Measuring consumer taste preferences through wine shows



FINAL REPORT to
GRAPE AND WINE RESEARCH & DEVELOPMENT CORPORATION

Project Number: CSU 1002

Principal Investigators: **Anthony Saliba**
Maame Yaakwaah Blay
Research Organisation: **NWGIC**

Date: **05/02/2013**

Grape and Wine Research and Development Corporation

Final Report, February 2013

Project Code: **CSU 1002**

Project Title: **Measuring consumer preference at wine show**

Table of Contents

1. Abstract 3
2. Executive Summary 3
3. Background 3
4. Project aims and performance target 4
5. Methods 5
6. Results/Discussion 13
7. Outcome/Conclusion 22
8. Recommendations 22
Appendix 1: References 23
Appendix 2: Intellectual Property 23
Appendix 3: Staff 23

1. Abstract

Australian wine shows were identified as a useful platform to help understand consumer wine preferences. A new preference mapping method was developed and validated at wine show public tasting days. This method quickly identifies innovative new wine flavours from consumer responses alone. There is an opportunity to develop, should this new method be adopted by wine show organisers, a large database of consume-preferred wine styles that the wine industry can tap into.

2. Executive Summary

The Australian wine industry is currently interested in better understanding consumer wine preferences. The wine show system in Australia does a fantastic job at improving wine quality by minimising faults; however, the system does not have a method in place to consistently identify wines that consumers will like. This PhD, funded by Charles Sturt University with additional funding provided by the Grape and Wine Research and Development Corporation (GWRDC), aimed to measure consumer taste preference at wine shows.

We determined at the onset of the project that, to successfully identify consumer-preferred wine styles, a validated method was required. In our literature search however, we did not find any suitable method that could be used in this setting. As a result, we developed a validated new method – relative preference mapping - that could be used at public tastings to quickly identify innovative new wine styles that consumers like. This method was tested at several wine show public tastings and validated against industry best practice. Results showed that relative preference mapping was easily understood by consumers and gave the desired results - helping to quickly identify those wine styles that were liked and found to be 'different' by consumers at public tastings. The method achieved this outcome when an archetypal gold winning wine was used as a reference sample.

Other uses for the relative preference mapping technique were identified, such as benchmarking against competitors or screening for liked products in the product development process. The method has potential use not only at wine show public tastings but at cellar doors and in formal testing laboratories. We determined that should wine show organisers adopt this test method as part of activities at their public tasting events, over time there would be a large database on consumer wine preference which would in turn be a powerful tool for industry to project consumer wine preference trends.

3. Background

In an unpublished report, it has been shown that taste is a primary reason why Australian drinkers avoid wine. There is a substantial untapped domestic market ready and waiting, provided we can generate flavour innovation. Generating new markets was the goal of Program 1 under the previous GWRDC Strategic Plan (2007-2012).

The main assessment of taste is undertaken within the Australian wine show system. Wine shows provide mechanisms to better wine quality, with a focus on fault eradication. However, it has been known for some time that expert and consumer preference ratings differ (Ough & Amerine, 1967), so we cannot necessarily take a gold medal-winning wine and use that as a 'consumer hero' - the results derived through wine shows do not directly relate to broad consumer preference. The cost of every wine business in Australia conducting their own consumer preference activity, as per best practice is well in excess of $60 billion (possibly per year).

There are various databases such as ACNielsen, Cellar Door Metrics and others that present sales data. This can be used to infer preferred styles, however these metrics are influenced by price (especially 'discounts'), the range of locations where data is collected and other factors that render them unsuitable to determine consumer taste preference. Moreover, the data is based on wine styles currently sold; therefore, potential style innovations are never captured. This project sought to determine consumer taste preference for wine in the wine show context, precisely at public tastings.

4. Project aims and performance target

The project aimed to provide every Australian wine business with the kind of consumer insight that has previously only been available to a select few companies. The objectives were:

Primary:

1. To drive wine flavour innovation through the Australian wine show system.
2. To reward (e.g. medals) wines that substantially appeal to consumers.
3. To characterise more thoroughly what flavours consumers like, and thus assist wine businesses to understand the flavour styles that drive sales.

Secondary:

1. To increase the range of wines that appeal to wine avoiders (genuine new flavours and styles).
2. To 'empower' consumers with a sense that they are credible judges of wine, and that the Australian wine industry listens to what they want.
3. To substantiate consumer preference as a vital target for wine businesses.

Performance targets and activities

Based on the aims the following targets were set:

Year 1	Output	Target Date	Activities
a	Literature review	01/03/10	Literature search as part of PhD objectives
b	Involvement and participation of various wine shows	01/04/10	Formalise a commitment from wine shows who have already offered to participate in the research
c	Conduct quantitative trial	01/06/10	Administer questionnaire to determine the distribution of attendees at current wine show consumer days
d	Establish methods for use at wine shows for consumer data collection	01/11/10	Pilot test of methods at NWGIC

Year 2	Output	Target Date	Activities
a	Pilot testing of developed method at pre-selected wine shows	30/03/11	Arrange with wine show organisers to implement method, attend wine show and implement test plans, collect data, analyse and review
b	Commercial test I to validate test method	30/06/11	Contract commercial company to carry out consumer test as per industry best practice, compare with results from wine show tests

c	Wide scale testing of pre-tested method	01/11/11	Contact wine show organisers, organise testing protocol to suit various wine shows, collect data, analyse and review
d	Commercial test II to validate test method*	01/02/11	Contract commercial company to carry out consumer test as per industry best practice, compare with results from wine show tests

*The second commercial test to validate the test method was not required as we determined a better way to validate the new method that helped to keep costs low.

5. Methods

Measuring consumer taste preference for wine at wine show public tastings is novel. There were several unknowns to be taken into account in the design of the overall methodology used to test the hypothesis that participants at public tastings can be used to measure consumer preference for wine. The flow diagram below (Figure 1) outlines the approach taken to test the overall research question. Items in the central section of the flow diagram represent the objective(s) set out at each stage of the project. The branches summarise the methodological approach used to answer the question. For details on each method used, the reader is kindly referred to the PhD thesis submitted to Charles Sturt University, Consumer preference mapping using wine show derived data by Maame Yaakwaah Blay. That PhD was the basis for this project. To avoid repetition of detail that is available elsewhere, the methods described in this report focus mainly on the parts of the PhD research that was funded by the GWRDC with the main aim of measuring consumer taste preferences at wine shows.

