

# Some evidence and discussion on the validity of using intrinsic sensory cues in stated choice experiments

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## **Abstract<sup>1</sup>**

This paper has two main aims, 1) to discuss the implications if consumers place more importance on sensory cue information than extrinsic cue information in wine choice and 2) the validity of using sensory cues in stated choice experiments. A sensory panel of experts classified four red wine styles, on characteristics including Body and Sweetness levels. Four broad, representative wine styles were then presented under blind laboratory conditions to a sample of 144 emerging Asian wine consumers (current, younger wine drinkers). Firstly, participants were asked to taste all four wines and indicate their overall preference on nine-point Likert scales. Overall, results showed a significant preference towards a sweeter, lighter bodied style of red wine. Secondly, participants were presented with a stated choice experiment involving nine choice tasks each with four choices, presented as actual wine bottles with descriptive attribute levels. These attribute levels included two intrinsic cues (body and sweetness) and two extrinsic cues (price and country-of-origin). Preliminary results showed that overall, utility was the highest for the sweetness attribute. Segmentation analysis identified involvement as the strongest covariate, showing that low involvement consumers significantly preferred the sweeter style of red wine and also rated the utility for sweetness as the highest amongst the four attributes. While not significant, the high involvement group showed preference for both a sweet style and a dry, fuller bodied style of red wine and the utility results for this group showed this tendency. The results lend support for the proposition that sensory intrinsic qualities presented as stated descriptors in choice experiments can be valid for identifying sensory preference and characteristics. The results also indicate that low involvement consumers still cue into memory certain elemental sensory elements that they prefer. Brands and other extrinsic cues may therefore not have as large an affect on these consumers as first thought.

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<sup>1</sup> This research is part of a larger project investigating wine preference in the emerging Asian market, with funding from The Department of Agriculture and Food (Western Australia), Australia Post, The Lagan Family Trust and with the support of the Open University of Hong Kong. Thanks to Dr. Cam Rungie and Dr. Larry Lockshin, Wine Marketing Group - Ehrenberg-Bass Institute of Marketing Science, for use of multinomial logit spreadsheet and discussion on the topic area.

## **Introduction**

When making a purchase decision most consumers have access to imperfect information and are forced to rely on intrinsic and extrinsic purchase cues. Intrinsic cues relate to the physical attributes of the product. In relation to wine, intrinsic cues refer to the nature of the wine itself, such as the sweetness, body, flavour, oak and aroma (Lockshin et al., 1993). Extrinsic cues are product related but not part of the physical product itself such as brand name, price and country of origin (Lee et al., 1995). To date, most of the emphasis in wine promotion and labelling has been on developing a competitive advantage by focussing on extrinsic cues. Research in this area has subsequently focussed on understanding the impact and interaction of these extrinsic cues.

In most cases, these extrinsic cues such as brand, place-of-origin, price, variety etc. give no real associations with the inherent intrinsic characteristics of the wine. These intrinsic characteristics might include relatively simple yet important characteristics such as the body, sweetness or finish of the wine. In areas of the food science discipline they may be referred to as sensory characteristics.

This paper discusses the consistency and importance consumers place on sensory characteristics. It moves into the marketing domain by incorporating these intrinsic sensory cues into the typical stated choice experiments that are utilised by researchers attempting to understand the impact of extrinsic cues in wine choice. The sensory analysis undertaken in the study also shows a correlation between the sensory preference of consumers and their selection of these sensory cues in the stated choice experiment, thereby providing support for the notion that stated choice experiments can be valid for indicating the strength of preference for intrinsic sensory cues. Incorporating both the sensory results and the stated results also shows that emerging wine consumers do have some understanding of the type of sensory characteristics that they prefer.

## **Background**

A number of different studies have explored the role of taste in the purchase decision. An important point in regards to the role of taste in the purchase decision is that more often than not, consumers are unable to taste a good before they purchase it. They can however cue into memory the sensory and other attributes that are important to them. Research using a number of different techniques has shown that the importance of taste in the purchase decision depends on consumers familiarity with the product category (Brickman et al., 1975; Di Monaco et al., 2005; Lange et al., 2002; Shepherd et al., 1991; Siret et al., 2000). When consumers are familiar with a product category, taste is more important in the purchase decision, for example the Shepherd, Sparks, Bellier and Raats (1991/2) study on flavoured milk and the Di Monaco, Ollila and Tuorila (2005) study on chocolate. In contrast when consumers are less familiar with a product category, then the role of taste in the purchase decision is reduced, for example the Lange, Martin, Chabanet and Issanchou (2002) study on Champagne and the Sirat and Issanchou (2000) on Pate.

