A comparison in five diverse countries of commonly used consumer survey question formats: Check-All-That-Apply (CATA), Check-All-Statements (CAS), Rate-All-That-Apply (RATA) and Rate-All-Statements (RATING)

by

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AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

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Abstract

Recent rapid advances in information technology and improved access to affordable internet across almost all countries have contributed to the increased use of online or web surveys in consumer research. Online surveys are a fast, low-cost, and far-reaching option for collecting responses from consumers. However, similar to other survey methods, online surveys are characterized by survey errors such as coverage error, sampling error, nonresponse error, and measurement error which influence the quality of response data. This research focused on measurement error and in particular the effect of question formats on consumers' online survey responses. Some authors have pointed out problems with using certain question formats. Therefore, the purpose of the current writing was to gain more understanding and differentiation in the characteristics of response data that are collected using four question formats that are commonly used in online surveys. The four question formats that were investigated included: the Check-All-That-Apply (CATA), Check-All-Statements (CAS) (yes/no), Rate-All-That-Apply (RATA), and Rate-All-Statements (RAS) or simply RATING. With CATA, respondents select all terms or statements that apply from a given list, while, with CAS, respondents must respond (e.g., yes/no or agree/disagree) to each term or statement to show that it applies or does not apply. For RATA, consumers select all terms or statements that apply from a given list and then continue to rate those selected based on how much they apply. With Rate-All-Statements (RATING), a widely used standard format for testing, consumers are asked to rate all terms or statements according to how much they apply.

Consumer motivations for eating items that belong to five food categories (dairy, desserts, fruits, protein-rich, starch-rich foods) were assessed in this study. Also, survey versions for each of the four question formats were fielded in five countries: Unites States of America (in English),

India (in Hindi or English), China (in Mandarin Chinese – Simplified), Brazil (in Portuguese), and Spain (in Spanish).

Results showed that fewer "apply" responses were noted and lesser discrimination occurred among attributes (in this case eating motivations) or product categories when CATA was used instead of CAS across all five countries. However, fewer incomplete responses were collected and respondents' liking of the survey experience was higher when CATA was used. Similarly, fewer "apply" responses were found and lesser discrimination occurred among attributes or product categories when RATA was used instead of RATING across all five countries. However similar to CATA, when RATA was used, mean scores for attributes were higher, there were fewer incomplete responses, and the survey experience was liked more.

Results from comparisons of demographic impacts showed that CAS questions were more discriminating among age groups and between genders than CATA. Also, although there were several similarities in associations between age group and eating motivations and between gender and eating motivations for CAS and CATA response data, some differences in the associations were found and they were inconsistent. Similarly, discrimination among age groups and between genders was higher when the RATING question format was used instead of RATA. Also, mean scores for eating motivations for age groups and gender were more consistent when RATING was used.

The findings of this research suggest that while all four question formats can be used to collect "big picture information", CAS and RATING question formats are better suited for surveys that seek more detailed responses from the consumers. Also, for consumer researchers such as product developers, and sensory scientists, CAS and RATING were found to be more discriminating among product attributes (and among products for RATING). However, surveys with CAS and RATING questions could likely cost researchers more because they require more time to complete than corresponding surveys with CATA and RATA questions respectively.

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Dedication

To Suzan and Karen Seninde

Chapter 1 - Literature Review

1. Introduction

Web or online surveys have become a popular tool for sensory/consumer researchers in recent years (Groves, 2011; Hoonakker & Carayon, 2009; Yeager et al., 2011). In East Asia, North America, and Western Europe, this development can be attributed to the rapid information technology advancements that enabled a faster and lower-cost environment for internet surveys in comparison to other methods (e.g., in-person interviews and telephone interviews) (Lavrakas, 2013). Further, internet surveys have pushed the limits of the number of respondents that can be recruited in a single survey. For example, Castro and Chambers, (2019) fielded a consumer behavior web survey in 13 countries with an average of over 600 consumers in each country. Clearly, this would not be feasible with face-to-face interviews or over the telephone, or via mail. Also, upsides of online surveys such as convenience (i.e., the respondents can answer the survey at their own pace and in their own time), and improvements to survey design (e.g., can include videos, audio clips) helped increase its popularity among both researchers and respondents (Link et al., 2014; Pew Research Center, 2015). However, just like other survey methods, the quality of web surveys is susceptible to survey errors such as coverage error, sampling error, nonresponse error, and measurement error (M. Couper, 2000; Drolet, Schwarz, & Yoon, 2011; Groves, 1989; Hoonakker & Carayon, 2009; Schaeffer & Dykema, 2020).

1.1 Coverage error

Web surveys are a cheaper, faster, and far-reaching (larger numbers of respondents) data collection option. However, web surveys too are susceptible to coverage error or a disconnect between the respondents from whom responses can be collected before sampling (frame population) and the target population (M. Couper, 2000; Groves, 1989). The fact that a proportion of the frame population may not participate in online surveys because they lack access to the internet possesses a notable challenge to inferences made from online surveys. In the USA, for example, access to home internet has been shown to be different in target populations depending on particular demographic factors such as race, household income, level of education, and age (Admnistration, 1999).

1.2 Nonresponse error

Nonresponse error occurs when not all persons included in the sample frame are willing or able to participate in or complete web surveys (M. Couper, 2000; Groves, 1989). This type of error is difficult to compute for cases such as open-access web surveys where the sample frame is not established as compared to web surveys that recruit through established databases (M. Couper, 2000) or electronic mailing lists (Listserv). It is also possible that some of the persons who had started answering the web survey are unable to complete it for several reasons. Couper, (2000) ascribed part of online survey nonresponse error to technical difficulties (e.g., slow internet connectivity or higher internet costs in particular locations, or limited capacity in the use of modern mobile technologies by frame population especially in poor-resource settings). Uncertainty of personal privacy and confidentiality is another explanation why some respondents may not complete answering web surveys. Furthermore, some respondents could choose to abandon the web survey because of boredom, or because they feel answering a particular survey is a tedious process especially for those web surveys that could be perceived as too long. Therefore, consideration of demographics of target respondents, question format, and other survey design features such as mean duration, compatibility with various operating platforms(e.g., iOS, and Android) can improve the quality of online surveys particularly in terms of survey nonresponse rates and efficiency (Link et al., 2014; Ochoa, Coates, Kramer, Bliss, & Vivar, 2021; Warnecke et al., 1997). Also, respondents tend to ignore survey invitations for which incentives or participant payment is considered wanting or not provided for (Ha, Zhang, & Jiang, 2020). Even more, the use of web consumer panels or databases overtime leads to the rise of “professional” respondents who are in it for the payment or incentives which could affect the web survey response quality (Toepoel, Das, & Soest, 2008).

1.3 Sampling error

Web survey errors linked to the sampling process occur when product testing with consumers is conducted on a subset of the frame population (Groves, 1989; Wright & Tsao, 1983). Different subsets of the frame population have varying product characterizations implying that product evaluations and the inferences drawn could vary depending on the particular subset that was assessed. Whereas coverage error is a result of respondents being excluded from the frame population, sampling error occurs during the process of selecting a sample from the frame population (M. Couper, 2000).

1.4 Measurement error

With telephone interviews or in-person interviews, administrators can provide clarifications to confusing sections or terms, check incomplete responses, keep the respondents’ focus on the task however, all this may not be possible with web surveys because they are self-administered studies (Groves, 1989). Also, whereas in-person and telephone interviews are susceptible to an error that is associated with how the interviewers administer surveys which could influence the responses of consumers (interviewer error), web surveys are not. Interviewer error is categorized as part of measurement error which is the difference between the observed consumer responses and their true responses (M. Couper, 2000). Measurement error as it relates to web consumer surveys includes expected error as a result of the survey and systematic error from aspects such as survey design (e.g., question format, question order placement, question-wording, question context, lack of consumer motivation) which could affect the quality of the consumer responses (Clark & Schober, 1992; M. Couper, 2000; Groves, 1989). Albaum et.al, (1982) and Clark and Schober, (1992) recommended the use of simple wording that is clear and can easily and quickly be understood by survey respondents as this ensures that the respondents' understanding of the survey questions is similar to that of the researcher. Some authors have suggested the inclusion of dialog-like explanations in web survey designs to provide more understanding of survey questions as this improves the accuracy of consumers' responses (Conrad, Schober, & Coiner, 2007). Further, the type of question format used in online surveys has been shown to impact the rate of nonresponse in online surveys (Ochoa et al., 2021). Web survey questions are typically organized into three categories, that is, frequency responses, occurrence responses, and intensity responses (Albaum et al., 1982; Schaeffer & Dykema, 2020; Schwarz, 1999).

2. Web survey question formats

2.1 Frequency question formats

Frequency question formats assess the number of occurrences of events within a given period (Schaeffer & Dykema, 2020; Schwarz, 1999). For example, a question may assess the frequency of consumption of a particular product in the last three months. Frequency scales are classified in either absolute or relative categories and cannot be bipolar (Schaeffer & Dykema, 2020). Absolute frequency scales ask respondents to provide either a discrete value (e.g., 5 number of times) or select an answer from alternatives that are provided from an ordered list. Also, the ordered lists for the absolute frequencies can be presented either in groups (e.g., 0-1, 2-3, 4-7,8+) or as different degrees (e.g., never, less than a month, 1-3 times a month, once a week, 1+ times a week) (Diersch & Walther, 2016). On the other hand, relative frequency scales are characterized by an ordered form (e.g., never, rarely, sometimes, often, extremely often) but can also be presented as relative proportional frequencies (e.g., never, less than half the time, about half the time, more than half the time, all the time) (Schaeffer & Dykema, 2020).

2.2 Occurrence question formats (e.g., closed and open responses)

Schuman and Presser Questions (1982) suggested that inferences researchers make from open-ended questions can be different from those based on closed-response survey questions. In consumer research, open-ended questions are often used in explorative studies that seek to understand better the respondents' attitudes such as on new products with "unfamiliar" attributes and on complex research topics. Such questions ask respondents to freely provide their attitudes and feelings and opinions, perceptions, and beliefs on products, unlike closed response questions that restrict respondents to a list of alternatives (Schwarz, 1999). As a result, open-ended questions are more likely to elicit "other" attributes that may not be initially considered by the researcher or provided in a closed-response question format (Pew Research Center, 2008). Conversely, in consumer research, closed-response questions are usually used in routine product testing such as studies involving products in the market and familiar product attributes (Smith, 1995; Sudman & Bradburn, 1982). Also, the percentage of endorsements for listed attributes in closed response questions has been shown to be greater than the corresponding percentage of endorsements that could be categorized under the same attributes for the open-ended questions (Albaum et al., 1982). Two examples of closed response question formats that are usually used in web surveys include the Check-All-That-Apply (CATA) and the Check-All-Statements (CAS).

2.2.1 Check-All-That-Apply (CATA) question format

The use of the Check-All-That-Apply (CATA) or the Mark-All-That-Apply question format as reported by Sudman and Bradburn, (1982) has become popular in consumer research (Gastón Ares et al., 2017; Esmerino et al., 2017; Jaeger, Chheang, Jin, Roigard, & Ares, 2020; Jaeger, Jin, Roigard, Le Blond, & Ares, 2020; Sandvik et al., 2020; Xia et al., 2020). This question format asks respondents to check all items that apply from a list of options. Although the research literature tends to be fairly recent, multiple industries have been using this procedure at least since the early 1980s (Loh & Ennis, 1982; Sudman & Bradburn, 1982). CATA was developed to reduce the fatigue of respondents while they completed a self-administered questionnaire. This tool provides an easy and non-tedious way of collecting multiple responses that are reproducible (Gastón Ares et al., 2017; Jaeger, Chheang, et al., 2020; Jaeger, Fiszman, et al., 2017; Jaeger, Kim, et al., 2017; Jaeger, Swaney-Stueve, et al., 2014). However, the CATA format has been criticized for ambiguity in interpreting the absence of a checkmark on listed options. The unchecked items can be interpreted as those that were not applicable or those for which the respondent was uncertain about the applicability. It is also possible that the respondent did not notice the item(s) as they hurriedly read the list of items or that they only paid attention to the first items or a limited set of items to save time (Gastón Ares et al., 2013; Smyth, Dillman, Christian, & Stern, 2006). Survey research theory suggests that for self-administered surveys (e.g., web surveys), respondents may select the first acceptable response(s) and not pay attention to later responses because it takes too much effort (J. A. Krosnick, 1991). This may particularly be true based on the cognitive elaboration model when the respondent is in visual mode (e.g., reading responses) because the respondent takes more time to consider the first options (Schwarz, Hippler, & Noelle-Neumann, 1992). Ares and Jaeger showed that the order in which items in the CATA question were presented had an impact on the results (Gastón Ares & Jaeger, 2013). For instance, items that appeared in the top left corner of the ballot were checked more frequently as compared to items that were placed at the bottom of the ballot and this consequently affected the total number of responses provided. This suggests that the items seen early in the questionnaire are more likely to be rated as “apply” than those later in the questionnaire. Simply randomizing the terms can reduce the impact of order bias on specific terms, but does not eliminate the problem and exacerbates the impact that order bias has on differences in scoring frequency when attempting to compare consumers or cluster them based on their responses. In a recent study with children, different response patterns were found, suggesting that cognitive impacts are apparent even in CATA questionnaires (Galler, Næs, L. Almli, & Varela, 2020).

2.2.2 Check-All-Statements (CAS) or Yes or No question format

For the Check-All-Statements (CAS) or the forced-choice question format, also known as the yes/no format or sometimes called “applicability scoring”, a respondent is asked to check a “yes” or “no” option (or something similar such as agree or disagree) for each item (Ennis & Ennis, 2013; Rocha, Marche, & Briere, 2013; Schaeffer & Dykema, 2020; Smyth, Christian, & Dillman, 2008; Smyth et al., 2006). Both the CATA and CAS question formats have been used extensively for questionnaires that are designed to be completed by respondents on the web. Although some researchers have shown that both the CAS and CATA question formats provide similar results in terms of outcomes, time, and survey satisfaction, other researchers disagree and suggest otherwise (Jaeger, Cadena, et al., 2014; Nicolaas, Campanelli, Hope, Jäckle, & Lynn, 2015). Fundamentally, the CAS seeks a response (e.g., yes or no) for each item, while the CATA question format requires that respondents only check those that they believe apply (the “yes” response) (Rasinski, Mingay, & Bradburn, 1994). Sudman and Bradburn, (1982), Smyth et al., (2006), and (Neuert, 2017) suggest that respondents pay more attention, read all the items, and provide more thoughtful responses for CAS than CATA questions. CAS has also been shown to result in more detailed responses in terms of a mean number of affirmative checked (“agree” or “apply”) responses per respondent as compared to the CATA format (Jaeger, Swaney-Stueve, et al., 2014; Rasinski et al., 1994; Smyth et al., 2006). This finding is also consistent with behavior survey data conducted in different languages and countries of residence (Thomas & Klein, 2006). However, most of the CATA–CAS comparison studies are public opinion surveys, with only one studying perceptions of food or food behavior. A potential issue with this forced-choice kind of questioning has been associated with acquiescence bias (Smyth et al., 2006). Acquiescence bias is a type of response bias where respondents tend to mark (or agree with) the positive connotation for all survey questions (Knowles & Nathan, 1997). Further, Best and Krueger, (2004) suggested that requiring an answer for each item on a questionnaire could frustrate respondents and could lead to a high number of partial completes as respondents quit the survey before it is completed. Nicolaas et al., (2015) and Smyth et al., (2006) did not find such effects, but they had reasonably short questionnaires of 8–15 questions. Typically, studies in the sensory literature have longer questionnaires than those in general survey studies that have been conducted, which could impact findings (Castro & Chambers, 2019b). Jaeger et al., (2020) showed that respondents found that rating each attribute was “slightly more tedious” than using the CATA format. Perhaps because of that, CAS is popular with telephone surveys but appears to be rarely used with in-person or web surveys for sensory consumer research (Ennis & Ennis, 2013; Smyth et al., 2008).

2.3 Intensity question formats

Cognitive psychologists and other consumer researchers have for long considered the RATING question format as the gold standard for evaluating the importance or applicability of particular attributes to a product or situation (Schwarz, 1999). Both unipolar and bipolar scales (i.e., present different degrees of one attribute and another set of degrees of the opposite attribute) can be used with the RATING question format (Schaeffer & Dykema, 2020). The Likert scale is an example of a popularly used bipolar scale in consumer-product testing studies (Likert, 1932). Of recent, the Rate-All-That-Apply (RATA) another type of intensity scale is popularly used in web surveys.

2.3.1 Rate-All-Statements (RATING)

The rate-all-statements (RAS) or RATING question format has been used in consumer research for over five decades (, 1932; Spector, 1980, 1992; Stevens, 1968). This question format asks respondents to assign product attributes a position on a scale. Several unipolar and bipolar intensity scales (e.g., Likert scales) are used for rating product attributes in consumer research (Andriosopoulos, Bigerna, Bollino, & Micheli, 2018; Ares et al., 2014; Chang, Liz Thach, & Olsen, 2016; 1932; Ng, Chaya, & Hort, 2013; Schaeffer & Dykema, 2020). Lengths of these intensity scales can vary depending on the objective of the consumer study and the desired level of scale sensitivity. For example, an intensity scale can have 5-points i.e., not at all important, slightly important, moderately important, very important, extremely important but can also be shorter with just 3-points (low, medium, high). Consumer responses for RATING survey questions are usually treated as interval scale data as recommended by (Stevens, 1968). As such RATING data is commonly analyzed using parametric tests such as t-tests and analysis of variance (ANOVA). However, RATING scales can also be treated in an ordered form (as ordinal scales) (Cohen, 1980; Doering & Hubbard, 1979; Jamieson, 2004; Knapp, 1990; Kuzon W M, Urbanchek, & McCabe, 1996). As ordinal data, non-parametric tests such as chi-Squares tests can be used to make sense of the data. For the RATING question format, consumers are required to provide a response for each product attribute whereas, for question formats such as CATA, consumers need to mark only those terms that apply to the product. This implies that this question format carries with it an extra burden for the respondent and researchers. Furthermore, because fielding of online studies is usually charged against the consumers' survey mean duration suggests that it would cost more for consumer researchers to field surveys with the RATING questions as compared to one that used other question formats such as CATA. Nevertheless, the RATING format maintains its position as the standard for product description questioning in consumer research (Schwarz, 1999).

2.3.2 Rate-All-That-Apply (RATA)

The rate-all-that-apply (RATA) question format is a combination of the check-all-that-apply (CATA) and the RATING question format (Gastón Ares, Bruzzone, et al., 2014; Ng et al., 2013). With RATA, respondents are asked first to check all the attributes that apply (CATA) to the particular product and second to rate all the selected attributes for the level of importance or applicability (Gastón Ares, Bruzzone, et al., 2014). Ng et al., (2013) noted that although the CATA question format is highly popular recently because of its ease and non-tedious structure, its level of discrimination among samples particularly among samples of similar profiles remains lacking. This inspired the development of a spin-off question format which saw the inclusion of an intensity or degree scale (e.g., 3-pt or 5-pt scale) onto the CATA question structure (Gastón Ares, Bruzzone, et al., 2014). Further, Meyners, Jaeger, & Ares, (2016) supported Stevens, (1968) earlier notion that rating scale responses should be treated as interval scale data and thus should be analyzed using parametric tests such as ANOVA. This implies that product attributes that are neither checked during the CATA phase nor rated during the rating phase when answering the RATA question are given a zero score when computing product attribute means using t-tests or ANOVA.

Ideally, RATA would be expected to benefit from the best features of CATA and RATING i.e., fairly easier to complete with a lesser burden to respondents than RATING, enhanced sample discrimination, and a more detailed sample description capability than CATA. However, some studies suggested that RATA was not superior to CATA (Vidal, Ares, Hedderley, Meyners, & Jaeger, 2018). Generally, CATA and RATA question formats produced similar results with small differences which were specific to product attributes and particular studies. At the time of this writing, little is known of how RATA compares with RATING particularly in aspects such as discrimination among product attributes or products and percentage of "apply" responses.

3. Effect of frame populations' demographics on survey quality

One study that was conducted in the USA reported that access to the internet has become a global reality and that a greater proportion of households that earned more than $50,000 or households that were headed by someone with a college degree had internet connections as compared to those that earned less than $50,000 or those that were headed by persons who did not have a college degree (Administration, 1999). Also, this study indicated that while men and women used the internet similarly, fewer boomers used the internet as compared to the younger consumers' age groups. The authors further stated that fewer black and Hispanic households had access to the internet as compared to the white households which were partly attributed to lower education levels and lower incomes that were prevalent among the black and Hispanic households. This supported previous findings by Warnecke et al., (1997) who suggested that ethnicity and gender were critical in how respondents processed and interpreted survey questions. Updated research information on the effect of respondents' demographic characteristics (e.g., age group, gender, income, education level) on web survey question formats is however lacking. More understanding of the impact of respondents' demographics on online survey quality could be beneficial to researchers particularly how they design future online surveys (M. P. Couper, Traugott, & Lamias, 2001).

4. Current web surveys and research objectives

In recent years, the increased access to affordable internet in almost all countries (including the least developed countries) has supported greatly the use of web surveys in consumer research (Anonymous, 2018; Hoonakker & Carayon, 2009; Link et al., 2014; Yeager et al., 2011). Various question formats are used in these web surveys to collect consumers' characterizations of products by marketers, sensory scientists, product developers, dieticians, and nutritionists. However, there is limited literature on the effect of question formats on the quality of consumers' responses that are collected using online surveys. Therefore, the overall objective of the current study was to provide more understanding and differentiation on the characteristics of responses that were collected using four question formats that are commonly used in web surveys. For that reason, this study was conducted as four independent web surveys that collected consumers' characterizations for five different food products across five countries (Brazil, China, India, Spain, and the USA). For each of the four web surveys, a different question format (CATA, CAS, RATA, RATING) was used to assess the consumers' motivations for eating five food items. The results of this study are presented in a total of five papers.

The first paper explained in detail the how who and what (methods and protocols) were used to field this study across five countries. The second paper compared the CAS and the CATA questions formats whereas the third paper compared the RATA and the RATING question formats. The fourth and fifth papers, compared the effect of consumers' age group and gender on (a) CAS and CATA responses and (b) RATA and RATING responses respectively.

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Chapter 2 - Comparing Four Question Formats in Five Languages for Online Consumer Surveys

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Abstract

Question formats are critical to the collection of consumer health attitudes, food product characterizations, and perceptions. The information from those surveys provides important insights in the product development process. Four formats based on the same concept have been used for prior studies: Check-All-That-Apply (CATA), Check-All-Statements (CAS), Rate-All-That-Apply (RATA), and Rate-All-Statements (RAS). Data can vary depending on what question format is used in the research, and this can affect the interpretation of the findings and subsequent decisions. This survey protocol compares the four question formats. Using a modified version of the Eating Motivation Survey (EMS) to test consumer eating motivations for five food items, each question format was translated and randomly assigned to respondents (N = 200 per country per format) from Brazil (Portuguese), China (Mandarin Chinese), India (Hindi or English), Spain (Spanish), and the USA (English). The results of this survey should provide more understanding of the differences and similarities in distribution of data for the four scale formats. Also, the translations and findings of this survey can guide marketers, sensory scientists, product developers, dieticians, and nutritionists when designing future consumer studies that will use these question formats.

1. Introduction

To improve the health of people in our communities, it is important to understand the motivations that drive food choices, the perceptions of foods, such as liking or sensory qualities, and consumer's reactions to products such as their emotional or attitudinal responses. This information is essential to nutritionists and dietitians as they develop sustainable meal plans for their communities. It also is beneficial to product developers, sensory scientists, and marketing researchers, as it guides them in producing and promoting food products that meet the needs of consumers. Various formats of questions have been used in consumer surveys to collect food product characterizations based on perceptions, opinions, beliefs, and attitudes of target group consumers [1–8]. Some commonly used ones include Check-All-That-Apply (CATA), Check-All-Statements (CAS), Rate-All-That-Apply (RATA), and Rate-All-Statements (RAS). These question formats are commonly used in consumer central location studies [2,7,9–12], phone interview surveys [13,14], self-administered studies (home-use tests [15,16] and on-line surveys [17,18]), and printed surveys [8] for a number of different types of studies related to consumer perception.

1.1. Check-All-That-Apply (CATA)

With CATA, consumers are asked to check all items that are of importance from a list of options [8,19]. The items provided are usually product sensory characteristics [9,20] and physiological and psychographic variables [16]. Despite its prevalence, the CATA question format has faced criticism for uncertainty in the interpretation of the unchecked items. The unchecked items could be explained in three different ways: Either (a) the items do not apply, (b) there is indecision of respondents, or (c) items were intentionally or non-intentionally left unchecked.

As the CATA question asks the respondent to check all items that apply, it would then be expected that the unmarked items are not important or do not apply. However, it is also likely that respondents who are undecided on whether a particular item applies could opt not to check the item. This lack of a neutral option in the CATA question format could impact on the accuracy and reliability of the collected responses that are intended to guide decision making when developing products. Also, whether intentionally or unintentionally, some items may remain unchecked by the respondent. It is possible that some unchecked items were not seen by the respondent as they speedily answered the question [5,18] or it could be that the respondent intentionally did not bother reading the entire list of options to save on time [21]. Such outcomes are brought on by the non-compulsory nature of the conventional CATA question format that does not require a response from each of the listed items. It is no wonder that the CATA question format has been described by respondents as fast and non-tedious as evidenced by the significantly shorter survey or study mean durations and higher respondent liking as compared to other diagnostic attribute rating questions such as the Just-About-Right (JAR) rating questions [1,10,22]. The JAR rating questions are popularly used in the product development process to optimize product sensory characteristics. Consumers are asked to rate the strength of an attribute based a 3 point or 5 point bi-polar scale with JAR at the center point, too weak on one end and too strong on the other end [10,23].

This, however, highlights the fact that a typical CATA question demands less cognitive effort from the respondents as compared to other question variations, such as the CAS, and other diagnostic rating questions such as Just-About-Right (JAR) [7,10,22]. Consequently, the amount of detail that is collected by the conventional CATA question format could be substantially less than that collected by similar question formats that require more cognitive effort from the respondents for each listed item. Hence, the level of thought that respondents accord to questions could have an impact on the accuracy of the information collected by the question format and this warrants more investigation [24].

Even more, a tendency for respondents to mark items that appear at the top of the list more than items that appear in the middle or at the bottom of the list (primacy bias) has been associated with print and online surveys [18] and central location studies [4] that employed the CATA question format. For phone interview surveys, where a list of CATA items are read out to the respondent, there is a likelihood of the items that were read last to be selected more as compared to items that were read at the beginning of the list, because they are more memorable (recency bias) [25]. For instance, telephone surveys that have long lists of CATA items or complicated CATA items could increase the cognitive burden, as respondents need to remember both the question and CATA items to form an accurate response [26].

1.2. Check-All-Statements (CAS)

In phone interview surveys, a different question format that is known as the Check-All-Statements (CAS) has been used extensively [14]. This question format has been applied also in on-line [18] and print surveys [8]. With CAS, respondents are presented the same CATA items but this time a “Yes” or “No” response is required for each item. For phone surveys with long lists of CATA items, the CAS question format would appear to be more feasible as respondents are not troubled with remembering all the items when making a selection of which apply but rather would provide a “yes” or “no” to each item as the interviewer reads them out. The CAS question format has been shown to result in more detailed responses in terms of a mean number of affirmative or positive checked responses per respondent as compared to the CATA format [2,8,18,27].

Thomas and Klein [27] showed that more detailed responses were consistent in various behavioral studies conducted in different languages and countries of residence. According to

Sudman [19], Smyth et al. [18] and Nicolaas et al. [14], respondents apply more cognitive effort when answering CAS as compared to the CATA format. Nicolaas et al. [14] reported that respondents took longer to complete CAS questions when they were offered across in-person interviews and on-line surveys as compared to corresponding CATA questions. Smyth et al. [13] found that the data collected by CAS in phone interview surveys and online surveys were similar. That confirmed Smyth et al.'s [18] earlier claim that CAS questions collected more detail as compared to CATA. Also, while responses from CATA questions could be susceptible to primacy bias, responses from CAS are not affected by this effect [13,19,25].

It is worth noting that the CAS question format can be limited by the tendency of respondents to select affirmative or positive responses more frequently (acquiescence bias) [14]. However, the findings of Nicolaas et al. [14] and Smyth et al. [18] had no such effects, but they had reasonably short questionnaires of 8–15 questions. Nicolaas et al. [14] also showed that that the lack of a neutral option in CAS, when applied to online surveys, could prompt respondents to select "yes" as the next alternative option when faced with indecision. This could influence the accuracy and reliability of the findings collected. According to Best and Krueger [28], requiring an answer for each of the items could upset respondents and could lead to a high number of partial completes or "drop-offs" as respondents quit the survey before it is completed. Typically, studies in the sensory and marketing literature have longer questionnaires than those in the survey studies that have been conducted, which could impact findings.

1.3. Rate-All-That-Apply (RATA)

In some cases, knowing that an item is important or applies is not enough and researchers want to gain more understanding of the level of importance or "how much" the item applies to the study question. To do this, researchers sometimes use the Rate-All-That Apply (RATA) question format where, if the item is checked as applying, respondents are then asked to rate how much the selected items apply based on a given scale. Usually, an intensity scale (3, 5, 7, or 9 point) can be used for example; a 5 pt. scale anchored at "Not at All Important" and "Extremely Important" can be used to rate the applicability or importance of each selected CATA item. More discrimination in product liking was realized by Jaeger et al. [22,29] in a total of five and eight consumer sensory studies when RATA was compared with the CATA question format.

However, Vidal et al. [30] refuted this claim and showed that there was no significant difference between RATA and CATA responses but noted that the use of either format was depended on the objective of the study and characteristics of the product category being investigated. According to Jaeger et al. [22], CATA and RATA were employed in emoji questionnaires that investigated the emotions consumers experienced when they consumed food products. Researchers found that while CATA and RATA questions produced similar proportions of emoji in central location tests, RATA questions produced a significantly greater proportion of emoji as compared to CATA in the online surveys. This study suggested that the reliability of data for consumer testing of foods that is collected using either CATA, CAS, or RATA questions could depend on whether the survey or study was conducted at a central location or via on-line testing.

1.4. Rate-All-Statements (RATING)

Another question format is the Rate-All-Statements (RAS) also known as RATING where instead of having the respondents check all items that apply and subsequently rate how much the selected items apply; they are directly asked to rate all CATA items. A similar Likert-type scale for RATA is usually used. This question format may collect more detail as compared to either CATA or CAS or RATA. The RATING question format would be expected to require a higher level of thought process and likely would result in longer mean survey duration as compared to the other aforementioned three question formats. Little literature was found on RATING as applied to consumer product characterizations in sensory analysis surveys and study questionnaires. Thus, there is a research gap for exploration into the results and distribution of responses collected by these four question formats (i.e., CAS, CATA, RATING, and RATA) across different survey questionnaire fielding platforms (i.e., online, print via mail, central location testing and via telephone). Also, there is little research on the impact of demographic aspects such as age and gender and location on CATA data.

The overall objective of this survey was to compare the CATA, CAS, RATA, and RATING question formats. The specific questionnaire used for the comparison was an on-line eating motivations survey. Specific objectives for the questionnaire comparisons were to (a) compare the number (percentage) of items identified as positively motivating the eating of specific foods by either of the four formats; (b) the length of time taken to complete questionnaires in the four formats; (c) compare liking and just about right questions for the four formats of questionnaires; and (d) compare completion rates for the four formats. Specific objectives for the eating motivations survey were to use results from the surveys to determine specific eating motivations that can guide marketing, sensory, product development, and nutrition intervention for each country. This writing provides a step-by-step description of how and what materials, methods, and protocols were used during the preparation and fielding stages of the on-line survey in five languages.

2. Methods and design

2.1. Questionnaire development

The Eating Motivations Survey (EMS) was developed to compare four question formats (i.e., CATA, CAS, RATA, RAS) across five food groups in five countries. The questions investigated the respondents' motivations for eating or not eating varying food items that belong to five different food groups (Starches, proteins, dairy, fruits, and desserts foods or desserts) [17,31] (Table 2.1). Differences in product availability and potential preferences among respondents in different countries were considered and food items commonly consumed in respective countries were used for the various question formats. For example, in the USA, respondents were asked about their motivations for eating baked potatoes (starches), hamburgers (proteins), cheese (milk and dairy), bananas (fruit and vegetables), and chocolate cake with frosting (desserts), all commonly eaten foods in the US. In Brazil, the baked potato was replaced with white rice as a starchy food, Feijao (a type of bean stew) replaced hamburger for protein foods, milk replaced cheese in the diary category, and brigadeiro (fudge cake balls) replaced chocolate cake with frosting. Bananas were commonly consumed by respondents from all five countries.

Based on previous research, a total of 16 motivation constructs, 15 from Renner et al. [32] and one added by Phan and Chambers [17], were used as motivation items for eating the different foods. The survey included motivation constructs such as Liking, Habits, Need and hunger, Health, Convenience, Pleasure, Traditional eating, Natural concerns, Sociability, Price, Visual Appeal, Weight Control, Affect Regulation, Social norms, Social Image, and Choice. Except for the Choice construct, which had two positive sub-items, the rest of the motivation constructs each consisted of three positive sub-items (Table 2.2). For example, for the Liking construct, respondents could have been motivated to eat a certain food either because they liked it and or because it tasted good and or because they had an appetite for it. As for the Choice construct, responses were collected using two sub-items that is either the respondent wanted to eat the food every day and or because the food was the only choice. On the other hand, in cases where respondents did not eat a particular food item, a different list of negative CATA items (sub-items) was presented (Table 2.3). Except for the Sociability construct all 16 motivation constructs had at least one negative sub item option presented to the respondents. For example, for the Liking construct, respondents either may not like the food item or the food item may not have been something they had desire to eat at the time. Overall, the number of positive CATA items were 47 while the negative CATA items were 20.

Additionally, the survey questionnaire included the food involvement scale [33] (13 questions), health and taste and attitudes scale [34] (14 questions), and neophobia scale [35] (10 questions) and the demographic questions [36] (5 questions). Furthermore, at the end of EMS, respondents were asked to rate how much they disliked or liked taking the survey (one question) and also to rate how long or short they found the survey (one question). This survey was designed following an approved protocol for conducting research that involves human subjects (IRB #7297.2) that were approved by the designated committee at Kansas State University, Manhattan.

Table 2.1. Food items that were used for each food group in each of the five countries.

Countries	Starchy Foods (Carbohydrates)	Proteins Foods (Meat, Fish, Eggs)	Milk and Dairy Foods	Fruit and Vegetables	Desserts(Fats and Sugars)
Brazil	White Rice	Feijao	Milk	Bananas	Brigadeiro
China	White rice	Red braised pork belly	Soy Milk	Bananas	Pan-fried red bean paste cakes
India	White rice	Toor Dal	Milk	Bananas	Gulab Jamun
Spain	Paella	Jamón Serrano	Milk	Bananas	Turrón
USA	Baked Potato	Hamburger	Cheese	Bananas	Chocolate cake with frosting

Table 2.2. 16 eating motivation constructs and their corresponding *positive* sub-items that were used in the Eating Motivation Survey (EMS).

Liking	**Sociability**
Because it tastes good	Because it is social
Because I like it	So that I can spend time with other people
Because I have an appetite for it	Because it makes social gatherings more comfortable
Habits	**Price**
Because I usually eat it	Because it is inexpensive

Because I am familiar with it	Because it is on sale
Because I'm accustomed to eating it	Because I don't want to spend any more money
Need and Hunger	**Visual Appeal**
Because I'm hungry	Because it spontaneously appeals to me
Because it is pleasantly filling	Because the presentation is appealing (e.g., packaging)
Because I need energy	Because I recognize it from advertisements or have seen it on TV
Health	**Weight Control**
Because it is healthy	Because it is low in calories
To maintain a balanced diet	Because it is low in fat
Because it keeps me in shape (e.g., energetic, motivated)	Because I watch my weight
Convenience	**Affect Regulation**
Because it is quick to prepare	Because I am sad
Because it is the most convenient	Because I feel lonely
Because it is easy to prepare	Because I am frustrated
Pleasure	**Social Norms**
Because I enjoy it	Because I am supposed to eat it
In order to indulge myself	To avoid disappointing someone who is trying to make me happy
In order to reward myself	Because it would be impolite not to eat it
Traditional Eating	**Social Image**
Because I grew up with it	Because others like it
Because it belongs to certain situations	Because it is trendy
Out of traditions (e.g., family traditions, special occasions)	Because it makes me look good in front of others
Natural Concerns	**Choice**
Because it is natural (e.g., not genetically modified)	I want to eat it every day
Because it contains no harmful substances	Because it is the only choice
Because it is organic	

Table 2.3. 16 eating motivation constructs and their corresponding *negative* sub-items that were used in EMS.

Liking	**Sociability**
I don't like it	**Price**
It is not something I have the desire to eat at this time	The price was too high
Habits	**Visual Appeal**
I don't usually eat it	I don't like the way it looked
Need and Hunger	**Weight Control**
It is not filling enough	It is too high in calories
The portion size was not suitable	**Affect Regulation**
Health	This food makes me feel sad, lonely, or frustrated
It is not healthy	**Social Norms**
Convenience	I am not supposed to eat it
It is not convenient	**Social Image**
Pleasure	It is not a food I eat around other people
I do not want to indulge myself	Eating it makes me seem "behind the times"
Traditional Eating	**Choice**
I don't think it is a snack	I had it recently and I don't want to eat the same food too often
It is not appropriate for the situation	I would never choose this because I like to eat the same food every day
Natural Concerns	
It is not organic	

2.2 Questionnaire translation

The use of consumer surveys is widespread and testing question formats in only one culture or language does not answer whether findings apply solely for that country/culture or are more generalizable. Thus, the consumer eating motivations survey using the four question formats were translated and tested in five countries: Brazil, China, India, Spain, and the USA. The questionnaire was initially written in English (Figure A1) for the respondents in the USA and was translated into Portuguese (Figure A2), Simplified Mandarin (Figure A3), Spanish (Figure A4), and Hindi (Figure A5) for respondents in Brazil, China, Spain, and India, respectively. The survey translation process used a variation of the translation, review, adjudication, retesting, and documentation (TRAPD) approach [37,38]. First, the surveys were written in English and pre-tested to determine ease of use and to ensure that the language matched from questionnaire to questionnaire for each questionnaire (the format of the question changed, but not the question itself). Then, the questionnaires were translated by an expert in the subject area who is a native speaker of the language who also spoke/read English and then back translated by another subject area expert native speaker who made alternations, if needed. Various authors have pointed out that differences between the original questionnaire and the back translated questionnaire can be ascribed to errors in the forward translation and can be emanating from the back translations and other errors [39,40]. In the modified TRAPD process both translators worked together (either face to face or online) to check the final translation and ensure the meanings were as intended. If there was disagreement the plan was to bring in a third party to adjudicate, but in this study, the two translators were able to reach agreement in every case. This procedure has been used for other surveys across multiple languages [36,41–43]. After this "adjudication" step, a "soft launch" in each country with 50 consumers was conducted to test each translated questionnaire [37] to determine if the questionnaires could be successfully understood and completed in the allotted time by the contacted on-line subjects. Data from the soft launch were tracked, no missing data were found, all data were found to be reasonable, and data from screening and validity checks questions included to determine if consumers were paying attention were similar across countries. Information from all steps in the process was documented.

2.3. Respondents and recruitment

Respondents in each of the five countries (i.e., USA, China, Brazil, Spain, and India) were recruited by Qualtrics, Provo, UT, USA using its or its partners existing databases. Qualtrics or its partners maintain proprietary databases of consumers in each country (usually with more than 1 million respondents per country and many more in some countries such as the USA). The databases have a range of demographics, which can be parsed based on age, sex, purchasing habits, etc. Each survey question format (CAS, CATA, RAS, and RATA) was assigned randomly to ~200 respondents per country meaning ~800 respondents per country were used in the test. Each of the 200 respondents per format were divided into 4 age groups with ~50 respondents per group for the study: (a) Generation Z (born in the years 1995 to 2001), (b) Millennials (born in the years 1980 to 1994), (c) Generation X (born in the years 1965 to 1979), and (d) Baby boomers (born in the years 1944 to 1964). Within each age, 50 % were female and 50 % were male. For recruiting, Qualtrics sends an e-mail to a percentage (e.g. 200 % of the target sample size) of random members of its panel that a survey is available. Those members who volunteer to take the survey complete a screening questionnaire to determine if they qualify (for this survey they had to fit within a particular age, gender quota). If they qualify, they take the survey. If they complete the survey, they receive compensation usually based on a points system for the country they live in. If they fail to complete the survey within a specific period of time, complete the survey too fast, or answer questions incorrectly that are intended to check if the respondent is paying attention, the respondent is exited from the survey. It must be noted that although the databases are populated with consumers from a broad range of consumers in each country, only those with access to the internet are included. Although China, India, the USA, and Brazil had the highest number of internet users in 2015 and Spain had one of the highest percentages of users [44] some individuals are not accessible using this method and, therefore, are excluded from this type of survey.

3. Procedure

3.1. Data collection

3.1.1. Panel screening process

This survey fielded during the summer of 2019. Respondents were required to be 18 years or older (born in 2001 or before) but not older than 75 years (born in 1944 or after). Respondents that did not meet the required age criteria were discontinued from completing soon after starting the survey. Another trigger was positioned after the completion of the demographic questions but before the start of the food involvement questions (Figure 2.1). Respondents who were not willing to provide thoughtful responses were discontinued. Also, if after completion of the demographic questions, and consequent questions on food involvement, heath and taste attitude and neophobia (Figure 2.2), a respondent was randomly assigned to a quota that had been filled, they too were discontinued from the survey. Furthermore, after the close of the soft launch, a speed check (half of the median time taken by respondents to complete the survey during the soft launch) was added. This inclusion allowed for the automatic termination of responses from people who went so fast through the questionnaire that they likely did not provide thoughtful responses but instead hurriedly completed the survey.

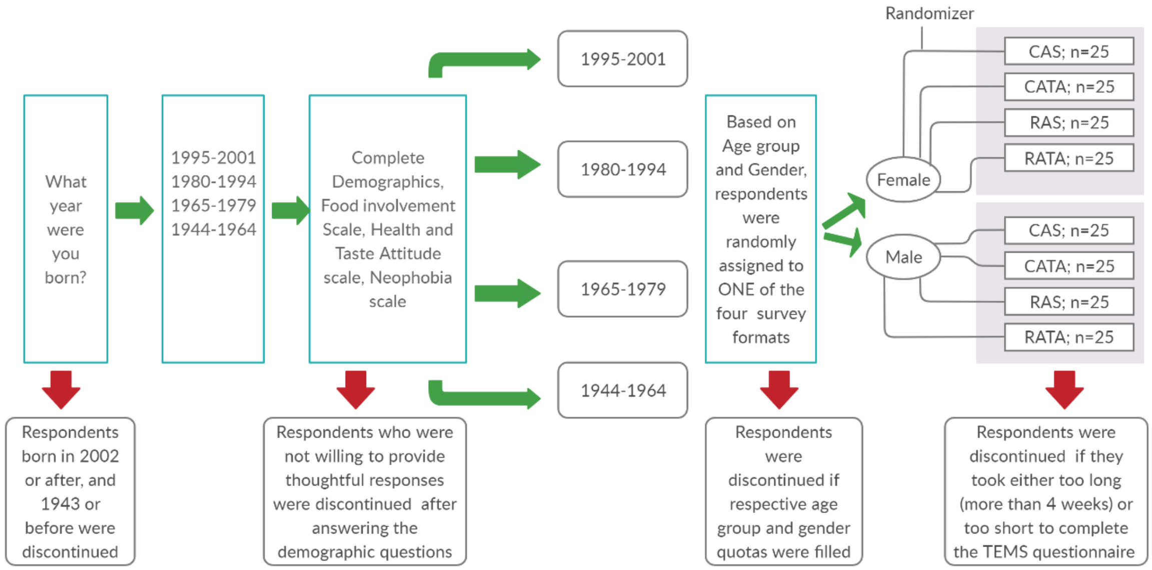

Figure 2.1. Process flowchart of the recruitment process for respondents who completed the entire survey questionnaire. Green arrows represent respondents who were selected to continue to complete the survey while the Red arrows represent respondents who were discontinued from participating in the survey. A total of 200 respondents per country per question format were recruited.

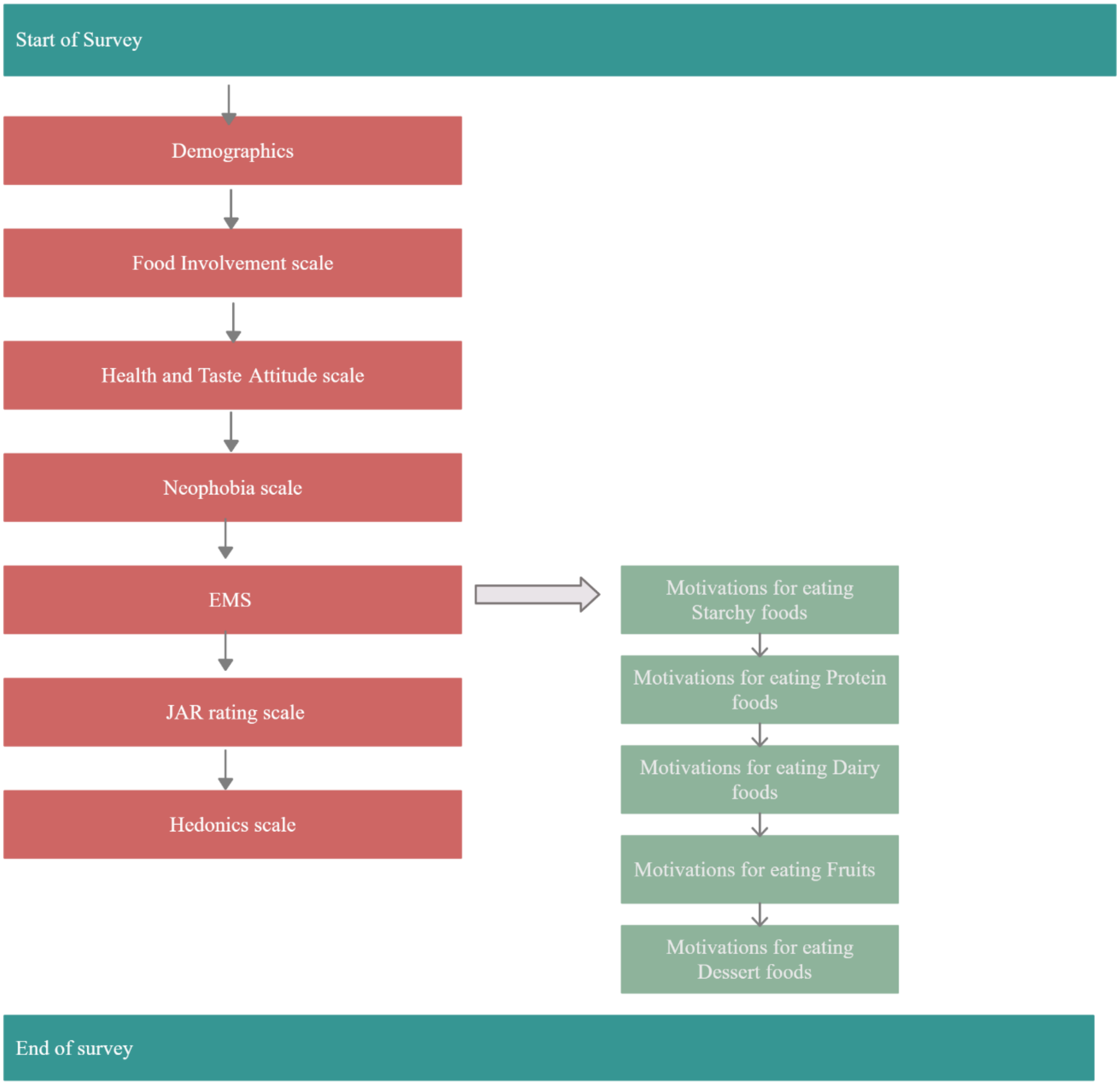

Figure 2.2. Flowchart showing the flow of questions of the entire survey questionnaire. EMS = Eating Motivation Survey; JAR= Just-About-Right

3.1.2. Survey Testing Design

Respondents first completed questions on demographics, food involvement, health, and taste attitudes, and food neophobia. Then they were asked to complete the EMS using one of the four question format variations. The computerized randomizer tool that was used took into consideration the gender (female, male) and age group (four age groups) of the respondents in order to ensure approximately equal numbers of respondents in each gender and age group for each question format. Initially, a pilot test with about 100+ respondents was conducted to verify that the survey questionnaire was collecting data as designed. The initial responses were carefully examined to check for any missing data and identify any corrections that needed to be made before final data were collected. This is the last point at which researchers can revise questions and flow to ensure the appropriate data were being collected. In this study, for example, researchers noticed that the randomizer assigned all four question format variations to each respondent. Thus, those data were discarded, and the randomizer tool was reprogrammed to randomly present only one question format to each respondent. Incomplete or partial responses for cases where the respondent did not complete answering the entire questionnaire within 4 weeks were recorded but not included in the respective quota fulfillment. That allows comparison of survey completion rates among the question formats to provide more understanding of how each format influences the willingness of respondents to complete the survey. Such information is critical in guiding researchers when designing self-administered surveys on consumer behavior. The time that was taken by each respondent to complete the entire survey was recorded in seconds.

3.2. Survey timeline

There was no specific length of time that was anticipated for the respondent recruitment and completion of fielding phases of the survey. This can be explained by the fact that both the recruitment and survey questionnaire completion occurred simultaneously. It can further be attributed to the complexity and number of required quotas (2 genders*4 age groups*4 questionnaires; =32) of this survey. However, from the start of respondent recruitment to the fulfillment of all quotas, it took on average five weeks to complete fielding in each country. Survey fielding began in the USA and continued to other countries as the respective translations became available. As expected for each country, certain quotas filled up quickly as compared to others.

For instance, for China, the generation X, and the boomers quotas took a longer time to fill up as compared to the quotas of the younger people.

3.3. Data analysis

Chi-square will be used to compare the CAS, CATA, RAS, and RATA data for each food group in each of the five countries. The ANOVA will be used to assess the effect of survey format on survey liking, mean duration, and respondent JAR for EMS in each country. Percentages of completion rates for each of the four question formats will be calculated. All analyses will be run using XLSTAT (a Microsoft Excel data analysis add-on tool).

4. Expected results

The results of this survey protocol can help to make decisions related to the best choices for determining survey question formats for future studies based on whole sample, age group and gender subsamples. The number (percentage) of items identified as positively motivating the eating of specific foods by the various formats will be compared in order to determine which format provides the most in-depth information. In addition, the completion rate and length of time respondents take to complete questionnaires in the four formats can be compared to determine if one or another format is reducing respondent participation or taking excessively long to conduct the survey. For on-line surveys, time is money; longer surveys cost more to conduct because respondent incentives must be higher. If one format takes much longer to complete than another format, the cost could be too high unless the data provides significantly more robust information. Respondent acceptance of the survey and their beliefs in it being too short, just right, or too long also can be assessed. In addition, eating motivations for various food groups in different countries with both males and females and different age groups can be determined. The questionnaires are available and translated to be used directly or with additional modification by other researchers.

The research results using this protocol can be used to guide nutrition and health interventions and assist marketing, sensory, and product development professionals in each country.

5. Discussion

5.1. Survey timeline

5.1.1. Development of survey questionnaire (s)—time for completion: 3 weeks in this study

Based on the objective(s) and purpose of the survey, items or terms to be included in questions, target population, and other items must be identified and established as part of the survey. Buy-in from stakeholders who will use the survey results must be obtained in order to make the data useful to them. In this project we discussed the project with a wide range of stakeholders before committing to the final design. Depending on the complexity of the project this timeline could be from a few days to more than a month.

Determining the questions should be done by review of available literature (e.g., the 15 motivation constructs from Renner et al. [32] and one construct from Phan and Chambers [17]). Also, qualitative approaches such as focus groups or one-on-one interviews with consumers and subject matter experts can be used to identify the appropriate terms [45] that will be used in the questions. Additional questionnaires were added to this survey to obtain information on food involvement [33], health and taste attitudes [34], and food neophobia [35]. Because this survey was to compare survey question formats (not known to consumers), respondents also were asked to rate the survey questionnaire based on how long or short it was (7 point JAR scale). Respondents also used a five-point hedonic scale to rate their experience of taking the survey (survey acceptance). Those two questions provide more understanding of respondents' questionnaire acceptance and perceptions on the duration of the survey.

The target population for the survey must be determined based on demographic, psychographic, or behavioral criteria of interest. Demographic questions such as gender, age group of respondents, education level, number of adults, and children who live in the respondents' home can be added to the questionnaire [36]. For international research, considerations should be made for several factors such as the culture and traditions of the people, official language, government restrictions, and policies on research involving human subjects [46].

For this survey, we also included a survey respondent "quality" or "trap" question to catch respondents who do not providing thoughtful responses. Questions with an obvious incorrect response or that require the consumer to do something that they may miss if they are not actually paying attention to the questions can help to minimize poor quality data [47].

5.1.2. Test Design, Questionnaire, and Survey Flow Verification—Time for Completion: 1 Week in this Study

Based on previous experience in conducting on-line surveys and because all the different versions of the questionnaire, including all language versions, should be tested to ensure that they run smoothly as required using the on-line survey tool (e.g., Qualtrics survey software) a pre-test in actual field trials with 10% of the sample was conducted. The survey flowed from demographic questions to food involvement scale to health and taste attitude scale to neophobia scale and then to EMS questions (Figure 2). For EMS, respondents answer CATA questions on starches, proteins, dairy, fruits, and desserts foods in that order [17,31]. After completion of EMS, respondents answered the JAR and hedonic questions.

5.1.3. Respondents Recruitment and Survey Fielding—Time for Completion: 4–6 Weeks Depending on the Availability of Target Population

For this study, recruitment and survey fielding was conducted simultaneously. Potential respondents in existing Qualtrics panel databases were screened, but that screening happens at different paces in various countries and cultures. In some countries where consumers of all ages regularly check computer communication (e-mail, text, etc.) screening and testing happened quickly. In other countries or for some demographic groups, recruitment and fielding took longer. In this case, we also checked the data after “completion” of the survey and added additional respondents when needed. The initial fielding took approximately 4 weeks with checks and additional recruitment taking 2 more weeks.

5.1.4. Data Analysis and Reporting—Time for Completion: On-Going

Responses were recorded in real-time as the respondents completed the survey questionnaire. The responses were coded and downloaded as Microsoft Excel datasets. Although simple analyses of percentage responses for items, such as positive or negative motivations and mean values of time and questionnaire acceptance, can be analyzed quickly, more in-depth analysis by gender, age group, and other survey data clusters take much longer to analyze and understand. Timing also is affected by other work streams the researchers are working on.

6. Limitations

On-line surveys only test those consumers who are on-line and accessible, an increasingly large part of the population but still only a portion of the global population. In some parts of the world such testing is impossible, and those sections are missed in on-line testing regardless of the question format used.

For the large population that can use on-line testing, the complexity of surveys such as this one that have a large number of recruitment categories, numerous question items (47 positive and 20 negative), additional questionnaires used (e.g., food involvement, taste and health attitudes) and various survey flows for question formats, specialized computer programs are required to set up the surveys and ensure they are properly fielded. For example, for the RATA format, the Qualtrics system provided a pop-up question when respondents rated an item as important. Other survey computerized systems or survey methods (for example, in person paper ballots) may not have the same abilities to adjust the formatting or flow of questions. Adjustments must be considered if researchers conduct similar surveys using different survey methods.

Continuous, near real-time careful examination of collected responses and updates on quota fulfillment is required with this on-line survey approach. This ensures that quotas are not overfilled (increased cost beyond planned budget) but also prevents cases of unfulfilled quotas. For example, we noticed that the USA-RATA questionnaire for the female Generation Z quota had missing responses for four consumers and we were able to recruit and field additional respondents.

Appendix A

The following are also available online at http://www.mdpi.com/2409-9279/3/3/49/s1, Figure A1: English-USA (Questionnaire), Figure A2: Portuguese-Brazil (Questionnaire), Figure A3: Simplified Mandarin- China (Questionnaire), Figure A4: Spanish-Spain (Questionnaire), and Figure A5: Hindi-India (Questionnaire).

Figure S1 (USA-English).pdf | Figure S5 (India-Hindi).pdf | Figure S4 (Spain-Spanish).pdf | Figure S3 (China-Mandarin).pdf | Figure S2 (Brazil-Portuguese).p

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Chapter 3 - A Comparison of the Percentage of "Yes" (Agree) Responses and Importance of Attributes (Constructs) determined using Check-All-That-Apply and Check-All-Statements (Yes/No) Question Formats in Five Countries

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Abstract

Check All That Apply (CATA) has become a popular type of questionnaire response in sensory/consumer research in recent years. However, some authors have pointed out potential problems with the method. An online survey using either a Check-All-That-Apply (CATA) or Check-All-Statements (CAS) format for questions was conducted to provide a deeper understanding of the response data using the two question formats. With CATA, respondents select all terms or statements that apply from a given list, while, with CAS, respondents must respond (e.g., yes/no or agree/disagree) to each term or statement to show that it applies or does not apply. Respondents from five countries (Brazil, China, India, Spain, and the USA) were randomly assigned one of the two question formats ($N = 200$ per country per method). Motivations for eating items that belong to five food groups (starchy, protein, dairy, fruits, and desserts) were assessed.

Results showed that CAS had higher percentages of "agree" responses than CATA. Also, the response ratio of CAS and CATA data was different, suggesting that interpretations of the data from each response type would also be different. Respondents in the USA, China, and Spain took longer to complete the CAS questionnaire, while respondents in Brazil and India had similar time durations for the two question formats. Overall, the CATA format was liked slightly more than the CAS format and fewer respondents dropped out of the survey when using the CATA response type. These findings suggest that the CATA format is quick and relatively easy for consumers to complete. However, it provokes fewer "apply" responses, which some psychologists suggest underestimates applicable terms or statements and CATA provides a different interpretation of data than the CAS format that requires consumers to respond to each term or statement. Further, CAS may overestimate the applicable terms. Consumer insights collected using CATA and CAS can lead to different decisions due to differences in data interpretation by researchers (e.g., marketers, nutritionists, product developers, and sensory scientists). More investigation is needed for the CATA and CAS question formats.

1. Introduction

The use of the Check-All-That-Apply (CATA) or the Mark-All-That-Apply question format as reported by Sudman and Bradburn [1] has become popular in consumer research [2–13]. This question format asks respondents to check all items that apply from a list of options. For the Check-All-Statements (CAS) or the forced-choice question format, also known as the yes/no format or sometimes called "applicability scoring", a respondent is asked to check a "yes" or "no" option (or something similar such as agree or disagree) for each item [10,11,14]. Both the CATA and CAS question formats have been used extensively for questionnaires that are designed to be completed by respondents with little or no intervention. Although the research literature tends to be fairly recent, multiple industries have been using this procedure at least since the early 1980s [1,15].

CATA was developed to reduce the fatigue of respondents while they completed a self-administered questionnaire. This tool provides an easy and non-tedious way of collecting multiple responses that are reproducible [3,8,16–18]. However, the CATA format has been criticized for ambiguity in interpreting the absence of a checkmark on listed options. The unchecked items can be interpreted as those that were not applicable or those for which the respondent was uncertain about the applicability. It is also possible that the respondent did not notice the item(s) as they hurriedly read the list of items [5,10] or that they only paid attention to the first items or a limited set of items to save time. Survey research theory [19] suggests that for self-administered surveys (e.g., online surveys), respondents may select the first acceptable response(s) and not pay attention to later responses because it takes too much effort. This may particularly be true based on the cognitive elaboration model [20] when the respondent is in visual mode (e.g., reading responses) because the respondent takes more time to consider the first options. Ares and Jaeger [21] showed that the order in which items in the CATA question were presented had an impact on the results. For instance, items that appeared in the top left corner of the ballot were checked more frequently as compared to items that were placed at the bottom of the ballot and this consequently affected the total number of responses provided. This suggests that the items seen early in the questionnaire are more likely to be rated as “apply” than those later in the questionnaire. Simply randomizing the terms can reduce the impact of order bias on specific terms, but does not eliminate the problem and exacerbates the impact that order bias has on differences in scoring frequency when attempting to compare consumers or cluster them based on their responses. In a recent study with children, different response patterns were found, suggesting that cognitive impacts are apparent even in CATA questionnaires [22].

Although some researchers have shown that both the CAS and CATA question formats provide similar results in terms of outcomes, time, and survey satisfaction, other researchers [12,23] disagree and suggest otherwise. Fundamentally, the CAS seeks a response (e.g., yes or no) for each item, while the CATA question format requires that respondents only check those that they believe apply (the “yes” response) [24]. Sudman [1] and Smyth et al. [10] suggest that respondents pay more attention, read all the items, and provide more thoughtful responses for CAS than CATA questions. CAS has also been shown to result in more detailed responses in terms of a mean number of affirmative checked (“agree” or “apply”) responses per respondent as compared to the CATA format [10,17,24]. This finding is also consistent with behavior survey data conducted in different languages and countries of residence [25]. However, most of the CATA–CAS comparison studies are public opinion surveys, with only one studying perceptions of food or food behavior. A potential issue with this forced-choice kind of questioning has been associated with acquiescence bias [10]. Acquiescence bias is a type of response bias where respondents tend to mark (or agree with) with the positive connotation for all survey questions [26]. Further, Best and Krueger [27] suggested that requiring an answer for each item on a questionnaire could frustrate respondents and could lead to a high number of partial completes as respondents quit the survey before it is completed. Nicolaas et al. [12] and Smyth et al. [10] did not find such effects, but they had reasonably short questionnaires of 8–15 questions. Typically, studies in the sensory literature have longer questionnaires [28,29] than those in general survey studies that have been conducted, which could impact findings. Jaeger et al. [18] showed that respondents found that rating each attribute was “slightly more tedious” than using the CATA format. Perhaps because of that, CAS is popular with telephone surveys but appears to be rarely used with in-person or web surveys for sensory consumer research [11,14].

The overall objective of the current online survey was to compare the CAS and CATA question formats, which were used to collect consumers' motivations for eating five food items belonging to different food groups. Specific objectives were to collect and compare data in multiple (five) countries and a) compare the percentages of " apply" ("yes" or "agree") responses for CAS and CATA, b) establish the response ratios of CAS to CATA), c) identify the level of importance of the eating motivation constructs, and d) compare respondents' mean survey duration, survey liking, just about right (JAR) rating questions, and completion rates for the two question formats of an eating motivation survey (EMS).

2. Materials and methods

2.1. Eating Motivation Survey (EMS)

An eating motivation survey (EMS) questionnaire [9,30,31] was modified to include questions on consumers' motivations for eating (in the original EMS) or not eating food items (added) that belong to five food groups [29]. The questionnaires were randomly assigned to respondents in either the CAS or CATA formats but not both (each respondent saw only one format). A total of 47 positive motivation items that could be categorized into 16 motivation constructs were assessed in each format of the EMS questionnaire (Table 3.1). Each eating motivation had 3 subscales or items except for the choice motivation that had only two subscales. The CATA and CAS questionnaires were designed so that respondents checked each of the motivation items that they agreed contributed to them eating that food (CATA) or checked either "yes" or "no" for each motivation (CAS) as to whether they believed it contributed to them eating that food. In the results and discussion sections of this paper, we use "agree" or "apply" to refer to responses for which the respondents selected motivation items (in CATA) or checked the "yes" option (in CAS). For CATA, all 47 items were presented on a single page, while, for the CAS question format, five questions were presented on each page. The number of CATA items (47) that were assessed in the current survey was not unusual. In fact, the literature shows several articles where a similar number of CATA items were evaluated [9,10,23,30].

Table 3.1. The 16 eating motivation constructs (bold) and their corresponding *positive* subscales or terms that were used in the eating motivation survey (EMS) (adapted from [9,31]).

Liking	**Sociability**
Because it tastes good	Because it is social
Because I like it	So that I can spend time with other people
Because I have an appetite for it	Because it makes social gatherings more comfortable
Habits	**Price**
Because I usually eat it	Because it is inexpensive
Because I am familiar with it	Because it is on sale
Because I'm accustomed to eating it	Because I don't want to spend any more money
Need and Hunger	**Visual Appeal**
Because I'm hungry	Because it spontaneously appeals to me
Because it is pleasantly filling	Because the presentation is appealing (e.g., packaging)
Because I need energy	Because I recognize it from advertisements or have seen it on TV
Health	**Weight Control**
Because it is healthy	Because it is low in calories
To maintain a balanced diet	Because it is low in fat
Because it keeps me in shape (e.g., energetic, motivated)	Because I watch my weight
Convenience	**Affect Regulation**
Because it is quick to prepare	Because I am sad
Because it is the most convenient	Because I feel lonely
Because it is easy to prepare	Because I am frustrated
Pleasure	**Social Norms**
Because I enjoy it	Because I am supposed to eat it
In order to indulge myself	Because it would be impolite not to eat it
In order to reward myself	To avoid disappointing someone who is trying to make me happy
Traditional Eating	**Social Image**
Because I grew up with it	Because others like it
Because it belongs to certain situations	Because it is trendy

Out of traditions (e.g., family traditions, special occasions)	Because it makes me look good in front of others
Natural Concerns	**Choice Limitation**
Because it is organic	I want to eat it every day
Because it contains no harmful substances	Because it is the only choice
Because it is natural (e.g., not genetically modified)	

The questionnaires focused on motivations for eating items from five food groups: foods rich in starch (e.g., potato and rice dishes), proteins (e.g., meat, beans), dairy, fruits, and sweet foods/desserts [30,32]. Food items fitting in these food groups and applicable to the particular country were used (Table 3.2). For example, in the case of starchy foods, baked potatoes were used for the USA, while paella was used for Spain and white rice was used for Brazil, China, and India. These foods were chosen based on discussions with multiple sensory scientists in each country who reviewed and discussed all the foods chosen in all countries to ensure the products represented the "concept" of the food category as much as possible for that country. Where possible, similar foods were used (e.g., white rice in three countries for "starchy foods"), but where the product was not widely consumed in that form (e.g., Spain) or not consumed in a similar form by a large portion of the population (e.g., USA), alternative products were selected that were more commonly eaten.

Table 3.2. Food items that were used for each food group in each of the five countries.

