Cultural and sensorial correlates of Trebbiano wine consumption

Luigi Fabbris, Alfonso Piscitelli

1. Introduction

The Trebbiano from Abruzzo is a variety of white grapevine cultivated in the Abruzzo region, Italy. The Trebbiano grapevine is also called 'white Bombino' or 'Tuscan Trebbiano' and is cultivated all over central and southern Italy, in the Emilia Romagna region and here and there in other northern Italy regions. The variety cultivated in Abruzzo and respecting the production protocol can be named Trebbiano from Abruzzo – quality assurance label (*Trebbiano d'Abruzzo DOC*).

Varieties of Trebbiano grapevine are cultivated in Italy since at least two millennia. At the time of ancient Romans, Pliny the Elder in his first century *Naturalis Historia* mentions a 'vinum trebulanum' whose name was associated to the word 'trebula', say farmhouse. This may highlight the large diffusion of this vine because its primary use was, particularly at those times, for home consumption of farmers. The semantics of its name, as some scholars object (Bacci, 1596, quoted in Labra et al., 2001; Hohnerlein-Buchinger, 1996) could differ. Also, the varieties of current Trebbiano wine do not show a common ancestor (see the DNA analysis of various Trebbiano-like strains in Labra et al., 2001). As a matter of fact, this grapevine has found on the Abruzzo hills such an ideal soil and climate to gain a foothold that the Abruzzo Trebbiano vine (from now on, Trebbiano) could now be considered an autochthon variety.

In this paper, we analyse the preference for Trebbiano wine by means of a sample of Italian consumers involved in an experimental wine tasting experience. Due to the small sample at hand, we keep ~~it~~ our analytical model simple and assume cultural and sensorial characteristics of Italian consumers as possible predictors of preference of Trebbiano to other wines. In this way, we highlight the characteristics of the social groups who are favourable to its consumption and, on the contrary, those who dislike it, so to be able to campaign for a larger consumption of Trebbiano from Abruzzo.

The rest of the paper is organised as follows: Section 2 introduces the available data, the wine tasting experience that led to the data collection and the model for data analysis. Then, Section 3 presents the main results of the statistical analysis of the collected data. Finally, Section 4 discusses the results with reference to the mainstream literature on wine preference analysis.

2. Data and methods

2.1. The tasting experience

In September 2018, a sensory evaluation experiment was conducted on 12 white wines originating from four grape varieties (*Trebbiano d'Abruzzo, Pecorino d'Abruzzo, Passerina d'Abruzzo, Verdicchio dei Castelli di Iesi*). In the sensory experiment the *Trebbiano d'Abruzzo* was also blindly served as it were two different grape varieties (*Vino bianco DOC; Vino bianco da pasto*). Overall, in the experiment there were six grape varieties, and two different cellars were included for each grape. The tasting experiment consisted in evaluating the preferences for aspects of a set of four wines administered to the assessors according to a randomised fractional factorial design; only the name of the wines to evaluate was made explicit to the

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assessors. Though, in order to avoid complaisance towards the Trebbiano, also either of two anonymous wines (*Vino bianco DOC; Vino bianco da pasto*) –which were actually Trebbiano– was juxtaposed at each tasting trial to Trebbiano.

The pool of tasters included 48 individuals, of whom 30 typically consumed mild amounts of wine (mild consumers), and 18 were professional sommeliers belonging to the AIS-Abruzzo association. Both mild consumers and sommeliers were selected on the basis of their consensus to the experiment as well as their experience in wine consumption.

The wine characteristics considered in this experiment were selected through an anonymous paper questionnaire. This questionnaire asked participants to make judgements on 11 intrinsic attributes of appearance and an overall judgement of each tasted wine. Attributes were rated on a 10-point Likert scale from 'Min Preference' (1) to 'Max Preference' (10). The questionnaire also gathered data regarding the tasters' background characteristics, their drinking habits, and the relevance of wine in their diet and social life.

