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WineSense:

Making sense of wine: Exploring the nature of perceived complexity

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Fine wine provides us with pleasure. Perhaps less obvious to many is that fine wine also challenges us to think (Aron, 1999). In other words, wine is a food product capable of evoking cerebral (cognitive) as well as sensorial responses. This is particularly so in the case of fine or high quality exemplars of the product (e.g., Charters and Pettigrew, 2007).

The concept of complexity

From a scientific perspective, exactly what makes a wine "fine" or of high quality is not clear. An attribute that is frequently applied to those wines deemed of superior quality or that encourage thought is "complex". Quality and complexity have become often-used but vague variables that give a wine a distinction and a status (Aron, 1999). Sensory perception of a wine, and the ensuing individual and social mental representation of the wine, are "fed" or reinforced by these somewhat vague factors. Recently, the notion of perceived quality in wine has come under serious investigation (Charters & Pettigrew, 2007). The work described in the present article is aimed at tackling the second of these "vague variables" (Aron, 1999) by elucidating the important dimensions of the concept of 'complexity' in wine.

So, what do we mean when we sample a wine and say that the wine has complexity? What are we expecting when we are told that one wine is "complex" and another is relatively "simple"? That is, what does a complex wine have that a less-complex wine does not have? And what is the relation between perceived complexity in a wine and perceived wine aging potential? We do not as yet have clear answers to these questions, but such questions are being explored in a new programme of research involving collaboration between sensory scientists at Lincoln University in New Zealand, and at two French universities.

First, it is important to make explicit that our research concerns perceived complexity rather than actual or objective complexity, even though our research programme involves both sensory and chemical data. When actual complexity in wine is discussed, with wine considered "an especially complex" stimulus (e.g., Thorngate, 1997, p. 271), the definition of complex typically relates to concrete attributes such as the quantity and diversity of the product's constituent chemical compounds. In contrast, perceived complexity makes explicit that there is an organism or perceiver in the equation and lends itself to a more psychological definition, an example of which was provided by Melcher and Schooler (1996) in their wine recognition study. Melcher & Schooler defined complex stimuli as "things that are difficult to capture in words" (1996, p. 232) such as the aroma of fine perfume or difficult-to-describe visual stimuli (e.g., human faces).

Background literature

Although we currently have few sound data concerning perceived complexity in wine, we can make some general comments about the concept. A generalisation that is relatively safe to make is that a judgement of complex is a positive judgment for a wine in that complexity in wine is typically conceived of as a desirable attribute (e.g., Kennedy, 2009, p. 72). Similarly, complexity has been linked positively with higher quality wine (Charters & Pettigrew, 2007) and

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with high typicality of a wine varietal, at least in Sauvignon blanc (Parr, Green, White & Sherlock, 2007). Recently, the attribute 'complex' was shown to be an important organising term when wine consumers and wine professionals categorised hierarchically the specific characteristics of Sauvignon wine (Urdapilleta, Parr, Dacremont, & Green, manuscript under review).

We can also hypothesise from published research indirectly linked to wine complexity that certain factors and psychological processes may be associated with perception of complexity in wine. For example, fundamental literature on odour complexity (Lawless, 1997; Dalton, 2000) suggests familiarity of a wine (i.e., prior experience) and the number of perceived distinct components in a mixture (e.g., Jinks & Laing, 2001) may be relevant variables. From a theoretical perspective, published research investigating cognitive processes involved in human olfaction raises several empirically testable hypotheses. For example, it has been suggested that "complex" may be a single percept, while being a multi-dimensional term. Jinks and Laing (2001) argued on the basis of both physiological and psychological evidence that integration of aromas in a multi-component mixture (i.e., a wine or a perfume) may give rise to a single percept described by the single word "complex". Similarly, Lawless (1997) argued that multiple odours may be recognised as a whole pattern, with the individual features not being accessible to consciousness. In keeping with this idea, Charters and Pettigrew (2007) comment that wine quality can be considered a "higher level abstraction" (p. 998), rather than a concrete attribute of a wine, and therefore involves an overall assessment of a wine. With this in mind, we employed a range of global (overall assessment) and analytical techniques and tasks in our initial investigations of perceived complexity to provide both conceptual data (interview techniques) and organoleptic data (wine sensory evaluation tasks).

Related to the argument that wine complexity, like wine quality, may be a higher-level abstraction is the notion that complexity in wine can be an ambiguous concept (i.e., hard to make concrete in some contexts). A result of ambiguity is that individuals are likely to allocate different meanings to the term complex based on their prior experiences and in different contexts. To examine these notions, our current research programme includes investigation of perceived complexity as a function of domain-specific expertise (i.e., wine expertise), and in the context of aging ability of wine. Wine aging ability was considered a relevant contextual factor to examine on the basis that aging ability was one of seven dimensions of wine quality reported by Jover, Montes, and Fuentes (2004), and a link between perceived quality and perceived complexity in wine was identified by Charters & Pettigrew (2007).

Current research

Two empirical projects are underway.

