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Comparison of methods for generating sensory vocabulary with consumers: A case study with two types of satiating foods

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ABSTRACT

Understanding consumers' sensory vocabulary can help to identify the most relevant characteristics for liking and reduce the differences with descriptions provided by trained panels. The present study compared three methods for generating sensory vocabulary with consumers: repertory grid (RG), comparison of the sample set (CW), and individual sample description (ID). A consumer study was carried out with two groups of 90 participants, randomly divided into 3 subgroups ($n = 30$) which evaluated one of the two types of satiating product (chocolate-flavoured shakes and biscuits) using one of the three methods to generate sensory vocabulary. The methods differed in their ability to encourage consumers to verbalize their sensory perception in detail, and also in the total number of terms generated and the frequency with which consumers generated some terms. The lowest number of terms, at both individual and aggregate level, was elicited when consumers described similarities and differences in the whole sample set. However, the most frequent terms were similar in the three methods, indicating their convergent validity. Results from the present work suggest that ID and RG are preferable to CW. Considering practical aspects related to their implementation, ID shows advantages over RG for identifying the consumers' vocabulary without seriously compromising data quality. Texture attributes, which have been related to satiating capacity, were frequently mentioned to describe the evaluated products. Terms related to viscosity were the most frequently elicited, whereas varied textural features were mentioned for biscuits.

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1. Introduction

Sensory lexicons or vocabularies are sets of words that describe the sensory characteristics of food products. Beyond their academic interest, they are useful for the industry in research and development, manufacturing and marketing (Lawless & Civille, 2013). Standardised sensory vocabularies are usually developed with experienced sensory assessors who generate terms, which are accurately defined and usually associated with references (ASTM, 2011; Drake & Civille, 2003).

Although standardised vocabularies allow accurate description of the products and facilitate communication across different panels and companies, they do not always reflect how consumers would describe the products (Lawless & Civille, 2013). Experts and trained assessors tend to use more precise, specific and technical terms than consumers (Chollet & Valentin, 2001; Guerrero, Gou,

& Arnau, 1997; Hayakawa et al., 2010; Lawless, Vanne, & Tuorila, 1997; Solomon, 1990). A better understanding of consumers' sensory vocabulary can help to identify which characteristics are most relevant for liking and to reduce the differences with descriptions provided by trained panels (Carr, Craig-Petsinger, & Hadlich, 2001). This approach can also be useful for improving communication with non-technical staff and to design marketing and communication strategies which rely on sensory information (Lawless & Civille, 2013; Swahn, Öström, Larsson, & Gustafsson, 2010). Providing information about the sensory characteristics of products has been reported to improve consumers' expectations and purchase intention and has been used increasingly by food companies (Nuessli Guth & Wagner, 2009; Smith, Møgelvang-Hansen, & Hyldigc, 2010; Wansink & Painter, 2001).

Sensory perception is often difficult to describe since it requires expressing sensations using words (Swahn et al., 2010). Vocabulary generation methods aim to elicit sensory terms stored in consumers' minds that are relevant for describing the specific product category (Steenkamp & van Trijp, 1997). Different methods have

been used for generating sensory vocabulary with consumers, including focus groups (McNeill, Sanders, & Civille, 2000), description of a set of samples (Mcewan, Colwill, & Thomson, 1989; Piggott & Watson, 1992), repertory grid (Hersleth, Berggren, Westad, & Martens, 2005; Jaeger, Andani, Wakeling, & Macfie, 1998; Swahn et al., 2010) and descriptions of individual samples using open-ended questions (Ares, Giménez, Barreiro, & Gámbaro, 2010; Symoneaux, Galmarini, & Mehinagic, 2012; ten Kleij & Musters, 2003). The present work focuses on the last three methods.

In the Free Choice Profiling or Flash Profile method (Dairou & Sieffermann, 2002; Williams & Langron, 1984), consumers are presented with a set of samples that represents the main variations in the sensory characteristics of a group of products and are asked to describe the samples or the differences among them (Tárrega & Tarancón, 2014). Some authors have reported that the assessors can find it difficult to describe their perceptions in words and to generate a large number of sensory terms (Mcewan et al., 1989; Piggott, Sheen, & Apostolidou, 1991).

The repertory grid method has been proposed as a more structured and systematic approach that makes it easier to generate vocabulary (Thomson & McEwan, 1988). It is based on Kelly's clinical–psychological Theory of Personal Constructs (Kelly, 1955). In this technique, products are arranged into triads (groups of three) and presented to participants in such way that two of the objects within the triad are arbitrarily grouped and separated from the third (Gains, 1994). Consumers are asked to describe how the two grouped objects are similar to each other and different from the third (Kelly, 1955). The main disadvantage of this approach is that consumers can find it difficult to understand and tedious (Ryle & Lunghi, 1970). It has also been reported to be more difficult to implement and more time consuming than describing a whole sample set (Mcewan et al., 1989).