Since it was deemed practical to serve only four out of the six possible varieties to each taster, the actual subset of wine varieties to be administered to each assessor was defined according to a fractional design with main factor grape-variety.

Therefore, four glasses were served in randomised order to each taster, and for each of the proposed varieties one of the two potential cellars was randomly selected. The wines were poured in a flight, and taster were supplied with a glass of water too. In the tasting session, the judges received six centilitres of each of the four randomly selected wine varieties, which were served at the same cold temperature. The protocol envisaged that tasters could taste and re-taste before concluding preferential judgements, and they would evaluate the intrinsic attributes of each tasted wine.

2.2 The analytical model

The model for data analysis of responses collected about Trebbiano includes the frequency of consumption of Trebbiano as a criterion variable, Y, a first regressor, X_1, describing the role of Trebbiano wine in an everyday outdoor dinner, and a selection of other J–1 significant regressors, so that $\mathbf{X} \equiv (X_1, X_2, \ldots, X_J)$. The relationship may be written as

$$Y = f(X_1, X_2, \ldots, X_J).$$

The Y variable, measured on an ordinal *scale*, was dichotomised as follows: $Y = 1$ if the respondent used to drink Trebbiano wine often or occasionally, and $Y = 0$ if the respondent consumed it rarely or never.

The logistic regression model is written as follows (Hosmer and Lemeshow, 2000):

$$logit\,[p(Y=1)] = \beta_0 + \beta_1 X_1 + \cdots + \beta_p X_J\,,$$

where $logit(p) = ln[(p/(1–p)]$, and β_i (i=0, 1, …, J) measures the relation between Y and X_i when all other variables in the model remain fixed. Regressor X_1 was forced into the model, while X_i (i = 2, …, J) was selected in a stepwise fashion, block after block, according to its significance (< 0.10). The goodness of fit is measured through the Nagelkerke pseudo-R^2 index.

The possible regressors were examined in blocks: firstly, the selection concerned the descriptors of consumers' wine expertise and Trebbiano wine evaluation and, finally, the set of variables describing the personal and social aspects that, either in a positive or negative direction, may influence wine consumption. The characteristics of the assessed Trebbiano wines enter this analysis as distributional parameters (mean and absolute deviation) of the scores which single assessors assigned to the tasted wines.

Such a model identifies a relational scheme *à la Ajzen* (Fishbein and Ajzen, 1975; Ajzen, 1991), in which blocks of predictors positively and negatively correlated to the response both concur to the statistical fit of the propensity to consume the topical wine and then to its consumption in reality. Statistical analysis was performed using the SPSS package (IBM, 2020).

3. Results

From responses to the questionnaire, it resulted that Trebbiano wine was regularly consumed by the majority of the involved assessors: 29.2% consumed it often and 37.5 occasionally in a regular meal, while another 18.7% declared drinking it rarely, and only 14.6% never. Overall, our sample included a group of experts and a group of nonexperts. Of the 48 assessors, five (10.4%) considered themselves to be wine experts, and eight (16.7%) stated that they were able to recognise some wines but did not consider themselves to be wine experts. The majority of the 12 participating sommeliers classified themselves in the latter category. A large share of assessors (47.9%) indicated that they possessed sufficient knowledge of wine to adequately understand its quality. Finally, 25% of the assessors admitted that they knew little or very little about wine. Regarding wine practice, about 56% of assessors had been consuming wine for decades, usually with dinner. Several assessors (54.2%) had attended a wine-tasting session coordinated by a sommelier.

Both experts and nonexperts perceive that commonly people associate the label Trebbiano with low quality wines: 47.8% of assessors perceive that a general consumer evaluates it as a mediocre wine, 34.8% as just fair and only 17.4% as a fine quality wine. Instead, the evaluation of Trebbiano at the tasting experiment was generally positive and, in any case, better rated than the other labelled wines: indeed, the mean of the two tastes of Trebbiano obtained a mean evaluation of 6.48 (out of 10) and that of the tastes in which the Trebbiano label was evident of 6.91, against an overall mean of the four tasted wines of 6.72.