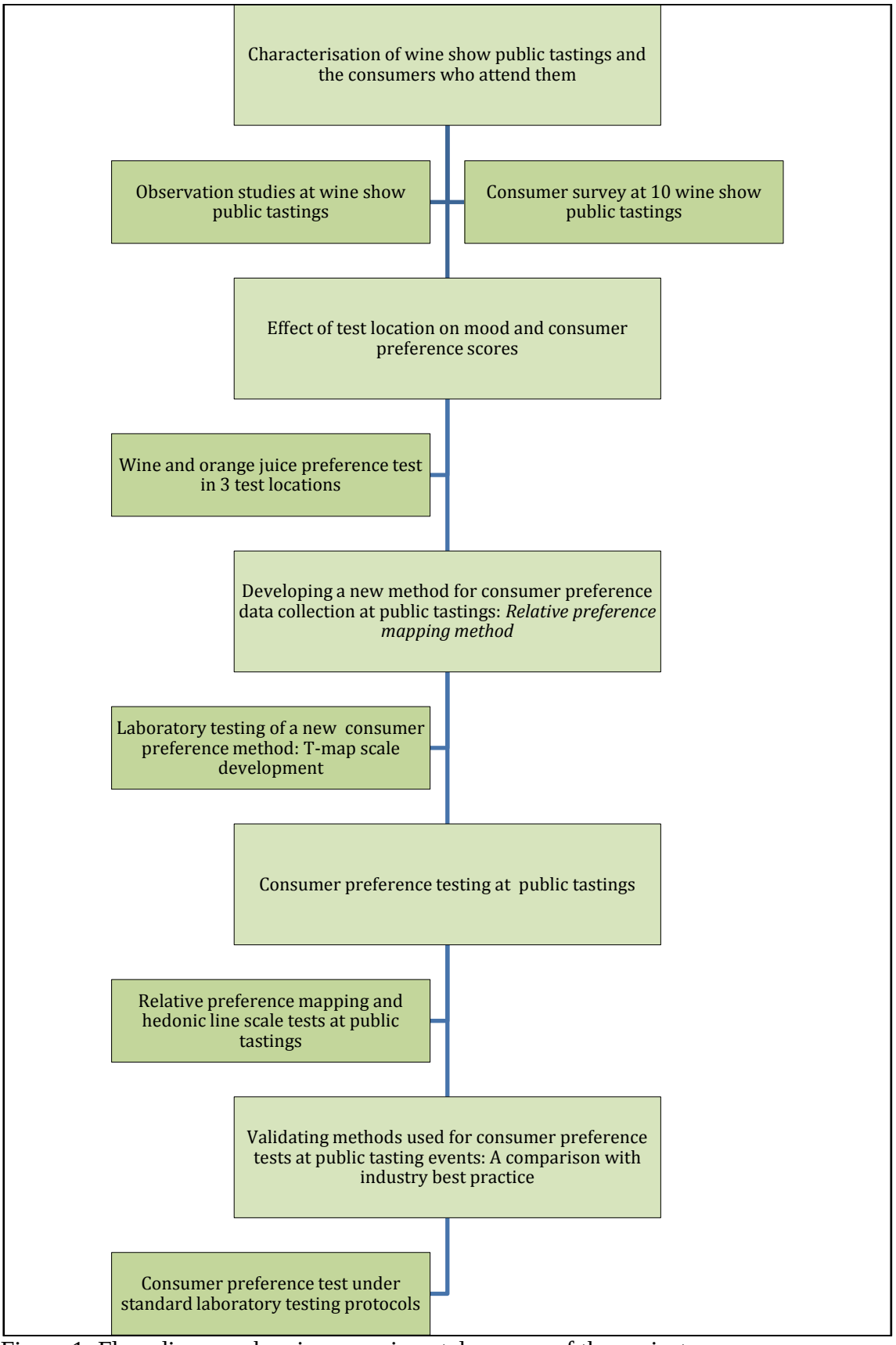


Figure 1: Flow diagram showing experimental process of the project

Wine shows involved in the study

A list of all wine shows advertised on *Winebiz*® website (Winetitles, 2009) in September 2009 was made. The shows were screened to include those in Australia only. A further screening lead to the selection of only those wine shows which advertised consumer or public tasting events as part of the activities in their 2009/2010 wine show event. This reduced the number of applicable wine shows from 79 to 49.

Organisers of all 49 wine shows were contacted by telephone and or email to find out about the structure of their public tasting event and to invite the shows to participate in the project. At the end of the stratification and telephone recruitment, 11 wine shows across 4 states and 1 territory in Australia formally volunteered to be involved in the study. This meant that the researcher was allowed entry to these events to collect data from consumers. In addition to the 11 wine shows formally engaged with the study, another 2 shows were included based on proximity to the researcher and availability at the time of the study. As no formal arrangements were made with organisers of those shows, less intrusive studies (e.g. observations) were done at these shows. In total, 13 different wine show public tasting events were included in the project (Figure 2).

To enable us to meet project time lines within budget, different types of data were collected from the different wine shows as shown in Table 1 below. Given the limitations involved in contacting organisers due to the busy time of year during the wine show period, including 13 out of 49 possible public tastings was considered a good representation of the different public tastings across Australia for the purpose of this project.

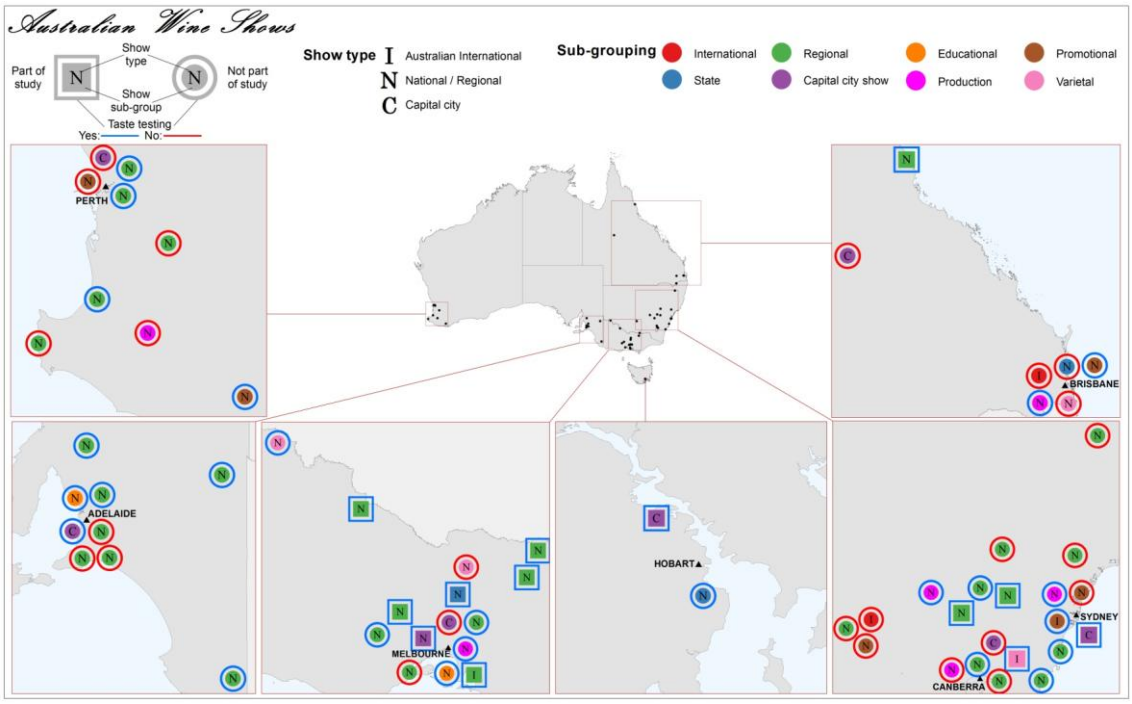


Figure 2: Geographic locations of wine shows included in the study. *Map created by courtesy of Spatial Data Analysis Network (SPAN), Charles Sturt University, Wagga Wagga with information provided from this PhD research*

Table 1 Wine shows included in overall research

Name of wine show	State	Year of visit	Type of data collected
Rutherglen Wine Show[+]	VIC	2009	• Observation
Canberra International Riesling Challenge	ACT	2009	• Observation
Daylesford Wine show	VIC	2009 &2010	• Observation • Written survey
Victorian Wines Show	VIC	2009 & 2010	• Observation • Written survey
King Valley Shed Wine Show	VIC	2010	• Observation • Written survey

National Cool Climate Show	NSW	2010*	• Written survey
Australian Inland Wine Show	VIC	2010 & 2011	• Observation • Written survey • Consumer preference
Cairns Show Wine Awards	QLD	2010 & 2011	• Observation • Written survey • Consumer preference
Cowra Wine Show	NSW	2010 & 2011	• Observation • Written survey • Consumer preference
International Cool Climate Wine Show	VIC	2010 & 2011	• Written survey • Consumer preference
Le Concours des Vins du Victoria	VIC	2010 & 2011	• Written survey • Consumer preference
Royal Hobart International Wine Show	TAS	2010 & 2011	• Consumer survey • Consumer preference
Macquarie Group Sydney Royal Wine Show[+]	NSW	2012	• Observation

[+]*No formal agreement was made with these shows to be part of the project*

Measuring consumer preference at public tasting using the new Relative Preference Mapping method

Preliminary work was carried out at the NWGIC to develop the relative preference mapping method. The method development phase used wines that had been entered into the expert judging competition of an accredited wine show. The results of the method indicated that the relative preference mapping method was useful to identify innovative new wine styles that experts missed during the judging phase. Details of the method development phase is described in the PhD thesis by Maame Y. Blay and not repeated here.