Countries	Starchy Foods (Carbohydrates)	Proteins Foods (Meat, Fish, and Eggs)	Milk and Dairy Foods	Fruit and Vegetables	Desserts (Fats and Sugars)
Brazil	White rice	Feijao	Milk	Bananas	Brigadeiro
China	White rice	Red braised pork belly	Soy milk	Bananas	Pan-fried red bean paste cakes
India	White rice	Toor dal	Milk	Bananas	Gulab jamun
Spain	Paella	Jamón serrano	Milk	Bananas	Turrón
USA	Baked potato	Hamburger	Cheese	Bananas	Chocolate cake with frosting

In addition to EMS, the online survey questionnaire also included other questions that were included in the survey timing. For example, two questions that investigated the respondents' survey experience in terms of liking (a hedonic question) and a rating based on the length of the survey (a just about right or JAR question) were included near the end of the survey. The survey liking question and the JAR question were each placed on separate pages. The survey was written in English for the respondents in the USA and the survey was translated into Simplified Mandarin, Hindi, Spanish, and Portuguese for respondents in China, India (English also provided as an option), Spain, and Brazil, respectively. The survey translation process used a variation of the translation, review, adjudication, retesting, and documentation (TRAPD) approach [33,34]. The full procedure for the survey methods, including translation, and the surveys in all five languages have been published previously [29].

This online survey was designed following a protocol for research with human subjects (IRB #7297.2) that was approved by the designated review board at Kansas State University, Manhattan, KS, USA.

2.2. Respondents and recruitment

Respondents in five countries were recruited by Qualtrics, Provo, UT, USA using its or its partners' existing databases. Using the Qualtrics survey software, one format of the survey questionnaire with CAS questions and another with CATA questions were assigned randomly to 400+ respondents per country (N~200 per questionnaire per country) [29]. Respondents were required to be 18 or older and then were recruited to fill demographic quotas of age and gender for each questionnaire format (CAS and CATA). Four age groups (n = 50+ per age group) were used in this study: Generation Z (born in the years 1995 to 2001), Millennials (born in the years 1980 to 1994), Generation X (born in the years 1965 to 1979) and Baby Boomers or Boomers (born in the years 1944 to 1964). For each age group, 50% were female and 50% were male. Once the required number of completed responses for a particular quota was filled, newly qualified respondents (for the filled quotas) were discontinued from completing the EMS. Other demographic data that were collected for informational purposes included respondents' level of education, number of adults, and number of children in the households (Table 3.3).

Table 3.3. Overview of demographic segmentation of respondents who completed the CAS and CATA question formats of the EMS in all five countries[1].

	USA		Brazil		Spain		India		China	
	CAS	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**
Gender										
Men	105	106	100	100	107	106	132	120	102	103
Women	107	108	100	100	107	107	130	137	103	108
Age Group										
Boomers	54	54	50	50	52	52	55	57	53	52
Generation X	53	53	50	50	54	54	76	70	51	53
Millennials	53	54	50	50	54	54	54	65	49	52
Generation Z	52	53	50	50	54	53	77	65	52	54
Education Level										
Primary school or less	1	4	6	4	7	7	13	14	10	10
High school	114	94	87	94	81	99	52	42	67	67
College or university	97	116	107	102	126	107	197	201	128	134
# Adults in Household										
One	50	62	18	19	17	15	12	16	6	4
Two or more	162	152	182	181	197	198	250	241	199	207
# Children in Household										
None	143	133	95	102	117	110	106	119	80	91
One or more	69	81	105	98	97	103	156	138	125	120

[1] Number of respondents.

2.3. Data analysis

2.3.1. Comparison of percentages of "Agree" responses

The percentages of CAS and CATA "agree" responses for each food group in each of the five countries was calculated. Percentages were used because the possible number of ticks/checks varied depending on how many people ate that particular food in a particular country and the number of subscales in the eating motivation category. Chi-square tests were used to compare significant differences in proportions between CATA and CAS. Also, chi-square was to assess discrimination among food categories for all eating motivations across the five countries.

2.3.2. Establishment of ratios of CAS to CATA and standard indices for CAS and CATA

The ratios of percentages of “agree” responses for CAS to CATA were calculated to determine if the ratio of responses varied or remained the same between the two methods. Similarly, a “standard index of importance” (SII) of responses was determined for all motivation categories versus liking within CATA or CAS. This index value shows the proportion of the number of “agree” responses for any motivation to “agree” responses for the liking motivation, which has been shown in prior studies to be the highest motivation on average [9,30]. Using liking as the comparison index factor (the denominator in the proportion calculation) within each food group, country, and consumer demographic segment allows a within-sample “variable” to be used to adjust all comparisons and put them on a similar “scale” (typically 0–1,0). Note, it is possible to exceed 1.0 when a motivation exceeds liking in importance for a group of people, although this rarely happened. Put simply, the SII is 1.0 when the “agree” responses for any motivation are equal to the “agree” responses for liking within that method for that group of respondents. Similarly, the SII would be 0.5 when a motivation response is half the number compared to liking and so forth. The index was created using the principles espoused by creators of other indices for psychological phenomena that must be compared across various segments but can vary in response behavior across segments [35,36]. If the CAS and CATA formats were assessing the same behavioral patterns of consumers, then the SII values for CAS and CATA for the different motivation constructs would be similar or relatively close. However, if the SII values for the two formats were different, this would indicate that the questions from the two formats were interpreted, processed, and answered differently by the respondents. Major differences in standard index values for motivations within CATA or CAS would suggest that the results of the two methods likely would provide different information to the researchers. Such findings would suggest that CATA and CAS, for various reasons, do not measure the same psychological phenomena or, at a minimum, the results would be interpreted differently.

2.3.3. Identification of the Level of Importance for Motivation Constructs

Based on the percentages of "agree" responses for the CAS and CATA question formats of the online survey, ranking was used to identify the top five motivation constructs for each food group in each country.

2.3.4. Comparison of Survey Format Incompletion Rates, Survey Mean Duration, Survey Liking, and Survey JAR Rating

Analysis of variance (ANOVA) was conducted to assess the effect of survey format on survey liking, mean duration, and respondent JAR for EMS in each location. Percentages of incompletion rates for each of the two question formats were also calculated.

All analyses were run using XLSTAT (version 2020.1, AddinSoft, New York, NY, USA).

3. Results and discussion

3.1. Percentages of "Agree" responses for CAS and CATA

The CAS and the CATA question formats collected significantly different ($p \leq 0.01$) percentages of "agree" responses for each of the 16 positive motivation constructs in all five countries for starchy foods (Table 3.4). Data for proteins, dairy, fruit, and sweet/dessert foods are presented in the Supplementary Materials (Tables A1–A4). The CAS format amassed a higher percentage of "agree" responses than the CATA question format, which is similar to that mentioned or found by other authors [1,10–12,23,24]. For example, baked potatoes (a starchy food) in the USA (Table 3.4) received more "agree" responses for all of the eating motivation constructs when CAS was used as compared to when the CATA question format was used. A case in point, for the USA, 5% and 44% of respondents who completed the CATA question format identified choice limitation and liking, respectively, as important motivations for eating baked potatoes. Conversely, the percentage of responses that identified choice limitation and liking as important eating motivations was more than twice (25% and 92%, respectively) for people who answered the CAS format of the survey in the same country. Similar cases were observed for the other four countries (Brazil, China, India, and Spain) and for the other four food groups (protein-rich foods, dairy foods, fruit, and desserts).

Table 3.4. Percentage of "agree" responses for CAS and CATA for all five countries for the respective starch-rich foods.*

	USA		**Brazil**		**Spain**		**India**		**China**	
	CAS	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**
Liking	92	44	94	48	98	63	80	31	76	21
Habits	68	22	89	43	74	33	82	25	84	33
Need/Hunger	71	23	75	26	77	23	73	15	78	19
Health	46	12	54	20	51	18	74	23	63	17
Convenience	64	25	63	27	26	9	72	22	69	18
Pleasure	64	23	53	13	79	32	74	20	44	7
Trad. eating	47	14	43	24	71	28	72	23	63	19
Nat. concern	46	12	50	12	49	9	74	19	63	13
Sociability	22	4	32	9	52	13	52	9	41	5
Price	43	13	29	8	15	3	43	7	35	6
Visual app	38	8	15	3	36	10	56	11	40	4
Wt. control	34	8	32	12	15	4	55	13	42	9
Affect regul.	14	3	3	1	4	0	28	3	15	2
Social norm	18	4	19	5	17	2	39	5	37	8
Social image	23	4	8	2	15	4	38	5	32	3
Choice limit	25	5	43	11	20	2	51	12	47	9

* All percentages within a country and construct (e.g., CAS vs. CATA for liking in the USA) were significantly different ($p \leq 0.01$).

The large difference in the percentage of respondents who found a motivation "important" in CAS or CATA could be the result of several factors. Based on various survey theories, the higher proportion of unchecked items for the CATA format could be explained by respondents who tend to want to hurry through questionnaires and, thus, only focus on checking a few items, perhaps only the attributes or statements with the highest priority to them. Similarly, the lack of attention could also lead to checking only the first few items and not spending time reading the rest of the items but moving on to the next question after they felt they had satisfied the question requirement. Because the statement items were randomized for each respondent, the bias would be randomized throughout the test, but still influences the number of responses over all consumers. According to Jaeger et al. [21] and Smyth et al. [12], the smaller percentage of “agree” responses for CATA could partly be explained by respondents who missed them as they read the list of 47 items and it is also possible that respondents who were unsure whether an item was applicable did not mark that statement.

Conversely, the higher percentage of responses for CAS could be ascribed to the fact that the CAS question format required a response for each of the 47 eating motivations items, which was not the case for the CATA question format. Some authors suggest that the percentage of forced-choice scores (e.g., CAS) could be high if respondents choose the “yes” or “agree” category to avoid actively saying they “disagree” with any item or statement. This reasoning suggests that requiring respondents to provide either a “yes” or a “no” for each item could cause some respondents to lean towards giving a "yes" or “agree” response. This potential acquiescence bias has been noted by sensory researchers for some populations and is sometimes referred to as a “politeness” bias [37–39]. However, more recent studies have not shown such “politeness” effects [40,41]. Further, if the bias were true for this set of consumers and questions, we would expect to see consistently high percentages for CAS across all products and motivations within a country. We did not. The range of percentages for CAS “agree” responses is quite large, e.g., for the starch-rich food group, the CAS percentages range from 4% to 98% for Spain and 20% to 80% for India.

For CATA, the range is smaller, from 0% to 63% for Spain and 2% to 33% for China. For all food categories, there are CAS "agree" responses greater than 90% and less than 10%, suggesting that respondents were not simply checking "agree" to be polite or checking in some random way.

The lower percentage of "agree" responses for the CATA format appears much more likely to be explained by a portion of respondents who paid lower attention to each statement and simply selected the "agree" option more randomly and chose fewer options because of that. This is supported by the fact that although less-used motivations tended to be used less in both methods, they were used so infrequently in CATA that they did not differentiate among themselves. This was not true for CAS data. For example, the least-used constructs for dairy foods generally were affect regulation, social norms, social image, visual appeal, and sociability. Within a country, the frequency of the use of and range for these attributes using the CATA format was less than 10% and 5%, respectively (except India, where it was 12% and 8% percentage, respectively). These attributes were neither discriminating nor helping to understand differences among motivations for eating by individuals using the CATA format. In comparison, these same motivations for dairy foods using the CAS format received a low of 10% to a high of 60% use (depending on the country), with a range of scores 24% points within any single country. Clearly, they were not only used more frequently in the CAS format but were also not contributing the same degree of explanation and discrimination of eating behaviors.

3.2. Response ratios [CAS: CATA, Standard Index of Importance (SII)]

Similar to prior studies [9,42], liking was almost always found to be peoples' greatest motivation (higher percentage of "agree" responses overall) for eating items from the five food groups in the five countries (Table 3.4 and Supplementary Materials Tables A1–A4). This did not change regardless of whether CAS or CATA was used for measurement in the survey. However, the importance of other constructs did change depending on the method of measurement used, CAS or CATA. This indicated that the detail of the data collected using CAS and that collected using CATA was different. In addition to the higher percentages of "agree" responses for CAS as compared to CATA, authors noticed that the ratio of CAS to CATA "agree" responses for each of the five food groups was not only greater than one but that it also varied largely depending on the particular motivation construct that was being assessed (Table 3.5, Supplementary Materials Table A5–A8). For example, the construct "health" was chosen at a higher frequency in CAS than CATA, suggesting that it may be more important than the CATA data imply. It is possible that either the CAS questions overestimated the level of importance of the health construct or that the CATA questions underestimated the level of importance of the same construct to the respondents. Further, and perhaps even more pertinent, the importance of the health construct changed (depending on the country) among the various food types when using CAS compared to CATA data. In the US, the importance of health in the dairy category (Table 3.5) increased 6-fold using CAS, whereas it only increased 2-fold for the fruit category (Table A5). These ratios were much more similar, approximately a 2-fold increase for both dairy and fruits, for the other countries in the study, but varied for other categories. In another example, the construct "traditional eating" in China showed large differences in importance for all food groups. However, the effect was much less for the starchy foods category (Table A6) than the protein food category (Table A7), a 3.4-fold vs. 6.2-fold increase, respectively. These changes were also noted for all other countries, but the differences among food groups were less with Brazil showing almost no variation among food groups. Quite large differences among CAS and CATA were noted for some other motivations, but those typically involved motivations where consumers actually chose that motivation infrequently in CATA. These findings point out a research gap for the validation of the CAS and

CATA results using qualitative studies such as focus groups with respective populations to determine the level of accuracy that each question format provides.

Table 3.5. Ratios of CAS "agree" responses to CATA "agree" responses and standard indices of importance for CAS and CATA "agree" responses for each motivation construct to the liking construct for dairy foods in all five countries.

	USA			Brazil			Spain			India			China		
	R	S	T	R	S	T	R	S	T	R	S	T	R	S	T
Liking	2.1	1.00	1.00	1.9	1.00	1.00	1.7	1.00	1.00	2.7	1.00	1.00	3.4	1.00	1.00
Habits	3.1	0.87	0.59	2.3	0.86	0.71	2.4	0.95	0.67	3.9	1.03	0.71	3.4	0.94	0.95
Need/Hunger	3.6	0.72	0.41	2.8	0.69	0.46	3.2	0.76	0.39	3.6	0.95	0.71	5.8	0.69	0.41
Health	6.1	0.41	0.14	2.2	0.65	0.55	1.9	0.69	0.59	2.4	1.01	1.14	2.9	0.98	1.15
Convenience	3.8	0.85	0.47	2.8	0.71	0.47	2.9	0.78	0.45	4.9	0.92	0.50	4.9	0.79	0.56
Pleasure	2.8	0.76	0.57	3.6	0.59	0.31	2.8	0.71	0.42	4.4	0.97	0.58	5.5	0.60	0.37
Trad. eating	3.2	0.63	0.41	2.1	0.43	0.38	2.8	0.66	0.39	3.4	0.90	0.70	4.6	0.63	0.47
Nat. concern	4.9	0.36	0.15	4.9	0.46	0.18	3.4	0.54	0.27	3.0	1.00	0.89	5.6	0.86	0.52
Sociability	5.1	0.29	0.12	4.4	0.23	0.10	8.9	0.19	0.04	8.9	0.69	0.21	7.3	0.42	0.20
Price	3.6	0.48	0.27	3.9	0.25	0.12	5.3	0.29	0.09	5.6	0.59	0.28	3.9	0.47	0.41
Visual app	6.5	0.45	0.14	9.3	0.17	0.03	9.7	0.30	0.05	4.8	0.77	0.43	8.0	0.56	0.24
Wt. control	4.0	0.27	0.14	4.8	0.32	0.12	2.7	0.34	0.21	5.1	0.76	0.40	4.3	0.76	0.61
Affect regul.	4.9	0.19	0.08	5.0	0.03	0.01	27.0	0.11	0.01	9.8	0.47	0.13	10.1	0.24	0.08
Social norm	8.2	0.26	0.06	3.4	0.21	0.12	3.5	0.23	0.11	7.1	0.59	0.22	7.3	0.45	0.21
Social image	4.8	0.25	0.11	2.5	0.05	0.04	9.6	0.15	0.03	6.2	0.57	0.25	4.7	0.40	0.30
Choice	4.2	0.25	0.12	3.3	0.29	0.17	3.4	0.29	0.14	4.1	0.52	0.34	6.1	0.31	0.17

R = ratio of CAS "agree" responses to CATA "agree" responses, S = standard index of CAS "agree" responses for each construct to liking, and T = standard index of CATA "agree" responses for each construct to liking.

Another way to look at the importance of each construct is to compare its SII. This index, which shows how each construct or attribute compares in importance to the most important construct or attribute (in this case liking), is also shown for each of the five food groups for the five countries in Table 3.5, and Supplementary Materials Tables A5–A8. If the relative importance of each attribute is the same for the two methods, then the SII should be the same between the methods for each construct in each country. This was not the case in this study. Although we might expect some random variation among these values, the *difference* (SII:CAS minus SII:CATA) in the SII index ranges from 0.16 for the USA starch foods category, to 0.82 for that same category in China. This low SII index (0.16) shows some differences among methods but might be reasonably consistent, but the larger one clearly shows a large difference in information provided by the two methods may not be the same. Overall, the difference in the range of SII values within a country and food category is approximately 0.3, which would seem to indicate that the variation is enough to potentially impact subsequent data analysis and interpretation.

The variation in both percentage and index data is critically important because it shows that CAS and CATA are not necessarily providing the same information to researchers. If that is the case, researchers could infer different conclusions using the two methods. It is not a simple matter of getting more “agree” responses using the CAS format, it is a matter of getting both more and different percentages of “agree” responses depending (in this study) on the food category and the motivation. Thus, the suggestion that the primary difference in CAS and CATA is that people simply choose fewer statements or attributes when using CATA as compared to when using CAS is incorrect. This difference in scoring behavior between the two methods is a major issue that requires further investigation.

3.3. Level of importance of consumer eating motivations based on CAS vs. CATA

To determine whether information from the two methods provides different interpretations would require a complete analysis of each country’s data and publication of multiple maps and interpretations for each country. However, an examination of the major themes presented by each set of data can be gained by examining the relative positioning of the constructs consumers chose in the CAS and CATA studies (Table 3.6). Overall, the top five eating motivations were reasonably similar within a country within a food between CAS and CATA. The top motivation, which was liking for almost all foods and countries, was common for both CAS and CATA. Similarly, habits, need/hunger, pleasure, and health typically make up the top five constructs for eating behavior across most foods and countries regardless of whether CAS or CATA is used. Convenience, traditional eating, natural concerns, weight control, visual appeal, and sociability also appeared in various lists depending on the country, the food, and the method used for testing. In general, for so-called Western cultures (USA, Spain, and Brazil), the similarities between CAS and CATA data for the main constructs were similar, with some slight variation in their rankings based on percentage agreement with the statements. This was less true for India and China, where differences in the order of importance of the constructs and differences in which constructs were chosen were more frequent. This suggests that the "big picture" information may change, but not drastically, depending on the method and, in some cases, the cultural use of the two methods.

However, moderately used motivations (e.g., weight control, visual appeal, sociability, choice limitation, and social image) were much more likely to change in their ranked importance between CAS and CATA data within a food category within a country. For example, weight control was more likely to have a higher SII index for CATA than CAS data, pushing it into the "top 5" motivations, suggesting that it had greater importance when using that method.

Table 3.6. Rank of the top five motivation constructs based on percentages within each food group and each country for both CAS and CATA [1].

	USA		**Brazil**		**Spain**		**India**		**China**	
	CAS	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**
Starchy foods										
Liking										
Habits										
Need/Hunger										
Pleasure										
Convenience										
Health										
Trad. Eating										
Nat. Concerns										
Protein foods										
Liking										
Habits										
Need/Hunger										
Pleasure										
Convenience										
Health										
Trad. Eating										
Nat. Concerns										
Visual App.										

Dairy foods										
Liking	purple	purple	purple	purple	purple	purple	yellow	red	purple	red
Habits	red	red	red	red	red	red	purple	green	yellow	yellow
Need/Hunger	blue	blue	green	blue	green			green		
Pleasure	green	yellow			blue	blue	blue			
Convenience	yellow	green	yellow	green	yellow	green			blue	blue
Health			blue	yellow		yellow	red	purple	red	purple
Trad. Eating		blue						yellow		
Nat. Concerns							yellow		green	blue
Wt. Control										green
Fruit										
Liking	purple	purple	purple	purple	purple	purple	purple	red	purple	purple
Habits	yellow	green	red	yellow	yellow	green	yellow	green	red	yellow
Need/Hunger	green	yellow	yellow	green	red	yellow	green	green		
Pleasure		green				blue	blue			
Convenience	red				green				yellow	green
Health	blue	red	green	red	blue	red	red	purple	green	red
Nat. Concerns			blue	blue			blue	yellow	blue	blue
Wt. Control				blue						blue
Desserts										
Liking	purple	purple	purple	purple	purple	purple	purple	purple	purple	purple
Habits	yellow	blue	yellow	yellow	green	green	yellow	yellow	yellow	red
Need/Hunger	green	yellow	blue	green	blue	blue			red	yellow
Pleasure	red	red	red	red	red	yellow	purple	red	yellow	green
Convenience			blue	green						
Trad. Eating	blue	yellow			yellow	red	green	green		green
Visual App.	blue						blue	green	blue	
Sociability			green	green		blue				

[1] Rank color codes for the top five motivation constructs: purple = first position, red = second position, yellow = third position, green = fourth position, and blue = fifth position.

Another potential way to look at the data is to compare it to prior studies using the same basic eating motivation survey. The most similar direct comparison (same CATA questionnaire used in the USA) [30] investigated food groups among people living in the USA. These findings suggested that all foods were eaten primarily because of liking. Need and hunger factored highly into meats, starchy foods, and dairy, with health important to dairy and fruit consumption. Habits for protein foods, convenience for starchy foods, and weight control for fruits were the other highest-ranking motivations. In addition to liking, the sweets category in that study was most influenced by pleasure and choice limitation. In the current survey, CATA findings for the USA showed some similarities and several differences in how respondents perceived the level of importance of each motivation construct for the five food groups that were tested. In both studies, liking was predominant and need and hunger often was key. Other constructs such as convenience, weight control, or health moved around somewhat or disappeared from the top set of motivations in one study or the other for some food groups. Other research in the USA [43] using the same set of constructs (except for choice limitation) and using a scale instead of a CATA measure found that liking, need and hunger, and habit were the three most important constructs with health, convenience, and pleasure next. These authors did not separate foods by groups. In that same study, results from India showed that liking, pleasure, need and hunger, and health were most important. This is somewhat different than the CATA findings from this study, which never showed pleasure in the top five of importance for India except for desserts. In Brazil [44], a study similar to the one from India showed that liking, habits, and need and hunger were the three primary constructs used by consumers to make food choices. Liking and habits were common findings in both that and our study. However, the current study with CATA data for India does not show need and hunger as one of the top three factors for any food, although it does tie for fourth place with fruit and dairy foods. In the CATA portion of this study, factors such as health, traditional eating, and natural concerns are more important. These differences to other studies show that CATA data find similar, but not the same information. These differences could be the result of the question format(s), e.g., the CATA format, or other issues including differences in the populations tested within each country, and differences in the recency of testing (although they were all completed within 5 years of each other).

The differences in response ratio for CAS and CATA in the current study suggest that motivations for eating foods could be shown to be more or less important depending on whether the CAS or CATA question formats were used in online consumer surveys [11]. This would be critical in how consumer data is interpreted and what decisions would be made thereafter. For example, product developers and sensory scientists usually use such data to identify product sensory attributes that drive consumer acceptance to guide product reformulations and product-line extensions. Sensory scientists may apply the CATA and CAS question formats in studies for product claim substantiation and studies that seek to understand more product consumer psychographics. Nutritionists and dietitians use these two question formats in baseline surveys when designing health and nutrition interventions and services for communities. However, without knowing which of the CATA or CAS question formats collects more accurate data, it may be difficult to recommend the use of one question format over the other in future online surveys. Information and interpretation based on these online surveys must be accurate if the consumer researchers are to attain their desired objective. This calls for careful consideration by consumer researchers when choosing to use either CATA or CAS in their online consumer surveys [11].

3.4. Sample or product discrimination

Overall, the total number of cases where the eating motivation constructs had significant differences among the food groups or samples for the CAS question format (n =70) was higher than that of CATA (n = 65) (Table 3.5). This was showcased in three out of the five countries (China, India and the USA). For example, in the USA the CATA question format identified 11 cases where significant differences were found among the samples whereas for CAS the number of significant differences among samples was 14. However, the fact that in Brazil and Spain this was not the case suggests that discrimination among samples by CAS or CATA could depend on the particular country of the respondents. This finding can be key for consumer researchers when designing future online surveys that would investigate characteristics of products or samples that are similar or closely related. Further work is needed to determine impacts of such differences on findings in sensory and consumer behavior studies.

Table 3.7. *p*-values of chi-square analysis for food categories or samples for CAS (A) and CATA (B) data for all eating motivation constructs.

	Brazil		China		India		Spain		USA		TSD	
	A	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
Liking	0.071	0.000*	0.000*	0.001*	0.129	0.007*	< 0.0001*	< 0.0001*	< 0.0001*	0.026*	3	5
Habits	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	0.001*	0.027*	< 0.0001*	< 0.0001*	< 0.0001*	0.001*	5	5
Need/Hunger	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	5	5
Health	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	5	5
Convenience	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	5	5
Pleasure	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	0.578	0.130	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	4	4
Trad.eating	0.279	0.006*	< 0.0001*	< 0.0001*	0.020*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	0.691	4	4
Nat.concern	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	5	5
Sociability	< 0.0001*	< 0.0001*	0.007*	0.798	0.944	0.001*	< 0.0001*	< 0.0001*	< 0.0001*	0.014*	4	4
Price	0.001*	< 0.0001*	0.000*	0.001*	0.000*	0.002*	< 0.0001*	0.004*	< 0.0001*	0.000*	5	5
Visual app	< 0.0001*	< 0.0001*	0.000*	0.070	0.010*	0.214	< 0.0001*	< 0.0001*	< 0.0001*	0.297	5	2
Wt.control	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	< 0.0001*	5	5
Affect regul.	< 0.0001*	< 0.0001*	< 0.0001*	0.342	< 0.0001*	0.033*	< 0.0001*	0.056	0.010*	0.156	5	2
Social norms	0.000*	0.022*	0.250	0.028*	0.016*	0.820	0.221	0.000*	0.037*	0.034*	3	4
Social image	0.039*	0.691	0.791	0.001*	0.000*	0.159	0.127	0.009*	0.718	0.119	3	3
Choice limit	< 0.0001*	0.000*	< 0.0001*	0.073	0.007*	0.264	< 0.0001*	< 0.0001*	0.177	0.147	4	2
TSD	14	15	14	12	13	11	14	15	14	11	70	65

A = CAS, B = CATA, TSD = Total Significant Differences

*p-values were lower than the significance level alpha = 0.05, implying particular mean scores among the food categories within a question format differed significantly.

3.5. Mean duration, Just About Right (JAR) rating, consumer liking, and incompletion rates for CAS and CATA

The average mean duration to complete the CAS and CATA questions were found to be significantly different for countries such as the USA, China, and Spain. For these three countries, it took the respondents significantly longer to complete the CAS questionnaire than the CATA questionnaire (Table 3.7). Smyth et al. [10] attributed the longer times taken to complete the CAS questions to the demand for deeper thought processes, as stated by Sudman and bardburn [1], and also the time consumed when selecting the disagree or "no" options, which was not the case for the CATA format of the survey. There was, however, no difference in the mean time required to complete both the CAS and CATA questions for respondents in Brazil and India. Both of these countries took longer to complete the questionnaire than respondents in other countries.

Table 3.8. Means [1] and *p*-values for the survey mean duration for CAS and CATA per country.

	Brazil	**China**	**India**	**Spain**	**USA**
CAS	33.6	24.5	32.9	23.6	20.9
CATA	32.9	14.7	28.0	17.7	12.4
p-value	0.7576	<0.0001 *	0.3718	0.0044 *	<0.0001 *

[1] Mean duration in minutes; * *p*-values with an asterisk indicate that CAS and CATA LS means differed significantly ($p \leq 0.05$).

Respondents in the USA, Spain, China, and Brazil rated the CAS format as a little too long and the CATA format as just about right (Table 3.8). This partly explained the significantly higher scores for survey liking that the respondents in these countries expressed for the CATA format when they were asked about how they felt about the survey experience (Table 3.9). Although respondents in India also liked the CATA format more than the CAS format of the survey, they did not have a significant difference in the length of the two question formats of the survey.

Table 3.9. Means† and p-values for just about right ratings for CAS and CATA per country.

	Brazil	**China**	**India**	**Spain**	**USA**
CAS	4.9	4.8	3.6	5.1	4.6
CATA	4.3	4.3	3.7	4.3	4.2
p-values	<0.0001 *	<0.0001 *	0.960	<0.0001 *	<0.0001 *

† Seven-point scale; 1 = much too short, 4 = just about right (JAR), and 7 = much too long; * *p*-values with an asterisk indicate that CAS and CATA LS means differed significantly ($p \leq 0.05$).

Table 3.10. Means † and *p*-values for survey liking for CAS and CATA per country.

	Brazil	**China**	**India**	**Spain**	**USA**
CAS	4.1	3.7	4.1	3.9	3.8
CATA	4.4	3.9	4.3	4.2	4.1
p-value	<0.0001 *	0.003 *	0.024	<0.0001 *	0.000 *

† Five-point scale; 1 = I hated taking it, 3 = I have no feelings either way, and 5 = I liked it a lot; * *p*-values with an asterisk indicate that CAS and CATA LS means differed significantly ($p \leq 0.05$).

The CAS version of the survey had a higher percentage of incomplete responses as compared to the CATA questionnaire (Figure 3.1). This was highlighted in India where the rate of survey completion for CAS was less than 50% as compared to the 95% completion rate for the CATA questionnaire in the same country. Such information must be considered as part of the overall planning for studies. However, completion rates and consumer liking of questionnaires should never be used as a reason to change a questionnaire format to one that collects data if the format will provide less or lower quality data and information.

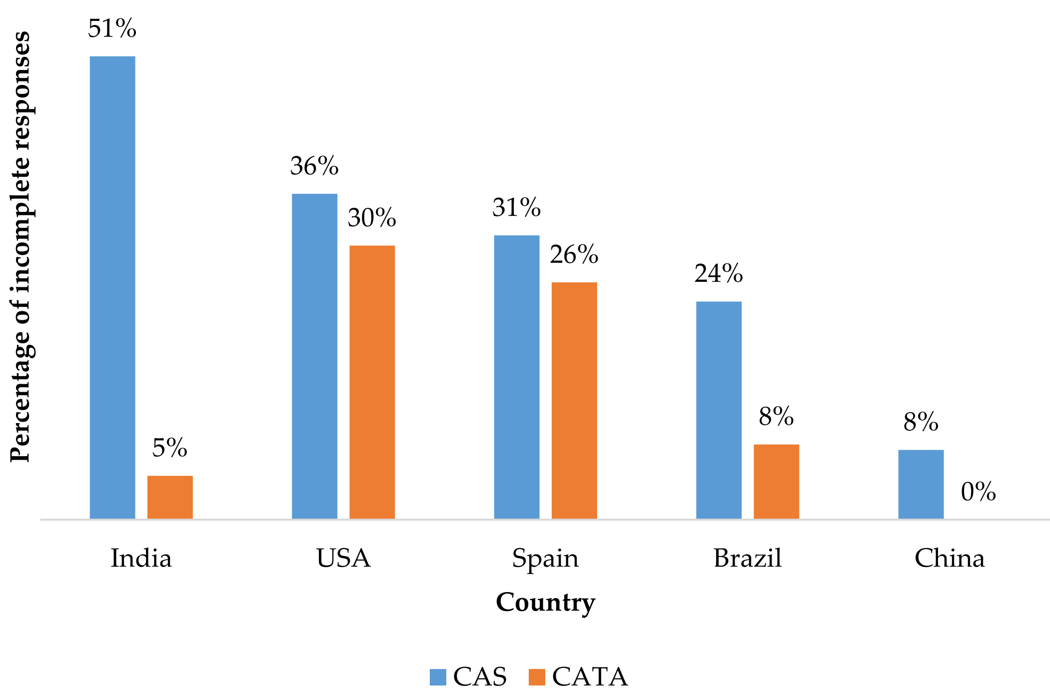

Figure 3.1. Percentage of incomplete responses for CAS and CATA per country[1]. [1] Incompete questionnaires were not accepted or used and were not counted in the approximately 200 responses received per country per questionnaire type.

3.6. Survey limitations

This study has several limitations that must be considered when comparing the methods, food groups, and countries. First, except for the fruits and vegetables food group, where the banana was tested in all five countries, some different food items were used to test the other food groups in the countries. Differences in products chosen, such as potato for the USA and rice for all other countries, could have affected the reliability of the findings between countries in the online survey. However, specific differences among countries were not the focus of this study and the use of commonly eaten foods in each country likely was more critical to this study than a consistent food for each country that few people in a country might eat. Consumer researchers designing future similar studies may choose to have half of the products the same for all locations and the other half custom picked to match the individual locations that are being investigated. Such information might increase the cross-country comparison reliability, but would also double the size of the sample needed.

A more meaningful limitation is that all respondents who completed this survey in the five countries were literate and had access to the internet. This indicates that parts of the population(s) who were illiterate or had no access to the internet at the time of fielding were not included. Access is a common problem with surveys and each survey type has limitations related to its method of fielding. In this study, although the population was technically “national”, most databases for online surveys have a preponderance of consumers with higher than average access to the internet. Survey respondents are also literate, have time and are willing to take an online survey, and can be distracted by other influences during the testing, which can slow them down or result in them becoming more frustrated with surveys that are more time consuming or more difficult to complete. Similar future international research surveys could be extended to include the responses of people who may not have access to the internet or be conducted in areas with more limited access to testing. However, survey location is a limitation of in-person surveys that usually are conducted in only one or a few locations, which provides a limited sample. For people who are unable to read, the survey can be read to them, either by telephone (if available) or in person. Such in-person, one-on-one testing has been reported, particularly in countries where literacy rates are low, but typically is not used for most survey research because of the large increase in resources required for such testing.

4. Conclusions

This online survey confirmed that the CAS question format provided more “apply” responses per attribute construct as compared to the CATA questionnaire format. Further, the response ratio of CATA to CAS responses was found to be different for each motivation construct, each food group, and for each country. This suggested that the level of importance that was accorded by the respondents to each motivation construct though similar in a few cases differed largely depending on whether the CAS or CATA question format was used in the online survey. The SII varied greatly within the CAS format and varied less for the CATA format, implying that the CAS format was much more discriminating among the motivation constructs than the CATA format. Although the overall “big picture” of the main constructs may appear similar when examining the ratios, the constructs that were not part of the top five appear to vary more, which alludes to differences in interpretation that may occur when the two methods are used and detailed information is needed.

This study suggests that more research is needed before consumer researchers can use the CATA and CAS formats interchangeably in their online survey questionnaires. The work highlights a need for additional research to understand the reasons for the large discrepancies in responses in the two methods. Such research is needed to determine which method, if either, provides a more accurate assessment of consumers’ determination of the importance or presence of characteristics such as motivations for eating to more effectively guide consumer researchers on when best to use either question format in future studies.

Appendix A

Table A1. Percentage of "agree" responses for CAS and CATA for all five countries for the respective protein-rich foods.*

	USA		Brazil		Spain		India		China	
	CAS	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**
Liking	93	49	97	56	95	70	82	35	86	31
Habits	74	25	89	43	84	37	82	25	57	16
Need/Hunger	74	25	79	30	75	27	72	13	65	19
Health	26	6	62	30	58	19	81	31	37	9
Convenience	68	21	42	15	64	23	72	19	29	4
Pleasure	74	28	52	16	78	44	72	17	62	17
Trad. eating	57	15	43	21	74	25	69	22	46	7
Nat. concern	31	6	52	12	53	15	77	23	42	5
Sociability	34	8	29	8	46	11	53	8	38	6
Price	45	12	22	5	15	2	44	8	24	3
Visual app	51	6	17	4	41	9	57	13	50	8
Wt. control	20	4	30	11	32	6	60	18	20	3
Affect regul.	16	3	4	0	9	1	32	5	18	2
Social norm	21	4	25	8	19	2	43	6	33	4
social image	24	5	7	2	18	3	41	6	28	3
Choice	28	6	44	17	31	9	51	12	24	4

* All percentages within a country and construct (e.g., CAS vs. CATA for liking in the USA) were significantly different ($p \leq 0.01$).

Table A2. Percentage of "agree" responses for CAS and CATA for all five countries for the respective milk and dairy foods.*

	USA		Brazil		Spain		India		China	
	CAS	CATA	CAS	CATA	CAS	CATA	CAS	CATA	CAS	CATA
Liking	84	41	95	51	92	55	78	29	76	22
Habits	73	24	82	36	87	37	80	21	72	21
Need/Hunger	61	17	66	23	70	22	74	21	53	9
Health	34	6	62	28	63	33	79	33	75	26
Convenience	71	19	67	24	72	25	72	15	60	12
Pleasure	64	23	57	16	65	23	75	17	46	8
Trad. eating	53	17	41	19	61	22	70	20	48	10
Nat. concern	31	6	44	9	50	15	78	26	66	12
Sociability	25	5	22	5	18	2	54	6	32	4
Price	40	11	24	6	27	5	46	8	36	9
Visual appeal	38	6	16	2	28	3	60	12	43	5
Wt. control	23	6	30	6	32	12	59	12	58	14
Affect reg.	16	3	3	1	10	0	37	4	19	2
Social norm	22	3	20	6	21	6	46	6	35	5
social image	21	4	5	2	14	1	45	7	31	7
Choice	32	8	42	13	39	12	61	15	35	6

* All percentages within a country and construct (e.g., CAS vs. CATA for liking in the USA) were significantly different ($p \leq 0.01$).

Table A3. Percentage of "agree" responses for CAS and CATA for all five countries for fruit.*

	USA		Brazil		Spain		India		China	
	CAS	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**
Liking	89	43	97	58	91	62	80	28	76	27
Habits	74	22	81	39	80	31	77	21	70	20
Need/Hunger	72	25	79	35	83	36	76	21	53	10
Health	63	28	74	40	73	41	79	32	66	25
Convenience	77	21	65	18	75	23	63	10	68	16
Pleasure	62	22	58	18	72	27	74	17	47	11
Trad. eating	38	14	38	18	52	14	64	15	39	8
Nat. concerns	52	17	66	22	64	24	74	24	64	13
Sociability	19	5	20	3	18	2	53	8	33	4
Price	48	13	32	15	27	5	54	12	34	8
Visual appeal	34	6	19	3	34	5	57	12	44	5
Wt. control	48	13	52	22	36	14	63	16	54	13
Affect reg.	15	4	7	0	11	1	38	5	19	3
Social norm	24	6	25	9	21	4	46	6	38	5
social image	23	7	8	2	13	1	44	7	30	7
Choice	31	10	38	13	30	11	56	10	30	6

* All percentages within a country and construct (e.g., CAS vs. CATA for liking in the USA) were significantly different ($p \leq 0.01$).

Table A4. Percentage of "agree" responses for CAS and CATA for all five countries for the respective desserts.*

	USA		Brazil		Spain		India		China	
	CAS	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**
Liking	86	41	97	60	92	51	76	35	74	25
Habits	61	15	59	20	68	22	73	19	56	15
Need/Hunger	51	16	44	15	55	16	64	15	66	13
Health	19	3	14	3	28	4	54	11	38	8
Convenience	35	7	44	13	49	8	54	10	46	9
Pleasure	79	38	67	27	83	37	76	21	56	10
Trad. eating	49	16	39	15	75	38	66	13	49	10
Nat. concerns	25	5	16	2	38	7	54	10	44	5
Sociability	34	7	47	15	48	16	54	12	31	5
Price	25	5	22	4	15	2	48	9	40	8
Visual appeal	49	8	34	9	45	10	65	15	55	6
Wt. control	15	2	7	1	17	1	48	8	34	3
Affect reg.	22	5	27	5	16	2	40	7	31	4
Social norm	25	6	16	5	21	3	47	6	41	4
social image	25	7	11	3	19	4	50	9	31	8
Choice	26	6	21	6	17	3	50	12	35	6

* All percentages within a country and construct (e.g., CAS vs. CATA for liking in the USA) were significantly different ($p \leq 0.01$).

Table A5. Ratios of CAS "agree" responses to CATA "agree" responses and standard indices of importance for CAS and CATA "agree" responses for each motivation construct to the liking construct for fruits and vegetables in all five countries.

	USA			Brazil			Spain			India			China		
	R	S	T	R	S	T	R	S	T	R	S	T	R	S	T
Liking	2.1	1.00	1.00	1.7	1.00	1.00	1.5	1.00	1.00	2.9	1.00	1.00	2.8	1.00	1.00
Habits	3.3	0.83	0.52	2.1	0.84	0.67	2.6	0.88	0.50	3.7	0.97	0.74	3.6	0.93	0.73
Need/Hunger	2.9	0.81	0.57	2.3	0.82	0.60	2.3	0.91	0.58	3.7	0.96	0.74	5.5	0.70	0.35
Health	2.2	0.71	0.66	1.9	0.77	0.69	1.8	0.81	0.66	2.5	1.00	1.14	2.7	0.87	0.92
Convenience	3.6	0.86	0.49	3.5	0.67	0.32	3.2	0.82	0.38	6.3	0.79	0.36	4.3	0.90	0.59
Pleasure	2.8	0.69	0.51	3.2	0.60	0.31	2.7	0.79	0.43	4.4	0.93	0.60	4.2	0.62	0.42
Trad. eating	2.7	0.42	0.33	2.1	0.39	0.31	3.8	0.57	0.22	4.2	0.81	0.55	5.0	0.52	0.29
Nat. concerns	3.1	0.59	0.38	3.0	0.68	0.38	2.6	0.70	0.39	3.1	0.93	0.86	4.8	0.84	0.49
Sociability	4.1	0.22	0.11	6.0	0.21	0.06	9.0	0.20	0.03	6.9	0.66	0.28	8.1	0.43	0.15
Price	3.6	0.54	0.31	2.1	0.33	0.26	5.5	0.29	0.08	4.3	0.68	0.45	4.1	0.45	0.31
Visual app	5.3	0.38	0.15	6.1	0.19	0.05	6.6	0.38	0.08	4.8	0.72	0.43	8.4	0.59	0.19
Wt. control	3.6	0.54	0.31	2.3	0.53	0.39	2.6	0.39	0.22	4.0	0.79	0.56	4.3	0.72	0.47
Affect regul.	3.9	0.17	0.09	18.5	0.07	0.01	8.8	0.12	0.02	7.3	0.48	0.19	7.1	0.25	0.10
Social norm	3.9	0.27	0.14	2.8	0.26	0.16	4.9	0.23	0.07	7.9	0.58	0.21	7.0	0.50	0.20
Social image	3.2	0.26	0.17	4.4	0.08	0.03	12.3	0.15	0.02	6.8	0.56	0.23	4.5	0.39	0.25
Choice	3.3	0.24	0.15	2.9	0.26	0.15	2.9	0.22	0.11	5.6	0.47	0.24	5.1	0.27	0.14

R = ratio of CAS "agree" responses to CATA "agree" responses, S = standard index of CAS "agree" responses for each construct to liking, and T = standard index of CATA "agree" responses for each construct to liking.

Table A6. Ratios of CAS "agree" responses to CATA "agree" responses and standard indices of importance for CAS and CATA "agree" responses for each motivation construct to the liking construct for starch-rich foods in all five countries.

	USA			Brazil			Spain			India			China		
	R	S	T	R	S	T	R	S	T	R	S	T	R	S	T
Liking	2.1	1.00	1.00	1.9	1.00	1.00	1.6	1.00	1.00	2.6	1.00	1.00	3.7	1.00	1.00
Habits	3.1	0.73	0.50	2.1	0.94	0.88	2.2	0.76	0.53	3.3	1.02	0.80	2.5	1.11	1.60
Need/Hunger	3.1	0.77	0.52	2.9	0.80	0.54	3.4	0.79	0.36	4.9	0.92	0.48	4.1	1.03	0.92
Health	3.7	0.49	0.28	2.8	0.58	0.41	2.9	0.52	0.28	3.3	0.93	0.74	3.8	0.84	0.80
Convenience	2.5	0.69	0.58	2.3	0.67	0.56	3.0	0.27	0.14	3.4	0.91	0.70	3.8	0.91	0.88
Pleasure	2.8	0.69	0.53	4.0	0.57	0.28	2.5	0.81	0.50	3.7	0.93	0.65	6.3	0.58	0.34
Trad. eating	3.4	0.51	0.32	1.8	0.46	0.49	2.5	0.73	0.45	3.1	0.90	0.76	3.4	0.83	0.90
Nat. concern	3.9	0.50	0.27	4.1	0.53	0.25	5.6	0.50	0.14	3.9	0.93	0.62	4.9	0.84	0.63
Sociability	5.5	0.23	0.09	3.7	0.34	0.18	3.9	0.53	0.21	5.8	0.65	0.29	8.5	0.54	0.23
Price	3.4	0.47	0.29	3.4	0.31	0.17	5.4	0.15	0.04	6.2	0.53	0.23	6.1	0.46	0.27
Visual app.	4.5	0.41	0.19	4.9	0.16	0.06	3.7	0.37	0.16	4.9	0.70	0.37	9.5	0.53	0.20
Wt. control	4.3	0.37	0.18	2.7	0.34	0.24	4.0	0.15	0.06	4.2	0.69	0.42	4.8	0.55	0.42
Affect regul.	5.0	0.15	0.06	4.3	0.03	0.01	24.8	0.04	0.00	8.2	0.35	0.11	6.8	0.20	0.11
Social norm	4.5	0.19	0.09	3.5	0.20	0.11	7.3	0.17	0.04	7.5	0.49	0.17	4.8	0.49	0.38
Social image	5.3	0.25	0.10	4.0	0.09	0.04	4.3	0.16	0.06	7.1	0.47	0.17	10.5	0.42	0.15
Choice	4.8	0.18	0.08	3.9	0.30	0.15	9.0	0.13	0.02	4.2	0.43	0.26	5.3	0.42	0.29

R = ratio of CAS "agree" responses to CATA "agree" responses, S = standard index of CAS "agree" responses for each construct to liking, and T = standard index of CATA "agree" responses for each construct to liking.

Table A7. Ratios of CAS "agree" responses to CATA "agree" responses and standard indices of importance for CAS and CATA "agree" responses for each motivation construct to the liking construct for protein-rich foods in all five countries.

	USA			Brazil			Spain			India			China		
	R	S	T	R	S	T	R	S	T	R	S	T	R	S	T
Liking	1.9	1.00	1.00	1.7	1.00	1.00	1.4	1.00	1.00	2.3	1.00	1.00	2.8	1.00	1.00
Habits	2.9	0.79	0.51	2.1	0.92	0.77	2.3	0.88	0.53	3.3	1.00	0.71	3.6	0.67	0.52
Need/Hunger	2.9	0.79	0.51	2.6	0.82	0.54	2.8	0.79	0.38	5.4	0.88	0.38	3.5	0.76	0.61
Health	4.5	0.28	0.12	2.0	0.64	0.54	3.0	0.61	0.28	2.6	0.99	0.89	4.0	0.43	0.30
Convenience	3.3	0.73	0.42	2.9	0.43	0.26	2.8	0.68	0.33	3.8	0.88	0.55	7.3	0.34	0.13
Pleasure	2.6	0.79	0.58	3.2	0.54	0.29	1.8	0.82	0.63	4.2	0.89	0.50	3.5	0.72	0.57
Trad. eating	3.7	0.62	0.31	2.0	0.44	0.38	2.9	0.78	0.36	3.2	0.85	0.62	6.2	0.54	0.24
Nat. concern	4.9	0.33	0.13	4.4	0.53	0.21	3.5	0.56	0.22	3.3	0.95	0.67	8.8	0.49	0.16
Sociability	4.4	0.37	0.16	3.6	0.30	0.15	4.1	0.48	0.16	6.4	0.65	0.23	6.9	0.44	0.18
Price	3.8	0.49	0.24	4.9	0.23	0.08	8.1	0.16	0.03	5.8	0.55	0.22	6.9	0.28	0.11
Visual app.	8.2	0.55	0.13	4.6	0.18	0.07	4.7	0.43	0.13	4.3	0.69	0.38	6.3	0.59	0.26
Wt. control	5.7	0.22	0.07	2.6	0.31	0.20	4.9	0.33	0.09	3.4	0.73	0.50	5.7	0.23	0.11
Affect regul.	5.3	0.17	0.06	11.0	0.04	0.01	13.6	0.10	0.01	5.9	0.40	0.16	10.5	0.21	0.06
Social norm	5.3	0.23	0.08	3.3	0.26	0.14	12.2	0.20	0.02	7.8	0.53	0.16	8.7	0.39	0.12
Social image	4.9	0.26	0.10	3.1	0.08	0.04	5.3	0.19	0.05	6.6	0.50	0.18	8.7	0.33	0.11
Choice	4.5	0.20	0.08	2.6	0.30	0.20	3.6	0.22	0.08	4.4	0.42	0.22	6.0	0.19	0.09

R = ratio of CAS “agree” responses to CATA “agree” responses, S = standard index of CAS “agree” responses for each construct to liking, and T = standard index of CATA “agree” responses for each construct to liking.

Table A8. Ratios of CAS “agree” responses to CATA “agree” responses standard indices of importance for CAS and CATA “agree” responses for each motivation construct to the liking construct for desserts in all five countries.

	USA			Brazil			Spain			India			China		
	R	S	T	R	S	T	R	S	T	R	S	T	R	S	T
Liking	2.1	1.00	1.00	1.6	1.00	1.00	1.8	1.00	1.00	2.2	1.00	1.00	3.0	1.00	1.00
Habits	4.1	0.71	0.36	2.9	0.61	0.34	3.1	0.74	0.43	3.8	0.97	0.55	3.8	0.77	0.60
Need/Hunger	3.2	0.59	0.39	3.0	0.45	0.24	3.4	0.60	0.32	4.4	0.84	0.42	5.1	0.89	0.53
Health	7.2	0.22	0.06	4.3	0.15	0.05	7.4	0.31	0.07	5.0	0.71	0.31	4.8	0.52	0.33
Convenience	5.3	0.41	0.16	3.3	0.46	0.22	6.0	0.53	0.16	5.2	0.71	0.30	5.1	0.62	0.36
Pleasure	2.1	0.92	0.92	2.5	0.69	0.44	2.2	0.91	0.73	3.6	1.01	0.61	5.5	0.75	0.41
Trad. eating	3.1	0.57	0.39	2.5	0.40	0.25	2.0	0.82	0.75	4.9	0.87	0.39	4.8	0.66	0.41
Nat. concerns	5.6	0.30	0.11	7.0	0.16	0.04	5.3	0.41	0.14	5.4	0.72	0.29	9.6	0.60	0.19
Sociability	4.6	0.40	0.18	3.1	0.49	0.25	3.1	0.52	0.31	4.4	0.72	0.35	5.9	0.42	0.21
Price	5.1	0.30	0.12	5.6	0.22	0.06	7.3	0.16	0.04	5.4	0.63	0.26	4.8	0.54	0.34
Visual appeal	6.0	0.57	0.20	3.6	0.35	0.15	4.3	0.49	0.20	4.2	0.86	0.44	8.4	0.74	0.26
Wt. control	7.1	0.18	0.05	5.3	0.07	0.02	33.6	0.18	0.01	5.7	0.63	0.24	11.1	0.46	0.13
Affect reg.	4.1	0.26	0.13	5.0	0.27	0.09	10.3	0.17	0.03	5.9	0.53	0.19	8.4	0.42	0.15
Social norm	4.3	0.30	0.14	3.3	0.16	0.08	7.5	0.23	0.05	7.3	0.62	0.18	10.3	0.56	0.16
social image	3.8	0.30	0.16	3.6	0.11	0.05	4.9	0.20	0.07	5.8	0.66	0.25	4.0	0.42	0.31
Choice	4.4	0.20	0.10	3.8	0.14	0.06	6.4	0.12	0.03	4.2	0.44	0.22	6.2	0.31	0.15

R = ratio of CAS “agree” responses to CATA “agree” responses, S = standard index of CAS “agree” responses for each construct to liking, and T = standard index of CATA “agree” responses for each construct to liking.

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Chapter 4 - Comparing the Rate-All-That-Apply and Rate-All-Statements Question Formats across Five Countries

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Abstract

Rate All That Apply (RATA) is a derivative of the popularly used Check-All-That-Apply (CATA) question format. For RATA, consumers select all terms or statements that apply from a given list and then continue to rate those selected based on how much they apply. With Rate All Statements (RATING), a widely used standard format for testing, consumers are asked to rate all terms or statements according to how much they apply. Little is known of how the RATA and RATING question formats compare in terms of aspects such as attribute discrimination and sample differentiation. An online survey using either a RATA or RATING question format was conducted in five countries (Brazil, China, India, Spain, and the USA). Each respondent was randomly assigned one of the two question formats (n = 200 per country per format). Motivations for eating items that belong to five food groups (starch-rich, protein-rich, dairy, fruits and vegetables, and desserts) were assessed. More "apply" responses were found for all eating motivation constructs within RATING data than RATA data. Additionally, the standard indices showed that RATING discriminated more among motivations than RATA. Further, the RATING question format showed better discrimination ability among samples for all motivation constructs than RATA within all five countries. Generally, mean scores for motivations were higher when RATA was used, suggesting that consumers who might choose low numbers in the RATING method decide not to

check the term in RATA. More investigation into the validity of RATA and RATING data is needed before use of either question format over the other can be recommended.

1. Introduction

In quantitative consumer research, several question formats are used to collect respondents' product descriptions and perceptions, opinions, beliefs and attitudes (POBAs). Questionnaires for consumer studies (e.g., online surveys, central location tests, and home-use tests) may include the highly popular Check-All-That-Apply (CATA) [1–3], or Check-All-Statements (CAS) [2,4–6], or RATING questions [7–10], or the Rate-All-That-Apply (RATA) questions [3,11–14].

For the Check-All-That-Apply (CATA) or Mark-All-That-Apply format, respondents select all attributes or statements that apply from a given list. Easy and non-tedious are the key reasons why CATA has gained popularity in recent years [2,15–18]. However, there is criticism of this question format because of the equivocal interpretations of the unchecked attributes on the listed options [1,4,5,19]. Conversely, the Check-All-Statements (CAS) or the forced-choice yes/no questions require respondents to provide a response (e.g., yes/no or agree/disagree) for each attribute or statement to show that it applies or does not apply. Although CAS is immune to primacy bias (attributes at the top of the list are marked more frequently than those at the bottom of the list), which is prevalent with CATA questions, CAS has been associated with acquiescence bias, where respondents tend to mark or agree with the positive connotation for all survey questions [1,4,20–22].

1.1. Rate-All-Statements (RATING)

The Rate-All-Statements (RAS) or simply the RATING question format uses intensity, or degree, scales to rate consumers' responses for each attribute or term in relation to the particular product(s) that are being investigated [7,9]. Cognitive psychologists and other consumer researchers have for over five decades considered the RATING question format as the gold standard for measuring the intensity or degree of importance or applicability of product attributes [8,23–27]. Unipolar and bipolar scales (i.e., present different degrees of one attribute and another set of degrees of the opposite attribute) are usually used with the RATING question format [28–32]. Lengths of these intensity scales can vary depending on the objective of the consumer study and the desired level of scale sensitivity or discrimination [28]. For example, an intensity scale can have 5 points, i.e., not at all important, slightly important, moderately important, very important, and extremely important, but can also be shorter, with just 3 points (low, medium, and high) [3,12].

Stevens [26] recommended that interval-scale data such as intensity, degree, or Likert scales can be analyzed using parametric tests which comprise arithmetic means with t-tests or analysis of variance (ANOVA) to determine significance. The numerical value assigned to each node of the intensity scale allows for linear transformation of the data without loss of information [26]. However, treating these ordinal scales as interval scales has been met with controversy by various authors [33–37] who advocate for the use of non-parametric tests (e.g., chi-square tests and Spearman’s Rho) to analyze the ordinal data. One advantage of the RATING question format is that its scales collect more detail and also provide for ranking of respondents’ opinions, something that is not the case for other question formats such as CAS and CATA question formats, where respondents provide either a yes/no response and a simple check for those terms that apply, respectively. Further, scales used for RATING questions are usually anchored on one end, with terms such as “strongly disagree”, “never”, “none” and “not important at all” which give the respondent an “out” in case they do not find the particular term or attribute important or applicable to the product that is being examined. One notable disadvantage for the RATING question format is that accuracy of responses could be impacted based on the subject or topic being assessed. For instance, it is possible that respondents may provide incorrect responses to socially sensitive questions (e.g., child abuse behavior and sexual habits) [38]. Further, considering that the RATING question format requires a greater thought process than other question formats such as CATA and CAS, it is possible that the consumers' survey mean duration could be longer, which could impact the cost of consumer studies, since more time means more money. Similarly, survey incompletion rates (non-response error) for the RATING format could be higher than those of other question formats such as CATA and CAS [39]. Nevertheless, the RATING question format remains the unofficial gold standard for product description questioning in consumer studies [23].

1.2. Rate-All-That-Apply (RATA)

For the Rate-All-That-Apply (RATA) question format, after checking all terms that "apply" from a list of options (that is a CATA question), respondents are asked to rate them using a scale that can be 3–9 points [12–14,40,41]. Put simply, RATA is a combination of the CATA and RATING question formats [14,41]. Ng et al. [41] noted that although the CATA question format has become highly popular in recent years because of its ease and non-tedious structure, its degree of discrimination among samples, particularly among samples of similar profiles, is limited. This inspired the development of a spin-off question format which saw the inclusion of an intensity or degree scale (e.g., 3-point or 5-point scale) onto the CATA question structure [14]. Data collected using RATA questions can be analyzed in two ways. The first method involves treating of RATA responses as CATA data and conducting analyses such as correspondence analysis. The second and recommended way of analyzing RATA data is by treating it as interval-scale data rather than ordinal data [3,12]. As such, unchecked attributes could be coded with a zero. Meyners et al. [12] explains that if a 3-point scale was used to rate the checked terms, it could be treated as a 4-point scale and analyzed using parametric tests such as t-test and analysis of variance

(ANOVA). Ideally, RATA would be expected to benefit from the best features of CATA and RATING, i.e., fairly easier to complete with a lesser burden to respondents than RATING, and enhanced sample discrimination and a more detailed sample description capability than CATA. Additionally, the RATA question format could be associated with CATA limitations such as primacy bias and ambiguity in interpreting unchecked attributes when RATA is used in place of RATING. Vidal et al. [3] who compared CATA and RATA data collected from seven consumer studies found that RATA data were not superior than CATA data. In fact, those authors stated that the use of RATA instead of CATA could be influenced by the overall research objective and the particular sample or product characteristics [3,14]. At the time of writing, there is no research that compared RATA and RATING data in terms of aspects such as discrimination among samples and discrimination among attributes, non-response error (survey incompletion rates) which are important parameters that researchers use determining what question format to use in future consumer studies.

Rapid advancements in information technology in recent years—for example, the increased access to faster and affordable internet in East Asia, North America and Western Europe—have made online or web surveys a popular survey method for consumer researchers in multiple countries [42–45]. Online surveys are a cheaper, faster, and far-reaching (larger numbers of respondents) data collection option than other survey methods such as in-person interviews, telephone interviews or mail surveys. Additionally, the fact that several features can be added to online survey designs (these can include videos, audio clips, and product nutrition information labels) has made online surveys a staple for many consumer researchers [46]. Conrad et al. [47] suggested that inclusion of dialog-like features in web survey designs could improve respondents' understanding of survey questions and accuracy of collected responses. The RATA question format is one possible way of including human dialogue to online surveys.

The overall objective of the current writing was thus to examine the characteristics of data that were collected using the RATA and RATING question formats in an online survey. Comparison of RATA data with data collected using the gold-standard method could provide better understanding of when researchers could use the RATA question format. Additionally, five versions (five languages/countries) of this online survey were conducted to assess the consistency or replicability of the data characteristics for the two question methods. Specific objectives for the questionnaire comparisons were to (a) compare the percentage of "apply" responses for RATA and RATING; (b) compare response distribution based on ratios of "apply" responses; (c) compare the mean scores for eating motivation constructs or terms for each food category within five countries; (d) identify the level of importance accorded to constructs by RATA and RATING question formats; (e) compare the significant differences among food categories or samples for RATA and RATING; (f) compare consumers' survey mean duration, survey liking, just-about-right (JAR) rating, and completion rates for RATA and RATING survey formats.

2. Materials and methods

2.1. Survey structure

An eating motivation survey (EMS) which included questions on consumers' motivations for eating or not eating food items that belong to five food groups was used for this online study [1,7]. The questionnaires were randomly assigned to respondents in either the RATA or RATING formats but not both (each respondent saw only one format). A total of 47 positive motivation terms that could be categorized into 16 eating motivation constructs were assessed in each question format of the EMS [1,7]. Each eating motivation construct consisted of three terms or subscales except for the choice limitation construct that had only two terms. Details on why the authors used the 47 motivation terms and how "apply" responses for the subscales were summarized into 16 constructs has been published previously [1,7]. For the RATA question format, the 47 terms were randomized for each respondent. Additionally, respondents marked the terms that applied and continued to rate how much each of the checked terms applied based on a five-point intensity type scale. The scale was anchored with "not at all important" at one end and "extremely important" at the other with internodes of "slightly important", "moderately important", and "very important". The RATING question format, on the other hand, did not provide an option for the respondents to check what terms applied but rather asked them to rate the level of importance or applicability of each of the 47 terms based on the same five-point Likert intensity scale that was used for the RATA format. RATING questions were not randomized for each respondent. For RATA, all 47 items were presented on a single page for the respondent to Check All That Apply followed by separate pages for individually rating each of the selected terms. As for the RATING question format, five terms were assessed on a single page because of computer screen page limitations. These formats are typical of many on-line or computer-based consumer studies using RATA or rating. The number of respondents and number of terms or attributes that were assessed in the current survey was not unusual. In fact, the literature shows several articles where a similar number of terms or attributes were evaluated [2,4,48–50].

The subject for survey questionnaires was consumers' motivations for eating items that belonged to five food groups. The food groups included foods rich in starch (e.g., potato and rice dishes), proteins (e.g., meat, beans), dairy, fruits, and sweet foods/desserts [48,51]. Authors used food items that fit in these food groups and were relevant to the particular country [7]. For example, in all countries, bananas were used as the fruit. In the case of starch-rich foods, baked potatoes were used for the USA, while paella was used for Spain and white rice was used for Brazil, China, and India. These foods were chosen based on discussions with multiple sensory scientists in each country who reviewed and discussed all the foods chosen in all countries to ensure the products represented the “concept” of the food category as much as possible for that country. Where possible, similar foods were used (e.g., white rice in three countries for “starch-rich foods”), though where the product was not widely consumed in that form (e.g., Spain) or not consumed in a similar form by a large percentage of the population (e.g., USA), alternative products were selected that were more commonly eaten.

The online survey questionnaire also included other questions that were included in the survey timing. For example, two questions that investigated the respondents’ survey experience in terms of respondent liking (a hedonic question) and a rating question based on the perceived length of the survey (a just-about-right or JAR question) were included near the end of the survey. The respondents’ survey liking question and the JAR question were each placed on separate pages. The two survey questionnaires were initially written in English for the respondents in the USA. The approved survey question formats written in American English were then translated into Simplified Mandarin, Hindi, Spanish, and Portuguese for respondents in China, India (English also provided as an option), Spain, and Brazil, respectively. The survey translation process used a variation of the translation, review, adjudication, retesting, and documentation (TRAPD) approach [52,53]. The full procedure for the survey methods, including translation, and the surveys in all five languages have been published previously [7].

All subjects gave their informed consent for inclusion before they participated in this online survey. Additionally, the survey was conducted in accordance with the Declaration of Helsinki, and the protocol was approved by the designated review board at Kansas State University, Manhattan, KS, USA subjects (IRB #7297.2).

2.2. Respondents and recruitment

Respondents in five countries were recruited by Qualtrics, Provo, UT, USA using its or its partners' existing databases. Using the Qualtrics survey software, one format of the survey questionnaire with RATA questions and another with RATING questions were assigned randomly to 400+ respondents per country (N~200 per questionnaire per country) [7]. Respondents were required to be 18 or older and then were recruited to fill demographic quotas of age and gender for each questionnaire format (RATA and RATING). Four age groups (n = 50+ per age group) were used in this study: Generation Z (born in the years 1995 to 2001), millennials (born in the years 1980 to 1994), Generation X (born in the years 1965 to 1979) and baby boomers or boomers (born in the years 1944 to 1964). For each age group, 50% were female and 50% were male. Once the required number of completed responses for a particular quota was filled, newly qualified respondents (for the filled quotas) were discontinued from completing the EMS. Other demographic data that were collected for informational purposes included respondents' level of education and number of adults and number of children in the households (Table 4.1).

Table 4.1. Overview of demographic segmentation of respondents who completed the RATA and RATING question formats of the EMS in all five countries [1].

	Brazil		China		India		Spain		USA	
	A	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
Gender										
Males	100	115	103	100	128	136	106	107	106	105
Females	100	100	107	100	122	137	107	107	102	108
Age Group										
Boomers	50	65	51	49	54	57	52	52	54	54
Generation X	50	50	53	51	67	80	54	54	53	53
Millennials	50	50	52	50	56	62	54	54	53	53
Generation Z	50	50	54	50	73	74	53	54	48	53
Education Level										
Primary school or less	5	5	4	9	10	14	5	2	7	5

High school	96	89	86	68	35	55	111	93	101	86
College or university	99	121	120	123	205	204	97	119	100	122
Adults in Household										
One	10	13	7	2	12	14	1	0	47	56
Two or more	190	202	203	198	238	259	212	214	161	157
Children										
None	107	103	85	79	96	106	115	101	119	132
One or more	93	112	125	121	154	167	98	113	89	81

[1] Number of respondents. A = RATA; B = RATING.

The respondents in both samples were selected with "matched" demographics of age and gender within each country. The sample sizes are also reasonably large for each group (>200 per group in each of the five countries) and no characteristic (gender, age, education, household numbers) was significantly different between the two samples from each country. Thus, we conclude that any differences noted between the two question formats are likely driven by the formats and not some inherent bias among the respondents.

2.3. Data analysis

2.3.1. Comparison of percentages of "Apply" responses

Consumers' responses were categorized into two baskets. The first basket was the "apply" basket that included RATA and RATING responses, where consumers rated the motivation terms or subscales as important such as either "slightly important" or "moderately important" or "very important" or "extremely important" to them eating the particular items that belonged to the different food groups. The second basket included the "not at all important" or "not apply" responses for the RATING survey questions. Additionally, this basket consisted of responses for cases where respondents on second thought rated a term as "not at all important" even though they had previously checked it as "apply". Data analyses such as comparisons between RATA and RATING question formats in the current writing focused on the "apply" responses, e.g., percentages of "apply" responses, standard indices for RATA and RATING, and ratios of RATING to RATA.

