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Communicating on the sensory quality of wine : Questions about sensory training and expertise

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Summary

This paper adresses the question of the sensory information provided by experts in order to avoid uncertainty to wine purchasers about the sensory attributes of wines. It recalls the literature showing that there are many sensory and cognitive limitations to the acquisition and transmission of taste information. The author proposes two experimentations. In the first one, untrained customers are invited to recognize white and red wine, using sensory descriptors issues by an expert in wines. In the second one, a similar exercise is performed by a group of untrained students, and a group of students trained in sensory analysis of wine. Results of both experimentations show that untrained consumers are not able to match the wines and the descriptors better than random. The test however functions partially with trained respondents, suggesting that formal training has improved their performance. The author discusses then the value of taste information generally used to inform wine purchasers and role of the expert to provide trust on the market of wines, with some marketing implications.

Key words : sensory perception, sensory analysis,wine tasting, wine marketing, wine communication qualit of wine, experience, learning process, expertise.

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Communicating on the sensory quality of wine :
Questions about sensory training and expertise

It is well known that market uncertainty may be decreased by introducing adequate trustworthy information on product quality. In the case of wine, labeling on bottles, tasting reports in specialized magazines, direct mail marketing by producers or wine clubs are examples of vehicles of such information, frequently associated with the signature of a well known expert. The back labels of wine bottles contain very often a sensory definition of the wine that provides an "objective" base that will hopfully secure the consumer about the intrinsic value of the product. This "objectivity" is based in large part on the the widespread belief that the tasters are experts able to distinguish and identify wines on a sensory basis, during blind test sessions. Few other sector, including the perfume industry, has undoubtedly developed a language and vocabulary which makes it possible to describe the characteristics of a product in detail using all of the sensory dimensions : sight, smell, taste, touch.

From a marketing point of view, the communication about product attributes must be both understood and reliable. Therefore two questions arise. Firstly, is the information about the sensory attributes of wine correctly interpreted by the consumer, should he be a layman or a trained person ? This first question raises the problem of the language used to describe wine quality, and its efficiency in the communication process. Secondly, are the sources of the communication about wine sensory attributes trustworthy ? This second question relates to the expertise about wine. If expertise exists, this means that there is a corpus of knowledge shared by the experts, and this knowledge can be acquired through formal learning programs.

We offer to shed light on these questions by first examining certain properties of sensory perceptions and their interactions on the basis of experimental results obtained in neuroscience and sensory analysis, with examples in the wine sector. Many experiments concern perception and learning capacities of both laymen and experts.

We then present an experimentation whose first objective is to measure the effectiveness of descriptors formulated by experts on the ability of untrained and trained subjects to recognize wines. A second objective is to evaluate if the formal training of the subjects improves their capacity to recognize wine descriptors.

In light of the results, we will discuss the learning process in wine tasting and explain to what extent sensory information on bottles may be relevant from a marketing perspective.

A few properties of sensory perception

The confusion of the senses

Neurophysiologists consider that sensory response is the conclusion of a process containing several physiological steps. (Mc Leod and Sauvageot, 1986, Mc Leod, 1990). The first is the detection of stimulus by different sensory receptors (called the stage of "transduction" or encoding). This raw information, in its nature and intensity is treated by the peripheral organs

of the brain without anything relating to a biological signification or a form of evaluation. This signal is then rebuilt in a stage called "integration", or cognitive step which gives meaning to the perceived signal. In a fraction of a second, "all information is brought together in a global message, simultaneously sensorial and affective and which the subject is most often unable to discern the components of." (Mc Leod, ibid., p 8).

Figure 1. The physiological and cognitive process of sensory perception (MacLeod, 1990).

Exposition
Transduction, encoding
Cognitive integration
Experience, familiarization

Neuro-sciences have established that each individual has use of similar captors, but that the genetic codification is not identical for all people. This explains in part the differences between individuals during the initial stage of physiological processing of the perception.

The effects of the senses interacting among each other and the mediating effect of non sensory information must be added to this physiological variability of sensory circuits unique to each individual.

