowledged smelling disease (asnomia) to define wine tastes. Normally, a Bordeaux smells of red fruits and wood to tasters, even if they then disagree on its smelling of blackcurrant or raspberries. Sauternes taste sweet, and Chardonnay does not. These are the ways wines are normally perceived. Even individuals most sceptical about 'wine tasting rituals' would agree on a certain range of indubitable distinctions, on certain objective smells and tastes certain wines really have.

Nonetheless, there may be a problem as normal flavour is defined by its being the one perceived by normal tasters. How, then, are 'normal tasters' defined if not by their ability to perceive normal tastes? The circularity seems hazardous, as it would be awkward and unhelpful to state that 'Burgundy tastes of red fruit to normal tasters' and 'normal tasters are the ones to which Burgundy tastes of red fruits'. This is not the kind of trivia we are interested in when we inquire into the nature of wine.

But is this apparent circularity that threatening? It seems a rather common characteristic of cultural practices that they don't really begin with a baptismal act, but arise from random or isolated acts that have succeeded in being transmitted, sometimes through

transformation and improvement. They have been adopted, validated and modified through history. Our ideas of normal tastes and normal tasters are correlated. This means that they reinforced each other through subsequent experience and interactions, not that they rely on nothing at all. This is why normal taste may evolve. When Bordeaux winemakers decided to stress tertiary aromas, previously considered undesirable and too 'woody', the idea of the 'normal' taste of Bordeaux changed. Those who now count as 'normal tasters' for Bordeaux wines become those with the ability to notice the new taste and secure the agreement of their peers.

Thus wine tasting is partly a cultural practice that has evolved through history. This does not make the taste of wine something constructed out of nothing – but something powerful enough to set in motion a rich practice, structured enough to allow for discussion and agreement.

The general criticism of circularity deserves further analysis and more points could be made, but it seems more important here to consider the specific challenge wine poses to the definition of 'normal perceivers' and 'normal perceptual quality'. Regarding colours, normal or official colours are the ones perceived by average people, whereas in the case of wine, its normal qualities are the ones perceived and described by experts. Isn't it paradoxical to consider that normal taste is actually experienced only by a (happy) few tasters? Why don't we say that normal taste is the most commonly experienced, and consider the expert's taste as a non–normal one, a sort of esoteric taste?

Again, there is only an apparent tension here. One can think of the normal taste of a wine as the way it would taste to *anyone* taking her time to taste it in the best conditions, such

as the ones experts have. This is to say that the normal taste is *not different from* the most complete and purest taste of wine. There is nothing esoteric about it: all there is to taste is accessible. Yet it ould not actually be accessed unless one is in certain conditions. These conditions are dictated by the wine itself, not arbitrary codified by culture.
An important lesson to be drawn is that the smells and tastes favoured in our descriptions, and considered as 'normal', are not exactly the *most frequent* ones. There may be no such thing for wines, given all the different conditions in which they are served and appreciated, and the variability of people's tasting apparatus. Normal tastes draw the limits of all that could be tasted.

The normal conditions may appear too difficult to realise and can seem rather abstract or ideal. The wine has to be tasted alone, before eating but not that far from a meal (for even appetite may change the saliva, and thus the taste), somewhere between room and cellar temperature. But, in fact, they consist in the most easily obtainable and repeatable conditions, and also in the ones that seem *to enable* one to appreciate the *most important range of differences* within the wine. Hot wines, as we know, do not express many different tastes, nor taste very different from one another. So that it is a pity to warm a good Bordeaux; without mentioning the crime of adding sugar and cinnamon. Wine experts recommend tasting a wine in certain conditions in order to get more out of it.

PREDICTING AND BEING SURPRISED

There is another benefit in saying that wine has a 'power to give rise to the experience of sweetness' rather than saying than 'it is sweet'. As previously mentioned, to have the power to do something to the perceiver means that the experience of sweetness will be

had or not depending on whether the conditions are met. It also suggests that it may be revealed in different ways. Elasticity for instance is a power, or a disposition to be stretched: rubber is elastic whether or not it is stretched. And its elasticity may be manifested when it is lengthened and also when it contracts. There are many ways for the same rubber piece to be stretched or to contract. The fact that they never occur does not effect how elastic or not the piece of rubber is.

