The position of Australian Chardonnay in the world-wide flavour map

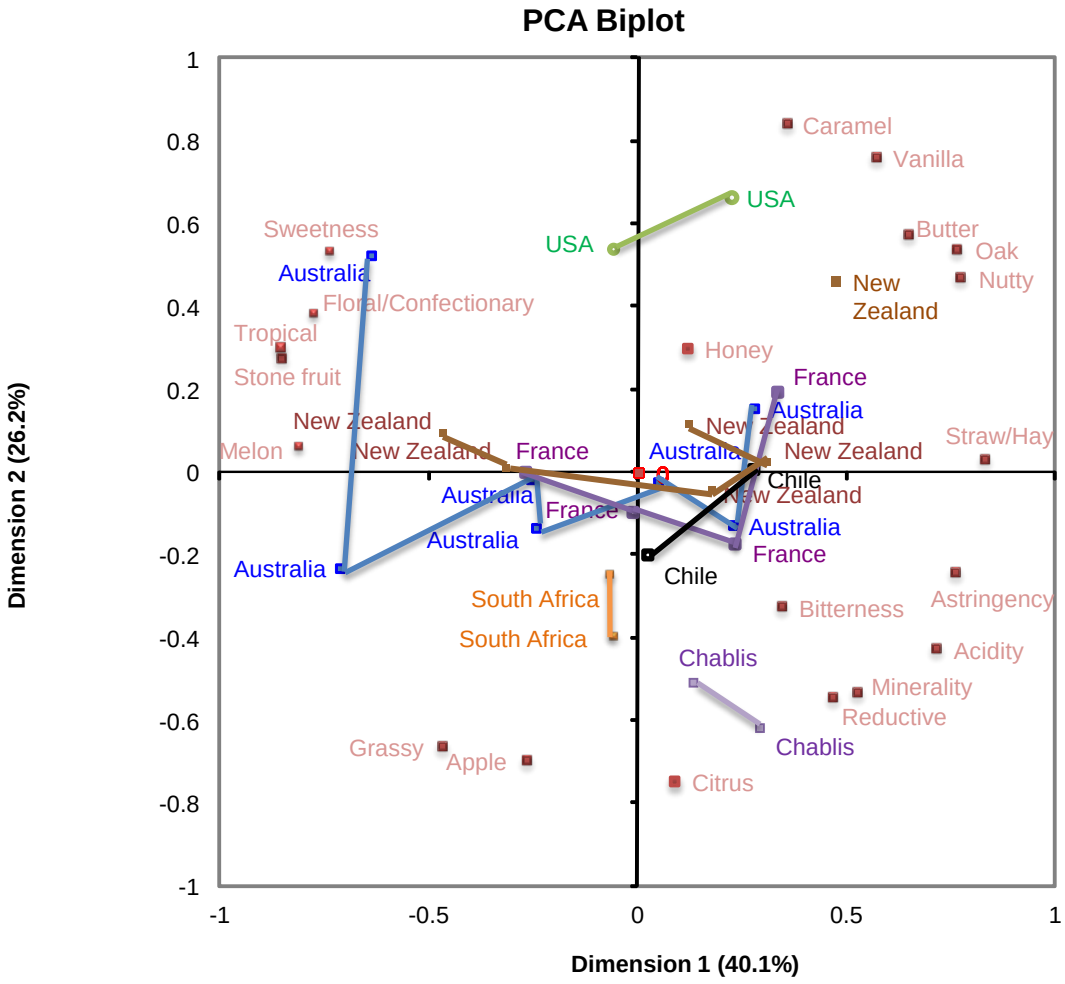
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Introduction

Results of the 'Attitudes, Drivers of Consumption and Taste Preferences: A focus on Chardonnay' project demonstrated, via means of sensory and consumer studies, that there are existing styles of Australian Chardonnay that are liked by a broad range of consumers, and that some styles enjoy high demand amongst niche consumer groups. One of the key messages from the data has been how little parochialism Australian wine consumers show toward Australian wine. This is thought to be due to the lack of definition around how Australian Chardonnay differs from other countries. One of the key moves in defining New Zealand Sauvignon Blanc as different was the establishment of an international flavour map for Sauvignon Blanc (Lund et al., 2009). One of the challenges of this type of work is to accurately define each country of interest. For instance, in the Lund et al. (2009) study, Spain was defined through the use of just two wines.

