



Understanding quality judgements of red wines by experts: Effect of evaluation condition



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ABSTRACT

The effect of evaluation condition on quality judgements of wine experts was evaluated. Quality perceived by wine experts was investigated under the assumption that this construct is built from multimodal sensory inputs. Twenty-one wine experts from Rioja (Spain) scored the intrinsic quality of 16 Spanish red wines under four conditions: (i) visual stimulation only, (ii) orthonasal olfaction alone, (iii) in-mouth sensations only (wearing a nose clip) and (iv) global tasting. Agreement among judges and the effect of evaluation condition were evaluated by principal component analysis (PCA) and ANOVA, respectively. In parallel, a trained panel described aroma, taste and in-mouth sensory properties such as astringency, global intensity and persistence. CIELab colour coordinates were also obtained. These descriptive data were submitted to regression analyses to explore their relationship with quality scores derived from the four evaluation conditions. Common mental representations of wine quality under visual, olfactory and global conditions were confirmed, while there was not a clear quality construct based exclusively on taste and mouthfeel properties. Wine taste and mouth-feel quality concept is suggested to be built only in combination with aroma and/or colour stimuli, and thus within a wine context.

Global quality judgement integrated information provided by visual and olfactory cues, even if olfactory stimuli were suggested to have more importance on the construction of the global quality concept of wine experts. Significant interactions between wine and evaluation condition revealed significant differences in quality scores dependent on the stimuli received during tasting and on the wine judged. Sensory cues driving quality, especially visual and in-mouth properties varied depending on the evaluation condition, which suggested that global wine quality concept would be the result of the integration of perceptual and cognitive information rather than a collection of independent stimuli.

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1. Introduction

Quality is generally defined as the judgment of a products' overall excellence or superiority (Zeithaml, 1988). Understanding the mechanisms underlying food quality perception is important as it

is involved in the decision-making process of consumers at purchase situations (Marin & Durham, 2007). Wine is a particular case study within the general food and beverage domain as the opinion of wine experts, especially of the so-called wine gurus, exerts an important influence on wine market. It is thus important to understand sensory drivers of experts' quality perception as their judgements tend to generate quality prototypes among wine consumers. Despite the known relevance of understanding quality perception for the wine industry, this concept is not yet fully understood in part because it is a multidimensional concept, which makes it difficult to define.

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1.1. Multidimensionality of quality

The multidimensional character of perceived quality is related to factors such as the properties of the product itself, and the characteristics of consumers.

Quality perception is influenced by the characteristics of the product which have been mainly classified into intrinsic and extrinsic factors (Charters & Pettigrew, 2007). Intrinsic cues are those related to the product itself (physical part of it) and its organoleptic properties such as aroma, in-mouth properties or colour. Extrinsic cues refer to properties which are not physically part of the product such as package design or region of origin. For the specific case of wine, intrinsic cues of previously experienced wines are determinant in repurchase situations (Mueller, Osidacz, Francis, & Lockshin, 2010). The importance of extrinsic properties lies on the fact that at wine purchase the consumer is rarely able to taste wine and thus has to rely on extrinsic cues to infer wine quality.

Quality cannot be understood unless the characteristics of the consumer judging the product are considered. This is particularly important for wine since consumers' perceptions are quite heterogeneous and is highly influenced by consumer's level of expertise and different from that of experts (Ballester, Patris, Symoneaux, & Valentin, 2008). Experts seem to have common memorised wine prototypes, especially within the same production area (Hopfer & Heymann, 2014; Torri et al., 2013), contrary to less experienced consumers (Urdapilleta, Parr, Dacremont, & Green, 2011). The fact that quality assessment is based on technical winemaking processes for experts and on individual experiences for consumers results in a misalignment in the quality concept between wine professionals and low-experienced consumers (Lattey, Bramley, & Francis, 2010; Sáenz-Navajas, Ballester, Pêcher, Peyron, & Valentin, 2013).

1.2. Flavour: An integrated percept

Food flavour has been defined as the combination of stimuli perceived in the oral cavity combining taste, olfactory as well as trigeminal somatosensory and thermal perception. Prescott (2012b) suggested that during food experiences rather than the perception of individual discrete sensations, products are perceived as an integration of these signals. Discrete physiological sensory systems (taste, odours or tactile sensations) are anatomically separated, but they are functionally connected (Gibson, 1966). They are integrated into a single perception (flavour). Perceptions are constructed from a combination of both perceptual and cognitive signals, these lasts including the sensory properties of the object that are encoded in the memory (Small & Prescott, 2005).

