Napping – a rapid method for sensory analysis of wines

The method of quantitative descriptive sensory analysis has been used for many years to discover the most important sensory characters for a group of wines. This method involves a trained sensory panel rating defined characters for their intensity in each wine, so that the presence and intensity of wine descriptors can be compared to give an overall picture of the similarities and differences among a group of wines. This is a very sensitive and reproducible method and gives a great deal of information about the individual wines and how they compare to others in the group tested. The data can also be compared to wine chemical measures or preference and quality data. The method can be used, for example, to see the sensory effect of a new yeast strain for winemaking, or to examine the effect of grape ripeness on wine sensory properties.

However, to apply this method a highly trained panel of sensory assessors is required, with specific training for each group of wines the panel assesses. This can be both time-consuming and expensive. A number of alternative methods have been developed which can be used to assess a set of wines more rapidly. Several papers have been written about the different methods, their similarities and their differences, their weaknesses and their strengths (Varela and Ares 2012, Dehlholm et al. 2012, Hopfer and Heymann 2013, Valentin et al. 2012, among others). One such recently developed method is 'napping'. The name 'napping' comes from 'nappe' or tablecloth in French, a term used originally by French researchers working with this method. It is a type of projective mapping which may also include sorting tasks.

Napping is a way of evaluating a group of samples, with individual assessors arranging them in a two-dimensional space according to how similar or different they consider samples to be from one another. Samples which are most similar are placed close together and samples which are very different are placed well apart. This sample placement can be made on a sheet of paper on a flat surface like a table or bench (hence 'nappe') or on a computer screen, using the horizontal and vertical axes on the computer screen in the same way as an assessor would use the two dimensions of a paper sheet on a bench. At the AWRI, the use of sensory software allows data to be recorded immediately and means that samples can be evaluated in sensory booths in a controlled environment (Figure 1). One disadvantage of this approach is that it may be difficult for some assessors to think in terms of a vertical screen space rather than a flat bench space in making their placements.

Assessors may be instructed to assess the wines separately by appearance, aroma, or palate (partial napping), or overall, using all aspects (global napping). Assessors use their own criteria and their own experience to decide whether samples are similar or different. In this

way each assessor places the wines according to what is important to them, not according to a group consensus. Each assessor receives their coded wines in a different, randomised order, like any other sensory assessment, removing the effect of tasting order. In general only a single replicate of each wine is used but there have been some explorations regarding the use of replication in napping, with either whole sample sets or selected samples within a set (Hopfer and Heymann 2013). The number of samples that can be assessed is still a matter for debate, but a set of up to 18 samples has been found to be practical using the AWRI's facilities. This is an important constraint as it limits the number of samples which can be assessed in a single study.

To gain more information, assessors can be asked to write a few words describing each wine or group of wines. This can be performed using any words the assessor chooses (free-choice) or by choosing words from a prepared list.

The most important factor for assessors using napping is that they understand the task. A single training session is generally enough to explain the method and to give assessors an opportunity to try it. Samples for training do not need to be related to the test samples to be assessed later. If assessors are using computer screens, a session to familiarise them with the task of placing their samples on a vertical screen rather than a horizontal bench is helpful. One great advantage of this method is that once assessors are familiar with the method they do not require training for each study. Assessors for napping do not have to be experts in a particular product or even in sensory assessment, and it could be interesting to assess consumers' responses using this method. Studies by researchers who have explored napping with consumers or assessors with no previous sensory analysis experience (Risvik 1997, Barcenas 2004, Kennedy & Heymann 2009, Valentin et al. 2012, among others) have concluded that consumers could generally complete the task satisfactorily and provide

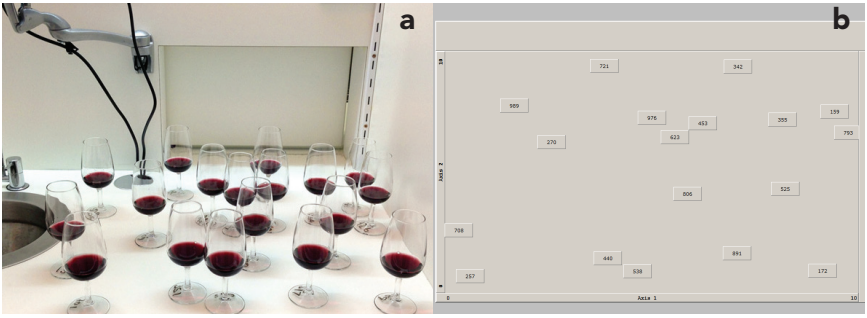

Figure 1. An example of wines placed in the napping space after assessment, where a) shows the wines placed on the bench in an AWRI sensory booth; and b) shows the subsequent placement of wines on the screen with Fizz sensory software.

important information, although some have suggested that other rapid methods would be easier for consumers to understand (Veinand et al. 2011) or might provide more accurate profiling of products (Moussaoui and Varela 2010). Used in conjunction with a descriptive analysis study by a trained panel assessing the same wines, it could help to better understand consumer perceptions of the wines. So far the AWRI has not used the method in this way. Currently it is members of the AWRI sensory descriptive panel that have also been used to generate napping data.