REPRESENTATION OF COMPLEXITY IN WINE: INFLUENCE OF EXPERTISE AND CONTEXT (AGING ABILITY)

Sensory scientist Wendy Parr and Oenologist Sue Blackmore of Lincoln University, together with Viticulture and Oenology student Tim Pelquest-Hunt, are working with Professor Isabel Urdapilleta and Ph. D. student Marion Mouret of the University of Paris VIII on the project. The main objective of this study was to investigate

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what is meant by perceived 'complexity', and how one's concept of complexity in wine is influenced by domain-specific expertise. That is, we aim to elucidate the important underlying dimensions essential to the concept "complex" as applied to wine as a function of wine-related expertise. A second aim was to investigate the representation of "complex" as applied to (i) red wine and (ii) white wine in a specific context, namely vin de garde (i.e., ability of a wine to age well).

A recent experiment involved 39 wine professionals and 30 wine consumers from New Zealand and Australia taking part in a structured interview. Using a technique of free association and hierarchical evocation (see Viaud, 2002 for a description of the method), participants were asked to produce the first words or phrases that came to mind when asked about complexity in wine. Subsequent interview questions resulted in participants organising their own thoughts. In two further conditions, each participant was asked about complexity in relation to "red wine with aging potential" and "white wine with aging potential".

The interview responses formed the data which are currently being analysed at the University of Paris VIII in France. Analysis is by a textual data-analysis method known as ALCESTE (Reinert, 1986; 2001), used previously to investigate oenologists' descriptions of wines that had undergone different oak treatments (Sauvageot, Urdapilleta, & Peyron, 2006). The goal of this analysis is to quantify a text so as to extract the most significant structures by modelling the distribution of words in a description and identifying the language patterns that are most frequently used by the participants. An important assumption on which the methodology is based is that words evoked or induced by questioning each person within a group (wine 'expert' or wine consumer) are assumed to reflect part of each individual's memorised linguistic system and hence the contents and organisation of their mental representation of the concept of interest, namely complexity in wine (Dubois & Giboreau, 2006). The textual analysis allows consideration of the shared mode of thinking within and between the groups, the shared thinking giving rise to social representations of the concept or product.

Preliminary results show that wine professionals and wine consumers conceptualised complexity in wine in different ways. Wine consumers' focus when asked about perceived complexity was on intrinsic factors relating to their experiences of consuming wine (e.g., smelling; tasting flavours) and was personalised and subjective (e.g., about their own enjoyment and pleasure associated with a wine). On the other hand, wine professionals' conceptualisations of complexity were very much dominated by extrinsic factors such as oenological processing operations aimed at increasing complexity (e.g., lees stirring; malo-lactic fermentation; judicious use of oak barrels) and terroir variables (e.g., vineyard soil type). When asked about the concept of complexity in relation to either white or red wine with aging potential, wine expertise was again a significant factor in influencing between-group differences. These data, that already give some indication as to how wine consumers and wine professionals *think* differentially about wine complexity and about wines with aging potential, will be reported in full in scientific media once the data analyses are complete.

PERCEIVED COMPLEXITY IN SAUVIGNON BLANC WINE

This collaborative project includes Pascal Schlich, INRA Research Director of LIRIS (Laboratoire d'interface recherché-industrie-sensométrie) and Ph. D. student and Oenologist Marcela Medel of the University of Burgundy in France and their colleagues, and wine scientist Wendy Parr of Lincoln

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University and wine-maker Julia O'Connell of Pernod Ricard New Zealand. The major aim is to elucidate the components or dimensions of perceived complexity in white wine, employing New Zealand Sauvignon blanc as the wine varietal for investigation. The project involves both sensory and chemical data. Prior work at the University of Burgundy has involved investigation of perceived complexity, primarily employing red wine.

In a recent experiment, thirteen Sauvignon wines from Marlborough, New Zealand, were evaluated organoleptically by both New Zealand and French participants, the wines being freighted to France so that both sensory experiments could be conducted within a three-month temporal parameter. Nine of the wines formed part of a new-product development project within a large wine company where the wines reflect a range of viticultural (e.g., vineyard site and aspect) and oenological-processing (e.g., natural yeast fermentation) factors aimed at increasing complexity in the resulting wines. The other four wines in the stimulus set were commercially available Sauvignon wines from the same vintage (2009). A total of 117 people evaluated the wines, the participant groups consisting of New Zealand wine professionals, French wine professionals (oenologists), French wine connoisseurs, and French wine consumers. Participants undertook several sensory evaluation tasks that involved smelling and tasting the thirteen wines prior to making both global judgments (overall assessment tasks such as sorting/classification) and analytical judgments (e.g., intensity ratings of a range of specific wine characteristics). Of particular importance was employment of a new methodology, recently developed at the University of Burgundy (Medel, Viala, Meillon, Urbano, & Schlich, 2009). The methodology involves an illustrated questionnaire to which participants responded by rating each wine on seven assumed components of wine complexity, along with an overall judgment of complexity. The sensory data are currently in the process of being analysed at the University of Burgundy and will be reported at a later date. Chemical analyses of the wines employed in the sensory component of the project will allow the sensory and chemical data to be associated by multivariate analyses.

In conclusion, empirical projects are currently underway aimed at elucidating the key components of perceived complexity in wine from conceptual (mental representation), organoleptic (sensory), and chemical composition perspectives ■

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