

## TYPICALITY RELATED TO TERROIR: FROM CONCEPTUAL TO PERCEPTUAL REPRESENTATION. STUDY OF THE LINKS WITH ENOLOGICAL PRACTISES

Cadot Yves <sup>(1)</sup>, Caillé Soline <sup>(2)</sup>, Thiollet-Scholtus Marie <sup>(1)</sup>, Samson Alain <sup>(3)</sup>, Barbeau Gérard <sup>(1)</sup>, Cheynier Véronique <sup>(2)</sup>

<sup>(1)</sup>INRA, UE 1117, UMT Vinitera,  
F-49070 Beaucouzé, France  
Yves.cadot@angers.inra.fr

<sup>(2)</sup>INRA, UMR1083 Sciences pour l'Œnologie,  
F-34060 Montpellier, France

<sup>(3)</sup>INRA, UE999 Pech-Rouge,  
F-11430 Gruissan, France.

### ABSTRACT

The conceptual image of a wine related to the terroir has consequences in technical terms. Among factors affecting the typicality, producers put forward the environmental factors of the terroir system, then the variety and finally the viticultural and oenological factors. We postulate that for the production of red wine, the "phenolic maturity" must be considered as an essential criterion. The "phenolic maturity" was translated into the date of grape harvest and the duration of vatting. Because of the nature of the corresponding biochemical compounds, these choices could have important consequences on the sensory profile of wines. The objective of this study is to understand the relationship between the conceptual image of a wine and the perceptual dimension of the wine, by connecting the typicality with some technical acts. The distinctive French wine style "Anjou Village Brissac" was investigated through four methods. A survey was performed to measure the conceptual dimension, and three sensorial methods were used for the perceptual dimension (Quantitative descriptive analysis (QDA) by a sensory expert panel, Just About Right analysis (JAR) by wine experts, and assessment of the typicality by wine experts). Wine experts were producers, winemakers, and oenologists from the area. The survey allowed highlighting soil as the first factor that affects the typicality. On the other hand, the QDA and JAR profiles highlighted the prevalence of the technical factors, in particular oenological, over the environmental factors. The JAR profile allowed to classify attributes in the typicality scores. Moreover, the study made it possible to show the shift between the conceptual typicality and the perceptual typicality, from the point of view of the technical acts, but also from the sensory point of view.

### KEYWORDS

Terroir – Cabernet – Typicality – Sensory analysis – Practices – Soil

### INTRODUCTION

The guarantee of quality of wine « Appellation d'Origine Contrôlée, (AOC) » indicates a product native of a region or a definite place among which the quality or the characters are essentially owed to this geographical environment. It results from the combination of a production and a "terroir" which expresses itself by the know-how of the men (République Française, 1993). Geographical indication with respect to wine is a concept where it is

supposed that in the wine, combination of characteristics can be attributed to the “terroir”. For Casabianca, these characteristics must be defined by a consensus of the producers (Casabianca *et al.*, 2005).

The characteristics of a product from a terroir, give the product « typicality », meaning that the product is representative of its terroir. The typicality could make it possible to differentiate, identify, and recognise the product. The terroir being defined by two dimensions, (i) the environmental factors (ii) and the variety, the cultivation and wine making (Salette, 1997). It applied to the wines of “Appellation d’Origine Contrôlée” (protected denomination of origin; AOC), the typicality, which corresponds to biochemical and sensory characteristics, is the most synthetic expression of the soil, contributing to making AOC wine an original product that can be considered as typical (Letablier, Nicolas, 1994; Salette *et al.*, 1998). According to Sauvageot, when the concept of typicality is applied to oenology, it represents wine characteristics all in all, resulting from type of vine, soil, and wine making process (Sauvageot, 1994). Thus, the typicality includes sensory, technical, and environmental dimensions and can be defined as a set of properties of belonging and distinction (Casabianca *et al.*, 2005).

The terroir is usually defined in terms of a delimited geographical area, (Laville, 1990, Morlat, Asselin, 1992), combination of environmental parameters and the functioning of the grapevine (Carey *et al.*, 2007) or combination of delimited geographical area, agronomic potentialities and local practices (Deloire *et al.*, 2008; Salette *et al.*, 1998; Casabianca *et al.*, 2005; Cadot, 2006). But, most of the studies have shown the influence of terroir as natural environmental factors on the composition and the quality of grapes and wines (Chone *et al.*, 2001; Jones, Davis, 2000; Leeuwen *et al.*, 2004; Morlat, Bodin, 2006; Vaudour *et al.*, 1998).