In the context of wine flavour, Castriota-Scanderbeg et al. (2005) showed that the pattern of brain activations was different in wine consumers with different levels of expertise (experts vs naïve consumers). Experts showed activation of areas implicated in gustatory/olfactory integration in primates and involved higher cognitive functions such as memory. They showed higher sensitivity to combined olfactory and taste perception and thus the ability of integrating several sensory modalities, which would result in flavour representation (Pazart, Comte, Magnin, Millot, & Moulin, 2014). Differently, naïve consumers showed activations in the primary gustatory cortex and brain areas related to a more emotional and global experience when drinking a wine (Castriota-Scanderbeg et al., 2005). Less-experienced consumers seem to have recourse to more analytical approaches than experts, thus a complex stimulus seems to be perceived as the individual elements rather than integrated as a flavour.

1.3. Wine quality evaluated by experts

Wine quality is usually judged by wine professionals. For this purpose, either analytical (based on descriptive analysis) (Etaio et al., 2010) or integrated (holistic) (Goldwyn & Lawless, 1991) methodologies are described in the bibliography. Concerning analytical methods, it is widely extended in the wine sector that groups of experts from a same region carry out the sensory quality control, especially in Protected Designations of Origins (PDOs) contexts such as that accredited and described by Etaio et al. (2010) for young red wines from Rioja. Usually, a panel of around five–seven experts carries out a descriptive task by scoring the intensity of individual parameters linked to visual, aroma and in-mouth properties and/or selecting positive attributes or defects from a previously established list. The parameters included in the score card are previously selected by a group of experts during the method development. These attributes have to be specific of the wine category object of evaluation and to influence its sensory quality. An overall quality score is calculated by applying a weighting factor to each parameter of the scorecard. The contribution of each parameter to the overall sensory quality is defined by consensus among experts during method development. For example, Etaio et al. (2010) attributed weighting factors of 10%, 30% and 60% to parameters evaluated in the presence of exclusively visual, aroma and all perceived in-mouth (aroma, taste and trigeminal sensations) cues, respectively. Accordingly, in-mouth and visual properties were suggested to be more and less important, respectively, for the overall sensory quality.

Integrated quality assessments consist in the direct evaluation of quality based on a holistic approach (Goldwyn & Lawless, 1991; Hopfer & Heymann, 2014). Experts are asked to score quality as a single multidimensional attribute of wine. This approach considers both the common mental representation of wine quality among wine experts from the same production area, and their heterogeneity, as mental concepts are based on individual experiences (e.g., past tastings), ideas and expectations. This methodology considers quality as an integrated percept (flavour) rather than the summation of individual discrete sensations (taste and mouth-feel, aroma, colour) in contrast to analytical approaches.

Most popular score cards for wine tasting combine both, analytical and holistic approaches. Therefore, in the first step of wine evaluation, quality of wine is scored based on exclusively visual stimuli. Then, judges evaluate wine quality based on olfactory cues and the last step involves the scoring of overall wine quality with access to all sensory stimuli: visual, olfactory and gustatory. Even if this wine tasting protocol is widely extended, there is a lack of scientific work exploring the relationship between global quality perception (with access to all stimuli) and quality scored in the presence of isolated sensory stimuli (e.g., visual or olfactory). In the present work, quality perception was evaluated in these three conditions: with visual stimulation only (Qv), with orthonasal olfaction alone (Qo), and global tasting (Qg: with visual, olfactory, taste and trigeminal stimuli) together with a fourth perception mode in the presence of in-mouth sensations only (Qm: wearing a nose clip). Even if wearing nose clips could be rather disturbing, they have been employed as a means of closing participants' nostrils in previous studies (Labbe, Damevin, Vaccher, Morgeneegg, & Martin, 2006; Lawless et al., 2004; Parr, Ballester, Peyron, Grose, & Valentin, 2015) and are considered a suitable method to prevent olfactory perception. This permitted us to study the contribution of exclusively in-mouth stimuli (taste and trigeminal sensations) to the overall wine quality perception. Together with visual cues, orthonasal olfaction, in-mouth properties (taste, and trigeminal stimulation), retronasal olfaction is also involved in the perception of wines. However, the direct evaluation of this chemosensory process deems difficult, since in the oral cavity retronasal aroma stimuli and taste/mouthfeel properties are

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