When consumers purchase goods, they rely on both intrinsic and extrinsic purchase cues (Monroe et al., 1985). To properly understand consumer wine purchase behaviour, the

relationship between intrinsic and extrinsic factors must be investigated (Lee et al., 1995). Discrete stated choice experiments is one research area and technique which has the possibility of combining intrinsic and extrinsic factors. However, surprisingly few authors have included both intrinsic and extrinsic factors in a discrete choice framework (Lange et al., 1998), namely because intrinsic cues are very specific to the individual sensing them, as well as intrinsic qualities being difficult to present as a “one-word” extrinsic descriptor on labels and choice experiments. However, it was the Vickers (1993) paper on the yoghurt market which was the first to incorporate taste along with extrinsic factors of brand and price in a conjoint experiment. The Vickers (1993) study showed that the intrinsic cue of taste and ‘health claim’ can have a larger impact on purchase intent than the extrinsic cues of brand and price. While stated choice experiments developed out of the economic and consumer based literature, the method is starting to be utilised by, among others, the food science community to analyse taste (Enneking et al., 2007; Moskowitz, 2001). Moskowitz (2001) used a conjoint experiment which included descriptive information as a substitute for physical taste, in relation to the hamburger market. The technique allowed more variables to be examined than if the stimuli were physically tasted, but neglected extrinsic factors. The Enneking, Neumann and Henneberg (2007) paper included a choice based experiment with extrinsic factors and intrinsic factors which related to taste. The Enneking, Neumann and Henneberg (2007) study required participants to physically taste a product while being exposed to brand, labelling and price information. Also included in the choice based study was a description of taste (participants were given a description of the type of sweetener used in a soft drink which gives some clue of taste).

## **Method**

The methodology for this study was designed to help understand wine purchasing in the emerging market of Asia and particularly among younger, emerging wine drinkers. In summary, the method involved respondents ( $n=144$ ) in Hong Kong being exposed to one flight of four red wines and asked to rate these wines on overall hedonic preference using nine-point Likert scales. The four wines were developed using a panel of experts in Australia who developed a cross section of wines, based on appearance, palate and aroma characteristics (see table 1). These wines were therefore classified based on sensory characteristics. The respondents in the same sitting were then asked to complete a conjoint experiment consisting of nine choice tasks with four choices available in each task. The attributes were presented as actual descriptors on wine bottles and included two intrinsic cues (sweetness and body) and two extrinsic cues (country-of-origin and price) (see figure 4).

In order to identify the wine styles most preferred by the respondents and to ensure that participants could possibly tell the difference between the wines, as wide a range of styles were presented to participants. Consultation with wine merchants and retailers in Hong Kong was used to gather informal information on the range of wine styles available in the market as well as from secondary statistical data (Euromonitor, 2007). As a result, the most popular wine styles were chosen. The four broad styles of 1) Light Bodied Pinot Noir, 2) Full Bodied Oaked Shiraz/Cabernet, 3) Fruity Cabernet Blend and 4) Sweet Blend were chosen to represent the Hong Kong market.

**Table 1: Expert Panel Wine Appraisal Results**

Wine	Appearance	Aroma	Palate				
			Balance	Body	Flavours	Sugar	Finish
<b>Light Pinot Noir</b>	Red Ruby	Rhubarb, char & cherry	Firm acid	Medium- Chalky	Strawberry & tart cherry	Dry	Medium & hot
<b>Shiraz Cabernet</b>	Red Black/purple	Currant & tobacco,	Big oak	Medium- full	Dark fruit, oak & spice	Dry	Long & lingers
<b>Cabernet Merlot</b>	Red Purple/ruby	Raspberry, herbal, lollies	Rounded	Medium- full	Berry, herbal & chocolate	Dry	Medium & warm
<b>Sweet Blend</b>	Red Crimson	Earthy, herbs, stewed	Sweet/ acid	Light- smooth	Spicy plum fruit	Sweet	Medium to long