The new method was pilot tested at the International Cool Climate Wine Show to fine tune the laboratory process for adoption at wine shows. Wide scale *in situ* testing using the new Relative Preference Mapping method was carried out at three wine shows. The method is reported here to make it accessible for interested stakeholders in the wine industry. Concurrent validation of the new method was carried out at two other wine shows using a standard preference testing method; the hedonic line scale test method. Further validation of the new method was carried out by comparing the results obtained from wine shows with results obtained from a standard preference test carried out using industry best practice carried out by an external sensory testing agency; Your Source, the field testing agent of Colmar Brunton Marketing Research Company.

In situ testing of relative preference mapping at wine show public tastings

A total of 132 (66 males, 55 females 11 no response) participants from 3 different consumer-focused public tastings took part in this experiment. Assessor break down from each location was as follows: Cairns Show Wine Awards (L02) = 32 (10 males, 14 females 8 no response); Cowra Wine Show (L03) = 56 (26 males, 27 females 3 no response) and Royal Hobart International Wine Show (L8) = 44 (30 males, 14 females). Seven Chardonnays were used in this study. These wines had not been prejudged by industry experts and were used for logistic reasons to save cost as a concurrent project to understand consumer preference for Chardonnay was on-going at the time. White wines (rather than red wines) were used to reduce the impact of palate fatigue, as consumers are not accustomed to tasking many wines at once. The Relative Preference Mapping method requires a reference sample and this was carefully selected to be a 'neutral' wine that was not overly strong in sensory character to allow easy identification of innovative new wine flavours that consumers liked. Table 2 below

shows the wines used in this project and the sensory profile of these wines is shown in the results section.

Table 2: Wines used for consumer tests at public tastings

Product number	Product code	Brand/Winery	Product details
1	CR	Charles Sturt University	2009 Chardonnay
2	P1	Goundrey Homstead	2010 u/wooded Chardonnay
3	P2	Penfold's Thomas Hyland	2009 Chardonnay
4	P3	Casella Yellow Tail Wines	2010 Chardonnay
5	P4	De Bortoli Sacred Hill	2010 u/wooded Chardonnay
6	P5	Warburn Estate Gossips	2011 Chardonnay
7	P6	Penfold's Rawson's Retreat	2010 Chardonnay

A large version of the T-map scale (Figure 3 below) printed on a 90x100cm laminated sheet was used. The test area was set up in an informal and catchy way to draw attention and also to fit into the social atmosphere of the public tasting as shown in Figure 4 below. Wine samples were served from behind a screen to prevent participants from seeing the wines. As an added precaution, the original labels of the wines were covered with plain white paper and identified with codes meaningful only to the researchers (Figure 5).

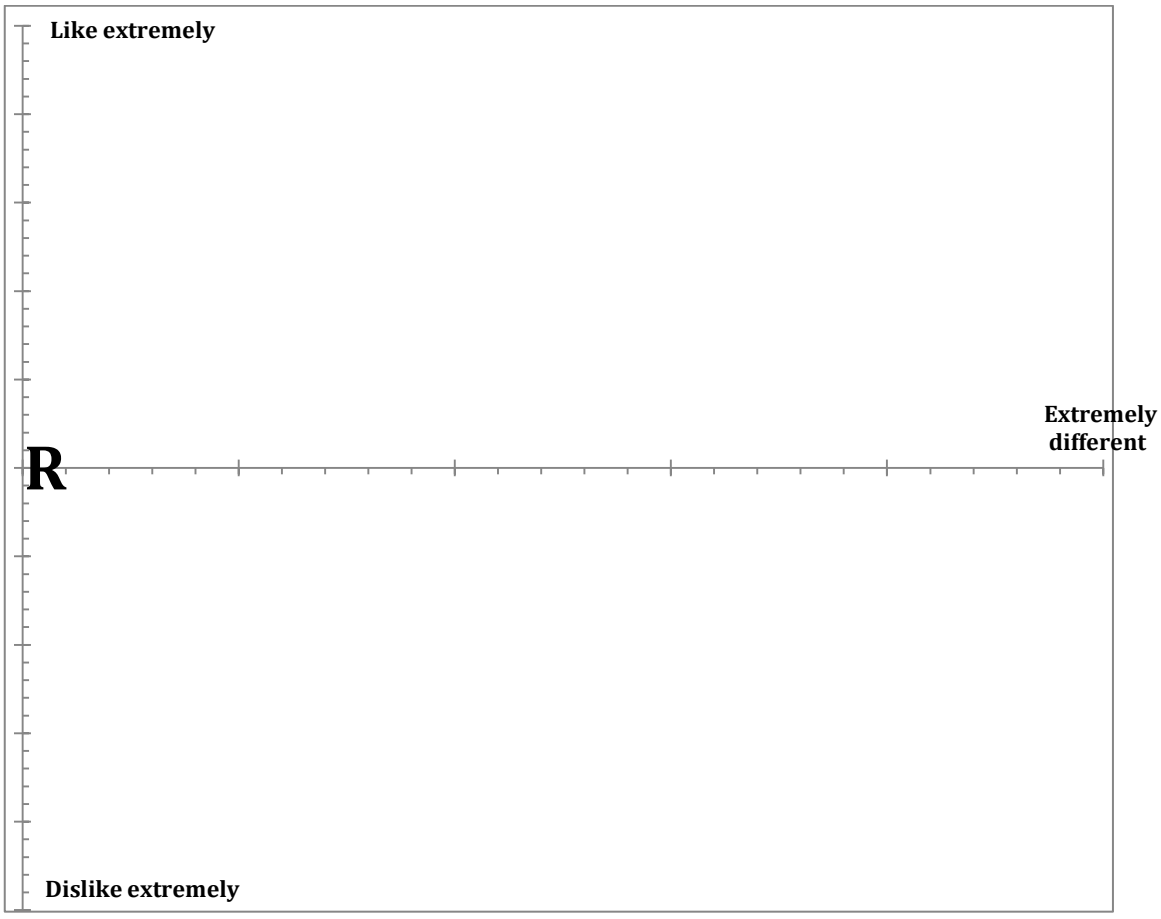


Figure 3: The T-map scale developed for relative preference mapping



Figure 4: Test set up area for relative preference mapping using T-map scale at a wine show public tasting venue


Figure 5: Sample preparation area for *in situ* testing

Experimental procedure

Approximately 15ml of each test sample and 30ml of the reference sample was served at ambient temperature. The ambient temperatures fluctuated depending on the time of year a show was held; between 19±2^{o}C during southern hemisphere autumn/winter months (April to September) and 23±2^{o}C during southern hemisphere spring/summer months (October to March). Twice the volume of the reference sample was served as it was retained for comparison with all test samples. The reference sample was always served first followed by the test wine served in a monadic sequential order based on the Williams' balanced order design method from Compusense *release* 5.0 (Compusense Inc. Guelph, Ontario, Canada). Similar to procedures at public tastings, the same glass was used to serve all test samples; however a different glass was provided and retained to test the reference sample. A rinse protocol, rinsing the test glass with each successive

test sample prior to serving, was adopted to minimise the potential of odour and flavour carry over.

