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ScienceDirect
Food Quality and Preference 18 (2007) 849–861
Food Quality and Preference
www.elsevier.com/locate/foodqual

The distinctive flavour of New Zealand Sauvignon blanc: Sensory characterisation by wine professionals

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Received 21 May 2006; received in revised form 1 February 2007; accepted 2 February 2007
Available online 15 February 2007

Abstract

The distinctive New Zealand wine style "Marlborough Sauvignon blanc" was investigated by sensory characterisation, by judgments of typicality, and by chemical analysis of selected aroma compounds. Typicality was defined in terms of perceived representativeness where good examples of the concept were considered more typical. Wine professionals undertook three sorting tasks and a descriptive rating task involving 15 Sauvignon blanc wines from New Zealand and France. Ortho-nasal and global (retronasal and taste) data were each considered. Wines were sorted into experimenter-provided categories of "green" or "not green", "ripe" or "not ripe", and "good varietal definition" or "not good varietal definition". To elucidate the critical components of representativeness, typicality ratings for each wine were considered in relation to descriptive ratings of specific flavours, to the sensory data from the three sorting tasks, and in relation to the concentrations of two aroma compounds, namely 3-isobutyl-2-methoxypyrazine (IBMP) and 3-isopropyl-2-methoxypyrazine (IPMP). Results demonstrated that wines considered to have good varietal definition were also rated higher on typicality with respect to Marlborough Sauvignon blanc than wines that were judged to be lower in varietal characteristics. The data also showed that the higher-order flavour concepts of Green and Ripe were mutually exclusive but each was essential to the concept of a typical Marlborough Sauvignon blanc. Specific flavour characteristics (e.g., green capsicum; boxwood) were predictive of high typicality ratings for a wine, whilst others (e.g., mineral) were predictive of low typicality ratings. The chemical concentrations of IBMP and IPMP correlated positively with perceived green flavours, and inversely with perceived ripe and fruity flavours. The data are interpreted within a cognitive model of conceptual structure [Rosch, E., & Mervis, C. (1975). Family resemblances: Studies in the internal structure of categories. *Cognitive Psychology, 7*, 573–605] that considers not only the ideal or prototypical Marlborough Sauvignon blanc but also the limits to the variability in flavour profile that can be tolerated by experienced wine professionals for a wine to be perceived as typical of its style.

Keywords: Wine; Sauvignon blanc; Sensory; Wine professionals; Typicality

The *Vitis Vinifera* grapevine appears capable of expressing distinctive flavour characteristics as a function of its physical and cultural environment. Geographical indication with respect to wine is a relatively new concept in New Zealand but has a longer history in Europe, where it is a central part of agricultural policy (Barker, 2006). Inherent in the notion of geographical indication is presence in the wine of unique characteristics, or combination of characteristics, that can be attributed to the product's source. The source is usually defined in terms of a delimited geographical area, often referred to as "terroir" (Jackson & Lombard, 1993). The unique characteristics of a product from a delimited geographical area, chemical and sensory, give the product *typicité*, meaning that the product is representative of its terroir. We employ the term "typicality" as the best, albeit imperfect, translation of the French notion of typicité (see Sauvageot, 1994, for elaboration).

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doi:10.1016/j.foodqual.2007.02.001

Sauvignon blanc grapes produced in several regions of New Zealand, in particular the delimited geographical area known as Marlborough (see Rae & Tozer, 1990), do appear capable of producing wines with highly distinctive sensory characteristics. The notion that a concept of Marlborough Sauvignon blanc exists as a distinctive entity in the minds of wine professionals and wine consumers is exemplified in national and international wine writing (e.g., New Zealand Winegrower, Spring, 2004, p. 27). The concept is often expressed in a way that assumes readers know what flavour profile to expect of the wine. The sensory characters reported by wine writers are fruit and vegetable flavours such as passionfruit and green capsicum that, balanced with racy acidity, are central to descriptions of the wine style. In other words, the dominant style of Sauvignon blanc wine currently made in New Zealand emphasises the grape's identity (i.e., varietal characters), rather than oenological manipulations such as oak treatment.