It is evident that the label of the tasted wine somewhat influenced the assessors: if the label of the Trebbiano was in fact 'white wine' (n = 32), the mean evaluation was 6.34 and in case the label was 'white wine suited for meals' (n = 32) it was 6.19. The difference between the Trebbiano-labelled wine and the generally 'white wine' labelled one was 0.65 (out of 10), which is statistically significant at 10% level only. This induces to conjecture the presence of a mild complaisance effect among the tasters who better scored the wines labelled Trebbiano than those which, actually being Trebbiano, were labelled in a more general, less inviting way.

Table 1 summarises the results of two applications of the regression analysis: Model 1 (**M1**, referred by columns 2 and 3) concern the analysis in which X_1 was forced as a regressor and Model 2 (**M2**, referred by columns 4 and 5) without any forced variable. The fairly significant statistical fit of the Trebbiano consumption propensity (pseudo-R^2 = 37.3% for Model 1 and 30.1% for Model 2) supports the following claims:

Table 1. Parameter estimates $\widehat{\boldsymbol{\beta}}$ of two regression models with Trebbiano wine consumption as criterion variable (forward stepwise selection of regressors, n = 48; ** < *0.01;* * < *0.05;* ° < 0.10; NS= Not significant).

Regressor	$\widehat{\boldsymbol{\beta}}$ **(M1)**	*Significance* **(M1)**	$\widehat{\boldsymbol{\beta}}$ **(M2)**	*Significance* **(M2)**
Intercept	-6.936	*	-5.205	*
Role of Trebbiano wine in an outdoor dinner	0.452	°	=	=
Self-perceived expertise	(a)		(a)	
Average evaluation of two Trebbiano tastes	0.515	NS	0.684	°
Absolute deviation between Trebbiano tastes	1.055	°	1.127	°
Drinking wine regularly	1.590	*	1.234	°
Nagelkerke Pseudo R^2	0.373		0.301	

(a) *Variable initially selected and then ejected because of its correlation with other significant predictors.*

- The applied models show a fair fit of the criterion variable: the models involving only the significant regressors returned pseudo-R^2 values equal to 37.3% (**M1**) and 30.1% **(M2**). These quotas are encouraging (Smith at al., 2021), although there may be other socio-economic and contextual variables that, in combination with those considered in this application, could improve the fit.