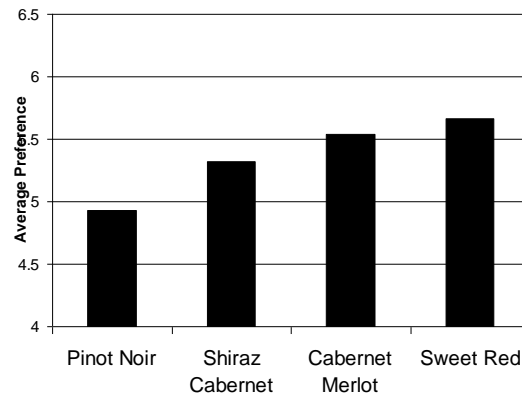
Once wine styles were decided, three options for each style were sourced and presented to an expert panel of six wine experts. Options for each style were priced at below \$HK 200 which is the price bracket where 84% of wine sales occur. The wine experts were required to taste each option and in silence describe which wine they thought best represented the style. The wine experts were also asked to rate the wine out of 20 (industry standard) to ensure that all wines were of a similar quality level. By ensuring that all wines were of a similar quality ensured that the hedonic preference was not influenced by quality.

In order to improve the reliability of results, all sensory analysis was conducted in a strictly controlled environment. No talking was allowed so that each individual independently analysed each wine. Wines were presented in XL5 wine glasses which are an international standard glass. Wine tasting took place in front of a white background that the true colour of the wine could be appraised. Sensory analysis was undertaken in a well ventilated room so that the smell of one wine did not confound that of another. The respondents were required to rinse their mouth with water between each wine. The standard wait time of two minutes between samples was applied in order to minimise carry over effects (Nurgel et al., 2005, , 2006).

The respondents were therefore presented with four styles of red wine and were asked to indicate their overall preference for each wine on a nine-point Likert scale. The four wines were presented to all 144 respondents, the number of wines being low in order to minimise the effect of sensory fatigue (Hersleth et al., 2003; Lattey et al., 2007; Lawless et al., 1998). In order to minimise the effect of a fixed sample order, the serving order was randomised. The experiment location was well lit and well ventilated and all sensory preference information was collected at the same location for all 144 respondents.

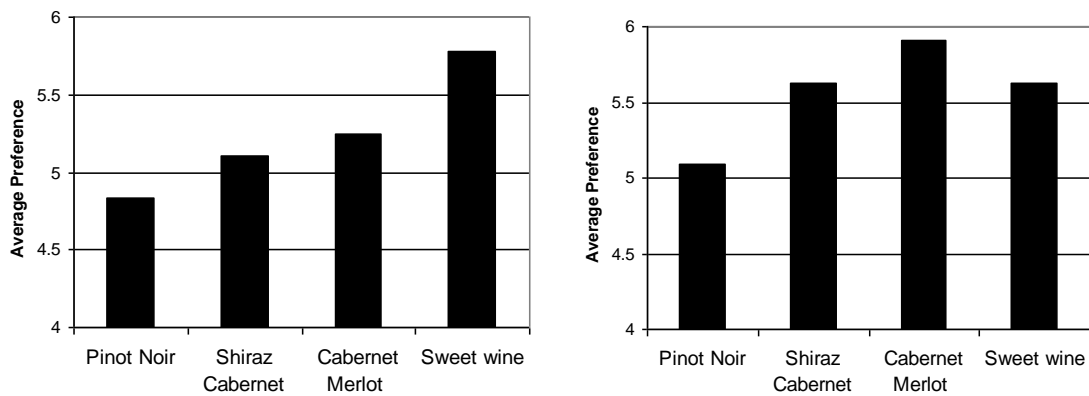
As a whole group, the results confirmed anecdotal evidence which suggested that sweet wines are preferred in the Hong Kong wine market. The average preference rating for each wine style is shown in figure 1. The main result to come from the sensory analysis is that sweeter wines were statistically significantly preferred over dry wines. Using wine style as a grouping variable in Kruskal Wallace Test, showed that hedonic results produced statistically significant differences at  $p = < 0.05$ . In Figure Two a similar pattern was observed in relation to low-involvement consumers, whereby the semi-sweet wine was statistically significantly preferred over the light bodied Pinot Noir.