An *open assessment* method, where assessments were done within sight of other consumer participants and observers, was used at the public tastings (Figure 6). The open assessment method is a clear deviation from standard sensory testing protocols that require that products to be tested in individually partitioned booths. The open assessment method was used however to enhance the game like effect of the RPM method. It was determined in the pilot trial at International Cool Climate Wine Show that using such an approach encouraged better consumer participation and reduced the 'clinical' feel of the test (details of this test is reported in Appendix 7 of the PhD thesis relating to this project). To minimise external influence from other consumers caused by the open assessment method and monitor the serving order of wines the following precautions were taken:

1. Each consumer was assigned a unique participant number.
2. Each consumer received a strip of coloured dots (2cm wide) with individualised 3-digit sample codes arranged according to the Williams design order.
3. Individualised 3-digit sample codes were randomly assigned to each sample so that for the same sample, no two assessors had the same 3-digit code.
4. The colours of the stickers were randomly selected to avoid creating patterns for other assessors.
5. Assessors were told they will receive different samples and so there would be no benefit in comparing responses.
6. Researchers kept a copy of the tasting order and marked off samples as they were served to assessors according to the tasting order.

The instructions given to consumers to complete the tasting were as follows:
"A new way of measuring consumer preference at wine show public tastings has been developed. In this method, you are first asked to taste and familiarise yourself with the reference sample served in your NWGIC glass labelled R. You will then be served a test sample, labelled with a 3-digit code in your wine show tasting glass. Compare this test sample to the reference sample and indicate how much you like the test sample compared to the reference sample and at the same time how different you perceive the test sample to be from the reference sample. Place the corresponding coloured sticker on the map to reflect your opinion of this wine. When you are completely satisfied with your answer, please return your empty test glass for the next sample. Please retain your reference sample as you will use this to assess all the 7 test samples we have for you today".

On completing the taste test, consumers completed a five-item evaluation of the test method. The evaluation questionnaire had 5 response levels 1 = Not at all to 5 = Very much. Consumers also completed a demographic questionnaire at the end of the taste test.



Figure 6: Consumers participating in RPM test at a public tasting

In the concurrent validation test using *in situ* hedonic line scale testing, a total of 79 (41 males, 37 females, 1 no response) consumers at 2 different public tastings took part in this test. The number of consumers included at each wine show were as follows: Australian Inland Wine show (L05) = 35 (14males, 21 females) and Le Concours des Vins du Victoria (L10) = 44 (27 males, 37 females, 1 no response). The consumers evaluated their overall liking for the same 7 wine samples as used in the RPM method. The test set up was similar to that for the Relative Preference Mapping test only that responses were collected on individual sheets not using an open assessment method as with the RPM method. This procedure is closer to standard testing protocols carried out in a non-standard test location.

In the final validation of the new RPM method carried out by the external testing agency, a different set of 132 consumers evaluated the same 7 test samples in individually partitioned booths in a laboratory setting according to set practice in industry.

Data analysis

Relative preference mapping – in situ testing

Individual points on the map were extracted into X, Y coordinate values using a 100 point grid developed for the map (Figure 7) for each assessor and each sample.

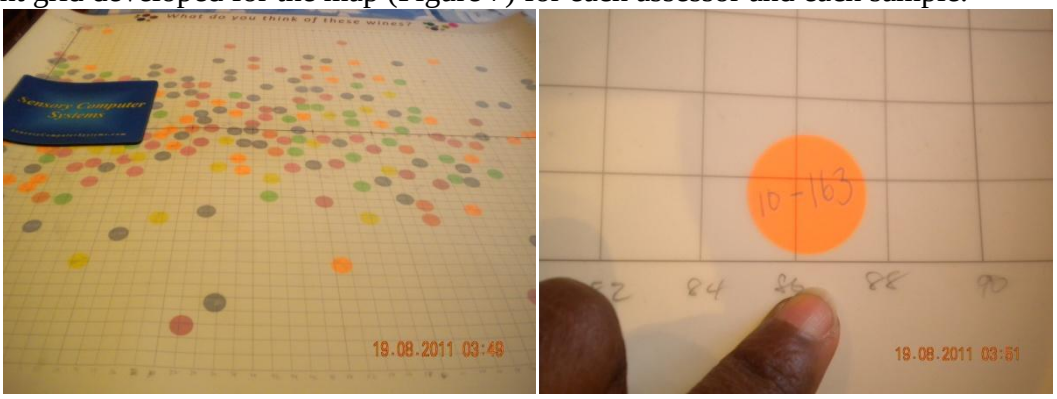


Figure 7 Reading coordinates from T-map scale using 100 point grid

All statistical analyses were carried out using XL-STATS (Addinsoft, 40 rue Damremont, 75018, Paris, France). A three-way ANOVA (location-assessor-product) was carried out on the data for the individual axes of the T-map scale since the data were collected from different test locations. The data were also subjected to generalised

procrustes analysis (GPA) to determine product positions on a consensus perceptual map and identify the area of innovation. An assessor plot showing the spread of consumers and possible segments formed was generated using Senstools (OP&P Product Research, BV, Utrecht, The Netherlands). A correlation of the two axes from the map scale was done to determine that the two axes were used independently. Mean and standard deviations for the method evaluation questions were determined. The mean liking scores from RPM data were compared to mean liking scores from hedonic line scale test from wine shows and the hedonic line scale test from industry best practice. Correlations of the same were carried out.

6. Results/Discussion

Product differences using individual axes from RPM test at wine shows

The mean liking (Y-axis) scores and the location-by-product interaction graphs for this axis are shown in Figures 8 and 9 below.

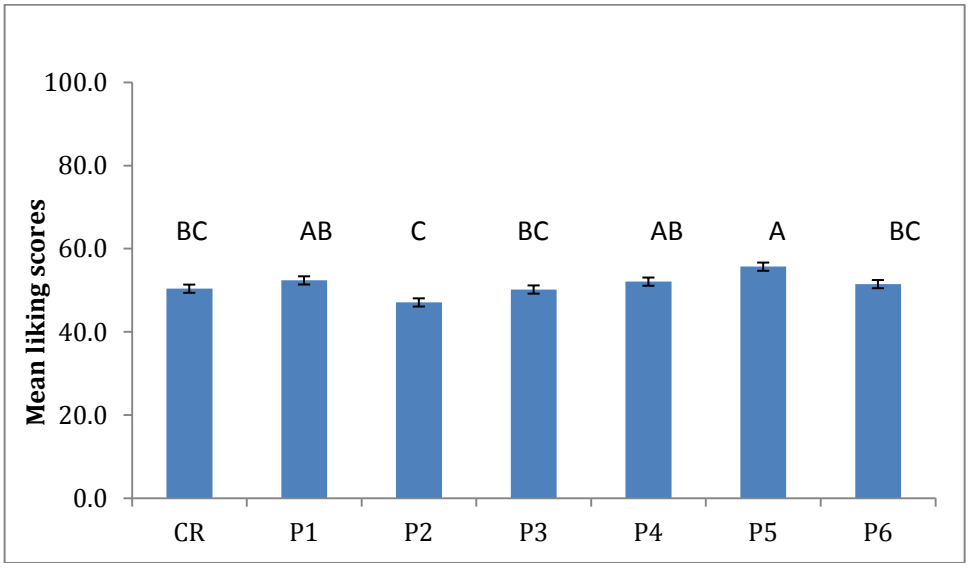


Figure 8: Mean product liking scores on Y-axis of T-scale map Error bars are standard error of the means. Letters represent Fisher's LSD post hoc analysis of means. Samples with no letters in common are significantly different at the 95% confidence level.