- A model *à la Ajzen* —implying that the variable anticipating the behaviour, which in our case is the perception that a Trebbiano wine label may influence the wine choice in an outdoor dinner, the behaviour being the consumption of that wine— is supported by the data at hand. In other words, it may be conjectured a causal chain starting from a bipartite set of regressors (one part being the personal and social resources and the other being the personal and social problems related to the consumption of that typical wine) and crossing the competence of assessors as wine consumers which may influence the assessors' disposition towards that wine, and, finally, its regular consumption.
- Model 2 includes three regressors: 1) the mean evaluation of the two tasted Trebbiano wines, 2) a measure of evaluation variability between the two tasted wines, and 3) the habit of drinking wine at meals. Model 1 involves again three regressor, but the mean evaluation of the two tasted Trebbiano wines is substituted with R_0, the perception that Trebbiano can be considered a good wine for an outdoor meal. The measure of variability between the two tastes of Trebbiano —a low or null variability measuring the ability to similarly evaluate two wines from the same bottle but served as different— can be considered an indirect measure of tasting ability of the involved assessors, in the sense that the smaller the variability, the higher the ability of an assessor to discern wine quality. The relationship with Trebbiano consumption being positive, the presence of this predictor in both models highlights that Trebbiano, *ceteris paribus*, that in this case means for a given evaluation score, was more consumed by qualified tasters.
- Also, it may be noticed that positive evaluations of the tasted Trebbiano negatively correlate with the measure of variability between evaluations ($r = -0.466$; $p < 0.01$). This means that Trebbiano wine is more appreciated by more expert assessors and this trend parallels real consumption. This may pinpoint the idea of Trebbiano as a specialist's wine.
- Another regressor enters both analytical models: the regular consumption of wine at meals. This variable shows significantly higher scores in the evaluation of Trebbiano ($r = 0.328$; $p < 0.05$) but not with the variability index ($r = -0.084$; $p > 0.10$). This may mean that regularly assuming wine at meals does create a feeling with Trebbiano wine but not necessarily is related to a technical expertise concerning wine tasting.
- Finally, let us consider the (positive) disposition towards Trebbiano consumption. This variable brings forward the actual consumption. In fact, there is a significant correlation between disposition towards and consumption of Trebbiano: $r = 0.288$ ($p = 0.047$). Though, the disposition is uncorrelated with all other possible regressor. In the multiple regression analysis, the disposition towards Trebbiano wine enters the model as an alternative to a positive evaluation of Trebbiano tastes. The two concepts are so tightly related to allow stating that the disposition towards the consumption of Trebbiano represents the assessors' dimension of their own wine culture.
- A regressor that does not show up in the final model is the self-perceived expertise. Indeed, it was selected at a certain step of the analysis but was rejected after the selection of the three described regressors. This means that the assessors' expertise correlates with the custom to drink wine at meals ($r = 0.348$; $p < 0.05$) and with sensorial skills that develop in people for whom wine is a part of the daily diet.

Crossing some characteristics of the assessors with their wine consumption habits and the general opinion about Trebbiano quality we obtain Table 2. The results summarised in table help understanding some apparent inconsistencies in our data. Indeed, there is a gap between the regular consumption of Trebbiano by the people involved in our tasting experiment and the reputation for that wine perceived by the assessors in the public opinion.

Trebbiano wine is present with a certain regularity on the dining tables of two thirds of the involved consumers. Also, the people self-rating as wine experts, the regional sommeliers and the regular consumers of wine at meals consume it at a rate above 80% and are prepared to

suggest Trebbiano as a wine alternative to match food at an outdoor dinner. No doubt that those who better know it, have a superior opinion of Trebbiano. The same categories showing the more positive opinions about Trebbiano perceive that the general public basically reputes Trebbiano a mediocre wine: 61% of sommeliers and 56% of those who drink wine at meals believe that 'the others' consider Trebbiano as a mediocre, ordinary wine. These percentages are higher than the average computed over all assessors (50%). Definitely, we can state that there is a large perception divide between the more expert assessors and the general public as Trebbiano reputation is concerned.

Nevertheless, it may be that the more expert assessors were influenced by a sort of complaisance towards that wine. In order to check for complaisance, we can evaluate two survey results: 1) the difference between the judgement of Trebbiano wine when its name was printed on the paper place mat each assessor had in front when tasting, and that when Trebbiano was served with a general label, for instance, 'white wine'; and 2) the variability index of the two Trebbiano tastes (one explicit, the other hidden) each assessor was required to do.

The data show that regular consumers of Trebbiano assigned high scores to the Trebbiano whose name was explicitly indicated and even higher to the Trebbiano served under a general label. This may mean that people accustomed to drink Trebbiano at meals recognised and appreciated in the tasted wines the same qualities they appreciated when matching wine with food at home. In some sense, regular consumers of the topical wine expect to feel in their nose and palate sensations they feel when they drink wines at meals.