The percentages of “apply” responses for RATA and RATING for all 16 motivation constructs for all five food groups for all countries were calculated. Additionally, although the current paper focused on comparisons between RATA and RATING data, Check-All-That-Apply (CATA) “apply” percentages based on RATA data were also calculated. Percentages were used because the possible number of ticks/checks varied depending on how many people ate that particular food in a particular country and the number of subscales in the eating motivation category.

2.3.2. Establishment of standard indices for RATA and RATING and ratios of RATING to RATA

Standard indices of importance (SII) of “apply” responses were determined for all motivation constructs versus liking within RATA or RATING survey formats. The standard index of importance is an index value that shows the proportion of the number of “apply” responses for any motivation construct to “apply” responses for the liking motivation [1]. Earlier studies [1,48,49] have shown the Liking construct to be the highest motivation on average. Using liking as the comparison index factor (the denominator in the proportion calculation) within each food group, country, and consumer demographic segment allows a within-sample “variable” to be used to adjust all comparisons and put them on a similar “scale” (typically 0–1.0) [1]. Note, it is possible to exceed 1.0 when a motivation exceeds liking in importance for a group of consumers, although this rarely happened. Put simply, the SII is 1.0 when the “apply” responses for any motivation are equal to the “apply” responses for liking within that method for that group of respondents. Similarly, the SII would be 0.5 when a motivation response is half the number compared to liking and so forth. The index was created using the principles espoused by creators of other indices for psychological phenomena that must be compared across various segments though can vary in response behavior across segments [54,55]. If the RATA and RATING formats were assessing the same behavioral patterns of consumers, then the SII values for CAS and CATA for the different motivation constructs would be similar or relatively close. However, if the SII values for the two formats were different, this would indicate that the questions from the two formats were interpreted, processed, and answered differently by the respondents. Major differences in standard index values for motivations within RATA or RATING would suggest that the results of the two survey formats likely would provide different information to the consumer researchers. Such findings would suggest that RATA and RATING, for various reasons, do not measure the same psychological phenomena or, at a minimum, the results would be interpreted differently [1].

Further, the ratios of percentages of "apply" responses for RATA to RATING were calculated to determine whether the ratio of responses varied or remained the same between the two survey formats.

2.3.3. Comparison of mean Scores for all eating motivation constructs

Meyners et al. [12] recommended the use of mean scores in the analysis of RATA data as opposed to analyzing RATA data as CATA. Two issues had to be addressed when using the RATA rating data. First, in cases where respondents changed their mind, i.e., the respondent checked a motivation term as "apply" but then rated it as "not at all" (suggesting that they should not have checked the term to begin with), that specific data point was included in the analysis as a "1". Second, in cases where none of the motivations within a construct (usually three motivation subscales per construct) were checked by a respondent, a score of "1" (not at all important) was used in the analysis of the overall construct for that consumer.

Two-sample t-tests were used to compare mean scores for RATA and RATING responses for all 16 constructs for all food categories in all five countries with a significance level of $p \leq 0.05$

[3]. Significant differences ($p \leq 0.05$) between means of a particular motivation construct would indicate that not only did the consumers interpret, process and answer the respective questions differently but also the interpretation by researchers could be different.

2.3.4. Identification of the level of importance for motivation constructs

Motivation constructs whose percentage of "apply" responses made the list of top five for the RATA or RATING survey formats for each country for all the five food categories were identified [1]. Similarly, motivation constructs whose mean scores for RATA and RATING were in the top five positions within each food category and each country were also identified.

2.3.5. Comparing significant differences among food categories

Analysis of variance (ANOVA) at a 5% level of significance was used to identify significant differences among the food categories [3,12]. Post hoc mean separation was carried out using Fisher's Least Significant Difference (LSD). This was performed to determine which of the two question formats showed better discrimination ability among samples.

2.3.6. Comparison of survey format completion rates, survey mean duration, survey liking, and survey JAR rating

Percentages of completion rates for consumers who answered either RATA or RATING question formats of the survey were calculated. Additionally, chi-square tests at a 5% level of significance based on counts of incomplete responses for each format in each country were computed. Additionally, two-sample *t*-tests at a 5% level of significance were computed to provide comparisons of survey format means and standard deviations for consumers' survey mean duration, survey liking, and survey JAR rating for each country.

All analyses were run using XLSTAT (version 2020.1, AddinSoft, New York, NY, USA).

3. Results and discussion

3.1. Comparison of percentages of “Apply” responses

In this paper, the term “apply” refers to (a) responses for which the respondents selected motivation terms (in RATA) or (b) marked responses for “extremely important”, “very important”, “moderately important” and “slightly important” for either RATA or RATING survey formats. The RATING question format was associated with a significantly higher percentage of “apply” responses for all 16 motivation constructs for all five food groups in all countries as compared to corresponding CATA and RATA data. For example, In Brazil, CATA and RATA question formats showed that 48% and 47% of respondents, respectively, identified habits as an important motivation for eating starch-rich foods while RATING showed that 94% of corresponding respondents identified the habits construct as important (Table 4.2). Data for protein-rich foods, dairy foods, fruits and vegetables and dessert foods are presented in Appendix Materials Tables A1–A4. A similar case was seen in China, where 80% of RATING question format respondents identified visual appeal as an important motivation for eating white rice (a starch-rich food), whereas only 4% and 3% of CATA and RATA responses, respectively, identified the same construct as important. Seeing that “visual appeal” of starch-rich foods garnered a higher frequency in RATING than RATA in China implies that it may be more important than the RATA or CATA suggest. It is also possible that either the RATING questions overestimated the level of importance of the visual appeal construct or that the RATA questions underestimated the level of importance of the same construct to the respondents.

Table 4.2. Percentage of “apply” responses for CATA, RATA, and RATING for all five countries for the respective starch-rich foods.

	Brazil			**China**			**India**			**Spain**			**USA**		
	C	**D**	**E**	**C**	**D**	**E**	**C**	**D**	**E**	**C**	**D**	**E**	**C**	**D**	**E**
Liking	50	50	97	18	18	96	31	31	95	67	67	97	50	49	97

Habits	48	47	94	30	30	98	25	24	96	35	33	86	23	22	88
Need/Hunger	24	24	94	21	21	97	20	19	93	21	21	95	26	26	91
Health	23	23	85	19	19	95	26	26	94	22	22	84	14	14	79
Convenience	31	31	90	14	14	96	20	20	94	12	11	76	25	24	88
Pleasure	10	10	80	6	6	81	22	22	91	33	33	93	21	21	88
Trad. eating	25	24	68	20	19	92	24	24	92	32	32	85	16	15	72
Nat. concern	14	14	87	11	11	95	24	24	96	14	14	87	10	10	81
Sociability	6	6	68	5	5	84	11	11	85	16	16	82	2	2	53
Price	13	13	75	7	6	78	9	8	78	3	3	66	10	9	81
Visual app	4	4	54	4	3	80	16	16	85	10	10	69	5	5	68
Wt. control	13	13	80	6	6	87	15	15	89	6	6	73	10	10	71
Affect regul.	0	0	26	2	2	53	5	4	65	0	0	36	1	1	40
Social norm	5	5	56	7	7	75	7	7	72	3	3	61	3	3	54
Social image	2	2	33	5	5	76	10	9	72	6	6	50	2	2	46
Choice	15	14	70	13	13	84	16	16	86	4	4	65	5	5	67

C = percentage of "apply" responses for CATA; D = percentage of "apply" responses for RATA; E = percentage of "apply" responses for RATING.

The higher percentage of "apply" responses for the RATING survey format was expected based on multiple aspects, but has important implications for researchers. When consumers show that a term or construct is more applicable in one method than another that shows that the method impacts the interpretation of the information. For example, in the data shown in Table 4.2, only approximately one-quarter of consumers (or less in some countries) using the RATA format indicated that eating starch-rich foods (i.e., rice or potatoes) was motivated by health concerns. In contrast, for the RATING format, more than three-quarters of consumers in each country indicated that eating such foods was motivated by concerns related to "health". Those findings bring vastly different conclusions about the importance of "health" in selecting such foods. Product developers, sensory and marketing scientists, and nutrition and health professionals would use different strategies to encourage or discourage such consumption depending on which method was used for the research. That points to a major problem and discrepancy that needs to be addressed before a decision is made regarding survey methods. Which method is correct? We cannot know from this research and further investigation is needed.

This suggests that the differences may be an artifact of the testing methodology, either from difference in the psychological "threshold" of importance used by consumers in the various methods or in various biases that may be inherent in the methods. RATA respondents checked only terms that "applied" or were important and then continued to rate the level of importance of the selected terms. Not checking a term could be the result of not considering it "important enough" to check. Some respondents may have only checked terms that were of the highest importance to them and, thus, rated only those terms. Inherent biases such as not checking and subsequently not rating a term in RATA because the person did not notice the term can occur [4]. That is impossible in a forced testing method such as RATING. If the consumer was rushed, used a small screen, or simply missed a line of print for example, they could unintentionally not check some terms that otherwise might have "applied". Primacy bias (checking those terms that occur earlier more often than those that occur later) among RATA "apply" responses also can occur even though terms were randomized across the respondents. However, it is possible that this bias could have influenced the total percentage of "apply" responses over all RATA respondents, even though the effect should be small.

It is important to note that the percentage of RATA "apply" responses for all motivation constructs for all food categories in all countries remained the same or reduced slightly when compared to corresponding CATA data. Prior studies [3,14] that compared CATA and RATA data showed that the percentage of "apply" responses for the attributes increased with use of RATA as compared to CATA. There are two possible explanations for this occurrence. Firstly, in those studies [3,14], one group of respondents saw the CATA question format of the survey while the other saw the RATA format, whereas, in the current study, respondents saw only the RATA question and we derived the CATA "apply" responses based on the first task in the RATA format.

This implies that the CATA percentages shown here are part and parcel of the RATA data. Secondly, in some, but not all RATA question formats [3,14], consumers were asked to check terms that applied and then rate those that they had selected on the same page. It is possible that consumers who see the check box and the rating box on the same page are more likely to select "apply" more often. It is possible that the percentage of "apply" responses for RATA responses in the present study was lower because the consumers did not see the rating scale for RATA until after they had checked the "apply" response. However, if that were the case we might have seen increases in "apply" ratings for foods evaluated after the first one since respondents would have learned they would be asked to rate those that they checked as "apply". We did not find that scenario. Regardless of such findings, we note that the focus of the current study were comparisons between RATA and RATING data and not CATA data.

We also found a few cases where RATA respondents changed their minds about the applicability of some motivation terms that they had previously checked as "apply" and instead rated them as "not at all important" or "not apply" for particular foods. This explains the change in percentages of "apply" responses between CATA and RATA (Table 4.2, Appendix Materials Tables A1–A4). For example, in Spain, while 35% of consumers marked the three subscales for the habits construct as an important motivation for them eating starch-rich foods (CATA), 2% of the same consumers changed their minds and rated it as "not apply" or "not at all important" in the rating portion of the RATA format. Thus, the resulting 33% "apply" responses for RATA. This shows that with the RATA question format, respondents took some time to think about their previous choices as they rated the selected terms for applicability for the particular food items something that the CATA question format does not provide for [14]. Nonetheless, just as Vidal et al. [3] stated, the small differences between RATA and CATA that were identified were particular to terms or attributes and food groups.

3.2. Ratios of RATING to RATA and standard indices for RATA and RATING

The fact that the ratio of "apply" responses of RATING to RATA question formats for all 16 constructs was greater than one reiterated our findings that the RATING question format had a higher percentage of "apply" responses as compared to the corresponding RATA data (Table 4.3, Appendix Materials Tables A5–A8). In addition, it was also evident that the importance of eating motivation constructs based on ratios of RATING to RATA varied among the five food groups depending on country. For example, in India, the importance of convenience in the eating of fruits and vegetables (Table A5) increased 12-fold using RATING, whereas it increased approximately only 6-fold for the starch-rich foods (Table A6). For the dairy category (Table 4.3), it increased 10-fold while for both protein-rich (Table A7) and desserts categories (Table A8) it increased 9-fold when the RATING question format was used in India. On the other hand, in China, importance for the convenience construct increased 23-fold for both protein-rich and desserts categories when the RATING survey format was used. Except for the liking motivation, similar variations were also noted for the other motivation constructs among different food groups across the five countries depending on whether RATA or RATING questionnaires were used.

Table 4.3. Ratios of RATING "apply" responses to RATA "apply" responses (R) and standard indices of importance for RATING (S) and RATA (T) "apply" responses for each motivation construct to the liking motivation construct for dairy foods in all five countries.

	Brazil			**China**			**India**			**Spain**			**USA**		
	R	**S**	**T**	**R**	**S**	**T**	**R**	**S**	**T**	**R**	**S**	**T**	**R**	**S**	**T**
Liking	2.1	1.00	1.00	4.9	1.00	1.00	4.2	1.00	1.00	2.4	1.00	1.00	2.5	1.00	1.00
Habits	2.9	0.98	0.72	6.8	0.99	0.72	7.0	1.02	0.61	3.5	0.97	0.66	6.1	0.97	0.40
Need/Hunger	4.5	0.95	0.45	16.0	0.93	0.29	5.0	1.00	0.84	7.4	0.99	0.32	9.3	0.95	0.26
Health	3.6	0.92	0.54	4.3	0.97	1.13	3.7	1.04	1.17	3.3	0.97	0.71	10.7	0.80	0.19
Convenience	4.8	0.91	0.41	9.1	0.92	0.51	10.1	0.99	0.41	5.9	0.92	0.37	9.1	0.95	0.26
Pleasure	7.8	0.81	0.22	15.3	0.86	0.28	6.9	0.97	0.59	7.6	0.88	0.28	5.7	0.92	0.40
Trad. eating	4.0	0.70	0.38	12.0	0.88	0.36	6.4	0.96	0.63	5.5	0.86	0.38	8.3	0.80	0.24

Nat. concern	11.4	0.90	0.17	9.1	0.97	0.53	4.4	1.03	0.99	10.1	0.93	0.22	31.0	0.77	0.06
Sociability	32.7	0.63	0.04	35.8	0.82	0.11	12.9	0.83	0.27	36.3	0.61	0.04	21.6	0.63	0.07
Price	15.5	0.77	0.11	18.4	0.81	0.22	11.8	0.81	0.29	18.6	0.74	0.10	11.5	0.85	0.19
Visual app	42.6	0.55	0.03	17.7	0.85	0.24	9.7	0.89	0.39	21.8	0.64	0.07	23.8	0.75	0.08
Wt. control	12.5	0.83	0.14	10.1	0.93	0.45	7.7	0.96	0.52	15.8	0.86	0.13	39.3	0.71	0.05
Affect regul.	na	0.33	0.00	43.9	0.64	0.07	16.1	0.71	0.19	31.3	0.46	0.04	73.3	0.50	0.02
Social norm	18.1	0.58	0.07	17.8	0.78	0.22	15.1	0.78	0.22	13.7	0.63	0.11	37.9	0.60	0.04
Social image	28.7	0.37	0.03	21.0	0.79	0.19	12.1	0.76	0.26	23.4	0.49	0.05	18.9	0.55	0.07
Choice	8.6	0.72	0.18	15.9	0.85	0.26	9.3	0.91	0.41	9.6	0.79	0.20	17.3	0.76	0.11

R = ratio of RATING "apply" responses to RATA "apply" responses, S = standard index of RATING "apply" responses for each construct to liking, and T = standard index of RATA "apply" responses for each construct to liking. na = not applicable because none of the corresponding construct's terms or subscales were checked.

We did notice, however, that several of the larger differences (30+) in construct importance between RATA and RATING data occurred among motivation constructs that received the lowest ratings overall. Such motivations included; affect regulation, social image, and social norms. It is also worth noting that for food groups such as protein-rich foods, dairy and fruits and vegetables, RATA respondents in Brazil did not consider (neither checked nor rated) any of the three terms or subscales for the affect regulation construct to be important motivations for eating the aforementioned foods (Tables A1–A3). Consequently, the affect regulation construct received zero "apply" responses and zero values for corresponding standard indices of importance for the RATA question format (Table 4.3 and Tables A5 and A7).

Overall the liking motivation construct had a higher percentage of "apply" responses for eating foods from the five food groups across all five countries (Table 4.4 and Appendix Materials Tables A1–A4). It did not matter what question format (whether RATING or RATA) was used, liking was the most important motivation for the consumers. These findings support several earlier studies that found a similar concept [1,49,56].

In consideration of that finding, the authors established standard indices of importance (SII) to identify how the other constructs compared with liking, the greatest motivation construct. A motivation construct found to have closely similar SII values for RATA and RATING would indicate that the relative importance accorded to it by either RATA or RATING were also closely similar [1]. For example, in Brazil, the difference between the two indices (SII:RATING minus SII:RATA) for the habits construct for starch-rich foods (0.05), protein-rich foods (0.2) and the dairy food category (0.26) could be explained as expected random variation among these values. However, the same cannot be said for the corresponding difference for the fruit and vegetables category (0.53) and dessert/sweet food category (0.71) in the same country. Clearly, in this case, consumers interpreted, processed and answered the RATING and RATA questions differently. Similar large differences (SII:RATING minus SII:RATA) were observed for other motivation constructs among the five food groups across all five countries. Further, the differences (SII:RATING minus SII:RATA) in the SII index ranged from 0.28 for the USA protein-rich foods category, to 0.95 for that same category in India. At this point, we found that not only was one survey format providing a significantly higher percentage of "apply" responses but also that the "apply" responses could be different. This strengthens the case for different information being provided by the two question formats which could result in variations in data analysis, interpretation and study conclusions by researchers.

To correctly understand the perceptions, opinions, beliefs and attitudes of consumers, researchers (e.g., sensory scientists, product developers, nutritionists, and marketers) should ask the right questions and, even more importantly, survey questions should be asked in a structure that collects the most accurate responses. Thus, determining what question format to use would be a critical step in the design process for upcoming online consumer studies. For the current study, we did not conduct exit interviews or focus groups (qualitative research studies) with the respondents (both RATA and RATING) from the five countries to validate the respective collected data for accuracy. As such, we could not prove that one survey format underestimated or overestimated the consumers' responses. Further research in the validation of RATING and RATA data is warranted. It must be noted, however, that RATING has been the de facto standard for collecting sensory and consumer behavior data for decades. Although that does not mean that it is, in fact, correct, it does suggest that it is incumbent on authors proposing new methods, such as RATA, to show that the data produced are either similar or better than existing methods.

3.3. Comparison of mean scores for eating motivation constructs

Results showed that mean scores for RATA and RATING data were similar for some attributes (constructs) for some countries and for some food categories. A case in point, both RATA and RATING survey respondents in China and the USA identified the habits eating motivation as very important to their eating of protein-rich foods (Table 4.4), dairy foods (Table A9) and Fruits and vegetables (Table A10). This could imply that in some situations particular respondents (or, in this case, respondents in certain countries) interpreted and processed the subscales or terms for particular constructs similarly for both RATA and RATING survey questions. Put simply, the same level of importance was placed on attributes/constructs in such cases. However, that was not always true. For example, although consumers in the US gave the same degree of importance (moderately important) to the habit construct for starch-rich foods using either format (A11), for dessert foods RATA respondents reported habits to be "very important" while corresponding RATING respondents found it to be "moderately important"(A12).

Table 4.4. Mean scores [1] for RATA and RATING survey formats and *p*-values for the corresponding two-sample *t*-test for each motivation construct for protein-rich foods in all five countries.

	Brazil			China			India			Spain			USA		
	K	L	M	K	L	M	K	L	M	K	L	M	K	L	M
Liking	4.3	4.2	0.063	4.1	3.6	<0.0001 *	4.3	3.8	<0.0001 *	4.1	4.0	0.088	4.2	4.0	0.006 *
Habits	3.8	3.9	0.530	3.3	3.2	0.559	4.2	3.9	0.005 *	3.6	3.3	0.015 *	3.4	3.3	0.375
Need/Hunger	4.3	3.8	<0.0001 *	3.9	3.4	0.001 *	4.3	3.7	<0.0001 *	4.0	3.5	0.000 *	4.0	3.6	0.000 *
Health	4.5	3.6	<0.0001 *	3.9	3.0	<0.0001 *	4.5	3.9	<0.0001 *	4.2	3.3	<0.0001 *	4.4	2.6	<0.0001 *
Convenience	3.8	3.1	0.000 *	3.2	2.8	0.222	4.0	3.6	0.030 *	4.0	3.2	<0.0001 *	3.6	3.3	0.053
Pleasure	4.0	3.1	<0.0001 *	3.7	3.3	0.005 *	4.2	3.7	0.000 *	4.2	3.7	<0.0001 *	4.0	3.7	0.002 *
Trad. eating	3.8	2.7	<0.0001 *	3.2	3.0	0.460	4.2	3.6	<0.0001 *	3.6	3.2	0.001 *	3.5	2.9	0.000 *
Nat. concern	4.4	3.5	<0.0001 *	4.2	3.2	0.009 *	4.4	3.9	<0.0001 *	4.2	3.4	<0.0001 *	4.3	2.7	<0.0001 *
Sociability	4.1	2.6	<0.0001 *	3.9	3.0	0.003*	4.1	3.2	0.000 *	4.0	2.8	<0.0001 *	4.0	2.5	<0.0001 *
Price	4.1	2.8	<0.0001 *	3.2	2.7	0.225	4.0	3.0	<0.0001 *	4.2	2.5	<0.0001 *	3.9	2.9	<0.0001 *
Visual app	3.9	2.3	<0.0001 *	3.8	3.0	0.002 *	4.0	3.4	0.001 *	3.7	2.7	<0.0001 *	3.6	2.8	0.009 *
Wt. control	4.3	3.0	<0.0001 *	3.7	2.7	0.008 *	4.4	3.5	<0.0001 *	4.2	2.7	<0.0001 *	3.8	2.4	0.006 *
Affect regul.	1.0	1.6	0.593	3.1	2.5	0.206	3.7	2.7	0.004 *	4.6	2.0	<0.0001 *	4.8	2.1	<0.0001 *
Social norm	3.8	2.5	<0.0001 *	3.5	2.8	0.062	4.1	2.9	<0.0001 *	4.5	2.4	<0.0001 *	4.0	2.4	0.001 *
Social image	4.0	1.8	<0.0001 *	3.7	2.8	0.009 *	3.9	3.0	0.001 *	4.1	2.3	<0.0001 *	3.9	2.2	<0.0001 *
Choice	4.0	2.9	<0.0001 *	3.4	2.9	0.231	4.3	3.4	<0.0001 *	4.1	2.8	<0.0001 *	4.7	2.6	<0.0001 *

K = mean scores for RATA, L = mean scores for RATING, and M = *p*-values for two-sample *t*-test. [1] Five-point scale: 1 = not at all important, 2 = slightly important, 3 = moderately important, 4 = very important, and 5 = extremely important. * *p*-values were lower than the significance level alpha = 0.05, implying that particular mean scores for RATA and RATING significantly differed.

Except for China, where seven, eight and ten constructs were found to have similar mean scores for the two question formats for the protein-rich, dairy, and dessert food categories, respectively, other countries each had at most only five out of the 16 constructs that had similar mean scores for the two question formats for all food categories. RATA respondents from all countries pointed out that social image was a very important motivation for them eating protein-rich foods. However, corresponding RATING data for consumers in Western societies (Brazil, Spain, and the USA) identified the same construct as slightly important RATING data for China and India categorized social image as “moderately important”. Obviously, it would be illuminating to compare the impact of consumers’ demographic aspects on the RATA and RATING “apply” responses. However, this was not the objective for this paper.

Consumers’ RATA mean scores in Brazil, India, Spain and the USA for close to three-quarters (11/16) of the constructs for all food categories were significantly higher (greater level of importance) than those of corresponding RATING scores. In fact, in Spain, only two motivation constructs had similar mean scores for RATA and RATING for any food categories. At least fourteen had significantly higher mean scores based on RATA questioning as compared to RATING in every food group. This shows that consumer insights gathered using the RATA and the RATING question formats in online survey may not necessarily be the same. We noted also that overall the mean score values for the RATA question format were higher than those of corresponding RATING data for all food groups in all countries. This was true for all constructs except for the habits and convenience constructs regardless of whether the differences were statistically significant or not. There are two explanations for this occurrence. Firstly, the RATA question format requires respondents to select only attributes that are important and then rate the selected terms for “applicability” or level of importance. It can be assumed that all the terms selected at this point do “apply” though they may apply at different levels of importance. The RATING question provides no “opt out” option for but rather asks consumers to rate all statements or terms based on a scale from 1 to 5, where 1 means not at all important. If that score is chosen, the construct mean will decrease. It would appear that for ratings used during RATA, consumers were more likely to choose higher scores for importance since they had already stated that the motivation terms or statements were applicable. Furthermore, the five-point scale that was used included a “not at all important” option, which gave RATA respondents an “out” in case they changed their mind (i.e., checked a term as “apply” but then rated it as “not at all”). Such responses were included in the analysis and were added in as 1, which could increase the mean score slightly for RATA data. The case was not the same for the RATING responses which were treated as is [24–26,57].

We also noted eight cases that were linked to the habits and convenience constructs for particular food categories in Brazil, China and the USA, where the mean score for RATING was slightly higher than the corresponding RATA value. However, of these eight cases, it was only the habits construct under the starch-rich food category in China, where the mean score for RATING significantly differed from that of RATA (Table A11).

It is also important to note that differences between mean scores for RATING and RATA were smaller for constructs that were most frequently used by respondents. In India, for example, the differences for frequently used motivations (e.g., liking (0.52), habits (0.32) and convenience (0.32)) for the protein-rich category were less than the corresponding differences for infrequently used motivations (e.g., social image (0.87), affect regulation (0.96), and weight control (0.89)). As demonstrated also by the ratio of RATING to RATA "apply" responses and standard indices for the two question formats (Table 4.5, Appendix Materials Tables A5–A8), this indicates that the level of importance is likely to vary more among less-frequent and moderately used attributes or motivation constructs than frequent ones depending on whether RATA or RATING was used within a food category within a country.

3.4. Level of importance for motivation constructs

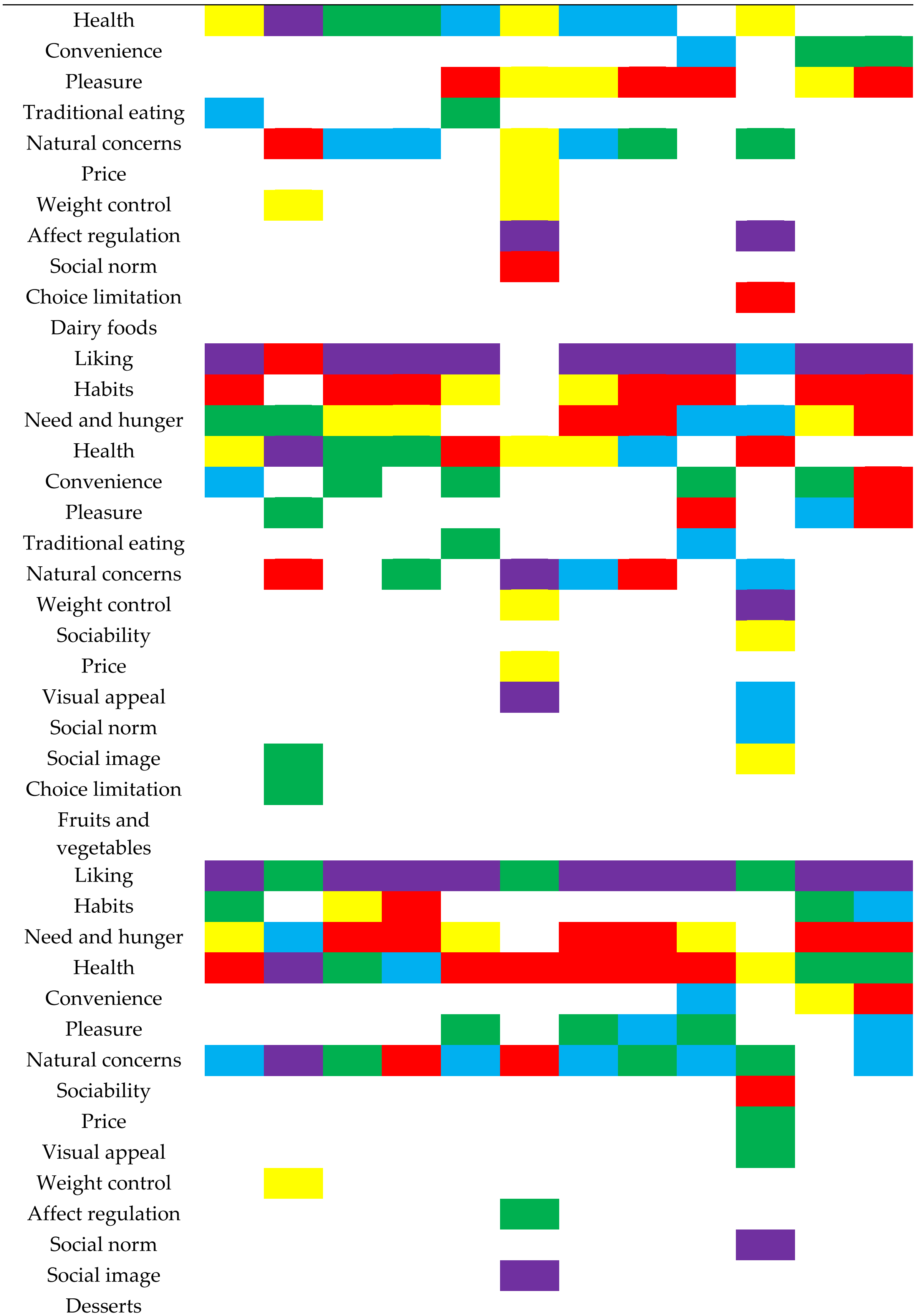
3.4.1. Based on percentages of "Apply" responses

Inspection of the relative positioning of the motivation constructs for RATA and RATING data for each country provided more understanding of the level of importance consumers accorded to each construct for the different food categories. Based on percentage of "apply" responses, consumers (both RATA and RATING respondents) in Western countries (Brazil, Spain, and the

USA) identified the liking construct as the most important motivation for eating foods from all five categories (Figure 1a). This was not surprising since similar findings were attained by other authors in prior related studies [1,49,56].

However, for Asian countries (China and India), while the liking maintained the top most position for the food categories such as desserts, its ranking varied inconsistently for other food categories. Rate-All-That-Apply responses in China, for example, suggested that liking, pleasure, need and hunger were the leading drivers for the eating of protein-rich foods in that order, while RATING "apply" responses pointed out need and hunger, liking and habits in that order as the constructs that drove consumers in China to eat protein-rich foods. A similar case was seen in India where RATA data showed that consumers ate starch-rich foods mostly because they liked them while corresponding RATING data noted that Indians ate starch-rich foods mainly because it was a habit.

a	**Brazil**				**Spain**				**USA**			
	RATA		**RATING**		**RATA**		**RATING**		**RATA**		**RATING**	
	A	**B**	**C**	**D**	**A**	**B**	**C**	**D**	**A**	**B**	**C**	**D**
Starch-rich foods												
Liking												
Habits												
Need and hunger												
Health												
Convenience												
Pleasure												
Traditional eating												
Natural concerns												
Weight control												
Affect regulation												
Social norm												
Social image												
Protein-rich foods												
Liking												
Habits												
Need and hunger												


Health
Convenience
Pleasure
Traditional eating
Natural concerns
Price
Weight control
Affect regulation
Social norm
Choice limitation
Dairy foods
Liking
Habits
Need and hunger
Health
Convenience
Pleasure
Traditional eating
Natural concerns
Weight control
Sociability
Price
Visual appeal
Social norm
Social image
Choice limitation
Fruits and vegetables
Liking
Habits
Need and hunger
Health
Convenience
Pleasure
Natural concerns
Sociability
Price
Visual appeal
Weight control
Affect regulation
Social norm
Social image
Desserts

Liking								
Habits								
Need and hunger								
Convenience								
Pleasure								
Traditional eating								
Natural concerns								
Sociability								
Visual appeal								
Health								
Price								
Weight control								
Affect regulation								
Social norm								
Social image								
Choice limitation								

b	China				India			
	RATA		RATING		RATA		RATING	
	A	B	C	D	A	B	C	D
Starch-rich foods								
Liking								
Habits								
Need and hunger								
Health								
Convenience								
Pleasure								
Traditional eating								
Natural concerns								
Sociability								
Weight control								
Protein-rich foods								
Liking								
Habits								
Need and hunger								
Health								
Convenience								
Pleasure								
Traditional eating								
Natural concerns								
Sociability								

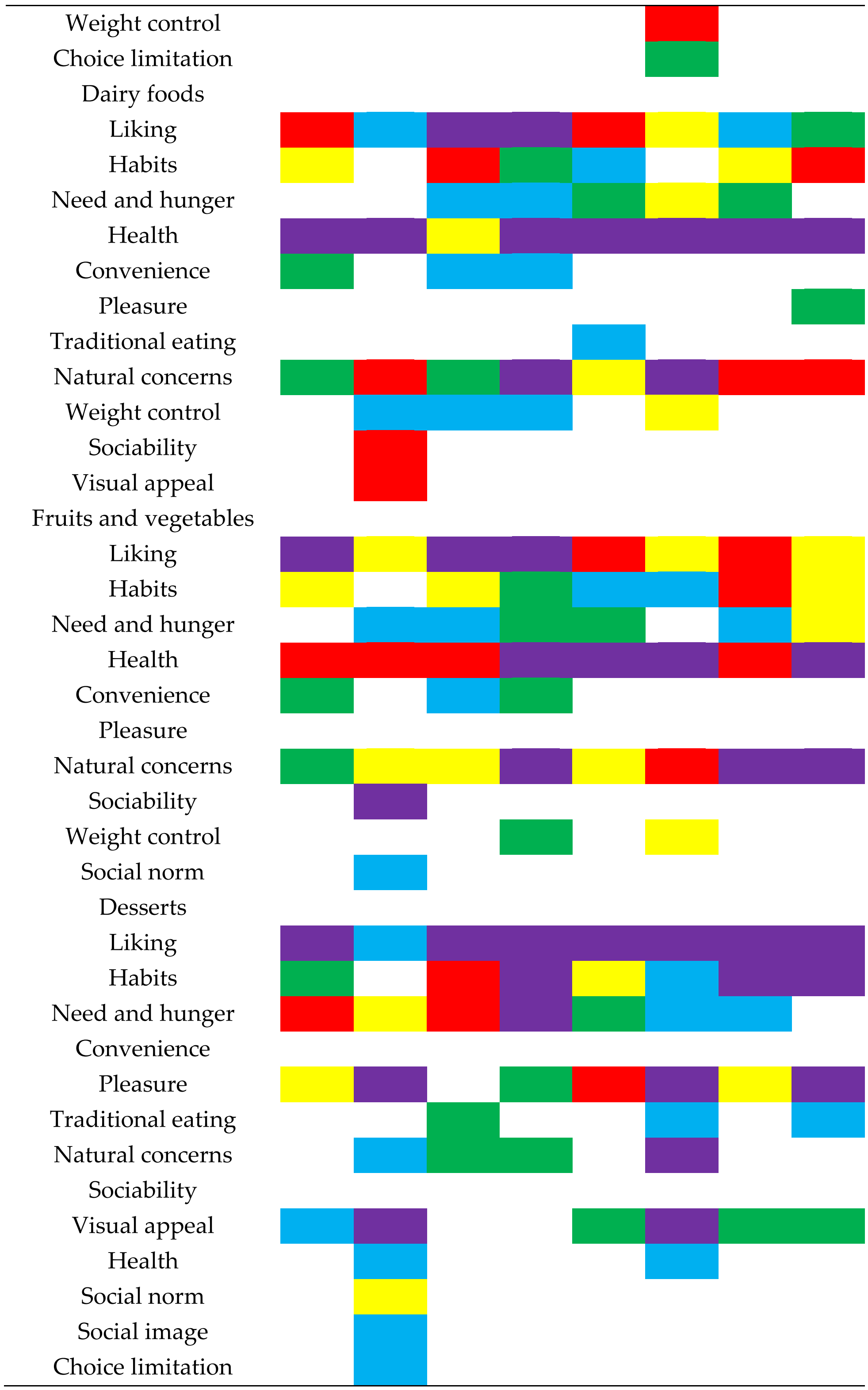


Figure 4.1. (a) Rank of the top five motivation constructs based on percentages of "apply" responses for RATA (A) and RATING (C) survey formats within each food group for Brazil, Spain, and the USA. Additionally, the top five motivation constructs based on mean scores per country for RATA (B) and RATING (D) within each food group for Brazil, Spain, and the USA

are included. Rank color codes for the top five motivation constructs: purple = first position, red = second position, yellow = third position, green = fourth position, and blue = fifth position. (b) Rank of the top five motivation constructs based on percentages of "apply" responses for RATA (A) and RATING (C) survey formats within each food group for China and India. Additionally, the top five motivation constructs based on mean scores per country for RATA (B) and RATING (D) within each food group for China and India are included. Rank color codes for the top five motivation constructs: purple = first position, red = second position, yellow = third position, green = fourth position, and blue = fifth position.

Eating motivations such as habits, need and hunger, convenience, and pleasure joined the liking construct and took positions among the top five constructs for eating behavior across most food categories and countries regardless of whether RATA or RATING survey question formats were used. Furthermore, traditional eating, natural concerns, health, weight control, and sociability were the other eating motivation constructs that also appeared among the top five positions, though these depended on the survey question format used, food category and country of target population. It is worth noting however that the level of importance for the latter set of constructs differed between RATA and RATING data more frequently as compared to the former set of motivation constructs. This further suggests that although some similarities between RATA and RATING data can be found, information collected using RATA questions and that collected using RATING questions may be different and may be interpreted differently potentially leading to different conclusions and decisions.

Another way to look at the ranking of attributes based on level of importance is to compare the data analysis approaches that were used for RATA and RATING data. To calculate the percentages of "apply" responses, RATA data were treated as CATA data, implying that the consumers' responses were analyzed as binary numbers (1, 0) where a value of 1 was placed for each subscale or term that was selected as an important motivation for the consumption of a particular product category. Additionally, a value of 0 was placed for each subscale or term that was not selected as an important motivation for the consumption of a particular product category[12]. For RATA, the ratings or intensity scores were ignored except for cases where respondents changed their mind, i.e., the respondent checked a motivation term as "apply" but then rated it as "not at all important" (suggesting that they should not have checked the term to begin with), that specific data point was excluded from the analysis. Although the data show that rarely happened (<2% of cases), this decreased the percentage of apply responses and ranking slightly for RATA data. On the contrary, when computing the percentages of "apply" responses for RATING data, all response categories but "not at all important" were categorized as 1 and the only the "not at all important" were categorized as zero.

Additionally, those differences may depend on the particular product or sample (or food category) and country or culture of target population. Careful consideration is therefore recommended for consumer researchers when determining what question format to use in future online surveys for particular products because the level of importance given to each attribute or term may change depending on what survey format a respondent answers and the particular product(s) being assessed. More investigation into the accuracy of both methods may be needed before suggestions for use of one question format over the other can be made

3.4.2. Based on motivation constructs' mean scores

Across all five countries, the RATA question format gave a larger variety of top five motivation constructs based on mean scores as compared to those of the corresponding RATING format. This may be the result of differences in actual motivations across product categories that show up using the RATA format or could be an artifact of testing. We note that the RATING format produced more consistent top five motivation constructs when determined based on the percentage of "apply" responses and mean scores than did the RATA format. In RATA top five constructs sometimes changed depending on the data used.

In Brazil, except for convenience, which was replaced with natural concerns for the dairy food category, the same constructs were identified either based on percentages or mean scores for all five food categories using RATING. Another example was seen in Spain where the same key constructs were pinpointed based on percentages or mean scores for all food categories except for habits. Habits was replaced with traditional eating among the top five motivations for eating starch-rich foods when the mean scores for the constructs were compared using RATING data. That was not the case for the RATA survey format. We also noted that for the RATING survey format, the motivation construct ranking within the food categories did not change much particularly in Western countries (Brazil, Spain and the USA) and when the ranking did change, the constructs' positions moved slightly. Conversely, for the RATA question format, several infrequently used motivation constructs such as affect regulation, social norms, social image, and choice limitation joined the list of top five constructs. For example, based on percentage of "apply" responses both RATA and RATING identified liking as the most important motivation for eating starch-rich foods. That was followed by habits. However, RATA mean scores suggested that affect regulation followed by natural concerns took the lead and liking came in fifth. Habits did not appear in the top five positions for motivations for eating starch-rich foods in Brazil. As for the RATING survey format, liking and habits both maintained their lead as key motivations for eating of starch-rich foods in Brazil. These findings suggest that ranking of attributes based on level of importance was more consistent for the RATING question format but changed significantly for RATA depending on whether ranking was based on percentages of "apply" responses or mean scores for attributes or constructs.

Meyners et al. [12] who analyzed RATA data both as CATA and also as a parametric found that RATA data were more meaningful when treated as parametric. At the time of writing, we did not find any research that provides more insights on how RATA and RATING compare in terms of discrimination among products, degree of importance or applicability of attributes. More investigation is needed to provide more understanding on ranking of attributes based on attribute percentage of “apply” responses and attribute mean scores.

3.5. Significant differences among samples

Overall, the total number of cases where the eating motivation constructs had significant differences among the food groups or samples for the RATING question format (n = 67) was higher than that of RATA (n = 20) (Table 4.5). This was showcased in all five countries. For example, in both Brazil and the USA, the RATA question format identified only four cases where significant differences

Table 4.5. p-values of analysis of variance (ANOVA) for food categories or samples for RATA (A) and RATING (B) data for all eating motivation constructs.

	Brazil		China		India		Spain		USA		TSD	
	A	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**	**A**	**B**
Liking	0.339	<0.0001 *	0.017 *	0.049 *	0.271	0.100	0.372	0.000 *	0.259	<0.0001 *	1	4
Habits	0.020 *	<0.0001 *	0.354	<0.0001 *	0.052	0.001 *	<0.0001 *	<0.0001 *	<0.0001 *	0.084	3	4
Need/Hunger	0.905	<0.0001 *	0.320	<0.0001 *	0.249	<0.0001 *	0.606	<0.0001 *	0.353	<0.0001 *	0	5
Health	0.004 *	<0.0001 *	0.732	<0.0001 *	0.000*	<0.0001 *	0.003 *	<0.0001 *	0.013 *	<0.0001 *	4	5
Convenience	0.150	<0.0001 *	0.392	<0.0001 *	0.032*	<0.0001 *	0.034 *	<0.0001 *	0.026 *	<0.0001 *	3	5
Pleasure	0.183	<0.0001 *	0.002 *	0.001 *	0.791	0.017 *	0.032 *	<0.0001 *	0.172	<0.0001 *	2	5
Trad.eating	0.016 *	0.713	0.295	<0.0001 *	0.590	0.008 *	0.016 *	<0.0001 *	0.167	0.004 *	2	4
Nat.concern	0.749	<0.0001 *	0.694	<0.0001*	0.269	<0.0001 *	0.904	<0.0001 *	<0.0001 *	<0.0001 *	1	5
Sociability	0.863	<0.0001 *	0.549	0.067	0.833	0.009 *	0.313	<0.0001 *	0.542	0.000 *	0	4
Price	0.792	<0.0001 *	0.320	0.036 *	0.914	0.423	0.529	<0.0001 *	0.892	0.000 *	0	4
Visual app	0.612	<0.0001 *	0.299	0.435	0.788	0.036 *	0.018*	0.013 *	0.076	0.009 *	1	4
Wt.control	0.081	<0.0001 *	0.995	<0.0001 *	0.020 *	<0.0001 *	0.918	<0.0001 *	0.513	<0.0001 *	1	5
Affect regul.	0.000 *	<0.0001 *	0.111	<0.0001*	0.384	0.000 *	0.657	0.000 *	0.352	<0.0001 *	1	5
Social norms	0.776	0.085	0.050 *	0.016 *	0.061	0.054	0.151	0.397	0.834	0.021 *	1	2
Social image	0.063	0.012 *	0.507	0.154	0.805	0.026 *	0.258	0.112	0.663	0.003 *	0	3
Choice limit	0.202	0.032 *	0.720	0.043 *	0.229	0.093	0.840	<0.0001 *	0.127	0.120	0	3
TSD	4	14	3	13	3	12	6	14	4	14	20	67

A = RATA, B = RATING, and TSD = Total Significant Differences. * p-values were lower than the significance level alpha = 0.05, implying that particular mean scores among the food categories within a question format differed significantly.

were found among the samples, whereas, for RATING, the number of significant differences among samples was more than 3-fold higher (n = 14). Clearly, RATING was more discriminating among samples than RATA. This finding can be key for consumer researchers when designing future online surveys that would investigate characteristics of products or samples that are similar or closely related. Although it is not known which of the significant differences are "true", the RATING format has been the gold standard for many decades and does appear to give somewhat different results than RATA. Further work is needed to determine impacts of such differences on findings in sensory and consumer behavior studies.

3.6. Comparison of survey format completion rates, survey mean duration, survey liking, and survey JAR rating

3.6.1. Consumers' survey question format completion rates

Chi-square tests showed that the percentage of incomplete responses for RATING data for countries such as Brazil, India and China were significantly higher than those of corresponding RATA data (Figure 2). This information could be beneficial when planning future international consumer studies (with RATA or RATING questions) in these five countries or countries with similar cultures.

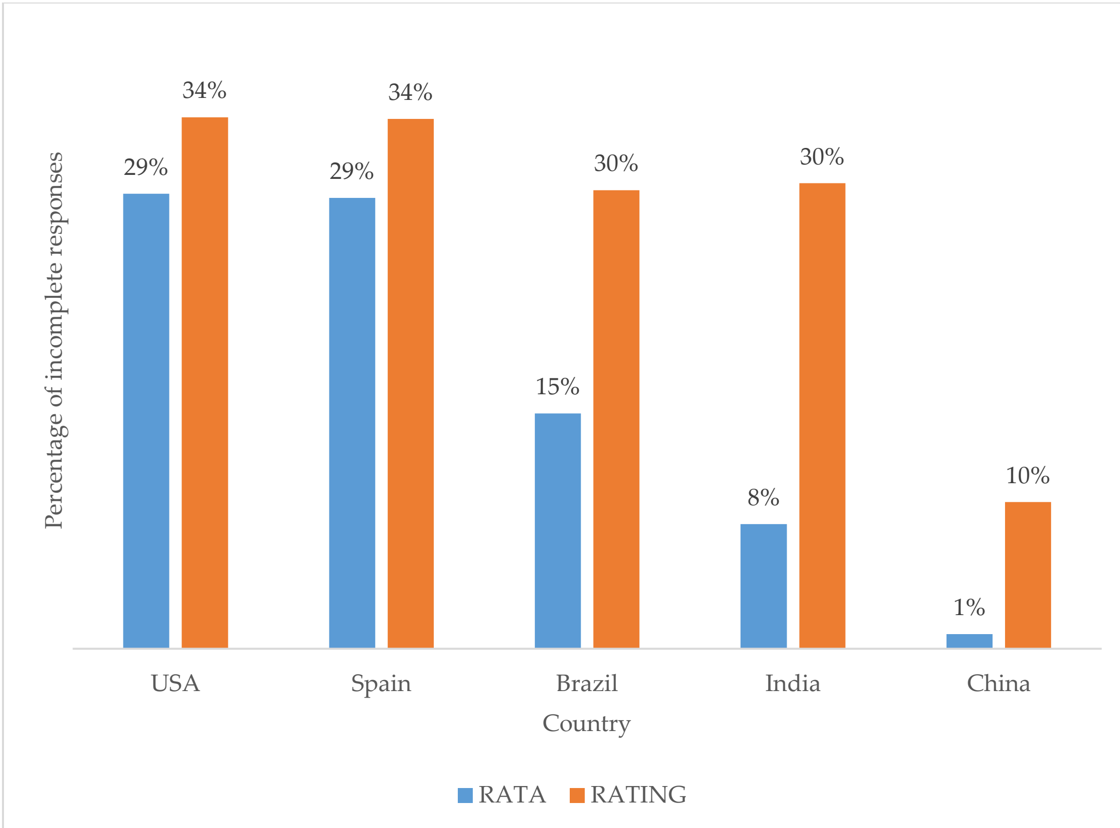


Figure 4.2. Percentage of incomplete responses for RATA and RATING per country. Incomplete questionnaires were not accepted or used and were not counted in the approximately 200 responses received per country per questionnaire type.

3.6.2. Consumers' survey mean duration

In China and Spain, consumers who answered the RATING format of the online survey took a significantly longer time to complete the survey compared to their counterparts who completed the RATA survey format (Table 4.6). That was not unexpected, especially since RATA respondents rated only those terms or attributes that they considered to "apply", whereas RATING respondents rated all 47 terms. It was, however, surprising to note that in the USA, consumers took slightly longer (although not significantly) to complete the RATA questions than the RATING questions.

Table 4.6. Means and standard deviations † and *p*-values for the survey mean duration for RATA and RATING per country.

	Brazil	China	India	Spain	USA

	Means	SD	Means	SD	Means	SD	Means	SD	Means	SD
RATA	36.5	60.3	17.9	17.6	34.6	98.1	18.0	14	37.8	288.9
RATING	44.7	81.3	29.5	34.3	46.0	141	34.7	88.3	26.9	19.4
p-value	0.248		<0.0001 *		0.287		0.007 *		0.582	

† Mean duration and standard deviations in minutes; * *p*-values with an asterisk indicate that RATA and RATING means differed significantly ($p \leq 0.05$).

3.6.3. Consumers' survey Just-about-Right (JAR) rating

Apart from India, respondents from all five countries rated the RATING version of the survey as a little too long, while the RATA version of the survey was rated as JAR (Table 4.7). In India, however, the RATING survey format was rated as JAR, while the RATA format of the same survey was rated as a little too short. Except for the USA, this finding can be explained by the more time that respondents needed to complete the RATING format of the survey. These findings suggest that neither of the formats was overly burdensome to those who completed the questionnaire, but other factors such as survey liking and completion rates may be important.

Table 4.7. Means and standard deviations † *p*-values for just-about-right ratings for RATA and RATING per country.

	Brazil		China		India		Spain		USA	
	Means	SD	Means	SD	Means	SD	Means	SD	Means	SD
RATA	4.4	0.7	4.3	0.8	3.1	1.8	4.5	0.8	4.4	1.0
RATING	5.0	1.1	5.0	1.2	3.6	2.1	5.2	1.1	5.0	1.4
p-value	<0.0001 *		<0.0001 *		0.007 *		<0.0001 *		<0.0001 *	

† Seven-point scale: 1 = much too short, 2 = too short, 3 = a little too short, 4 = just about right (JAR), and 5 = a little too long, 6 = too long, and 7 = much too long; * *p*-values with an asterisk indicate that RATA and RATING means differed significantly ($p \leq 0.05$).

3.6.4. Consumers' survey liking

In all five countries, the RATA versions of the survey were liked significantly more than the corresponding RATING versions of the same survey (Table 4.8). The higher liking gained by the RATA survey format could be expected by the JAR survey ratings. It must be noted that for both formats, the mean values for liking are positive, suggesting that at least for many consumers, the format they used in testing was acceptable.

Table 4.8. Means † and *p*-values for survey liking for RATA and RATING per country.

	Brazil		China		India		Spain		USA	
	Means	SD	Means	SD	Means	SD	Means	SD	Means	SD
RATA	4.3	0.7	4.0	0.8	4.4	0.8	4.1	0.7	4.0	0.9
RATING	3.9	1.0	3.5	1.1	4.1	1.0	3.8	0.9	3.5	1.1
p-value	<0.0001 *		<0.0001 *		0.002 *		<0.0001 *		<0.0001 *	

† Five-point scale: 1 = I hated taking it, 2 = I did not like taking it, 3 = I have no feelings either way, 4 = I liked taking it and 5 = I liked it a lot; * p-values with an asterisk indicate that RATA and RATING means differed significantly ($p \leq 0.05$).

In the case that the information collected from the shorter surveys satisfies the research objectives, then there may be no need to conduct longer surveys, especially since longer surveys would cost more. On the other hand, longer surveys could be used in place of shorter surveys in cases when more robust information is needed from the consumers. Additionally, longer surveys could negatively affect the online survey completion rates, which could increase the difficulty in attaining the required number of complete responses. However, survey duration and completion rates should not be used as a key basis for determining what question format to use in online survey questionnaires considering that quality of data could be impacted.

4. Study limitations

It is possible that a proportion of the target population did not participate in this online survey (coverage error) simply because they lacked access to a stable and steady internet connection [58,59]. This implies a limitation to the inferences that can be made based on the current internet survey. According to Armstrong et al. [60], differences in response data, particularly in multi-country online surveys, can be ascribed in part to different recruitment software. Although we used the same software in all countries, the actual devices used (i.e., computer, phone, etc.) are likely different from country to country and may have some impact on the results. Similarly, paper ballots could be included in future survey designs as an option for respondents within the target populations who may not have access to the internet. Other survey limitations such as selection of particular samples (food groups) have been discussed previously [1].

5. Conclusions

This online survey showed that the RATING question format provided more “apply” responses for each attribute than the RATA question format. Additionally, based on the standard indices for RATA and RATING, the RATING question format showed better discrimination ability among attributes for all food categories in all countries as compared to the corresponding RATA data. Additionally, overall, the RATA mean scores for the attributes were found to be significantly higher (greater level of importance) than those of the RATING survey format. Further, the RATING question format showed better discrimination ability among food categories or samples than RATA for all motivation constructs or attributes and within all countries. More investigation into the use of the RATA and RATING question formats in future consumer research is needed.

Appendix A

Table A1. Percentage of "apply" responses for CATA, RATA, and RATING for all five countries for the respective protein-rich foods.*

	Brazil			China			India			Spain			USA		
	C	D	E	C	D	E	C	D	E	C	D	E	C	D	E
Liking	53	53	99	32	32	96	25	25	95	59	59	98	48	47	96
Habits	40	40	95	9	9	92	16	16	97	27	27	91	19	18	87
Need/Hunger	25	25	94	13	12	97	20	20	94	18	18	94	21	20	91
Health	29	29	88	7	7	86	34	34	97	19	19	89	5	5	67
Convenience	8	8	82	3	3	76	11	11	93	14	14	87	18	17	88
Pleasure	9	9	76	14	14	90	17	17	93	34	34	93	25	24	90
Trad. eating	19	19	67	6	6	86	18	18	91	20	20	86	10	10	76
Nat. concern	10	10	87	2	2	85	23	23	97	11	11	89	2	2	65
Sociability	3	3	67	3	3	84	6	6	81	6	6	79	5	4	65
Price	5	5	75	2	2	71	8	8	77	3	3	66	7	6	77
Visual app	2	2	54	5	5	84	10	9	85	7	7	70	4	4	73
Wt. control	10	10	78	3	3	75	13	13	88	7	7	76	1	1	59
Affect regul.	0	0	26	1	1	62	4	3	62	2	2	42	1	1	42
Social norm	6	6	59	3	3	78	6	5	70	2	2	63	2	2	55
Social image	1	1	33	4	3	78	5	5	71	4	4	54	4	4	47
Choice	13	13	72	3	3	79	14	14	84	6	6	75	3	3	66

C = percentage of "apply" responses for CATA, D = percentage of "apply" responses for RATA, and E = percentage of "apply" responses for RATING.

Table A2. Percentage of "apply" responses for CATA, RATA, and RATING for all five countries for the respective milk and dairy foods.*

	Brazil			China			India			Spain			USA		
	C	D	E	C	D	E	C	D	E	C	D	E	C	D	E
Liking	45	45	96	20	20	97	23	23	94	39	39	94	37	37	94
Habits	33	33	94	15	14	96	14	14	96	26	26	91	16	15	91
Need/Hunger	20	20	91	6	6	90	19	19	95	13	13	93	9	9	89
Health	24	24	88	22	22	95	26	26	98	28	28	91	7	7	75
Convenience	18	18	88	10	10	90	9	9	93	15	15	86	10	10	88
Pleasure	10	10	78	5	5	83	13	13	92	11	11	83	15	15	86
Trad. eating	18	17	67	7	7	85	14	14	90	15	15	81	10	9	75
Nat. concern	8	8	87	11	10	94	22	22	97	9	9	88	2	2	72
Sociability	2	2	61	2	2	80	7	6	79	2	2	57	3	3	59
Price	5	5	74	5	4	78	7	6	76	4	4	70	7	7	80
Visual app	1	1	53	5	5	82	9	9	84	3	3	60	3	3	70
Wt. control	6	6	80	9	9	90	12	12	90	5	5	81	2	2	66
Affect regul.	0	0	32	2	2	62	5	4	67	1	1	43	1	1	46
Social norm	3	3	56	4	4	76	6	5	74	4	4	60	1	1	56
Social image	1	1	36	4	4	77	6	6	72	2	2	46	3	3	52
Choice	8	8	69	5	5	82	9	9	86	8	8	74	4	4	71

C = percentage of "apply" responses for CATA, D = percentage of "apply" responses for RATA, and E = percentage of "apply" responses for RATING.

Table A3. Percentage of "apply" responses for CATA, RATA, and RATING for all five countries for the respective fruits and vegetables.*.

	Brazil			China			India			Spain			USA		
	C	**D**	**E**	**C**	**D**	**E**	**C**	**D**	**E**	**C**	**D**	**E**	**C**	**D**	**E**
Liking	51	51	98	24	24	96	26	25	95	43	43	97	37	37	96
Habits	22	22	93	14	14	94	15	15	95	15	14	90	12	11	88
Need/Hunger	29	29	94	7	7	92	17	16	93	26	25	95	21	21	95
Health	35	35	90	19	19	95	26	26	95	34	34	95	27	27	88
Convenience	10	10	83	11	11	92	7	7	86	12	12	88	12	12	91
Pleasure	10	10	77	5	5	85	13	12	91	17	17	92	16	16	85
Trad. eating	11	11	61	5	5	82	13	12	87	6	6	76	6	5	64
Nat. concern	18	18	90	11	11	94	22	22	96	16	16	91	12	12	83
Sociability	1	1	52	3	3	80	5	5	77	2	2	51	1	1	52
Price	9	9	75	5	5	78	12	11	79	5	5	71	7	7	81
Visual app	2	2	51	4	4	85	9	9	80	4	4	66	4	4	65
Wt. control	17	17	80	8	8	90	13	13	89	12	12	81	11	11	83
Affect regul.	0	0	32	1	1	63	4	3	68	1	1	44	1	1	46
Social norm	5	5	55	4	4	78	5	4	71	2	2	60	2	2	56
Social image	1	1	33	3	3	79	7	7	72	2	2	45	2	2	48
Choice	7	7	67	3	3	84	9	8	83	4	4	77	4	4	71

C = percentage of "apply" responses for CATA, D = percentage of "apply" responses for RATA, and E = percentage of "apply" responses for RATING.

Table A4. Percentage of "apply" responses for CATA, RATA, and RATING for all five countries for the respective desserts.*

	Brazil			China			India			Spain			USA		
	C	D	E	C	D	E	C	D	E	C	D	E	C	D	E
Liking	56	56	96	21	21	95	30	30	92	33	33	95	36	35	95
Habits	11	11	88	8	8	94	14	13	92	9	9	87	7	6	83
Need/Hunger	7	7	76	12	12	94	13	12	86	6	6	87	8	7	86
Health	2	2	56	6	6	87	8	7	80	2	2	67	2	2	58
Convenience	10	10	76	4	4	89	9	9	81	3	3	78	2	2	75
Pleasure	17	16	81	9	9	87	17	16	91	22	22	94	30	29	92
Trad. eating	9	9	69	6	6	91	10	9	85	31	31	89	7	6	81
Nat. concern	2	2	54	3	3	91	7	7	80	2	2	76	2	2	63
Sociability	12	12	77	5	5	85	9	8	84	7	7	80	4	4	70
Price	2	2	67	6	6	83	6	6	75	1	1	63	3	3	67
Visual app	5	5	69	7	7	86	13	12	88	4	4	73	4	4	74
Wt. control	1	1	48	5	5	85	7	7	77	1	1	55	1	1	57
Affect regul.	6	6	55	4	4	80	5	4	72	1	1	51	1	1	58
Social norm	0	0	53	3	3	84	5	4	74	3	3	65	2	2	63
Social image	1	1	43	5	5	81	6	5	79	2	2	52	3	3	58
Choice	3	3	63	5	5	88	6	5	80	1	1	64	5	4	66

C = percentage of "apply" responses for CATA, D = percentage of "apply" responses for RATA, and E = percentage of "apply" responses for RATING.

Table A5. Ratios of RATING "apply" responses to RATA "apply" responses (R) and standard indices of importance for RATING (S) and RATA (T) "apply" responses for each motivation construct to the liking motivation construct for fruits and vegetables in all five countries.

	Brazil			China			India			Spain			USA		
	R	S	T	R	S	T	R	S	T	R	S	T	R	S	T
Liking	1.9	1.00	1.00	4.0	1.00	1.00	3.7	1.00	1.00	2.3	1.00	1.00	2.6	1.00	1.00
Habits	4.3	0.95	0.42	6.9	0.97	0.57	6.4	1.00	0.58	6.5	0.93	0.33	7.6	0.91	0.31
Need/Hunger	3.2	0.96	0.58	12.7	0.95	0.30	5.7	0.98	0.64	3.7	0.97	0.60	4.6	0.99	0.56
Health	2.6	0.92	0.69	5.0	0.98	0.79	3.6	1.00	1.03	2.8	0.97	0.79	3.3	0.91	0.72
Convenience	8.7	0.85	0.19	8.5	0.96	0.45	12.3	0.90	0.27	7.5	0.90	0.27	7.8	0.94	0.32
Pleasure	8.0	0.79	0.19	16.9	0.88	0.21	7.4	0.96	0.49	5.3	0.95	0.41	5.5	0.88	0.42
Trad. eating	5.8	0.62	0.21	17.7	0.85	0.20	7.2	0.92	0.48	13.5	0.79	0.13	12.0	0.67	0.15
Nat. concern	5.0	0.92	0.36	8.8	0.97	0.45	4.4	1.01	0.87	5.6	0.94	0.38	6.7	0.86	0.34
Sociability	95.5	0.53	0.01	30.7	0.83	0.11	15.4	0.81	0.20	24.5	0.52	0.05	54.5	0.54	0.03
Price	8.9	0.77	0.17	16.8	0.81	0.20	7.1	0.83	0.44	15.0	0.73	0.11	12.4	0.84	0.18
Visual app	31.5	0.52	0.03	24.0	0.88	0.15	9.1	0.84	0.35	16.7	0.68	0.09	17.7	0.67	0.10
Wt. control	4.7	0.82	0.34	11.2	0.93	0.34	7.0	0.94	0.50	6.8	0.83	0.28	7.3	0.86	0.31
Affect regul.	na	0.32	0.00	34.0	0.66	0.08	23.7	0.72	0.11	46.4	0.45	0.02	59.6	0.47	0.02
Social norm	10.8	0.56	0.10	18.2	0.81	0.18	17.3	0.75	0.16	24.4	0.61	0.06	26.5	0.58	0.06
Social image	60.3	0.33	0.01	26.5	0.82	0.13	11.0	0.75	0.26	29.6	0.46	0.04	19.3	0.50	0.07
Choice	9.9	0.68	0.13	30.0	0.87	0.12	9.9	0.88	0.33	19.4	0.79	0.09	16.4	0.73	0.12

R = ratio of RATING "apply" responses to RATA "apply" responses, S = standard index of RATING "apply" responses for each construct to liking, and T = standard index of RATA "apply" responses for each construct to liking. na = not applicable because none of the corresponding construct's terms or subscales were checked.

Table A6. Ratios of RATING "apply" responses to RATA "apply" responses (R) and standard indices of importance for RATING (S) and RATA (T) "apply" responses for each motivation construct to the liking motivation construct for starch-rich foods in all five countries.

	Brazil			China			India			Spain			USA		
	R	S	T	R	S	T	R	S	T	R	S	T	R	S	T
Liking	1.9	1.00	1.00	5.4	1.00	1.00	3.0	1.00	1.00	1.4	1.00	1.00	2.0	1.00	1.00
Habits	2.0	0.98	0.93	3.3	1.02	1.67	4.0	1.01	0.78	2.6	0.88	0.49	4.1	0.91	0.44
Need/Hunger	3.9	0.98	0.48	4.6	1.01	1.18	4.9	0.98	0.61	4.4	0.97	0.32	3.6	0.94	0.52
Health	3.7	0.88	0.47	4.9	0.98	1.07	3.6	0.99	0.83	3.8	0.87	0.33	5.7	0.81	0.28
Convenience	2.9	0.93	0.61	7.0	0.99	0.76	4.6	0.99	0.65	6.7	0.79	0.17	3.6	0.91	0.50
Pleasure	7.7	0.83	0.21	12.9	0.84	0.35	4.1	0.96	0.71	2.8	0.96	0.49	4.2	0.91	0.43
Trad. eating	2.9	0.70	0.47	4.8	0.95	1.06	3.9	0.96	0.76	2.6	0.88	0.49	5.0	0.74	0.30
Nat. concern	6.3	0.90	0.27	8.8	0.99	0.60	4.1	1.01	0.76	6.1	0.90	0.21	8.1	0.84	0.20
Sociability	10.8	0.70	0.13	16.9	0.87	0.28	8.1	0.90	0.34	5.2	0.84	0.23	21.7	0.54	0.05
Price	6.0	0.78	0.25	12.0	0.81	0.36	9.3	0.83	0.27	19.6	0.68	0.05	8.6	0.83	0.19
Visual app	13.8	0.56	0.08	22.9	0.83	0.19	5.3	0.89	0.51	6.8	0.71	0.15	15.1	0.70	0.09
Wt. control	6.4	0.83	0.25	13.8	0.91	0.35	6.0	0.94	0.47	11.3	0.75	0.10	7.0	0.73	0.20
Affect regul.	153.7	0.27	0.00	26.7	0.55	0.11	14.8	0.68	0.14	74.3	0.37	0.01	38.2	0.41	0.02
Social norm	10.4	0.58	0.11	11.0	0.78	0.38	10.9	0.75	0.21	22.2	0.62	0.04	18.3	0.56	0.06
Social image	17.9	0.35	0.04	15.2	0.79	0.28	8.0	0.76	0.29	7.4	0.51	0.10	18.9	0.47	0.05
Choice	4.8	0.72	0.29	6.4	0.88	0.74	5.4	0.91	0.51	17.9	0.66	0.05	14.3	0.69	0.10

R = ratio of RATING "apply" responses to RATA "apply" responses, S = standard index of RATING "apply" responses for each construct to liking, and T = standard index of RATA "apply" responses for each construct to liking. na = not applicable because none of the corresponding construct's terms or subscales were checked.

Table A7. Ratios of RATING "apply" responses to RATA "apply" responses (R) and standard indices of importance for RATING (S) and RATA (T) "apply" responses for each motivation construct to the liking motivation construct for protein-rich foods in all five countries.