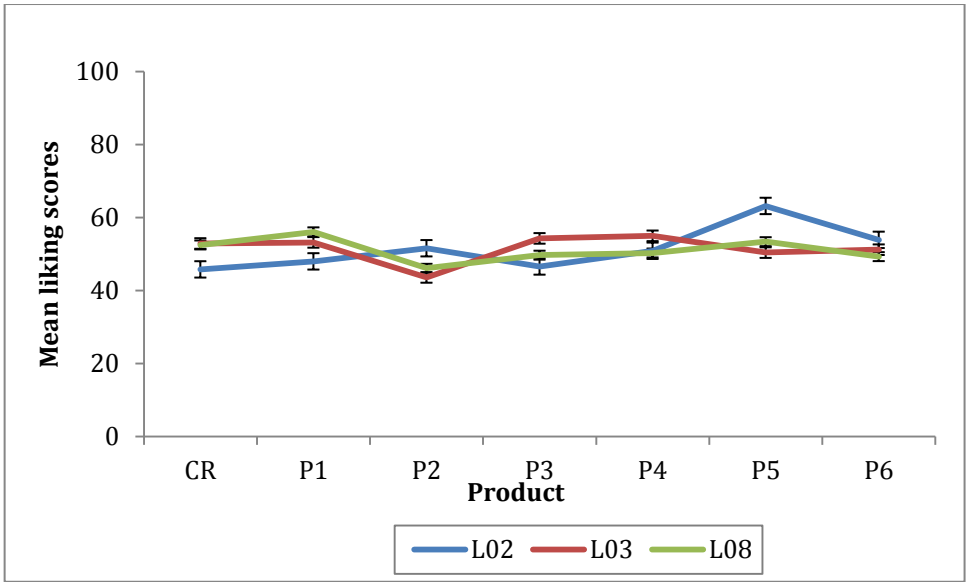


Figure 9: Product-by-location effect for liking (Y-axis) scores using T-map scale at public tastings. Error bars are standard error of the means.

ANOVA showed a statistically significant product effect but no statistically significant location effect. Fisher's LSD comparisons of the means showed that product P2 was liked less than products P5, P1 and P4 (Figure 8). The product-by-location interaction effect was statistically significant and was due to a higher rating for product P5 at location L02 and to a lesser extent a higher rating of product P2 also at location L02. No other differences were noted (Figure 9)

The mean difference from reference (X-axis) scores for the test samples are presented in Figure 10 below. On this axis, ANOVA showed statistically significant product differences but no statistically significant location or product-by-location effect was found at the 95% significance level. At 90% significance level a statistically significant product-by-location effect was found. Fisher's LSD comparisons of the means showed that product P2 and P5 were considered more different from the reference than products CR and P6 (Figure 10). The ANOVA results for both axes of the T-map scale are shown in Table 8.2 below.

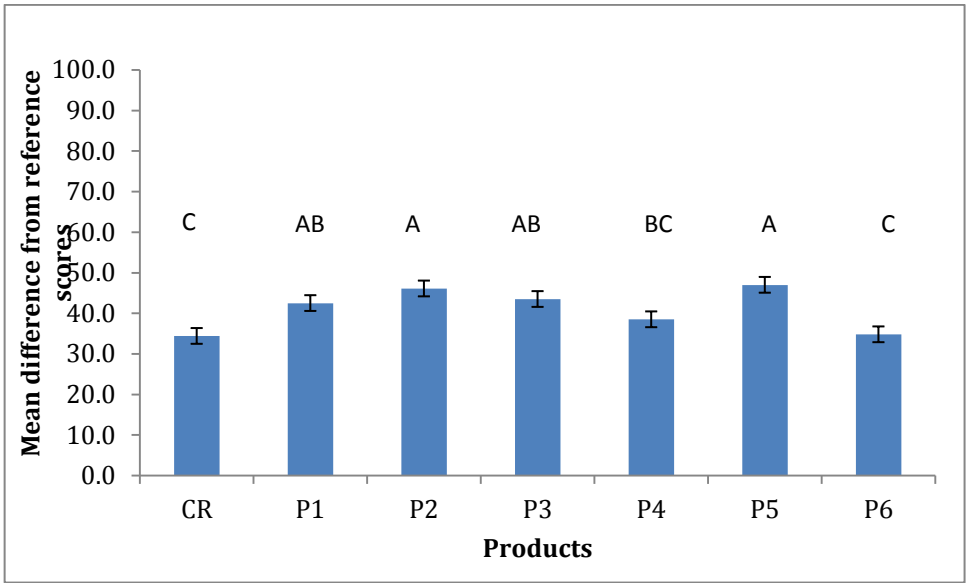


Figure 10: Mean product difference from reference (X-axis) scores for T-map scale at public tastings Error bars are standard error of the means. Letters represent Fisher's LSD post hoc analysis of means. Samples with no letters in common are significantly different at the 95% confidence level.

Table 2: ANOVA results for axes of the T-map scale used at public tastings

Scale axis	Source	df	SS	MS	F	P-Value
Liking (Y-axis)	Total	923	364878			
	Location	2	39	20	0.03	0.9721
	Error (a) = Assessor (Location)	129	89394	693		
	Product	6	5129	855	2.54	0.0195
	Location* Product	12	9386	782	2.32	0.0065
	Error (b) = Residual	774	260923	337		
Difference from reference (X-axis)	Total	923	673092			
	Location	2	6917	3458	2.80	0.0648
	Error (a) = Assessor(Location)	129	159608	1237		
	Product	6	19937	3323	5.36	0.0001
	Location*Product	12	4931	411	0.66	0.7879
	Error (b) = Residual	774	479802	620		

It was note-worthy that although samples P5 and P2 were not significantly different from each other in terms of how different they were to the reference sample, these two samples were significantly different from each other on the liking (Y-axis) scale.

There was no statistically significant correlation between the liking (Y-axis) and difference from reference (X-axis) of the T-map scale (r = -0.105, *p* = 0.823).

Perceptual map using GPA

The assessor plot below (Figure 11) shows how consumers were spread within the product space. From this map it can be seen that the consumers perceived products differently. With the exception of a few consumers in the lower left quadrant and on the extreme right hand side who used the map differently, the majority were homogenous in the way they used the T-map.