Defining an entire country's variety through two wines is problematic, but pragmatically the task of conducting a full analysis for each country is not feasible. We sought to make the results from each country in our study relevant by choosing from wines that were readily available to consumers in Australia. By doing this, we were able to determine how Australian Chardonnay compares and contrasts in flavour compared to wines available in Australia from other countries. Our results are therefore relevant to domestic sales; readers can also extrapolate our findings to international sales for the countries where sufficient wines were represented – specifically New Zealand and France.

The aim of this work was to establish how Australian Chardonnay differs from international wines available domestically.

Materials and Method

Wines

Around fifty wines were selected in consultation with an industry advisory panel made up of experts from the Australian wine industry with some representation from international companies. Wines included had to be readily available from Australian commercial outlets for approximately $10-$30 per 750 mL bottle and represent the flavour profile typical of the country of origin.

A sensory panel tasted each wine in country of origin sets, and determined which wines should be chosen to represent the range of styles that were expressed. In some cases, wine styles were limited and only two wines were needed to represent that country (see Table 1). This was interesting because the wines chosen did represent the range of Chardonnay styles available for sale in Australia from that country. This position may change in future, but from our experience the results have been fairly stable for the last few years.

The Australian wines were chosen from a much larger set, since many more Australian Chardonnay wines are available domestically. The wines were chosen from a complete descriptive analysis of Australian Chardonnay, results of which were reported in the previous edition of the Wine and Viticulture Journal (Saliba et al., 2013).

Table 1: Country of Origin of Chardonnay Wines

Wine	Country	Vintage
Brancott Estate 'Letter Series O'	New Zealand	2008
Wither Hills	New Zealand	2010
Villa Maria Private Bin	New Zealand	2010
Cloudy Bay	New Zealand	2010
Craggy Range Gimblett Gravels	New Zealand	2010
Curious Kiwi	New Zealand	2010
Kendall-Jackson Vintner's Reserve	USA	2010
Wente Vineyards Morning Fog	USA	2010
Fleur du Cap	South Africa	2011
Obikwa	South Africa	2011
Montes Classic Series	Chile	2011
Montes Alpha	Chile	2010
Maison Champy Bourgogne	France	2010
Louis Latour Macon-Villages Chameroy	France	2010
William Fevre Petit Chablis	France	2010
La Chablisienne Chablis	France	2009
JP Chenet	France	2011
Domaine Astruc	France	2011
Yellow Tail	Australia	2012
Jacob's Creek S Eastern Australia	Australia	2011
Warburn Gossips	Australia	2012
Goundrey	Australia	2011
Penfolds Thomas Hyland	Australia	2011
De Bortoli Yarra Valley	Australia	2011
Barwang	Australia	2011

Sensory Analysis

Sensory descriptive analysis was conducted on the eighteen International wines. Twelve panel members were recruited from the NWGIC (mean age 41.3 years), most having been involved in previous descriptive analysis work. The training was complex given the heterogeneity of the samples and testing only proceeded after appropriate performance was demonstrated; for most participants this was approximately 10 sessions of training. Data was collected in triplicate using the Compusense™ program in the NWGIC sensory laboratory.

Results

The sensory data was analysed using Canonical Variates Analysis (CVA) and results suggested two dimensions (see Figure 1). Wines separated across the first dimension by fresh fruit to oak character, while the second dimension ranged from minerality, citrus and apple to vanilla and caramel. Analysis of Variance showed that wines from each country differed, justifying further comparison of wines from each country.