Our hypothesis is that both representations of the terroir could be linked, and highlighted by measurement of a conceptual typicality (where environmental factors could be pregnant), and a perceptual typicality (where the human factors could be pregnant).

Conventional profile is adapted from Quantitative Descriptive Analysis (Stone, 1974). It is a well-established methodology for the description of the sensory dimension and had been previously used in the case of the typicality concept (Cadot *et al.*, 2010; Fischer *et al.*, 1999; Perrin *et al.*, 2008). Relating to the sensory dimension of typicality related to appellation of origin, some other tools have been proposed, as typicality judgement (Ballester *et al.*, 2005; Moio *et al.*, 1993; Cadot *et al.*, 2010), napping test (Perrin *et al.*, 2008), free profiling (Perrin *et al.*, 2007), descriptive rating task (Parr *et al.*, 2007) or Just About Right profiles (Cadot *et al.*, 2010). However, Cadot showed the relevance of the QDA profile in discriminating the products according to their typicality (Cadot *et al.*, 2010).

This work proposes to compare the sensory dimension of the wine as a concept with descriptive methods in order to evaluate the gap between the concept and the perceptual dimension of the typicality: a conceptual dimension from an interview of producers as the first reference, three perceptual dimensions (a conventional profiling, taken as reference, a JAR profile and a quest for typicality). In a second step, the links with some terroir dimensions were valued.

## MATÉRIALS ET MÉTHODES

Two AOC were studied, « Anjou-Villages Brissac » (AVB) and « Anjou Rouge » (OUR). These AOC wines were located in the middle Loire valley (France), in southeast of Angers. For both AOCs, different criteria for grape varieties, training systems and oenological practices allow winegrowers easily change to the type of wine produced, depending on the wine market. The plot soils were classified in 3 classes, using a field soil model based on the

type of parent rock, the depth and the clayeyness of the soil, mainly in connection with the weathering level of the parent rock: weakly weathered rock (wWR), moderately weathered rock (mWR) and strongly weathered rock (sWR), according to studies on this area by Morlat and Bodin (Morlat, Bodin 2006; Bodin, Morlat, 2006). The wines studied were commercially available red wines. The bottles of wines, from 2005 vintage, were collected directly in the wineries in March 2007, and the sensory analysis was performed in May and June 2007. Sixteen « Anjou-Villages Brissac » AOC (AVB) and eight outliers, « Anjou rouge » AOC (OUT), were selected. Wines were chosen to be representative of type of soils and main technical practices (viticultural and oenology) of the area. OUT wines were produced by the same producers as the AVB wines. Their main technical and biochemical characteristics are shown in Tab. 1. In order to characterize vine production systems in the Anjou-Villages Brissac (AVB) area, we based a survey on direct “closed-ended” interviews with winegrowers who produced OUT and AVB wines in the AVB area. Quantitative descriptive analysis

Table 1. Technical and biochemical characteristics of the wines.

	AOC	AVB	OUT	Chi2/ ANOVA	P value
Bedrock type					
wWR		8	5		
mWR		6	2		0.817
sWR		2	1		
Technical characteristics	Average	St. dev.	Average	St. dev.	Pr>F
Cab. Franc (%)	61.66	39.98	95.0	14.14	0.032
Harvest date	10-oct	6.4	10-avr	5.0	0.024
Yield (hl.Ha-1)	44.7	4.3	46.9	5.3	0.291
Potential alcohol (% by vol.)	14.03	0.67	13.78	0.47	0.371
Mean Alcoholic ferment. temp. (°C)	23.4	3.0	21.6	1.9	0.136
Vatting time (days)	20.5	12.7	8.5	1.5	0.015
Maturing time (after FML, Months)	12.0	3.1	5.1	2.2	<0.0001
Aging in oak barrels (Nb. Wines)	2	/	0	/	N/A
Biochemical characteristics	Average	St. dev.	Average	St. dev.	Pr>F
Alcohol by vol. (%)	13.66	0.85	13.33	0.36	0.304
Acidity (pH)	3.58	0.13	3.63	0.12	0.386
Absorbance 420nm	4.39	1.16	3.60	0.48	0.080
Absorbance 520nm	6.31	1.97	4.89	0.94	0.069
Absorbance 620nm	1.68	0.58	1.31	0.29	0.112
CIE Coordinate L	46.44	9.51	53.01	6.46	0.094
CIE Coordinate a	54.16	6.13	48.98	7.23	0.079
CIE Coordinate b	15.39	3.91	12.61	2.64	0.085
Total anthocyanins (mg.L-1)	0.32	0.06	0.31	0.07	0.588
Total phenolics (Folin Ciocalteu Index)	80.81	26.15	62.53	13.22	0.078

described by Cadot (Cadot *et al.*, 2010). ANOVAs for each sensory attribute were carried out according to the model: attribute = judge+product+ε to select the discriminate descriptors and to determine the level of significance, Chi2 was used for categorical variables (Statgraphics Centurion XV, Statpoint, 2006). Principal Component Analyses (PCA), Agglomerative

