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Polarized Projective Mapping: Comparison with Polarized Sensory Positioning approaches

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ABSTRACT

Holistic methodologies such as Projective Mapping and sorting have gained popularity for sensory characterization of products with both trained assessors and consumers. One of their main disadvantage is that all samples should be simultaneously evaluated in the same session. An alternative to overcome this limitation is to evaluate samples by comparing them with a fixed set of products, as proposed in Polarized Sensory Positioning (PSP). In the present work a combination of Projective Mapping and Polarized Sensory Positioning, called polarized Projective Mapping (PPM), is presented and compared with the two original ways of performing PSP (scale based and triadic-PSP), in terms of conclusions regarding differences between samples and difficulty for consumers. Nine orange-flavored powdered drink samples (including one blind repeated sample) were evaluated by three groups of 45 consumers using PSP, triadic-PSP and PPM using a between-subjects design. Although the three methodologies provided similar sensory spaces, some differences were identified in terms of discriminative ability, conclusions regarding similarities between samples and perceived difficulty. Polarized Projective Mapping seems to be an interesting approach that combines the advantages of Polarized Sensory Positioning and the holistic character of Projective Mapping, providing the possibility of comparing samples evaluated in different sessions.

1. Introduction

Sensory characterization has been traditionally performed with trained assessors, who objectively evaluate the sensory properties of products (Stone & Sidel, 2004). The most used technique is Quantitative Descriptive Analysis (QDA), which involves the selection, training and maintenance of a panel usually composed of 8–20 assessors (Lawless & Heymann, 2010). This methodology provides detailed, reliable and reproducible information even when small differences among products are considered (Murray, Delahunty, & Baxter, 2001).

This approach has several disadvantages related to the time and resources needed for its implementation, particularly when working with complex food products (Varela & Ares, 2012). Selecting and training the assessors is in some cases a problem for companies which need to develop new products in short time frames. Besides, panel training can be difficult for small food companies which usually cannot afford its associated costs, and it could even mean a significant investment for big companies if several panels are required for evaluating a wide range of products. Another disadvantage of QDA is that sensory characterization is obtained from highly trained assessors who could perceive and describe the sensory characteristics of the products differently from consumers. In this context, new methodologies for sensory characterization which have been reported to be quick and versatile and can be used with consumers, semi trained and trained assessors have gained popularity in the last decade (Valentin, Chollet, Lelièvre, & Abdi, 2012; Varela & Ares, 2012).

Projective Mapping or Napping® is a projective method which provides information about the overall similarity and dissimilarity among a set of products (Risvik, McEwan, Colwill, Rogers, & Lyon, 1994). This method collects a bi-dimensional map from each assessor in a single session (Risvik, McEwan, & Rodbotten, 1997). Assessors are asked to try the samples and to locate them in a sheet of paper according to their differences and similarities using their own criteria. As in any projective technique, the idea is to have a vague task which is not well defined, in order to get a simple and spontaneous response (Risvik et al., 1994). When information about the sensory characteristics responsible for differences between samples is required, assessors are asked to write down comments to describe each sample or groups of samples (Pagès, 2005; Perrin & Pagès, 2009). This methodology has been applied for sensory characterization of various food products including chocolate (Risvik et al., 1994), commercial dried soup samples (Risvik et al., 1997), snack bars (King, Cliff, & Hall, 1998), ewe milk cheeses (Bárcenas, Pérez Elortondo, & Albisu, 2004), citrus juices

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(Nestrud & Lawless, 2008), wines (Perrin & Pagès, 2009), hot beverages (Moussaoui & Varela, 2010), milk desserts (Ares, Deliza, Barreiro, Giménez, & Gámbaro, 2010), orange-flavoured powdered drinks (Ares, Varela, Rado, & Giménez, 2011), fish nuggets (Albert, Varela, Salvador, Hough, & Fiszman, 2011), ice tea (Veinand, Godefroy, Adam, & Delarue, 2011) and liver pâté (Dehlholm, Brockhoff, Mejnert, Aaslyng, & Bredie, 2012b).

The main disadvantage of this methodology is that all samples should be simultaneously evaluated in the same session. This limits the number of samples that can be characterized, particularly when considering products that require careful temperature control or that have intense and persistent sensory characteristics. Moreover, unlike characterizations obtained with QDA, results from sensory characterizations from Projective Mapping performed in different moments in time cannot be compared. A solution for these problems has been proposed by Teillet, Schlich, Urbano, Cordelle, and Guichard (2010), through the development of Polarized Sensory Positioning.