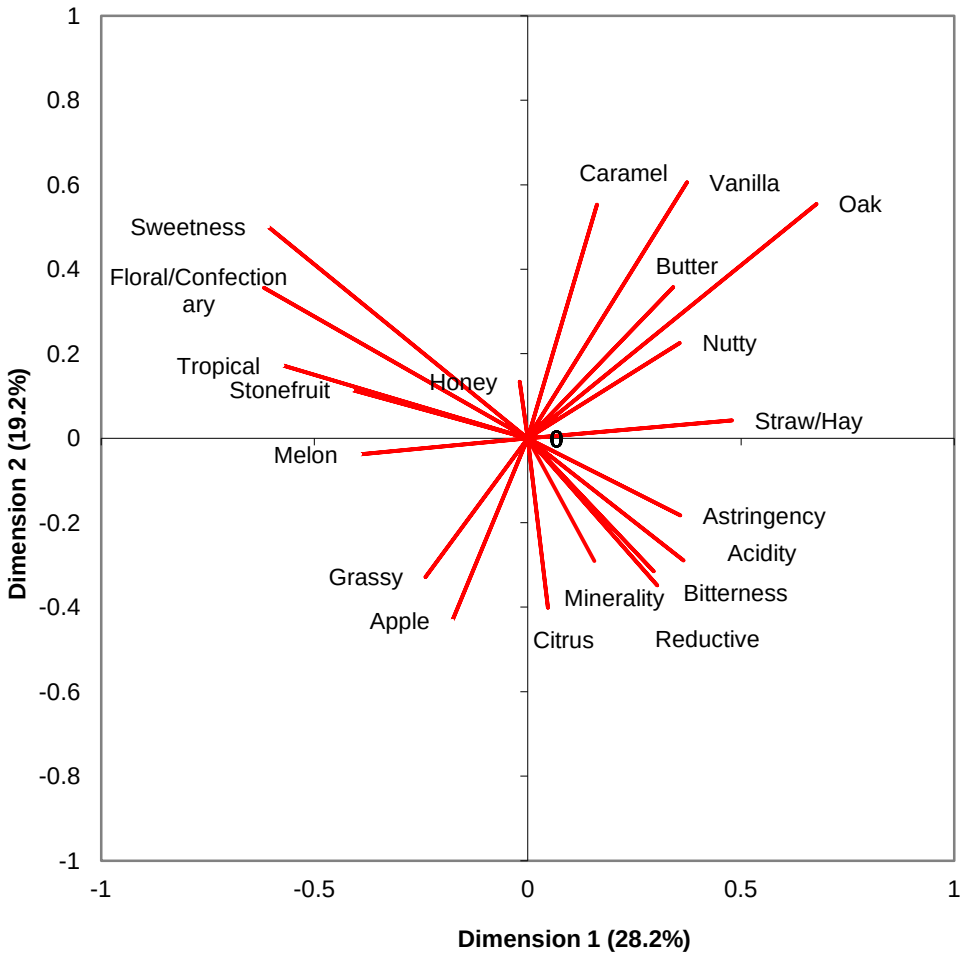


Figure 1: Canonical Variates Analysis Loadings

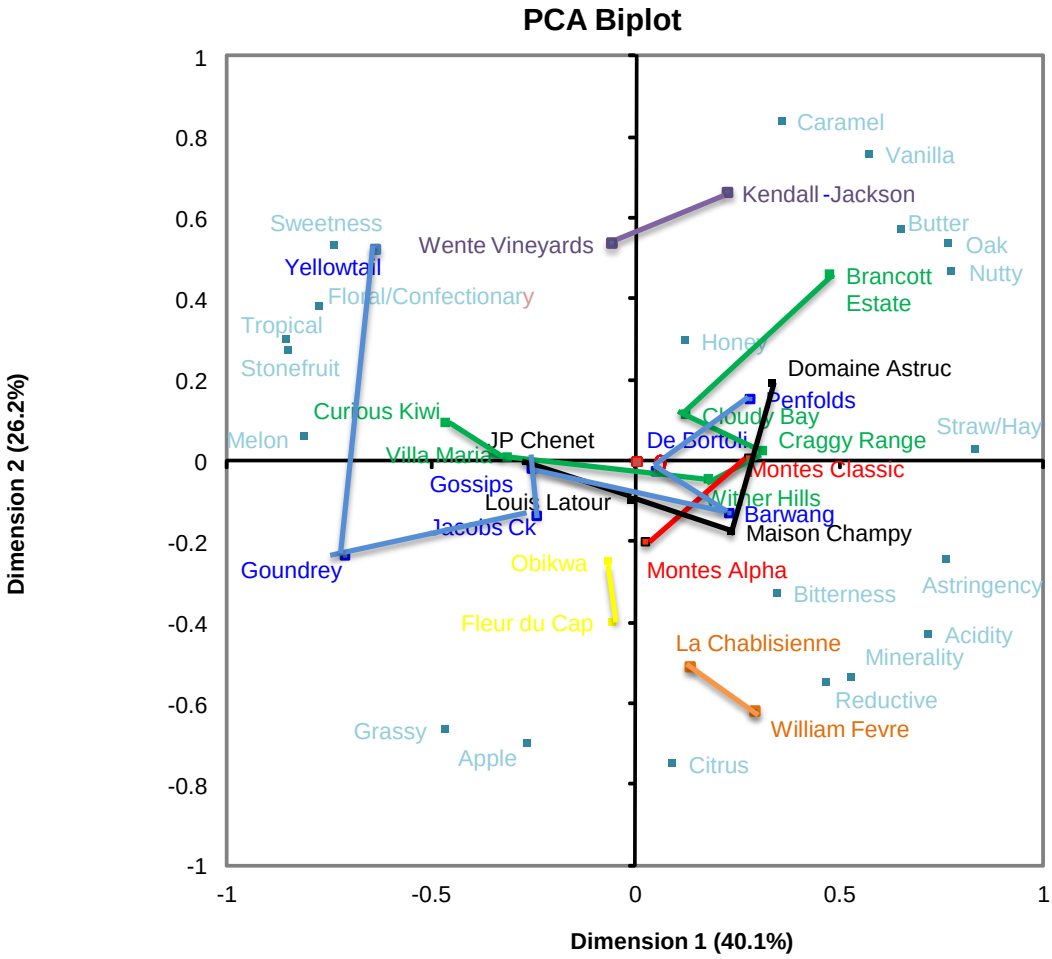


Figure 2: Biplot of wines and descriptors; wines are colour-coded to country of origin: New Zealand, Chablis, Rest of France, USA, South Africa, Chile and Australia.

Principal component analysis (PCA) (Figure 2) was performed in order to compare the characteristics of each wine. The correlation matrix was used to generate a two-factor solution and accounted for over 66% of the total variation, thereby passed the conditions of the scree test and interpretability (Lawless and Heymann, 1998).

Figure 2 illustrates the vast array of flavour characteristics associated with the various styles of Chardonnay wines. Profound differences in fruit descriptors, ripeness levels and winemaking influences such as the use of oak, residual sugar, malolactic fermentation (MLF) and lees stirring/aging produced a diverse group of wines, with this complexity evident in many of the wines when examined individually. Whilst this diversity and complexity leads to some difficulties in style interpretation and differentiation, the main sources of variation are able to be considered. Dimension 1 accounted for 40.1% of the variance, with the samples separated to riper fruit characters (tropical, stonefruit, melon, floral/confectionary) and sweetness as opposed to attributes associated with oak handling (oak, nutty, straw/hay and astringency). The second dimension, which accounted for 28.1% of the variation, points toward a separation due to grassy, apple, citrus, reductiveness and minerality attributes, with a lesser influence of acidity, in comparison to attributes principally related to MLF – caramel, honey and butter – as well as a vanilla attribute, which can be due to both fruit characters or winemaking artefact.

