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Performance of Flash Profile and Napping with and without training for describing small sensory differences in a model wine

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ABSTRACT

Rapid sensory methods are a convenient alternative to conventional descriptive analysis suitable for quickly assessing sensory product differences. As these methods gain in popularity, assessments of their discriminability and reproducibility in food applications are increasingly needed. Moreover, it is of interest to explore whether small adjustments to the existing protocols could improve the results. In this study different variations of two rapid sensory methods, one based on holistic assessment – Napping, and one based on attribute evaluation – Flash Profile, were tested for the evaluation of the flavour in wine. Model wines were developed with control over the sensory differences in terms of sensory characters and sensory intensities (weak to moderate). Some modifications to the classical Napping and Flash Profile protocols were employed in order to improve discriminability, repeatability and accuracy. The results showed that conducting Napping with a panel training on either the method (training on how to arrange samples on the sheet) or the product (familiarisation with the sensory properties of the wines) improved the outcome compared to the classical Napping protocol. The classical Flash Profile protocol and its modified version including a Napping with subsequent attributes generation as the word generation step and limiting the number of attributes for ranking gave a similar sample space. The Napping method could best highlight qualitative sample differences, whereas the Flash Profile provided a more precise product mapping on quantitative differences between model wines.

1. Introduction

Rapid sensory methods have gained considerable interests as alternatives to conventional descriptive profiling, due to their speed and cost-effectiveness. Among the several alternatives proposed, Napping and Flash Profile are two attractive approaches. Napping (Pagès, 2003) is a specific variant of Projective Mapping, a method originally proposed for applied sensory studies by Risvik, McEwan, Colwill, Rogers, and Lyon (1994) to describe overall differences among samples. The samples are simultaneously presented to the assessors, who are then required to project samples on a two-dimensional space in a way that reflect their perceived sample differences, i.e., by placing samples perceived as similar close to each other, and samples perceived to be more different further apart. Since Napping itself does not provide a description of the samples, a subsequent step where the assessors write down attributes to describe samples is usually coupled with Napping. Although many researchers have reported that Napping is an easy and user-friendly method to use (Albert, Varela, Salvador, Hough, & Fiszman, 2011; Veinand, Godefroy, Adam, & Delarue, 2011), it has been found that, without a proper training on the method, some assessors may have problems with the Napping task. For instance, they might be unable to create a plane sample representation map (Hopfer & Heymann, 2013; Nestrud & Lawless, 2008; Pagès, 2005; Veinand et al., 2011). In order to overcome this limitation efforts have been made to conduct panel training before performing the Napping task, using different approaches. Risvik, Barcenas and their colleagues (Barcenas, Elortondo, & Albisu, 2004; Risvik, McEwan, & Rødbotten, 1997; Risvik et al., 1994) used the example of intercity distances from Kruskal and Wish (1978), and Hopfer and Heymann (2013) took a short training exercise using various shapes differing in colour and size. Besides, earlier works on training of sensory panels for descriptive analysis showed rapid learning in the early confrontations of the panel with the products (Byrne,

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Bredie, & Martens, 1999; Byrne, O'Sullivan, Dijksterhuis, Bredie, & Martens, 2001; Liu et al., 2015). It is therefore suggested to expand the classical Napping protocol (and other perceptual mapping methods) with a simple panel product orientation session. To date, no study has yet investigated the outcome from different training strategies on Napping compared with the classical Napping approach.

Flash Profile (FP) was introduced by Sieffermann (2000) as a variant of Free Choice Profiling (Williams & Langron, 1984), in which the assessors are required to have a comparative assessment of the whole sample set. Assessors are asked to list the sensory characteristics that best describe the differences among the samples and then rank all the samples for each of their individual attribute lists (Dairou & Sieffermann, 2002). FP has already been used for sensory evaluation in many different food product categories, including jams (Dairou & Sieffermann, 2002), dairy products (Delarue & Sieffermann, 2004), hot beverages (Moussaoui & Varela, 2010), lemon iced teas (Veinand et al., 2011), fish nuggets (Albert et al., 2011), and liver pâté (Dehlholm, Brockhoff, Meinert, Aaslyng, & Bredie, 2012). One of the drawbacks of this method is that, since assessors are not imposed on the use of a common vocabulary, the semantic interpretation of FP results can be complex. Besides, if assessors generate a large amount of attributes, the difficulty of ranking samples would increase significantly. The attributes generation step in FP thus plays an important role in the quality of the results obtained with this method. Perrin and Pagès (2009) hypothesised that attributes collected in the context of a holistic sensory task (i.e., Napping or Free Sorting Task) could be more consistent than those obtained in a totally free semantic description. They pointed out that the positioning task could help assessors to get familiar with the sample space. Inspired by this idea, it might be interesting to include Napping as a product familiarisation and attributes generation step within the FP method. Perrin et al. (2008) had already applied a similar approach on white wines, where attributes from the Napping tablecloth were collected prior to running a Free Choice Profiling. In the context of the FP method, this might be a valuable modification to increase assessors' focus on the most important attributes within the sample set. In the present study, we tried to test the outcome of this modification by comparing a classical FP and its modified version.