Much research has been conducted to show the influence of non sensory informations on sensory evaluations (price, packaging, brand or origin of product). Within the scope of this paper, we concentrate primarily on sensory interaction because blind tasting is generally the proper method to assess the quality of a wine.

One of the questions which researchers ask themselves is how to distinguish between the relative part of sensory signals and how they interact within the general process of perception, and more particularly how sigh and smell interact with taste assessments

Research concluding that sight plays a mediating role with other perceptions is convergent (Pangborn 1960, Pangborn et al, 1962, Christensen,1983, Maga,1974, Gilbert et al.,1996). Even if conclusions diverge at times due to the experimental context, this research shows that color and aspect always influence both the levels and intensity of other perceptions.

Whereas it may seem logical to observe this influence in the case of untrained subjects, it is to be observed that this mediating effect of colour can also be observed with subjects trained in sensory analysis (Pangborn et al, 1962). Morrot et al. (2001) have experts evaluate white wines, then the same wines coloured red by artificial means, upon observing that the vocabulary used to describe the taste qualities of various wines uses specific verbal repertories depending on the colour of wine. They hence notice that the descriptors used for the coloured wines change repertories: banana, pear, pineapple or white or yellow floral repertory for white wine, red fruit, leathers, animal odours for the same wines coloured in red.

There is also much research which explores the relationship between smell and savour[1]. John Prescott (1999), for example, underlines that the effect of a "sweet" taste is strengthened when the aromatic intensity is increased, so that a certain coherence between smell and taste is respected. A smell judged to be "sweet" will have a tendency to erase any "acidic" smells. This result can be observed when novices are given dry white wines to taste (that is to say containing less than 3 g of residual sugar per litre): the more the wines are perfumed, the more the subjects will qualify them as "sweet", even if their residual sugar rate places the wines in the category of dry wines.

Physiological limits which can be partially compensated for by experience and learning

The ability of a person to identify odors decreases rapidly with its number and complexity. Thus Laing and Francis (1989) demonstrate that individual capacities to identify odours decrease rapidly as the number increases, and thus as the aroma becomes more complex. Faced with the task of identifying the odours which they have previously been exposed to, untrained subjects are able (with the help of a list of odours) to recognize an odour 80% of the time if it is presented alone, but only 40% of the time when two odours are combined and 20% of the time when three odours are mixed. If only the absolutely correct answers are analysed (that is to say unaffected by false answers), the recognition of two odours combined appears only 12% of the time. When more than three components are used, the success rates approaches zero.

When the experiment is done with experts, the performance improves sharply. But according to Laing and Francis (1989), only 5% of them are able to identify up to 5 odours in a mixture.

Experience revealed in literature suggests nevertheless that training can improve perceptual performance, at least when it comes to wine. Lawless (1984) thus observes that experts are superior to novices at classifying white wines when these wines habe been described to them. Sauvageot and Chapon (1983) show that the rate of recognition of a white or red wine by untrained subjects in a blind taste test is higher than would normally be expected from the effects of random chance but that the number of errors is minimal with oenologists. Bende and Nordin (1997) observe that when dealing with wines, experts are distinctly superior to untrained subjects at differentiating between smells. Gawel (1997) confirms that formal training in oenology improves the level of performance in matching white wines to their descriptors.

It nevertheless seems apparent that training results are seriously limited. It contributes to forming expertise in a restrained professional framework but does not contribute to the development of general sensory perception skills. Thus, Bende and Nordin (1997) note that experts' superiority at recognizing is limited to smells that are found in the realm of wine. Livermore and Laing (1996) confirm the lack of ability to memorize odours outside of one's professional field through experiments with perfumers. It should be added that experimentation reveals a certain confusion between odour and savour in this field : thus Noble et al. (1984) underline that experts' discriminations are based more on acidity and bitterness (i.e. savours), rather than on aromatic definitions. Lastly, Leschaeve and Issanchou (1996), conclude after extensive research that olfactory memorization, which is more related to personal capacity and experience, does not improve through training and practice.

[1] The term "savour" is different than that of "taste" or "flavour", in that it only designates the stimuli perceived by the tongue (sugar, salt, bitterness, acidity). The taste (flavour) results from the combination of these stimuli along with those coming from the nose by "retro-nasal" effect.