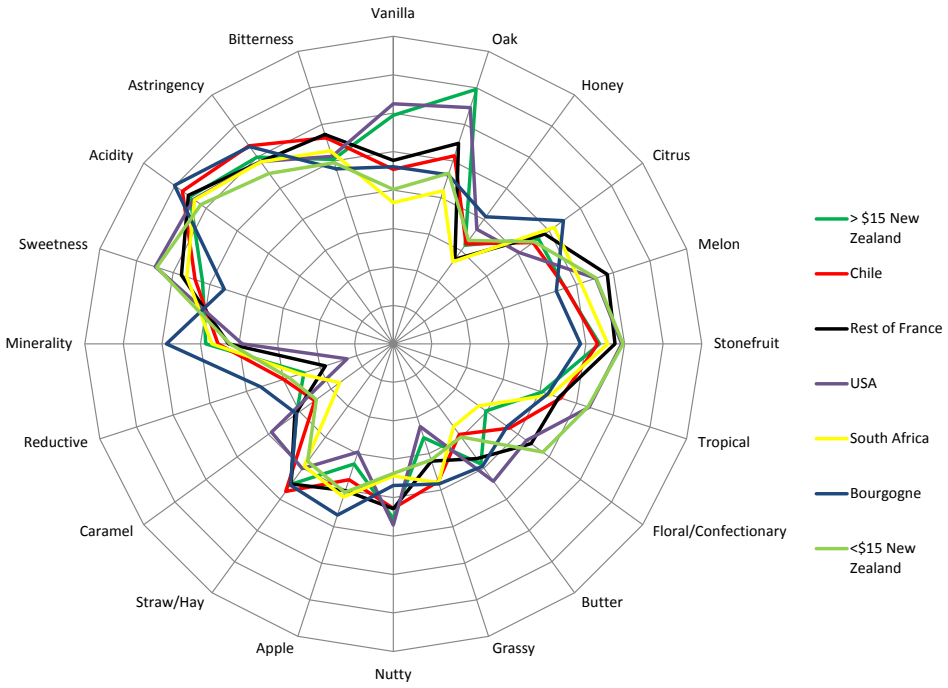


Figure 3: Spider plot of means for each country of origin, for each descriptor.

The primary characters of the commercially available international wine can be most easily interpreted when both Figure 2 and 3 are considered together. Figure 3 demonstrates that the four Burgundy wines had the highest mean ratings for acidity, minerality, reductiveness, citrus and grass, and so it is not surprising that these are seen as a distinct group on the PCA. The wines from the Chablis region of Burgundy, the William Fevre Petit Chablis and La Chablissienne Chablis appear lower on the PCA, showing the taut, lemon/lime, grassy, mineral characters that are typical of the appellation.

The other two French wines, from South-West France rather than the traditional home of Chardonnay, Burgundy, appear above these wines on the PCA due to their riper fruit characteristics, higher residual sugar and lower perceived acidity. The highest average bitterness for the wines is possibly a result of high extraction rates required to produce these relatively inexpensive commercial wines.

The cheaper New Zealand wines (RRP ~ <$15) are produced in a style in which ripe fruit characters and some residual sweetness are important. The more expensive examples of New Zealand wines appear further to the right on the PCA, due to more pronounced oak (the highest mean rating) as well as lower levels of perceived sweetness and ripe fruit characters. The South African wines were rated the lowest for oak, vanilla, butter, honey, caramel and butter. This would seem to indicate that the style of wine intended was to be a fresh, fruit driven style, however low fruit ratings were also observed, indicating the wines were relatively non-descript.

The Chilean wines were amongst the highest for both bitterness and astringency, with high extraction rates similar to the commercial SW France wines possibly being the cause. The straw/hay character is also a more dominant feature than ripe fruit characters.

