



Check-all-that-apply (CATA) questions for sensory product characterization by consumers: Investigations into the number of terms used in CATA questions



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ABSTRACT

In recent years methodological research into application of CATA questions has gained momentum. Yet, key questions for this approach remain unaddressed – how to generate the sensory terms that populate CATA questions and how many terms should be used. The second of these questions was addressed in seven consumer studies, involving a total of 735 consumers and five product categories (crackers, cheese, fruit-flavored drinks, chocolate, milk desserts). Sensory product characterizations elicited with “short” and “long” CATA questions (10–17 terms vs. 20–28 terms) were compared on a number of criteria such as frequency of CATA term use, product differences, spatial configurations (samples and terms) and task perceptions. Two strategies for generating “long” lists of CATA terms were examined: adding synonym terms to those already featuring on the “short” list (e.g., ‘hard’ and ‘firm’), and adding antonym terms to those already featuring on the “short” list (e.g., ‘hard’ and ‘not hard’ or ‘natural’ and ‘artificial’). Between-subjects experimental designs were used to compare product characterizations from “short” and “long” CATA questions. Results revealed that “short” and “long” lists of CATA terms generated largely similar results. In general, sample configurations were very similar, as were task perceptions. However, there were, at times, differences in frequency of CATA term use and term configurations, as well as instances where conclusions about sample differences depended on whether “short” or “long” CATA lists were used. Additionally, here was some evidence that CATA questions with “long” lists of synonym or antonym terms may cause a “dilution” effect of the responses. This fits expectations of idiosyncrasy in consumer perception/expression of sensory stimuli, but may be associated with reduced discriminatory ability of the CATA question. How to best balance these opposing considerations is deserving of further investigation.

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1. Introduction

Consumer-based methods which deliver sensory product characterizations are gaining popularity (Varela & Ares, 2012). Check-all-that-apply (CATA) questions are a structured question format in which respondents are presented with a list of terms and asked to select all those that apply to the focal sample.

Methodological investigations involving CATA questions, which help to determine pros and cons of this question format, have to date focused on implementation and data analysis (Ares, Antúnez, et al., 2014; Ares, Etchemendy, et al., 2014; Ares & Jaeger, 2013; Ares, Jaeger, et al., 2013; Ares, Tárrega, Izquierdo, &

Jaeger, 2014; Jaeger, Chheang, et al., 2013; Jaeger, Giacalone, et al., 2013; Lee, Findlay, & Meullenet, 2013; Meyners, Castura, & Carr, 2013). Yet to receive significant attention are the important questions of how to select the terms to be included in CATA questions and how many terms should be used. Focusing on the second of these questions, the present research consists of a first contribution to closing of this knowledge gap.

Using CATA questions composed of a large number of terms can provide a complete description of the sensory characteristics of the focal samples. The relevance of long lists of terms pertains to idiosyncrasy in consumer perception and expression of sensory sensations, and ability to capture nuances in similarities and differences between the focal samples. Idiosyncrasy in consumer vocabularies is widely acknowledged and explicitly captured in methods such as free-choice profiling (Williams & Langron, 1984). For example, for

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apples, some consumers use the term ‘mealy’ to describe a mostly undesirable textural characteristic, while other consumers use terms such as ‘spongy’, ‘dry’, ‘coarse’ and ‘floury’ to express similar sensory sensations (Andani, Jaeger, Wakeling, & MacFie, 2001).

In addition, long lists of terms can include focal terms and their antonym (e.g., ‘sweet’ and ‘not sweet’), which could help test administrators to check the validity of consumers’ responses to CATA questions. Uncertainty over the meaning of unchecked terms has been highlighted as a weakness of CATA questions. Participants can leave a term unselected because it does not apply to the product, because they overlooked it or because they were neutral or undecided about its applicability (Sudman & Bradburn, 1982). Therefore, the inclusion of antonyms could be used to determine what it means when CATA terms are left unchecked and identify consumers who check both a term and its antonym (possibly with a view to removing them from the data set due to inattention).

One of the main advantages of CATA questions is that consumers perceive the task as easy and not tedious to complete (Ares, Jaeger, et al., 2013; Jaeger & Ares, 2014). However, by increasing the length of the list of terms included in the CATA question the perceived ease of the task can decrease and its tediousness can increase, compromising attention to the task. For this reason, long lists of terms can encourage satisficing response strategies, leading consumers to select the terms that easily catch their attention without thinking deeply about the sensory characteristics of the samples (Krosnick, 1999; Krosnick & Alwin, 1987; Rasinski, Mingay, & Bradburn, 1994).

