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Exploring consumer product profiling techniques and their linkage to a quantitative descriptive analysis

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ABSTRACT

Consumer's voice is crucial for new product development. One way to capture it is to ask consumers to describe products and to quantify their perception of this description. In this context four profiling methods; sorting, projective mapping, flash profile and repertory grid method (RGM) were explored among target consumers of hot beverages in two European countries (UK and France) with the assumption that meaningful sensory descriptors can be generated and quantified, and that product maps can ultimately be drawn. A quantitative descriptive analysis was also performed with a trained panel and its outcomes were used as a basis for comparison. Results showed that consumers were able to describe and quantify product differences, that their perception was similar on a cross-country level, that trained panel maps translated well consumers' description, and that flash profiling and RGM were more suitable for such a task as they generate a rich vocabulary and more accurate maps. However, when describing complex attributes as mouthfeel or afterfeel, the consumers' description was not enough detailed or not consensual.

1. Introduction

Sensory evaluation can be seen as a link between research and development, with a focus made on technical aspects of food, and consumer and marketing research, with a focus on consumers' behaviour and psychology (Dijksterhuis, 1997). They measure the reaction to stimuli resulting from the use or consumption of a product through analytical and/or affective tests. Traditionally, analytical tests (discriminative and descriptive) are performed with trained panels whereas affective tests are run with consumers (Stone & Sidel, 1993).

QDA(R) method is based on the principle of a panellist's ability to verbalize perceptions of a product in a reliable manner; panellists are screened and trained in attribute recognition and scaling, they use a common and agreed sensory language, and products are scored on repeated trials to obtain a complete, quantitative description (ASTM, 1992). Describing the sensory characteristics of products has been an integral part of the food and beverage industry since long ago. Information obtained from the description of the sensory characteristics of food and beverages enable companies to make more informed business decisions (Stone & Sidel, 1993). Sensory profiling of a product can guide product development teams on what to change to match the consumer's desired sensory profile, to get closer to a benchmark, to detect detailed differences created by a change of an ingredient, etc.

The hypothesis that consumers are able to accurately describe products is more and more managed within the sensory science community. A first step in the development of effective techniques was the exploration of some methods like repertory grid method, or the emergence of new ones as sorting, projective mapping (known also as Napping®) or flash profiling. Several researches have already used these methods and focused on their validation with panels who have received different levels of training (Faye et al., 2004; Nestrud & Lawless, 2008; Perrin et al., 2008) but not much was done to assess the comparative applicability of all this methods with the use of naïve consumers panels.

The sorting task aims to detect meaningful sensory characteristics within pairs of samples that explain similarities and dissimilarities within the investigated sample set. The method was applied to various sorts of products: breakfast cereals (Cartier et al., 2006), plastic pieces (Faye et al., 2004) and beers (Chollet & Valentin, 2001) to mention a few. It consists of sorting products into groups according to their similarities. The method has the

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advantage that it can be applied to a large sample set but it often needs to be completed by a verbalization task in order to describe the groups formed and to explain the dimensions of the resulting perceptual map (Popper & Heymann, 1996).

Projective mapping, and its variant Napping®, are profiling methods that were developed (Pagès, 2005; Risvik, McEvan, Colwill, Rogers, & Lyon, 1994) in order to collect an Euclidian configuration for each assessor in a single sensory session. Samples, simultaneously presented, are positioned by each assessor on a tablecloth or a blank paper according to the differences/similarities (sensory distances) present between them in such a way that the smaller the distance separating two samples, the more similar they are (Perrin et al., 2008). The positioning criteria and their importance are chosen on an individual basis by each assessor, which makes projective mapping a flexible and spontaneous procedure.

Data are entered as position coordinates (x and y, with an origin that can be placed anywhere (Perrin et al., 2008) and the judgments of the assessors are equally taken into account. However, the number of samples presented should be limited to sets of 10–20 samples in order to limit fatigue or adaptation (Schifferstein, 1996). Similarly to sorting, projective mapping does not describe the product itself and needs to be completed with either instrumental or sensory data (Pagès, 2005) or with a verbalization task to better understand the perceptual dimensions.

Flash profiling was defined by Sieffermann (2000, 2002) as a combination of free-choice profiling with a comparative evaluation of the product set. It is a flexible method meant to position products rapidly according to their sensory attributes. It proved to be as satisfactory as conventional profiling when products are very different in terms of sensory attributes (Dairou & Sieffermann, 2002). However, when the tested products belong to the same product category or to similar product categories, flash profiling appears to be more discriminating than conventional profiling (Delarue & Sieffermann, 2004).