The wines from the United States of America have the highest MLF characters (butter and caramel ratings), with relatively high oak and vanilla attributes also being an important feature. These rich, full-bodied styles are reminiscent of some Australian Chardonnays that were produced about 10 years ago. The Wente Vineyard wine is located further to the left on the PCA, as it rated higher for riper fruit characters and lower for oak characteristics than the Kendall Jackson Chardonnay. Both wines had a similar, relatively high perceived sweetness rating.

The Australian wines used in this study were not graphed on Figure 3 as a diverse range of wine styles were deliberately chosen. The lack of clustering of the Australian wines on the PCA further validates the choice of these wines as illustrative of the range of styles produced. Further, it shows that Australian consumers have the opportunity to select Australian Chardonnay that has desirable characters found in other Chardonnay producing countries.

The Casella Yellowtail wine has some similar characters (particularly vanilla and noticeable sweetness) to the commercial USA wines studied, but the wine has profound ripe fruit (tropical and stonefruit) characters and considerably less oak influence. It is in fact noticeable that none of the Australian wines were *dominated* by the influence of oak and in particular, MLF characters. Even the Penfold's Thomas Hyland wine, deliberately chosen to reflect an oak-influenced Australian wine, had less oak and MLF influence than the international wines made in this style. A crisp acidity and a relatively high citrus character were the other most important feature of this wine.

The Goundrey Chardonnay, an unwooded style with a mixture of ripe fruit, citrus and grassy characters with some residual sugar, appears to be quite unique in this study. The most similar wine is the Curious Kiwi Chardonnay which has negligible oak but lower intensities of all fruit characters. The Barwang Chardonnay, with relatively high citrus character, acidity, minerality and some reductiveness, was the closest in style to the Burgundy wines studied.

The Jacob's Creek and De Bortoli's Chardonnays are depicted in the middle of the PCA – reflecting that no single attributed dominated either wine. These are examples of balanced wines. The Jacob's Creek has riper fruit characters and the De Bortoli's wine, less fruit overall with higher bitterness and astringency, indicating the importance of texture in this style.

Conclusions

Two main conclusions present from this work. Firstly, most of the International Chardonnay wines readily available for sale in Australia offer flavour profiles that can be offered through the purchase of Australian wines. The two departures are the apparently unique blend of minerality and citrus characters associated with wine from Burgundy, particularly the Chablis region. The oak and MLF dominated style associated with wines tested from the USA would also seem to be no longer a major wine style found on Australian bottle shop shelves. Our own work on consumer preference suggests that few consumers like buttery, oak dominated Chardonnay, though we suspect that some consumers would find minerality appealing. Further work is required to characterise minerality both sensorially and chemically, and to understand vineyard and winemaking influences, though initially, it should be confirmed that consumers find minerality appealing before substantial resources are devoted to understanding the full picture. While our work here has highlighted the importance of minerality in Chardonnay, other wine varieties such as Semillon and Riesling should be included in further work on minerality.

The second main conclusion from this work is that there are at least two distinct ‘styles’ that Australia produces that are relatively unique, compared to the International Chardonnay readily available in Australia. Firstly, there are wines that have been produced to deliver a range of overt fresh fruit character with no oak influence. Secondly, there are a range of wines available that have good balance between fruit and oak character. If there was one take home message from this work, it is that Australian Chardonnay tends to be more balanced than many of the International examples available domestically. Balance is an important characteristic of fine wine and certainly related to liking amongst high-involvement consumers. Further work is needed to determine how balance appeals to lower-involvement consumers, something that is important given that the vast majority of wine sales in Australia are accounted for amongst this segment.

These results can be used to explain the similarities and differences between Australian Chardonnay styles and International styles available domestically. This would help consumers understand the position of Australian Chardonnay on the international flavour map, something that helped New Zealand Sauvignon Blanc develop a following. Further, it elucidates the ‘reason to buy Australian Chardonnay’; without this in the past, domestic purchase behaviour has not been as parochial as the industry would prefer.

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