Napping provides a rapid snapshot of a group of samples – how similar or how different they are. With the use of descriptive terms, information about the nature of the differences can be gained. It provides a picture – a consensus map – of how the wines sit in a two dimensional space, using the data from all assessors to make this picture. While the panel provides two dimensional data, after analysis the results generated are in multiple dimensions, similar to Principal Component Analysis (PCA) plots, usually viewed two dimensions at a time. Results from napping can be related to PCA plots generated from descriptive analysis. The two methods give closely similar results, as assessed by a multivariate correlation coefficient called the RV coefficient. Figure 2 shows the results of a napping exercise for a set of white wines.

The positions of the wines in Figure 2 indicate the similarities among the wines, based on where the assessors placed the wines in their individual nappings. The attributes in the napping figure are also shown, based on how often they were chosen to describe the wines. This gives information about which words are closely associated with particular wines or groups of wines, but the attributes do not influence the position of the wines. A consensus map looks similar to a PCA plot generated as part of descriptive analysis, but in PCA, the intensity scores of the attributes are used to make the map of samples; they influence the

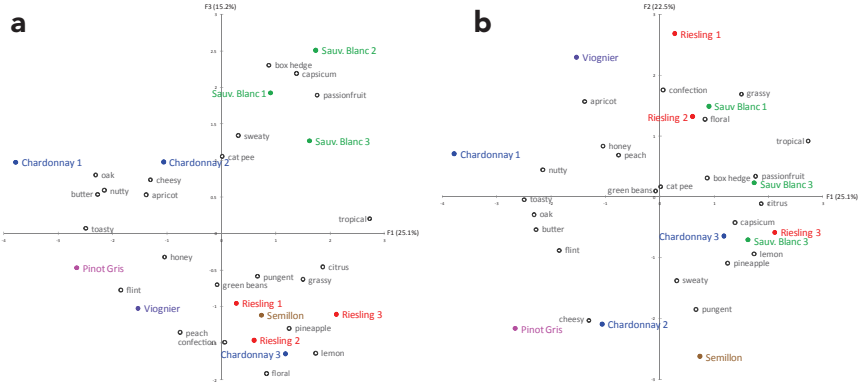

Figure 2. Consensus map of twelve commercial white wines generated by napping – aroma only. a) dimensions 1 and 2; b) dimensions 1 and 3.

position of the samples. Figure 2 shows that separation along the horizontal axis (dimension 1) mostly separates the Riesling, Sauvignon Blanc and Semillon wines on the right, from two of the Chardonnays, the Pinot Gris and Viognier on the left. The wines on the right are closer to citrus fruit, grassy, tropical fruit and capsicum terms, while wines on the left are closer to oak, butter, nutty, cheesy and flint. The wines are distributed along the second dimension (vertical axis, Figure 2a), but not strongly grouped within varieties along this axis. In Figure 2b, the Sauvignon Blanc wines are separated on the third (vertical) dimension from the Rieslings, Pinot Gris and Viognier. Sauvignon Blanc wines had higher frequency of terms such as box hedge, capsicum, and passionfruit while lemon and floral were more important to the Rieslings and one of the Chardonnay wines.

There are many potential applications for this method at the AWRI. These include:

- evaluating effects of treatments or production variables
- assessing differences among a set of commercial wines
- conducting an objective preliminary screening for a group of wines to decide whether to proceed with more in-depth sensory or chemical analysis
- screening for a set of experimental wines to decide which might be of interest for further work
- selecting wines of interest from a larger group of wines, for example for consumer studies
- comparing winemaker tastings with descriptive analysis results
- assessing consumer perceptions compared to experts or trained panels.

Some advantages of napping in comparison to descriptive analysis:

- it is more rapid, often requiring only a single session
- it is less expensive to run
- it does not require expert sensory assessors
- assessors evaluate the samples based on what is important to them
- the data from the analysis can be acquired quickly using computers with sensory software
- it gives an overall snapshot of a group of wines.

Some disadvantages of napping in comparison to descriptive analysis:

- the method is not always as sensitive as descriptive sensory analysis and panel performance is harder to analyse
- the number of samples is limited as they must all be assessed in a single session
- preparation and statistical analysis of the data can be more difficult than analysis of data from traditional methods and requires specialised software
- it requires training and experience in analysing and interpreting the data

- some assessors may find the method difficult to understand and may find it difficult to place samples on the computer screen space
- it is not possible to assess statistical significance regarding attribute intensities.

In summary, this method, like any other sensory method, has advantages for specific types of study depending on the aim of the project. It is particularly useful in screening studies. It is rapid, less expensive and generally easier to use than conventional sensory methods. It is very helpful for projects, including contract or commercial studies, where timeframes are tight and budgets are limited. Overall, it is a valuable new addition to the suite of sensory analyses at the AWRI.

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