The repertory grid method (RGM) is based on the theory of personal construct psychology developed (Kelly, 1955). It associates meanings with products as bipolar constructs and results in a broad picture of how decisions are taken (Russel & Cox, 2004). For an example an assessor can be given three drinks and he/she may say that two of them are fruit-based while the third one is a dairy drink. 'fruit-based drink" is a construct in this context. In general, RGM is conducted in two sessions. The first one is dedicated to the attribute generation where products are presented in triads to the assessors who are asked to differentiate 2 samples from a third within each triad and explain why. The second session is a rating session in which samples are given scores for each of the elicited attributes. Assessors can also be asked to define a scale to quantify each perceived construct (attribute). This way, each assessor builds his/her own attributes and scales which are then used as in free-choice profiling (FCP), in order to obtain a configuration of N objects in K dimensions (William & Langron, 1984).

The objectives of this study were, (a) to prove whether naïve consumers are able to describe hot beverages and generate relevant attributes by four descriptive methods: sorting, projective mapping, flash profiling and repertory grid method; (b) to compare the consumers' description of the same sample set in 2 countries of the EU: the United Kingdom and France, looking at the influence of the language in the description; (c) to critically compare the applicability of the four methods and to correlate the outcomes to a trained consumer panel description via quantitative descriptive analysis.

2. Material and methods

2.1. Sample set

A sample set of 8 hot beverages (seven samples plus one of them repeated), was used to perform the four descriptive methods. In the quantitative description by the trained panel (QDA), all of the 7 samples were evaluated by duplicate. The 7 products were selected in order to cover a wide flavour space, with distinctive sensory properties.

2.2. Sample preparation and serving designs

The drinks were served warm (at 70–75 °C) immediately after preparation, in 3-digit coded paper cups. Tasting evaluation was performed in individual booths, under white light and at room temperature. Samples for sorting, projective mapping and flash profiling were delivered to consumers in the three cases all at once, to be compared. In session 1 of the repertory grid method (RGM) samples were presented to consumers in 3 triads were the samples were rotated, to avoid position and carry over effects, using a presentation design following a MOLS design (multiple orthogonal Latin squares). For the second session of the RGM and the quantitative descriptive analysis, samples were presented sequentially, following a Latin square design.

2.3. Panels

2.3.1. Trained panel

A panel of 11 trained assessors tasted and described the same sample set as the consumers did. Panellists were trained in the assessment of the category of products, varying in tasting experience from 1 to 15 years.

2.3.2. Consumer panels

Sorting, napping, flash profiling and repertory grid methods were tested using a different panel of 24 naives consumers each, who were recruited by a recruiting agency according to the following screening criteria: frequent consumers of the category in study (hot beverages), not rejecters of milk or sugar, ages between 18 and 65, 50% males, 50% females.

At the end of each tasting session, the consumers were asked to fill in a feedback form and answer questions related to the understanding, ease and time-effectiveness of each profiling method they used.

2.4. Profiling methods

2.4.1. QDA

Samples were completely rotated and 2 repetitions were completed. The evaluation proceeded in 3 sessions of 2 h each:

- Session 1 – Training: Samples were presented to the panellists in pairs. A list of 42 attributes corresponding to the hot beverage product category was used for the assessment. In this step the panellists rated the pair of samples perceived intensities on 150 mm closed-end unstructured scales. This task informed about whether an attribute was perceived by the panellists, and allowed assessing the degree of consensus in the ratings. If discrepancies in attributes or ratings were detected, an open discussion was prompted, in order to arrive to a consensus. Attributes selected for the data collection step were the ones utilized by at least half of the panel (23 attributes in total).
- Sessions 2 & 3 – Sensory evaluation & repetition: Samples were presented to the panellists in a sequential monadic way following a Latin square design generated by Fizz (FIZZ 2.40B, Biosystems, France). They entered their intensity ratings by logging in a FIZZ QDA session built for 7 products and including the 23 selected attributes, using closed-end unstructured 150 mm scales displayed on computer screens. *Session 3*: was a repetition of Session 2 in order to check the performance of the panel as well as the reproducibility and attribute interactions as used by the panellists.