However, these results suggest that sensory learning contributes to a specific skill regarding analytic capacities, but this skill is limited to the studied field in terms of identification.

Experiment 1 : Can sensory descriptors be communicated ?

The first experiment aimed at measuring the ability of a group of untrained consumers at recognizing wines with the help of descriptors..

This experiment was conducted by students at ENSAM (Ecole Nationale Supérieure d'Agronomie at Montpellier) during a course on experimental design.

During two different taste tests, a series of wines is offered anonymously to volunteer untrained tasters who are members of the INRA-ENSA campus personnel in Montpellier (n=30). Age, sex are not recorded. All volunteers drink wine at least occasionally, none of them has had some kind of formal training in oenology. First, 8 white wines (2 chardonnay and 6 sauvignon blanc varieties, from two different regions), are offered at the same time, with the wine descriptors. The panelists are in a special room equipped for wine tasting, with individual partition. The wines are served at room temperature in a random order, in normalized international tasting glasses. The task consists in matching the wines with the descriptors. Then the tasters are asked to fill a 10 minutes questionnaire on wine drinking habits and attitudes. Lastly, they are offered 10 red wines (5 merlot and 5 cabernet, from Languedoc and Chile) . Two "decoys" are introduced in the red wines, which are white wines coloured with anthocyanins, having no effect on the taste of the wine (Brochet et Morrot, 1999). Again, the respondents are asked to match the wines with the descriptors. The wines were purchased at a hypermarket and the price range is between 17 FF and 44 FF. None of them underwent a special aging process.

The definition of descriptors

The descriptors were obtained from an expert who is used to training novices. He was informed about the objectives of the experimentation in order to restrict vocabulary to words which would be understandable by non-experts, and avoid as much as possible the technical jargon. The descriptors appear on a tasting card which is standard practice when presenting tasting commentaries and do not contain too many idiosyncratic or abstract terms . In fact, as shown on exhibits 1a to 1c, the use of polysemic wordings is not avoided ("balanced" acidity) and it is not possible to control for the individual understanding of each of these words.

Protocol of the experimentations

The protocol differs slightly depending on whether white or red wines are used. For white wines, tasters were given 8 tasting cards for 8 wines. For the red wine, tasters were given 12 tasting cards for only 8 wines (including the two decoys). As said before, the test consisted of correctly identifying the wines based on their descriptors, as the wines were identified with a random coding system.

Results

Tables 1 show how often tasters gave correct answers, that is to say matched each white wine with the tasting card it belonged to. Table 2 provides the same information for the red wines.

These tables show that, for 30 respondents, a total of 36 correct answers have been given in the case of the white wines (average individual score : 1,2 with a possible range of 0 to 8) , 55 in the case of the red wines (average score : 1,81 with a possible range of 0 to 8).

Table 1 : Matching scores of the white wines and their descriptors (n=30, untrained respondents)

Recognized as :	527 Chardon-nay	632 Sauvi-gnon	276 Chardon-nay	322 Chardon-nay	534 Chardon-nay	832 Chardon-nay	434 Sauvi-gnon	018 Chardon-nay
527	**3**	2	4	3	0	0	11	6
632	3	**18**	1	1	1	1	2	2
276	2	4	**0**	0	3	16	3	1
322	6	4	7	**3**	1	2	3	3
534	3	1	4	5	**4**	3	2	7
832	3	0	2	2	12	**3**	3	3
434	2	0	5	7	5	3	**3**	5
018	6	1	7	8	2	1	2	**2**
matchings	**3**	**18**	**0**	**3**	**4**	**3**	**3**	**2**

Table 2 : Matching score of the red wines with their descriptors (n= 30, untrained respondents)

Recognized as :	121 Cab.sauv	136 Merlot	024 Cab.sauv	124 white+colour	309 Merlot	197 Merlot	002 Cab.sauv	302 white+colour
121	**2**	5	2	2	1	1	2	2
136	5	**4**	3	0	2	5	1	0
024	1	2	**5**	0	4	5	3	0
124	0	0	0	**17**	0	0	0	9
309	0	2	4	0	**6**	2	9	0
197	8	0	0	1	1	**3**	3	0
002	4	7	0	0	0	2	**1**	2
302	0	0	0	9	0	0	0	**17**
228 Merlot Chili	7	2	1	1	1	1	2	0
201Cab Sauv. Chili	1	3	2	0	11	1	4	0
804Cab. Sauv. France	2	2	0	0	2	6	1	0
206Cab. Sauvi. France	0	3	13	0	2	4	4	0
Correct matchings	**2**	**4**	**5**	**17**	**6**	**3**	**1**	**17**