It should be noted here that, as one of holistic approaches and attribute-based methodologies, Napping and FP have been compared in previous studies using different food products. For instance, Albert et al. (2011) performed a Napping, FP and conventional descriptive analysis on hot served food fish nuggets. They found that FP provided more detailed information about the samples characteristics while Napping tended to summarise the information. Moussaoui and Varela (2010) conducted a Sorting, Projective Mapping, FP and Repertory Grid Method (RGM) on hot beverages, reporting that FP and RGM presented the advantage of producing more relevant and richer descriptions comparing to the holistic methodologies. Dehlholm, Brockhoff, Meinert, et al. (2012) compared Napping, FP and several other methodologies on liver pâtés, and observed that FP had higher discriminability than Napping. However, a limitation of such studies is that most have been carried out on complex food products. Usually, conventional descriptive analysis was used as a benchmark to infer validity, but actual differences among products were unknown. In the present work, we chose to use a model system developed with full control over the sensory differences among samples, both in terms of sensory characters and perceived intensities, in order to more accurately evaluate the performance of the different methodologies.

A last issue to be considered is evaluating the repeatability and accuracy of rapid methodologies. Previous works have been done on this topic by comparing responses from the same assessors to the same sample set in different sessions for the repeatability, or comparing the position of a blind repeated sample on product spaces for accuracy (Ares & Varela, 2014, chap. 14). Several researchers have found that both Napping and FP were repeatable (Dairou & Sieffermann, 2002; Moussaoui & Varela, 2010; Veinand et al., 2011). The FP method has normally been performed in two or three replicates (Dairou & Sieffermann, 2002; Price et al., 2014). On the contrary, it is less prevalent to include replicates for the Napping, and also the use of blind duplicate within the same session has not been extensively used to evaluate this method. Large differences from replicate to replicate in the sample configurations of Napping have been observed in previous studies although overall similarities and differences among samples were constant over repeated sessions (Ares & Varela, 2014, chap. 14; Hopfer & Heymann, 2013; Kennedy, 2010; Mielby, Hopfer, Jensen, Thybo, & Heymann, 2014). Therefore, in this study we looked into the effects of replicate between and within sessions on each of used method.

Overall, the specific objectives of this study were:

(a) to evaluate whether conducting training prior to Napping could enhance the outcome, and to evaluate which type of training (method or product) would give the best results;
(b) to investigate whether a modification could improve the results obtained with the Flash Profile approach;
(c) to compare the performance of Napping and Flash Profile on wine samples with small and experimentally controlled differences;
(d) to evaluate the repeatability of the methodologies between sessions (using measures of configurational similarity) and the accuracy within sessions (using the position of a blind repeated sample).

2. Materials and methods

2.1. Samples

2.1.1. Sample preparation

Model wines were prepared by adding either one of the flavour compounds benzaldehyde, isopentyl acetate or 2-phenylethanol into a plain white wine (Pinot Blanc, 11.5% v/v, Alsace) at two concentrations labelled as 'high' and 'low'. The flavour compounds were of food grade quality and of a high purity (Aldrich, USA). The concentrations were decided based on a series of pre-tests, and verified by a scaling test (Section 2.1.2) in order to make sure the wine samples had small but detectable differences. Two samples – 'benzaldehyde high' and '2-phenylethanol low' – were served as blind duplicates to investigate the performance of the panel. So nine wine samples in total, including a base wine without any addition of flavours, were used for the sensory tests (Section 2.2). The details on the model wine samples are shown in Table 1.

2.1.2. Samples verification

In order to verify the sensory differences between the model wines, a scaling test on the perceived intensities was performed with a sensory panel of ten assessors (three males; mean age = 32 years). This formed a basis for comparison of the Napping and FP evaluations. The scaling test was run in four replicates, in each of which the assessors were asked to rate the intensity of four attributes (almond, banana, rose/floral/spicy, and overall intensity) on unstructured 15-cm scales for each of the seven wine samples (two blind replicates were not tested in this section).