Table 2. Percentage proportion of Trebbiano consumers and of the perceived public opinion of Trebbiano wine, by contextual and assessors' characteristics (n=48)

Characteristics	% Trebbiano consumers	Public opinion of Trebbiano wine		
		Mediocre	Just fair	Fine
Self-perceived as an expert (n=13)	92.3	46.2	30.7	23.1
Being a sommelier (n=18)	83.3	61.1	27.8	11.1
Drinking wine regularly (n=27)	81.5	55.6	37.0	7.4
Interviewee always deals with wines at home (n=27)	81.5	44.4	44.4	11.2
Olfactory skills (7/10 on; n=27)	74.1	55.6	33.3	11.1
Aroma tasting skills (7/10 on; n=29)	72.4	55.2	31.0	13.8
Role of Trebbiano in an outdoor dinner (7/10 on; n=22)	81.8	40.9	22.7	34.4
Below average evaluation of 2 Trebbiano tastes (n=20)	60.0	60.0	25.0	15.0
Above average evaluation of 2 Trebbiano tastes (n=28)	71.4	42.9	39.2	17.9
Below average variability of 2 Trebbiano tastes (n=26)	57.7	57.7	34.6	7.7
Above average variability of 2 Trebbiano tastes (n=22)	77.3	40.9	31.8	27.3
Below average evaluation of explicit Trebbiano (n=10)	40.0	50.0	40.0	10.0
Above average evaluation of explicit Trebbiano (n=22)	68.2	54.5	31.8	13.7
Below average evaluation of hidden Trebbiano (n=33)	57.6	54.5	24.2	21.3
Above average evaluation of hidden Trebbiano (n=31)	83.9	42.0	42.0	16.0
Smoker (n=14)	57.1	50.0	14.3	35.7
Gender (male; n=24)	62.5	33.4	45.8	20.8
Age 45 year-old and more (n=29)	72.4	44.8	37.9	17.3
Total (n=48)	**66.7**	**50.0**	**33.3**	**16.7**

Moreover, both the mean scores and the between-score variability of the two tastes of Trebbiano ―one explicit, the other masked― were much higher among those for which Trebbiano is part of their diet. Both the assessors who gave a more positive evaluation of the tastes and those whose scores less differed perceived a scanty public reputation of Trebbiano. So, indirectly, the assessors who gave a better evaluation of Trebbiano's qualities and possessed a superior capacity of discerning wines are among those who believe that public opinion is not inclined towards Trebbiano.

4. Discussion and conclusion

This work was aimed to detect the characteristics of the Trebbiano wine consumers as stemming from the data collected through a tasting experiment on white wines from the Abruzzo region. The experiment was designed also to measure the possible complaisance that may affect the tasters' judgements. Our analysis illustrates that Trebbiano was judged as a good quality wine by the large majority of assessors and, in particular, by people who, for professional or dietary reasons, know it better. Thus, sommeliers and other experts knowledgeable of wines, after the tasting, scored Trebbiano in a very satisfactory way. A level of satisfaction that leads to its regular consumption both at home and outdoor meals.

We could summarise our results by stating that knowledgeable people evaluate Trebbiano as palatable as more renowned wines, despite its large consumption. Experts judged positively its intrinsic qualities and juxtaposed their judgements to that of the general public, who —according to them— associate the topical wine with the plethora of ordinary quality, even mediocre, wines. This contrast highlights the strength of experts' judgement in favour of Trebbiano: we (those who know) consider it a good wine, the others (the uninformed) consider it as ordinary, too diffused to be good. Now, we should define a good wine. We could relate a wine goodness to how its sensorial properties cross its relevance in a heathy diet. Wine experts, indeed, distinguish between a wine whose qualities are so peculiar (and non-disagreeable) to make it a wine with an own personality, one that other experts would similarly suggest in a particular occasion, and a wine that is so palatable that they themselves would drink it safely every day. Though, this issue would lead us far from our research questions and we leave it.

The feeling with Trebbiano shown by our experts went even further. Some of them instinctively expressed judgements on its qualities that went beyond their favourable position, adding complaisance in cases the wine they tasted was explicitly labelled as Trebbiano. In fact, comparing these judgements with those given when Trebbiano was instead administered as a 'white wine' or 'wine suited for meals' their judgements were rather different. This may be interpreted as such a biased disposition of the regional experts to Trebbiano to even bias their judgements in case they are called to evaluate it.

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