(QDA), was carried out by a sensory expert panel. For Just About Right profile (JAR), twelve judges (5 winemakers, 6 oenologists, and 1 wine broker) took part in the experiment. They had good experience with the different expressions of Cabernet produced in the Loire Valley as all of them practice their professions in the area. After the JAR profile was established, the same twelve judges assessed the typicality. Assessors were instructed as follows: “For each wine presented, you must answer the following question: «do you think this wine is a good example or a bad example of what an AVB wine is?»”. The sensory plan was

Hierarchical Clustering (AHC), and Penalty Analysis (PA) were carried out on sensory data (XLstat-pro, Addinsoft, 2009).

**RESULTS ET DISCUSSION**

The main characteristics of the wines were not different, except for the harvest date, the vating date, and the proportion of Cabernet franc. The bedrock type was not significant (Tab. 1). This must be relied to the conceptual typicality of AVB wines. For producers, the main

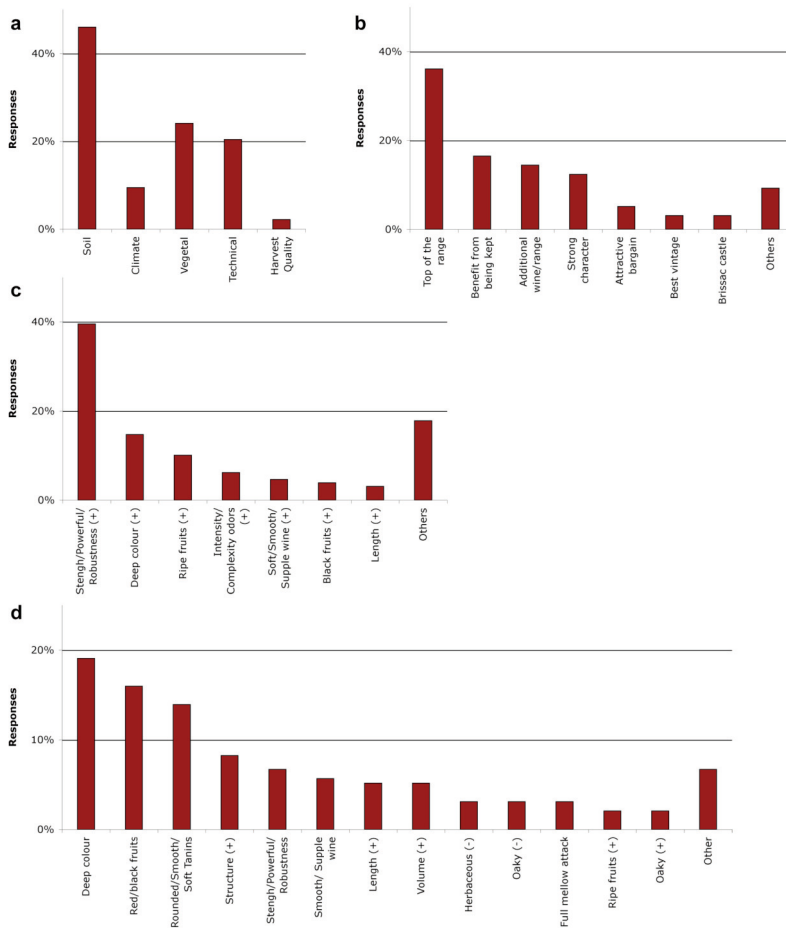


Figure 1. Conceptual typicality. 1a. Main factors that explain the AVB typicality. 1b. Image of the AVB wines for the producers. 1c. Main differences with OUT wines for producers. 1d. Conceptual typicality of AVB wines for producers.

characteristic which, explain AVB typicality was very consensual, with soil, then variety, and finally technical acts (Figure 1a). It was clear that there was a gap between the conceptual dimension of typicality produced (Figure 1b). For producers, differences with OUT wines were for robustness, colour, and ripe fruits (Figure 1c). The main sensory attributes of an AVB wine were for colour, then black and red fruits and then softy tanins (figure 1d). The consensus was high for all of these attributes. If QDA and JAR profiles gave different information (Cadot et al., 2010), they were well linked with typicality scores (Table 2). Most of the attributes but red fruits and soft tanins (JAR) were linked to typicality. For JAR profiles, colour intensity, complexity of odours, black and ripe fruits, thickness and balance could explain typicality scores (Figure 2). From the perceptual point of view, AVB wines were quite different than conceptual, where soft tanins and red fruits were not highlighted, but colour, ripe and black fruits and thickness were important.