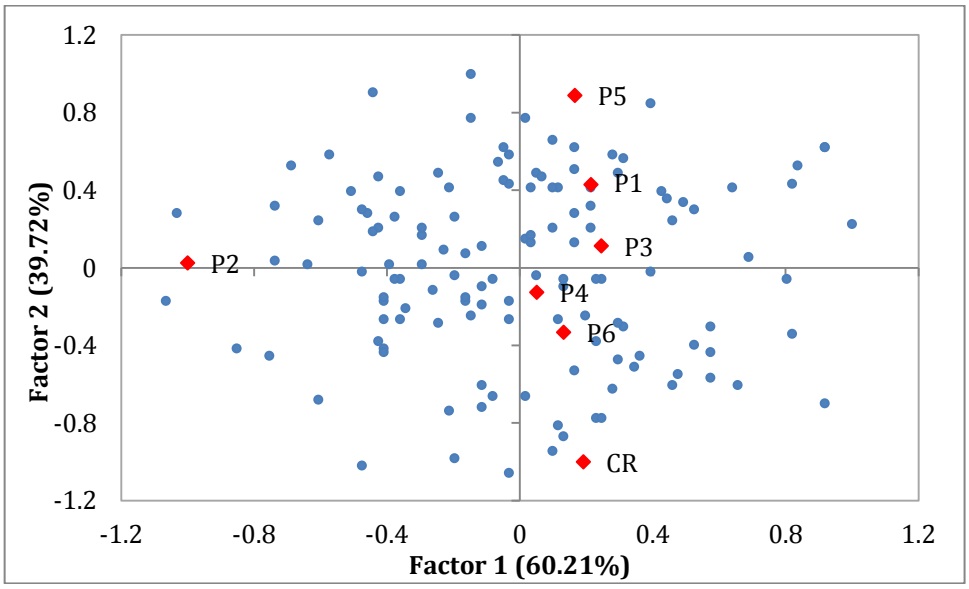


Figure 11: Assessor plot from GPA of T-map test at public tastings. CR=control reference. Blue dots represent individual consumers. Red diamonds are products

The product residual values gave an indication of the consensus agreement between assessors in placing products in the consensus map. Higher residual values implied low assessor agreement on the position of products in the consensus map. The graph (Figure 12) shows products CR and P2 had lower residual values compared to the other products, suggesting better assessor agreement on the position of these products in the consensus space. The generally high residual values for all the products reflect individual differences in the way the products were positioned in the map.

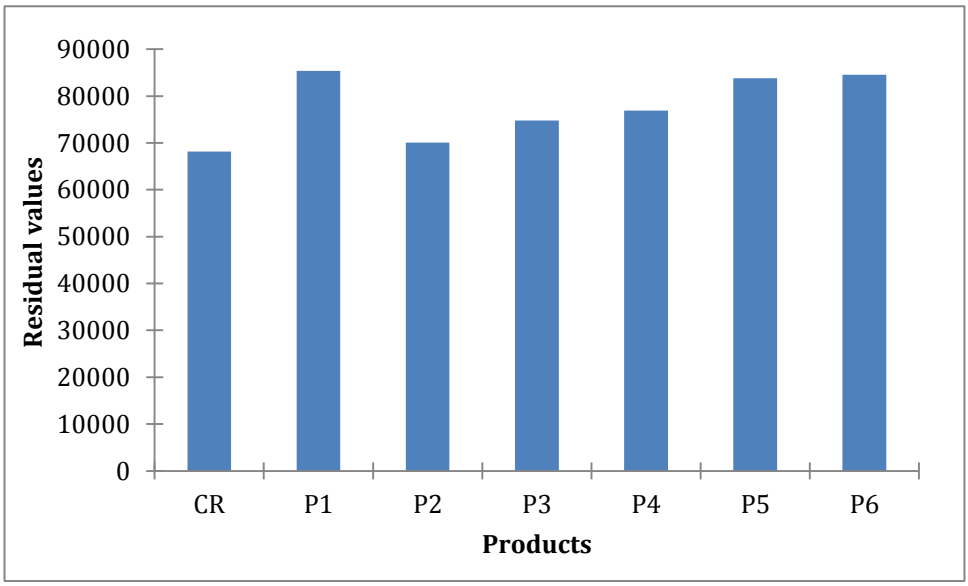


Figure 12: Product residual values from GPA of T-scale test at public tasting events

The consensus product map generated from GPA (Figure 13) explained 30.4%[1] of the variance in the data. The liking variable (i.e. Y-axis of the T-scale map) was more strongly correlated to Factor 1 (r= 0.840) than Factor 2 (r=0.391) while the difference variable was more strongly correlated to Factor 2 (r=0.805) than Factor 1 (r=-0.423).

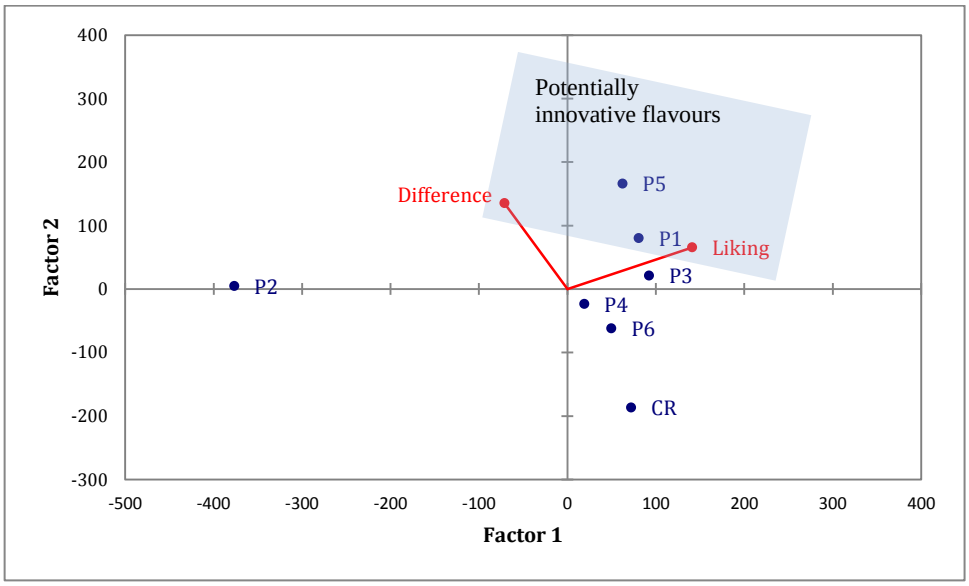


Figure 13 Consensus GPA product map from T-map test at public tastings

Generally, products were differentiated into liked and not liked products on F1 and different from reference or not on F2. It can be deduced from the map that product P2

[1]Total variance explained by the data was obtained from Senstools PANOVA results. This is because XL-STATS was unable to test the statistical significance of the consensus space derived from GPA due to the large data size

was the least liked product as it was loaded in the negative direction on F1 while all the other products were liked approximately equally and loaded in the positive direction of F1. In the second dimension it was clear from the map that product CR was considered the least different to the reference while product P5 was considered most different to the reference.

Summary and interpretation of product map

The ANOVA showed that both the liking and difference from reference axes of the T-map differentiated between products. The product location interaction effect was noted for product P5 and to an extent P2 tasted in location L02 on the liking axis only. No other statistically significant interaction effects were noted, suggesting the RPM method was *reliable* in giving consistent results in terms of product differentiation at the different locations. No significant correlation between the liking (Y-axis) scale and difference from reference (X-axis) scale was noted suggesting that these two variables were not related terms. The GPA consensus map differentiated between liked and not liked products on F1 and products that were different or not different from the reference on F2. Lower residual values for CR and P2 suggested assessors were in agreement on the position of these products in the consensus map.

Although technically speaking an innovative area was identified (i.e. the area on the consensus map between the liking and different from reference vectors) on the perceptual map, the interpretation of the product map in this instance is made differently considering that the reference sample was not an archetypal wine as determined by expert judges' scores. In this instance, since the reference wine was 'neutral' in flavour, it implies that products that lie in the innovation area have flavours that were liked by consumers and could be new wine flavours as they are different from the reference. For further product development purposes however, the sensory profile of those wines will be required. The results of the product map can also be interpreted from a benchmarking point of view, where the reference sample is the benchmarked wine. Thus products that lie in the 'innovative' quadrant are products for the benchmarked wine to aspire to become like if embarking on product repositioning, while those in the lower left quadrant are direct competitors for the benchmarked reference sample.

Comparing RPM and hedonic line scale tests used at public tastings

Product differentiation on liking scales

Generally, the order of product liking scores from the RPM liking (Y-axis) scale and the hedonic liking scale was similar although the hedonic line scale differentiated between products better than the liking scale from T-map scale (Figure14). In addition, the liking scores from the T-map scale were generally higher than those from the hedonic line scale test.