Looking at thse matching scores, two questions arise :

1. Is the matching task performed correctly as a whole ? In other words, is the mean matching performance is any better (H_1) than if the task had been randomly performed (H_0) ?
2. Have any of these wines been recognized correctly, or at least better than others ?

We compare the actual distribution of correct answers to the expected results of a random matching. Therefore we test the hypothsesis H_0 that the average number of correct answers follow a normal distribution defined by its parameters : mean =1, varaince = 1/n (according to the central limit theorem. With n = 30, the approximation is considered as correct. The results are shown on table 3.

Table 3 : Evaluation of the matching of the white and red wines

	n	Mean score of test	Prob. H_0 (α=0,05)	Prob. H_0 (α=0,01)	
White wines 8 cards, 8 wines	30	1,20	1,30		H_0 not rejected
Redwines (8 cards, 12 wines)	30	1,83	0,91	1,01	H_0 rejected

In the case of the white wine, the probability under H_0 of the number of correct matchings being over 1,30 is 0,5. The mean score being 1.2, H_0 cannot be rejected.

Just looking at the table 1, only wine # 632 seems to be recognized by more than 62% of the respondents. This score is much higher than this of other wines. It might be related to a very insistant reference to citrus taste mentionned in the descriptors list. For all the other wines, it can be concluded that the matching performance is not better than random.

As to the red wines test, probabilities appear different, because the 8 cars had to be related to 8 among 12 wines. In this experiment, the normal expectation of the right answers mean is 0,67, with a variance of 0,65. In this case, the probability under H_0 of the number of correct matchings being over 0,91 is 0,05. The probability of the correct matchings being over 1,01 is 0,01. H_0 should be rejected at the α = 0,01 level.

Apparently, the matching performance was better on the red wines than on the white wines.

This more promising result should be however been made relative due to the two decoys (wines 124 and 302) which were quite easier to identify than the others, especially based on colors.

The erratic results on other wines suggest that the matching performance of the red wines is not better than random.

Does training improve the transmission of sensory information ?

In order to answer this question, we then proceeded with another experiment with the same red wines that were previously tasted. This second experiment contained certain changes compared to the previous one. The decoys were removed, the test involved analysing 8 red wines. These eight wine cards (compared to twelve in the earlier test) were to be matched to eight wines.

The participants were made up of 56 engineering students, 32 of whom were students in oenology, and therefore recipients of specialized training in wine tasting (at the time of the experiment, the trained students had had half a dozen sessions of tasting with a professor of oenology). The remaining 24 students received no particular training at all on sensory analysis. It is to be noted that all students follow the same 4 years teaching program within the school, until their fifth year of studies where they may choose specialized courses, such as oenology. Because of this homogeneous background and age, it is possible to test the effect of the training factor on the average matching performance of the two groups. We have to assume however that students in both groups had the same level of experience and practise of wine. A test in order to differentiate for wine involvement between the groups showed that the difference was very low. All participants showed above average scores of wine involvement. In the average, oenology students were more frequent drinkers than other students

Lastly, the final difference with the previous experiment was that the descriptors were defined by a group consensus of four oenology experts and not by one single expert as in experiment 1 (annex 1 c).

Results

The results of the matching are compared to a random distribution of events according to a normal law of parameters 1 and 1/n (n = number of tasters). The table 4 of average scores show the results for each group of respondents according to their category (trained or untrained).