Polarized Sensory Positioning (PSP) is a reference-based methodology for sensory characterization which consists on the comparison of samples with a fixed set of products called poles. Although this methodology was developed by Teillet et al. (2010) to explore the sensory characteristics of water using 15 trained assessors, this technique could also be used with semi trained or naïve consumers. There are two main ways of performing a PSP task. The first alternative is to ask assessors to quantify the overall difference between each sample and the poles using unstructured scales ranging from "exactly the same" to "totally different". In a second option, called triadic-PSP, assessors are asked to which of the poles each sample is the most similar and to which is the least similar. Despite its potentialities, only two applications of PSP have been reported (Chrea, Teillet, & Navarro, 2011; Teillet et al., 2010). The main disadvantage of this methodology is that descriptive information about the sensory characteristics of the samples is only obtained relative to the poles. Also, the fact that assessors are just comparing samples "one to one" and putting them on a scale, even if they can describe the differences in a second step, could mean that the cognitive process used to evaluate samples might potentially limit the obtained description.

In this context, the aim of this study is to present a combination of Projective Mapping and Polarized Sensory Positioning, called polarized Projective Mapping (PPM) and to compare it with two other ways of performing Polarized Sensory Positioning (PSP) in terms of conclusions regarding similarities and differences between samples and difficulty for consumers.

In Polarized Projective Mapping (PPM) assessors are asked to locate a set of samples on a sheet of paper in which 3 reference samples or poles have been previously located. Assessors are asked to try the three poles and each sample; to place each of the samples in the sheet according to its similarities and differences between the sample and each of the three poles, considering that samples that are placed close to each other are similar and those that are far from each other are different. After they positioned the samples a description of the samples could be obtained in order to understand why samples are similar or different and also to gather information about consumers' vocabulary. This methodology has the advantage of overcoming some of the limitations of both Projective Mapping and Polarized Sensory Positioning, combining their positive qualities. It enables to compare results obtained from different sessions using Projective Mapping, being a holistic projective technique that does not rely on the use of scales. Besides, unlike traditional Polarized Sensory Positioning it allows to get verbal descriptive information about the sensory characteristics of the product and not a descriptive comparison between the samples and the reference products. The hypothesis is, that being a holistic evaluation, not restricted to scales but with the freedom of putting the samples in a two-dimensional space, and with the description not cognitively limited to a comparison, the obtained results would be both stable (more "absolute", permitting between session comparisons) and thorough (from the holistic assessment).

2. Materials and methods

2.1. Preliminary study: selection of the poles

2.1.1. Samples

Fourteen different commercial brands of orange-flavored powdered drinks, all of them available in the Uruguayan market were initially considered. A description of the samples, in terms of market positioning and main characteristics is provided in Table 1. Although the powdered drink category is generally targeted to low and medium income groups of consumers, a classification in economy, medium and premium products can be done taking into account the quality and the prices of the products at the time of the study, as well as market positioning data (Varela, Ares, Giménez, & Gámbaro, 2010).

Samples were prepared by diluting the powders in tap water as recommended on the package by the manufacturer. They were stored in a fridge at 15 °C, until they were served to consumers, within 4 h. Samples (50 mL) were served in plastic glasses, coded with random 3-digit numbers.

2.1.2. Preliminary study: selection of the poles

Projective Mapping was used to get a sensory map of the powdered drinks and to select appropriate poles and the sample set for the PSP tasks. The study was carried out with 42 consumers, recruited from the University campus based on their availability and interest to participate (ages ranging from 18 to 52, 40% male and 60% female).

Consumers were asked to try the 14 samples and to place them on an A3 white sheet (60 cm × 40 cm), according to their similarities or dissimilarities. Consumers were asked to complete the task using their own criteria and that there were no right or wrong answers. Additionally, it was explained that two samples close together on the sheet corresponded to very similar samples and that if they perceived two samples as very different they had to place them very far from each other. For each consumer map, the X and Y coordinates of each sample were determined, considering the left bottom corner of the sheet as the origin of coordinates.

The test was carried out in a sensory laboratory that was designed in accordance with ISO 8589 (ISO, 1988). Evaluations were performed under artificial daylight type illumination, temperature control (between 22 and 24 °C) and air circulation. Mineral water was available for rinsing between samples.

2.1.3. Data analysis

The data obtained from the sheets of consumers as X and Y coordinates was analyzed using Multiple Factor Analysis (MFA), as suggested by Pagès (2005). MFA was performed considering the coordinates of each consumer as a separate group of variables.

2.2. Polarized Projective Mapping and Polarized Sensory Positioning

2.2.1. Samples

Eight orange-flavoured powdered drinks were selected based on results from the preliminary study: samples A–H (c.f. Table 1). Three poles were selected for the study: samples F, G and H. The poles were repeated among 9 samples which included a blind repeated sample (samples B and B1). Samples were prepared as described in Section 2.1.1.