It was also clear that responses from professionals were not consensual, due to different

Tab. 2. Relationship between sensory profiles and tyoicality scores

	Profile	JAR	QDA
ANOVA :			
Typicality = HAC+product	Pr<F	<0.0001	<0.001

perception, but also to different conception of the ideal wine (not shown), as results presented previously by Cadot (Cadot et al., 2010). Nevertheless, QDA and JAR profiles,

could describe the typicality scores, with good correspondence between overall representation of wines by QDA and JAR profiles, and typicality (Tab. 2). Moreover, seven among the 21 attributes from QDA, and nine among the 13 attributes from JAR profiles were well linked

with typicality scores. For both profiles, visual attributes and astringency were especially highlighted.

In order to link perceptual typicality to soil and technical dimensions of the terroir system, Khi2 test and ANOVA were performed. Results are shown in Tab. 3. Soil effect was not significant, instead of oenological practices. Our hypothesis, that the "phenolic maturity" must be considered as an essential criterion in the typicality, was verified. The "phenolic maturity" was translated by the date of grape harvest and the duration of vatting. The date harvest could explain the potential alcoholic content of harvest, and could be an explanation of the duration of the alcoholic fermentation duration. Because of the nature of the corresponding biochemical compounds, these choices could have important consequences on the sensory profile of wines (colour,

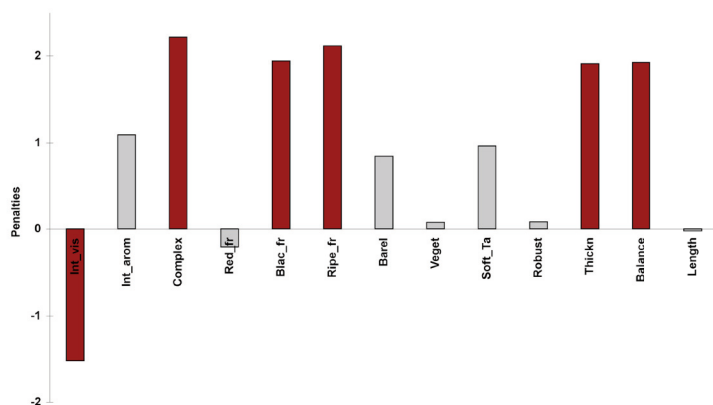


Figure 2. Penalty analysis from JAR analysis. In red, significant attributes.

Tab. 3. Correlations between typicality scores and some dimensions of the terroir system.

Variables		Pr (AVB scores)
Soil type	Bedrock type	NS
Vegetal material	Cab. Franc (%)	NS
Vitic. practices	Harvest date	P<0.01
	Yield (hl.Ha-1)	NS
Oenol. practices	Potential alcohol (harvest)	P<0.001
	Duration alcoholic fermentation	P<0.01
	Mean alcoholic fermentation temp.	NS
	Vatting duration	P<0.001
	Maturing duration	P<0.05

astringency). The difference between the conceptual and perceptual dimensions of the typicality witch, highlight the prevalence of consensual use of some practices, could reinforce the AOC concept, as Hinnewinkel suggested (Hinnewinkel, 2004).

### CONCLUSION

The comparison between the sensory dimension of the wine as a concept with descriptive methods highlighted the gap between the conceptual and the perceptual dimension of the typicality. The conceptual dimension which, was studied from a survey of producers, was consensual with the soil as the first factor that affects the typicality. On the other hand, the perceptual dimension which, was studied from three sensorial methods, highlighted the prevalence of the technical factors, in particular oenological, over the environmental factors. The JAR profile allowed to classify attributes in the typicality scores. The consensus of the producers in conceptual typicality was not verified in the perceptual typicality. This study made it possible to show the shift between the conceptual typicality and the perceptual

typicality, from the point of view of the technical acts, but also from the sensory point of view.

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