**Fig. 1: Red wine average hedonic preference**



The total sample was segmented into ‘low-involvement’ and ‘high-involvement’ groups, based on the average of three involvement items (Cronbach  $\alpha = 0.7$ ). The results showed that the low involvement group statistically preferred the sweet wine over the light bodied Pinot Noir. In comparison, the high involvement group actually preferred the fruit-driven, fuller bodied Cabernet Merlot. The results are shown in Fig. 2 and 3. These results are important because it is these results which are compared to the utility results in the stated choice experiment.

**Fig. 2: Low involvement consumers average red wine hedonic preference rating. Fig. 3: High involvement consumers average red wine hedonic preference rating.**



After the sensory component of the trial was completed, respondents were then presented with the choice experiment. In order to compare the trade-off between intrinsic and extrinsic cues, a combination of both were presented to respondents. This was based on focus group research conducted on young Asian wine drinkers living in Australia. The attributes and levels are shown in Table 2.

**Table 2: Extrinsic and Intrinsic Purchase Cues and Levels Used in Choice Experiment**

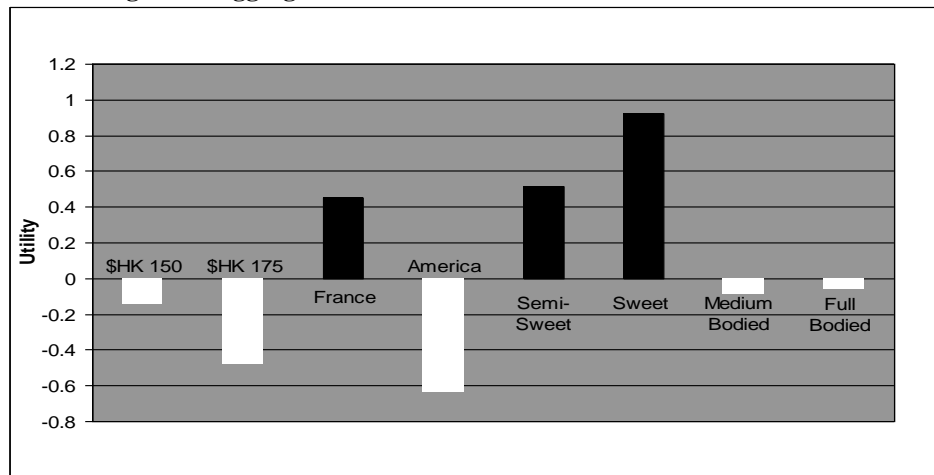
Extrinsic		Intrinsic	
Purchase Cue 1 Price (\$HK)	Purchase Cue 2 Country	Purchase Cue 3 Sweetness	Purchase Cue 4 Body
0* = 125	0 = Australia	0 = Dry	0 = Light
1 = 150	1 = France	1 = Semi-sweet	1 = Medium
2 = 175	2 = America	2 = Sweet	2 = Full

\* Constant is 125, Australia, Dry, Light Bodied.

Participants were presented with nine choice tasks. Each task included four options, which is a common format when creating choice sets (Street et al., 2005). Each option was represented by a full bottle of red wine. Each bottle had information printed on a white label which included a different level for all four purchase cues. Participants were asked to select their preferred options for each choice task. This resulted in 1,179 total responses (choice tasks) being collected.

A main-effects Multi-Nomial Logit (MNL) was estimated from the 1,179 choice tasks. A summary of the results are shown in Figure 4.