	Brazil			China			India			Spain			USA		
	R	S	T	R	S	T	R	S	T	R	S	T	R	S	T
Liking	1.9	1.00	1.00	3.0	1.00	1.00	3.7	1.00	1.00	1.7	1.00	1.00	2.0	1.00	1.00
Habits	2.4	0.96	0.76	10.4	0.95	0.28	6.2	1.02	0.62	3.4	0.93	0.46	4.9	0.91	0.38
Need/Hunger	3.7	0.95	0.48	7.7	1.01	0.39	4.6	0.99	0.80	5.4	0.96	0.30	4.6	0.95	0.42
Health	3.0	0.89	0.55	13.1	0.89	0.21	2.9	1.02	1.33	4.7	0.91	0.32	14.1	0.70	0.10
Convenience	10.1	0.83	0.15	23.2	0.79	0.10	8.9	0.98	0.41	6.4	0.89	0.23	5.2	0.92	0.36
Pleasure	8.4	0.77	0.17	6.4	0.94	0.44	5.5	0.98	0.66	2.7	0.95	0.58	3.8	0.94	0.51
Trad. eating	3.5	0.67	0.36	15.6	0.90	0.17	5.0	0.96	0.72	4.4	0.88	0.33	7.6	0.80	0.21
Nat. concern	8.4	0.87	0.20	41.8	0.89	0.06	4.2	1.02	0.91	7.8	0.91	0.19	26.4	0.68	0.05
Sociability	20.8	0.67	0.06	27.3	0.87	0.10	14.8	0.86	0.22	12.9	0.81	0.10	14.9	0.68	0.09
Price	15.7	0.76	0.09	43.4	0.74	0.05	9.8	0.81	0.31	21.6	0.68	0.05	11.9	0.81	0.14
Visual app	21.8	0.55	0.05	17.0	0.87	0.15	9.3	0.89	0.36	10.5	0.72	0.11	20.8	0.76	0.07
Wt. control	8.0	0.79	0.19	28.1	0.78	0.08	6.6	0.93	0.53	11.4	0.78	0.11	41.9	0.62	0.03
Affect regul.	na	0.27	0.00	60.2	0.64	0.00	18.6	0.65	0.13	27.7	0.43	0.03	40.0	0.44	0.02
Social norm	9.9	0.60	0.11	25.4	0.81	0.10	14.0	0.74	0.20	28.3	0.64	0.04	34.6	0.57	0.03
Social image	23.6	0.34	0.03	23.7	0.81	0.10	14.8	0.75	0.19	14.3	0.55	0.06	12.3	0.49	0.08
Choice	5.8	0.73	0.24	28.7	0.82	0.09	6.1	0.88	0.54	12.3	0.77	0.10	19.2	0.69	0.07

R = ratio of RATING "apply" responses to RATA "apply" responses, S = standard index of RATING "apply" responses for each construct to liking, and T = standard index of RATA "apply" responses for each construct to liking. na = not applicable because none of the corresponding construct's terms or subscales were checked.

Table A8. Ratios of RATING "apply" responses to RATA "apply" responses (R) and standard indices of importance for RATING (S) and RATA (T) "apply" responses for each motivation construct to the liking motivation construct for dessert foods in all five countries.

	Brazil			China			India			Spain			USA		
	R	S	T	R	S	T	R	S	T	R	S	T	R	S	T
Liking	1.7	1.00	1.00	4.6	1.00	1.00	3.1	1.00	1.00	2.9	1.00	1.00	2.7	1.00	1.00
Habits	8.0	0.91	0.20	12.1	0.99	0.38	7.0	1.01	0.44	9.6	0.92	0.28	14.3	0.88	0.17
Need/Hunger	10.6	0.79	0.13	7.6	0.99	0.60	7.3	0.94	0.40	15.5	0.92	0.17	12.3	0.90	0.20
Health	33.4	0.58	0.03	14.1	0.92	0.30	11.3	0.87	0.24	27.3	0.71	0.07	27.5	0.61	0.06
Convenience	7.7	0.79	0.18	22.9	0.94	0.19	9.4	0.89	0.29	26.4	0.82	0.09	32.4	0.79	0.07
Pleasure	5.0	0.84	0.29	9.7	0.92	0.43	5.6	1.00	0.55	4.2	0.99	0.68	3.1	0.96	0.83
Trad. eating	7.6	0.72	0.16	15.7	0.96	0.28	9.5	0.93	0.30	2.9	0.95	0.93	12.8	0.85	0.18
Nat. concern	32.0	0.56	0.03	33.5	0.96	0.13	12.2	0.88	0.22	31.1	0.81	0.07	33.7	0.66	0.05
Sociability	6.7	0.80	0.21	16.8	0.89	0.25	10.9	0.92	0.26	10.9	0.84	0.22	16.7	0.74	0.12
Price	30.9	0.69	0.04	14.3	0.88	0.28	12.7	0.82	0.20	51.7	0.67	0.04	22.2	0.71	0.09
Visual app	13.7	0.72	0.09	13.0	0.91	0.32	7.0	0.96	0.42	16.5	0.77	0.13	18.7	0.78	0.11
Wt. control	67.0	0.50	0.01	15.6	0.89	0.26	11.7	0.84	0.22	75.2	0.59	0.02	61.6	0.60	0.03
Affect regul.	9.5	0.57	0.10	20.6	0.84	0.19	17.0	0.78	0.14	41.5	0.54	0.04	41.6	0.61	0.04
Social norm	222.0	0.55	0.00	27.0	0.88	0.15	16.8	0.80	0.15	18.9	0.69	0.10	30.0	0.66	0.06
Social image	44.5	0.44	0.02	15.0	0.86	0.26	15.2	0.86	0.18	30.1	0.55	0.05	17.7	0.61	0.09
Choice	21.8	0.65	0.05	18.9	0.93	0.23	15.2	0.88	0.18	43.3	0.67	0.04	17.3	0.70	0.11

R = ratio of RATING "apply" responses to RATA "apply" responses, S = standard index of RATING "apply" responses for each construct to liking, and T = standard index of RATA "apply" responses for each construct to liking. na = not applicable because none of the corresponding construct's terms or subscales were checked.

Table A9. Mean scores1 for RATA and RATING survey formats and p-values for the corresponding two-sample *t*-test for each motivation construct for dairy foods in all five countries.

	Brazil			China			India			Spain			USA		
	K	L	M	K	L	M	K	L	M	K	L	M	K	L	M
Liking	4.4	4.1	0.001 *	3.8	3.6	0.098	4.3	3.9	<0.0001 *	4.1	3.8	0.000 *	4.1	3.7	<0.0001 *
Habits	3.9	3.8	0.533	3.6	3.5	0.585	4.2	4.0	0.098	3.6	3.4	0.121	3.2	3.4	0.433
Need/Hunger	4.3	3.7	<0.0001 *	3.6	3.3	0.283	4.3	3.8	0.05 *	4.1	3.4	<0.0001 *	4.1	3.4	0.000 *
Health	4.6	3.6	<0.0001 *	4.1	3.6	<0.0001 *	4.4	4.1	0.000 *	4.2	3.3	<0.0001 *	4.3	2.9	<0.0001 *
Convenience	4.1	3.5	0.000 *	3.6	3.3	0.084	4.0	3.8	0.108	3.9	3.2	<0.0001 *	3.6	3.4	0.165
Pleasure	4.3	3.2	<0.0001 *	3.7	3.2	0.035 *	4.2	3.9	0.036 *	3.9	3.2	0.000 *	4.0	3.4	0.000 *
Trad. eating	3.9	2.8	<0.0001 *	3.7	3.1	0.007 *	4.1	3.7	0.005 *	3.8	3.0	<0.0001 *	3.3	2.9	0.074
Nat. concern	4.4	3.6	0.000 *	3.9	3.6	0.053	4.4	4.0	0.000 *	4.3	3.4	<0.0001 *	4.1	2.9	0.009 *
Sociability	4.1	2.5	0.002 *	3.9	2.9	0.012 *	3.9	3.2	0.006 *	4.1	2.3	0.000 *	4.2	2.5	<0.0001 *
Price	4.0	2.9	0.000 *	3.0	2.9	0.496	3.8	3.2	0.011 *	4.2	2.6	<0.0001 *	4.0	3.1	0.000 *
Visual app	3.3	2.3	0.108	3.9	3.1	0.006 *	4.2	3.5	0.001 *	4.3	2.5	<0.0001 *	4.1	2.8	0.001 *
Wt. control	4.0	3.1	0.000 *	3.8	3.3	0.007 *	4.3	3.6	<0.0001 *	4.2	2.9	<0.0001 *	4.5	2.6	0.000 *

Affect regul.	1.0	1.8	0.553	3.4	2.5	0.054	3.4	2.9	0.110	4.0	2.1	0.000 *	3.3	2.2	0.182
Social norm	4.1	2.5	<0.0001 *	3.7	2.9	0.006 *	3.5	3.1	0.163	3.8	2.4	<0.0001 *	4.1	2.4	0.004 *
Social image	4.3	1.9	<0.0001 *	3.7	2.9	0.015 *	3.9	3.1	0.003 *	3.9	2.1	<0.0001 *	4.2	2.4	<0.0001 *
Choice	4.3	2.8	<0.0001 *	3.6	3.1	0.101	4.2	3.6	0.013 *	4.0	2.8	<0.0001 *	3.9	2.8	0.007 *

K = mean scores for RATA, L = mean scores for RATING, and M = *p*-values for two-sample t-test, [1] Five-point scale: 1 = not at all important, 2 = slightly important, 3 = moderately important, 4 = very important, and 5 = extremely important. * *p*-values were lower than the significance level alpha = 0.05, implying that particular mean scores for RATA and RATING significantly differed.

Table A10. Mean scores1 for RATA and RATING survey formats and *p*-values for the corresponding two-sample *t*-test for each motivation construct for fruits and vegetables in all five countries.

	Brazil			China			India			Spain			USA		
	K	L	M	K	L	M	K	L	M	K	L	M	K	L	M
Liking	4.3	4.3	0.586	4.0	3.5	<0.0001*	4.3	3.8	<0.0001*	4.2	4.0	0.011*	4.2	3.9	0.006*
Habits	3.8	3.9	0.409	3.5	3.3	0.319	4.1	3.8	0.003*	3.6	3.4	0.213	3.7	3.4	0.054
Need/Hunger	4.2	3.9	0.001 *	3.9	3.3	0.001*	4.2	3.8	0.000*	4.0	3.8	0.030*	3.9	3.7	0.185
Health	4.5	3.8	<0.0001 *	4.1	3.5	<0.0001*	4.5	3.9	<0.0001*	4.3	3.8	<0.0001*	4.3	3.5	<0.0001*
Convenience	3.9	3.6	0.094	3.4	3.3	0.568	3.8	3.4	0.089	4.1	3.4	0.000*	3.6	3.7	0.931
Pleasure	4.0	3.3	0.000 *	3.2	3.1	0.579	4.1	3.7	0.013 *	4.1	3.6	0.000 *	4.0	3.4	0.000 *
Trad. eating	3.8	2.7	<0.0001 *	3.4	3.0	0.175	4.0	3.5	0.002 *	4.0	2.9	<0.0001 *	3.2	2.7	0.064
Nat. concern	4.5	3.9	<0.0001 *	4.0	3.5	0.001 *	4.4	3.9	<0.0001 *	4.3	3.7	0.000 *	4.2	3.4	<0.0001 *
Sociability	3.7	2.3	0.115	4.2	2.9	0.000 *	3.8	3.1	0.006 *	3.7	2.2	0.000 *	4.4	2.4	0.004 *
Price	4.1	3.1	<0.0001 *	3.4	2.9	0.040 *	3.9	3.1	<0.0001 *	3.9	2.7	0.000 *	4.2	3.1	0.000 *
Visual app	3.7	2.4	0.017 *	3.8	3.0	0.007 *	4.1	3.3	<0.0001 *	4.1	2.7	<0.0001 *	4.2	2.7	<0.0001 *
Wt. control	4.4	3.3	<0.0001 *	3.7	3.3	0.019 *	4.3	3.5	<0.0001 *	4.1	3.0	<0.0001 *	4.0	3.1	<0.0001 *
Affect regul.	1.0	1.8	0.554	3.7	2.6	0.036 *	3.1	2.9	0.483	4.2	2.0	0.000 *	3.5	2.2	0.041 *
Social norm	3.7	2.4	<0.0001 *	3.9	2.9	0.000 *	3.2	3.0	0.412	3.8	2.4	0.000 *	4.5	2.5	<0.0001 *
Social image	3.5	1.9	0.025 *	3.7	3.0	0.023 *	3.6	3.0	0.020 *	4.4	2.0	<0.0001 *	4.1	2.3	<0.0001 *
Choice	4.0	2.9	0.000 *	3.4	3.0	0.296	4.0	3.4	0.008 *	3.8	2.8	0.006 *	4.0	2.8	0.003 *

K = mean scores for RATA, L = mean scores for RATING, and M = *p*-values for two-sample t-test, [1] Five-point scale: 1 = not at all important, 2 = slightly important, 3 = moderately important, 4 = very important, and 5 = extremely important. **p*-values were lower than the significance level alpha = 0.05, implying that particular mean scores for RATA and RATING significantly differed.

Table A11. Mean scores1 for RATA and RATING survey formats and p-values for the corresponding two-sample t-test for each motivation construct for starch-rich foods in all five countries.

	Brazil			China			India			Spain			USA		
	K	L	M	K	L	M	K	L	M	K	L	M	K	L	M
Liking	4.2	4.0	<0.0001 *	3.7	3.6	0.263	4.2	3.8	<0.0001 *	4.1	4.0	0.083	4.1	4.0	0.048 *
Habits	3.6	3.7	0.054	3.5	3.7	0.038 *	3.9	3.8	0.140	3.3	3.0	0.003 *	3.2	3.2	0.711
Need/Hunger	4.3	3.6	<0.0001 *	3.9	3.7	0.004 *	4.1	3.6	<0.0001 *	3.9	3.6	0.000 *	3.9	3.6	0.006 *
Health	4.3	3.2	<0.0001 *	4.1	3.4	<0.0001 *	4.3	3.6	<0.0001 *	4.0	3.0	<0.0001 *	4.0	2.9	<0.0001 *
Convenience	4.0	3.3	<0.0001 *	3.4	3.4	0.726	4.1	3.8	0.000 *	3.7	2.7	<0.0001 *	3.7	3.3	0.000 *
Pleasure	4.0	3.0	<0.0001 *	3.5	3.0	0.014 *	4.2	3.6	<0.0001 *	4.0	3.6	<0.0001 *	4.2	3.4	<0.0001 *
Trad. eating	3.5	2.7	<0.0001 *	3.5	3.4	0.231	4.0	3.6	<0.0001 *	3.6	3.1	<0.0001 *	3.0	2.8	0.067
Nat. concern	4.4	3.4	<0.0001 *	4.1	3.5	0.000 *	4.3	3.8	<0.0001 *	4.3	3.3	<0.0001 *	4.1	3.1	<0.0001 *
Sociability	3.9	2.6	<0.0001 *	3.8	3.0	0.001 *	3.9	3.3	0.000 *	3.8	2.9	<0.0001 *	3.9	2.3	0.000 *
Price	4.1	2.9	<0.0001 *	3.5	2.9	0.009 *	3.9	3.1	<0.0001 *	4.0	2.4	<0.0001 *	3.9	3.0	<0.0001 *
Visual app	3.5	2.2	<0.0001 *	3.6	3.0	0.023 *	4.0	3.3	<0.0001 *	3.6	2.6	<0.0001 *	3.3	2.7	0.019 *
Wt. control	4.2	2.9	<0.0001 *	3.7	3.1	0.002 *	4.2	3.4	<0.0001 *	4.1	2.6	<0.0001 *	3.9	2.7	<0.0001 *
Affect regul.	5.0	1.6	0.003 *	2.5	2.2	0.370	3.1	2.7	0.108	4.3	1.8	0.000 *	4.3	2.0	<0.0001 *
Social norm	3.7	2.3	<0.0001 *	3.3	2.8	0.012 *	3.8	2.9	<0.0001 *	3.6	2.3	<0.0001 *	4.1	2.3	<0.0001 *
Social image	2.8	1.8	0.003 *	3.4	2.8	0.021 *	3.7	3.0	<0.0001 *	3.7	2.1	<0.0001 *	4.4	2.2	<0.0001 *

Choice	3.9	2.8	<0.0001 *	3.6	3.1	0.006 *	3.9	3.3	0.001 *	3.9	2.3	<0.0001 *	3.8	2.6	0.000 *

K = mean scores for RATA, L = mean scores for RATING, and M = p-values for two-sample t-test, [1] Five-point scale: 1 = not at all important, 2 = slightly important, 3 = moderately important, 4 = very important, and 5 = extremely important. * p-values were lower than the significance level alpha = 0.05, implying that particular mean scores for RATA and RATING significantly differed.

Table A12. Mean scores1 for RATA and RATING survey formats and p-values for the corresponding two-sample *t*-test for each motivation construct for dessert foods in all five countries.

	Brazil			China			India			Spain			USA		
	K	L	M	K	L	M	K	L	M	K	L	M	K	L	M
Liking	4.3	4.2	0.115	3.9	3.4	0.003 *	4.2	3.7	<0.0001 *	4.1	3.9	0.069	4.3	3.8	<0.0001 *
Habits	3.8	3.4	0.064	3.2	3.4	0.540	4.1	3.7	0.004 *	3.9	3.3	0.002 *	4.4	3.2	<0.0001 *
Need/Hunger	4.2	3.1	<0.0001 *	4.0	3.4	0.004 *	4.1	3.5	0.000 *	4.0	3.2	0.005 *	3.7	3.3	0.137
Health	4.4	2.3	<0.0001 *	3.9	3.1	0.012 *	4.1	3.2	<0.0001 *	4.0	2.5	0.001 *	4.9	2.5	<0.0001 *
Convenience	4.3	3.0	<0.0001 *	3.4	3.2	0.632	3.7	3.2	0.021 *	4.3	2.9	0.001 *	4.7	2.9	<0.0001 *
Pleasure	3.9	3.5	0.042 *	4.2	3.3	0.001 *	4.2	3.7	0.000 *	4.0	3.8	0.057	3.9	3.7	0.315
Trad. eating	3.7	2.8	0.000 *	3.2	3.2	0.961	4.1	3.4	0.000 *	3.9	3.5	0.001 *	3.5	3.0	0.058
Nat. concern	4.6	2.3	<0.0001 *	3.9	3.3	0.225	4.2	3.2	<0.0001 *	4.2	3.0	0.012 *	4.6	2.7	0.000 *
Sociability	4.0	3.0	<0.0001 *	3.7	3.2	0.178	3.8	3.3	0.010 *	3.6	2.9	0.007 *	3.7	2.7	0.009 *
Price	4.4	2.6	0.000 *	3.7	3.0	0.046 *	3.9	3.0	0.000 *	3.6	2.3	0.039 *	4.2	2.7	0.001 *
Visual app	3.9	2.9	0.003 *	4.2	3.1	0.000 *	4.2	3.5	<0.0001 *	4.0	2.8	0.001 *	4.0	3.0	0.010 *
Wt. control	4.7	2.1	0.002 *	3.6	3.1	0.113	3.9	3.1	0.001 *	4.3	2.3	0.011 *	4.3	2.4	0.014 *
Affect regul.	3.8	2.4	<0.0001 *	3.5	3.0	0.317	3.6	3.1	0.041 *	4.4	2.2	0.000 *	3.8	2.5	0.053
Social norm	4.0	2.3	0.257	4.0	3.2	0.064	3.5	3.0	0.112	4.1	2.4	<0.0001 *	4.4	2.6	0.001 *
Social image	4.3	2.1	0.003 *	3.9	3.1	0.017 *	3.8	3.2	0.030 *	4.3	2.1	<0.0001 *	4.4	2.5	<0.0001 *
Choice	4.6	2.5	0.000 *	3.9	3.2	0.105	4.0	3.3	0.054	4.3	2.5	0.012 *	3.5	2.7	0.112

K = mean scores for RATA, L = mean scores for RATING, and M = p-values for two-sample t-test, [1] Five-point scale: 1 = not at all important, 2 = slightly important, 3 = moderately important, 4 = very important, and 5 = extremely important. * *p*-values were lower than the significance level alpha = 0.05, implying that particular mean scores for RATA and RATING significantly differed.

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Chapter 5 - Comparing the Impact of Check–All-That-Apply (CATA) and Check-All-Statements (CAS) Question Formats on "agree" responses for Different Consumers' Age groups and Genders across Five Countries.

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Abstract

Check-All-That-Apply (CATA) and Check-All-Statements (CAS) or (Yes/No) question formats are used by consumer researchers but literature on the influence of those formats on responses from different consumer demographics is lacking. With CATA, consumers select all terms/statements that apply from a list while with CAS, consumers must respond (yes/no or agree/disagree) to each term/statement to show if it applies or not. Online surveys using CATA and CAS were conducted to compare the impact of the two question formats on the "agree" responses for gender and age groups (Boomers, Generation X, Millennials, Generation Z) in Brazil, China, India, Spain, and the USA. Consumers in each country were randomly assigned one of the two question formats (N = 200 per country per method). For most questions and demographic categories, the percentage of "agree" responses was higher when the CAS question

format was used. Multiple Factor Analysis (MFA) showed similarities in the "big picture" information collected by CAS and CATA but differences existed in the details. The response distribution and level of detail provided by specific age groups or gender depended on which question format was used. The resulting decisions and recommendations made by researchers for demographic segments of the population could be different.

Practical applications

This study suggests that CATA and CAS provide similar "big picture" information but that the details may be different when using the shortened form (CATA) of questionnaire design for some demographic sub-groups in some countries.

Keywords: Check-All-That-Apply; Check-All-Statements; CATA; Eating Motivations; Survey; Cross-Cultural

1. Introduction

The Check-All-That-Apply (CATA) is one of the most commonly used question formats today in quantitative consumer research (Cardinal et al., 2015; Esmerino et al., 2017; Jaeger, Fiszman, et al., 2017; Jaeger, Kim, et al., 2017; Phan & Chambers, 2016a). The CATA question format involves asking the respondents to check items that apply from a list of options. The need to reduce respondent fatigue as they completed self-administered surveys initiated the development of the CATA question format (Sudman & Bradburn, 1982). This format provides an easy and non-tedious way of collecting multiple responses that are reproducible (Ares et al., 2014; Jaeger et al., 2018; Jaeger, Fiszman, et al., 2017). The Check-All-Statements (CAS) is another question format that is commonly used in industry to collect consumer product characterizations and perceptions and attitudes. With the CAS question format, a respondent is required to provide a "yes" or "no" option to each of the items provided.

CATA and CAS question formats have been used interchangeably by consumer researchers because they are believed to provide similar results (Jaeger et al., 2014; Smyth et al., 2006). However, some findings suggest that the two question formats can produce different responses for research projects (Seninde & Chambers, 2020b; Smyth et al., 2008). For instance, online surveys and central location studies that employed CATA questions showed the question format to be more susceptible to primacy bias which is a tendency of respondents checking items at the top of the list more than items that appear either in the middle or at the bottom of the list (Ares & Jaeger, 2013; Carlson, 1996; Schwarz et al., 1992; Sudman & Bradburn, 1982).

According to Seninde and Chambers, (2020b), a higher percentage of incomplete or partial responses (cases where respondents did not complete answering the survey within four weeks from the start date) was identified with the CAS survey format when it was compared to the CATA question format. For example, the completion rates for the online survey in India were 95 % for CATA and less than 50 % for the CAS question format. The higher rate of "drop-offs" associated with the CAS survey format was ascribed to the number of respondents who were irritated with the monotonous "yes" and "no" options placed on each item (Best & Krueger, 2004).

Consumer researchers such as dietitians, nutritionists, product developers, sensory scientists, and food marketing researchers all have the overarching goal of improving health. Understanding what motivations drive the food choices for the targeted populations could therefore be critical when designing and developing sustainable products that consumers or particular communities need. CAS and CATA are two question formats that are usually used in collecting food product characterizations (e.g., eating motivations) from different age groups or genders within a target population (Jaeger et al., 2014; Phan & Chambers, 2016b, 2016a). However, literature investigating similarities or differences in CATA or CAS data provided by consumers of different age groups and gender in various countries is limited. Additionally, Thomas and Klein (2006) showed that more detailed responses were consistent in various behavioral studies conducted in different languages and countries of residence.

Thus, the current online study compares the effect of CATA and CAS question formats on responses of four consumers' age groups and two genders in five countries. Specific objectives included a) comparison of percentages of "agree" responses for age groups and gender for CAS and CATA b) comparison of the impact of CAS and CATA questions on consumers' age group or gender "agree responses, c) comparison of the impact of CAS and CATA question formats on individual food categories' "agree" responses, and d) comparison of consumers' survey mean duration, survey liking, just about right (JAR) rating questions and incompletion rates for CAS and CATA.

2. Materials and methods

2.1 Questionnaire development

The Eating Motivation Survey (EMS) questionnaire was used to collect perceptions of eating motivations from qualified respondents. A total of 47 positive or "agree" motivation terms were randomly assessed in each format (CAS or CATA but not both) of the survey questionnaire (see Seninde & Chambers, 2020a). Also, the 47 positive terms were constituents for 16 eating motivation constructs that were investigated in previous literature: Fifteen from Renner et al. (2012) and one additional construct from Phan and Chambers (2016b). The motivation constructs included items related to liking, habits, need and hunger, health, convenience, pleasure, traditional eating, natural concerns, sociability, price, visual appeal, weight control, affect regulation, social norms, social image, and choice limitation. Each eating motivation had 3 subscales or items except for the choice limitation motivation which had only two subscales.

The questions in EMS focused on the motivations for eating five items that belonged to five food groups. The five food groups included foods rich in starch or proteins. Other food groups that were considered included dairy, fruits and vegetables, and sweet foods/desserts (National Health and Medical Research Council, 2015; Phan & Chambers, 2016b). Food items that belonged to these food groups and that applied to the general population of the particular country were used. For example, for desserts, chocolate cake with frosting was used for the USA while turrón was used for Spain, gulab jamun for India, pan-fried red bean paste cakes for China, and brigadeiro for Brazil (Seninde & Chambers, 2020a).

Other questions included five questions on respondent demographics (Castro & Chambers, 2019b), one question that investigated the respondents' survey experience in terms of liking (5-point hedonic scale) and another question that asked the respondents to rate the length of the survey based on a 7-point Just About Right (JAR) scale was also included at the end of the EMS questionnaire(Seninde & Chambers, 2020a). This online survey was designed following an approved protocol for conducting research that involves human subjects (IRB #7297.2) that were approved by the designated committee at Kansas State University, Manhattan, KS, USA. Complete information on the survey and its implementation have been published (Seninde & Chambers, 2020a) but the basic information is found below. Similar procedures for translation and implementation have been published recently in other research (Castro & Chambers, 2019a; Sánchez-Bravo et al., 2020).

2.2 Respondents and recruitment

Respondents in five countries (Brazil, China, India, Spain, and the USA) were recruited through Qualtrics, Provo, UT, USA using its or its partners' existing databases. The two question formats (CAS and CATA) were randomly assigned to respondents from five countries (N=200 per question format per country) and each respondent answered only one of the two formats but not both. Also, the respondents were recruited based on two demographic quotas. One of the quotas was the year in which the respondent was born and the other was the gender of the respondent. Four age groups were considered for this study with each having at least 50 respondents responding to each one of the survey questionnaire formats (Table 5.1).

Table 5.1. Overview of demographic segmentation of respondents who completed the CAS and CATA question formats of the EMS in all five countries[1]

	Brazil		**China**		**India**		**Spain**		**USA**	
G[2]	**CAS**	**CAT**	**CAS**	**CAT**	**CAS**	**CAT**	**CAS**	**CAT**	**CAS**	**CAT**
Boomers										
Males	25	25	26	25	29	29	26	26	27	27
Females	25	25	27	27	26	28	26	26	27	27
Generation X										
Males	25	25	26	26	40	34	27	27	26	26
Females	25	25	25	27	36	36	27	27	27	27
Generation Z										
Males	25	25	26	27	36	30	27	26	26	26
Females	25	25	26	27	41	35	27	27	26	27
Millennials										
Males	25	25	24	25	27	27	27	27	26	27
Females	25	25	25	27	27	38	27	27	27	27

[1] Number of respondents, [2] Gender by Age group

The age groups consisted of Generation Z (born in the years 1995 to 2001), Millennials (born in the years 1980 to 1994), Generation X (born in the years 1965 to 1979), and lastly Boomers (born in the years 1944 to 1964). Also, the respondents recruited in each age group had a Female: Male ratio of 1:1(Seninde & Chambers, 2020a).

2.3 Data analysis

2.3.1 Comparing percentages of "agree" responses for age groups and gender for CAS and CATA.

Because the possible number of ticks/checks varied depending on how many people ate that particular food in a particular country and the number of subscales in the eating motivation category, the counts were standardized by converting them to percentages. Thus, percentages for "agree" responses for each age group and gender for each motivation construct across all five food groups in the five countries were calculated.

2.3.2 Discrimination among age groups and genders for CAS and CATA responses.

To determine how similar or different the counts of "agree" responses for the four age groups or two genders were to each other for all 16 motivation constructs, chi-squared tests at 5% level of significance were computed on the counts of "agree" responses. The number of food groups that had significant differences among age groups or genders for all 16 motivation constructs for CAS and CATA question formats within the five countries was tabulated.

2.3.3 Comparing associations among age groups or between genders and eating motivations and food groups depicted by CAS and CATA data.

Multiple Factor Analysis (MFA) charts for CAS and CATA data were produced using the percentage of "agree" responses for the 16 motivations as quantitative variables, and food category, age group or gender, and the country as qualitative variables. Additionally, because this particular analysis aimed to compare the associations between consumers' age groups or genders, eating motivations, and food categories depicted by CAS and CATA data, the country of residence of the consumers was considered as a supplementary variable.

2.3.3 Comparing associations among age groups or between gender and motivations, and country within individual food categories.

To provide a more zeroed in on comparison of associations among age groups or between gender and eating motivations and country within an individual food category, correspondence analysis (CA) plots were generated using chi-square distances for percentages of "agree" responses for the 16 motivation constructs for each food group for each survey format (Cardinal et al., 2015; Vidal et al., 2015). This was done not to shift focus to the cross-cultural similarities or differences among countries but to further expound on the influence the CATA and CAS question formats wield and the possible data interpretations for the two question formats. Furthermore, two sets of RV coefficients were also computed to determine the similarity between spaces obtained using the two survey formats for each food group (Robert & Escoufier, 1976). The first set was based on the first two dimensions of CA row coordinates for CAS and CATA which represented the age groups or genders' configurations for a particular food category (Jaeger et al., 2014). Similarly, the second set was computed using the first two dimensions of CA column coordinates for CAS and CATA which represented the motivation constructs' configurations for a particular food category. RV Permutation tests were applied to test the significance of the RV coefficients that were computed (Jaeger et al., 2014; Josse et al., 2008). Values for RV coefficients can be less than or equal to one but greater than or equal to zero ($0 \leq RV \leq 1$). RV coefficients that are closer to 1 would indicate that the two matrices were more similar (Josse et al., 2008). Whereas RV coefficients that are closer to zero would indicate that the CATA and CAS spaces were uncorrelated or more different. Josse et al., (2008) stated that the number of attributes (constructs), number of consumers, and number of first dimensions considered in the computation of RV coefficients can influence the resulting values. When designing this study, the authors accounted for this fact and as such made sure to recruit similar numbers of respondents for all age groups and gender in all five countries (Table 5.1). Because the survey had the same number of attributes or motivations regardless of the survey format the implications from the studies should be similar if similar data was provided by the consumers.

2.3.4 Comparison of consumers' incompletion rates, survey mean duration, survey liking, and JAR rating for CAS and CATA

Percentages of incompletion rates for each age group and gender that answered either CAS or CATA question formats of the survey were calculated. Also, chi-squared tests at a 5 % level of significance based on percentages of incomplete responses for each age group and gender in each country were computed.

Furthermore, a two-way model of analysis of variance (ANOVA) at a 5 % level of significance was conducted to assess the effect of survey format and age group or gender on consumers' survey liking, mean duration, and consumers' JAR rating for the survey in each country. Details of scales that were used to assess consumers' liking of the survey experience and JAR rating have been published previously (Seninde & Chambers, 2020a). Type III Sum of Squares analysis was considered. Also, post-hoc Least Squares mean separation was carried out using Fisher's Least Significant Difference (LSD). All analyses were run using XLSTAT (version 2020.1, AddinSoft, New York, USA).

3. Results and discussion

3.1 Comparison of percentages of “agree” responses for CAS and CATA data.

Except for the affect regulation construct and in particular countries (Brazil and the USA), and for particular food categories (protein-rich, starch-rich, fruits, and desserts), the percentage of age groups’ “agree” responses that were collected using the CAS question format were higher than those collected by CATA for all 16 motivations (Tables Appendix A1-A5). To be specific, in the USA, the percentage of age groups’ CATA “agree” responses for the affect regulation motivation was higher than the corresponding percentage of CAS “agree” responses by 1% (in desserts, protein-rich and Starch-rich foods) or 4% (in Fruits and vegetables). In Brazil, it was only within the Starch-rich food category where the percentage of age groups’ CATA “agree” responses for affect regulation was higher (by 1%) than the corresponding percentage for CAS.

On the contrary, across all five countries, within all five food categories and for all 16 motivations, the percentage of genders’ CAS “agree” responses were higher than corresponding percentages for CATA (Tables B1-B5).

Seninde & Chambers, (2020b) found a higher percentage of “agree” responses for CAS and CATA. The authors explained in detail the several factors that could be the reason for the higher CAS percentages for “agree” responses. These findings were not unexpected as they were backed by other authors who attained similar findings between the two survey formats (Jaeger et al., 2014; Nicolaas et al., 2015; Smyth et al., 2006, 2008). Also, according to Seninde and Chambers, (2020b), the more “agree” responses obtained using CAS versus CATA could indicate that one or the other survey format may under- or overestimate the applicability of the motivation constructs.

3.2 Discrimination among age groups or genders by CAS and CATA questions

Chi-squared tests among proportions of "agree" responses for all 16 motivation constructs showed that the CAS survey format had a higher number of food groups that had significant differences ($p \leq 0.05$) among the four age groups for consumers in Brazil, Spain, and the USA as compared to corresponding CATA responses (Table 5.2.). These results support overall findings by Seninde and Chambers, (2020b) who used standard indices to show that the "agree" response distribution of CAS and CATA survey formats were different and that CAS was more discriminating among attributes (in this case constructs) as compared to the CATA survey format. The CAS responses in China were however surprisingly characterized with a significantly fewer number of food groups that had significant differences among the four consumer age groups. Additionally, for CATA, 22 out of the 25 food groups that had significant differences among the four age groups, boomers took the top position based on the percentage of "agree" responses. In fact, for motivations such as natural concern, sociability, visual appeal, weight control, and social image which were characterized with significant differences among age groups in three or more food categories, boomers had the highest percentages. Conversely, for CAS, each of the four age groups took the top position at least twice (2:2:2:3) among nine food groups that had statistically significant differences. This suggests that in China, the question format in particular CATA had a greater influence on how the boomers interpreted, processed, and answered the survey.

Table 5.2. Number of food groups that had significant differences among consumers' age groups for all 16 motivation constructs in the five countries.

	Brazil		**China**		**India**		**Spain**		**USA**		**Total**	
	CAS	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**
Liking	3	1	0	0	2	1	5	2	4	5	14	9
Habits	3	1	0	1	1	3	5	3	1	3	10	11
Need/Hunger	3	1	0	1	3	0	2	0	2	3	10	5
Health	4	1	0	0	2	2	2	2	2	1	10	6
Convenience	4	3	1	1	3	1	2	1	1	4	11	10

Pleasure	1	0	1	1	1	1	2	3	0	3	5	8
Trad.eating	1	0	1	1	1	2	2	0	1	0	6	3
Nat.concern	0	1	2	3	1	2	2	1	1	2	6	9
Sociability	4	0	2	4	2	0	4	2	5	0	17	6
Price	2	1	0	1	1	0	4	1	3	0	10	3
Visual app	4	2	0	3	0	1	2	2	1	0	7	8
Wt.control	2	0	0	3	3	2	4	2	2	1	11	8
Affect regul.	4	2	1	2	0	2	5	0	5	0	15	6
Social norms	0	0	0	0	0	2	1	3	5	0	6	5
Social image	0	0	1	3	0	2	5	1	5	0	11	6
Choice limit	0	0	0	1	0	0	1	1	3	1	4	3
Total	35	13	9	25	20	21	48	24	41	23	153	106

More Qualitative research with this demographic could provide more understanding of how respondents interpreted and completed the two survey formats.

In India, both CAS and CATA question formats attained similar numbers of food groups that had significant differences among the age groups.

Table 5.3. Number of food groups that had significant differences between consumers' gender for all 16 motivation constructs in the five countries.

	Brazil		China		India		Spain		USA		Total	
	CAS	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**
Liking	2	3	0	0	0	0	1	0	3	4	6	7
Habits	3	0	0	0	1	0	1	0	2	0	7	0
Need/Hunger	0	2	0	1	0	0	1	0	1	1	2	4
Health	1	1	1	0	1	0	2	1	4	4	9	6
Convenience	3	0	3	0	1	1	2	1	2	0	11	2
Pleasure	0	1	1	0	0	0	0	0	3	1	4	2
Trad.eating	0	0	1	2	1	0	0	0	4	0	6	2
Nat.concern	3	1	1	2	0	0	0	0	4	2	8	5
Sociability	2	3	1	1	1	0	0	1	5	3	9	8
Price	0	0	0	0	2	0	0	0	2	1	4	1
Visual app	0	0	1	0	1	0	0	0	4	2	6	2
Wt.control	1	0	3	1	0	0	1	1	4	3	9	5
Affect regul.	0	1	1	0	1	0	0	1	5	3	7	5
Social norms	0	0	2	1	1	0	0	0	5	3	8	4
Social image	0	1	0	0	1	1	0	0	5	5	6	7
Choice limit	0	0	0	0	1	0	0	0	3	1	4	1
Total	15	13	15	8	12	2	8	5	56	33	106	61

Table 5.3 shows that CAS “agree” responses had significantly more food groups that had significant differences between genders for consumers in China, India, and the USA as compared to corresponding CATA responses. It is important to note that in China and for the CAS question format, in particular, females had a higher proportion of “agree” responses than corresponding males for all 15 food groups which had statistically significant differences. On the other hand, for CATA, females took the lead in three out of the eight food groups that had significant differences between genders. Both survey formats however had similar numbers of food groups that had significant differences between gender for consumers in Brazil and Spain.

3.3 Comparison of the impact of CAS and CATA question formats on age group or gender responses

3.3.1 Comparison of the impact of CAS and CATA question formats on age groups’ “agree” responses

According to the MFA correlation circle for CATA data (Figure 1b), consumption of starch-rich foods by the older age groups (i.e., boomers and Generation X) was mostly driven by motivations such as liking, habits, convenience, and need and hunger. The opposing quadrant of the same correlation circle identified the younger age groups (i.e., Generation Z and millennials) as people who mostly ate desserts because of affect regulation, social image, and visual appeal.

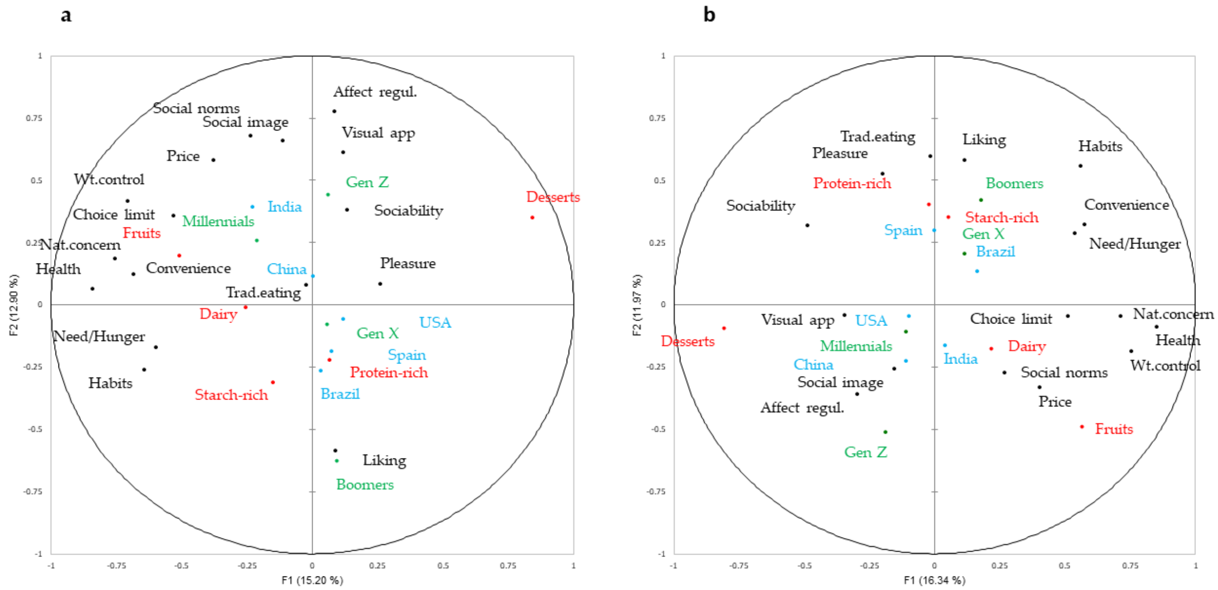

Figure 5.1. Multiple Factor Analysis of (a) CAS and (b) CATA consumers' age group responses for all 16 motivations for eating items from the five food categories within all five countries.

On the other hand, the correlation circle for CAS data (Figure 1a) showed that boomers and Generation X consumers ate protein-rich foods mainly because they liked them. Additionally, the opposing quadrant identified millennials as people who ate fruits mainly because of constructs such as health and natural concern, choice limitation, weight control, price, and convenience. According to dimension 2 of the CAS correlation circle, Generation Z was mostly correlated with constructs such as affect regulation, pleasure, visual appeal, and sociability as key motivations for their consumption of desserts. There were similarities between the CAS and CATA maps but also there were several differences in the information depicted by the two question formats. This suggests that CAS and CATA question formats could have influenced how different age groups interpreted, processed, and ultimately answered the online survey. Furthermore, although the goal of the MFA was to compare the two question formats based on the depicted age groups-eating motivations-food category associations, we found it worthy to note the associations among countries (supplementary variables) also differed depending on what question format was used. For example, according to CATA, Brazil was positioned opposite China and the USA whereas India was positioned opposite Spain. On the contrary, for CAS, Brazil, Spain, and the USA were grouped opposite China and India.

3.3.2 Comparison of the impact of CAS and CATA question formats on genders' "agree" responses

Dimension 2 of the MFA correlation circle for CATA "agree" responses (Figure 2b) identified females as consumers who were driven to eat protein-rich foods and Starch-rich foods mainly because it was a tradition and because they liked them respectively. On the opposite side of dimension 2, the corresponding male consumers were most differentiated by consumption of desserts mainly because of affect regulation, social image, and visual appeal. Also, the males were

Figure 2. Multiple Factor Analysis of (a) CAS and (b) CATA consumers' gender responses for all 16 motivations for eating items from the five food categories within all five countries.

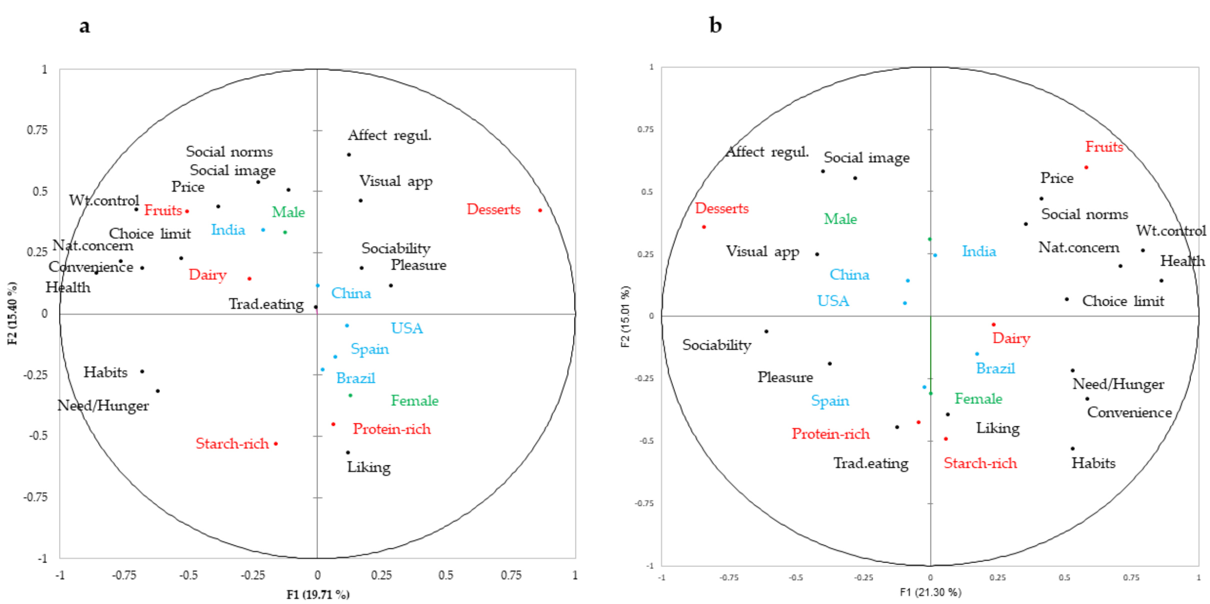

Figure 5.2. Multiple Factor Analysis of (a) CAS and (b) CATA consumers' gender responses for all 16 motivations for eating items from the five food categories within all five countries.

closely associated with eating fruits mainly because of constructs such as natural concern, price, social norms. On the other hand, CAS's "agree" responses (Figure 2a) depicted the females to be most differentiated by the consumption of protein-rich foods because they liked them. The corresponding males were mostly associated with eating fruits because of motivation constructs such as weight control, price, choice limitation, social image, and social norms.

There were multiple similarities between the CAS and CATA maps but also certainly, there were several differences in the information collected depending on what survey question format the two genders answered. Similar to age group MFA correlation circles, grouping among countries was different depending on what question format was used in the survey. For example, the CAS correlation circle grouped Brazil, Spain, and the USA together and opposite India. However, the corresponding CATA correlation circle grouped Brazil opposite China and the USA, while India was grouped opposite Spain.

3.4 Comparison of the impact of CAS and CATA question formats on individual food categories "agree" responses.

3.4.1 Based on consumers' age groups.

In practice, consumer researchers would typically design online studies such as the current survey to better understand associations between age groups or genders and product and product attributes. The results and conclusions of which would then be used to inform key decisions and recommendations be it in academia or industry. We, therefore, used correspondence analysis (CA) plots to compare the impact of CAS and CATA question formats as used to assess the constructs that were responsible for the age groups' or genders' consumption of items that belong to a particular food category. These comparisons between CAS and CATA showed four points that came across amongst all the five food categories and which could be important to consumer researchers when designing future online surveys that include either CATA or CAS questions. First, there were cases where age groups who answered either CATA or CAS question formats were associated with the same motivation constructs for particular food groups. For example, for protein-rich foods, Generation Z, Generation X, and Millennials in the USA were more associated with price and visual appeal than USA Boomers who were more associated with pleasure using both survey formats. As another example, Generation X consumers in Spain (for both CAS and CATA formats) were most associated with the habit of eating protein-rich foods. Figures that depict comparisons of CAS and CATA age groups' responses for protein-rich foods, dairy foods, desserts, fruits, and starch-rich foods are available in the Appendix C. Second, it is important to note that although similarities between age group and motivation construct associations were identified when CAS and CATA correspondence analysis plots for the different food groups were compared, slight differences tagged to some of the observed similarities were also found. These were cases where a particular age group was mostly associated with one or more motivation constructs for one survey format on top of those that were found in common between CAS and CATA data among the different food groups. For instance, although Generation Z in the USA were mostly set apart from other age groups by the price motivation construct when choosing protein-rich foods, corresponding CAS responses further indicated that Generation Z consumers were also mostly differentiated by the visual appeal of the protein-rich foods which was not the case for the corresponding CATA responses). Similarly, CATA responses showed that Generation X in Spain were most differentiated by motivations such as habits, pleasure, and liking. Whereas corresponding CAS responses agreed to habits and pleasure being responsible for setting apart Generation X in Spain, they disagreed on liking but instead identified need and hunger and traditional eating as the other most differentiating constructs. Several related cases were observed in comparisons of correspondence analysis plots for CATA and CAS for the other food groups. The differences in CATA and CAS data seen here suggest that not only could researchers' interpretations be different but also that the decisions made thereafter could be different. For example, boomers in the USA were more differentiated from other US consumers using the CAS format than the CATA format. Also, CA plots that were used in these specific comparisons between CAS and CATA survey formats for age group and construct associations were based only on the first two dimensions. The limitation to this approach is that there are other distinguishing age groups and construct associations that were present in further dimensions but were not highlighted in a two-dimensional plot.

The case for the similarity between motivation associations between CAS and CATA data was highlighted by the RV coefficients (Table 5.4). Values for RV coefficients between motivation construct configurations were closer to 1 and ranged from 0.85 to 0.90 for all food groups except the starch-rich food group that had 0.75. This indicated that construct configurations for the two survey formats for almost all food groups had a fairly strong relationship. It was not surprising to find the motivation constructs were highly correlated. The current study's RV coefficients between attribute or construct configurations were not all that different from Jaeger et al. (2014) who attained values that ranged from 0.89 to 0.97 among five studies (studies 1-5). In their analyses, they also used the first two CA attribute configurations for CATA and CAS to compute the RV coefficients. The strong relationship between eating motivation constructs configurations indicated that consumers used the construct subscales to evaluate the different food items in a similar way (Jaeger et al., 2014). Based on Jaeger et al., (2014) the higher and significant values for motivation constructs RV coefficients can be attributed to the use of food items (or samples) that belonged to different food groups.

Table 5.4. RV coefficients among age groups, motivation constructs and gender configurations obtained from Correspondence Analysis from CAS and CATA data.

	Starches	**Proteins**	**Dairy**	**Fruits**	**Desserts**
Age groups	0.65	0.64	0.78	0.72	0.77
Motivation constructs	0.75	0.85	0.89	0.90	0.87
Gender	0.83	0.73	0.91	0.87	0.89
Motivation constructs	0.80	0.83	0.88	0.91	0.86

The RV coefficients between the CAS and CATA age group configurations for the five food groups were slightly lower (ranging from 0.64 to 0.78) than those of corresponding motivation construct configurations. This moderate correlation between age group configurations for CAS and CATA essentially meant that there were similarities between CAS and CATA data but also there were differences between the data from the two survey formats across the different age and food groups. This could be ascribed to the fact that consumers from the four age groups interpreted, processed, and similarly answered CAS and CATA questions for some cases and different in other cases.

Third, it must be noted that the CA plots are a compilation of many data points and are reduced to “similar vectors” that may not illustrate all data well. For this study, there were cases where particular associations between consumers’ age group and eating motivations based on CATA and CAS responses were different even though CA plots for CAS and CATA presented a similar picture. For instance, consumption of protein-rich foods by millennials in the USA who completed either CAS or CATA survey formats seemed to be mostly motivated by the price of the items when viewing the CA plots. However consumption of protein-rich foods for millennials in the USA who completed the CAS survey format were not mostly motivated by price when viewing the original data.

Fourth, several distinct differences in age group and eating motivation associations between CAS and CATA data were found among the different food groups. Put simply, these are cases where the information provided by the CATA and CAS survey responses differed significantly. An example of this was seen among the boomers who ate protein-rich foods. In the USA, boomers who saw the CATA format were most characterized by pleasure, convenience and price motivations while corresponding CAS respondents were most differentiated by the liking construct. In Brazil, another western-cultured country, boomers who answered CATA reported that they ate protein-rich foods mainly as a habit which was not the case for their counterparts who answered the CAS survey format. Furthermore, in China, boomers who completed the CATA question format were most motivated to eat protein-rich foods because of affect regulation while their colleagues who completed CATA generally were not motivated by affect regulation.

We also noticed that the correspondence analysis plots for CAS for all five food groups based on either consumers' age group or gender data were characterized with higher explained variance than corresponding CA plots for CATA. For example, the CAS correspondence analysis plot for consumers' age group responses for motivations for eating Fruits and vegetables explained 77.2% of the variation whereas the comparable CATA plot only explained 59.9% of the total variance (Figure Appendix 1). Another example, based on consumers' gender responses for motivations for eating Dairy foods, showed that CAS CA plots explained 89.4% of the total variation while the CATA correspondence analysis plots explained 71.2% of the total variation (Appendix C). The differences in interpretation of CAS versus CATA data such as those discussed here further emphasize the fact that decisions made based on CAS and CATA data may not be similar. These findings further suggest that higher RV coefficient values between age group configurations for CAS and CATA data may not necessarily indicate a stronger similarity in the information collected by the two survey formats (Josse et al., 2008). This can be linked to the fact that RV coefficient values are influenced by the number of dimensions of the configurations, the number of attributes, and the number of consumers (Josse et al., 2008). Consumer researchers (e.g., sensory scientists, product developers, nutritionists, and marketers) rely heavily on accurately receiving and interpreting the needs of consumers to design and develop suitable products and services that meet the needs of their consumers. Consumers' age groups could be interpreting, processing and according to levels of importance to the attributes or in this case motivation subscales differently depending on what survey format they were presented and the particular food group an item belonged to. It is thus imperative that careful consideration be taken when selecting the question format to use in online consumer surveys. Authors did not conduct exit qualitative consumer research such as focus groups or interviews with the consumers from five countries who had completed either CAS or CATA to validate the respective data for accuracy. As such, the authors could not confirm if one survey format underestimated or overestimated the consumer responses.

The current findings suggested that the CAS and CATA questions had a significant impact on the age group responses of the targeted population for an online survey. However, this study also found that the differences in age group and motivation construct associations between CAS and CATA survey data were inconsistent across the five countries.

3.4.2 Based on consumers' genders.

Similar to Age groups, comparisons of CAS and CATA motivation construct spaces based on consumers' genders were also characterized with the same four points. First, similarities between the information communicated by the two survey formats were found. For example, females in China, and the USA who completed the survey (either CAS or CATA) were not differentiated by any motivation construct based on their responses for the protein-rich food group. Males in Brazil who completed either CAS or CATA question formats ate protein-rich food items mainly because they had limited choices. Figures that depict comparisons of CAS and CATA genders' responses for dairy foods, desserts, fruits, and starch-rich foods are available in Appendix C. As was similar to the age group findings, a comparison of CAS and CATA configurations based on consumers' genders also showed that RV coefficients between construct configurations (column coordinates) were closer to 1 (≥ 0.8). This highlighted the similar way consumers used the motivation subscales to evaluate the food items. Nonetheless, RV coefficients between gender configurations (row coordinates) were slightly higher than corresponding RV coefficients between age group configurations which indicated that there were more differences between CAS and CATA "agree" responses based on consumers' age groups than consumers' genders data. The dairy and protein-rich food groups for example had RV coefficients of 0.91 and 0.73 between gender configurations versus 0.78 and 0.64 between age group configurations respectively.

Second, we also noticed nuances among several cases where gender and motivation construct associations between CAS and CATA were found to be similar. For example, males in Spain who answered either survey format were most differentiated by the motivation to eat dessert foods because of tradition. However, while those (males in Spain) who answered CATA also identified sociability as a key motivation, their counterparts who answered CAS identified pleasure as the other main motivation for eating desserts. Still, in Spain, females who completed either survey format ate fruits mainly because of pleasure and need and hunger. Corresponding CATA responses however also cited liking and convenience as the other key motivations while CAS responses did not.

Third, there were cases where either CATA or CAS survey formats provided a semblance of similarity between the data collected by either format of the survey. For instance, females in the USA who completed either of the two formats were mostly motivated by constructs such as pleasure to eat dairy foods. However based on the percentages of "agree" responses for CAS and CATA, females in the USA did not have a construct that distinguished them most (Appendix C). Also similarly, based on CA plots for CATA and CAS it seemed as though the consumption of desserts among females in the USA was mostly driven by motivations such as liking (Appendix C). However, females in the USA ate desserts and answered CATA identified pleasure as one of the most important motivations whereas their counterparts who also ate desserts but answered the CAS survey format were not differentiated by any motivation construct.

Lastly, there also were cases where gender and motivation construct associations for CATA differed significantly from those of corresponding CAS data. For example, Males in China who completed the CATA survey format were mostly motivated to eat dairy foods by constructs such as price while their counterparts who completed CAS were not. For the protein food group, CATA responses showed that men in Spain mainly ate such food items because they liked them while corresponding CAS responses did not identify liking as a key motivation for that gender.

Despite the similarities in how specific genders were similar regardless of the survey method, it is noteworthy that there were also multiple differences between the gender and motivation construct associations for CATA and CAS question formats for all the food groups across the five countries.

3.5 Comparison of consumers' incompletion rates, mean survey duration, survey liking, and JAR rating for CAS and CATA survey formats.

3.5.1 Comparison of survey format incompletion rates.

Incompletion rates for CATA and CAS survey formats for boomers in all five countries were similar. Chi-square tests showed that in Spain CATA and CAS survey formats attained similar incompletion rates for all four consumers' age groups (Table 5.5). Generation X consumers

Table 5.5. Percentages of incomplete (partial) responses for each of the four age groups for CAS and CATA for each of the five countries.

	Brazil		China		India		Spain		USA	
	CAS	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**
Boomers	6	6	4	0	11	7	13	10	41	40
Generation X	10	2	2	0	16	4	39	35	38	32
Millennials	21	7	6	0	80	4	40	31	55	35
Generation Z	44	17	21	0	35	4	25	23	22	4

in China, Spain, and the USA who answered either CAS or CATA questions completed the survey similarly. However, a significantly higher percentage of Generation X consumers in Brazil and India who saw the CAS question format did not complete the survey as compared to corresponding CATA respondents. Also, millennials in Spain and the USA completed the two survey formats similarly while a significantly higher percentage of millennials in Brazil, China, and India who answered the CAS survey format did not complete the questionnaire when compared to their counterparts who answered the CATA format. Further, Generation Z, CAS respondents in all five countries except Spain were characterized with a significantly higher percentage of incomplete responses as compared to matching consumers who answered the CATA question format. Alumbaugh (2017) suggested this performance by Generation Z consumers can be ascribed to the fact that they have a shorter attention span and desire to complete tasks faster as compared to survey respondents from preceding age groups. Also, the fact that the CAS format demanded more thought processes and time as compared to the CATA format possibly is not what they expected.

Thus, they may have gotten irritated at the time commitment, which led to a higher percentage of Generation Z exiting the online survey without completion (Ochoa et al., 2021).

Table 5.6. Percentages of incomplete (partial) responses for men and women for CAS and CATA for each of the five countries.

	Brazil		China		India		Spain		USA	
	CAS	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**	**CAS**	**CATA**
Females	24	6	5	0	64	4	27	26	39	36
Males	24	11	11	0	23	6	35	26	33	23

Females and males in Spain and the USA had similar percentages of partial responses for CAS and CATA survey formats (Table 5.6). Ruiz-Pérez et al. (2011) reported that sociodemographic and psychological factors had no impact on the psychological distress of close to 30,000 men and women in Spain. Conversely, CAS data for females and males in Brazil, China, and India were found to have significantly higher percentages of incomplete responses.

3.5.2 Comparison of the survey mean duration for CAS and CATA respondents

Some authors have shown that the forced-choice option that is inherent with the CAS question format prompts deeper cognitive processing by respondents as they attempt to answer web survey questions and thus requires more time to complete as compared to the CATA format that requires less cognitive effort and less time (Carlson, 1996; Jaeger et al., 2014; Smyth et al., 2006; Sudman & Bradburn, 1982). The current writing supported this argument and further highlighted significant differences in survey mean duration among consumers' age groups and gender (Table 5.7). Except for Brazil, significant differences in survey mean duration were found among the four age groups for all five countries with the CAS format taking longer than the CATA format as expected. p-values of sources of variation (age group, gender, and question format, and variable interactions) obtained from ANOVA for survey mean duration are available in Appendix D.

Table 5.7. Least Square Means† of individual factors (age group, gender, question format) from ANOVA for survey mean duration in the five countries[1].

Country	Age group				Question format	
	Boomers	Gen X	Millennials	Gen Z	CAS	CATA
Brazil	31.6 ^{a}	35.2 ^{a}	32.9 ^{a}	36.0 ^{a}	33.6 ^{a}	34.2 ^{a}
China	19.6 ^{ab}	24.1 ^{a}	15.8 ^{b}	19.1 ^{b}	24.7 ^{a}	14.6 ^{b}
India	48.8 ^{a}	28.7 ^{b}	23.4 ^{b}	23.1 ^{b}	33.0 ^{a}	28.9 ^{a}
Spain	23.5 ^{ab}	24.1 ^{a}	17.9 ^{bc}	17.1 ^{c}	23.7 ^{a}	17.7 ^{b}
USA	19.6 ^{a}	16.0 ^{b}	15.9 ^{b}	15.1 ^{b}	20.9 ^{a}	12.4 ^{b}

Country	Gender		Question format	
	Female	Male	CAS	CATA
Brazil	35.3 ^{a}	31.2 ^{a}	33.6 ^{a}	32.9 ^{a}
China	20.0 ^{a}	19.3 ^{a}	24.7 ^{a}	14.6 ^{b}
India	29.0 ^{a}	32.0 ^{a}	32.9 ^{a}	28.1 ^{a}
Spain	21.1 ^{a}	20.2 ^{a}	23.6 ^{a}	17.7 ^{b}
USA	18.0 ^{a}	15.3 ^{b}	20.9 ^{a}	12.4 ^{b}

† Survey Mean duration in minutes; Least Square Means with a different letter (superscript) for an individual factor differred significantly ($p \leq 0.05$) within a country. Also, analyses for age group and for gender were run separately.

For example, in India and the USA, Generation Z, millennials, and Generation X respondents took a significantly much shorter duration to complete the survey as compared to the corresponding boomers. Also, millennials and Generation Z in China and Spain on average took a significantly shorter time to complete the survey as compared to corresponding Generation X. Additionally, Generation Z respondents in Spain required significantly much less time to complete the survey as compared to the corresponding boomers.

Overall, this demonstrated that older consumers tended to take more time to complete the online survey as compared to their younger counterparts in almost every country. Rapid developments in information and communication technology have further widened the gap in consumer expectations and behavior between the younger consumers (Generation Z and millennials) and the older consumers (Generation X and boomers) (Brown, 2017; Eliot Simangunsong, 2018; Ochoa et al., 2021; Zhitomirsky-Geffet & Blau, 2016). According to Eliot

Simangunsong (2018) and Priporas (2017), Generation Z consumers are early adopters to innovation and are proficient in the use of modern technology as demonstrated by their inclination to use e-commerce (e.g. Amazon, Ebay) and social media (e.g., Youtube, Snapchat, and Instagram). Brown (2017) also stated that the Generation Z population has been exposed to today's information technology devices such as smart devices for a large portion of their lives as compared to older generations such as Generation X and the boomers.

It is worth noting that although there were no significant differences in survey mean duration among age groups in Brazil, the two-way interaction between consumers' age group and survey format was significant. Generation X in the same country took a significantly longer duration to complete the CATA format as compared to the corresponding boomers who answered the same survey format. However, similar mean duration was reported for corresponding Generation X and boomers who completed the CAS format. This interaction between the age groups and question format further calls for careful consideration of location or country, survey question format, and targeted consumer age group combinations by researchers when designing international consumer online surveys.

Except for the USA, females, and males from all countries had similar mean durations for either format of the survey. In the USA, females had a significantly longer survey mean duration as compared to the corresponding males.

Longer surveys could likely provide more robust information as compared to shorter surveys. However, it is also likely that the information collected from the shorter surveys satisfies the research objectives and thus may not warrant more expense since for online surveys time is money. Additionally, longer surveys could negatively affect the online survey completion rates which could increase the difficulty in attaining the required number of complete responses. Survey duration and completion rates should however not be used as cornerstones of the design process when creating online survey questionnaires especially when the quality of data could be significantly impacted. Based on current findings, it is apparent that the age group of the targeted respondents should be taken into consideration when determining whether to use either CAS or CATA question formats as this could affect the completion rates of the web survey.

3.5.3 Comparison of survey liking for CAS and CATA respondents

Consumers (all age groups and both gender) in all five countries liked taking the CATA format of the survey significantly much more than the CAS format (Table 5.8). This was no surprise because a similar result was found by (Seninde & Chambers, 2020b). It was only in China and the USA where age groups and gender differed significantly in their liking of the survey. For example, in the USA, Generation X consumers liked the experience of answering the survey significantly much more than the corresponding boomers and Generation Z respondents. Also, the fact that it took females in the USA much longer to complete the survey explained in part why they consequently liked taking the survey much less as compared to corresponding males.

Table 5.8. Least Square Means† of individual factors (age group, gender, question format) from ANOVA for survey liking in the five countries[1].

Country	Age group				Question format	
	Boomer s	Gen X	Millennials	Gen Z	CAS	CATA
Brazil	4.2 a	4.4 a	4.3 a	4.4 a	4.2 b	4.4 a
China	3.7 b	3.8 ab	4.0 a	3.7 b	3.7 b	3.9 a
India	4.2 a	4.3 a	4.1 a	4.2 a	4.1 b	4.3 a
Spain	4.1 ab	4.0 ab	4.1 a	3.9 b	3.9 b	4.2 a
USA	3.9 b	4.2 a	4.0 ab	3.8 b	3.8 b	4.1 a

Country	Gender		Question format	
	Female	Male	CAS	CATA
Brazil	4.3 a	4.3 a	4.2 b	4.4 a
China	3.9 a	3.7 b	3.7 b	3.9 a
India	4.2 a	4.2 a	4.1 b	4.3 a

Spain	4.0 a	4.0 a	3.9 b	4.2 a
USA	3.9 b	4.1 a	3.8 b	4.2 a

† Five-point scale; 1 = I hated taking it, 2 = I did not like taking it, 3 = I have no feelings either way, 4 = I liked taking it and 5 = I liked it a lot; Least Square Means with a different letter (superscript) for an individual factor differred significantly ($p \leq 0.05$) within a country. Also, analyses for age group and for gender were run separately.

Millennials in China significantly liked more the experience of taking the survey than the corresponding boomers and Generation Z. Also, females in China liked taking the survey significantly much more than the corresponding males. *p*-values of sources of variation (age group, gender, and question format, and variable interactions) obtained from ANOVA for survey liking are available in Appendix D.

3.5.4 Comparison of just-about-right survey rating for CAS and CATA respondents

Except for India, consumers from all five countries rated the CAS survey format a little too long as compared to the CATA format, which was rated JAR (Table 5.9). Also, India and Spain were the only countries that were characterized with significant differences in how the four consumers' age groups rated the length of the survey. For instance, Generation Z in India rated the online survey as a little too short while corresponding Generation X rated it as JAR. Further, Generation Z in Spain found the survey a little too long as compared to corresponding boomers, Generation X, and millennials who rated the survey as JAR. Clearly, these differences were not consistent among consumers' age groups across the different countries. *p*-values of sources of variation (age group, gender, and question format, and variable interactions) obtained from ANOVA for survey JAR rating are available in Appendix D.