Table 4 : Average score of recognizing wines, trained and untrained repondents

	n	mean score	H_0 α=0,05	H_0 α=0,01	
Whole group	56	1,2321	1,22		H_0 rejected
Trained	32	1,4575	1,29	1,41	H_0 rejected
Untrained	24	0,9583	1,33	1,33	H_0 not rejected

For the entire sample, the hypothesis H_0 of a random distribution of answers should be rejected : the matching of the wines appears to be sligthly better than random (with α=0,05), even if the mean score of the sample is very similar to the score in the previous experiment with the white wines. However, this overall group result is due to the fact that the oenology students' answers are significantly better than those of the non oenologists.

If one only considers the answers of the untrained students, the H_0 hypothesis cannot be rejected, whereas for the group of trained students, the hypothesis H_0 should be clearly rejected (with α=0,01) : the descriptors enable oenologists to improve their recognition score.

Synthesis of results, experiments 1 and 2

The results of the two experiments show that recognizing wines based on tasting cards by untrained tasters is less than convincing. The observed differences between trained tasters' and random matching tasting cards are indeed positive but not significantly so. It can nevertheless be observed that visual descriptors seem to produce a better distribution for red wines than random matching, though this is not the case for white wines. A case by case

analysis leads one to think that the effect of sensory contrast between wines is not unrelated to these results. Whenever the contrast appear to be slight, the matchings seem random.

Within the limits of our experimentation, it can be concluded that untrained consumers are not capable of recognizing a wine from the sensory descriptors provided by a trained taster. Recognition occurs only when the contrast between samples is significantly sharp.

However, these results suggest that formal wine tasting training does improve the recognition rate. Although the recognition rate for trained subjects should be considered weak.

Discussion

These results are consistent with the literature mentioned earlier in this paper. In a similar experiment, Gawel (1997) did obtain much higher recognition rates, but the respondents were all experienced wine tasters, and the wines were probably more contrasted than in our experiment. However, even in Gawels context, it seems that formal training improves significantly the efficiency of the description of sensory cues.

It is important therefore to comment on the particular context of our experiment. Subjects were to simultaneously discriminate between sensory impressions and to identify them, that is to say match them to a proposed description by a third person. It is quickly apparent that three groups of factors come together to make this task quite difficult. The first comes from the capacity and aptitudes of the subjects themselves (a), the second from the nature of the wines used in our experimentation (b), and the third from the choice of descriptors (c).

a. First of all, the subjects were requested to try the wines several times during a relatively long process (60 minutes for the first experiment, 30 minutes for the second). We should take in account the physiological process of the odour and the taste. According to Mac Leod (2002), for the senses that are of chemical nature, the variation within the individual is high and similar to the variation between individuals. This means that the same object will not always give the same “drawing” of smell or taste and that a common and consistent representation of this object will be undoubtedly more problematic. This effect may apply particularly in our experiment with prolonged and repetitive exposure, creating an instability in sensory image.

b. This phenomenon is made worse by the fact that temperature variation and progressive oxygenation of wines add to a continual change in the stimulus itself during the presentation. Peynaud (1980) indicates that aromas evolve according to the changing volatility of molecules, the more volatile aromas being perceived first. In addition, the choice of wines themselves can be considered to offer a relatively limited contrast in palate as they were all made from only two grape varieties, and chosen from rather limited price ranges. Identifying them can therefore be considered particularly difficult, especially for untrained subjects. As many researchers point out, when identification is possible, it is in correlation to the intensity of the main odor in a mixture (Laing et Wilcox 1983) or to the degree of contrast between the wines that are choosen in the experimentation, (Gawel 1997).

c. Lastly, it is hardly possible to guarantee that the descriptors themselves were the most adapted to describe the wines. The comparison between the tasting cards written by one expert in the first experiment, and those obtained from the panel of experts in the second,

indicates that there are at least several ways to describe the sensory profile of a same wine. Just comparing appendix 1b to 1c, it is not apparent that theses descriptors correspond to the same wines ! Our experiment however does not permit to conclude which is the most efficient set of descriptors : the set made by one expert, or the set resulting from the consensus of several experts.

In addition to this, most descriptors used by the experts in these experiments refer to aromas. Indeed, the cues that are based on aromatic descriptors might prove only partly adequate. Noble and al. (1984) find that acidity and bitterness dimensions are used more often as discriminators by the experts than aromatic dimensions. It should be noted however that aromatic descriptors are widely used in wine labels or comments by specialists aimed at wine purchasers.