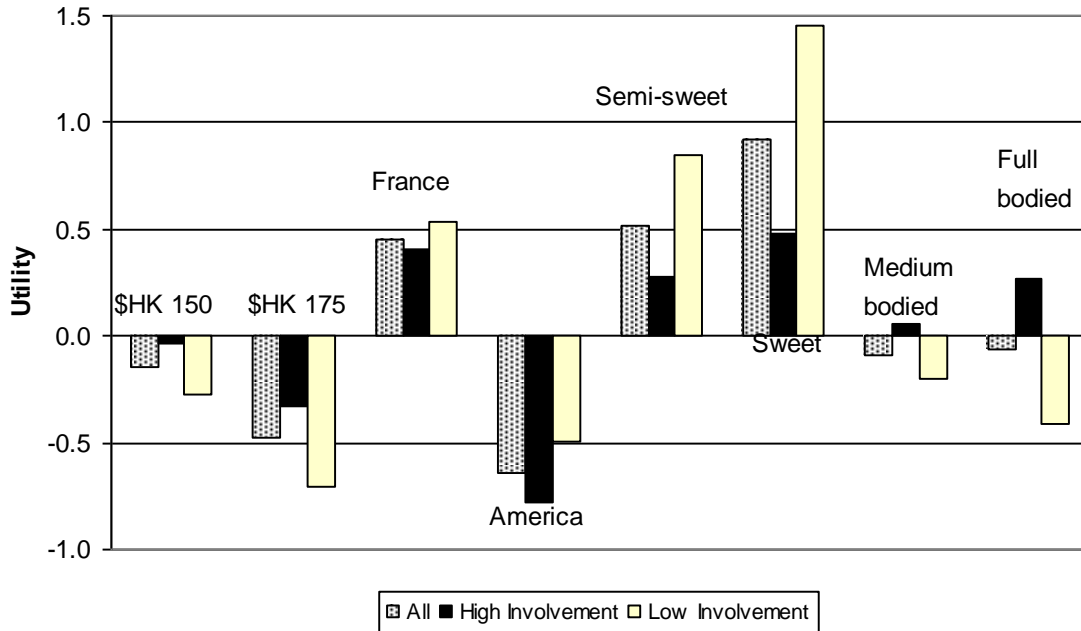
**Figure 4: Aggregated main-effect utilities for each Attribute Level**



The overall results show a link between the blind preference for sweeter wine styles and the utility results of the MNL estimation.

The involvement segments mentioned earlier were tested against other variables in the choice experiment. The null model log likelihood sum was -1452.00 (LL0). The involvement segments provided the best improvement in the choice model (LL1 of -1408.08, chi-square of 12df, sig. 0.001). Taking the two involvement segments, of which the sensory results are shown in Figure 2 and 3, we note that the low involvement significantly preferred the sweeter style of wine and the high involvement preferred the fuller bodied style of wine. We now devise separate MNL estimations for the two groups. The results are shown in Figure 5.

**Figure 5: MNL utility estimates – Involvement segments**



The utility results in Figure 5 from the discrete choice experiment show the utility that each attribute level generates. Discrete choice experiment utility results for the different involvement groups identify a number of interesting patterns for wine marketers in Hong Kong:

1. Looking at Figure 5, the most obvious trend is that low involvement consumers rely heavily on the purchase cues of ‘semi-sweet’ and ‘sweet’. Also noticeable is that low involvement consumers rely on these attributes much more than high involvement consumers. This trends fits in with anecdotal evidence which suggests that as consumers gain a greater understanding of wine, their hedonic preference moves from sweet styles of wine to dry style of wine. The important thing about this result for wine marketers is that it shows that the hedonic preference for sweeter wines can influence the choice decision.

2. Figure 5 also showed that the term ‘body’ had minimal impact on the utility for the entire group. However, segmentation shows a different picture. Although only small, we can see that high involvement consumers are more likely to choose full bodied wines which is displayed in the positive utility generated by the words ‘full body’. Low involvement consumers seem to have an aversion to full bodied wines which is displayed by the negative utility generated by the words ‘full body’. This gives evidence that under segmentation conditions, the patterns in the utility for intrinsic cues matches the respondent’s hedonic preference ratings. This also gives evidence that consumers actually know and cue into sensory and extrinsic memory the styles of wine that they prefer.

## Conclusion

This exploratory paper has three important implications that require further analysis and explanation. Firstly, the results indicate the sensory preference for one geographic group of emerging wine consumers. The results are positive for wine marketers as the results indicate that an expert panel of industry participants from another country can actually match the preferences of an emerging market such as Asia, as shown through the choice experiment. Secondly, the link between the sensory and the MNL results support the proposition that measuring sensory information and importance in stated choice experiments can be valid. Thirdly, the results indicate that these sensory cues can be just as important and if not more important than extrinsic cues in choice decisions. This requires a re-think in how brands and regions, including symbols, associate with these intrinsic cues in order to increase the likelihood of selection. Further work comparing the proportions of times the intrinsic cues are chosen for each respondent compared with each individual's hedonic preference scores will further statistically verify the propositions presented in this paper.

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