Table 5.9. Least Square Means† of individual factors (age group, gender, question format) from ANOVA for survey JAR rating in the five countries[1].

Country	Age group				Question format	
	Boomers	Gen X	Millennials	Gen Z	CAS	CATA
Brazil	4.5 a	4.6 a	4.7 a	4.6 a	4.9 a	4.3 b

China	4.6^{a}	4.5^{a}	4.6^{a}	4.6^{a}	4.8^{a}	4.3^{b}
India	3.7^{a}	3.9^{a}	3.8^{a}	3.2^{b}	3.7^{a}	3.6^{a}
Spain	4.6^{b}	4.6^{b}	4.7^{b}	5.0^{a}	5.1^{a}	4.3^{b}
USA	4.5^{a}	4.4^{a}	4.3^{a}	4.5^{a}	4.6^{a}	4.2^{b}

Country	Gender		Question format	
	Female	Male	CAS	CATA
Brazil	4.6^{a}	4.6^{a}	4.9^{a}	4.3^{b}
China	4.4^{b}	4.7^{a}	4.8^{a}	4.3^{b}
India	3.6^{a}	3.7^{a}	3.6^{a}	3.7^{a}
Spain	4.7^{a}	4.7^{a}	5.1^{a}	4.3^{b}
USA	4.4^{a}	4.4^{a}	4.6^{a}	4.2^{b}

[†] Seven-point scale; 1 = much too short, 2 = too short, 3 = a little too short, 4 = just about right (JAR), 5 = a little too long, 6 = too long, and 7 = much too long; Least Square Means with a different letter (superscript) for an individual factor differred significantly ($p \leq 0.05$) within a country. Also, analyses for age group and for gender were run separately.

Even more, females in China rated the survey as JAR while the corresponding males rated it as a little too long. This partly explained the significantly higher liking of the survey experience by the females as compared to the corresponding males in China. Even more, the interaction between gender and question format for consumers in China was found to be significant. Males in China who completed the CAS format rated the survey as a little too long while females in China who completed the same survey format rated it JAR however the males and females who completed the CATA format rated the survey as JAR.

3.6 Survey limitations

Although online access is widely available and used in all the countries tested, one limitation for this online survey was the fact that in each of the five countries, respondents who were recruited were literate and had access to online testing. This implies that consumers in these locations who were illiterate or had no access to the internet at the time the survey was fielded were not recruited. As stated by Muñoz and King, (2007), access to the internet and literacy of the target population are among the key parameters consumers researchers should consider when designing international studies. If required for the population studied, future surveys could be pushed to include the responses of people who may not have access to the internet or be conducted in areas with more limited access to testing. In such cases, paper ballots could be used in place of web versions of the survey for locations where consumers may have limited access to the internet. Also, in-person interviews could be conducted with the help of a local interpreter to mediate between the researcher and the respondent for illiterate populations. Obviously, this could significantly increase the time and budget for the study. Other limitations such as the specific foods or food groups chosen have been discussed previously (Seninde & Chambers, 2020a).

4. Conclusions

The results of this survey suggested that the age group and gender of respondents may be important when determining whether to use CATA or CAS survey formats in online consumer research. Generally, the CAS question format produced a higher percentage of “agree” responses for all motivations, for both genders for all five food categories and across all five countries. Furthermore, CAS and CATA data had several similarities and differences in associations among age groups or between genders and food category and eating motivations. Also, individual food category CATA and CAS data were found to have inconsistent similarities and differences in associations between age groups or between gender and country and motivations. More investigations to better understand the validity of CATA and CAS responses could provide more insights to researchers when designing future consumer studies.

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Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Difference between the percentage of RATING and RATA "apply" responses (%CAS - %CATA) for Boomers (A), Generation X (B), Millennials (C), and Generation Z (D) consumers in Brazil, China, India, Spain, and the USA for the five food categories.

Food category		Brazil				China				India				Spain				USA			
Dairy foods		A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	Liking	45	39	49	45	50	53	61	51	49	50	55	44	34	36	33	44	40	40	45	50
	Habits	32	45	55	51	46	43	59	56	58	55	68	61	54	53	47	47	39	46	57	57
	Need/Hunger	39	32	53	48	31	48	55	40	51	45	68	55	54	39	49	51	50	41	44	41
	Health	46	29	37	25	46	46	47	56	38	42	55	49	34	25	33	28	27	31	27	30
	Convenience	48	33	42	53	34	44	53	63	52	63	65	50	54	46	42	45	35	58	55	62
	Pleasure	45	35	44	41	38	36	34	41	52	53	69	61	33	43	40	55	25	43	48	46
	Trad.eating	16	18	28	21	36	34	39	40	45	46	63	47	43	47	34	34	31	39	41	37
	Nat.concern	42	31	37	30	37	55	64	60	43	47	62	56	41	33	34	29	29	26	22	16
	Sociability	13	10	28	15	21	30	19	40	39	49	56	47	10	16	22	15	11	25	18	25
	Price	15	15	18	23	22	25	24	36	31	40	37	41	13	15	28	34	22	33	25	36
	Visual app	11	6	21	20	31	41	40	37	42	50	57	45	23	22	28	26	29	39	26	32
	Wt.control	31	18	22	26	42	38	51	48	45	50	51	46	23	8	20	26	13	20	17	18
	Affect regul.	2	2	3	3	18	16	16	16	30	31	36	35	0	8	11	21	0	25	12	11
	Social norms	20	5	16	17	30	28	33	26	31	40	49	40	16	11	18	15	8	24	19	27
	Social image	4	1	5	3	20	25	21	30	26	43	50	31	5	9	17	20	9	21	14	25
	Choice limit	27	20	37	32	24	33	30	30	42	47	52	43	27	30	24	31	20	26	25	25

Food category		Brazil				China				India				Spain				USA			
Desserts		A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	Liking	31	35	42	37	48	42	55	53	34	46	50	32	40	42	45	37	36	45	52	47
	Habits	36	25	51	40	34	54	39	43	49	60	61	49	53	43	41	43	47	38	54	45
	Need/Hunger	35	16	32	33	48	51	64	50	54	43	61	42	41	34	43	39	37	31	32	39
	Health	17	2	17	9	25	37	25	41	39	45	53	36	30	18	23	27	4	15	23	25
	Convenience	19	20	36	43	42	42	30	33	45	43	49	38	42	37	43	40	27	23	33	30
	Pleasure	41	30	48	39	40	47	50	45	56	52	62	53	46	43	41	57	30	38	50	49
	Trad.eating	17	15	36	23	38	46	33	36	53	48	63	49	44	33	37	30	28	28	38	40
	Nat.concern	14	12	17	11	34	47	45	35	40	50	53	34	33	29	26	35	14	21	22	25
	Sociability	30	21	46	30	28	35	14	30	41	44	53	32	31	45	24	31	20	20	29	41
	Price	7	11	24	24	35	34	27	33	37	37	50	33	6	9	14	25	11	17	15	37
	Visual app	18	21	36	18	51	46	40	58	50	50	55	44	29	33	39	39	34	41	34	54
	Wt.control	4	1	9	6	31	37	20	42	36	39	49	35	7	13	25	25	3	17	12	23
	Affect regul.	8	22	25	24	21	29	23	45	30	38	43	24	5	15	11	30	-1	23	19	31

	Social norms	10	8	16	8	36	44	27	45	41	37	51	34	10	14	23	28	3	25	26	27
	Social image	2	4	11	11	13	37	15	33	35	45	51	35	8	11	19	25	10	15	20	31
	Choice limit	15	13	14	20	48	42	55	53	34	46	50	32	10	14	16	19	15	19	23	24

Food category		Brazil				China				India				Spain				USA			
Fruits		A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	Liking	32	38	39	46	48	48	50	49	47	47	59	55	24	34	26	32	38	79	56	50
	Habits	24	46	54	44	50	50	57	46	54	53	57	62	52	44	43	55	47	47	64	50
	Need/Hunger	42	48	49	39	43	49	45	37	49	52	67	55	54	45	49	40	42	42	64	42
	Health	30	35	39	34	46	42	43	35	43	47	55	47	35	33	31	32	21	45	48	42
	Convenience	45	33	53	55	48	54	63	45	44	50	67	52	52	55	50	49	48	58	63	52
	Pleasure	42	35	36	48	43	33	37	32	54	55	67	54	42	46	46	47	34	35	43	46
	Trad.eating	8	19	28	27	29	28	36	33	41	46	54	55	48	35	33	34	20	34	27	15
	Nat.concern	39	41	52	42	39	49	63	50	46	43	58	54	34	42	41	41	29	30	46	39
	Sociability	9	13	23	23	29	30	26	32	33	47	56	46	10	12	27	17	5	25	12	21
	Price	15	8	22	22	20	26	28	30	31	42	46	48	13	17	23	39	21	46	32	43
	Visual app	11	9	22	23	35	40	46	36	36	42	51	51	35	25	30	26	26	34	23	32
	Wt.control	24	28	37	28	37	42	42	46	45	46	57	44	17	23	25	27	19	33	42	47
	Affect regul.	3	8	4	11	11	18	16	21	31	30	41	29	5	7	17	13	-4	19	17	19
	Social norms	12	18	16	18	28	28	38	37	34	39	51	38	17	17	20	14	7	25	22	22
	Social image	4	3	8	10	27	27	17	22	28	43	45	33	7	10	16	18	6	20	18	23
	Choice limit	20	23	25	32	32	21	22	23	45	44	50	45	21	14	23	22	3	29	33	24

Food category		Brazil				China				India				Spain				USA			
Protein-rich foods		A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	Liking	38	36	43	47	54	62	49	55	43	50	48	45	21	28	27	25	34	35	50	58
	Habits	38	45	49	51	37	41	49	36	54	56	66	51	43	45	56	44	44	47	47	57
	Need/Hunger	45	41	61	51	48	39	52	46	52	52	72	61	48	52	52	42	51	36	49	58
	Health	41	30	38	17	31	27	32	20	47	46	57	49	38	39	45	33	14	22	22	24
	Convenience	20	15	29	47	32	20	30	20	45	46	63	57	48	38	46	33	36	47	52	56
	Pleasure	38	36	41	30	43	39	53	42	50	55	64	52	32	41	32	32	36	39	50	57
	Trad.eating	14	21	31	21	53	30	37	35	46	39	56	51	46	58	48	46	36	47	42	42
	Nat.concern	35	38	40	46	40	28	48	33	55	44	62	57	31	36	48	34	23	26	26	24
	Sociability	18	18	34	15	26	28	39	35	41	45	57	37	37	34	39	25	21	20	31	35
	Price	16	14	18	23	27	13	20	22	27	38	45	38	9	7	20	18	31	38	27	37
	Visual app	9	10	26	8	37	41	49	42	41	45	50	39	22	31	45	31	38	41	44	56
	Wt.control	19	9	24	21	16	11	22	16	40	40	54	39	26	24	27	22	13	22	16	15
	Affect regul.	2	0	5	6	16	9	18	22	22	27	34	26	5	6	12	14	-1	21	16	15
	Social norms	18	17	16	19	24	28	36	29	30	38	48	36	15	13	22	23	2	24	20	23

	Social image	6	1	9	4	19	25	23	32	31	38	44	27	5	10	25	19	11	22	23	22
	Choice limit	22	24	32	30	16	12	25	29	38	34	55	35	19	22	28	21	12	26	22	30

Food category		Brazil				China				India				Spain				USA			
Starch-rich foods		A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	Liking	50	41	44	48	47	55	63	56	49	44	54	50	29	35	37	38	46	40	60	50
	Habits	35	46	54	51	51	55	40	57	56	59	54	60	38	42	45	38	43	43	55	42
	Need/Hunger	44	42	58	53	53	54	64	64	61	49	66	59	58	59	57	43	47	44	55	48
	Health	37	35	35	31	41	48	44	52	49	45	61	53	38	28	44	24	25	39	38	30
	Convenience	19	35	39	49	48	49	52	54	46	50	60	50	6	22	27	13	27	44	41	42
	Pleasure	39	39	37	45	40	32	40	34	54	49	62	51	43	47	48	50	32	41	48	44
	Trad.eating	14	15	28	21	47	49	36	45	41	48	55	50	39	47	42	44	26	39	37	31
	Nat.concern	35	36	42	37	40	52	56	54	49	53	64	55	41	39	51	31	29	36	35	36
	Sociability	20	19	33	21	31	34	40	39	39	50	47	37	43	42	42	25	5	24	18	25
	Price	17	18	18	29	27	29	27	32	35	34	41	35	10	12	15	11	16	37	33	36
	Visual app	10	7	16	15	33	32	45	33	42	44	49	46	15	31	33	27	29	32	24	32
	Wt.control	18	14	22	26	31	29	39	31	42	36	56	37	9	6	23	6	16	34	31	25
	Affect regul.	-1	2	0	6	15	8	16	12	30	27	23	20	1	2	8	4	-1	20	9	17
	Social norms	9	18	12	15	24	27	34	33	36	35	34	30	13	13	18	12	4	22	11	19
	Social image	4	6	8	7	30	29	25	32	32	38	34	27	4	8	18	16	8	26	16	26
	Choice limit	31	26	37	35	41	31	40	42	36	41	42	36	9	20	27	13	12	18	30	19

Appendix B

Difference between the percentage of RATING and RATA "apply" responses (%RATING - %RATA) for Female (F) and Male (M) consumers in the five countries for the five food categories.

Food category		Brazil		China		India		Spain		USA	
Dairy foods		F	M	F	M	F	M	F	M	F	M
	Liking	47	42	59	49	43	55	39	34	44	42
	Habits	38	55	52	49	57	62	54	47	44	55
	Need/Hunger	41	46	49	39	49	59	49	49	38	50
	Health	31	38	52	46	40	52	31	31	27	31
	Convenience	39	49	55	41	57	57	45	49	50	56
	Pleasure	40	42	40	34	56	60	40	43	35	46
	Trad.eating	20	23	36	39	44	55	42	36	30	44
	Nat.concern	29	42	54	54	49	55	33	37	20	30
	Sociability	12	23	29	26	45	50	15	17	11	30
	Price	15	21	33	21	41	34	23	21	25	32
	Visual app	14	15	41	34	43	53	25	25	23	42
	Wt.control	20	29	51	38	46	50	15	25	15	19
	Affect regul.	0	4	19	15	33	32	10	9	4	23
	Social norms	12	17	36	22	42	38	14	17	13	26
	Social image	3	4	27	21	39	37	12	12	7	27
	Choice limit	27	33	28	31	45	47	24	31	22	27

Food category		Brazil		China		India		Spain		USA	
Desserts foods		F	M	F	M	F	M	F	M	F	M
	Liking	38	35	49	48	38	43	42	40	41	48
	Habits	38	39	44	39	54	55	46	45	43	50
	Need/Hunger	29	28	51	54	49	48	42	36	32	38
	Health	12	10	38	20	40	45	18	30	9	23
	Convenience	34	28	40	33	46	39	36	46	22	34
	Pleasure	38	43	55	32	54	57	43	48	37	45
	Trad.eating	19	27	40	37	46	58	39	35	25	41
	Nat.concern	12	16	47	31	43	45	30	32	18	24
	Sociability	31	33	36	14	39	44	34	31	20	34
	Price	20	17	33	29	40	39	12	13	14	26
	Visual app	27	21	56	37	52	47	35	35	41	41

	Wt.control	7	3	36	23	41	38	15	18	7	20
	Affect regul.	28	14	26	28	33	33	17	11	12	21
	Social norms	11	11	44	28	43	37	17	20	14	25
	Social image	9	7	28	16	37	45	13	17	13	25
	Choice limit	19	12	32	25	42	35	17	12	15	22

Food category		Brazil		China		India		Spain		USA	
Fruits		F	M	F	M	F	M	F	M	F	M
	Liking	44	34	51	46	53	50	30	29	41	50
	Habits	39	45	51	49	57	55	51	46	47	56
	Need/Hunger	50	39	48	39	56	55	48	46	40	54
	Health	36	33	42	40	45	51	33	32	27	43
	Convenience	45	48	53	51	50	56	49	53	53	58
	Pleasure	44	37	39	31	57	57	45	45	32	47
	Trad.eating	19	21	36	26	49	49	37	40	16	31
	Nat.concern	43	44	49	53	49	52	44	35	31	39
	Sociability	18	16	31	26	46	45	13	19	3	26
	Price	19	14	31	21	47	36	22	21	29	41
	Visual app	15	16	40	39	43	47	27	31	21	35
	Wt.control	31	27	45	37	50	46	22	21	30	39
	Affect regul.	5	8	19	15	36	30	11	8	2	21
	Social norms	16	16	34	31	42	38	17	16	9	27
	Social image	7	6	26	20	39	36	13	11	5	27
	Choice limit	25	25	25	23	50	42	23	16	16	27

Food category		Brazil		China		India		Spain		USA	
Protein-rich foods		F	M	F	M	F	M	F	M	F	M
	Liking	44	38	52	57	44	49	24	28	36	51
	Habits	41	50	46	37	59	54	47	48	44	53
	Need/Hunger	55	45	47	46	57	59	49	48	45	52
	Health	31	33	32	24	44	54	34	45	10	30
	Convenience	23	32	32	20	56	50	37	47	45	50
	Pleasure	38	34	46	42	53	57	34	35	42	48
	Trad.eating	18	25	46	34	52	44	49	50	36	48
	Nat.concern	34	46	42	33	52	55	36	40	17	32
	Sociability	22	20	38	28	49	40	35	34	19	34
	Price	14	21	24	17	43	31	11	16	30	36
	Visual app	16	12	46	39	45	42	29	34	40	50

	Wt.control	16	21	18	14	42	43	18	31	8	25
	Affect regul.	3	5	22	11	34	20	7	11	9	17
	Social norms	15	20	34	25	46	30	14	21	11	23
	Social image	4	5	28	22	41	29	11	18	13	25
	Choice limit	26	27	25	17	44	35	20	26	17	26

Food category		Brazil		China		India		Spain		USA	
Starch-rich foods		F	M	F	M	F	M	F	M	F	M
	Liking	48	43	59	52	50	48	32	37	46	51
	Habits	39	52	53	49	60	53	40	42	41	51
	Need/Hunger	50	48	62	55	58	58	56	53	44	52
	Health	35	35	50	43	51	51	26	40	29	38
	Convenience	32	38	55	47	52	50	14	22	34	44
	Pleasure	41	39	37	36	54	53	50	45	37	45
	Trad.eating	16	22	51	37	49	48	40	46	27	40
	Nat.concern	35	40	49	52	55	55	38	44	29	40
	Sociability	21	25	39	33	40	45	39	38	9	27
	Price	21	20	33	25	38	34	12	12	28	34
	Visual app	14	10	37	34	43	46	26	26	29	30
	Wt.control	19	21	33	33	44	39	7	15	25	28
	Affect regul.	1	3	13	13	26	23	3	5	6	16
	Social norms	12	15	30	29	36	31	15	13	7	21
	Social image	5	7	32	26	34	30	11	12	9	30
	Choice limit	31	32	43	34	44	34	17	19	17	22

Appendix C

Figure C1. Correspondence Analysis of (a) CAS and (b) CATA consumers' age group responses for motivations for eating Fruits and vegetables for B= Brazil, C= China, I= India, S= Spain, and U= USA

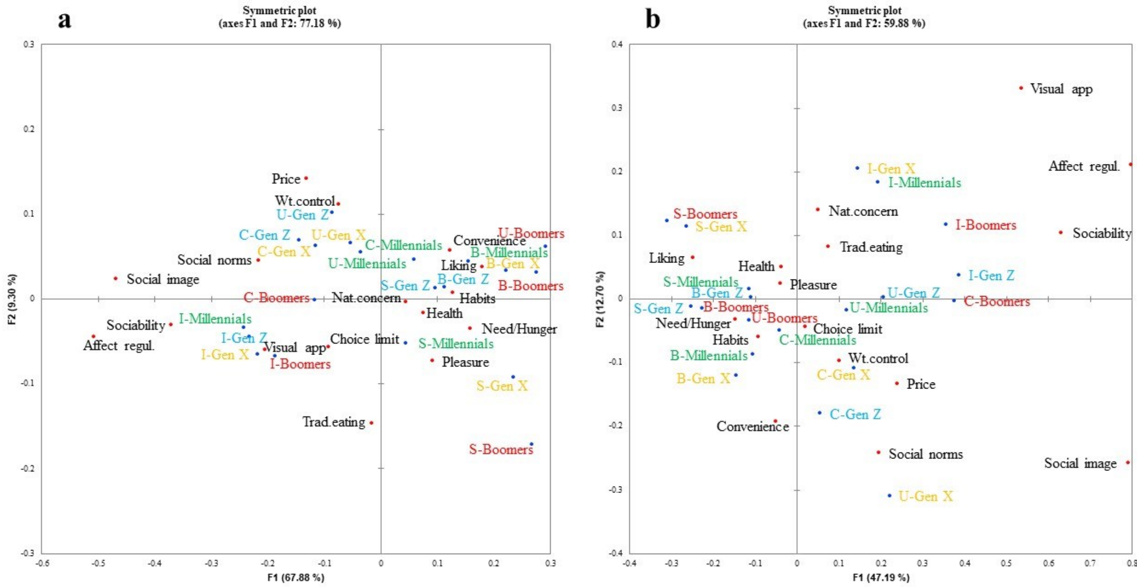


Figure C2. Correspondence Analysis of (a) CAS and (b) CATA consumers' age group responses for motivations for eating Starch-rich foods for B= Brazil, C= China, I= India, S= Spain, and U= USA

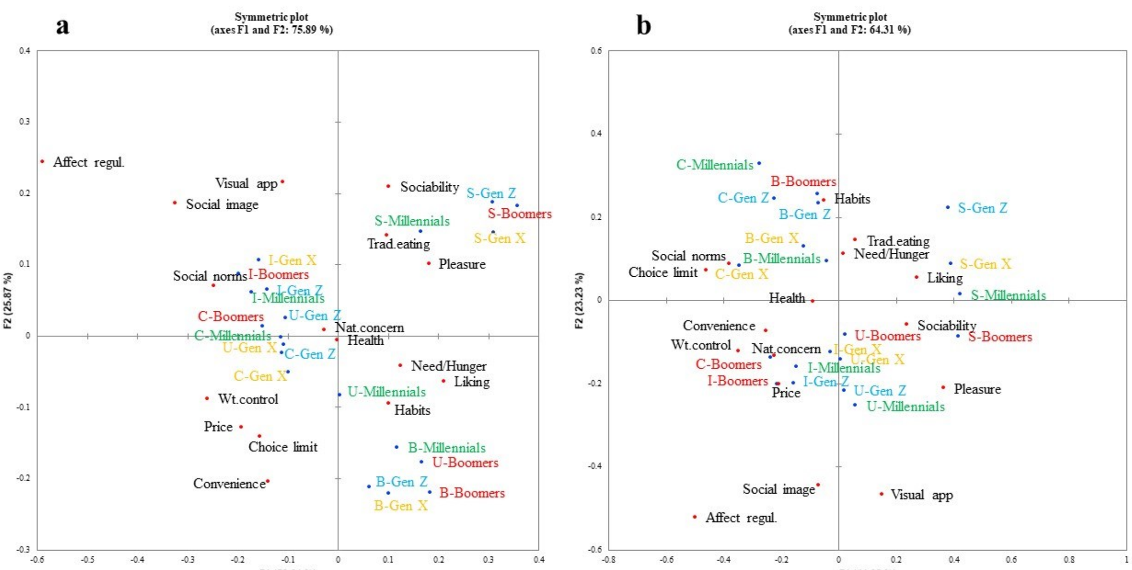


Figure C3. Correspondence Analysis of (a) CAS and (b) CATA consumers' age group responses for motivations for eating Dairy foods for B= Brazil, C= China, I= India, S= Spain, and U= USA

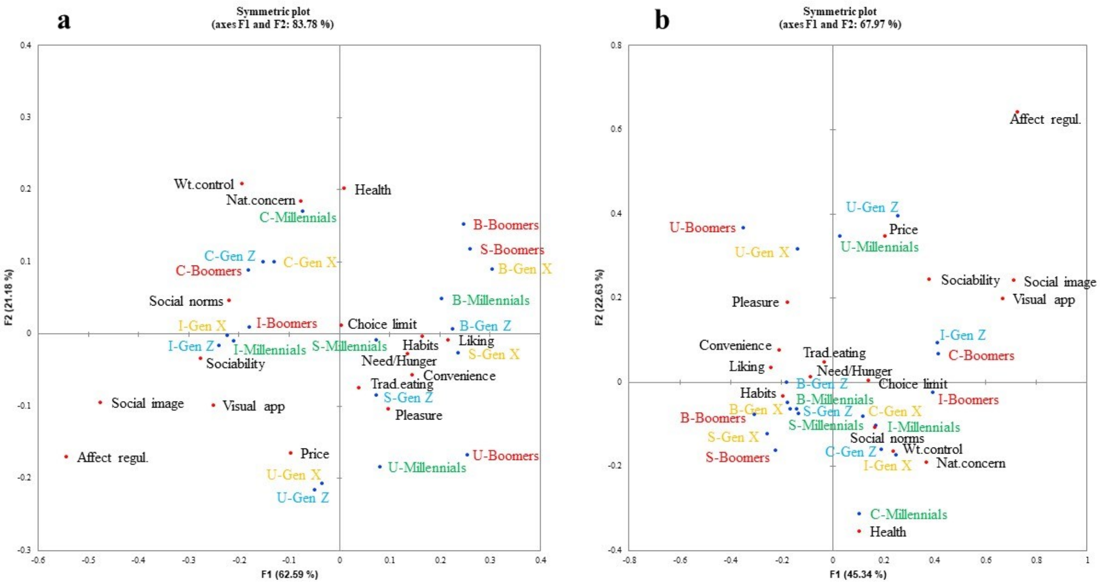


Figure C4 Correspondence Analysis of (a) CAS and (b) CATA consumers' age groups responses for motivations for eating Desserts for B= Brazil, C= China, I= India, S= Spain, and U= USA

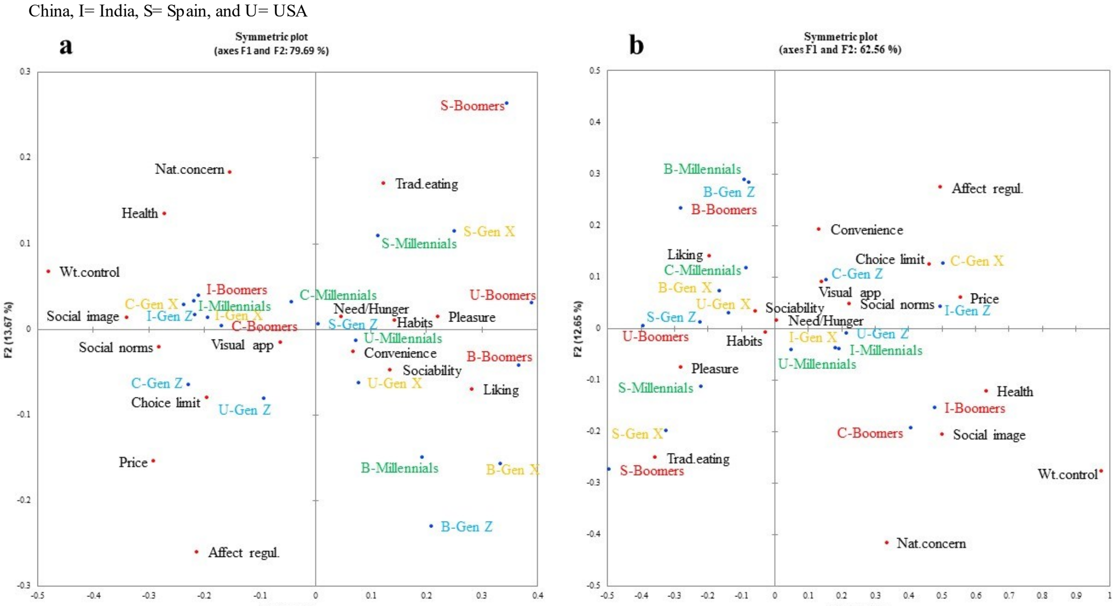


Figure C5. Correspondence Analysis of (a) CAS and (b) CATA consumers' age group responses for motivations for eating Protein-rich foods for B= Brazil, C= China, I= India, S= Spain, and U= USA

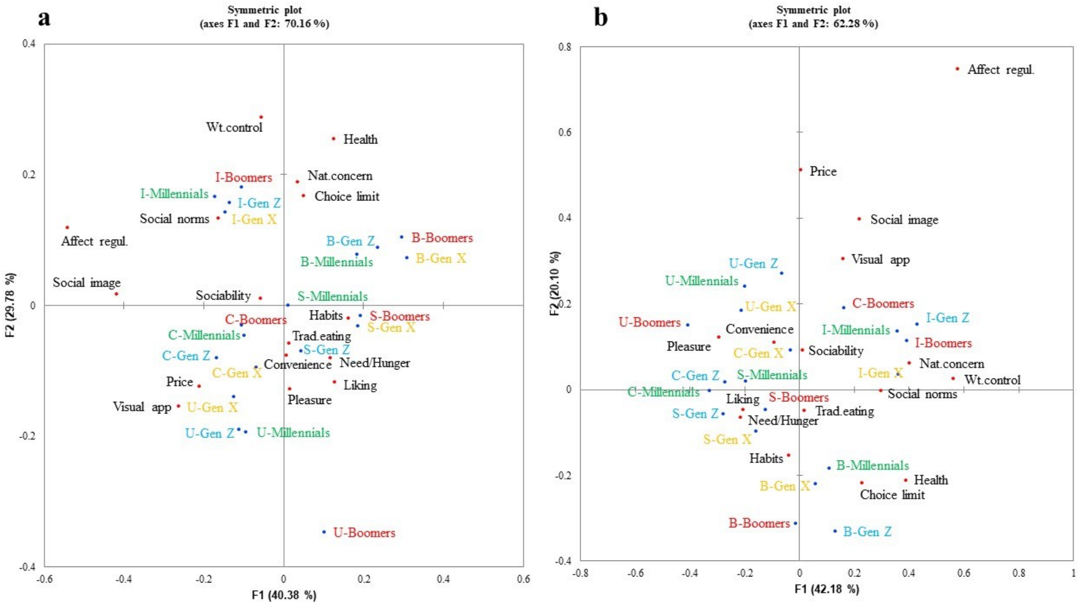


Figure C6 Correspondence Analysis of (a) CAS and (b) CATA consumers' gender responses for motivations for eating Dairy foods for B= Brazil, C= China, I= India, S= Spain, and U= USA

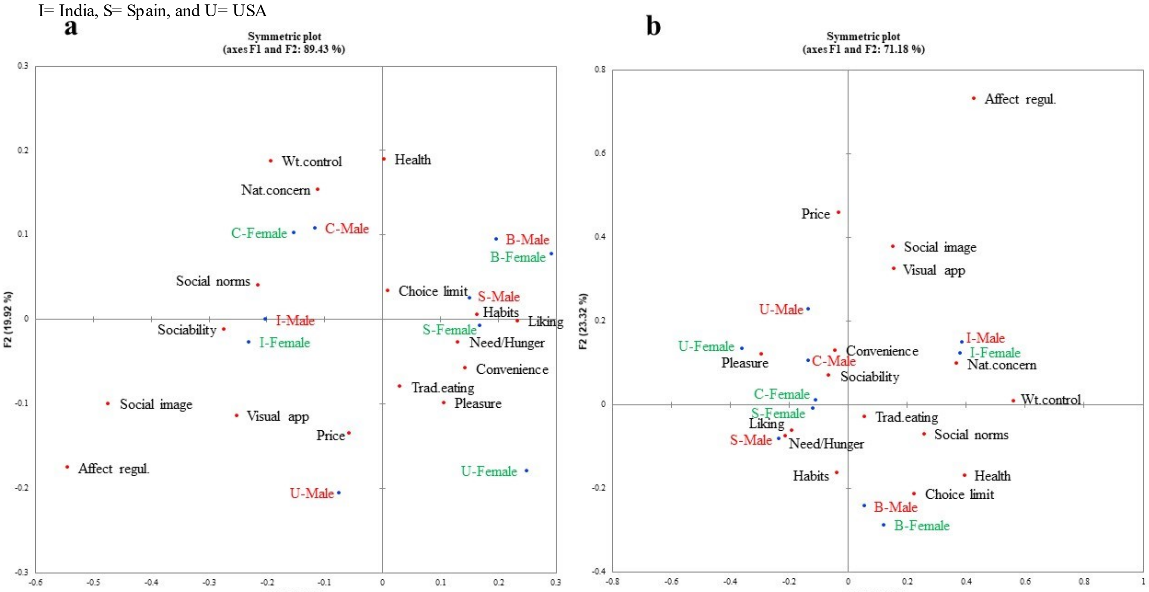


Figure C7 Correspondence Analysis of (a) CAS and (b) CATA consumers' gender responses for motivations for eating Protein-rich foods for B= Brazil, C= China, I= India, S= Spain, and U= USA

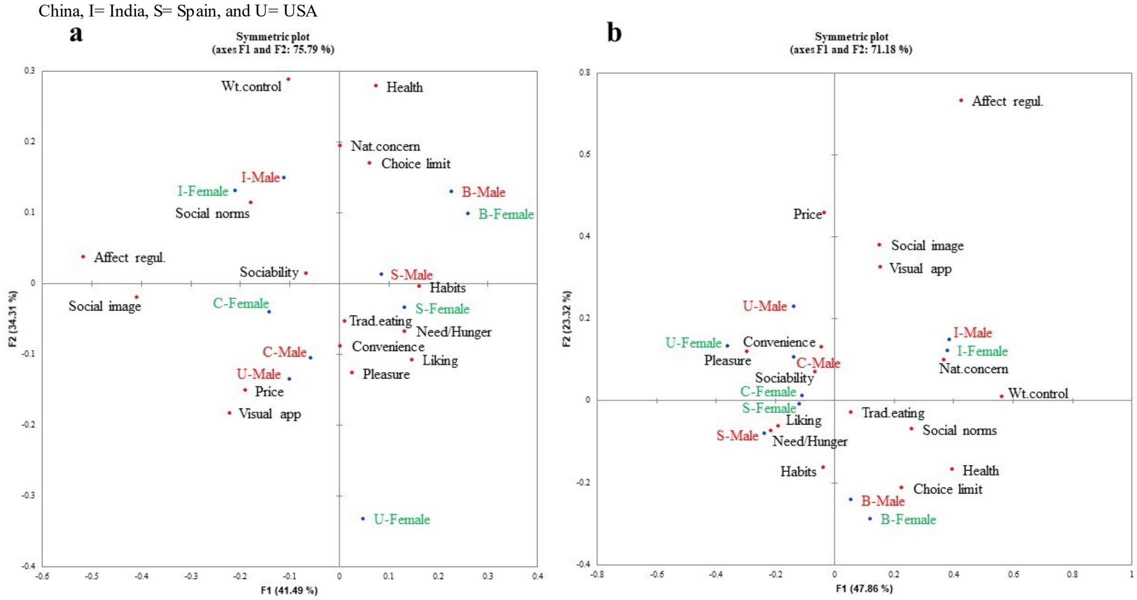


Figure C8 Correspondence Analysis of (a) CAS and (b) CATA consumers' gender responses for motivations for eating Starch-rich foods for B= Brazil, C= China, I= India, S= Spain, and U= USA

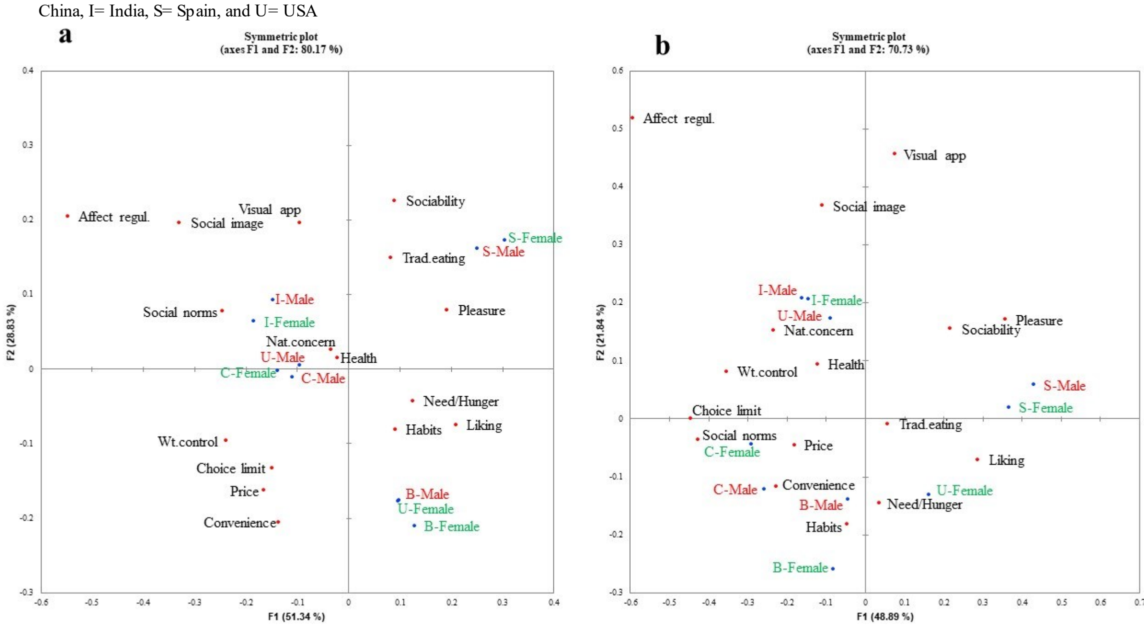


Figure C9. Correspondence Analysis of (a) CAS and (b) CATA consumers' gender responses for motivations for eating Fruits for B= Brazil, C= China, I= India, S= Spain, and U= USA

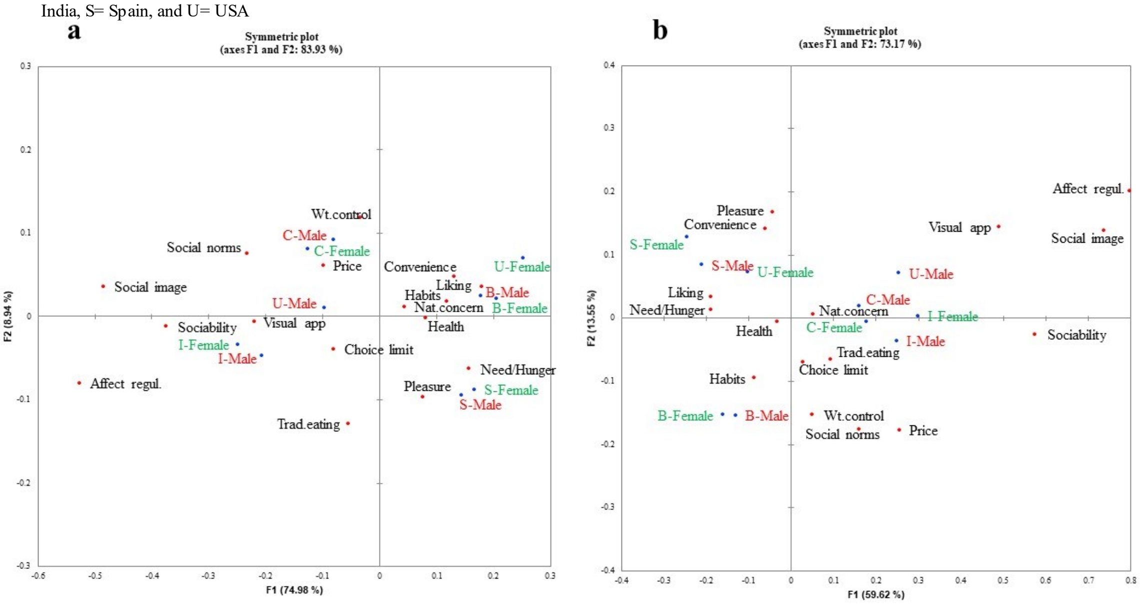
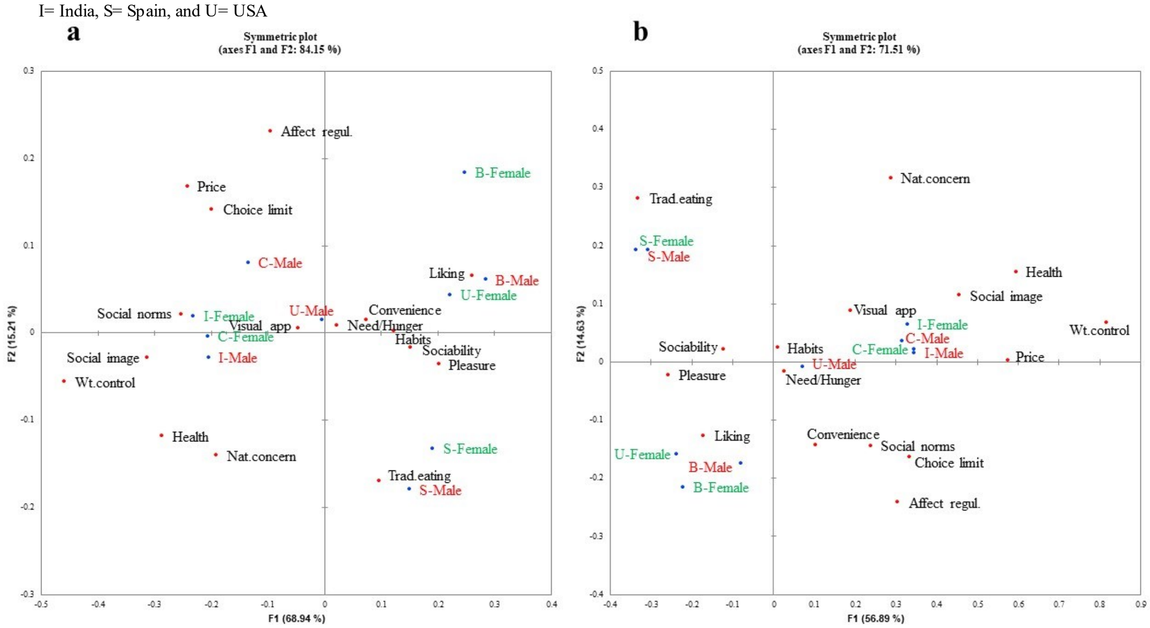


Figure C10. Correspondence Analysis of (a) CAS and (b) CATA consumers' gender responses for motivations for eating Desserts for B= Brazil, C= China, I= India, S= Spain, and U= USA



Appendix D

*p-values of sources of variation (age group, gender, question format and variable interactions) based on Type III Sum of Squares for survey mean duration, just-about-right (JAR) rating and liking. *p-values for source of variation that was significantly different (p ≤ 0.05)*

Survey mean duration	Country	Age group	Question format	Age * Question format
	Brazil	0.48	0.78	0.02 *
	China	0.01*	< 0.01*	0.64
	India	0.00*	0.46	0.31
	Spain	0.03*	0.00*	0.28
	USA	0.03*	< 0.01*	0.68

Survey mean duration	Country	Gender	Question format	Gender * Question format
	Brazil	0.06	0.76	0.35
	China	0.69	< 0.01*	0.53
	India	0.58	0.39	0.84
	Spain	0.69	0.00*	0.74
	USA	0.02*	< 0.01*	0.89

Survey Liking	Country	Age group	Question format	Age group * Question format
	Brazil	0.22	0.00*	0.65
	China	0.03*	0.00*	0.85
	India	0.48	0.02*	0.60
	Spain	0.11	< 0.01*	0.59
	USA	0.02*	< 0.01*	0.44

Survey Liking	Country	Gender	Question format	Gender * Question format
	Brazil	0.87	0.00*	0.26
	China	0.01*	0.00*	0.28
	India	0.74	0.03*	0.73
	Spain	0.87	< 0.01*	0.12
	USA	0.02*	< 0.01*	0.89

Survey Just-about-right-(JAR) rating	Country	Age group	Question format	Age group * Question format
	Brazil	0.66	< 0.01*	0.99
	China	0.77	< 0.01*	0.76
	India	0.02*	0.89	0.76
	Spain	0.01*	< 0.01*	0.69
	USA	0.32	< 0.01*	0.29

Survey Just-about-right-(JAR) rating	Country	Gender	Question format	Gender * Question format
	Brazil	1.00	< 0.01*	0.73
	China	0.01*	< 0.01*	0.01*
	India	0.30	0.90	0.18
	Spain	0.35	< 0.01*	0.34
	USA	0.47	< 0.01*	0.26

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Chapter 6 - Comparing the Impact of Rate-All-That-Apply (RATA) and Rate-All-Statements (RATING) question formats on "apply" responses for different consumers' age groups and genders across five countries.

This chapter is a pre-print version of a paper that is currently in Review: Seninde, D. R., & Chambers, E. Comparing the Impact of Rate-All-That-Apply (RATA) and Rate-All-Statements (RATING) question formats on "apply" responses for different consumers' age groups and genders across five countries *Food Qual. Prefer*.

Highlights

- More discrimination among age groups or between genders for RATING data
- Interactions between question format and age group or gender was critical.
- RATING attribute mean scores for age groups or gender were more consistent.
- Larger and fewer clusters for age groups and gender obtained with RATING data

Abstract

Whereas check-all-that-apply (CATA) questions ask consumers to simply check all the attributes that apply to a product, rate-all-that-apply (RATA) questions ask the consumers to go a step further and rate all the attributes they have selected. Intensity scales used for RATA are similar to those that are applied for rate-all-statement (RATING) question format which asks consumers to rate all the product attributes. Literature shows that RATING often collects more detail and is more discriminating both among product attributes and among products than RATA. However, there is a gap in research information on the effect of the RATA and RATING question formats on the "apply" responses for different age groups and genders. A RATA or RATING format of the current online survey was randomly assigned to 200 consumers in Brazil, China, India, Spain and the USA. Consumers' motivations for eating five food products were assessed. Results confirmed that all consumers' age groups and gender had more "apply" responses for RATING than RATA. Also, effects of the two question formats on "apply" responses for the four age groups and two genders on RATA and RATING responses were critical and varied among the 16 attributes for all samples and within all five countries but were mitigated by their interaction with other factors. Discrimination among consumers' age groups or between genders was greater for the RATING survey format. Also, attribute mean scores were more consistent when the RATING question format was used. Generally, females in China and India (regardless of whether they answered RATA or RATING questions) rated the importance of motivations higher than the corresponding males however males in Spain and the USA rated the importance of motivations higher than corresponding females. These findings could be beneficial to product developers, consumer researchers, and marketeers when designing future consumer studies that include the RATA and RATING questions.

Keywords: Check All That Apply; Rate All That Apply; Rate All Statements; Check All Statements; CATA; RATA; RATING; survey; sensory; marketing; questionnaire

1. Introduction

The rate-all-statements (RATING or RAS) question format has been used in consumer research for over five decades (Likert, 1932; Spector, 1980, 1992; Stevens, 1968). This question format asks respondents to assign product attributes a position on a scale. Several unipolar and bipolar intensity scales (e.g., Likert scales) are used for rating product attributes in consumer research (Andriosopoulos et al., 2018; Ares et al., 2014; Chang et al., 2016; Likert, 1932; Ng et al., 2013; Schaeffer & Dykema, 2020). Lengths of these intensity scales can vary depending on the objective of the consumer study and the desired level of scale-sensitivity. For example, an intensity scale can have 5-points i.e., not at all important, slightly important, moderately important, very important, extremely important but can also be shorter with just 3-points (low, medium, high). Consumer responses for RATING survey questions are usually treated as interval scale data as recommended by (Stevens, 1968). As such, RATING data commonly is analyzed using parametric tests such as t-tests and analysis of variance (ANOVA). That said however, RATING scales can also be treated in an ordered form (as ordinal scales) (Cohen, 1980; Doering & Hubbard, 1979; Jamieson, 2004; Knapp, 1990; Kuzon W M et al., 1996). As ordinal data, non-parametric tests such as chi-Squares tests can be used to make sense of the data. The RATING question format has been associated with gathering of significantly more detail than other question formats such as the check-all-that-apply (CATA) (D. R. Seninde & Chambers, 2021b).This is so because with RATING, consumers are required to provide a response for each product attribute whereas for question formats such as CATA, consumers need to mark only those terms that apply to the product (D. R. Seninde & Chambers, 2020b). This implies that this question format carries with it an extra burden for the respondent and researchers. For example, one study that was conducted in China and Spain where "apply" responses for the RATING survey format and the rate-all-that-apply (RATA) question formats were compared, respondents took significantly longer to complete the RATING survey format than the RATA survey format (D. R. Seninde & Chambers, 2021b) Also, the RATING survey format has been characterized with a greater percentage of incomplete surveys than other question formats such as RATA (D. R. Seninde & Chambers, 2021b). Furthermore, because the cost of fielding online studies often is based on the consumers' survey mean duration (among other factors), the cost for fielding RATING format surveys may be higher compared to the RATA format. Regardless, the RATING format maintains its position as the standard for product description questioning in consumer research (Schwarz, 1999a).

The rate-all-that-apply (RATA) question format is a combination of the check-all-that-apply (CATA) and the RATING question format (Ares et al., 2014; Ng et al., 2013). With RATA, respondents are asked first to check all the attributes that apply (CATA) to the particular product and second to rate all the selected attributes for level of importance or applicability (Ares et al., 2014). Ng et al., (2013) noted that although the CATA question format is highly popular of recent because of its ease and non-tedious structure, its level of discrimination among samples particularly among samples of similar profiles remains lacking. This inspired the development of a spin off question format which saw the inclusion of an intensity or degree scale (e.g., 3-pt or 5-pt scale) onto the CATA question structure (Ares et al., 2014). Further, Meyners, Jaeger, & Ares, (2016) supported Stevens, (1968) earlier notion that rating scale responses should be treated as interval scale data and thus should be analyzed using parametric tests such as ANOVA. This implies that product attributes that are neither checked during the CATA phase nor rated during the rating phase when answering the RATA question are given a zero score when computing product attribute means using t-tests or ANOVA.

Ideally, RATA would be expected to benefit from the best features of CATA and RATING i.e., easier to complete with a lesser burden to respondents than RATING, enhanced sample discrimination and a more detailed sample description capability than CATA. Indeed, RATA is easier, faster (in particular countries) and consumers' liking of their experience answering a RATA survey format is undoubtedly far greater than that of the RATING survey format (D. R. Seninde & Chambers, 2021b). Overall, product attribute mean scores for RATA have been reported to be greater than corresponding RATING scores. However, RATA questions have been reported to be less discriminating among product attributes or products than RATING questions (D. R. Seninde & Chambers, 2021b). Furthermore, other studies suggested that RATA was not superior than CATA (Vidal et al., 2018). Generally, CATA and RATA question formats produced similar results with small differences which were specific to product attributes and particular studies.

Today, the RATA question format is becoming more commonly used in online surveys in industry and academia as an alternative for the CATA or RATING question formats (Giacalone & Hedelund, 2016; Jaeger et al., 2018; Jaeger & Ares, 2015; Tan et al., 2020). However, there is a critical gap in research information on what effect these question formats may have on the quality of the online survey data based on different age groups and genders in different locations (M. P. Couper et al., 2001). An investigation into the effect of the check-all-statements (CAS) or yes/no format and CATA question formats on "agree" responses found that different age groups and genders across five locations consumers interpreted, processed and completed the CAS and CATA survey formats similarly in some cases and differently in other cases (D. R. Seninde & Chambers, 2021a). Understanding better the effect of RATA and RATING on "apply" responses for different consumers' age groups and genders could be core to the design and development of higher-quality surveys. Hence, the current research studied the impact of RATA and RATING question formats on "apply "responses for different consumers' age groups and genders across five countries.

2. Materials and methods

2.1. Survey questionnaire development

Two question formats i.e., a RATA and a RATING of an eating motivation survey (EMS) were designed and developed for completion on an online platform (D. R. Seninde & Chambers, 2020a). The two survey formats were randomly assigned to recruited respondents with each one seeing only one format but not both. The study questionnaires assessed the importance or applicability of a total of 47 positive terms as motivations for the consumption of five foods that belonged to different food categories. The number of terms or attributes used in the current study was representative of routine consumer behavior studies that used similar number of attributes (Chang et al., 2016; Jaeger et al., 2015; Nicolaas et al., 2015; Phan & Chambers, 2016b, 2016a). The 47 terms were categorized into 16 eating motivation constructs with each construct comprised of three terms or subscales except for the choice limitation construct that had only two terms.

Respondents who completed the RATA format of the survey questionnaire were presented all 47 terms on a single page and asked to check-all-the terms-that applied (CATA) before continuing to rate individually how much the selected terms applied or were important based on a five-point intensity scale (RATA). The five-point scale began with “Not at all important” at one end followed by “Slightly important”, “Moderately Important”, “Very Important” and concluded with “Extremely Important” at the other end (Schwarz, 1999b). Respondents who answered the RATING survey format were not provided an option to mark the terms that applied but rather were asked to rate the importance or applicability of each of the 47 terms based on the same intensity scale that was used for the RATA question format. For the RATING question format of the survey, five terms were assessed on a single page except for the last page that had only two terms. In this section (Materials and Methods) and other sections of this writing, we use “apply responses” to refer to responses for which the respondents checked terms (in RATA) or rated terms as “Extremely Important”, “Very Important”, “Moderately Important” or “Slightly Important” for either RATA or RATING question formats.

Survey respondents in five countries (Brazil, China, India, Spain and the USA) completed either RATA or RATING questions on their motivations for eating five food items that were particular and relevant to those locations and belonged to five different food groups. The food categories included foods rich in starch (e.g., rice dishes), proteins (e.g., beans, meats), dairy, fruits and vegetables, and sweet foods/desserts (D. R. Seninde & Chambers, 2020a). Among other questions included in the EMS questionnaire was the survey liking (a five-point hedonic question) and survey Just About Right (JAR) (a seven-point rating question) both of which were placed at the end of the survey in that order but on separate pages (D. R. Seninde & Chambers, 2020a). This online survey was designed following a protocol for research with human subjects (IRB #7297.2) that was approved by the designated review board at Kansas State University, Manhattan, KS, USA.

2.2. Survey questionnaire translation

Following the drafting of the two survey questionnaires in American English for consumers in the USA, the two survey questionnaires were translated into four other languages namely; Portuguese, Simplified Mandarin, Hindi, and Spanish for respondents in Brazil, China, India, and Spain respectively. The detailed complete procedure for the survey methods, including translation, and the survey questionnaires in all five languages have been published previously (D. R. Seninde & Chambers, 2020a).

2.3. Respondents and recruitment

Respondents in five countries were recruited by Qualtrics, Provo, UT, USA using its or its partners' existing databases. The RATA and RATING survey formats were assigned randomly to 400+ respondents per country (N~200 per survey questionnaire format per country) (D. R. Seninde & Chambers, 2020a). Respondents were required to be 18 or older and then were recruited to fill demographic quotas of age and gender for each questionnaire format (RATA and RATING). Four age groups (n = 25 per age group per gender) were used in this study (Table 6.1): Generation Z (born in the years 1995 to 2001), millennials (born in the years 1980 to 1994), Generation X (born in the years 1965 to 1979) and baby boomers or boomers (born in the years 1944 to 1964). For each age group, 50% were female and 50% were male. Once the required number of completed responses for a particular quota was filled, newly qualified respondents (for the filled quotas) were discontinued from completing the EMS.

Table 6.1. Overview of demographic segmentation of respondents who completed the RATA and RATING question formats of the EMS in all five countries[1].

	Brazil		China		India		Spain		USA	
G[2]	A	B	A	B	A	B	A	B	A	B
Boomers										
Males	25	40	25	25	28	30	26	26	27	27
Females	25	25	26	24	26	27	26	26	27	27
Generation X										
Males	25	25	26	24	37	39	27	27	26	26
Females	25	25	27	27	30	41	27	27	27	27
Generation Z										
Males	25	25	27	26	36	40	26	27	27	26
Females	25	25	27	24	37	34	27	27	21	27
Millennials										
Males	25	25	25	25	27	27	27	27	26	26
Females	25	25	27	25	29	35	27	27	27	27

[1] Number of respondents, A = RATA, B = RATING, [2] Gender by Age group

2.4. Data Analysis

2.4.1. Comparison of percentage of "apply" responses for consumers' age groups or gender for RATA and RATING.

The "apply" responses included cases where consumers identified a particular term as at least "slightly important" implying that they selected any one of the five options but "not at all important" on the rating scale for either survey formats. The percentage of "apply" responses for each consumers' age group and gender for all 16 motivation constructs within all five countries for all five food categories were computed in Microsoft Excel. Also, differences in percentage of "apply responses" between RATING and RATA (i.e., %RATING - %RATA) for the 16 motivation constructs for all five food categories and within the each of the five countries were calculated. The use of percentages allowed for effective comparisons among consumers' age groups or gender and motivation constructs that varied in sample size and number of subscales respectively.

2.4.2. Comparing significant differences among consumers' age groups or genders

Chi-Squares tests at a 5% level of significance based on the number of "apply" responses for consumers' age groups or gender for all 16 constructs within all five countries and for all five categories were computed. This enabled the authors to compare the number of food categories which had significant differences among consumers' age groups or between consumers' genders for all 16 motivation constructs for RATA and RATING survey formats within all five countries.

2.4.3. Comparison of mean scores for consumers' age groups or gender for RATA and RATING.

Mean scores were used in the analysis of RATA data as opposed to analyzing RATA data as CATA (Meyners et al., 2016). Also, when analyzing RATA responses in cases where none of the motivations within a construct (usually three motivation subscales per construct) were checked by a consumer, a score of "1" (not at all important) was used in the analysis of the overall construct for that consumer (D. R. Seninde & Chambers, 2021b). Further, RATA and RATING data were analyzed using analysis of variance (ANOVA) at a 5% level of significance (Vidal et al., 2018). Also, Fisher's Least Significant Difference (LSD) was used to identify the mean separation among consumers' age groups or gender. Furthermore, Multiple Factor Analysis (MFA) was run on RATA and RATING mean scores for the four age groups, all five food categories and within all five countries to generate a "big picture" interpretation of the data. Similarly, MFAs for RATA and RATING data based on the two genders were developed.

2.4.4. Comparison of clustering of consumers' age groups or gender for RATA and RATING.

Agglomerative hierarchical clustering (AHC) using wards' method was used to categorize the 20 consumers' age group combinations based on dissimilarity in terms of eating motivations for all five food categories (D. Seninde et al., 2020). Similarly, AHC was also used to group the 10 consumers' gender combinations for all the five food categories. Furthermore, Principal Component Analysis (PCA) were conducted to verify and visualize the findings of the AHC (D. Seninde et al., 2020). Even more, the resulting PCA biplots were used to visualize the consumers' age groups-motivation constructs associations and the consumers' gender-motivation constructs association.

2.4.5. Comparison of survey incompletion rates for RATA and RATING

Percentages of partial responses for consumers' age groups or gender who answered either RATA or RATING question formats of the survey were calculated. Also, chi-square tests at a 5 % level of significance based on counts of incomplete responses for each format in each country were computed.

2.4.6. Comparison of survey mean duration, survey liking, and survey JAR rating for RATA and RATING

Analyses of variance (ANOVA) at a 5% level of significance were computed were computed to provide comparisons of survey format means for consumers' survey mean duration, survey liking, and survey JAR rating for each country.

All analyses were run using XLSTAT (version 2020.1, AddinSoft, New York, NY, USA).

3. Results

3.1. Difference between the percentage of RATING and RATA "apply" responses

3.1.1. Impact of consumers' age group

As expected, the RATING survey format attained a higher percentage of "apply" responses for all four consumers' age groups within all five countries for all 16 motivation constructs as compared to corresponding RATA data. This is similar to overall findings (D. R. Seninde & Chambers, 2021b). For example, the percentage of millennial respondents in Brazil and the USA who indicated that price was an important motivation for eating Starch-rich foods was 71% and 80% higher when the RATING question format was used instead of RATA (Table 6.2). Another case was seen in China and India where the percentage of boomers who scored weight control as an important motivation for eating starch-rich foods was 88% and 75% higher when the RATING question format was used. The difference between the percentage of RATING and RATA "apply" responses based on consumers' age groups for protein-rich foods, dairy, fruits and vegetables, and desserts are presented in Appendix A.

Table 6.2. Difference between the percentage of RATING and RATA "apply" responses for Boomers (A), Generation X (B), Generation Z (C), and Millennials (D) consumers in Brazil, China, India, Spain, and the USA for the respective Starch-rich foods.

	Brazil				**Spain**				**USA**			
	A	**B**	**C**	**D**	**A**	**B**	**C**	**D**	**A**	**B**	**C**	**D**
Liking	42	46	48	50	29	27	32	32	36	45	63	49
Habits	42	48	46	57	42	55	55	62	56	68	69	76
Need/Hunger	66	72	68	76	74	76	74	67	66	61	68	71
Health	58	65	56	70	58	62	59	69	58	67	65	70
Convenience	59	58	56	65	59	65	65	71	54	62	68	71
Pleasure	63	71	72	74	52	58	67	67	60	71	69	71
Trad.eating	35	50	41	54	48	58	51	55	39	67	56	69
Nat.concern	73	73	68	79	72	72	73	75	57	74	79	76
Sociability	52	59	59	79	65	69	59	71	23	62	54	62
Price	58	66	58	71	53	67	65	65	58	76	72	80
Visual app	34	54	50	67	49	65	55	65	50	70	65	71
Wt.control	67	67	66	69	60	74	61	69	52	64	58	69
Affect regul.	13	26	32	36	27	41	41	32	9	48	51	48
Social norms	43	50	52	63	52	67	56	55	30	59	56	60
Social image	18	34	33	46	35	51	41	48	17	54	51	52
Choice limit	48	50	57	69	46	70	68	59	48	63	65	75
	China					**India**						

	A	B	C	D	A	B	C	D
Liking	72	82	79	79	55	60	73	64
Habits	59	75	68	70	71	68	79	69
Need/Hunger	74	81	74	77	65	73	84	72
Health	71	81	73	76	75	58	73	67
Convenience	77	85	83	84	69	67	86	73
Pleasure	77	79	70	73	65	63	74	72
Trad.eating	76	78	69	67	65	64	74	69
Nat.concern	82	88	81	84	68	63	85	72
Sociability	79	85	78	74	72	71	78	77
Price	74	78	72	60	63	67	77	73
Visual app	83	83	72	66	64	67	74	69
Wt.control	88	87	70	78	75	66	79	77
Affect regul.	57	56	56	34	54	56	62	71
Social norms	70	71	70	60	63	55	69	74
Social image	79	79	68	56	63	53	65	73
Choice limit	78	72	68	67	65	66	75	74

3.1.2. Impact of consumers' gender

The percentage of "apply" responses for males and females were higher for all motivation constructs and for all five food categories within all five countries when the RATING question format was used instead of RATA. For example, the "apply" responses for the natural concern motivation among female and male consumers of Starch-rich foods in Spain were characterized by a 70% and 75% increase respectively when the RATING question format was used in the survey instead of RATA. The difference between the percentage of RATING and RATA "apply" responses based on consumers' genders for protein-rich foods, dairy, fruits and vegetables, and desserts are presented in Appendix B.

Table 6.3. Difference between the percentage of RATING and RATA "apply" responses for Female (F) and Male (M) consumers in the five countries for the respective Starch-rich foods.

	Brazil		China		India		Spain		USA	
	F	M	F	M	F	M	F	M	F	M
Liking	47	46	79	77	63	64	31	28	43	53
Habits	52	43	70	66	74	71	50	57	66	68
Need/Hunger	72	68	79	73	74	75	72	75	65	66
Health	71	54	74	76	72	65	59	65	64	66
Convenience	61	58	82	82	77	71	60	70	55	73

Pleasure	74	65	76	74	69	69	59	62	66	69
Trad.eating	51	38	78	67	69	67	51	55	54	61
Nat.concern	78	69	86	82	74	72	70	75	73	70
Sociability	66	57	87	71	76	74	66	66	45	56
Price	66	59	75	67	74	66	62	63	68	75
Visual app	53	47	80	72	74	63	54	63	63	65
Wt.control	75	60	83	78	79	70	62	70	59	62
Affect regul.	29	23	58	43	66	54	31	39	31	46
Social norms	56	47	72	64	65	65	57	59	47	57
Social image	33	30	78	63	65	60	39	48	36	51
Choice limit	61	50	76	65	75	66	56	66	64	61

3.2. Discrimination among consumers' age groups

Except for India, in all five countries the RATING question format had a higher count (≥ x2) of food categories that had significant differences in number of "apply" responses among consumers' age groups than corresponding RATA data (Table 6.4). This indicated that the level of discrimination among respondents' age groups based on how they processed, interpreted and consequently answered this online consumer behavior survey was greater when the RATING question format was used. Also, for the RATING survey format, infrequently used motivation constructs such as choice limitation, social image and affect regulation were characterized with a higher number of food groups that had significant differences in number of "apply" responses among consumers' age groups than frequently-used constructs such as liking, and habits.

Table 6.4. Number of food groups that had significant differences in number of "apply responses among consumers' age groups for RATA (A) and RATING (B) for all 16 motivation constructs in the five countries.

	Brazil		China		India		Spain		USA		Total	
	A	B	A	B	A	B	A	B	A	B	A	B
Liking	1	1	3	2	4	2	3	1	5	5	16	11
Habits	1	3	4	3	4	0	1	2	3	1	13	9
Need/Hunger	0	1	0	2	5	0	0	1	0	2	5	6
Health	1	1	2	4	4	1	2	3	1	1	10	10
Convenience	2	4	2	4	4	2	1	1	4	1	13	12
Pleasure	1	5	2	5	4	2	3	1	5	1	15	14
Trad.eating	0	3	0	3	5	1	0	2	3	4	8	13
Nat.concern	2	1	1	4	5	0	2	1	1	4	11	10

Sociability	1	4	2	5	2	2	0	3	1	5	6	19
Price	3	4	1	5	4	0	1	5	1	3	10	17
Visual app	0	5	1	5	4	2	0	4	0	5	5	21
Wt.control	1	2	2	5	4	3	2	2	0	4	9	16
Affect regul.	0	5	2	5	4	4	1	4	0	5	7	23
Social norms	1	5	1	5	4	5	0	2	0	5	6	22
Social image	0	5	1	5	4	5	0	5	1	5	6	25
Choice limit	1	2	2	5	3	0	1	2	1	5	8	14
Total	15	51	26	67	64	29	17	39	26	56	148	242

3.3. Discrimination between males and females

Except for Brazil, all five countries had a higher count of food categories that had significant differences in number of "apply" responses between females and males for the RATING survey format than the corresponding RATA responses (Table 6.5).