Over the last decade, researchers have reported data concerning existence of a concept for a particular wine variety in specific geographical locations. Arguably the most extensive work to date has involved Burgundy Chardonnay, which has been investigated from both a chemical (e.g., Moio, Schlich, & Etievant, 1994) and sensory (e.g., Ballester, Dacremont, Le Fur, & Etievant, 2005; Moio, Schlich, Issanchou, Etievant, & Feuillat, 1993) perspective. Ballester et al. reported ortho-nasal and global (retronasal and taste) data, demonstrating a reasonable consensus among French wine professionals concerning a shared Chardonnay wine concept. Moio et al. (1994) reported typicality judgments to Burgundy Chardonnay wines as a function of appellation. Other reported work includes investigation of grape composition and wine quality of Californian Chardonnay wines (e.g., Arrhenius, McCloskey, & Sylvan, 1996), South African Sauvignon blanc (Marais, Hunter, & Haasbroek, 1999) and German Riesling wines (Fischer, Roth, & Christmann, 1999) in relation to specific geographical regions.

The overall aim of the present study was to provide empirical evidence to support anecdotal reports concerning existence of a Marlborough Sauvignon blanc wine concept. More specifically, we investigated whether there is an agreed ideal or typical variant amongst wine professionals, and the specific flavours that are essential for a wine to have typicality; that is, to be seen as a good example of the concept. Flavour in the current study refers to attributes perceived via ortho-nasal olfaction, retronasal olfaction, taste, and tactile stimulation.

Three previous studies in our laboratory, where wine professionals generated their own descriptors to New Zealand Sauvignon blanc wines, provided data that demonstrated the salience of both higher-order (e.g., "green") and more specific (e.g., "grassy") perceived flavours to the Sauvignon blanc wines. Some of the reported flavour characters were associated to a statistically significant degree with wines rated as good examples of Marlborough Sauvignon blanc (Parr, Frost, White, & Marfell, 2004; Parr, Green, & White, 2005), and with wines judged as being of high quality in a simulated wine judging show (Parr, Green, & White, 2006). Several of the reported sensory characters such as passionfruit, boxwood, and green capsicum have established relations with chemical compounds of interest to Sauvignon blanc researchers. For example, Tominaga and colleagues (e.g., Tominaga, Baltenweck-Guyot, Peyrot des Gachons, & Dubourdieu, 2000) have reported data implicating several volatile thiol compounds as underlying the distinctive aroma of Sauvignon blanc wines, whilst Allen, Lacey, Harris, and Brown (1991) have focused on methoxypyrazine compounds.

Methodology and theory from cognitive psychology were drawn on to extend our previous published work. The present study involved four sensory tasks. The overall methodology had some similarities to the two-stage methodology reported in a recent study that investigated berry flavour in wine (Piombino, Nicklaus, Le Fur, Moio, & Le Quere, 2004). The two stages employed by Piombino et al. involved a sorting task followed by descriptive analysis of a subset of the sorted wines. The four tasks employed in the current study were a sorting task, a typicality-rating task, a descriptive rating task, and a hedonic (liking) task. Together, these tasks permitted us to gather several types of data in terms of the underlying cognitive processing assumed involved in wine evaluation by wine professionals. We considered it prudent to obtain data via several different methods for validity purposes as Saint-Eve, Paci-Kora, and Martin (2004) reported that profiling specific descriptors did not reveal the same information concerning sensory interactions as did methods tapping global judgments such as sorting.

The sorting and concept rating tasks allowed us to consider responses to wine at the conceptual level of individuals (i.e., global judgments about a wine that can include top-down cognitive processes such as knowledge about winemaking). Top-down cognitive processes include our mental representations of a wine variety (e.g., Sauvignon blanc) and its variants, based on prior experience (Hughson & Boakes, 2002), as well as our expectations, desires, and ideas (see Parr, White, & Heatherbell, 2003). Wine professionals would be expected to bring substantial top-down information to their judgments (Ballester et al., 2005). The sorting tasks and a global concept rating of each wine therefore could be assumed valid with respect to both construct validity and ecological validity.

On the other hand, the descriptive rating task was assumed weighted toward bottom-up sensory responses to individual flavour characteristics (Dalton, 2000). This is because instruction to make intensity ratings to individual flavour descriptors directs an individual's focus toward one flavour note, rather than toward the wine sample as a whole. Bottom-up processes emphasise properties of the stimulus (i.e., wine sample) such as intensity of salient characteristics, intensity being the psychological correlate of chemical concentration.