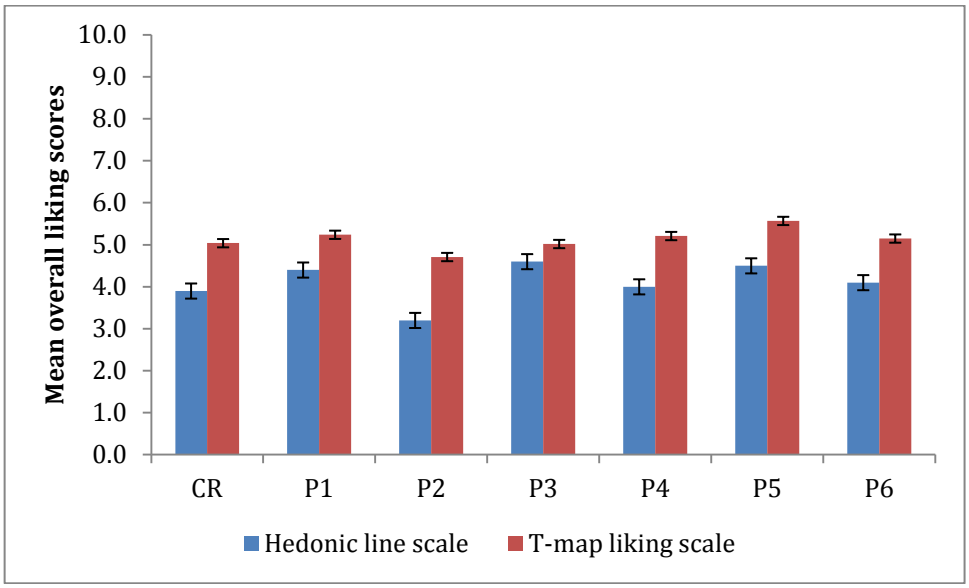


Figure 14: Comparing pattern of product liking from T-map scale liking axis and hedonic line scale. Error bars are standard error of the mean. CR = control reference sample. Note however that hedonic line scale did not include a reference sample and the test was not comparative as with the T-map liking scale. Mean liking scores from T-map scale have been divided by 10 to make the values comparable with hedonic line scale scores

Consumer evaluation of test methods

Table 3 below compares the two test methods on five evaluation items rated by consumers on a 5 point Likert rating scale. The student's t-test showed where significant differences between scores existed.

Table 1: Comparing mean values of test evaluation statements

Scale type		Easy to understand	Complicated	Enjoyable	Appreciate wine	Detracted from show experience
Map scale	Mean (N=106)	4.18 [B]	1.40	3.72	2.70	1.83
	SEM	0.09	0.07	0.10	0.12	0.11
Line scale	Mean (N=44)	4.63 [A]	1.44	3.87	2.85	2.03
	SEM	0.13	0.16	0.18	0.18	0.22
	P-value (Two-tailed t-test)	0.007*	0.842	0.441	0.521	0.385

**ANOVA showed significant difference at 95%confidence level. SEM = Standard error of the mean. Letters represent Fisher's LSD post hoc analysis of means. Means with no letters in common are significantly different at the 95% confidence level. Items were rated 1 = Not at all through to 5 = Very much*

Generally, consumers who took part in the line scale test considered this test method to be significantly easier to understand than consumers who took part in the map test method. Nevertheless, the mean score for both methods on this evaluative item were in the same category (i.e. 4 on a 5-point scale), suggesting that both methods were considered to be easy to understand. No other significant differences were found between the two methods. Thus both methods were considered not to be complicated or detract from consumers' public tasting experience. Consumers were 'indifferent' as to how much they enjoyed both tests as the mean scores for both tests were mid range. Consumers did not find either method helped them to appreciate wines. Written

comments about the map method however suggested that consumers would have found the method helpful to appreciate wines better if the reference sample was known. A few consumers reported that the map method took time but was enjoyable. No written comments about the line scale method were provided by consumers.

Summary

Overall, the liking results from the T-map scale using RPM were comparable to the results obtained from the hedonic line scale test. The relative liking for products on both scales was the same, although the scores from T-map scale liking axis were higher than that from the hedonic line scale. In addition, the hedonic line scale was more discriminating than the liking axis of the T-map. There was a high positive correlation between the two liking scales but no correlation between the liking scales and the difference from reference scale of the T-map. The RPM method was able to provide actionable information for product development and marketing purposes.

Comparing RPM at public tastings with hedonic line scale test carried out using industry best practice

Product differentiation on liking scales

Generally, the order of product liking scores from RPM liking (Y-axis) scale and the hedonic line scale were similar although the line scale differentiated between products better than the liking scale from T-map scale (Figure 15). In addition, the liking scores from the T-map scale were generally lower than those from the hedonic line scale test, except for the scores for P2 which was slightly lower with the line scale test compared to the T-map scale test.

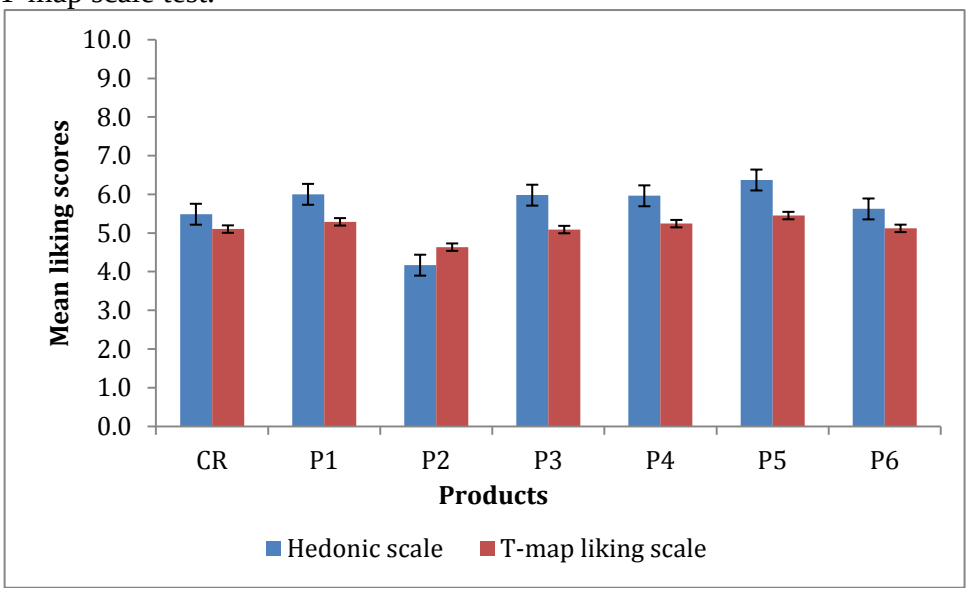


Figure 15: Comparing pattern of product liking from T-map scale liking axis and hedonic line scale Error bars are standard error of the mean. CR = control reference sample. Note that hedonic line scale did not include a reference sample and the test was not comparative as with the T-map liking scale.

Correlation between T-scale axes and hedonic line scale test under standard conditions show a significant positive correlation between the hedonic line scale and liking (Y-axis) scale of the T-scale map (r = 0.959, p = 0.001). A negative correlation between the difference from reference (X-axis) and the hedonic line scale was found but was not statistically significant (r = -0.109, p = 0.817). The correlation results show evidence of convergent and discriminant validity respectively.