Table 6.5. Number of food groups that had significant differences among consumers' gender for RATA (A) and RATING (B) for all 16 motivation constructs in the five countries.

	Brazil		China		India		Spain		USA		Total	
	A	B	A	B	A	B	A	B	A	B	A	B
Liking	0	0	0	1	0	0	0	0	3	0	3	1
Habits	2	1	0	1	0	1	0	4	1	1	3	8
Need/Hunger	1	1	0	2	0	2	1	2	2	1	4	8
Health	2	2	0	2	1	2	2	1	2	1	7	8
Convenience	0	0	0	1	0	3	1	2	5	2	6	8
Pleasure	4	4	1	1	0	3	0	1	1	1	6	10
Trad.eating	1	2	0	0	0	2	2	2	0	3	3	9
Nat.concern	4	0	1	4	1	2	0	0	1	1	7	7
Sociability	2	0	0	3	0	3	2	2	2	4	6	12
Price	0	0	1	1	1	4	0	2	1	1	3	8
Visual app	0	1	1	3	1	4	2	3	0	1	4	12
Wt.control	3	1	1	5	0	3	0	0	1	1	5	10
Affect regul.	0	1	0	1	1	4	1	3	1	4	3	13
Social norms	0	0	2	1	0	3	1	3	1	5	4	12
Social image	0	0	0	1	0	3	3	5	0	5	3	14
Choice limit	0	1	0	1	0	4	0	2	0	1	0	9
Total	19	14	7	28	5	43	15	32	21	32	67	149

3.4. Effect of question format

Based on the consumers' age group responses, at least eight motivation constructs' mean scores for RATA significantly differed from corresponding RATING scores for all five food categories within all countries (e.g. Brazil Starch-rich foods, Table 6.6) except for desserts in China. Mean scores for RATA and RATING based on consumers' age groups and corresponding *p*-values for the 16 motivation constructs for desserts and other food categories for all five countries are available in Appendix C. For example, for the Starch-rich food category, the corresponding total number of motivation constructs that had significantly different mean scores was 14 for all five countries except China which had a total of ten differences.

Table 6.6. *p*-values for sources of variation (Question format, Age group, and Question format*Age group interaction) and Least Squares mean scores for RATA and RATING question formats and age groups (boomers, Generation X, Generation Z, and millennials) for all constructs that motivated consumers in Brazil to eat Starch-rich foods.

	p-values			Means†					
	Sources of variance			Survey format		Age group			
Construct	R	S	T	L	M	A	B	C	D
Liking	0.000*	0.275	0.222	4.2^{a}	4.0^{b}	4.0^{a}	4.2^{a}	4.1^{a}	4.1^{a}
Habits	0.019*	<0.0001*	0.001*	3.6^{b}	3.8^{a}	3.4 c	3.8^{ab}	3.9^{a}	3.7^{b}
Need/Hunger	<0.0001*	0.058	0.356	4.3^{a}	3.7^{b}	3.8^{b}	3.9^{ab}	4.2^{a}	3.9^{ab}
Health	<0.0001*	0.925	0.672	4.3^{a}	3.2^{b}	3.8^{a}	3.8^{a}	3.7^{a}	3.7^{a}
Convenience	<0.0001*	0.278	0.070	4.0^{a}	3.3^{b}	3.6^{a}	3.8^{a}	3.7^{a}	3.6^{a}
Pleasure	<0.0001*	0.973	0.093	4.0^{a}	3.0^{b}	3.5^{a}	3.6^{a}	3.5^{a}	3.5^{a}
Trad.eating	<0.0001*	0.198	0.737	3.5^{a}	2.8^{b}	2.9^{a}	3.2^{a}	3.2^{a}	3.1^{a}
Nat.concern	<0.0001*	0.726	0.784	4.5^{a}	3.4^{b}	3.9^{a}	4.0^{a}	3.8^{a}	3.9^{a}
Sociability	<0.0001*	0.518	0.509	4.0^{a}	2.7^{b}	3.3^{a}	3.4^{a}	3.0^{a}	3.7^{a}
Price	<0.0001*	0.419	0.982	4.1^{a}	2.9^{b}	3.2^{a}	3.6^{a}	3.5^{a}	3.6^{a}
Visual app	<0.0001*	0.210	0.932	3.4^{a}	2.2^{b}	2.4^{a}	3.0^{a}	2.8^{a}	3.1^{a}
Wt.control	<0.0001*	0.616	0.978	4.2^{a}	2.9^{b}	3.7^{a}	3.7^{a}	3.5^{a}	3.4^{a}
Affect regul.	0.483	0.021*	0.026*	2.0^{a}	1.6^{a}	1.2^{b}	3.3^{a}	1.3^{b}	1.4^{b}
Social norms	<0.0001*	0.803	0.246	3.8^{a}	2.3^{b}	3.3^{a}	2.8^{a}	3.0^{a}	3.1^{a}
Social image	0.001*	0.411	0.436	3.1^{a}	1.8^{b}	2.2^{a}	3.0^{a}	2.1^{a}	2.5^{a}
Choice limit	<0.0001*	0.998	0.229	3.9^{a}	2.8^{b}	3.4^{a}	3.3^{a}	3.3^{a}	3.4^{a}

R, S, T = Type III Sum of Squares analysis *p*-values for Sources of variance i.e., R=Question format, S=Age group, and T=Question format*Age group interaction respectively;
* *p*-values for Sources of variance were significantly different at ($p \leq 0.05$);
L, M = Least Squares Means for RATA and RATING respectively;

A, B, C, D = Least Squares Means for Boomers, Generation X, Generation Z and Millennials respectively; Least Squares Means assigned different lettering (superscripts) were significantly different;
†Five-point scale; 1 = Not at All Important, 2 = Slightly Important, 3 = Moderately Important, 4 = Very Important, 5 = Extremely Important.

Similarly, based on consumers' gender, at least eight motivation constructs' mean scores for RATA significantly differed from corresponding RATING scores for all five food categories (e.g. India Protein-rich foods, Table 6.7) within all countries except for the desserts in China and the USA Mean scores for RATA and RATING based on consumers' gender and corresponding p-values for the 16 motivation constructs for desserts and other food categories for all five countries are available in Appendix D.

Table 6.7. *p*-values for sources of variation (Question format, Gender, and Question format*Gender interaction) and Least Squares mean scores for RATA and RATING survey formats and males and females for all constructs that motivated consumers in India to eat Protein-rich foods.

	p-values			Means†			
	Sources of variance			Survey format		Gender	
Construct	R	S	T	RATA	RATING	Female	Male
Liking	<0.0001*	0.004*	0.022*	4.3^{a}	3.8^{b}	4.2^{a}	3.9^{b}
Habits	0.004*	0.024*	0.541	4.2^{a}	3.9^{b}	4.2^{a}	3.9^{b}
Need/Hunger	<0.0001*	0.019*	0.136	4.3^{a}	3.7^{b}	4.1^{a}	3.9^{b}
Health	<0.0001*	0.077	0.022*	4.5^{a}	3.9^{b}	4.3^{a}	4.1^{a}
Convenience	0.041*	0.298	0.016*	3.9^{a}	3.6^{b}	3.9^{a}	3.7^{a}
Pleasure	0.000*	0.001*	0.504	4.2^{a}	3.7^{b}	4.2^{a}	3.7^{b}
Trad.eating	<0.0001*	0.017*	0.602	4.2^{a}	3.6^{b}	4^{a}	3.7^{b}
Nat.concern	<0.0001*	0.156	0.146	4.4^{a}	3.9^{b}	4.2^{a}	4.1^{a}
Sociability	0.000*	0.242	0.501	4.1^{a}	3.2^{b}	3.8^{a}	3.5^{a}
Price	<0.0001*	0.001*	0.748	4^{a}	3^{b}	3.8^{a}	3.2^{b}
Visual app	0.001*	0.002*	0.897	4^{a}	3.4^{b}	4^{a}	3.4^{b}
Wt.control	<0.0001*	0.014*	0.193	4.4^{a}	3.5^{b}	4.1^{a}	3.7^{b}
Affect regul.	0.015*	0.007*	0.221	3.6^{a}	2.7^{b}	3.6^{a}	2.7^{b}
Social norms	<0.0001*	0.007*	0.493	4^{a}	2.9^{b}	3.8^{a}	3.1^{b}
Social image	0.002	0.018*	0.916	3.8^{a}	3^{b}	3.7^{a}	3.1^{b}
Choice limit	<0.0001	0.031*	0.669	4.2^{a}	3.4^{b}	4^{a}	3.6^{b}

R, S, T = Type III Sum of Squares analysis p-values for Sources of variance i.e., R=Question format, S=Gender, and T=Question format*Gender interaction respectively; * p-values for Sources of variance were significantly different at ($p \leq 0.05$); Least Squares Means assigned different lettering (superscripts) were significantly different; †Five-point scale; 1 = Not at All Important, 2 = Slightly Important, 3 = Moderately Important, 4 = Very Important, 5 = Extremely Important.

3.4.1 Effect on the "big picture" interpretation

Comparison of Multiple Factor Analysis for RATA and RATING based on respondents' age groups "apply" responses showed that even though there were some similarities between the information collected using the two question formats, the "big picture "interpretation of the two question formats had multiple differences (Figure 6.1).

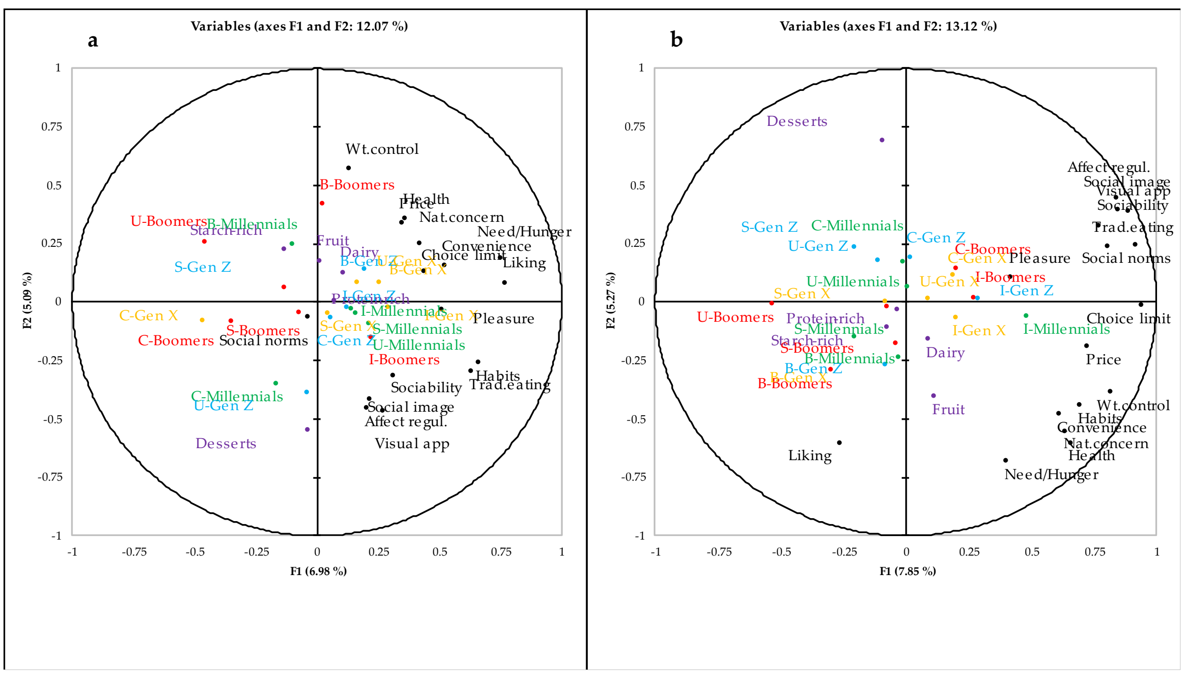

Figure 6.1. Multiple Factor Analysis of (a) RATA and (b) RATING consumers' age group responses for all 16 motivations for eating items from the five food categories within all five countries (B= Brazil, C= China, I= India, S= Spain, and U= USA).

For instance, for RATA, dimension 1 showed that consumption of desserts and starch-rich foods by age groups such as Generation Z in Spain and the USA or millennials in Brazil and China was mainly motivated by social norms. Conversely, the corresponding dimension based on RATING data depicted that consumption of starch-rich and protein-rich foods by those same age groups was mostly motivated by liking. Furthermore, according to the RATING MFA, consumption of fruits and dairy foods by the age groups was mainly motivated by constructs such as weight control, health, price, habits, and natural concern, among others. However, although the corresponding MFA for RATA showed a similar strong association of constructs such as weight control, health, price, and natural concern with the consumption of fruits and dairy foods, the habits construct was more related to different constructs.

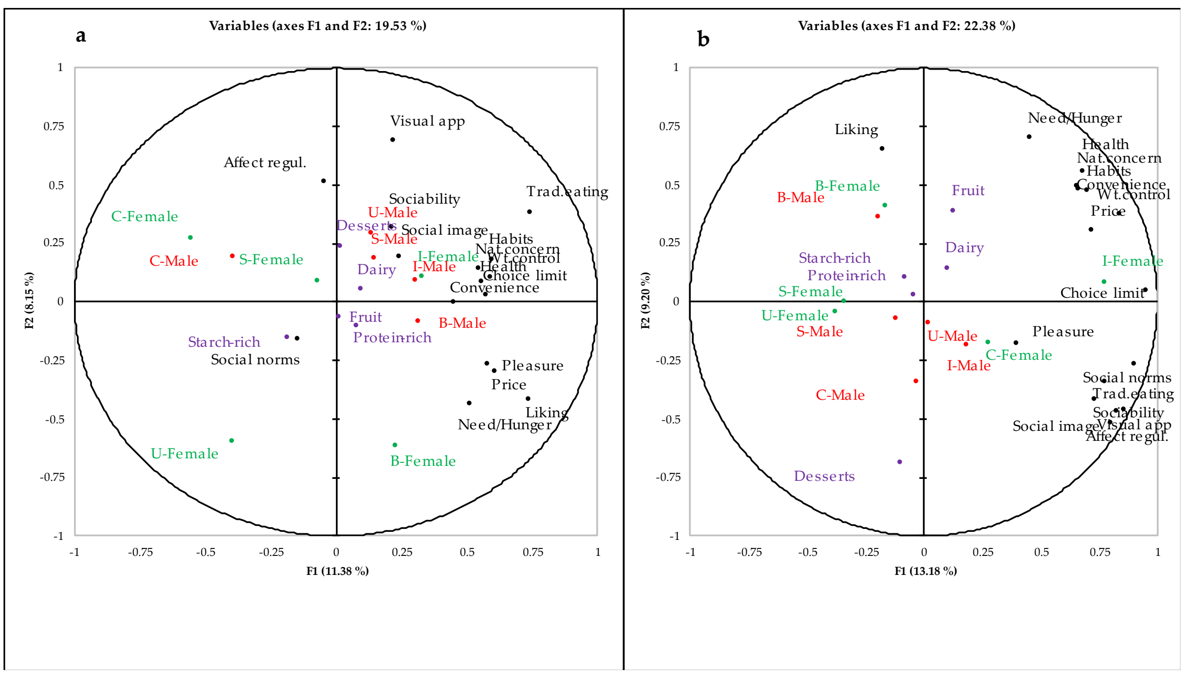

Figure 6.2. Multiple Factor Analysis of (a) RATA and (b) RATING consumers' gender responses for all 16 motivations for eating items from the five food categories within all five countries (B= Brazil, C= China, I= India, S= Spain, and U= USA).

Through the gender lens, dimension 1 of the RATA MFA showed that females in the USA were driven to eat starch-rich foods mainly because of social norms and affect regulation (Figure 6.2). Conversely, the corresponding dimension of the RATING MFA showed that consumption of not only starch-rich foods but also desserts and protein-rich foods by females in the USA was motivated mainly by Liking. Another case for difference in the "big picture" interpretation was seen in Brazil where according to RATA, consumption of fruits and protein-rich foods by females and males was mostly driven by motivations such as liking, price, pleasure and need or hunger. On the other hand, the corresponding MFA for RATING showed that females and males in Brazil ate protein-rich foods and Starch-rich foods mainly because of liking.

Evidently, the average level of importance accorded to motivation constructs for particular food categories by the four age groups and depended on if they saw the RATA or the RATING question format of the online survey.

3.5. Effect of consumers' age group

A total of 20 out of the 25-food category*country combinations (RATA and RATING averaged) had at least one motivation construct whose age group mean scores (regardless of whether they answered RATA or RATING) significantly differed among the four consumers' age groups. A case in point is the mean scores for habits and affect regulation for the starch-rich food category in Brazil significantly differed among the four age groups regardless of question format. Generation Z respondents in Brazil accorded habits a significantly higher level of importance for eating starch-rich foods as compared to corresponding boomers and millennials. Also, Generation X indicated that affect regulation was of a higher importance when it came to eating starch-rich foods than their boomers, Generation Z and millennial counterparts. Similar findings can be seen in other food categories within all five countries (Appendix C).

It is worth noting, however, that generally the number of constructs and the constructs themselves whose mean scores based on the four consumers' age groups significantly differed (regardless of question format) also varied among the five food categories and in all five countries (Appendix C).

3.5.1. Effect of question format and age group interaction

A total of 21 out of the 25-food category*country combinations had at least one interaction between question format and consumers' age group that was statistically significantly different. For example, while indeed Generation Z in Brazil who completed the RATING format of the survey gave habits a significantly higher score for starch-rich foods than corresponding boomers or millennials, their colleagues (Generation Z, boomers and millennials) who answered the RATA format of the survey rated the habits construct similarly for the starch-rich food category (Table 6.6). Another example within the same country and same food category (Table 6.6) is Generation X who based on RATA data indicated that affect regulation was “Extremely important” whereas corresponding boomers, millennials and Generation Z reported it to be “not at all important” however RATING mean scores showed that all four age groups found the affect regulation to be a “slightly important” motivation for the consumption of starch-rich foods.

Generally, the number of constructs and the constructs themselves that had statistically significant question format* age group interactions varied among the five food groups and within the five countries (Appendix C). These findings point out the need for consideration of consumers' age group and question format combinations by researchers when designing and developing future online surveys that include RATA or RATING questions.

3.6. Effect of consumers' gender

Nineteen out of the 25-food category*country combinations (RATA and RATING scores averaged) had at least one motivation construct whose mean scores (regardless of whether they completed RATA or RATING) significantly differed between males and females. For example, in India and for the protein-rich food category, females scored significantly higher than their male counterparts for three-quarters of the motivations (Table 6.7). Corresponding LS means and p-values for other food categories within all five countries are available in Appendix D.

Within China and India (Asian countries), females scored the degree of importance of motivations constructs generally higher than corresponding males for all motivations and for the five food categories that had statistically significant differences ($p \leq 0.05$) between gender mean scores. Conversely, within Spain and the USA (countries whose populations are characterized with social norms, values and traditional customs of western culture) males rated the degree of importance of motivations constructs higher than corresponding females for all cases where the effect of consumers' gender was significant across five food categories (Appendix D). It is possible that the culture and society norms could have affected how females and males rated the motivations across the five food categories within the five countries (e.g., Asian culture versus Western culture).

3.6.1. Effect of question format and gender interaction

Thirteen out of the 25 food category*country combinations had at least one interaction between question format and gender that was statistically significantly different (regardless of whether they answered RATA or RATING). For example, in India, females scored liking higher than corresponding males for the protein-rich food category (Table 6.7). However, further investigation into the question format*gender interaction, showed that while indeed females who answered the RATING question format found liking to be more important in the consumption of protein-rich foods as compared to their male counterparts, both males and females who saw the completed the RATA questions of the survey scored liking similarly. Another example of the effect of the question format*gender interaction can be seen with the health construct for India-protein-rich foods. Although based on main effects, the gender factor had no significant impact, the question format*gender interaction had a statistical impact (Table 6.7). In fact, females who saw the RATING question format scored it significantly higher than the corresponding males even though both males and females who completed RATA scored health similarly.

Certainly, based on these findings the interpretation and decisions made thereafter could be different for the two survey question formats. Therefore, consideration of interactions between survey question format and gender combinations could be critical for researchers when designing future similar studies.

3.7 Clustering of consumers' age groups

Agglomerative Hierarchical Clustering (AHC) for the RATA and RATING survey formats based on the consumers' age groups showed that for all food categories the RATING question format was characterized with fewer clusters than the corresponding RATA format (Table 6.8). Figure 6.3 illustrates an example of the fewer clusters for RATING (N=10) versus the larger number (n=18) for RATA for the dairy food category. Furthermore, the Principal Components Analysis (PCA) biplots for the RATING survey format for all five food categories were characterized with a higher explained variance than corresponding PCA biplots for RATA. For example, the PCA biplot for the dairy category for the RATING survey format explained more than 80% of the variation whereas the corresponding PCA biplot for the RATA survey format explained a little over 40% of the variation (Figure 6.4).

Table 6.8. Number of clusters for the RATA and RATING survey formats based on Consumers' age group and gender for all five food categories (Total possible n=25).

	Age group		Gender	
Food Category	**RATA**	**RATING**	**RATA**	**RATING**
Dairy	18	10	8	5
Dessert	18	13	8	6
Fruit	18	14	8	7
Protein	20	11	9	7
Starch	18	10	10	8

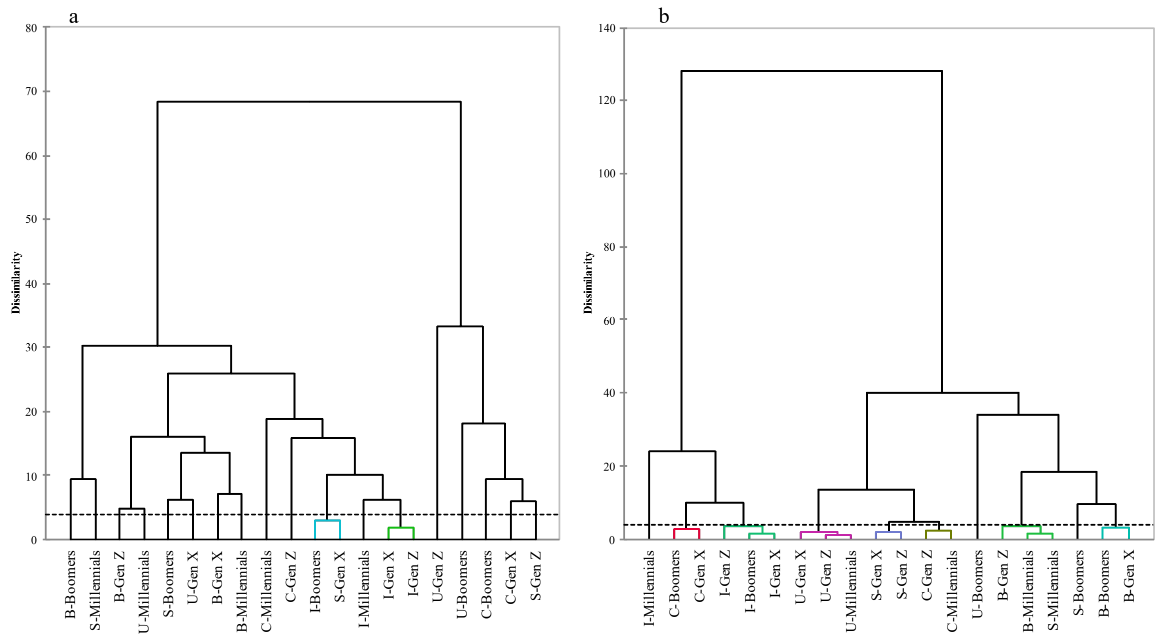

Figure 6.3. Agglomerative Hierarchical Clustering (AHC) dendrograms of the 20 consumers' age group combinations for (a) RATA and (b) RATING for the Starch-rich foods category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

Moving beyond the fact that the two question formats differed in the number of clusters, there were notable similarities and differences within the clusters themselves. For example, Generation Z in the USA who consumed dairy foods and answered the RATA survey format were grouped solitarily and were most differentiated by motivations such as choice limitation and traditional eating (Figure 6.4). Their counterparts who also consumed dairy foods but completed the RATING survey format were however grouped with millennials and Generation X from the USA and this cluster was not differentiated by clusters such as traditional eating and choice limitation.

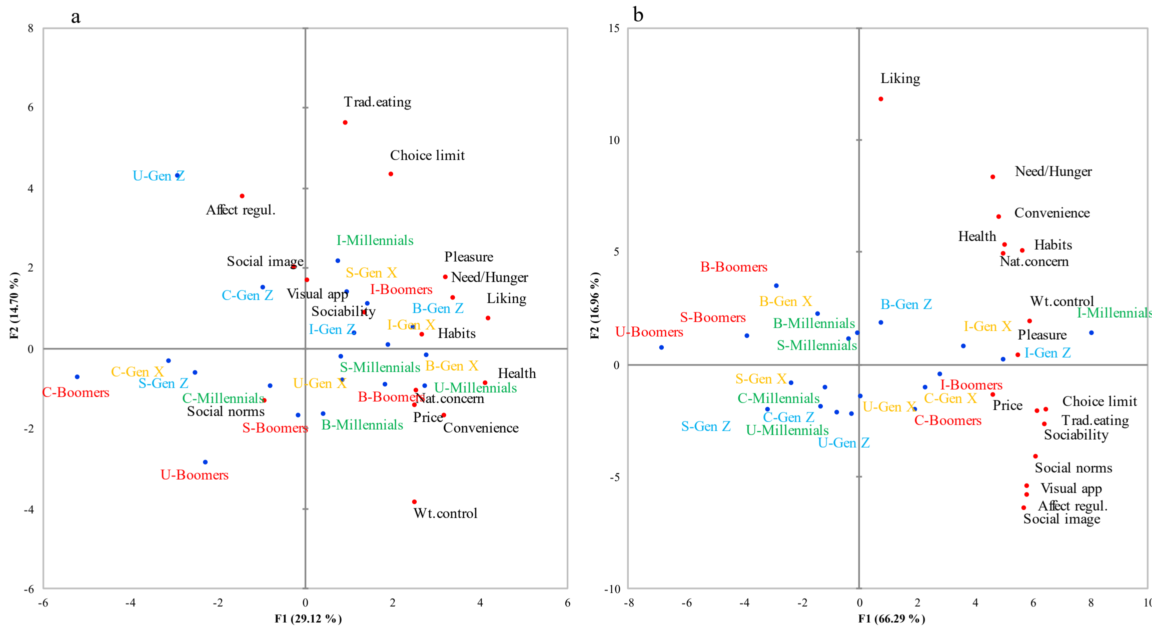

Figure 6.4. Principal Component Analysis (PCA) biplots of the 20 consumers' age group combinations for (a) RATA and (b) RATING for the Starch-rich foods category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

From these findings we gathered that' age group and attribute associations based on RATA and RATING survey question responses for different products may have some bits that are similar but could also be so different in many ways which could lead to varying interpretations by consumer researchers. AHC and PCA comparisons between clusters of RATA and RATING data for the other food groups are available in Appendix E.

3.8. Clustering of consumers' gender

Figure 6.5 shows that AHC dendrograms for the RATING question format for the starch-rich food category and based on gender data was characterized by fewer clusters than corresponding plot for RATA. Other food categories (dairy, desserts, fruits, and protein-rich foods) also followed a similar trend (Appendix E). Also, the explained variance of the PCA biplots for RATING survey was greater than that explained by corresponding biplots for the RATA survey format across all food categories. For example, the PCA biplot for the starch-rich foods category for the RATING survey format explained approximately 80% of the variation whereas the corresponding PCA biplot for the RATA survey format explained a little over 60% of the variation (Figure 6.6).

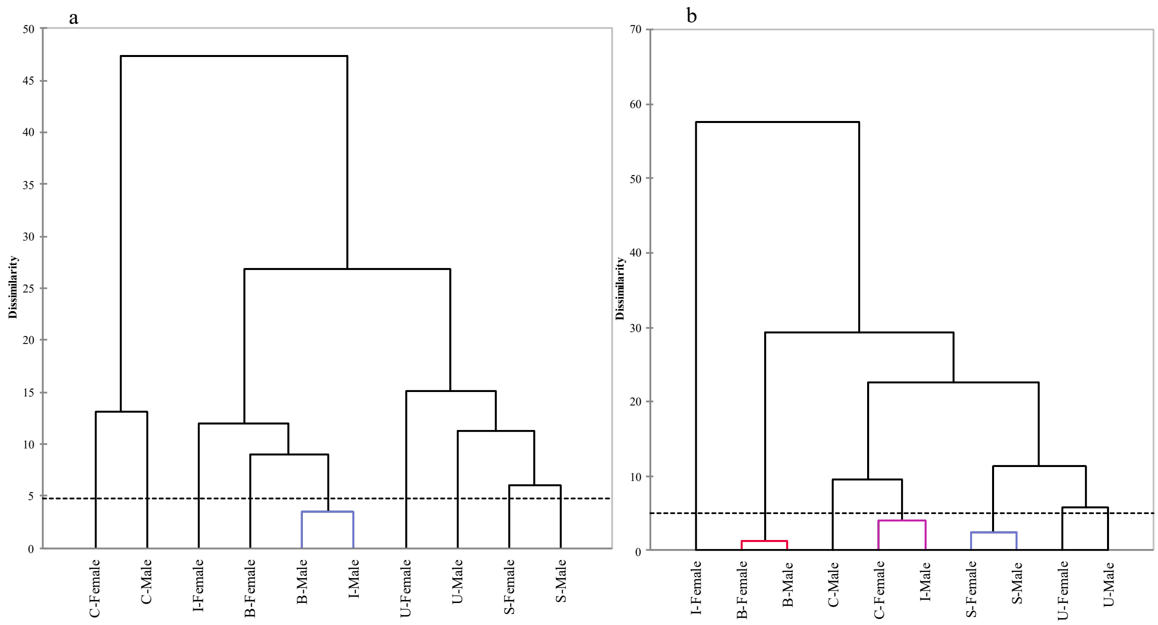

Figure 6.5. Agglomerative Hierarchical Clustering (AHC) dendrograms of the 10 consumers' gender combinations for (a) RATA and (b) RATING for the dairy foods category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

Further comparisons of clusters between RATA and RATING gender data found more similarities and differences. For example, females and males in Spain who consumed starch-rich foods and answered the RATING survey format were motivated to eat starch-rich foods mainly because they liked them and for pleasure (Figure 6.6). However, males in Spain who also consumed starch-rich foods but answered the RATA survey format were solitarily clustered and were mostly motivated by constructs such as natural concern, affect regulation and choice limitation whereas the female counterparts were not differentiated by any eating motivation.

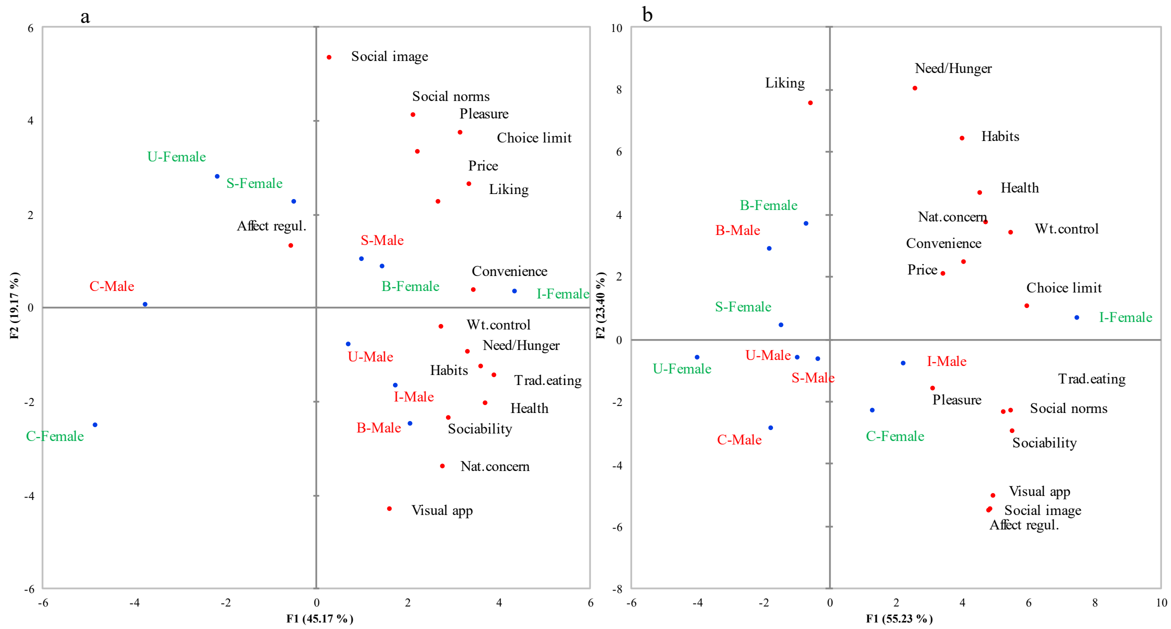

Figure 6.6. Principal Component Analysis (PCA) biplots of the 10 consumers' gender combinations for (a) RATA and (b) RATING for the dairy foods category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

3.9. Comparison of survey incompletion rates, survey mean duration, survey liking, and survey JAR ratings

3.9.1. Consumers' survey question format incompletion rates

Chi-squared tests showed that in Brazil, the counts of incomplete or partial questionnaires for millennials and Generation Z (younger consumers) who answered either RATA or RATING survey formats were significantly greater than those of boomers and Generation X (older consumers) (Table 6.9). Also, except for Generation Z in Brazil whose count of partial questionnaires for the RATING survey format was significantly greater than that for corresponding Generation Z who answered RATA, the counts of partial questionnaires for all four consumers' age groups in Brazil did not differ significantly between the two survey formats.

Table 6.9. Percentage of incomplete questionnaires for the four consumers' age groups for RATA and RATING per Country. Incomplete questionnaires were not accepted or used and were not counted in the approximately 200 questionnaires received per country per questionnaire type.

	Brazil		China		India		Spain		USA	
Age group	RATA	RATING	RATA	RATING	RATA	RATING	RATA	RATING	RATA	RATING
Boomers	6	14	0	4	4	19	13	22	36	41
Gen X	7	18	2	6	9	18	34	42	32	40
Gen Z	22	50	2	17	13	48	25	25	8	10
Millennials	23	28	0	11	3	23	39	43	34	39

In China, it is worth noting that the RATA survey format had the least number of incomplete questionnaires across all four consumers' age groups across the five countries. Also, the proportion of partial completes for all consumers' age groups that answered the RATA survey format were similar whereas Generation Z who answered the RATING survey format had a significantly higher count of incomplete questionnaires than corresponding boomers and Generation X. Further, a significantly higher count of Generation Z and millennials in China did not complete the RATING survey format as compared to RATA survey format. For India, a significantly higher count of Generation Z consumers did not complete either RATA or RATING survey formats as compared to corresponding boomers and millennials. Further, a significantly higher count of boomers, millennials and Generation Z in India did not complete the RATING survey format than the RATA survey format. For Spain, a significantly higher count of millennials and Generation X did not complete either the RATA or RATING survey formats as compared to corresponding boomers. In the USA, counts of incomplete questionnaires for the Generation Z consumers for either the RATA or the RATING survey formats were significantly lower than those of boomers, millennials, and Generation X accordingly. Also, the count of incomplete questionnaires for the RATA survey format and the RATING survey format for all four consumers' age groups in Spain and the USA did not differ significantly.

Table 6.10. Percentage of incomplete questionnaires for males and females for RATA and RATING survey formats per country. Incomplete questionnaires were not accepted or used and were not counted in the approximately 200 questionnaires received per country per questionnaire type.

	Brazil	China	India	Spain	USA

Gender	RATA	RATING	RATA	RATING	RATA	RATING	RATA	RATING	RATA	RATING
Males	19	34	1	14	9	37	28	34	20	26
Females	12	25	1	5	8	22	30	35	37	41

A look through the gender lens showed that except for the USA where the count of partial questionnaires for females for the RATA survey format was significantly higher than that of corresponding males, proportions of males and females who did not complete the RATA survey were similar for all countries (Table 6.10). Also, a significantly greater count of males in Asian countries (China, and India) did not complete the RATING survey format as compared to corresponding females. However, in the USA the count of partial questionnaires for females for the RATING survey formats were significantly greater than those of the corresponding males. Further, in Brazil, China, and India, the count of incomplete questionnaires for males for the RATING survey format were significantly greater than corresponding counts for the RATA survey format. For India, the females also had a significantly higher count of incomplete questionnaires for the RATING survey format than the corresponding RATA. In Spain, the counts (for males or females) who did not complete either the RATA or RATING survey were similar.

3.9.2 Consumers' survey mean duration.

In China, Generation X took significantly longer to complete either format of the survey than corresponding millennials and boomers (Table 6.11). For Brazil, India, Spain and the USA, it seemed that neither consumers' age group nor gender had a significant effect on the mean duration of either format of the survey. *p*-values of sources of variation (age group, gender, question format and variable interactions) based on Type III Sum of Squares analysis for survey mean duration are available in Appendix F. Usually, costs of execution of online consumer studies are charged against the mean duration of the respondents with higher fees being charged for longer surveys. This information could thus be beneficial to researchers when designing future international studies in these five countries.

Table 6.11. Least Squares Means† of individual factors (age group, gender, question format) from ANOVA for survey mean duration in the five countries.

	Age group				Question format	
Country	Boomers	Gen X	Gen Z	Millennials	RATA	RATING
Brazil	47.0[a]	34.3[a]	34.2[a]	46.4[a]	36.5[a]	44.4[a]
China	20.9[b]	29.4[a]	25.2[ab]	19.4[b]	17.9[b]	29.5[a]
India	38.4[a]	46.1[a]	35.0[a]	40.5[a]	34.8[a]	45.2[a]
Spain	27.1[a]	38.9[a]	18.0[a]	21.4[a]	18.0[b]	34.6[a]
USA	63.5[a]	22.5[a]	18.6[a]	22.9[a]	37.0[a]	26.8[a]

	Gender		Question format	
Country	Female	Male	RATA	RATING
Brazil	40.5[a]	40.5[a]	36.5[a]	44.5[a]
China	24.6[a]	22.9[a]	17.9[b]	29.5[a]
India	39.7[a]	41.1[a]	34.8[a]	46.1[a]
Spain	28.1[a]	24.6[a]	18.0[b]	34.7[a]
USA	43.8[a]	21.3[a]	38.2[a]	26.8[a]

† Survey mean duration in minutes; Least Squares Means with a different letter (superscript) for an individual factor were significantly different ($p \leq 0.05$) within a country.

3.9.3 Consumers' survey just-about-right (JAR) rating.

Boomers, millennials and Generation Z consumers in India rated the EMS survey as "a little too short "whereas corresponding Generation X rated the current survey as just about right (Table 6.12). Also, males in India rated this survey as JAR whereas corresponding females rated the survey as "a little too short". In Spain, Generation Z found this survey to be significantly longer than what their counterparts (boomers, millennials, Generation X in Spain) experienced. Furthermore, while Generation Z in Spain who answered the RATING survey rated the survey as "too long" as compared to corresponding boomers, millennials and Generation X who rated the survey as "a little too long", all four age groups that answered the RATA survey format found this format as "a little too long". Consideration of this interaction effect (consumers' age group and question format) when designing future studies such as in Spain is recommended. *p*-values of sources of variation (age group, gender, question format and variable interactions) based on Type III Sum of Squares analysis for survey JAR rating are available in Appendix F.

Table 6.12. Least Squares Means[†] of individual factors (age group, gender, question format) from ANOVA for survey just-about-rating (JAR) within the five countries.

	Age group				Question format	
Country	Boomers	Gen X	Gen Z	Millennials	RATA	RATING
Brazil	4.6^{a}	4.7^{a}	4.7^{a}	4.7^{a}	4.4^{b}	5.0^{a}
China	4.7^{a}	4.5^{a}	4.7^{a}	4.7^{a}	4.3^{b}	5.0^{a}
India	3.3^{b}	3.9^{a}	3.0^{b}	3.3^{b}	3.1^{b}	3.6^{a}
Spain	4.8^{b}	4.9^{b}	5.1^{a}	4.7^{b}	4.5^{b}	5.2^{a}
USA	4.8^{a}	4.5^{a}	4.9^{a}	4.6^{a}	4.4^{b}	5.0^{a}

	Gender		Question format	
Country	Female	Male	RATA	RATING
Brazil	4.7^{a}	4.6^{a}	4.4^{b}	5.0^{a}
China	4.6^{a}	4.7^{a}	4.3^{b}	5.0^{a}
India	3.1^{b}	3.7^{a}	3.1^{b}	3.6^{a}
Spain	4.9^{a}	4.9^{a}	4.5^{b}	5.2^{a}
USA	4.7^{a}	4.7^{a}	4.4^{b}	5.0^{a}

[†] Seven-point scale; 1 = much too short, 2 = too short, 3 = a little too short, 4 = just about right (JAR), 5 = a little too long, 6 = too long, and 7 = much too long; Least Squares Means with a different letter (superscript) for an individual factor were significantly different ($p \leq 0.05$) within a country.

3.9.4 Consumers' survey liking

Consumers' age groups had no statistically significant effect on the survey liking (Table 6.13). Despite that, there was a statistically significant interaction effect in China. Generation Z in China who completed the RATA survey format liked it significantly much more than corresponding Generation X. However, all four consumers' age groups in China who completed the RATING survey format liked it just the same. As for the effect of gender, females in India liked the experience of taking this survey significantly much more than corresponding males. It is worth noting also that females who answered the RATING question format significantly liked the survey experience much more than corresponding males even though both males and females who completed the RATA survey format liked it just the same. *p*-values of sources of variation (age group, gender, question format and variable interactions) based on Type III Sum of Squares analysis for survey liking are available in Appendix F.

Table 6.13. Least Square Means† of individual factors (age group, gender, question format) from ANOVA for survey liking in the five countries.

	Age group				Question format	
Country	Boomers	Gen X	Gen Z	Millennials	RATA	RATING
Brazil	4.1[a]	4.2[a]	4.1[a]	4.1[a]	4.3[a]	3.9[b]
China	3.6[a]	3.7[a]	3.8[a]	3.8[a]	4.0[a]	3.4[b]
India	4.2[a]	4.2[a]	4.1[a]	4.4[a]	4.4[a]	4.1[b]
Spain	4.0[a]	4.1[a]	3.8[a]	4.0[a]	4.1[a]	3.8[b]
USA	3.7[a]	4.0[a]	3.6[a]	3.7[a]	4.0[a]	3.5[b]

	Gender		Question format	
Country	Female	Male	RATA	RATING
Brazil	4.1[a]	4.1[a]	4.3[a]	3.9[b]
China	3.8[a]	3.7[a]	4.0[a]	3.5[b]
India	4.3[a]	4.1[b]	4.4[a]	4.1[b]
Spain	4.0[a]	3.9[a]	4.1[a]	3.8[b]
USA	3.7[a]	3.9[a]	4.0[a]	3.5[b]

† Five-point scale; 1 = I hated taking it, 2 = I did not like taking it, 3 = I have no feelings either way, 4 = I liked taking it and 5 = I liked it a lot; Least Squares Means with a different letter (superscript) for an individual factor were significantly different ($p \leq 0.05$) within a country.

4. Discussion

Seninde and Chambers, (2021b) ascribed the higher percentage of "apply" responses for the RATING survey format mainly to the more detail required by nature of its question structure as compared to that of the RATA survey format. Put simply, whereas consumers of all four age groups rated all the 47 terms in the RATING survey version, their counterparts only rated those terms that they had identified as important. Several related studies where one group of respondents were given the option to check-all-the terms that applied (CATA) and the corresponding group instead asked to check-all-statements (CAS) or choose yes/no also found that the percentage of "apply" responses for CAS was greater than that of CATA (Jaeger et al., 2014; Nicolaas et al., 2015; Smyth et al., 2006, 2008). Even more, CAS maintained the higher percentage of "apply" responses for all four age groups than corresponding CATA data (D. R. Seninde & Chambers, 2021a). It is possible that either the RATA responses for all four consumers' age groups or males and females underestimated the importance of the motivation constructs or the RATING responses overestimated the importance of the constructs in this study. Because percentage of "apply" responses are usually used by consumer researchers to inform critical decisions e.g., in the product development process and marketing and community nutrition-health interventions, validation of the RATA and RATING data for all four consumer age groups or genders is thus needed before either question format can be recommended for use in place of the other. This further strengthens the case for the possible use of the RATING question format in future studies that investigate the influence of consumers' demographic factors such as age group and gender on the scoring of product attributes in particular countries.

It is possible that the RATING question format could be more beneficial that RATA in explorative and characterization consumer-product testing with novel products (e.g., early product development prototypes) that involves rating of attributes and in cases where product formulators need detailed information from consumers. The RATA question format could be better suited for more routine hedonic product-testing with pre-existing products and common attributes (Antúnez et al., 2017; Ares et al., 2017). However, the fact that in India, discrimination among consumers' age groups based on "apply" responses for RATA and RATING was different from the other four countries suggests that other factors e.g., socio-cultural factors (Keery et al., 2004; Ruiz-Pérez et al., 2011) could also influence how consumers' rated the samples.

Clearly, how consumers' interpreted, processed and completed the RATA and the RATING survey formats was different (D. R. Seninde & Chambers, 2021b). Seninde & Chambers, (2021b) found that generally mean scores for attributes were significantly higher when the RATA survey format was used than when the RATING question format was used. Further, their results also suggested that the RATING question format was more discriminating among attributes and among samples than the RATA question format.

Another way to look at the impact of consumers' age group is to compare the attribute mean scores for the two survey formats based on the entire (unsegmented) consumers' responses which were reported by (D. R. Seninde & Chambers, 2021b)with the current corresponding mean scores based on the consumers' age groups. For instance, based on the unsegmented consumers' responses the RATA survey format identified affect regulation as an "Extremely important" ($\bar{x}$= 5.0) motivation for the consumption of starch-rich foods in Brazil. However, current mean scores based on the consumers' age groups, the RATA survey format classified the affect regulation as "slightly important" ($\bar{x}$= 2.0) for the consumption of starch-rich foods in Brazil (Table 6.6). For the RATING survey format, the mean scores for the affect regulation construct for the starch-rich foods category within Brazil that were based on unsegmented consumers' responses identified this construct as "not at all important" (i.e., $\bar{x}$= 1.6). Corresponding RATING mean scores based on consumers' age groups reported a similar mean score. The fact that mean scores for the RATING survey format were consistent or "more stable" whereas corresponding scores collected using the RATA question format changed significantly when responses were examined based on age groups suggests that in this particular case the effect of age group was greater when the RATA question format was used. Also, the fact that except for a score of 5 ("extremely important") from a single Generation X consumer in Brazil, all corresponding boomers, millennials and Generation Z who completed RATA neither checked nor rated any of the three subscales for the affect regulation construct implying that they did not consider it as an important motivation for eating starch-rich foods. Consumers' age groups that did not rate a particular motivation construct (i.e., none of particular constructs' subscales or terms were checked) received a score of "1" (not at all important). Consequently, the rating for the affect regulation construct as a motivation for eating starch-rich foods in Brazil significantly fell from "extremely important" ($\bar{x}$= 5.0) to "slightly important"($\bar{x}$= 2.0) with the adoption of "1s" as scores for all four consumers' age groups except Generation X when the data was analyzed using ANOVA. The above illustration depicts the similarities and differences in interpretation of RATA and RATING survey data if consumers' responses are analyzed as a whole (unsegmented) and when the same dataset is segmented based on age groups. An online survey that investigated the consumers' perceptions on health and wine by Chang et al., (2016) indicated that consumers' responses can vary depending on their age group or cultural background. Undoubtedly, there is a growing trend for research efforts to determine the effect of consumers' age groups' on product characteristics (e.g., sensory properties, perceptions, attitudes, etc.) (Andriosopoulos et al., 2018; Drolet et al., 2011; Groeppel-Klein et al., 2017; Ilicic et al., 2016; Rawat, 2015). Still, a better understanding of how consumers' age groups interpret, process and answer different survey questionnaires would be beneficial to that process (Peters, 2011). Similar compare-contrast analysis can be done for the RATA and RATING data based on gender versus unsegmented responses.

Multiple Factor Analysis (MFA) confirmed that multiple differences were found between the information communicated by RATA and RATING question formats based on the consumers' age group or gender and motivation construct associations for all five food categories and within all five countries. Hierarchical clustering provided a more detail-oriented comparison of the data collected using the two question formats without focusing on the social-cultural aspects of the locations. Previous literature established that the RATING question format was more discriminating both among attributes and among samples than the RATA question format (D. R. Seninde & Chambers, 2021b). Therefore, it is possible that the survey question format also had a significant impact on the consumers' age group and consumers' gender clustering. These findings further show the benefits for the consideration of the consumers' age group or gender and question format associations by researchers when designing future studies that would apply either RATA or RATING question formats to collect consumers' responses.

It was not surprising that, the consumers' age group or gender had a significant effect on the percentage of incomplete responses for the two survey formats and the survey JAR rating (Ochoa et al., 2021). But also, the location or country of residence itself also had a significant impact on how consumers completed or did not complete the survey. For example, the count of Generation Z in Brazil, China, and India who did not complete the RATING survey format was significantly greater than corresponding count for boomers. However, for the USA the reverse was true. A gender-related example involves the significantly higher count for males in China and India who did not complete the RATING survey format as compared to the count for corresponding females even though the reverse was true in the USA. These results provide a better understanding of previous findings of (D. R. Seninde & Chambers, 2021b).

5. Survey limitations

It is possible that some respondents who could have qualified but had no access to the internet did not get the opportunity to participate in this study (coverage error) (M. Couper, 2000; Groves, 1989; Link et al., 2014). We recommend that future international research studies allow for provisions such as paper ballots for qualified respondents who may not have access to the internet. Also, the current survey was also susceptible to nonresponse error whereby not all persons who were included in the sample frame were willing or were able to complete answering this web survey (Ha et al., 2020; Toepoel et al., 2008). Further, in order to evaluate five food items that belong to different food categories in five different countries, the authors used food items that were popular and particular to a country's population and represented a specific food group instead of using the same food item which was popular in some but unpopular in other countries for all five locations. Therefore, for certain food categories such as starch-rich foods different food items were assessed for all five countries whereas for fruits and vegetables a food item popular in all five countries as assessed.

6. Conclusions

The current study confirmed that the percentage of "apply" responses for attributes were higher when the RATING question format was used in web surveys compared to the RATA question format across most demographic segments. Certainly, the effect of RATA and RATING question formats on age group and gender "apply" responses were critical and varied among the attributes for all samples and within all five countries but were mitigated by their interaction with other factors. Also, generally, females in China and India who answered either RATA or RATING survey question formats rated the importance of motivations higher than the corresponding males whereas males in Spain and the USA (also regardless of whether they answered RATA or RATING) rated the importance of attributes higher than the corresponding females. Furthermore, mean scores for product attributes were more consistent or "stable" when the RATING survey format was used. Also, across all food categories, clusters of consumers' age groups or gender were larger in size and thus fewer when the RATING question format was used. Also, although there were similarities between the consumers' age group and gender clusters for RATA and

RATING survey formats, some differences too were also identified. Further, except for Spain and the USA, more Generation Z consumers in Brazil, China, and India did not complete the RATING survey format as compared to corresponding boomers. Also, excluding the USA where more females did not complete answering RATA than males, both gender had similar incompletion rates in all countries. Apart from China where Generation X took longer to complete the survey than corresponding boomers, and millennials, consumers' age group or gender had no significant effect on the survey mean duration. Furthermore, besides females in India who liked taking the survey much more than corresponding males, all consumers' age groups and gender liked taking the surveys just the same. More follow-up studies are needed to determine the level of accuracy of these two question formats and provide more insights on the effect of consumers' age groups and gender on product attribute scoring.

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Appendix A

Difference between the percentage of RATING and RATA "apply" responses (%RATING - %RATA) for Boomers (A), Generation X (B), Generation Z (C), and Millennials (D) consumers in Brazil, China, India, Spain, and the USA for the five food categories.

Food category	Brazil				China				India				Spain				USA			
Dairy foods	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
Liking	56	50	47	52	69	80	80	80	59	70	75	79	45	53	57	62	40	51	73	62
Habits	61	62	55	69	79	81	88	79	72	75	91	90	57	57	69	78	71	76	85	72
Need/Hunger	70	74	65	77	82	90	82	87	66	69	82	82	80	78	79	87	76	80	80	80
Health	54	66	57	80	71	67	76	74	68	60	78	80	59	58	62	73	60	67	77	66
Convenience	68	73	70	67	78	91	81	71	66	84	92	89	71	66	67	82	78	72	84	81
Pleasure	60	66	70	80	88	83	72	69	71	76	82	84	69	77	67	74	65	75	77	65
Trad.eating	41	52	49	61	84	82	69	77	62	76	75	89	60	63	67	73	45	71	75	74
Nat.concern	78	81	74	83	84	86	84	80	66	71	80	80	78	75	78	85	62	71	74	72
Sociability	50	60	63	67	88	86	69	69	66	69	75	79	46	56	57	62	34	67	66	63
Price	65	77	63	72	81	83	70	65	59	64	78	76	55	63	68	77	73	72	71	74
Visual app	35	49	55	72	87	82	69	74	64	72	81	84	40	61	57	72	53	80	73	65
Wt.control	69	78	71	76	84	89	74	79	75	65	89	86	74	74	70	83	53	70	72	65
Affect regul.	13	24	46	49	67	69	61	45	55	58	69	72	30	45	47	45	18	54	64	52
Social norms	40	56	62	59	75	80	70	64	58	64	75	80	45	57	60	59	32	65	61	62
Social image	17	30	46	49	82	86	65	64	56	59	71	77	28	43	52	52	19	57	66	59
Choice limit	56	57	65	69	83	85	72	70	61	74	87	81	57	57	74	76	53	73	77	67

Food category	Brazil				China				India				Spain				USA			
Desserts	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
Liking	35	46	39	41	71	72	86	64	59	62	58	69	51	73	50	68	56	60	65	63
Habits	64	75	83	83	91	81	91	77	76	77	85	77	80	76	67	87	74	84	77	75
Need/Hunger	64	63	77	74	84	85	78	81	73	73	77	73	77	87	70	90	76	86	71	85
Health	50	59	54	55	84	86	78	71	68	69	75	81	69	54	56	78	23	71	57	69
Convenience	67	70	70	58	92	86	82	79	70	69	73	80	69	81	66	82	69	81	69	73
Pleasure	61	61	63	75	85	78	77	67	71	77	79	73	63	77	57	85	52	64	70	67
Trad.eating	48	63	64	63	83	92	87	75	75	74	81	76	58	58	56	63	58	81	70	88
Nat.concern	50	60	52	47	93	93	84	79	75	69	77	78	77	71	53	87	37	74	60	71
Sociability	57	71	70	64	82	90	75	65	77	70	82	78	68	80	60	79	39	81	67	74
Price	55	72	72	59	74	83	85	61	71	62	74	73	47	65	63	75	55	72	60	69
Visual app	53	69	68	66	90	80	79	63	71	69	83	78	50	72	64	87	51	79	73	75
Wt.control	37	59	51	42	89	83	68	73	70	61	75	77	50	43	50	75	20	72	60	70
Affect regul.	30	44	63	57	84	76	76	62	69	61	73	68	48	40	50	61	23	65	67	68

	Social norms	37	57	64	53	90	86	72	68	72	61	72	78	59	62	54	70	35	71	67	68
	Social image	26	39	54	46	82	86	66	65	73	65	79	82	39	51	45	65	19	65	61	69
	Choice limit	56	62	61	61	93	88	86	56	69	71	83	79	52	53	65	80	49	70	65	66

Food category		Brazil				China				India				Spain				USA			
Fruits		A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	Liking	38	54	42	53	72	70	77	72	61	69	73	75	46	58	55	62	47	57	74	63
	Habits	62	75	70	79	76	86	77	82	75	81	83	81	72	82	73	78	73	79	75	79
	Need/Hunger	56	73	61	70	91	84	78	85	64	74	85	82	67	71	72	69	70	72	79	75
	Health	51	61	45	63	72	82	76	74	65	64	74	72	58	64	59	64	52	61	68	67
	Convenience	67	85	67	76	84	85	82	76	74	78	80	85	70	86	67	80	73	80	80	85
	Pleasure	54	70	71	78	88	82	71	79	75	79	82	80	68	82	70	79	58	71	75	74
	Trad.eating	42	56	44	59	85	81	68	76	73	73	78	79	63	81	66	74	40	67	66	65
	Nat.concern	72	71	62	82	82	84	85	80	73	71	81	71	77	77	73	74	59	76	74	78
	Sociability	40	63	45	59	89	84	68	69	71	60	78	81	39	57	54	45	24	67	63	58
	Price	59	77	55	79	79	80	70	68	62	60	78	73	52	78	66	70	65	81	80	75
	Visual app	36	56	43	67	89	87	73	78	69	63	76	82	53	66	60	70	48	74	71	56
	Wt.control	57	70	55	67	84	86	81	78	78	62	83	84	72	79	53	71	62	75	76	74
	Affect regul.	19	32	36	46	65	68	67	50	64	55	67	78	32	43	55	43	13	60	58	56
	Social norms	37	54	52	60	79	81	73	63	66	56	70	79	49	65	60	56	32	68	65	56
	Social image	15	38	36	46	82	83	72	68	63	57	66	76	28	48	54	45	18	60	58	53
	Choice limit	48	66	62	68	84	86	81	74	67	70	81	83	66	76	71	79	54	72	79	66

Food category		Brazil				China				India				Spain				USA			
Protein-rich foods		A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	Liking	45	45	46	50	65	74	62	56	61	68	73	75	30	41	34	50	37	51	57	52
	Habits	47	49	58	67	79	83	91	79	75	79	85	85	57	63	67	70	63	71	66	75
	Need/Hunger	64	69	69	74	86	83	80	86	63	71	78	80	80	75	73	77	67	72	73	70
	Health	53	57	59	66	90	85	69	72	59	48	69	76	69	67	73	71	55	63	65	64
	Convenience	68	78	72	80	87	82	62	59	74	77	85	93	73	76	65	79	67	69	76	74
	Pleasure	58	69	67	78	82	76	68	78	71	71	82	79	52	58	60	64	61	64	72	69
	Trad.eating	40	48	50	56	85	90	73	76	69	68	74	80	59	75	60	71	55	73	69	67
	Nat.concern	73	75	76	84	92	90	72	79	71	66	80	76	76	76	78	79	51	62	66	71
	Sociability	59	63	59	74	91	87	69	74	69	72	78	84	72	78	69	74	50	66	64	64
	Price	63	76	66	77	81	78	66	54	61	63	78	75	54	71	63	64	62	74	76	74
	Visual app	35	56	56	67	90	83	73	70	66	72	77	88	53	69	58	72	59	69	79	75
	Wt.control	59	72	69	75	85	83	63	59	72	62	84	84	68	76	64	69	46	58	66	62
	Affect regul.	13	27	37	35	64	68	67	46	54	47	66	68	28	42	53	41	13	46	56	53

	Social norms	43	55	56	66	84	81	74	63	59	58	67	75	52	69	64	58	33	63	60	60
	Social image	18	37	34	45	87	83	70	60	57	62	67	80	31	56	57	58	22	47	53	54
	Choice limit	51	52	65	74	85	81	77	66	63	65	71	80	69	73	69	66	51	63	71	66

Food category		Brazil				China				India				Spain				USA			
Starch-rich foods		A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
	Liking	42	46	48	50	72	82	79	79	55	60	73	64	29	27	32	32	36	45	63	49
	Habits	42	48	46	57	59	75	68	70	71	68	79	69	42	55	55	62	56	68	69	76
	Need/Hunger	66	72	68	76	74	81	74	77	65	73	84	72	74	76	74	67	66	61	68	71
	Health	58	65	56	70	71	81	73	76	75	58	73	67	58	62	59	69	58	67	65	70
	Convenience	59	58	56	65	77	85	83	84	69	67	86	73	59	65	65	71	54	62	68	71
	Pleasure	63	71	72	74	77	79	70	73	65	63	74	72	52	58	67	67	60	71	69	71
	Trad.eating	35	50	41	54	76	78	69	67	65	64	74	69	48	58	51	55	39	67	56	69
	Nat.concern	73	73	68	79	82	88	81	84	68	63	85	72	72	72	73	75	57	74	79	76
	Sociability	52	59	59	79	79	85	78	74	72	71	78	77	65	69	59	71	23	62	54	62
	Price	58	66	58	71	74	78	72	60	63	67	77	73	53	67	65	65	58	76	72	80
	Visual app	34	54	50	67	83	83	72	66	64	67	74	69	49	65	55	65	50	70	65	71
	Wt.control	67	67	66	69	88	87	70	78	75	66	79	77	60	74	61	69	52	64	58	69
	Affect regul.	13	26	32	36	57	56	56	34	54	56	62	71	27	41	41	32	9	48	51	48
	Social norms	43	50	52	63	70	71	70	60	63	55	69	74	52	67	56	55	30	59	56	60
	Social image	18	34	33	46	79	79	68	56	63	53	65	73	35	51	41	48	17	54	51	52
	Choice limit	48	50	57	69	78	72	68	67	65	66	75	74	46	70	68	59	48	63	65	75

Appendix B

Difference between the percentage of RATING and RATA "apply" responses (%RATING - %RATA) for Female (F) and Male (M) consumers in the five countries for the five food categories.

Food category		Brazil		China		India		Spain		USA	
Dairy foods		F	M	F	M	F	M	F	M	F	M
	Liking	51	51	75	80	75	69	54	55	51	60
	Habits	66	57	81	83	84	82	60	71	69	83
	Need/Hunger	75	68	89	81	78	73	76	85	74	84
	Health	68	60	74	70	77	66	54	73	64	72
	Convenience	72	66	80	79	86	81	68	76	74	83
	Pleasure	76	60	76	79	83	75	68	75	67	73
	Trad.eating	58	42	81	75	75	77	61	71	64	68
	Nat.concern	84	75	87	80	76	74	75	83	67	74
	Sociability	64	55	81	72	74	71	51	60	52	63
	Price	72	67	77	70	70	69	62	69	72	72
	Visual app	58	47	82	73	75	76	50	63	64	71
	Wt.control	76	71	86	76	79	78	74	78	62	68
	Affect regul.	38	26	61	59	62	65	37	46	37	57
	Social norms	58	49	72	71	67	72	47	62	46	64
	Social image	37	32	76	70	65	66	34	53	44	55
	Choice limit	65	58	79	74	79	74	61	71	65	70

Food category		Brazil		China		India		Spain		USA	
Desserts		F	M	F	M	F	M	F	M	F	M
	Liking	44	35	77	72	64	60	66	56	56	64
	Habits	82	70	91	82	83	75	76	79	77	79
	Need/Hunger	69	69	84	80	77	71	81	80	77	82
	Health	50	59	85	77	77	68	63	65	49	62
	Convenience	68	64	88	82	78	66	74	74	71	76
	Pleasure	69	61	77	78	76	73	75	68	52	72
	Trad.eating	60	59	89	81	81	71	52	66	70	79
	Nat.concern	48	56	91	86	75	72	70	76	54	68
	Sociability	65	64	80	79	83	69	63	78	59	72
	Price	63	66	86	69	73	63	53	68	60	70
	Visual app	64	65	84	75	79	71	65	69	70	71
	Wt.control	44	51	88	71	74	65	47	59	47	66
	Affect regul.	54	44	79	73	72	62	46	52	54	59

	Social norms	52	55	80	81	74	63	52	67	51	72
	Social image	37	46	77	74	79	68	41	55	44	64
	Choice limit	60	59	85	83	82	67	52	69	56	69

Food category		Brazil		China		India		Spain		USA	
Fruits		F	M	F	M	F	M	F	M	F	M
	Liking	46	48	76	69	71	69	55	54	53	66
	Habits	73	70	79	82	81	80	74	79	74	79
	Need/Hunger	66	63	88	81	81	73	64	74	70	78
	Health	61	50	78	74	72	66	56	67	53	70
	Convenience	75	73	81	83	85	73	76	76	76	82
	Pleasure	75	61	83	77	81	77	76	74	65	74
	Trad.eating	55	46	78	78	79	71	70	71	55	63
	Nat.concern	79	66	84	81	77	71	75	76	69	73
	Sociability	55	49	80	75	77	66	45	53	45	59
	Price	70	64	73	73	73	63	66	65	71	79
	Visual app	53	47	85	78	77	65	61	63	57	66
	Wt.control	70	57	85	79	80	73	70	69	64	79
	Affect regul.	33	31	61	63	68	62	40	47	38	55
	Social norms	52	48	75	73	71	63	54	61	46	64
	Social image	29	35	77	74	71	60	38	49	38	56
	Choice limit	61	59	80	81	81	69	74	71	64	70

Food category		Brazil		China		India		Spain		USA	
Protein-rich foods		F	M	F	M	F	M	F	M	F	M
	Liking	49	43	68	60	71	68	39	38	46	51
	Habits	60	50	82	84	80	82	58	70	68	70
	Need/Hunger	71	66	84	84	74	73	74	79	65	76
	Health	66	52	81	78	63	63	68	71	62	62
	Convenience	78	70	77	69	87	78	73	73	66	76
	Pleasure	75	60	79	73	80	72	59	58	60	71
	Trad.eating	54	42	82	80	73	71	66	66	60	71
	Nat.concern	84	69	89	78	76	71	78	77	61	63
	Sociability	68	59	85	76	79	73	71	75	58	63
	Price	73	68	72	67	72	66	59	67	69	72
	Visual app	56	48	82	75	79	73	61	66	70	69
	Wt.control	79	58	79	66	80	71	69	70	58	56
	Affect regul.	29	24	65	57	63	54	36	46	35	47

	Social norms	57	51	78	71	67	63	57	63	45	61
	Social image	34	31	77	72	70	64	46	54	35	51
	Choice limit	67	54	81	73	72	68	66	71	62	61

Food category		Brazil		China		India		Spain		USA	
Starch-rich foods		F	M	F	M	F	M	F	M	F	M
	Liking	47	46	79	77	63	64	31	28	43	53
	Habits	52	43	70	66	74	71	50	57	66	68
	Need/Hunger	72	68	79	73	74	75	72	75	65	66
	Health	71	54	74	76	72	65	59	65	64	66
	Convenience	61	58	82	82	77	71	60	70	55	73
	Pleasure	74	65	76	74	69	69	59	62	66	69
	Trad.eating	51	38	78	67	69	67	51	55	54	61
	Nat.concern	78	69	86	82	74	72	70	75	73	70
	Sociability	66	57	87	71	76	74	66	66	45	56
	Price	66	59	75	67	74	66	62	63	68	75
	Visual app	53	47	80	72	74	63	54	63	63	65
	Wt.control	75	60	83	78	79	70	62	70	59	62
	Affect regul.	29	23	58	43	66	54	31	39	31	46
	Social norms	56	47	72	64	65	65	57	59	47	57
	Social image	33	30	78	63	65	60	39	48	36	51
	Choice limit	61	50	76	65	75	66	56	66	64	61

Appendix C

*p-values for sources of variation (Question format, Age group, and Question format*Age group interaction), and Least Squares mean scores for RATA and RATING question formats and age groups (boomers, Generation X, Generation Z, and millennials) for the 16 constructs and for all five food categories and within all five countries.*

R, S, T = Type III Sum of Squares analysis *p*-values for Sources of variance i.e., R = Question format, S = Age group, and T = Question format*Age group interaction respectively; * *p*-values for Sources of variance were significantly different at ($p \leq 0.05$); L, M = Least Squares Means for RATA and RATING respectively; A, B, C, D = Least Squares Means for Boomers, Generation X, Generation Z and Millennials respectively; Least Squares Means assigned different lettering (superscripts) were significantly different; †Five-point scale; 1 = Not at All Important, 2 = Slightly Important, 3 = Moderately Important, 4 = Very Important, 5 = Extremely Important.