Applied to wine, the model can account for its *potential* tastes – we know that wine *would* taste different after a mouthful of chocolate mousse; we know that it could taste different to someone else. These tastes cannot always be enumerated. First, we do not know precisely what they are. How would this wine be with a foie-gras, or if it was a bit warmer? I may have ideas about it, but if I am so eager to taste it with foie-gras, and if I wait for the glass to get warmer I will have the precise experience in question. It would be an limitless task to list every different condition for tasting, yet this does not mean that wine flavours do not fall under a certain general descriptions.

FINE QUALITY AS THE POWER TO BRING ABOUT A CONSENSUS

Preferring powers of wine rather than states does not blur our image of wine. In a way, it is more compatible with our practices and with rigorous scientific methods. Of course, there are points where it may get more controversial. For instance, if so many things depend on conditions and 'normal' tasters profiles, it seems difficult to distinguish between fine and bad wines. Science does not, though we do, assess wine quality all the time. Our practices are not only about appreciating what a wine does, as with Alice, but

how well it does it. When tasted in the best conditions, what make the taste of a grand cru better than a vin de table's taste ?

The distinctions between particular dispositions provide a criterion to differentiate between fine and common wines. Indistinct smells and flavours are generally characteristic of bad wines. There is then something confused, and frustrating in the experience. Does this smell of orange or of grapefruit ? Both perhaps, or none: we do not grasp what the really distinctive feature of this wine is, and cannot relate our different sensations to different features of it. The better the wine is, the more complex the experience of it will be; but also the more this complexity shows distinct directions, revealing different things are going on there. It seems then that the adjectives we use are imposed by the wine: the discrete features we acknowledge account for the sharply distinct things the wine shows. In tasting fine wines we often come to recognise flavours we wouldn't have thought a wine could have. Yet they reveal themselves to us in a striking and powerful way. I wouldn't have thought that a ripe pineapple smell was so distinct before being able to recognise it in Château Rieussec, and hearing people around me agreeing with my judgement. Wines are better if they do many things, in an expressive way.

This also explains why a fine wine will secure most agreement. If the wine is bad, it has few dispositions that are manifested in different ways, and our accounts of it are too conflicting and variable for us to learn much, except that, as we then say, this wine is confused. Ongoing disagreement or silent drinking are signs that the wine is flat or bad.

CONCLUSION: STILL 'CLOSED' CONSIDERATIONS OF WINE PROPERTIES

The domain of wines, smells and tastes is thus a promising field for a deeper inquiry into the nature of 'secondary qualities'. It could illuminate philosophical debates. In turn, these considerations give sense and clarity to our tasting practices, such as the ambivalent place granted to chemical analysis or the official taste promised by labels.

These considerations point to further inquires. First, it may be possible to obtain a more precise view of particular wine properties, such as those responsible for allergic reactions of those that cause headaches, facial flushing, etc.; and for some of the ones that give rise to pleasure or disgust. Second, the scope could be expanded from the examination of this or that particular wine to consideration of the commonalities among kinds of wines, taking in questions about vintages, *terroirs*, appellations, etc. Having a better look at the dispositions of a particular wine, we may wonder what it shares with other wines of the same kind, and we may appreciate whether it is representative of the terroir or appellation. What is there is all these wines that gives sense to the classifications and enable us to recognise these as Burgundies or Côtes du Rhones? Is there any 'real essence' corresponding to appellations, châteaux or vintages? Is there any better, or more natural, classification of wines, such as the New World classification by grape varietal, rather than the complicated and protected names of Burgundy and Bordeaux? What does objectively relate a 1998 Charmes-Chambertin to other Burgundy wines, more than to a Californian Pinot Noir?

All these perspectives, however general they may seem, may help us to understand what makes for the singularity of a given wine, and for the uniqueness of wine among other beverages.

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