Against this background, the aim of the present work was to evaluate the influence of the number of terms used CATA questions on results from sensory product characterizations by consumers. Considering the lack of past research addressing this question an explorative research strategy was implemented, applying different strategies to CATA list generation, and testing these across several product categories where the degree of differences between samples varied from “small” to “large”. This strategy was deemed appropriate for an initial exploratory study and expected to yield directions for future research. The empirical work consisted of seven consumer studies and in each of these studies responses from CATA questions that were “long” (20–28 terms) were compared to responses from CATA questions that were “short” (10–17 terms). The lists of terms did not largely differ in the sensory modalities they included, but in the number of terms related to each of these dimensions. Drawing on research strategies previously employed in methodological research relating to CATA questions (e.g., Ares, Etchemendy, et al., 2014; Ares & Jaeger, 2013; Ares, Jaeger, et al., 2013; Ares, Antúnez, et al., 2014; Ares, Bruzzone, et al., 2014; Ares, Tárrega, et al., 2014; Jaeger, Giacalone, et al., 2013) sensory product characterizations obtained with CATA questions of different length were compared with respect to: (i) frequency of CATA term selection, (ii) sample discrimination, (iii) sample and term configurations, and (iv) consumers’ task perceptions.

2. Materials and methods

Across seven studies, a total of 735 consumers took part (Table 1). Studies 1–4 compared “short” CATA questions with “long” CATA questions, where the latter had been generated by adding synonym terms to the “short” list¹. Studies 5–7 compared “short” CATA questions with “long” CATA questions, where the latter

had been generated by adding antonym terms to the “short” list. A range of product categories were studied, in which differences between samples ranged from “small” to “large” as qualitatively assessed by the authors based on previous experience with the product category. In all studies, a between-subjects experimental design was used to compare product characterizations from the “short” and “long” CATA questions.

2.1. Participants

The consumer studies were conducted in Auckland (New Zealand) and in Montevideo (Uruguay), each with 99–135 participants (Table 1). In New Zealand, participants were registered on a database maintained by a professional recruitment firm and were screened in accordance with eligibility criteria for each of the studies (incl. product consumption/liking). In Uruguay, participants were recruited from the consumer database of the Food Science and Technology Department of Universidad de la República, based on their consumption of the focal products. Participants gave informed consent and were compensated for their participation.

Participants were aged between 18 and 60 years old and the percentage of female participants ranged from 38% to 68%. The consumer samples comprised varying household compositions, income levels, education levels, etc., but were not necessarily representative of the general populations in Montevideo and Auckland.

2.2. Samples

Five product categories were tested (Table 1). All samples in Studies 1, 3–7 were commercially available in Uruguay or New Zealand and had been purchased from local supermarkets. In Study 2 six samples of vanilla milk desserts were formulated with different sugar, modified starch and vanilla flavor concentrations.

In accordance with the explorative research strategy, and contributing to ability to generalize findings from the research, the products in each study were selected to be more/less similar. Based on past experience and trained assessors’ data, the authors made qualitative assessments in this regard, classifying each study as including samples with “small”, “medium” or “large” differences (Table 1).

Serving sizes were always sufficient to allow 2–3 bites/sips per sample. The milk desserts and the powdered drinks were presented at 10 °C, while all other samples were presented at room temperature. Odor-free plastic containers were used as serving vessels. Spoons were presented with milk desserts and toothpicks with cheese samples.

2.3. Experimental treatments, sensory terms and data collection

2.3.1. Experimental treatments

A between-subjects experimental design was used to evaluate the influence of list length on sensory product characterizations obtained using CATA questions. Consumers were randomly assigned to one of two possible experimental treatments. One experimental treatment was “short” CATA lists, meaning that the number of terms in this list was less than the number of terms included in the other experimental treatment (i.e., the “long” list). The terminology of “short” and “long” lists used in this paper is relative, and not intended to convey information about actual number of terms that define such lists. The fact that the actual number of terms on “short” and “long” lists varied (10–17 terms and 20–28 terms, respectively), and that some “long” lists were relatively longer than others (Table 1), was appropriate for the exploratory strategy adopted in this research and, furthermore, it contributed to ability to generalize findings from the research.

¹ The classification of terms added to “short” lists to create “long” lists as either synonym or antonym is intended to provide a conceptual framework and clarity in communication. It is used throughout the paper despite a few instances where terms that were neither synonyms nor antonyms, but new minor additional sensory features, were used (e.g., bitter in Study 1).

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