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Dairy foods	Brazil	Liking	0.001*	0.647	0.389	4.4^{a}	4.1^{b}	4.2^{a}	4.3^{a}	4.3^{a}	4.1^{a}
		Habits	0.649*	0.356	0.330	3.9^{a}	3.8^{a}	3.7^{a}	3.9^{a}	3.9^{a}	3.9^{a}
		Need/Hunger	<0.0001*	0.874	0.964	4.3^{a}	3.7^{b}	3.9^{a}	4^{a}	4.1^{a}	4.1^{a}
		Health	<0.0001*	0.573	0.729	4.5^{a}	3.6^{b}	4.2^{a}	4.1^{a}	4^{a}	4^{a}
		Convenience	0.001*	0.116	0.580	4^{a}	3.5^{b}	3.6^{b}	3.9^{ab}	4^{a}	3.7^{ab}
		Pleasure	<0.0001*	0.803	0.079	4.2^{a}	3.2^{b}	3.8^{a}	3.8^{a}	3.8^{a}	3.5^{a}
		Trad.eating	<0.0001*	0.168	0.954	3.9^{a}	2.8^{b}	3.1^{b}	3.4^{ab}	3.6^{a}	3.3^{ab}
		Nat.concern	0.001*	0.410	0.374	4.4^{a}	3.6^{b}	4.2^{a}	3.8^{a}	4.1^{a}	3.7^{a}
		Sociability	0.028*	0.361	0.571	3.8^{a}	2.5^{b}	2.1^{a}	3.6^{a}	3.6^{a}	3.3^{a}
		Price	0.001*	0.953	0.924	4.1^{a}	2.9^{b}	3.5^{a}	3.7^{a}	3.5^{a}	3.4^{a}
		Visual app	0.284	0.443	0.091	3^{a}	2.4^{a}	3.4^{a}	2.5^{a}	3^{a}	1.9^{a}
		Wt.control	0.001*	0.723	0.899	4.1^{a}	3.1^{b}	3.7^{a}	3.4^{a}	3.5^{a}	3.7^{a}
		Affect regul.	0.198	0.945	0.945	1^{a}	1.8^{a}	1.2^{a}	1.3^{a}	1.7^{a}	1.6^{a}
		Social norms	0.001*	0.802	0.455	3.9^{a}	2.5^{b}	3.2^{a}	3.4^{a}	2.9^{a}	3.5^{a}

		Social image	0.007*	0.032*	0.300	3.5^{a}	1.9^{b}	1.2^{b}	2.9^{a}	3.7^{a}	3.1^{a}
		Choice limit	<0.0001*	0.859	0.829	4.2^{a}	2.8^{b}	3.5^{a}	3.6^{a}	3.7^{a}	3.4^{a}

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Dairy foods	China	Liking	0.055	0.270	0.088	3.8^{a}	3.6^{a}	3.6^{a}	3.6^{a}	3.8^{a}	3.8^{a}
		Habits	0.644	0.500	0.077	3.6^{a}	3.5^{a}	3.5^{a}	3.6^{a}	3.4^{a}	3.7^{a}
		Need/Hunger	0.171	0.300	0.662	3.7^{a}	3.4^{a}	3.3^{a}	3.7^{a}	3.3^{a}	3.8^{a}
		Health	<0.0001*	0.621	0.021*	4.1^{a}	3.5^{b}	3.8^{a}	3.8^{a}	3.8^{a}	3.9^{a}
		Convenience	0.154	0.375	0.122	3.6^{a}	3.3^{a}	3.4^{a}	3.7^{a}	3.3^{a}	3.6^{a}
		Pleasure	0.021*	0.824	0.188	3.8^{a}	3.2^{b}	3.4^{a}	3.4^{a}	3.7^{a}	3.4^{a}
		Trad.eating	0.002*	0.515	0.032*	3.8^{a}	3.1^{b}	3.2^{a}	3.6^{a}	3.6^{a}	3.6^{a}
		Nat.concern	0.039*	0.521	0.266	4^{a}	3.6^{b}	3.6^{a}	3.8^{a}	3.8^{a}	3.9^{a}
		Sociability	0.040*	0.739	0.211	3.9^{a}	2.9^{b}	3.3^{a}	3.1^{a}	3.7^{a}	3.6^{a}
		Price	0.446	0.338	0.530	3.1^{a}	2.9^{a}	2.9^{a}	3.4^{a}	3.1^{a}	2.7^{a}
		Visual app	0.025*	0.845	0.643	3.8^{a}	3.1^{b}	3.6^{a}	3.3^{a}	3.4^{a}	3.5^{a}
		Wt.control	0.005*	0.991	0.020*	3.8^{a}	3.3^{b}	3.5^{a}	3.5^{a}	3.6^{a}	3.6^{a}
		Affect regul.	0.424	0.381	0.716	3^{a}	2.5^{a}	3.3^{a}	2.9^{a}	2.8^{a}	2.1^{a}
		Social norms	0.039*	0.693	0.501	3.9^{a}	2.9^{b}	3.5^{a}	3^{a}	3.2^{a}	3.8^{a}
		Social image	0.074	0.629	0.275	3.8^{a}	2.9^{a}	3.3^{a}	4.1^{a}	3.4^{a}	2.8^{a}
		Choice limit	0.309	0.533	0.276	3.5^{a}	3.1^{a}	3.4^{a}	3.1^{a}	3.8^{a}	2.9^{a}

			p-values			Means†					

			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Dairy foods	India	Liking	<0.0001*	0.106	0.698	4.3^{a}	3.9^{b}	3.9^{b}	4^{ab}	4.1^{ab}	4.3^{a}
		Habits	0.239	0.711	0.138	4.1^{a}	4^{a}	4^{a}	4.1^{a}	4.2^{a}	4^{a}
		Need/Hunger	0.000*	0.867	0.750	4.3^{a}	3.8^{b}	4^{a}	4^{a}	4.1^{a}	4.2^{a}
		Health	0.001*	0.582	0.013*	4.4^{a}	4.1^{b}	4.1^{a}	4.3^{a}	4.3^{a}	4.3^{a}
		Convenience	0.471	0.960	0.042*	3.9^{a}	3.8^{a}	3.8^{a}	3.9^{a}	3.8^{a}	3.8^{a}
		Pleasure	0.054	0.370	0.813	4.2^{a}	3.9^{a}	3.9^{a}	4^{a}	3.9^{a}	4.3^{a}
		Trad.eating	0.009*	0.663	0.907	4.1^{a}	3.7^{b}	3.8^{a}	3.9^{a}	3.8^{a}	4.1^{a}
		Nat.concern	0.000*	0.136	0.241	4.4^{a}	4^{b}	4.1^{ab}	4.4^{a}	4.1^{b}	4.3^{ab}
		Sociability	0.016*	0.733	0.353	3.8^{a}	3.2^{b}	3.7^{a}	3.4^{a}	3.4^{a}	3.7^{a}
		Price	0.109	0.988	0.678	3.7^{a}	3.2^{a}	3.5^{a}	3.4^{a}	3.4^{a}	3.4^{a}
		Visual app	0.002*	0.423	0.503	4.1^{a}	3.5^{b}	3.9^{a}	3.6^{a}	3.7^{a}	4^{a}
		Wt.control	0.000*	0.870	0.066	4.2^{a}	3.6^{b}	3.8^{a}	4^{a}	3.9^{a}	3.9^{a}
		Affect regul.	0.134	0.281	0.398	3.4^{a}	3^{a}	3.4^{a}	2.7^{a}	3.2^{a}	3.5^{a}
		Social norms	0.790	0.588	0.164	3.2^{a}	3.1^{a}	3.4^{a}	2.9^{a}	3.4^{a}	3^{a}
		Social image	0.032*	0.144	0.309	3.7^{a}	3.1^{b}	3.6^{ab}	3^{b}	3.1^{ab}	3.8^{a}
		Choice limit	0.034*	0.733	0.755	4.1^{a}	3.6^{b}	3.8^{a}	3.7^{a}	3.8^{a}	4.1^{a}

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Dairy foods	Spain	Liking	<0.0001*	0.006*	0.031*	4.1^{a}	3.7^{b}	3.9^{b}	3.9^{b}	3.7^{b}	4.2^{a}

		Habits	0.131	0.266	0.286	3.6^{a}	3.4^{a}	3.4^{a}	3.5^{a}	3.4^{a}	3.7^{a}
		Need/Hunger	<0.0001*	0.048*	0.433	4.1^{a}	3.4^{b}	3.7^{ab}	4^{a}	3.4^{b}	4^{a}
		Health	<0.0001*	0.001*	0.645	4.2^{a}	3.3^{b}	4^{a}	3.8^{a}	3.4^{b}	3.9^{a}
		Convenience	<0.0001*	0.262	0.867	4^{a}	3.2^{b}	3.7^{a}	3.5^{a}	3.3^{a}	3.8^{a}
		Pleasure	0.000*	0.127	0.560	4^{a}	3.2^{b}	3.3^{b}	3.6^{ab}	3.4^{ab}	3.9^{a}
		Trad.eating	<0.0001*	0.313	0.330	3.7^{a}	3^{b}	3.3^{a}	3.5^{a}	3.2^{a}	3.6^{a}
		Nat.concern	<0.0001*	0.648	0.264	4.3^{a}	3.4^{b}	3.8^{a}	4^{a}	3.6^{a}	3.9^{a}
		Sociability	0.099	0.036*	0.023*	3.1^{a}	2.3^{a}	3^{ab}	3.7^{a}	2.4^{b}	1.8^{b}
		Price	<0.0001*	0.963	0.748	4.1^{a}	2.6^{b}	3.4^{a}	3.5^{a}	3.4^{a}	3.2^{a}
		Visual app	<0.0001*	0.561	0.240	4.2^{a}	2.5^{b}	3.2^{a}	3.8^{a}	3.2^{a}	3.1^{a}
		Wt.control	<0.0001*	0.224	0.604	4.2^{a}	2.9^{b}	3.7^{a}	3.5^{a}	3^{a}	4^{a}
		Affect regul.	0.045*	0.048*	0.114	3.3^{a}	2.1^{b}	1.4^{b}	3.6^{a}	2.6^{ab}	3.1^{ab}
		Social norms	<0.0001*	0.955	0.507	3.9^{a}	2.4^{b}	3.1^{a}	3.3^{a}	3^{a}	3.1^{a}
		Social image	0.002*	0.138	0.283	3.6^{a}	2.1^{b}	2.5^{c}	3.6^{a}	3.1^{b}	2.1^{c}
		Choice limit	0.000*	0.815	0.754	4^{a}	2.8^{b}	3.3^{a}	3.5^{a}	3.2^{a}	3.7^{a}

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Dairy foods	USA	Liking	0.000*	0.118	0.003*	4.1^{a}	3.7^{b}	4^{a}	4^{a}	3.7^{b}	3.9^{ab}
		Habits	0.410	0.074	0.821	3.2^{a}	3.4^{a}	3^{b}	3.5^{a}	3.3^{ab}	3.4^{a}
		Need/Hunger	<0.0001*	0.211	0.532	4.2^{a}	3.4^{b}	3.5^{b}	4^{a}	3.8^{ab}	3.9^{ab}
		Health	<0.0001*	0.259	0.626	4.3^{a}	2.9^{b}	3.9^{a}	3.7^{a}	3.6^{a}	3.3^{a}
		Convenience	0.154	0.133	0.142	3.7^{a}	3.4^{a}	3.3^{a}	3.7^{a}	3.2^{a}	3.8^{a}

		Pleasure	0.001*	0.213	0.438	4.1^{a}	3.4^{b}	3.5^{a}	3.9^{a}	3.7^{a}	3.8^{a}
		Trad.eating	0.004*	0.000*	0.208	3.7^{a}	2.9^{b}	2.6^{b}	3.3^{a}	4^{a}	3.4^{a}
		Nat.concern	0.006*	0.741	0.544	4.4^{a}	2.9^{b}	3.8^{a}	3.4^{a}	3.4^{a}	4^{a}
		Sociability	0.002*	0.216	0.462	3.9^{a}	2.5^{b}	2.4^{a}	3.7^{a}	3.1^{a}	3.7^{a}
		Price	0.000*	0.518	0.645	4^{a}	3.1^{b}	3.4^{a}	3.6^{a}	3.3^{a}	3.8^{a}
		Visual app	0.018*	0.440	0.887	4^{a}	2.8^{b}	2.9^{a}	3.6^{a}	3.6^{a}	3.6^{a}
		Wt.control	0.053	0.122	0.072	3.7^{a}	2.7^{a}	3.2^{a}	3.9^{a}	1.9^{a}	3.6^{a}
		Affect regul.	0.881	0.116	0.559	2.1^{a}	2.2^{a}	1.2^{a}	2.8^{a}	3^{a}	1.7^{a}
		Social norms	0.002*	0.914	0.482	4.4^{a}	2.5^{b}	3.3^{a}	3.4^{a}	3.8^{a}	3.2^{a}
		Social image	<0.0001*	0.179	0.739	4.3^{a}	2.4^{b}	2.6^{b}	3.3^{ab}	3.6^{ab}	3.8^{a}
		Choice limit	0.007*	0.311	0.926	4.1^{a}	2.8^{b}	2.8^{a}	3.5^{a}	4.1^{a}	3.5^{a}

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Desserts	Brazil	Liking	0.143	<0.0001*	0.522	4.3^{a}	4.2^{a}	4.2^{bc}	4.3^{b}	4.5^{a}	4^{c}
		Habits	0.045*	0.001*	0.869	3.9^{a}	3.4^{b}	3.2^{b}	3.4^{b}	4.2^{a}	3.8^{ab}
		Need/Hunger	0.001*	0.814	0.832	4.1^{a}	3.1^{b}	3.6^{a}	3.6^{a}	3.8^{a}	3.4^{a}
		Health	0.048*	0.113	0.151	3.4^{a}	2.3^{b}	3.5^{a}	3.2^{a}	3.2^{a}	1.5^{a}
		Convenience	<0.0001*	0.458	0.580	4.3^{a}	3^{b}	3.5^{a}	3.5^{a}	3.9^{a}	3.6^{a}
		Pleasure	0.195	0.235	0.356	3.7^{a}	3.5^{a}	3.4^{a}	3.8^{a}	3.8^{a}	3.4^{a}
		Trad.eating	0.000*	0.473	0.968	3.7^{a}	2.8^{b}	3^{a}	3.3^{a}	3.4^{a}	3.3^{a}
		Nat.concern	0.024*	0.085	0.253	3.8^{a}	2.3^{b}	3.4^{a}	3.8^{a}	3.7^{a}	1.5^{a}

Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
		Sociability	<0.0001*	0.267	0.782	4^{a}	3^{b}	3.3^{a}	3.6^{a}	3.9^{a}	3.4^{a}
		Price	0.001*	0.805	0.852	4.6^{a}	2.6^{b}	3.7^{a}	3.9^{a}	3.7^{a}	3.2^{a}
		Visual app	0.003*	0.954	0.711	3.9^{a}	2.9^{b}	3.3^{a}	3.5^{a}	3.4^{a}	3.3^{a}
		Wt.control	0.357	0.075	0.017*	2.8^{a}	2.1^{a}	3.5^{a}	1.7^{a}	1.6^{a}	2.9^{a}
		Affect regul.	<0.0001*	0.817	0.034*	4.1^{a}	2.4^{b}	3.1^{a}	3.1^{a}	3.3^{a}	3.6^{a}
		Social norms	0.445	0.393	0.330	1.8^{a}	2.3^{a}	1.5^{a}	1.7^{a}	1.8^{a}	3.1^{a}
		Social image	0.053	0.131	0.358	3.4^{a}	2.1^{a}	1.3^{a}	3.3^{a}	3.3^{a}	3^{a}
		Choice limit	0.884	0.005*	0.035*	2.6^{a}	2.5^{a}	1.6^{b}	1.8^{b}	3.9^{a}	3^{ab}

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Desserts	China	Liking	0.000*	0.047*	0.016*	4^{a}	3.4^{b}	3.5^{b}	3.5^{b}	4.1^{a}	3.6^{ab}
		Habits	0.662	0.721	0.747	3.3^{a}	3.4^{a}	3.1^{a}	3.4^{a}	3.5^{a}	3.4^{a}
		Need/Hunger	0.027*	0.282	0.317	3.9^{a}	3.4^{b}	3.7^{a}	3.4^{a}	3.9^{a}	3.7^{a}
		Health	0.020*	0.804	0.625	4^{a}	3.1^{b}	3.6^{a}	3.8^{a}	3.4^{a}	3.3^{a}
		Convenience	0.026*	0.017*	0.176	2.2^{b}	3.2^{a}	3.4^{a}	2.1^{b}	3.4^{a}	1.9^{b}
		Pleasure	0.000*	0.764	0.133	4.3^{a}	3.2^{b}	3.7^{a}	3.5^{a}	3.9^{a}	4^{a}
		Trad.eating	0.857	0.093	0.158	3.3^{a}	3.2^{a}	2.8^{b}	2.8^{b}	3.6^{a}	3.6^{a}
		Nat.concern	0.535	0.023*	0.062	3.6^{a}	3.3^{a}	3.5^{a}	4.3^{a}	4.1^{a}	2^{b}
		Sociability	0.127	0.581	0.405	3.9^{a}	3.2^{a}	3.3^{a}	3.4^{a}	3.9^{a}	3.4^{a}
		Price	0.830	0.050	0.236	2.9^{a}	3^{a}	3.5^{a}	3.1^{a}	3.3^{a}	1.7^{a}
		Visual app	0.000*	0.859	0.380	4.3^{a}	3.1^{b}	3.8^{a}	3.5^{a}	3.7^{a}	3.8^{a}

		Wt.control	0.953	0.075	0.140	3.1^{a}	3.1^{a}	3.3^{a}	3.8^{a}	3.3^{a}	1.9^{a}
		Affect regul.	0.216	0.631	0.358	3.7^{a}	3^{a}	3.3^{a}	3.8^{a}	3.5^{a}	2.8^{a}
		Social norms	0.024*	0.628	0.154	4.3^{a}	3.1^{b}	3.3^{a}	3.6^{a}	4^{a}	3.9^{a}
		Social image	0.055	0.991	0.596	3.9^{a}	3.1^{a}	3.4^{a}	3.6^{a}	3.5^{a}	3.4^{a}
		Choice limit	0.103	0.453	0.699	3.9^{a}	3.1^{a}	3.7^{a}	3.5^{a}	4.1^{a}	2.8^{a}

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Desserts	India	Liking	<0.0001*	0.270	0.956	4.2^{a}	3.7^{b}	3.9^{a}	4^{a}	3.8^{a}	4^{a}
		Habits	0.015*	0.766	0.772	4.1^{a}	3.7^{b}	3.9^{a}	4^{a}	3.8^{a}	4.1^{a}
		Need/Hunger	0.000*	0.623	0.351	4.1^{a}	3.5^{b}	3.8^{a}	3.7^{a}	4^{a}	3.8^{a}
		Health	0.003*	0.466	0.996	4.1^{a}	3.3^{b}	3.8^{a}	3.5^{a}	3.6^{a}	3.8^{a}
		Convenience	0.065	0.362	0.872	3.7^{a}	3.3^{a}	3.6^{a}	3.2^{a}	3.5^{a}	3.6^{a}
		Pleasure	0.000*	0.879	0.147	4.2^{a}	3.7^{b}	3.9^{a}	4^{a}	4^{a}	4.1^{a}
		Trad.eating	0.001*	0.129	0.671	4.2^{a}	3.5^{b}	3.9^{ab}	3.5^{b}	3.9^{ab}	4.1^{a}
		Nat.concern	0.000*	0.134	0.676	4.2^{a}	3.2^{b}	4^{a}	3.4^{b}	3.8^{ab}	3.6^{ab}
		Sociability	0.145	0.531	0.963	3.9^{a}	3.4^{a}	3.7^{a}	3.4^{a}	3.6^{a}	3.7^{a}
		Price	0.012*	0.787	0.822	3.9^{a}	3.1^{b}	3.7^{a}	3.4^{a}	3.5^{a}	3.4^{a}
		Visual app	0.002*	0.670	0.932	4.1^{a}	3.6^{b}	3.9^{a}	3.8^{a}	3.7^{a}	4^{a}
		Wt.control	0.849	0.176	0.144	3.1^{a}	3.2^{a}	3.6^{a}	3.4^{a}	2.1^{a}	3.4^{a}
		Affect regul.	0.180	0.342	0.841	3.6^{a}	3.1^{a}	3.6^{a}	3.1^{a}	3.1^{a}	3.6^{a}
		Social norms	0.638	0.001*	0.095	3.3^{a}	3.1^{a}	3.7^{a}	2.4^{b}	3.3^{ab}	3.3^{a}

		Social image	0.319	0.568	0.649	3.7^{a}	3.3^{a}	3.6^{a}	3.4^{a}	3.1^{a}	3.7^{a}
		Choice limit	0.619	0.260	0.141	3.1^{a}	3.4^{a}	3.7^{a}	3.6^{a}	2.2^{a}	3.5^{a}

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Desserts	Spain	Liking	0.021*	0.025*	0.001*	4.1^{a}	3.8^{b}	4.2^{a}	4^{ab}	3.7^{b}	4^{ab}
		Habits	0.001*	0.519	0.321	4^{a}	3.2^{b}	3.6^{a}	3.5^{a}	3.4^{a}	3.9^{a}
		Need/Hunger	0.005*	0.792	0.744	4^{a}	3.2^{b}	3.6^{a}	3.7^{a}	3.4^{a}	3.7^{a}
		Health	0.119	0.171	0.138	3.3^{a}	2.5^{a}	3.5^{a}	3.1^{a}	3.1^{a}	1.8^{a}
		Convenience	0.005*	0.719	0.610	4.3^{a}	2.9^{b}	3.4^{a}	3.9^{a}	3.5^{a}	3.5^{a}
		Pleasure	0.022*	0.036*	0.003*	4^{a}	3.7^{b}	4^{a}	4^{a}	3.6^{b}	3.9^{ab}
		Trad.eating	0.000*	0.016*	0.261	3.9^{a}	3.5^{b}	4^{a}	3.8^{ab}	3.4^{b}	3.6^{b}
		Nat.concern	0.034*	0.386	0.559	4.3^{a}	3^{b}	3.9^{a}	3.9^{a}	2.7^{a}	4.1^{a}
		Sociability	0.011*	0.164	0.580	3.5^{a}	2.9^{b}	3.4^{ab}	3.5^{a}	2.7^{b}	3.2^{ab}
		Price	0.968	0.056	0.117	2.4^{a}	2.4^{a}	1.6^{a}	1.6^{a}	3.5^{a}	2.8^{a}
		Visual app	0.001*	0.641	0.864	4^{a}	2.8^{b}	3.4^{a}	3.3^{a}	3.2^{a}	3.8^{a}
		Wt.control	0.075	0.311	0.124	3.5^{a}	2.3^{a}	3.2^{a}	3.5^{a}	3.1^{a}	1.8^{a}
		Affect regul.	0.046*	0.177	0.103	3.4^{a}	2.2^{b}	1.6^{a}	3.3^{a}	3^{a}	3.2^{a}
		Social norms	0.001*	0.782	0.723	3.9^{a}	2.4^{b}	2.7^{a}	3.2^{a}	3.2^{a}	3.6^{a}
		Social image	0.018*	0.101	0.165	3.4^{a}	2.1^{b}	3.1^{a}	1.5^{a}	3^{a}	3.5^{a}
		Choice limit	0.168	0.248	0.072	3.4^{a}	2.5^{a}	2.7^{a}	3.5^{a}	3.5^{a}	1.9^{a}

			p-values			Means†					

			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Desserts	USA	Liking	<0.0001*	0.519	0.021*	4.3^{a}	3.8^{b}	4.2^{a}	4.1^{a}	4^{a}	4^{a}
		Habits	0.002*	0.097	0.805	4.2^{a}	3.1^{b}	3.1^{b}	4.2^{a}	3.5^{ab}	3.9^{a}
		Need/Hunger	0.158	0.301	0.985	3.7^{a}	3.3^{a}	3.3^{a}	3.9^{a}	3.2^{a}	3.6^{a}
		Health	0.024*	0.018*	0.096	3.8^{a}	2.5^{b}	2.7^{ab}	4^{a}	1.8^{b}	3.9^{a}
		Convenience	0.000*	0.583	0.972	4.7^{a}	2.9^{b}	3.3^{a}	4.1^{a}	3.9^{a}	3.8^{a}
		Pleasure	0.322	0.028*	0.328	3.9^{a}	3.7^{a}	3.9^{a}	4^{a}	3.8^{ab}	3.5^{b}
		Trad.eating	0.049*	0.021*	0.675	3.5^{a}	3^{b}	2.8^{b}	3.9^{a}	3.2^{ab}	3.2^{b}
		Nat.concern	0.215	0.013*	0.299	3.5^{a}	2.6^{a}	1.5^{b}	4.1^{a}	2.8^{ab}	3.9^{a}
		Sociability	0.012*	0.103	0.239	3.8^{a}	2.7^{b}	2.7^{b}	3.2^{ab}	3.4^{ab}	3.8^{a}
		Price	0.004*	0.218	0.548	4.1^{a}	2.7^{b}	3.1^{a}	4^{a}	2.8^{a}	3.7^{a}
		Visual app	0.049*	0.884	0.587	3.9^{a}	3^{b}	3.1^{a}	3.4^{a}	3.7^{a}	3.6^{a}
		Wt.control	0.992	0.278	0.002*	2.4^{a}	2.4^{a}	3.1^{a}	1.9^{a}	1.8^{a}	2.8^{a}
		Affect regul.	0.191	0.006*	0.090	3.3^{a}	2.5^{a}	1.2^{c}	4^{a}	2.4^{b}	3.8^{a}
		Social norms	0.021*	0.137	0.331	4^{a}	2.6^{b}	2.9^{a}	4^{a}	2.4^{a}	3.9^{a}
		Social image	<0.0001*	0.040*	0.933	4.4^{a}	2.5^{b}	2.4^{b}	4^{a}	3.8^{a}	3.6^{a}
		Choice limit	0.116	0.148	0.903	3.5^{a}	2.7^{a}	2.2^{b}	3.5^{a}	3.4^{a}	3.3^{a}

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Fruits	Brazil	Liking	0.566	0.036*	0.775	4.3^{a}	4.3^{a}	4.3^{ab}	4.4^{a}	4.4^{a}	4.1^{b}

		Habits	0.469	0.140	0.987	3.8^{a}	3.9^{a}	3.6^{b}	4^{a}	3.8^{ab}	3.9^{ab}
		Need/Hunger	0.001*	0.876	0.499	4.2^{a}	3.9^{b}	4^{a}	4.2^{a}	4.1^{a}	4.1^{a}
		Health	<0.0001*	0.212	0.304	4.5^{a}	3.8^{b}	4.2^{a}	4.3^{a}	4^{a}	4.1^{a}
		Convenience	0.096	0.521	0.755	3.9^{a}	3.6^{a}	3.6^{a}	3.9^{a}	3.6^{a}	3.8^{a}
		Pleasure	0.002*	0.742	0.358	4^{a}	3.3^{b}	3.7^{a}	3.8^{a}	3.5^{a}	3.6^{a}
		Trad.eating	<0.0001*	0.082	0.596	3.8^{a}	2.7^{b}	2.9^{b}	3.6^{a}	3.3^{ab}	3.1^{ab}
		Nat.concern	<0.0001*	0.291	0.071	4.5^{a}	3.8^{b}	4.3^{a}	4.3^{a}	4.1^{a}	4^{a}
		Sociability	0.942	0.242	0.264	2.3^{a}	2.3^{a}	1.5^{a}	2.8^{a}	3.1^{a}	1.7^{a}
		Price	0.000*	0.177	0.505	4^{a}	3.1^{b}	3.1^{b}	3.6^{ab}	3.6^{ab}	3.9^{a}
		Visual app	0.031*	0.907	0.782	3.7^{a}	2.4^{b}	2.9^{a}	3.3^{a}	3.1^{a}	2.9^{a}
		Wt.control	<0.0001*	0.447	0.343	4.4^{a}	3.3^{b}	3.8^{a}	4.1^{a}	3.9^{a}	3.7^{a}
		Affect regul.	0.215	0.990	0.990	1^{a}	1.8^{a}	1.2^{a}	1.4^{a}	1.5^{a}	1.5^{a}
		Social norms	<0.0001*	0.834	0.851	3.7^{a}	2.5^{b}	2.9^{a}	3.2^{a}	3.2^{a}	3.1^{a}
		Social image	0.209	0.041*	0.110	2.8^{a}	1.9^{a}	1.2^{c}	3^{ab}	3.6^{a}	1.6^{bc}
		Choice limit	0.002*	0.839	0.810	4^{a}	2.9^{b}	3.3^{a}	3.7^{a}	3.5^{a}	3.3^{a}

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Fruits	China	Liking	<0.0001*	0.073	0.053	4^{a}	3.5^{b}	3.6^{b}	3.6^{b}	3.8^{ab}	3.9^{a}
		Habits	0.305	0.716	0.265	3.5^{a}	3.3^{a}	3.4^{a}	3.3^{a}	3.5^{a}	3.4^{a}
		Need/Hunger	0.002*	0.865	0.260	3.9^{a}	3.3^{b}	3.4^{a}	3.6^{a}	3.6^{a}	3.6^{a}
		Health	<0.0001*	0.190	0.003*	4.1^{a}	3.5^{b}	3.9^{ab}	3.6^{b}	3.8^{ab}	3.9^{a}

		Convenience	0.567	0.291	0.199	3.4^{a}	3.3^{a}	3.2^{a}	3.2^{a}	3.6^{a}	3.5^{a}
		Pleasure	0.578	0.518	0.637	3.3^{a}	3.1^{a}	3.3^{a}	3.4^{a}	2.8^{a}	3.3^{a}
		Trad.eating	0.371	0.943	0.668	3.3^{a}	3^{a}	3.2^{a}	3.2^{a}	3.2^{a}	2.9^{a}
		Nat.concern	0.004*	0.543	0.909	4^{a}	3.5^{b}	3.8^{a}	3.8^{a}	3.5^{a}	3.8^{a}
		Sociability	0.001*	0.853	0.688	4.4^{a}	2.9^{b}	3.7^{a}	3.8^{a}	3.8^{a}	3.3^{a}
		Price	0.203	0.285	0.195	3.3^{a}	2.9^{a}	3^{a}	3.3^{a}	3.4^{a}	2.5^{a}
		Visual app	0.001*	0.274	0.017*	4.1^{a}	3^{b}	3.1^{a}	3.7^{a}	3.5^{a}	3.9^{a}
		Wt.control	0.026*	0.408	0.563	3.7^{a}	3.3^{b}	3.6^{a}	3.7^{a}	3.4^{a}	3.3^{a}
		Affect regul.	0.312	0.127	0.396	3.2^{a}	2.6^{a}	3^{a}	3.6^{a}	3.4^{a}	1.6^{a}
		Social norms	0.000*	0.792	0.676	4^{a}	2.9^{b}	3.4^{a}	3.7^{a}	3.2^{a}	3.4^{a}
		Social image	0.036*	0.893	0.608	3.9^{a}	3^{b}	3.3^{a}	3.5^{a}	3.6^{a}	3.3^{a}
		Choice limit	0.726	0.106	0.235	2.8^{a}	3^{a}	3.4^{a}	2.9^{a}	3.5^{a}	1.8^{a}

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Fruits	India	Liking	<0.0001*	0.760	0.603	4.3^{a}	3.8^{b}	4^{a}	4.1^{a}	4^{a}	4^{a}
		Habits	0.004*	0.978	0.211	4.2^{a}	3.8^{b}	3.9^{a}	4^{a}	4^{a}	4^{a}
		Need/Hunger	0.001*	0.383	0.603	4.2^{a}	3.8^{b}	3.9^{a}	4.1^{a}	4^{a}	3.9^{a}
		Health	<0.0001*	0.399	0.499	4.5^{a}	3.9^{b}	4.1^{a}	4.2^{a}	4.2^{a}	4.3^{a}
		Convenience	0.069	0.636	0.059	3.8^{a}	3.4^{a}	3.7^{a}	3.5^{a}	3.8^{a}	3.5^{a}
		Pleasure	0.010*	0.242	0.344	4.1^{a}	3.7^{b}	3.8^{a}	4.1^{a}	4^{a}	3.8^{a}
		Trad.eating	0.003*	0.993	0.033*	4^{a}	3.5^{b}	3.7^{a}	3.8^{a}	3.8^{a}	3.7^{a}
		Nat.concern	<0.0001*	0.117	0.276	4.4^{a}	3.9^{b}	4.1^{ab}	4.3^{a}	4.1^{b}	4.2^{ab}

		Sociability	0.016*	0.431	0.298	3.7^{a}	3.1^{b}	3.7^{a}	3.2^{a}	3.3^{a}	3.5^{a}
		Price	<0.0001*	0.671	0.375	3.9^{a}	3.2^{b}	3.7^{a}	3.4^{a}	3.5^{a}	3.5^{a}
		Visual app	0.000*	0.848	0.445	4.1^{a}	3.4^{b}	3.8^{a}	3.6^{a}	3.7^{a}	3.8^{a}
		Wt.control	<0.0001*	0.850	0.263	4.3^{a}	3.5^{b}	3.8^{a}	3.9^{a}	4^{a}	3.9^{a}
		Affect regul.	0.522	0.016*	0.008*	2.7^{a}	2.9^{a}	3.6^{a}	2.7^{b}	2.5^{b}	2.5^{b}
		Social norms	0.662	0.143	0.131	3.2^{a}	3^{a}	3.5^{a}	2.7^{b}	3.2^{ab}	3^{ab}
		Social image	0.152	0.331	0.016*	3.4^{a}	3.1^{a}	3.5^{a}	3.4^{a}	2.8^{a}	3.3^{a}
		Choice limit	0.029*	0.984	0.369	3.9^{a}	3.4^{b}	3.7^{a}	3.7^{a}	3.6^{a}	3.7^{a}

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Fruits	Spain	Liking	0.002*	0.055	<0.0001*	4.2^{a}	4^{b}	4.1^{ab}	4.2^{a}	4^{b}	4.2^{a}
		Habits	0.201	0.095	0.332	3.6^{a}	3.4^{a}	3.6^{ab}	3.8^{a}	3.2^{b}	3.4^{ab}
		Need/Hunger	0.051	0.001*	0.870	4^{a}	3.8^{a}	3.9^{a}	4.1^{a}	3.5^{b}	4^{a}
		Health	<0.0001*	0.003*	0.412	4.3^{a}	3.8^{b}	4.1^{ab}	4.2^{a}	3.8^{c}	3.9^{bc}
		Convenience	<0.0001*	0.228	0.774	4.1^{a}	3.4^{b}	3.6^{a}	4.1^{a}	3.6^{a}	3.8^{a}
		Pleasure	<0.0001*	0.170	0.497	4.1^{a}	3.6^{b}	3.7^{ab}	4^{a}	3.7^{b}	3.9^{ab}
		Trad.eating	<0.0001*	0.648	0.571	4^{a}	2.9^{b}	3.6^{a}	3.6^{a}	3.3^{a}	3.4^{a}
		Nat.concern	0.000*	0.091	0.467	4.3^{a}	3.7^{b}	4.1^{a}	4.1^{a}	3.7^{b}	4.1^{ab}
		Sociability	0.001*	0.590	0.493	3.8^{a}	2.2^{b}	3^{a}	3.3^{a}	2.7^{a}	3^{a}
		Price	0.000*	0.606	0.854	3.9^{a}	2.7^{b}	2.9^{a}	3.6^{a}	3.3^{a}	3.5^{a}
		Visual app	0.002*	0.979	0.937	4.1^{a}	2.7^{b}	3.3^{a}	3.5^{a}	3.5^{a}	3.4^{a}

		Wt.control	<0.0001*	0.751	0.796	4^{a}	3^{b}	3.6^{a}	3.6^{a}	3.5^{a}	3.3^{a}
		Affect regul.	0.281	0.017*	0.064	2.6^{a}	2^{a}	1.4^{b}	3.2^{a}	3.1^{a}	1.5^{b}
		Social norms	0.002*	0.782	0.391	3.9^{a}	2.4^{b}	3.6^{a}	2.8^{a}	3^{a}	3.3^{a}
		Social image	0.003*	0.186	0.074	3.6^{a}	2^{b}	3.1^{a}	3.2^{a}	1.6^{a}	3.3^{a}
		Choice limit	0.033*	0.991	0.963	3.8^{a}	2.8^{b}	3.2^{a}	3.2^{a}	3.3^{a}	3.4^{a}

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Fruits	USA	Liking	0.003*	0.001*	0.015*	4.2^{a}	3.9^{b}	3.9^{b}	4.2^{a}	3.9^{b}	4.3^{a}
		Habits	0.023*	<0.0001*	0.289	3.8^{a}	3.4^{b}	2.9^{b}	3.7^{a}	3.9^{a}	3.8^{a}
		Need/Hunger	0.268	0.015*	0.522	3.9^{a}	3.7^{a}	3.5^{b}	3.9^{a}	3.7^{ab}	4^{a}
		Health	<0.0001*	0.000*	0.531	4.3^{a}	3.5^{b}	3.5^{b}	4^{a}	4.2^{a}	4^{a}
		Convenience	0.528	0.001*	0.036*	3.8^{a}	3.7^{a}	3.3^{b}	4.1^{a}	3.6^{ab}	3.9^{a}
		Pleasure	<0.0001*	0.021*	0.584	4.1^{a}	3.4^{b}	3.4^{b}	4^{a}	3.9^{ab}	3.8^{ab}
		Trad.eating	0.010*	0.000*	0.510	3.5^{a}	2.7^{b}	2.2^{b}	3.3^{a}	3.7^{a}	3.1^{a}
		Nat.concern	<0.0001*	0.043*	0.282	4.2^{a}	3.4^{b}	3.3^{b}	3.9^{a}	3.9^{a}	4^{a}
		Sociability	0.553	0.007*	0.140	2.8^{a}	2.4^{a}	1.3^{b}	4^{a}	1.8^{b}	3.5^{a}
		Price	0.000*	0.009*	0.712	4.1^{a}	3.1^{b}	3.1^{b}	4.2^{a}	3.3^{b}	3.7^{ab}
		Visual app	0.003*	0.448	0.316	3.9^{a}	2.8^{b}	2.9^{a}	3.4^{a}	3.5^{a}	3.7^{a}
		Wt.control	<0.0001*	0.003*	0.357	4.1^{a}	3.2^{b}	3.1^{b}	3.8^{a}	3.9^{a}	3.7^{a}
		Affect regul.	0.104	0.020*	0.264	3.3^{a}	2.3^{a}	1.1^{b}	2.9^{a}	3.3^{a}	3.8^{a}
		Social norms	0.001*	0.261	0.907	4.2^{a}	2.5^{b}	2.3^{a}	3.9^{a}	3.5^{a}	3.9^{a}

		Social image	0.003*	0.203	0.646	3.8^{a}	2.4^{b}	2.6^{b}	3.4^{ab}	2.8^{ab}	3.6^{a}
		Choice limit	0.691	0.042*	0.144	3.1^{a}	2.9^{a}	2.6^{b}	3.5^{ab}	2.1^{b}	3.7^{a}

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Protein-rich foods	Brazil	Liking	0.054	0.553	0.060	4.3^{a}	4.2^{a}	4.2^{a}	4.3^{a}	4.2^{a}	4.2^{a}
		Habits	0.266	0.062	0.033*	3.8^{a}	3.9^{a}	3.7^{b}	3.9^{ab}	4^{a}	3.8^{ab}
		Need/Hunger	<0.0001*	0.583	0.428	4.3^{a}	3.9^{b}	4^{a}	4.1^{a}	4.1^{a}	4.1^{a}
		Health	<0.0001*	0.980	0.305	4.5^{a}	3.6^{b}	4.1^{a}	4.1^{a}	4^{a}	4^{a}
		Convenience	0.000*	0.457	0.765	3.9^{a}	3.1^{b}	3.3^{a}	3.7^{a}	3.4^{a}	3.5^{a}
		Pleasure	<0.0001*	0.733	0.545	4^{a}	3.2^{b}	3.5^{a}	3.8^{a}	3.5^{a}	3.6^{a}
		Trad.eating	<0.0001*	0.754	0.826	3.8^{a}	2.8^{b}	3.1^{a}	3.3^{a}	3.3^{a}	3.4^{a}
		Nat.concern	<0.0001*	0.718	0.934	4.4^{a}	3.5^{b}	4^{a}	4.1^{a}	3.8^{a}	4^{a}
		Sociability	0.000*	0.629	0.795	4.1^{a}	2.6^{b}	2.9^{a}	3.2^{a}	3.5^{a}	3.7^{a}

		Price	<0.0001*	0.659	0.910	4.1^{a}	2.9^{b}	3.2^{a}	3.5^{a}	3.5^{a}	3.7^{a}
		Visual app	0.002*	0.516	0.625	3.8^{a}	2.3^{b}	2.7^{a}	3.4^{a}	3.2^{a}	3^{a}
		Wt.control	<0.0001*	0.825	0.958	4.3^{a}	3^{b}	3.7^{a}	3.8^{a}	3.6^{a}	3.5^{a}
		Affect regul.	0.256	0.987	0.987	1.0^{a}	1.7^{a}	1.2^{a}	1.3^{a}	1.4^{a}	1.4^{a}
		Social norms	<0.0001*	0.488	0.988	3.8^{a}	2.5^{b}	2.7^{a}	3.2^{a}	3.2^{a}	3.4^{a}
		Social image	0.000*	0.542	0.223	3.8^{a}	1.9^{b}	3.2^{a}	3.2^{a}	3^{a}	2.1^{a}
		Choice limit	<0.0001*	0.354	0.385	3.9^{a}	2.9^{b}	3.2^{a}	3.6^{a}	3.7^{a}	3.3^{a}

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Protein-rich foods	China	Liking	<0.0001*	0.026*	0.023*	4^{a}	3.6^{b}	3.7^{b}	3.8^{b}	4.1^{a}	3.8^{b}
		Habits	0.402	0.966	0.430	3.4^{a}	3.3^{a}	3.3^{a}	3.4^{a}	3.4^{a}	3.3^{a}
		Need/Hunger	0.001*	0.436	0.282	3.9^{a}	3.4^{b}	3.6^{a}	3.6^{a}	3.9^{a}	3.6^{a}
		Health	<0.0001*	0.980	0.279	4^{a}	3.1^{b}	3.6^{a}	3.5^{a}	3.6^{a}	3.4^{a}
		Convenience	0.122	0.047*	0.500	3.4^{a}	2.8^{a}	3.5^{a}	3.2^{a}	3.3^{a}	2.3^{b}
		Pleasure	0.004*	0.745	0.211	3.7^{a}	3.3^{b}	3.6^{a}	3.4^{a}	3.5^{a}	3.6^{a}
		Trad.eating	0.275	0.735	0.394	3.3^{a}	3.1^{a}	3.1^{a}	3.4^{a}	3.1^{a}	3.2^{a}
		Nat.concern	0.014*	0.538	0.599	4.3^{a}	3.2^{b}	3.4^{a}	4^{a}	4^{a}	3.4^{a}
		Sociability	0.011*	0.232	0.653	3.8^{a}	3^{b}	3.9^{a}	3.4^{a}	3.3^{a}	3^{a}
		Price	0.333	0.447	0.653	3.2^{a}	2.7^{a}	2.8^{a}	3.5^{a}	2.9^{a}	2.6^{a}
		Visual app	0.006*	0.781	0.515	3.8^{a}	3^{b}	3.5^{a}	3.3^{a}	3.6^{a}	3.3^{a}
		Wt.control	0.872	0.037*	0.186	2.7^{a}	2.7^{a}	3.4^{a}	2.5^{ab}	3.3^{a}	1.6^{b}

		Affect regul.	0.315	0.114	0.354	2.0^{a}	2.5^{a}	3.0^{a}	2.6^{a}	1.8^{a}	1.5^{a}
		Social norms	0.074	0.903	0.529	3.6^{a}	2.9^{a}	3.1^{a}	3.3^{a}	3.3^{a}	3.2^{a}
		Social image	0.032*	0.795	0.795	3.7^{a}	2.9^{b}	3.5^{a}	3.2^{a}	3.2^{a}	3.2^{a}
		Choice limit	0.783	0.109	0.676	2.8^{a}	2.9^{a}	3.3^{a}	3.3^{a}	3.2^{a}	1.7^{a}

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Protein-rich foods	India	Liking	<0.0001*	0.056	0.711	4.3^{a}	3.8^{b}	4^{ab}	4.1^{a}	3.8^{b}	4.2^{a}
		Habits	0.018*	0.109	0.280	4.2^{a}	3.9^{b}	4.1^{a}	4.1^{ab}	3.7^{b}	4.2^{a}
		Need/Hunger	<0.0001*	0.237	0.561	4.3^{a}	3.7^{b}	3.9^{a}	4.1^{a}	3.9^{a}	4.1^{a}
		Health	<0.0001*	0.030*	0.781	4.5^{a}	3.9^{b}	4.1^{bc}	4.3^{ab}	4.1^{c}	4.3^{a}
		Convenience	0.142	0.761	0.197	3.9^{a}	3.6^{a}	3.8^{a}	3.9^{a}	3.8^{a}	3.6^{a}
		Pleasure	0.001*	0.452	0.385	4.2^{a}	3.7^{b}	3.9^{a}	4^{a}	3.8^{a}	4.1^{a}
		Trad.eating	<0.0001*	0.367	0.603	4.2^{a}	3.6^{b}	3.9^{a}	3.9^{a}	3.7^{a}	4^{a}
		Nat.concern	<0.0001*	0.815	0.077	4.4^{a}	3.9^{b}	4.1^{a}	4.2^{a}	4.1^{a}	4.1^{a}
		Sociability	0.030*	0.427	0.026*	4.1^{a}	3.2^{b}	3.8^{a}	3.9^{a}	3.5^{a}	3.4^{a}
		Price	0.001*	0.459	0.006*	3.9^{a}	3.1^{b}	3.6^{a}	3.7^{a}	3.5^{a}	3.2^{a}
		Visual app	0.003*	0.926	0.320	4^{a}	3.4^{b}	3.6^{a}	3.8^{a}	3.7^{a}	3.7^{a}
		Wt.control	<0.0001*	0.559	0.014*	4.3^{a}	3.5^{b}	3.8^{a}	4^{a}	3.8^{a}	4^{a}
		Affect regul.	0.063	0.211	0.005*	3.6^{a}	2.8^{a}	3.5^{a}	3.6^{a}	2.9^{a}	2.8^{a}
		Social norms	0.001*	0.476	0.042*	4^{a}	2.9^{b}	3.7^{a}	3.5^{a}	3.4^{a}	3.2^{a}
		Social image	0.036*	0.416	0.012*	3.8^{a}	3^{b}	3.6^{a}	3.6^{a}	3.4^{a}	3^{a}

		Choice limit	<0.0001*	0.478	0.659	4.2^{a}	3.4^{b}	3.7^{a}	3.9^{a}	3.6^{a}	3.9^{a}

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Protein-rich foods	Spain	Liking	0.076	0.009*	0.056	4.1^{a}	4^{a}	4.1^{a}	4.2^{a}	3.9^{b}	4.1^{a}
		Habits	0.021*	0.898	0.460	3.6^{a}	3.3^{b}	3.4^{a}	3.4^{a}	3.4^{a}	3.5^{a}
		Need/Hunger	0.000*	0.535	0.356	4^{a}	3.5^{b}	3.8^{a}	3.7^{a}	3.6^{a}	3.9^{a}
		Health	<0.0001*	0.044*	0.639	4.2^{a}	3.3^{b}	3.9^{a}	3.8^{a}	3.4^{b}	3.7^{ab}
		Convenience	<0.0001*	0.128	0.227	4^{a}	3.2^{b}	3.7^{ab}	3.6^{ab}	3.4^{b}	3.9^{a}
		Pleasure	<0.0001*	0.124	0.500	4.2^{a}	3.7^{b}	4^{ab}	4.1^{a}	3.8^{b}	4^{ab}
		Trad.eating	0.000*	0.049*	0.481	3.6^{a}	3.2^{b}	3.4^{ab}	3.5^{ab}	3.1^{b}	3.7^{a}
		Nat.concern	<0.0001*	0.442	0.558	4.2^{a}	3.4^{b}	4^{a}	3.9^{a}	3.7^{a}	3.7^{a}
		Sociability	<0.0001*	0.258	0.338	4^{a}	2.8^{b}	3.6^{a}	3.5^{a}	3^{a}	3.6^{a}
		Price	0.013*	0.054	0.152	3.5^{a}	2.5^{b}	1.6^{b}	3.6^{a}	3.3^{a}	3.5^{a}
		Visual app	<0.0001*	0.176	0.500	3.8^{a}	2.7^{b}	3.1^{a}	3.4^{a}	2.9^{a}	3.5^{a}
		Wt.control	<0.0001*	0.752	0.563	4.1^{a}	2.7^{b}	3.5^{a}	3.5^{a}	3.2^{a}	3.5^{a}
		Affect regul.	0.001*	0.032*	0.108	3.7^{a}	2^{b}	1.3^{b}	3.4^{a}	3.1^{a}	3.5^{a}
		Social norms	0.007*	0.040*	0.125	3.7^{a}	2.4^{b}	3.2^{a}	3.6^{a}	3.8^{a}	1.6^{b}
		Social image	<0.0001*	0.076	0.046*	4^{a}	2.3^{b}	3.1^{ab}	3.5^{a}	2.4^{b}	3.4^{ab}
		Choice limit	<0.0001*	0.715	0.822	4.1^{a}	2.8^{b}	3.5^{a}	3.6^{a}	3.4^{a}	3.2^{a}

			p-values			Means†					
			Sources of variance			Question format		Age group			

Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Protein-rich foods	USA	Liking	0.004*	0.488	0.182	4.2^{a}	4^{b}	4.2^{a}	4.2^{a}	4^{a}	4.1^{a}
		Habits	0.144	0.001*	0.394	3.5^{a}	3.3^{a}	3^{b}	3.3^{a}	3.7^{a}	3.5^{a}
		Need/Hunger	0.000*	0.324	0.682	4^{a}	3.6^{b}	3.7^{a}	4^{a}	3.7^{a}	3.8^{a}
		Health	<0.0001*	0.154	0.901	4.5^{a}	2.6^{b}	3.1^{b}	3.8^{a}	3.6^{ab}	3.6^{ab}
		Convenience	0.023*	0.062	0.043*	3.6^{a}	3.3^{b}	3.2^{b}	3.5^{ab}	3.5^{ab}	3.7^{a}
		Pleasure	0.004*	0.829	0.898	4^{a}	3.7^{b}	3.8^{a}	3.9^{a}	3.8^{a}	3.9^{a}
		Trad.eating	<0.0001*	<0.0001*	0.249	3.7^{a}	2.9^{b}	2.7^{b}	3.2^{ab}	3.8^{a}	3.6^{a}
		Nat.concern	<0.0001*	0.686	0.585	4.3^{a}	2.7^{b}	3.3^{a}	3.9^{a}	3.3^{a}	3.6^{a}
		Sociability	<0.0001*	0.037*	0.766	4^{a}	2.6^{b}	2.6^{b}	3.7^{a}	3.4^{ab}	3.5^{a}
		Price	0.000*	0.263	0.396	3.9^{a}	3^{b}	3.3^{a}	3.1^{a}	3.9^{a}	3.5^{a}
		Visual app	0.004*	0.043*	0.314	3.7^{a}	2.8^{b}	2.7^{b}	3.1^{ab}	3.6^{ab}	3.7^{a}
		Wt.control	0.529	0.253	0.044*	2.8^{a}	2.4^{a}	2.9^{a}	3.3^{a}	1.8^{a}	2.3^{a}
		Affect regul.	0.002*	0.008*	0.290	3.9^{a}	2.1^{b}	1.1^{b}	3.6^{a}	3.8^{a}	3.5^{a}
		Social norms	0.105	0.141	0.148	3.2^{a}	2.4^{a}	2.8^{a}	1.8^{a}	3.5^{a}	3.2^{a}
		Social image	<0.0001*	0.039*	0.787	3.8^{a}	2.2^{b}	2.2^{b}	3.3^{a}	3.4^{a}	3^{ab}
		Choice limit	0.034*	0.020*	0.167	3.7^{a}	2.7^{b}	1.5^{b}	3.6^{a}	3.6^{a}	3.9^{a}

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Starch-rich foods	Brazil	Liking	0.000*	0.275	0.222	4.2^{a}	4.0^{b}	4.0^{a}	4.2^{a}	4.1^{a}	4.1^{a}
		Habits	0.019*	<0.0001*	0.001*	3.6^{b}	3.8^{a}	3.4^{c}	3.8^{ab}	3.9^{a}	3.7^{b}

		Need/Hunger	<0.0001*	0.058	0.356	4.3[a]	3.7[b]	3.8[b]	3.9[ab]	4.2[a]	3.9[ab]
		Health	<0.0001*	0.925	0.672	4.3[a]	3.2[b]	3.8[a]	3.8[a]	3.7[a]	3.7[a]
		Convenience	<0.0001*	0.278	0.070	4.0[a]	3.3[b]	3.6[a]	3.8[a]	3.7[a]	3.6[a]
		Pleasure	<0.0001*	0.973	0.093	4.0[a]	3.0[b]	3.5[a]	3.6[a]	3.5[a]	3.5[a]
		Trad.eating	<0.0001*	0.198	0.737	3.5[a]	2.8[b]	2.9[a]	3.2[a]	3.2[a]	3.1[a]
		Nat.concern	<0.0001*	0.726	0.784	4.5[a]	3.4[b]	3.9[a]	4.0[a]	3.8[a]	3.9[a]
		Sociability	<0.0001*	0.518	0.509	4.0[a]	2.7[b]	3.3[a]	3.4[a]	3.0[a]	3.7[a]
		Price	<0.0001*	0.419	0.982	4.1[a]	2.9[b]	3.2[a]	3.6[a]	3.5[a]	3.6[a]
		Visual app	<0.0001*	0.210	0.932	3.4[a]	2.2[b]	2.4[a]	3.0[a]	2.8[a]	3.1[a]
		Wt.control	<0.0001*	0.616	0.978	4.2[a]	2.9[b]	3.7[a]	3.7[a]	3.5[a]	3.4[a]
		Affect regul.	0.483	0.021*	0.026*	2.0[a]	1.6[a]	1.2[b]	3.3[a]	1.3[b]	1.4[b]
		Social norms	<0.0001*	0.803	0.246	3.8[a]	2.3[b]	3.3[a]	2.8[a]	3.0[a]	3.1[a]
		Social image	0.001*	0.411	0.436	3.1[a]	1.8[b]	2.2[a]	3.0[a]	2.1[a]	2.5[a]
		Choice limit	<0.0001*	0.998	0.229	3.9[a]	2.8[b]	3.4[a]	3.3[a]	3.3[a]	3.4[a]

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Starch-rich foods	China	Liking	0.067	0.302	0.003*	3.8[a]	3.6[a]	3.6[a]	3.7[a]	3.9[a]	3.7[a]
		Habits	0.056	0.562	0.177	3.5[a]	3.7[a]	3.6[a]	3.6[a]	3.7[a]	3.5[a]
		Need/Hunger	0.004*	0.492	0.175	3.9[a]	3.7[b]	3.7[a]	3.8[a]	3.9[a]	3.8[a]
		Health	<0.0001*	0.350	0.350	4.1[a]	3.4[b]	3.8[a]	3.7[a]	3.6[a]	3.9[a]
		Convenience	0.876	0.277	0.023*	3.4[a]	3.4[a]	3.3[a]	3.5[a]	3.5[a]	3.3[a]

		Pleasure	0.001*	0.462	0.025*	3.7^{a}	3^{b}	3.1^{a}	3.2^{a}	3.4^{a}	3.6^{a}
		Trad.eating	0.332	0.646	0.115	3.5^{a}	3.4^{a}	3.4^{a}	3.3^{a}	3.5^{a}	3.5^{a}
		Nat.concern	<0.0001*	0.134	0.121	4.1^{a}	3.5^{b}	3.6^{b}	4^{a}	3.8^{ab}	3.9^{ab}
		Sociability	0.004*	0.770	0.419	4.1^{a}	3^{b}	3.6^{a}	3.3^{a}	3.9^{a}	3.4^{a}
		Price	0.002*	0.535	0.206	3.6^{a}	2.9^{b}	3.1^{a}	3.3^{a}	3.5^{a}	3^{a}
		Visual app	0.052	0.991	0.514	3.7^{a}	3^{a}	3.3^{a}	3.3^{a}	3.4^{a}	3.4^{a}
		Wt.control	0.001*	0.578	0.133	3.8^{a}	3.1^{b}	3.5^{a}	3.6^{a}	3.3^{a}	3.6^{a}
		Affect regul.	0.396	0.929	0.280	2.5^{a}	2.2^{a}	2.4^{a}	2.4^{a}	2.1^{a}	2.5^{a}
		Social norms	0.011*	0.775	0.516	3.3^{a}	2.8^{b}	3^{a}	3.3^{a}	2.9^{a}	3^{a}
		Social image	0.014*	0.300	0.003*	3.5^{a}	2.8^{b}	3^{a}	3.1^{a}	3^{a}	3.5^{a}
		Choice limit	0.006*	0.879	0.545	3.6^{a}	3.1^{b}	3.3^{a}	3.4^{a}	3.3^{a}	3.2^{a}

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Starch-rich foods	India	Liking	<0.0001*	0.285	0.318	4.1^{a}	3.8^{b}	3.9^{a}	4.1^{a}	3.8^{a}	4^{a}
		Habits	0.183	0.665	0.552	3.9^{a}	3.8^{a}	3.9^{a}	3.9^{a}	3.8^{a}	3.9^{a}
		Need/Hunger	<0.0001*	0.392	0.192	4.1^{a}	3.6^{b}	3.9^{a}	4^{a}	3.7^{a}	3.8^{a}
		Health	<0.0001*	0.127	0.130	4.2^{a}	3.6^{b}	3.8^{b}	4.1^{a}	3.9^{ab}	4^{ab}
		Convenience	0.000*	0.376	0.512	4.1^{a}	3.8^{b}	3.9^{a}	3.8^{a}	3.9^{a}	4.1^{a}
		Pleasure	<0.0001*	0.273	0.769	4.2^{a}	3.6^{b}	3.9^{a}	3.9^{a}	3.8^{a}	4.1^{a}
		Trad.eating	<0.0001*	0.450	0.120	4^{a}	3.6^{b}	3.8^{a}	3.9^{a}	3.7^{a}	3.9^{a}
		Nat.concern	<0.0001*	0.034*	0.054	4.2^{a}	3.8^{b}	4^{b}	4.2^{a}	3.9^{b}	4^{ab}

		Sociability	0.001*	0.289	0.034*	3.8^{a}	3.3^{b}	3.7^{a}	3.7^{a}	3.4^{a}	3.5^{a}
		Price	0.000*	0.125	0.006*	3.8^{a}	3.1^{b}	3.7^{a}	3.6^{ab}	3.4^{ab}	3.1^{b}
		Visual app	<0.0001*	0.520	0.660	4^{a}	3.3^{b}	3.8^{a}	3.7^{a}	3.5^{a}	3.7^{a}
		Wt.control	<0.0001*	0.603	0.162	4.2^{a}	3.4^{b}	3.8^{a}	3.8^{a}	3.6^{a}	3.9^{a}
		Affect regul.	0.485	0.002*	0.000*	2.9^{a}	2.7^{a}	3.4^{a}	3^{ab}	2.6^{ab}	2.3^{b}
		Social norms	0.003*	0.025*	0.001*	3.6^{a}	2.9^{b}	3.7^{a}	3.4^{ab}	2.9^{b}	3^{b}
		Social image	0.008*	0.034*	0.017*	3.6^{a}	3^{b}	3.8^{a}	3.3^{b}	2.8^{b}	3.2^{b}
		Choice limit	0.003*	0.964	0.424	3.8^{a}	3.4^{b}	3.7^{a}	3.6^{a}	3.5^{a}	3.6^{a}

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Starch-rich foods	Spain	Liking	0.099	0.030*	0.739	4.1^{a}	4^{a}	4.1^{a}	4.1^{a}	3.9^{b}	4.1^{a}
		Habits	0.004*	0.536	0.343	3.3^{a}	3^{b}	3.1^{a}	3.1^{a}	3^{a}	3.2^{a}
		Need/Hunger	0.001*	0.660	0.575	3.9^{a}	3.6^{b}	3.7^{a}	3.8^{a}	3.7^{a}	3.8^{a}
		Health	<0.0001*	0.188	0.555	4^{a}	3^{b}	3.6^{a}	3.6^{ab}	3.3^{b}	3.5^{ab}
		Convenience	<0.0001*	0.624	0.718	3.7^{a}	2.7^{b}	3.1^{a}	3.3^{a}	3.2^{a}	3.1^{a}
		Pleasure	<0.0001*	0.003*	0.994	4^{a}	3.6^{b}	3.7^{ab}	4^{a}	3.5^{b}	3.9^{a}
		Trad.eating	<0.0001*	0.253	0.077	3.6^{a}	3.1^{b}	3.4^{a}	3.4^{a}	3.2^{a}	3.4^{a}
		Nat.concern	<0.0001*	0.181	0.430	4.3^{a}	3.3^{b}	3.9^{a}	3.9^{a}	3.6^{a}	3.7^{a}
		Sociability	<0.0001*	0.002*	0.461	3.7^{a}	2.9^{b}	3.6^{a}	3.5^{a}	2.9^{b}	3.4^{a}
		Price	<0.0001*	0.106	0.381	3.9^{a}	2.4^{b}	2.6^{b}	3.7^{a}	3.1^{ab}	3.2^{ab}
		Visual app	<0.0001*	0.661	0.837	3.6^{a}	2.6^{b}	3^{a}	3.3^{a}	3.1^{a}	3.1^{a}
		Wt.control	<0.0001*	0.644	0.989	4.1^{a}	2.6^{b}	3.3^{a}	3.5^{a}	3.2^{a}	3.3^{a}

		Affect regul.	0.141	0.024*	0.035*	2.6^{a}	1.8^{a}	1.3^{b}	1.4^{b}	3.2^{a}	2.9^{ab}
		Social norms	<0.0001*	0.898	0.991	3.6^{a}	2.3^{b}	2.8^{a}	3.2^{a}	2.9^{a}	2.9^{a}
		Social image	<0.0001*	0.301	0.435	3.7^{a}	2.1^{b}	2.9^{a}	3.3^{a}	2.6^{a}	2.8^{a}
		Choice limit	<0.0001*	0.259	0.582	3.9^{a}	2.3^{b}	2.5^{a}	3.6^{a}	3^{a}	3.3^{a}

			p-values			Means†					
			Sources of variance			Question format		Age group			
Food category	Country	Motivation	R	S	T	L	M	A	B	C	D
Starch-rich foods	USA	Liking	0.022*	0.012*	0.066	4.2^{a}	4^{b}	4^{bc}	4.2^{a}	3.9^{c}	4.2^{ab}
		Habits	0.645*	<0.0001*	0.893	3.3^{a}	3.2^{a}	2.8^{b}	3.5^{a}	3.3^{a}	3.4^{a}
		Need/Hunger	0.020*	0.015*	0.261	3.8^{a}	3.6^{b}	3.4^{b}	3.9^{a}	3.6^{ab}	3.9^{a}
		Health	<0.0001*	0.008*	0.900	4^{a}	2.9^{b}	3.2^{b}	3.8^{a}	3.3^{b}	3.6^{ab}
		Convenience	0.007*	0.001*	0.319	3.6^{a}	3.3^{b}	3.1^{c}	3.7^{ab}	3.3^{bc}	3.8^{a}
		Pleasure	<0.0001*	0.012*	0.429	4.2^{a}	3.4^{b}	3.5^{b}	4^{a}	3.6^{ab}	4^{a}
		Trad.eating	0.008*	<0.0001*	0.063	3.2^{a}	2.8^{b}	2.4^{b}	3.1^{a}	3.3^{a}	3.2^{a}
		Nat.concern	<0.0001*	0.029*	0.578	4.2^{a}	3.1^{b}	3.2^{b}	3.7^{ab}	3.7^{ab}	3.9^{a}
		Sociability	0.027*	0.002*	0.239	3.5^{a}	2.3^{b}	2^{b}	2.3^{ab}	3.7^{a}	3.6^{a}
		Price	<0.0001*	0.001*	0.163	3.9^{a}	3^{b}	2.9^{b}	3.9^{a}	3.3^{ab}	3.7^{a}
		Visual app	0.038*	0.021*	0.896	3.4^{a}	2.7^{b}	2.4^{b}	3.2^{a}	3.1^{ab}	3.4^{a}
		Wt.control	<0.0001*	0.027*	0.866	4^{a}	2.7^{b}	2.9^{b}	3.5^{a}	3.2^{ab}	3.6^{a}
		Affect regul.	0.006*	0.027*	0.459	3.5^{a}	2.0^{b}	1.1^{b}	3.4^{a}	3.2^{a}	3.4^{a}
		Social norms	<0.0001*	0.404	0.787	3.9^{a}	2.3^{b}	2.6^{a}	3.3^{a}	3.1^{a}	3.5^{a}
		Social image	0.002*	0.325	0.913	3.9^{a}	2.2^{b}	2.2^{a}	3.2^{a}	3.2^{a}	3.6^{a}

Choice limit	0.121	0.034*	0.355	3.3[a]	2.6[a]	1.9[b]	3.5[a]	2.6[ab]	3.7[a]

Appendix D

*p-values for sources of variation (Question format, Gender, and Question format*Gender interaction), and Least Squares mean scores for RATA and RATING question formats and genders (females and males) for the 16 constructs and for all five food categories and within all five countries.*

R, S, T = Type III Sum of Squares analysis *p*-values for Sources of variance i.e., R = Question format, S = Gender, and T = Question format*Gender interaction respectively; * *p*-values for Sources of variance were significantly different at (*p*

≤ 0.05); Least Squares Means assigned different lettering (superscripts) were significantly different; †Five-point scale; 1 = Not at All Important, 2 = Slightly Important, 3 = Moderately Important, 4 = Very Important, 5 = Extremely Important.