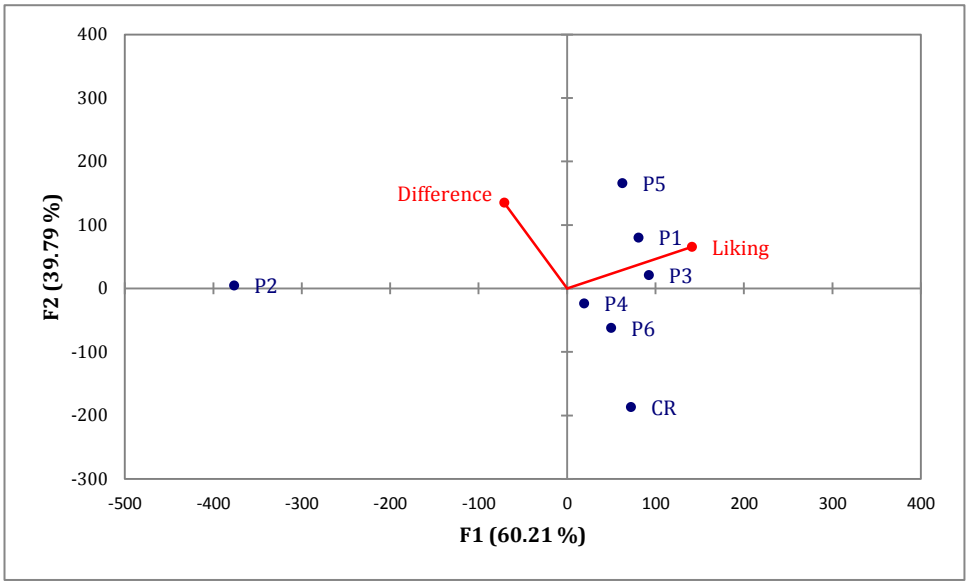


Figure 16: Product map derived from GPA of RPM T-map scale at public tastings.

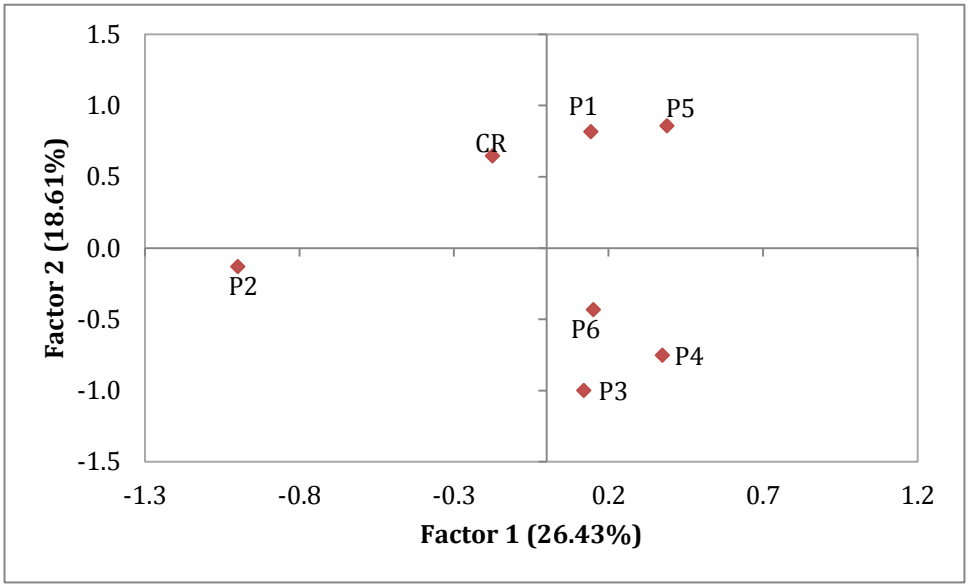


Figure 17: Product map derived from PCA of hedonic data obtained under standard testing conditions

The perceptual maps from the two tests (shown above Figures 16 and 17) had a similar pattern of product differentiation. In both maps, products P1 and P5 were considered similar to each other as they loaded close to each other on both maps. Product P2 was clearly different to all the other samples, while products P3, P4 and P6 appeared to be considered similar to each other. A point of difference however was that product CR was considered different to P6, P4 and P3 in the PCA map but in the GPA map, P6 was similar to P4 and CR.

Summary

Generally, the results from the two tests were similar in terms of product differentiation. Differences in the positions of particular products in the perceptual map however may be explained based on the different consumer groups involved in the two tests. It is known that the largest source of variation in consumer preferences is due to individual consumer differences. Consumers who took part in the RPM test were recruited from public tasting events and the majority age group of these consumers was 25-34 years.

Consumers who took part in hedonic line scale test under standard conditions on the other hand were more evenly spread across the different age groups, but with slightly more consumers over the age of 45 years. It is known that taste preferences change with age (Drewnowski, 1997) and this may have contributed to the differences in the way products were liked between the two test groups.

7. Outcome/Conclusion

This project was able to meet all performance targets within limits of experimental error and was within budget. We determined that consumer preference testing at public tastings can produce valid results using either a simple line scale or the newly developed T-map scale for relative preference mapping (RPM). The advantage of the relative preference mapping method is its ability to highlight an area of innovation from a consumer viewpoint, fast and cost effectively, without the need for external data such as sensory descriptive or instrumental data when the expert judges' results for the wines are known. Without expert judges' results, RPM is able to provide information for competitive benchmarking and fast identification of potentially innovative wine flavours. External data, such as sensory profile data are however required for further product development purposes.

In the long run, incorporating this type of testing at public tastings will provide a large database to allow the wine industry to identify trends in consumer preferences. In the short term, exhibitors who participate in such tastings will have additional information about their wines from a consumer perspective at no added cost. The 'game-like' nature of the relative preference mapping method makes the RPM method a suitable method as it fits into the mood of the public tasting experience. Regarding cost, entry fees already being charged for public tastings, can be used to cover any additional expenses incurred in incorporating this form of testing into the event.

8. Recommendations

There were several uncontrolled variables associated with testing at the public tastings; the use of one glass for all test samples (as is the practice at public tastings), the open assessment method as opposed to testing in individual booths, the noise level, the presence of other wines, labels on wines exhibited and the catalogue provided which presents more details about the wines (i.e. any award won and comments from judges). These are limiting factors for standard sensory testing protocols that may potentially bias results. In this study, effort was made to reduce the effect of some of these external factors but others were beyond the scope of this exploration into consumer testing at public tastings. Since public tastings form an example of a normal consumption location, this limitation highlights the limited knowledge available regarding testing in such locations and the presence of unknowns. Future research is thus called for in this area and in the public tasting setting more effort is required to understand the effect of these external factors on consumer preferences

Appendix 1: References

Blay, M. Y., Saliba, A., Hardie, J., Carr, T., & Heymann, H. (2012). Wine shows can give exhibitors more than medals. *Wine &Viticulure Journal, 27*(1), 70-73.

Blay, M. Y., Saliba, A.J., Hardie, W. J., Heymann, H. and Carr, B. T. *Developing a method for consumer data collection at Australian wine shows*. 4th European Conference on Sensory and Consumer Research, 5th -8th September, 2010. Palacio Europa, Vitoria-Gasteiz, Spain.

Blay, M. Y., Saliba, A.J., Hardie, W. J., Heymann, H. and Carr, B. T. *A method to collect consumer sensory data at Australian wine shows.* 14th Australian Wine Technical Conference, 3rd – 8th July, 2010 Adelaide Convention Centre, Adelaide, Australia.

Appendix 2: Intellectual Property

The Relative Preference Mapping method has been identified as a potential new method that can be adopted for use by stakeholders in the wine industry. To encourage the widespread use of this method however, we have chosen to make the method freely available to interested companies.

Appendix 3: Staff

Anthony Saliba – Principal Investigator
Maame Blay – Chief investigator