Beyond these limits, other factors related to language can help explain these results. Richardson and Zucco (1989) question both lack of vocabulary, its idiosyncratic nature, and each individual's particular background. For them, language cannot play an effective role in the cognitive processing of sensory information linked to odours, making it more difficult to discriminate and identify the stimulus univocally, which leads to a handicap in the retention and memorization stage. Despite these limits, these authors observe nevertheless that it is possible to slightly improve one's ability to identify. They theorize that the association of olfactory stimuli, visual images, and verbal representations make up "three systems of cognitive processes which are functionally independent but which are partially inter-related", which would explain why some subjects who have at their disposal greater cognitive knowledge regarding perceived objects get better results.

This theory is consistent with the conclusions found by Livermore and Laing (1996) and Bende and Nording (1997), quoted above, who confine sensory expertise to a particular professional field. In the case of wine, this would mean that experts are those who are able to relate efficiently these three cognitive areas, combining cues from different nature to define a prototype (for instance, the taste of a merlot, or a Saint Emilion wine). Acquisition of knowledge consists then in the accumulation of interactions of cues: a particular taste and smell, a color, the name of the variety, the wineyard, the vintage, all these informations belong to different cognitive sets. The aim of formal sensory training would be to train students to identify all cues available during a blind test session and have them converge towards a given prototype, the name of which being an abstraction for untrained subjects.

From this point of view, the vernacular and analytical descriptors used in our experiment are in the end only an unefficient means of communication with the untrained consumer. It may have worked better with the students in oenology, because thay have been trained to extract more information by combining the cues, and because they have acquired a better understanding of some of the cues taken from the professionnal jargon (such as "balanced acidity"). This interpretation finds support in Gawel experiments (1997), showing that trained tasters tend to use more abstract (as opposed to practical) descriptors than untrained tasters.

Conclusion

Our work has consisted of examining whether the sensory quality of wine could be described and communicated to untrained consumers by experts, and whether formal training would improve the efficiency of the communication. From our point of view, efficient

communication on sensory qualities of wine depend on two conditions : a reasonnable understanding of the descriptors of the quality, and the trustworthness of the source who formulates the descriptors. We have reiterated that a large number of physiological and cognitive obstacles exist due to the perception itself of the sensory attributes of a product, the instability itself of certain stimulus during the experiment, the verbal definition of sensory attributes and the communication of this perception.

Despite the number of limits imposed by the experimental conditions, our results are coherent with many previous experimental results. They demonstrate that the descriptors used by experts are only poorly interpreted by subjects who have not been trained in tasting. We believe that more positive results would have been obtained if the contrast between the wines used in the experimentation had been greater. It would undoubtedly be useful to renew the experimentation in this respect in order to determine what level of typicity can be successfully described and communicated to consumers.

Our results suggest that sensory training improves the ability to identify the sensory attributes of a wine from a list of sensory descriptors provided by wine experts. We have furthered the hypothesis that the choice of descriptors, taken from standard language in order to encourage subjects to approach their perception more analytically, did not perhaps fit the cognitive mechanisms of acquiring expertise. It would be necessary to continue the experiments in order to verify if more synthetic, holistic, indicators like grape variety or local soil would lead to a higher recognition performance for subjects who have been trained in oenology.

From a marketing point of view, one question arises. If experts cannot efficiently describe the characteristics of wine to ordinary wine consumers, how useful for the market are the sensory descriptions provided by the leaflets, wine reviews and catalogues, or written on the label at the back of the bottles ?

To our experience, the usual customer of wine generally perceives himself as a layman, on a subject where he feels there is a need for expertise. Famous sommeliers or chefs, specialized journalists, are some of those experts who are believed to be able to provide accurate descriptions and judgements. Wine marketers know how to use these experts as prescriptors on the wine market.

The fact that we find in our experiment that the wine drinker does not recognize the descriptors on the bottle may not be a major problem. The value of the descriptors on the back label may just lie in the fact that the bottler chooses to make feel the wine lover an expert himself, and the wine purchaser appreciates to be invited to share some of the expert's science.