The third approach to generating sensory vocabulary used in the present study is to ask consumers to describe the sensory characteristics of individual samples (Ares et al., 2010; ten Kleij & Musters, 2003). In this task, consumers are presented with the samples monadically and are asked to write down all the terms that describe their sensory characteristics (Symoneaux & Galmarini, 2014). The main advantage of this approach is that it is easy to understand for consumers and easy to implement for sensory researchers.

The aim of the present work was to compare the performance of these three methods for generating sensory vocabulary with consumers (description of the whole sample set, repertory grid and individual sample description) in a case study with two types of satiating foods: chocolate-flavoured shakes and biscuits. The quality of the vocabularies generated by the three methods was compared in terms of the number of elicited attributes and the insights they provided regarding the sensory characteristics of the samples. The level of abstraction and articulation of procedures for attribute elicitation methods have been considered key elements for their performance (Steenkamp & van Trijp, 1997). In this sense, sensory vocabularies should contain terms that relate to concrete and specific sensory characteristics that fully describe the product category of interest.

Food products with enhanced satiating capacity are increasingly being sold worldwide (Halford & Harrold, 2012). These products have filling effects that can be used as a way to control hunger and prevent weight gain, when combined with a healthy life style (Tárrega, Martínez, Vélez-Ruiz, & Fiszman, 2014). Apart from influencing consumer acceptance, the sensory characteristics of this product category affect the perception of its satiating capacity (Hogenkamp, Stafleu, Mars, Brunstrom, & de Graaf, 2011; Yeomans & Chambers, 2011) which, combined with its composition, will ultimately determine its effect on appetite control

(Chambers, McCrickerd, & Yeomans, 2015). Adding ingredients to enhance satiating capacity normally introduces changes in the sensory characteristics of the products that can lead to unpleasant sensations (Marcano, Ares, & Fiszman, 2015). The potential effects on consumer expectations of lowering the fat or sugar content are familiar and easy to predict, since there is a wide range of such products on the market. However, the expectations elicited by new food categories such as products with satiating capacity are not so straightforward. For this reason, understanding how consumers perceive the sensory characteristics of satiating products is essential for the development of successful food products within this new category (De Graaf, 2012; Yeomans, McCrickerd, Brunstrom, & Chambers, 2014). In this sense, the present work identifies the sensory characteristics consumers rely on when evaluating two exemplar products within this wide category: biscuits and shakes.

2. Materials and methods

2.1. Samples

Chocolate-flavoured shakes and biscuits available on the Spanish market were chosen for the study. Six samples of each product category that showed "satiating effects" information on their labels were selected.

Skimmed milk ($8 \pm 1 \,^\circ$C) was used to make up the chocolate-flavoured shakes as instructed on the package, 30 min before testing. The shakes (50 mL) were presented in 80-mL plastic cups coded with a three-digit number.

The biscuits were stored in their own packages at room temperature in a dry place until the sensory test. One unit was served on a plastic plate, coded with a three-digit number. Still mineral water was available for rinsing the palate between samples, but this was not enforced.

2.2. Participants

Two groups of 90 participants (aged between 18 and 64 years, 60% female) were recruited at Valencia University, the Polytechnic University of Valencia and the Institute of Agrochemistry and Food Technology, using advertisements, flyers and e-mails. The only requirements for recruitment were being a consumer of the target products (chocolate-flavoured shakes and biscuits), at least occasionally, availability and willingness to participate. The groups were randomly divided into 3 subgroups ($n = 30$). Each group assessed one type of product (chocolate-flavoured shakes or biscuits), with each subgroup using one of the three methods to generate sensory vocabulary. The groups did not significantly differ in their gender and age distribution ($p > 0.38$).

2.3. Vocabulary generation

The consumers were told that the samples were sold as "satiating shakes" or "satiating biscuits". Three methods were used to generate sensory vocabulary for each type of product.

2.3.1. Repertory grid (RG)

The samples were arranged into all the possible triads (C_6^3). Each participant received three of the triads (biscuits or milkshakes), according to the procedure described by Thompson and Mc Ewan (1998), and performed a three-step assessment of each. In the first step they were asked to observe and taste the samples and to write down the sensory characteristics that they thought two of the samples of a given triad (A–C) had in common (A and B), then the