Nonetheless, it should be interesting to investigate the type of of formal training which makes it possible for a normal wine drinker to interpret corrrectly a set of sensory descriptors. A market with a large number of well trained consumers should open opportunities to wine marketers for increased and more sophisticated segmentation based on sensory criteria.

In order to keep this prescription mechanism function, the source of information must be trustworthy, that is to say, recognized as an expert one. The marketers should encourage scientific research about sensory training and sensory methods. If the market relies on experts to assess the value of wines, then it needs proofs that their assesments are relevant and unquestionnable.

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Annex 1a : White wine descriptors (only one expert)

Wine #	eye	Nose	Mouth
527	Straw yellow, medium limpidity	White peach, garrigue, slight warmness	Ropy, slight bitterness, wood impression, lack of acidity
632	Straw yellow , greenish glints, average limpidity	Vivid, citrus, mango	Full first mouth, pleasant acidity, pomelo, green citrus
276	Pale gold, bluish glints, average limpidity	Impression of dry, uniform	Full first mouth, alcohol and wood, acidity is agressive
322	Straw yellow, averge limpididy	Discreet, candy and then flourish,	Full first mouth, pleasant acidity, slight alcohol impression
534	Gold, limpid and brilliant	Very discreete, citrus notes	Full first mouth, pleasant acidity, not ropy enough, generous, mineral notes
832	Yellow, average lipidity	Dried fruits (apricot, raisin) mint	Full first mouth, pleasant acidity, not ropy enough, short in mouth
434	Yellow straw, limpid	Peach, apricot, citrus, nice complexity	Full first mouth, average acidity and length
018	Yellow straw, average lipidity	Candied fruits, deep nose, still unrevealed	Slight CO_2, full mouth, lack of ropy, dry end of mouth

Annex 1b Red wine descriptors (only one expert)

Wine #	eye	Nose	Mouth
121	Medium red, brilliant Clear and transparent	Gats urine impression Red fruits	Strong, full first impression Length in mouth
136	Deep red, purple	Deep nose, concentration of spices, black fruits	Strong, full first impression Roundness, animal and spice tastes
024	Deep red, purple	Concentration of smells, ripeness, spice, cooked fruits	Impressions of fullness, with presence of tanins Sweetness (sugar)
124	Light red with slight violet glints	Sweets and fresh fruits	Excessive sweetness (sugar)
309	Dark red with purple glints	Blond tobacco, coffee, liquorice, impression pf complexity	Too dry and astringent
197	Nice ruby red	Lack of smell, closed, unrevealed	Black fruits, tannins,short in mouth
002	Garnet red, brillance of the disk	Slightly spicy, impression of alcohol	Astringency, warmness
302	Very pale color with violet glints	Sweets, slight acohol impression	Short in mouth, roundness
228	Garnet red, limpid	Closed, “wine making” smell	Full first impression, fine tanins, dryness at the end, alcohol
201	Deep red with ruby glints	Hawthorn, garrigue, spice, alcohol	Tannins, excessive alcohol
804	Ruby red, limpid	Closed, dominance of alcohol	Tannins astringency, short in mouth
206	Very deep red with slight garnet glints	Caramel, cacao, liquorice,vanilla, cinnamon	Full mouth, tannins not aggressive, short length in mouth

Annex 1 C Red Wine Descriptors, synthesis of 4 experts

Wine #	eye	Nose	Mouth
201	Deep red	Medium intensity; green green froth, undergrowth; fruity	Fleshy, full mouth, good balance, structured
121	Medium red	Strong intensity; grilled woody, coconut, light cherry	Medium balance; thin, slightly acid
136	Medium to deep red	intensité moyenne plus ; woodsy, vanilla, date, liquorice	balanced, woodsy, spicy
228	Deep red, brown colour	Medium to weak intensity; white chocolate, alcohol, light polystyrene	Round; alcohol mouth
309	Deep red	Medium to strong intensity, animal, stable	tart (acidity + astringency) ,
002	Deep red	Medium to strong intensity, woodsy, spicy, fruity (coconut)	supple, light concentration
206	Deep red	Weak intensity, fruity, menthol	Good balance, supple
804	Deep red	Medium intensity; light caramel, fruity	Thin, short, bitter, astringent