			p-values			Means†			
			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Dairy foods	Brazil	Liking	0.001*	0.870	0.847	4.4^{a}	4.1^{b}	4.2^{a}	4.2^{a}
		Habits	0.648	0.141	0.121	3.9^{a}	3.8^{a}	3.8^{a}	3.9^{a}
		Need/Hunger	<0.0001*	0.204	0.572	4.3^{a}	3.7^{b}	4.1^{a}	3.9^{a}
		Health	<0.0001*	0.879	0.861	4.6^{a}	3.6^{b}	4.1^{a}	4.1^{a}
		Convenience	0.001*	0.640	0.387	4.1^{a}	3.5^{b}	3.8^{a}	3.8^{a}
		Pleasure	<0.0001*	0.143	0.995	4.3^{a}	3.2^{b}	3.9^{a}	3.6^{a}
		Trad.eating	<0.0001*	0.779	0.191	3.9^{a}	2.8^{b}	3.3^{a}	3.4^{a}
		Nat.concern	0.003*	0.908	0.658	4.4^{a}	3.6^{b}	4^{a}	4^{a}
		Sociability	0.004*	0.989	0.745	4.1^{a}	2.5^{b}	3.3^{a}	3.3^{a}
		Price	0.000*	0.650	0.353	4^{a}	2.9^{b}	3.4^{a}	3.5^{a}
		Visual app	0.109	0.115	0.093	3.3^{a}	2.3^{a}	2.4^{a}	3.3^{a}
		Wt.control	0.001*	0.206	0.324	3.9^{a}	3.1^{b}	3.3^{a}	3.7^{a}
		Affect regul.	0.400	0.952	0.952	1^{a}	1.8^{a}	1.4^{a}	1.4^{a}
		Social norms	<0.0001*	0.996	0.751	4.1^{a}	2.5^{b}	3.3^{a}	3.3^{a}
		Social image	<0.0001*	0.813	0.864	4.4^{a}	1.9^{b}	3.2^{a}	3.1^{a}
		Choice limit	<0.0001*	0.485	0.757	4.2^{a}	2.8^{b}	3.7^{a}	3.4^{a}

			p-values			Means†			
			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Dairy foods	China	Liking	0.092	0.402	0.220	3.8^{a}	3.6^{a}	3.7^{a}	3.7^{a}
		Habits	0.573	0.409	0.959	3.6^{a}	3.5^{a}	3.6^{a}	3.5^{a}
		Need/Hunger	0.268	0.293	0.275	3.6^{a}	3.3^{a}	3.6^{a}	3.3^{a}
		Health	<0.0001*	0.101	0.191	4.1^{a}	3.6^{b}	3.9^{a}	3.7^{a}
		Convenience	0.079	0.604	0.264	3.6^{a}	3.3^{a}	3.5^{a}	3.4^{a}
		Pleasure	0.034*	0.980	0.372	3.8^{a}	3.2^{b}	3.5^{a}	3.5^{a}
		Trad.eating	0.007*	0.788	0.383	3.7^{a}	3.1^{b}	3.4^{a}	3.4^{a}

		Nat.concern	0.052	0.202	0.377	3.9^{a}	3.6^{a}	3.8^{a}	3.6^{a}
		Sociability	0.009*	0.928	0.208	3.9^{a}	2.9^{b}	3.4^{a}	3.4^{a}
		Price	0.485	0.381	0.569	3^{a}	2.9^{a}	3.1^{a}	2.8^{a}
		Visual app	0.007*	0.680	0.064	3.9^{a}	3.1^{b}	3.4^{a}	3.5^{a}
		Wt.control	0.006*	0.665	0.086	3.8^{a}	3.3^{b}	3.5^{a}	3.5^{a}
		Affect regul.	0.054	0.936	0.899	3.5^{a}	2.5^{a}	3^{a}	3^{a}
		Social norms	0.021*	0.517	0.797	3.7^{a}	2.9^{b}	3.4^{a}	3.2^{a}
		Social image	0.016*	0.845	0.464	3.7^{a}	2.9^{b}	3.4^{a}	3.3^{a}
		Choice limit	0.093	0.975	0.328	3.6^{a}	3.1^{a}	3.3^{a}	3.3^{a}

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Dairy foods	India	Liking	<0.0001*	0.007*	0.057	4.3^{a}	3.8^{b}	4.2^{a}	3.9^{b}
		Habits	0.081	0.028*	0.458	4.2^{a}	4^{a}	4.2^{a}	3.9^{b}
		Need/Hunger	0.000*	0.495	0.104	4.3^{a}	3.8^{b}	4.1^{a}	4^{a}
		Health	0.000*	0.200	0.002*	4.4^{a}	4.1^{b}	4.3^{a}	4.2^{a}
		Convenience	0.103	0.418	0.033*	4^{a}	3.8^{a}	4^{a}	3.8^{a}
		Pleasure	0.024*	0.025*	0.222	4.2^{a}	3.9^{b}	4.2^{a}	3.9^{b}
		Trad.eating	0.004*	0.114	0.382	4.1^{a}	3.7^{b}	4^{a}	3.8^{a}
		Nat.concern	0.000*	0.090	0.815	4.4^{a}	4^{b}	4.3^{a}	4.1^{a}
		Sociability	0.005*	0.618	0.365	3.9^{a}	3.2^{b}	3.6^{a}	3.5^{a}
		Price	0.007*	0.979	0.130	3.8^{a}	3.2^{b}	3.5^{a}	3.5^{a}
		Visual app	0.000*	0.631	0.129	4.2^{a}	3.5^{b}	3.9^{a}	3.8^{a}
		Wt.control	<0.0001*	0.809	0.051	4.3^{a}	3.6^{b}	4^{a}	3.9^{a}
		Affect regul.	0.185	0.224	0.705	3.4^{a}	2.9^{a}	3.4^{a}	2.9^{a}
		Social norms	0.144	0.887	0.404	3.5^{a}	3.1^{a}	3.3^{a}	3.3^{a}
		Social image	0.002*	0.792	0.263	3.9^{a}	3.1^{b}	3.5^{a}	3.4^{a}
		Choice limit	0.010*	0.335	0.149	4.2^{a}	3.6^{b}	4^{a}	3.8^{a}

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Dairy foods	Spain	Liking	0.000*	0.547	0.508	4.1^{a}	3.8^{b}	3.9^{a}	3.9^{a}

		Habits	0.087	0.039*	0.372	3.6^{a}	3.4^{a}	3.4^{b}	3.6^{a}
		Need/Hunger	<0.0001*	0.796	0.208	4.1^{a}	3.4^{b}	3.8^{a}	3.7^{a}
		Health	<0.0001*	0.888	0.951	4.2^{a}	3.3^{b}	3.8^{a}	3.8^{a}
		Convenience	<0.0001*	0.216	0.538	3.9^{a}	3.2^{b}	3.5^{a}	3.7^{a}
		Pleasure	<0.0001*	0.585	0.305	4^{a}	3.2^{b}	3.5^{a}	3.6^{a}
		Trad.eating	<0.0001*	0.018*	0.320	3.8^{a}	3^{b}	3.2^{b}	3.6^{a}
		Nat.concern	<0.0001*	0.596	0.956	4.3^{a}	3.4^{b}	3.9^{a}	3.8^{a}
		Sociability	0.003*	0.600	0.405	4.5^{a}	2.3^{b}	3.6^{a}	3.2^{a}
		Price	<0.0001*	0.393	0.920	4.1^{a}	2.6^{b}	3.2^{a}	3.5^{a}
		Visual app	0.007*	0.251	0.598	4^{a}	2.5^{b}	2.9^{a}	3.5^{a}
		Wt.control	<0.0001*	0.738	0.643	4.2^{a}	2.9^{b}	3.5^{a}	3.6^{a}
		Affect regul.	0.007*	0.134	0.391	3.7^{a}	2.1^{b}	2.4^{a}	3.3^{a}
		Social norms	<0.0001*	0.184	0.816	3.8^{a}	2.4^{b}	2.9^{a}	3.3^{a}
		Social image	0.002*	0.348	0.986	3.8^{a}	2.1^{b}	2.7^{a}	3.2^{a}
		Choice limit	<0.0001*	0.297	0.946	4^{a}	2.8^{b}	3.2^{a}	3.5^{a}

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Dairy foods	USA	Liking	<0.0001*	0.695	0.839	4.1^{a}	3.7^{b}	3.9^{a}	3.9^{a}
		Habits	0.501	0.112	0.827	3.3^{a}	3.4^{a}	3.2^{a}	3.4^{a}
		Need/Hunger	0.000*	0.658	0.569	4.1^{a}	3.4^{b}	3.7^{a}	3.8^{a}
		Health	<0.0001*	0.189	0.837	4.3^{a}	2.9^{b}	3.4^{a}	3.8^{a}
		Convenience	0.076	0.233	0.264	3.8^{a}	3.4^{a}	3.4^{a}	3.7^{a}
		Pleasure	0.000*	0.815	0.492	4^{a}	3.4^{b}	3.7^{a}	3.7^{a}
		Trad.eating	0.220	0.010*	0.424	3.2^{a}	2.9^{a}	2.8^{b}	3.4^{a}
		Nat.concern	0.053	0.665	0.810	4.1^{a}	2.9^{a}	3.4^{a}	3.6^{a}
		Sociability	0.009*	0.203	0.774	3.9^{a}	2.5^{b}	2.9^{a}	3.6^{a}
		Price	0.000*	0.690	0.547	4^{a}	3.1^{b}	3.6^{a}	3.5^{a}
		Visual app	0.001*	0.408	0.913	4.1^{a}	2.8^{b}	3.3^{a}	3.6^{a}
		Wt.control	0.001*	0.792	0.384	4.7^{a}	2.7^{b}	3.7^{a}	3.6^{a}
		Affect regul.	0.244	0.885	0.475	3.3^{a}	2.2^{a}	2.7^{a}	2.8^{a}
		Social norms	0.005*	0.739	0.445	4.1^{a}	2.5^{b}	3.2^{a}	3.4^{a}
		Social image	<0.0001*	0.142	0.883	4.2^{a}	2.4^{b}	2.9^{a}	3.6^{a}

		Choice limit	0.006*	0.181	0.604	4^{a}	2.8^{b}	3.1^{a}	3.7^{a}

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Desserts	Brazil	Liking	0.142	0.016*	0.209	4.3^{a}	4.2^{a}	4.3^{a}	4.1^{b}
		Habits	0.065	0.909	0.826	3.8^{a}	3.4^{a}	3.7^{a}	3.6^{a}
		Need/Hunger	<0.0001*	0.749	0.519	4.3^{a}	3.1^{b}	3.7^{a}	3.6^{a}
		Health	<0.0001*	0.561	0.787	4.4^{a}	2.3^{b}	3.2^{a}	3.5^{a}
		Convenience	<0.0001*	0.593	0.551	4.3^{a}	3^{b}	3.6^{a}	3.7^{a}
		Pleasure	0.042*	0.560	0.277	3.9^{a}	3.5^{b}	3.7^{a}	3.6^{a}
		Trad.eating	0.000*	0.482	0.570	3.7^{a}	2.8^{b}	3.1^{a}	3.3^{a}
		Nat.concern	<0.0001*	0.308	0.763	4.6^{a}	2.3^{b}	3.2^{a}	3.8^{a}
		Sociability	<0.0001*	0.823	0.722	4^{a}	3^{b}	3.5^{a}	3.5^{a}
		Price	0.001*	0.370	0.699	4.3^{a}	2.6^{b}	3.2^{a}	3.7^{a}
		Visual app	0.005*	0.801	0.472	3.8^{a}	2.9^{b}	3.4^{a}	3.3^{a}
		Wt.control	0.006*	0.433	0.708	4.5^{a}	2.1^{b}	3^{a}	3.7^{a}
		Affect regul.	<0.0001*	0.227	0.650	3.8^{a}	2.4^{b}	3.3^{a}	2.9^{a}
		Social norms	0.859	0.208	0.107	2.5^{a}	2.3^{a}	3.1^{a}	1.8^{a}
		Social image	0.004*	0.425	0.690	4.5^{a}	2.1^{b}	3^{a}	3.6^{a}
		Choice limit	0.000*	0.521	0.655	4.7^{a}	2.5^{b}	3.4^{a}	3.8^{a}

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Desserts	China	Liking	0.005*	0.298	0.060	3.9^{a}	3.4^{b}	3.5^{a}	3.7^{a}
		Habits	0.541	0.314	0.788	3.2^{a}	3.4^{a}	3.4^{a}	3.2^{a}
		Need/Hunger	0.004*	0.120	0.706	4^{a}	3.4^{b}	3.9^{a}	3.6^{a}
		Health	0.016*	0.505	0.792	3.9^{a}	3.1^{b}	3.6^{a}	3.4^{a}
		Convenience	0.626	0.914	0.583	3.4^{a}	3.2^{a}	3.3^{a}	3.3^{a}
		Pleasure	0.001*	0.703	0.558	4.2^{a}	3.3^{b}	3.7^{a}	3.8^{a}
		Trad.eating	0.993	0.866	0.605	3.2^{a}	3.2^{a}	3.2^{a}	3.2^{a}
		Nat.concern	0.139	0.477	0.252	4.1^{a}	3.3^{a}	3.5^{a}	3.9^{a}
		Sociability	0.183	0.936	0.962	3.7^{a}	3.2^{a}	3.4^{a}	3.5^{a}
		Price	0.198	0.885	0.373	3.5^{a}	3^{a}	3.3^{a}	3.3^{a}

		Visual app	0.000*	0.294	0.377	4.4^{a}	3.1^{b}	3.9^{a}	3.6^{a}
		Wt.control	0.220	0.552	0.191	3.5^{a}	3.1^{a}	3.2^{a}	3.4^{a}
		Affect regul.	0.360	0.874	0.323	3.4^{a}	3.1^{a}	3.2^{a}	3.3^{a}
		Social norms	0.066	0.986	0.986	4^{a}	3.2^{a}	3.6^{a}	3.6^{a}
		Social image	0.028*	0.519	0.924	3.9^{a}	3.1^{b}	3.6^{a}	3.4^{a}
		Choice limit	0.107	0.738	0.798	3.9^{a}	3.2^{a}	3.5^{a}	3.6^{a}

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Desserts	India	Liking	<0.0001*	0.041*	0.085	4.2^{a}	3.7^{b}	4^{a}	3.8^{b}
		Habits	0.002*	0.015*	0.248	4.1^{a}	3.7^{b}	4.1^{a}	3.8^{b}
		Need/Hunger	<0.0001*	0.339	0.014*	4.1^{a}	3.4^{b}	3.8^{a}	3.7^{a}
		Health	<0.0001*	0.287	0.000*	4.1^{a}	3.2^{b}	3.6^{a}	3.8^{a}
		Convenience	0.010*	0.025*	0.030*	3.7^{a}	3.2^{b}	3.7^{a}	3.2^{b}
		Pleasure	0.000*	0.118	0.017*	4.2^{a}	3.7^{b}	4^{a}	3.8^{a}
		Trad.eating	0.000*	0.132	0.051	4.1^{a}	3.4^{b}	3.9^{a}	3.6^{a}
		Nat.concern	<0.0001*	0.793	0.029*	4.3^{a}	3.2^{b}	3.8^{a}	3.7^{a}
		Sociability	0.004*	0.985	0.000*	3.8^{a}	3.3^{b}	3.6^{a}	3.6^{a}
		Price	0.000*	0.347	0.024*	4^{a}	3^{b}	3.6^{a}	3.4^{a}
		Visual app	<0.0001*	0.479	0.002*	4.2^{a}	3.5^{b}	3.9^{a}	3.8^{a}
		Wt.control	0.001*	0.405	0.036*	3.9^{a}	3.1^{b}	3.6^{a}	3.4^{a}
		Affect regul.	0.008*	0.468	0.010*	3.8^{a}	3^{b}	3.5^{a}	3.3^{a}
		Social norms	0.084	0.262	0.143	3.5^{a}	3^{a}	3.4^{a}	3.1^{a}
		Social image	0.011*	0.668	0.023*	3.8^{a}	3.2^{b}	3.6^{a}	3.5^{a}
		Choice limit	0.038*	0.322	0.198	4^{a}	3.3^{b}	3.8^{a}	3.5^{a}

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Desserts	Spain	Liking	0.084	0.570	0.361	4.1^{a}	3.9^{a}	3.9^{a}	4^{a}
		Habits	0.001*	0.449	0.491	3.9^{a}	3.2^{b}	3.5^{a}	3.7^{a}
		Need/Hunger	0.056	0.078	0.274	3.8^{a}	3.2^{a}	3.2^{a}	3.8^{a}
		Health	0.016*	0.445	0.708	3.8^{a}	2.5^{b}	2.9^{a}	3.4^{a}
		Convenience	0.017*	0.726	0.513	4.6^{a}	2.9^{b}	3.9^{a}	3.6^{a}

		Pleasure	0.081	0.738	0.203	4^{a}	3.8^{a}	3.9^{a}	3.9^{a}
		Trad.eating	0.000*	0.277	0.220	4^{a}	3.5^{b}	3.7^{a}	3.8^{a}
		Nat.concern	0.015*	0.846	0.616	4.2^{a}	3^{b}	3.6^{a}	3.5^{a}
		Sociability	0.005*	0.596	0.467	3.6^{a}	2.9^{b}	3.1^{a}	3.3^{a}
		Price	0.323	0.070	0.362	3^{a}	2.3^{a}	2^{a}	3.3^{a}
		Visual app	0.002*	0.958	0.462	4.1^{a}	2.8^{b}	3.5^{a}	3.4^{a}
		Wt.control	0.016*	0.971	0.529	4.3^{a}	2.2^{b}	3.2^{a}	3.2^{a}
		Affect regul.	0.000*	0.324	0.539	4.5^{a}	2.1^{b}	3^{a}	3.6^{a}
		Social norms	<0.0001*	0.309	0.669	4.1^{a}	2.4^{b}	3^{a}	3.4^{a}
		Social image	0.000*	0.526	0.933	4.2^{a}	2.1^{b}	3^{a}	3.3^{a}
		Choice limit	0.010*	0.730	0.372	4.5^{a}	2.4^{b}	3.6^{a}	3.3^{a}

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Desserts	USA	Liking	<0.0001*	0.510	0.372	4.3^{a}	3.8^{b}	4^{a}	4.1^{a}
		Habits	0.001*	0.324	0.821	4.3^{a}	3.2^{b}	3.6^{a}	3.9^{a}
		Need/Hunger	0.079	0.483	0.249	3.9^{a}	3.3^{a}	3.7^{a}	3.5^{a}
		Health	0.569	0.005*	0.033*	2.9^{a}	2.5^{a}	1.6^{b}	3.8^{a}
		Convenience	0.007*	0.970	0.617	4.8^{a}	2.9^{b}	3.8^{a}	3.9^{a}
		Pleasure	0.156	0.410	0.026*	3.9^{a}	3.7^{a}	3.8^{a}	3.9^{a}
		Trad.eating	0.058	0.156	0.783	3.5^{a}	3^{a}	3.1^{a}	3.5^{a}
		Nat.concern	0.860	0.012*	0.047*	2.8^{a}	2.7^{a}	1.7^{b}	3.8^{a}
		Sociability	0.008*	0.398	0.828	3.7^{a}	2.7^{b}	3.1^{a}	3.4^{a}
		Price	0.214	0.268	0.563	3.6^{a}	2.7^{a}	2.7^{a}	3.6^{a}
		Visual app	0.010*	0.149	0.235	4^{a}	3^{b}	3.2^{a}	3.8^{a}
		Wt.control	0.821	0.018*	0.097	2.6^{a}	2.4^{a}	1.6^{b}	3.5^{a}
		Affect regul.	0.451	0.130	0.240	3.1^{a}	2.5^{a}	2.2^{a}	3.4^{a}
		Social norms	0.002*	0.483	0.563	4.4^{a}	2.6^{b}	3.3^{a}	3.7^{a}
		Social image	<0.0001*	0.152	0.995	4.3^{a}	2.5^{b}	3.1^{a}	3.7^{a}
		Choice limit	0.128	0.120	0.780	3.4^{a}	2.7^{a}	2.7^{a}	3.4^{a}

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male

Fruits	Brazil	Liking	0.626	0.044*	0.671	4.3^{a}	4.3^{a}	4.4^{a}	4.2^{b}
		Habits	0.333	0.036*	0.054	3.8^{a}	3.9^{a}	3.7^{b}	3.9^{a}
		Need/Hunger	0.001*	0.434	0.545	4.2^{a}	3.9^{b}	4.1^{a}	4^{a}
		Health	<0.0001*	0.766	0.291	4.5^{a}	3.8^{b}	4.1^{a}	4.2^{a}
		Convenience	0.106	0.457	0.861	3.9^{a}	3.6^{a}	3.8^{a}	3.7^{a}
		Pleasure	0.001*	0.230	0.804	4.1^{a}	3.3^{b}	3.8^{a}	3.5^{a}
		Trad.eating	<0.0001*	0.834	0.827	3.8^{a}	2.7^{b}	3.2^{a}	3.2^{a}
		Nat.concern	<0.0001*	0.710	0.505	4.5^{a}	3.9^{b}	4.2^{a}	4.2^{a}
		Sociability	0.115	0.776	0.801	3.8^{a}	2.3^{a}	2.9^{a}	3.1^{a}
		Price	<0.0001*	0.163	0.365	4.1^{a}	3.1^{b}	3.8^{a}	3.4^{a}
		Visual app	0.108	0.567	0.445	3.4^{a}	2.4^{a}	2.7^{a}	3.1^{a}
		Wt.control	<0.0001*	0.892	0.651	4.4^{a}	3.3^{b}	3.9^{a}	3.9^{a}
		Affect regul.	0.404	0.998	0.998	1^{a}	1.8^{a}	1.4^{a}	1.4^{a}
		Social norms	<0.0001*	0.250	0.299	3.8^{a}	2.4^{b}	2.9^{a}	3.3^{a}
		Social image	0.024*	0.580	0.404	3.5^{a}	1.9^{b}	2.9^{a}	2.5^{a}
		Choice limit	0.001*	0.488	0.419	4^{a}	2.9^{b}	3.5^{a}	3.3^{a}

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Fruits	China	Liking	<0.0001*	0.065	0.113	4^{a}	3.5^{b}	3.8^{a}	3.7^{a}
		Habits	0.360	0.168	0.545	3.5^{a}	3.3^{a}	3.5^{a}	3.3^{a}
		Need/Hunger	0.001*	0.126	0.876	3.9^{a}	3.3^{b}	3.7^{a}	3.4^{a}
		Health	<0.0001*	0.241	0.161	4.1^{a}	3.5^{b}	3.9^{a}	3.7^{a}
		Convenience	0.466	0.972	0.097	3.4^{a}	3.3^{a}	3.4^{a}	3.4^{a}
		Pleasure	0.578	0.964	0.443	3.2^{a}	3.1^{a}	3.2^{a}	3.2^{a}
		Trad.eating	0.155	0.473	0.582	3.4^{a}	3^{a}	3.3^{a}	3.1^{a}
		Nat.concern	0.004*	0.018*	0.890	4^{a}	3.5^{b}	3.9^{a}	3.5^{b}
		Sociability	0.000*	0.732	0.686	4.2^{a}	2.9^{b}	3.6^{a}	3.5^{a}
		Price	0.052	0.654	0.945	3.4^{a}	2.9^{a}	3.2^{a}	3.1^{a}
		Visual app	0.007*	0.493	0.657	3.8^{a}	3^{b}	3.5^{a}	3.3^{a}
		Wt.control	0.026*	0.258	0.546	3.7^{a}	3.3^{b}	3.6^{a}	3.4^{a}
		Affect regul.	0.042*	0.729	0.753	3.8^{a}	2.6^{b}	3.1^{a}	3.3^{a}
		Social norms	0.000*	0.798	0.333	3.9^{a}	2.9^{b}	3.4^{a}	3.4^{a}

		Social image	0.015*	0.322	0.215	3.8^{a}	3^{b}	3.2^{a}	3.5^{a}
		Choice limit	0.252	0.791	0.531	3.5^{a}	3^{a}	3.2^{a}	3.3^{a}

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Fruits	India	Liking	<0.0001*	0.000*	0.078	4.3^{a}	3.8^{b}	4.2^{a}	3.9^{b}
		Habits	0.003*	0.000*	0.539	4.1^{a}	3.8^{b}	4.2^{a}	3.7^{b}
		Need/Hunger	0.000*	0.043*	0.089	4.2^{a}	3.8^{b}	4.1^{a}	3.9^{b}
		Health	<0.0001*	0.048*	0.011*	4.5^{a}	3.9^{b}	4.3^{a}	4.1^{b}
		Convenience	0.168	0.940	0.001*	3.7^{a}	3.4^{a}	3.6^{a}	3.5^{a}
		Pleasure	0.015*	0.383	0.003*	4.1^{a}	3.7^{b}	4^{a}	3.8^{a}
		Trad.eating	0.002*	0.214	0.023*	4^{a}	3.5^{b}	3.8^{a}	3.6^{a}
		Nat.concern	<0.0001*	0.092	0.152	4.4^{a}	3.9^{b}	4.3^{a}	4.1^{a}
		Sociability	0.005*	0.125	0.350	3.8^{a}	3.1^{b}	3.6^{a}	3.2^{a}
		Price	<0.0001*	0.203	0.048*	3.9^{a}	3.1^{b}	3.6^{a}	3.4^{a}
		Visual app	<0.0001*	0.289	0.042*	4.1^{a}	3.3^{b}	3.8^{a}	3.6^{a}
		Wt.control	<0.0001*	0.235	0.014*	4.3^{a}	3.5^{b}	4^{a}	3.8^{a}
		Affect regul.	0.868	0.005*	0.307	2.9^{a}	2.9^{a}	3.4^{a}	2.5^{b}
		Social norms	0.359	0.023*	0.988	3.3^{a}	3^{a}	3.4^{a}	2.8^{b}
		Social image	0.014*	0.041*	0.277	3.6^{a}	3^{b}	3.5^{a}	3.1^{b}
		Choice limit	0.006*	0.110	0.252	4^{a}	3.4^{b}	3.9^{a}	3.5^{a}

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Fruits	Spain	Liking	0.009*	0.304	0.516	4.2^{a}	4^{b}	4.2^{a}	4.1^{a}
		Habits	0.283	0.036*	0.537	3.6^{a}	3.4^{a}	3.3^{b}	3.7^{a}
		Need/Hunger	0.026*	0.520	0.287	4^{a}	3.8^{b}	3.9^{a}	3.9^{a}
		Health	<0.0001*	0.673	0.661	4.3^{a}	3.8^{b}	4^{a}	4^{a}
		Convenience	0.000*	0.905	0.462	4.1^{a}	3.4^{b}	3.8^{a}	3.8^{a}
		Pleasure	0.000*	0.884	0.986	4.1^{a}	3.6^{b}	3.8^{a}	3.8^{a}
		Trad.eating	0.001*	0.200	0.687	3.9^{a}	2.9^{b}	3.2^{a}	3.6^{a}
		Nat.concern	0.000*	0.647	0.911	4.3^{a}	3.7^{b}	4^{a}	4^{a}
		Sociability	0.026*	0.983	0.633	3.8^{a}	2.2^{b}	3^{a}	3^{a}

		Price	0.000*	0.738	0.856	3.9^{a}	2.7^{b}	3.2^{a}	3.3^{a}
		Visual app	0.000*	0.400	0.705	4.1^{a}	2.7^{b}	3.2^{a}	3.5^{a}
		Wt.control	<0.0001*	0.666	0.713	4.1^{a}	3^{b}	3.5^{a}	3.6^{a}
		Affect regul.	0.004*	0.690	0.956	4.1^{a}	2^{b}	2.9^{a}	3.2^{a}
		Social norms	0.001*	0.047*	0.228	3.8^{a}	2.4^{b}	2.7^{b}	3.5^{a}
		Social image	0.000*	0.852	0.420	4.6^{a}	2^{b}	3.4^{a}	3.3^{a}
		Choice limit	0.012*	0.711	0.688	3.7^{a}	2.8^{b}	3.2^{a}	3.3^{a}

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Fruits	USA	Liking	0.005*	0.129	0.526	4.2^{a}	3.9^{b}	4^{a}	4.1^{a}
		Habits	0.059	0.074	0.562	3.7^{a}	3.4^{a}	3.4^{a}	3.7^{a}
		Need/Hunger	0.196	0.873	0.852	3.9^{a}	3.7^{a}	3.8^{a}	3.8^{a}
		Health	<0.0001*	0.687	0.104	4.3^{a}	3.5^{b}	3.9^{a}	3.9^{a}
		Convenience	0.761	0.109	0.080	3.7^{a}	3.7^{a}	3.5^{a}	3.8^{a}
		Pleasure	0.000*	0.527	0.132	4^{a}	3.4^{b}	3.7^{a}	3.8^{a}
		Trad.eating	0.047*	0.038*	0.624	3.3^{a}	2.7^{b}	2.7^{b}	3.3^{a}
		Nat.concern	<0.0001*	0.183	0.252	4.2^{a}	3.4^{b}	3.7^{a}	3.9^{a}
		Sociability	0.733	0.016*	0.091	2.7^{a}	2.4^{a}	1.6^{b}	3.6^{a}
		Price	<0.0001*	0.792	0.407	4.2^{a}	3.1^{b}	3.7^{a}	3.6^{a}
		Visual app	0.000*	0.131	0.727	4.1^{a}	2.8^{b}	3.2^{a}	3.7^{a}
		Wt.control	<0.0001*	0.060	0.752	4^{a}	3.2^{b}	3.4^{a}	3.8^{a}
		Affect regul.	0.338	0.001*	0.017*	2.9^{a}	2.3^{a}	1.5^{b}	3.7^{a}
		Social norms	<0.0001*	0.970	0.162	4.5^{a}	2.5^{b}	3.5^{a}	3.5^{a}
		Social image	0.002*	0.198	0.820	3.9^{a}	2.4^{b}	2.8^{a}	3.5^{a}
		Choice limit	0.003*	0.504	0.161	4^{a}	2.8^{b}	3.6^{a}	3.3^{a}

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Protein-rich	Brazil	Liking	0.063	0.005*	0.343	4.3^{a}	4.2^{a}	4.3^{a}	4.1^{b}
		Habits	0.440	0.998	0.190	3.8^{a}	3.9^{a}	3.8^{a}	3.8^{a}
		Need/Hunger	<0.0001*	0.578	0.825	4.3^{a}	3.9^{b}	4.1^{a}	4.1^{a}

		Health	<0.0001*	0.989	0.219	4.5^{a}	3.6^{b}	4.1^{a}	4.1^{a}
		Convenience	0.000*	0.348	0.868	3.9^{a}	3.1^{b}	3.6^{a}	3.4^{a}
		Pleasure	<0.0001*	0.546	0.638	4^{a}	3.1^{b}	3.7^{a}	3.5^{a}
		Trad.eating	<0.0001*	0.375	0.089	3.7^{a}	2.7^{b}	3.2^{a}	3.3^{a}
		Nat.concern	<0.0001*	0.996	0.514	4.4^{a}	3.5^{b}	4^{a}	4^{a}
		Sociability	0.000*	0.940	0.920	4^{a}	2.6^{b}	3.3^{a}	3.3^{a}
		Price	<0.0001*	0.648	0.741	4.1^{a}	2.8^{b}	3.5^{a}	3.4^{a}
		Visual app	0.000*	0.457	0.396	3.8^{a}	2.3^{b}	2.9^{a}	3.2^{a}
		Wt.control	<0.0001*	0.792	0.153	4.3^{a}	3^{b}	3.6^{a}	3.7^{a}
		Affect regul.	0.450	0.994	0.994	1^{a}	1.6^{a}	1.3^{a}	1.3^{a}
		Social norms	<0.0001*	0.715	0.743	3.8^{a}	2.5^{b}	3.2^{a}	3.1^{a}
		Social image	<0.0001*	0.327	0.268	4^{a}	1.8^{b}	3.2^{a}	2.7^{a}
		Choice limit	<0.0001*	0.598	0.889	4^{a}	2.9^{b}	3.5^{a}	3.4^{a}

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Protein-rich	China	Liking	<0.0001*	0.417	0.019*	4.1^{a}	3.6^{b}	3.8^{a}	3.9^{a}
		Habits	0.548	0.587	0.160	3.4^{a}	3.2^{a}	3.3^{a}	3.3^{a}
		Need/Hunger	0.001*	0.744	0.612	3.9^{a}	3.4^{b}	3.7^{a}	3.6^{a}
		Health	<0.0001*	0.339	0.700	3.9^{a}	3^{b}	3.6^{a}	3.4^{a}
		Convenience	0.282	0.289	0.866	3.2^{a}	2.8^{a}	3.1^{a}	2.8^{a}
		Pleasure	0.005*	0.620	0.197	3.7^{a}	3.3^{b}	3.5^{a}	3.5^{a}
		Trad.eating	0.460	0.611	0.752	3.2^{a}	3^{a}	3.2^{a}	3.1^{a}
		Nat.concern	0.022*	0.432	0.912	4.1^{a}	3.2^{b}	3.8^{a}	3.5^{a}
		Sociability	0.004*	0.731	0.523	4^{a}	3^{b}	3.5^{a}	3.4^{a}
		Price	0.227	0.781	0.867	3.2^{a}	2.7^{a}	3^{a}	2.9^{a}
		Visual app	0.002*	0.181	0.948	3.8^{a}	3^{b}	3.6^{a}	3.3^{a}
		Wt.control	0.003*	0.309	0.039*	3.8^{a}	2.7^{b}	3.1^{a}	3.5^{a}
		Affect regul.	0.109	0.405	0.231	3.4^{a}	2.5^{a}	2.7^{a}	3.2^{a}
		Social norms	0.065	0.651	0.771	3.5^{a}	2.8^{a}	3.2^{a}	3.1^{a}
		Social image	0.004*	0.508	0.138	3.8^{a}	2.8^{b}	3.2^{a}	3.5^{a}
		Choice limit	0.190	0.720	0.304	3.5^{a}	2.9^{a}	3.1^{a}	3.3^{a}

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Protein-rich	India	Liking	<0.0001*	0.004*	0.022*	4.3[a]	3.8[b]	4.2[a]	3.9[b]
		Habits	0.004*	0.024*	0.541	4.2[a]	3.9[b]	4.2[a]	3.9[b]
		Need/Hunger	<0.0001*	0.019*	0.136	4.3[a]	3.7[b]	4.1[a]	3.9[b]
		Health	<0.0001*	0.077	0.022*	4.5[a]	3.9[b]	4.3[a]	4.1[a]
		Convenience	0.041*	0.298	0.016*	3.9[a]	3.6[b]	3.9[a]	3.7[a]
		Pleasure	0.000*	0.001*	0.504	4.2[a]	3.7[b]	4.2[a]	3.7[b]
		Trad.eating	<0.0001*	0.017*	0.602	4.2[a]	3.6[b]	4[a]	3.7[b]
		Nat.concern	<0.0001*	0.156	0.146	4.4[a]	3.9[b]	4.2[a]	4.1[a]
		Sociability	0.000*	0.242	0.501	4.1[a]	3.2[b]	3.8[a]	3.5[a]
		Price	<0.0001*	0.001*	0.748	4[a]	3[b]	3.8[a]	3.2[b]
		Visual app	0.001*	0.002*	0.897	4[a]	3.4[b]	4[a]	3.4[b]
		Wt.control	<0.0001*	0.014*	0.193	4.4[a]	3.5[b]	4.1[a]	3.7[b]
		Affect regul.	0.015*	0.007*	0.221	3.6[a]	2.7[b]	3.6[a]	2.7[b]
		Social norms	<0.0001*	0.007*	0.493	4[a]	2.9[b]	3.8[a]	3.1[b]
		Social image	0.002	0.018*	0.916	3.8[a]	3[b]	3.7[a]	3.1[b]
		Choice limit	<0.0001	0.031*	0.669	4.2[a]	3.4[b]	4[a]	3.6[b]

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Protein-rich	Spain	Liking	0.091	0.434	0.341	4.1[a]	4[a]	4.1[a]	4[a]
		Habits	0.012*	0.065	0.539	3.6[a]	3.3[b]	3.3[a]	3.5[a]
		Need/Hunger	0.000*	0.829	0.299	4[a]	3.5[b]	3.8[a]	3.7[a]
		Health	<0.0001*	0.715	0.354	4.2[a]	3.3[b]	3.7[a]	3.7[a]
		Convenience	<0.0001*	0.166	0.244	3.9[a]	3.2[b]	3.5[a]	3.7[a]
		Pleasure	<0.0001*	0.297	0.445	4.2[a]	3.7[b]	4[a]	3.9[a]
		Trad.eating	0.001*	0.183	0.424	3.6[a]	3.2[b]	3.3[a]	3.5[a]
		Nat.concern	<0.0001*	0.642	0.849	4.2[a]	3.4[b]	3.8[a]	3.8[a]
		Sociability	<0.0001*	0.793	0.824	4[a]	2.8[b]	3.4[a]	3.4[a]
		Price	<0.0001*	0.645	0.710	4.2[a]	2.5[b]	3.3[a]	3.4[a]
		Visual app	<0.0001*	0.336	0.920	3.7[a]	2.7[b]	3.1[a]	3.3[a]

		Wt.control	<0.0001*	0.498	0.515	4.1^{a}	2.7^{b}	3.4^{a}	3.5^{a}
		Affect regul.	0.237	0.004*	0.021*	2.8^{a}	2^{a}	1.4^{b}	3.4^{a}
		Social norms	<0.0001*	0.865	0.797	4.5^{a}	2.4^{b}	3.4^{a}	3.5^{a}
		Social image	<0.0001*	0.640	0.156	4.3^{a}	2.2^{b}	3.3^{a}	3.2^{a}
		Choice limit	<0.0001*	0.781	0.743	4.1^{a}	2.8^{b}	3.4^{a}	3.5^{a}

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Protein-rich	USA	Liking	0.005*	0.573	0.095	4.2^{a}	4^{b}	4.1^{a}	4.1^{a}
		Habits	0.390	0.058	0.619	3.4^{a}	3.2^{a}	3.2^{a}	3.4^{a}
		Need/Hunger	0.000*	0.873	0.309	4^{a}	3.6^{b}	3.8^{a}	3.8^{a}
		Health	<0.0001*	0.250	0.700	4.3^{a}	2.6^{b}	3.3^{a}	3.6^{a}
		Convenience	0.035*	0.246	0.475	3.6^{a}	3.3^{b}	3.4^{a}	3.5^{a}
		Pleasure	0.002*	0.490	0.017*	4^{a}	3.6^{b}	3.8^{a}	3.9^{a}
		Trad.eating	0.000*	0.084	0.865	3.5^{a}	2.8^{b}	3^{a}	3.3^{a}
		Nat.concern	<0.0001*	0.629	0.971	4.3^{a}	2.7^{b}	3.4^{a}	3.6^{a}
		Sociability	<0.0001*	0.255	0.999	4^{a}	2.5^{b}	3.1^{a}	3.4^{a}
		Price	<0.0001*	0.432	0.563	4^{a}	2.9^{b}	3.4^{a}	3.5^{a}
		Visual app	0.009*	0.012*	0.049*	3.6^{a}	2.8^{b}	2.8^{b}	3.6^{a}
		Wt.control	0.023*	0.660	0.881	3.7^{a}	2.4^{b}	2.9^{a}	3.1^{a}
		Affect regul.	<0.0001*	0.884	0.577	4.9^{a}	2.1^{b}	3.4^{a}	3.5^{a}
		Social norms	0.002*	0.632	0.632	4^{a}	2.4^{b}	3.1^{a}	3.3^{a}
		Social image	<0.0001*	0.701	0.134	3.9^{a}	2.2^{b}	3^{a}	3.1^{a}
		Choice limit	<0.0001*	0.829	0.884	4.7^{a}	2.6^{b}	3.6^{a}	3.7^{a}

			p-values			Means†			
			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Starch-rich foods	Brazil	Liking	<0.0001*	0.001*	0.090	4.2^{a}	4^{b}	4.2^{a}	4^{b}
		Habits	0.035*	0.002*	0.032*	3.6^{b}	3.7^{a}	3.5^{b}	3.8^{a}
		Need/Hunger	<0.0001*	0.631	0.034*	4.3^{a}	3.6^{b}	3.9^{a}	4^{a}

		Health	<0.0001*	0.453	0.768	4.3^{a}	3.2^{b}	3.7^{a}	3.8^{a}
		Convenience	<0.0001*	0.988	0.928	4^{a}	3.3^{b}	3.7^{a}	3.7^{a}
		Pleasure	<0.0001*	0.322	0.763	4^{a}	3^{b}	3.6^{a}	3.4^{a}
		Trad.eating	<0.0001*	0.360	0.023*	3.4^{a}	2.7^{b}	3^{a}	3.2^{a}
		Nat.concern	<0.0001*	0.395	0.671	4.4^{a}	3.4^{b}	3.8^{a}	4^{a}
		Sociability	<0.0001*	0.348	0.429	4^{a}	2.6^{b}	3.4^{a}	3.2^{a}
		Price	<0.0001*	0.508	0.541	4.1^{a}	2.9^{b}	3.5^{a}	3.4^{a}
		Visual app	<0.0001*	0.819	0.981	3.5^{a}	2.2^{b}	2.9^{a}	2.8^{a}
		Wt.control	<0.0001*	0.936	0.734	4.2^{a}	2.9^{b}	3.6^{a}	3.6^{a}
		Affect regul.	0.079	0.015*	0.011*	3^{a}	1.6^{a}	1.3^{b}	3.3^{a}
		Social norms	<0.0001*	0.425	0.486	3.6^{a}	2.3^{b}	2.8^{a}	3^{a}
		Social image	0.002*	0.084	0.099	2.9^{a}	1.8^{b}	2^{a}	2.6^{a}
		Choice limit	<0.0001*	0.825	0.607	3.9^{a}	2.8^{b}	3.4^{a}	3.3^{a}

			p-values			Means[†]			
			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Starch-rich foods	China	Liking	0.248	0.880	0.079	3.7^{a}	3.6^{a}	3.7^{a}	3.7^{a}
		Habits	0.035*	0.314	0.096	3.5^{b}	3.7^{a}	3.6^{a}	3.6^{a}
		Need/Hunger	0.006*	0.765	0.047*	3.9^{a}	3.7^{b}	3.8^{a}	3.8^{a}
		Health	<0.0001*	0.616	0.004*	4.1^{a}	3.4^{b}	3.8^{a}	3.7^{a}
		Convenience	0.704	0.121	0.446	3.4^{a}	3.4^{a}	3.5^{a}	3.3^{a}
		Pleasure	0.019*	0.216	0.749	3.5^{a}	3^{b}	3.4^{a}	3.1^{a}
		Trad.eating	0.284	0.869	0.005*	3.5^{a}	3.4^{a}	3.4^{a}	3.4^{a}
		Nat.concern	0.000*	0.281	0.247	4.1^{a}	3.5^{b}	3.9^{a}	3.7^{a}
		Sociability	0.000*	0.070	0.665	3.8^{a}	3^{b}	3.6^{a}	3.2^{a}
		Price	0.010*	0.899	0.179	3.4^{a}	2.9^{b}	3.2^{a}	3.2^{a}
		Visual app	0.022*	0.234	0.846	3.6^{a}	3^{b}	3.4^{a}	3.1^{a}
		Wt.control	0.004*	0.143	0.727	3.7^{a}	3.1^{b}	3.5^{a}	3.3^{a}
		Affect regul.	0.325	0.031*	0.478	2.6^{a}	2.2^{a}	2.7^{a}	2.1^{b}
		Social norms	0.014*	0.313	0.236	3.3^{a}	2.8^{b}	3.2^{a}	2.9^{a}

		Social image	0.021*	0.014*	0.845	3.4^{a}	2.8^{b}	3.4^{a}	2.8^{b}
		Choice limit	0.006*	0.653	0.012*	3.6^{a}	3.1^{b}	3.4^{a}	3.3^{a}

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Starch-rich foods	India	Liking	<0.0001*	0.001*	0.056	4.2^{a}	3.8^{b}	4.1^{a}	3.8^{b}
		Habits	0.131	0.016*	0.050	3.9^{a}	3.8^{a}	4^{a}	3.7^{b}
		Need/Hunger	<0.0001*	0.077	0.072	4.1^{a}	3.6^{b}	4^{a}	3.8^{a}
		Health	<0.0001*	0.127	0.001*	4.3^{a}	3.6^{b}	4^{a}	3.9^{a}
		Convenience	0.000*	0.010*	0.057	4.1^{a}	3.8^{b}	4.1^{a}	3.8^{b}
		Pleasure	<0.0001*	0.033*	0.046*	4.2^{a}	3.6^{b}	4^{a}	3.8^{b}
		Trad.eating	<0.0001*	0.007*	0.160	4^{a}	3.6^{b}	4^{a}	3.7^{b}
		Nat.concern	<0.0001*	0.048*	0.050*	4.3^{a}	3.8^{b}	4.1^{a}	4^{b}
		Sociability	0.000*	0.002*	0.533	3.9^{a}	3.3^{b}	3.8^{a}	3.3^{b}
		Price	<0.0001*	0.004*	0.543	3.9^{a}	3.1^{b}	3.8^{a}	3.2^{b}
		Visual app	<0.0001*	0.007*	0.620	4.1^{a}	3.3^{b}	3.9^{a}	3.5^{b}
		Wt.control	<0.0001*	0.002*	0.131	4.2^{a}	3.4^{b}	4^{a}	3.6^{b}
		Affect regul.	0.056	0.005*	0.590	3.2^{a}	2.7^{a}	3.3^{a}	2.6^{b}
		Social norms	<0.0001*	0.005*	0.194	3.8^{a}	2.9^{b}	3.7^{a}	3.1^{b}
		Social image	<0.0001*	0.009*	0.970	3.8^{a}	3^{b}	3.6^{a}	3.1^{b}
		Choice limit	0.000*	0.013*	0.181	3.9^{a}	3.3^{b}	3.8^{a}	3.4^{b}

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Starch-rich foods	Spain	Liking	0.085	0.374	0.523	4.1^{a}	4^{a}	4.1^{a}	4.1^{a}
		Habits	0.002*	0.000*	0.491	3.3^{a}	3^{b}	3^{b}	3.3^{a}
		Need/Hunger	0.000*	0.559	0.217	3.9^{a}	3.6^{b}	3.7^{a}	3.8^{a}
		Health	<0.0001*	0.147	0.417	4^{a}	3^{b}	3.4^{a}	3.6^{a}
		Convenience	<0.0001*	0.117	0.459	3.7^{a}	2.7^{b}	3.1^{a}	3.3^{a}
		Pleasure	<0.0001*	0.961	0.283	4^{a}	3.6^{b}	3.8^{a}	3.8^{a}
		Trad.eating	<0.0001*	0.228	0.966	3.6^{a}	3.1^{b}	3.3^{a}	3.4^{a}

		Nat.concern	<0.0001*	0.674	0.294	4.3^{a}	3.3^{b}	3.8^{a}	3.8^{a}
		Sociability	<0.0001*	0.670	0.613	3.8^{a}	2.9^{b}	3.3^{a}	3.4^{a}
		Price	<0.0001*	0.811	0.606	4^{a}	2.4^{b}	3.1^{a}	3.2^{a}
		Visual app	<0.0001*	0.312	0.603	3.6^{a}	2.6^{b}	3^{a}	3.2^{a}
		Wt.control	<0.0001*	0.578	0.974	4.1^{a}	2.6^{b}	3.3^{a}	3.4^{a}
		Affect regul.	0.001*	0.624	0.856	4.3^{a}	1.8^{b}	2.8^{a}	3.2^{a}
		Social norms	0.000*	0.255	0.597	3.5^{a}	2.3^{b}	2.7^{a}	3.1^{a}
		Social image	<0.0001*	0.314	0.686	3.7^{a}	2.1^{b}	2.8^{a}	3^{a}
		Choice limit	<0.0001*	0.063	0.317	3.9^{a}	2.3^{b}	2.8^{a}	3.4^{a}

			Sources of variance			Survey format		Gender	
Food category	Country	Motivation	R	S	T	RATA	RATING	Female	Male
Starch-rich foods	USA	Liking	0.011*	0.754	0.898	4.2^{a}	4^{b}	4.1^{a}	4.1^{a}
		Habits	0.986	0.239	0.465	3.2^{a}	3.2^{a}	3.1^{a}	3.3^{a}
		Need/Hunger	0.010*	0.455	0.501	3.9^{a}	3.6^{b}	3.8^{a}	3.7^{a}
		Health	<0.0001*	0.140	0.403	4^{a}	2.9^{b}	3.4^{a}	3.6^{a}
		Convenience	0.007*	0.204	0.274	3.6^{a}	3.3^{b}	3.4^{a}	3.6^{a}
		Pleasure	<0.0001*	0.839	0.217	4.2^{a}	3.4^{b}	3.8^{a}	3.8^{a}
		Trad.eating	0.029*	0.001*	0.485	3.1^{a}	2.8^{b}	2.7^{b}	3.2^{a}
		Nat.concern	<0.0001*	0.993	0.185	4.2^{a}	3.1^{b}	3.6^{a}	3.6^{a}
		Sociability	0.001*	0.394	0.847	3.7^{a}	2.3^{b}	2.9^{a}	3.2^{a}
		Price	<0.0001*	0.534	0.949	3.9^{a}	3^{b}	3.4^{a}	3.5^{a}
		Visual app	0.012*	0.009*	0.094	3.4^{a}	2.7^{b}	2.7^{b}	3.4^{a}
		Wt.control	<0.0001*	0.407	0.305	3.9^{a}	2.7^{b}	3.2^{a}	3.4^{a}
		Affect regul.	0.000*	0.377	0.951	4.3^{a}	2^{b}	2.9^{a}	3.4^{a}
		Social norms	<0.0001*	0.812	0.168	4.3^{a}	2.3^{b}	3.4^{a}	3.3^{a}
		Social image	<0.0001*	0.051	0.487	4.1^{a}	2.2^{b}	2.7^{a}	3.6^{a}
		Choice limit	0.002*	0.006*	0.030*	3.8^{a}	2.6^{b}	2.7^{b}	3.7^{a}

Appendix E

Agglomerative Hierarchical Clustering and corresponding Principal Component Analysis

Figure E1a. Agglomerative Hierarchical Clustering (AHC) dendrograms of the 20 consumers' age group combinations for (a) RATA and (b) RATING for the dairy foods category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

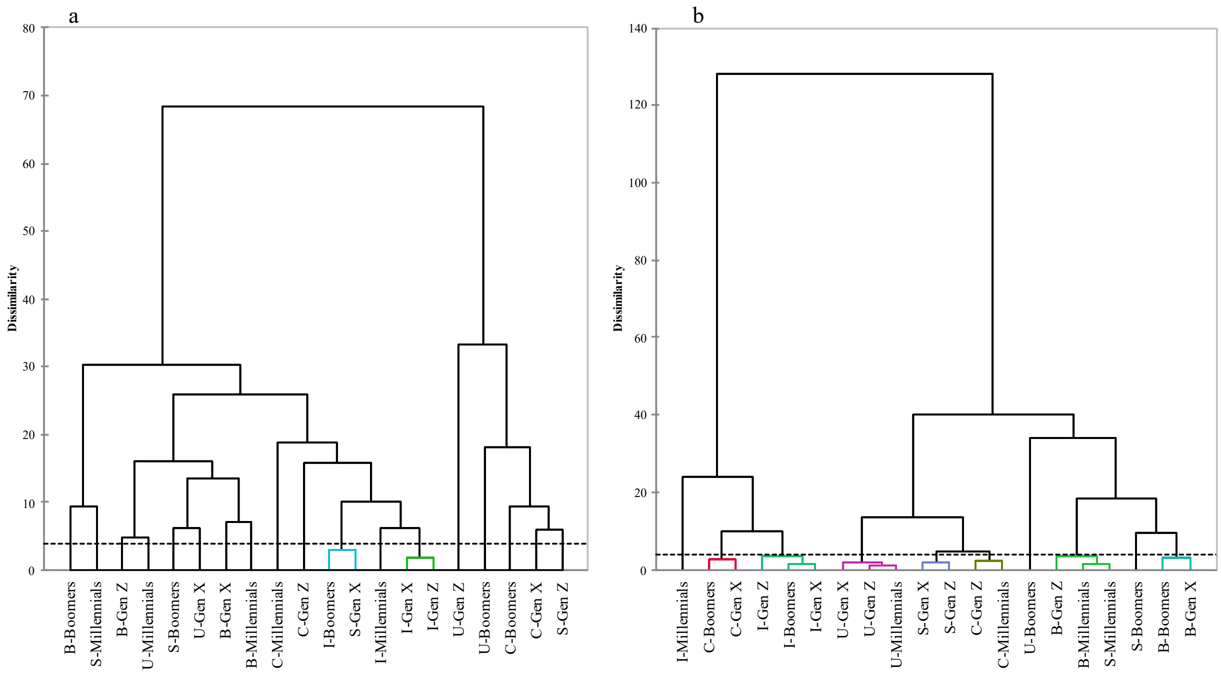


Figure E1b. Principal Component Analysis (PCA) biplots of the 20 consumers' age group combinations for (a) RATA and (b) RATING for the dairy foods category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

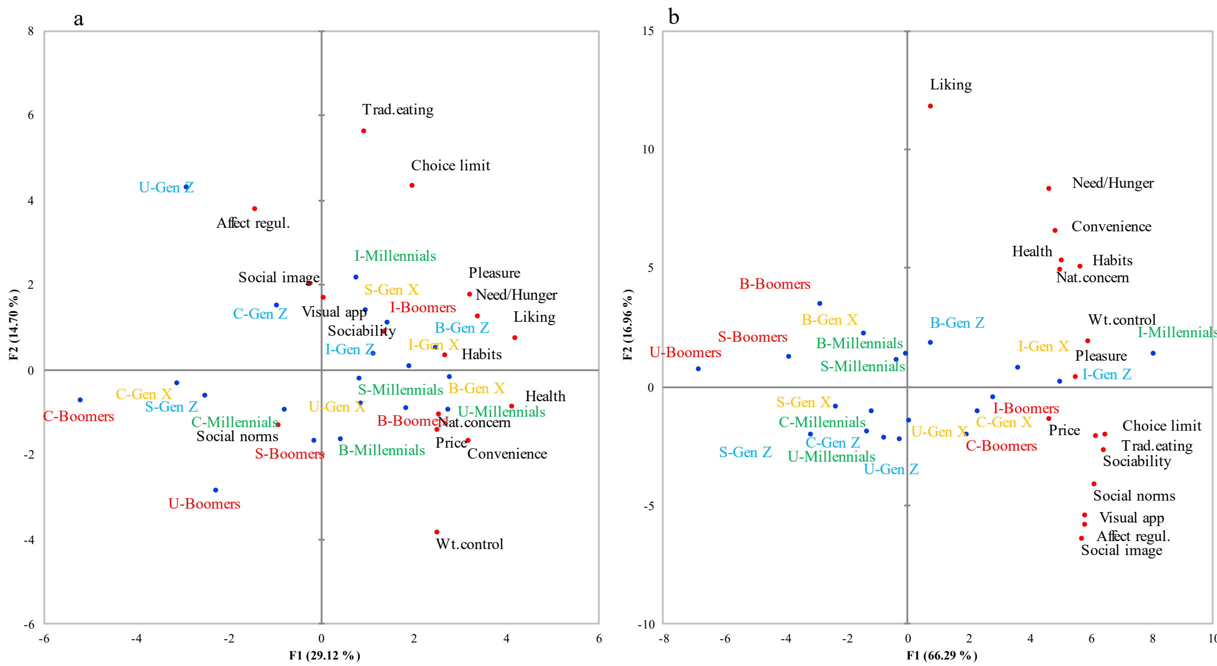


Figure E2a. Agglomerative Hierarchical Clustering (AHC) dendrograms of the 20 consumers' age group combinations for (a) RATA and (b) RATING for the desserts category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

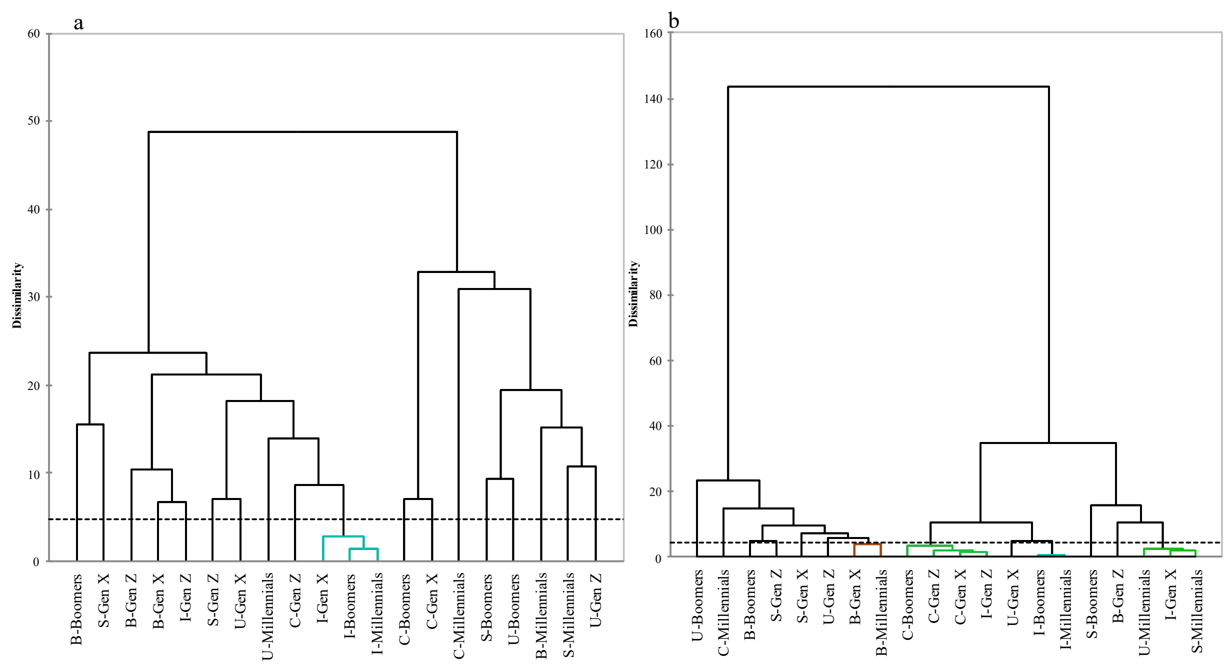


Figure E2b. Principal Component Analysis (PCA) biplots of the 20 consumers' age group combinations for (a) RATA and (b) RATING for the desserts category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

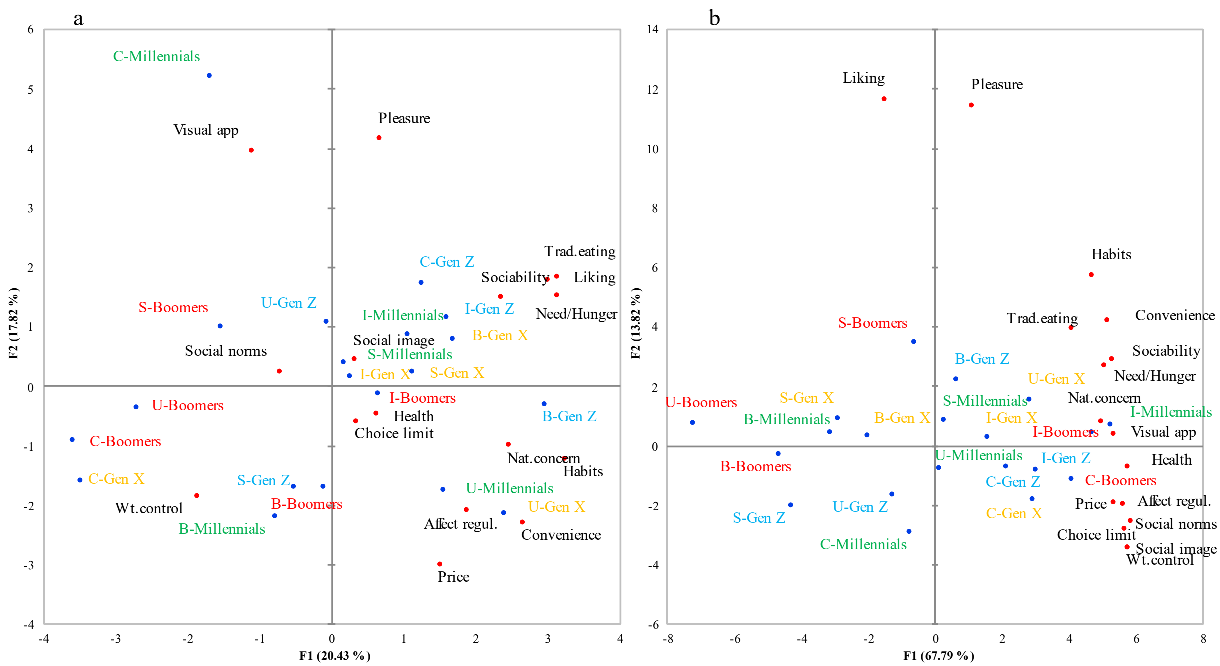


Figure E3a. Agglomerative Hierarchical Clustering (AHC) dendrograms of the 20 consumers' age group combinations for (a) RATA and (b) RATING for the fruits category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

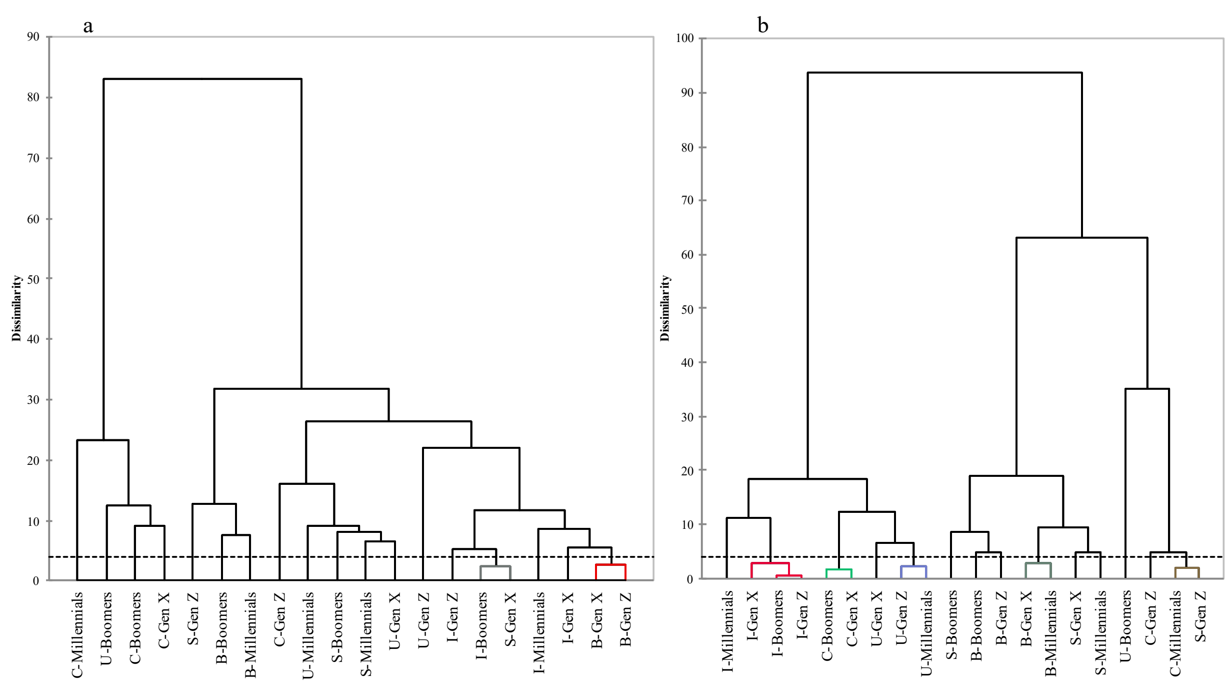


Figure E3b. Principal Component Analysis (PCA) biplots of the 20 consumers' age group combinations for (a) RATA and (b) RATING for the fruits category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

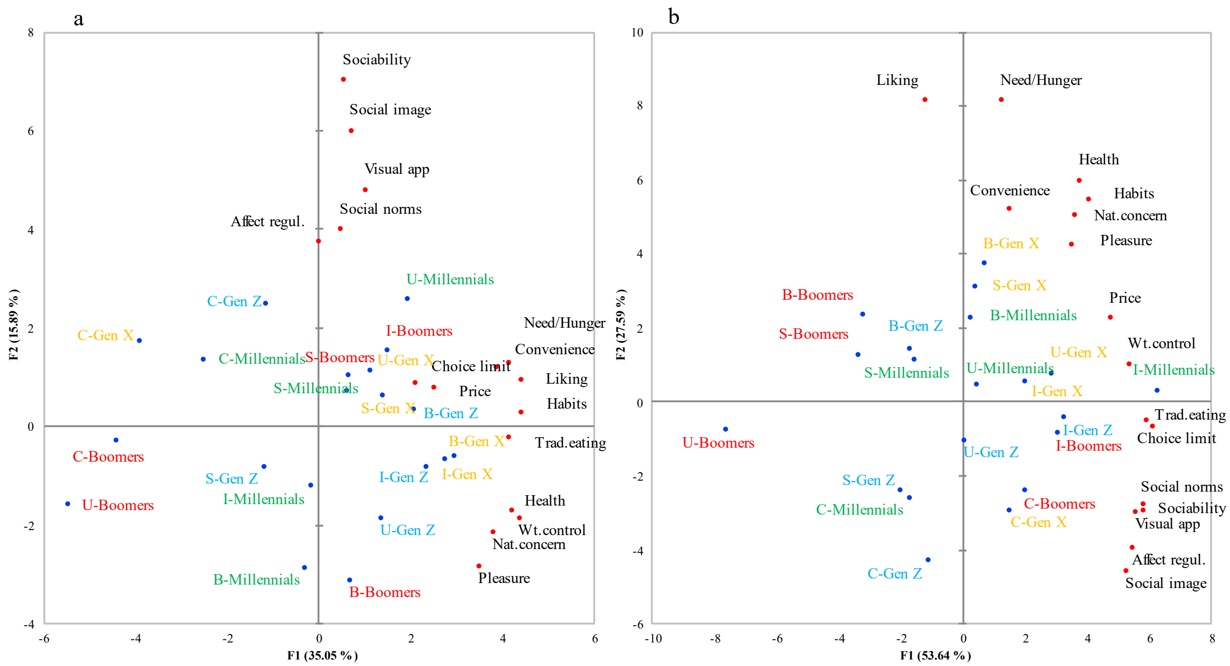


Figure E4a. Agglomerative Hierarchical Clustering (AHC) dendrograms of the 20 consumers' age group combinations for (a) RATA and (b) RATING for the protein-rich foods category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

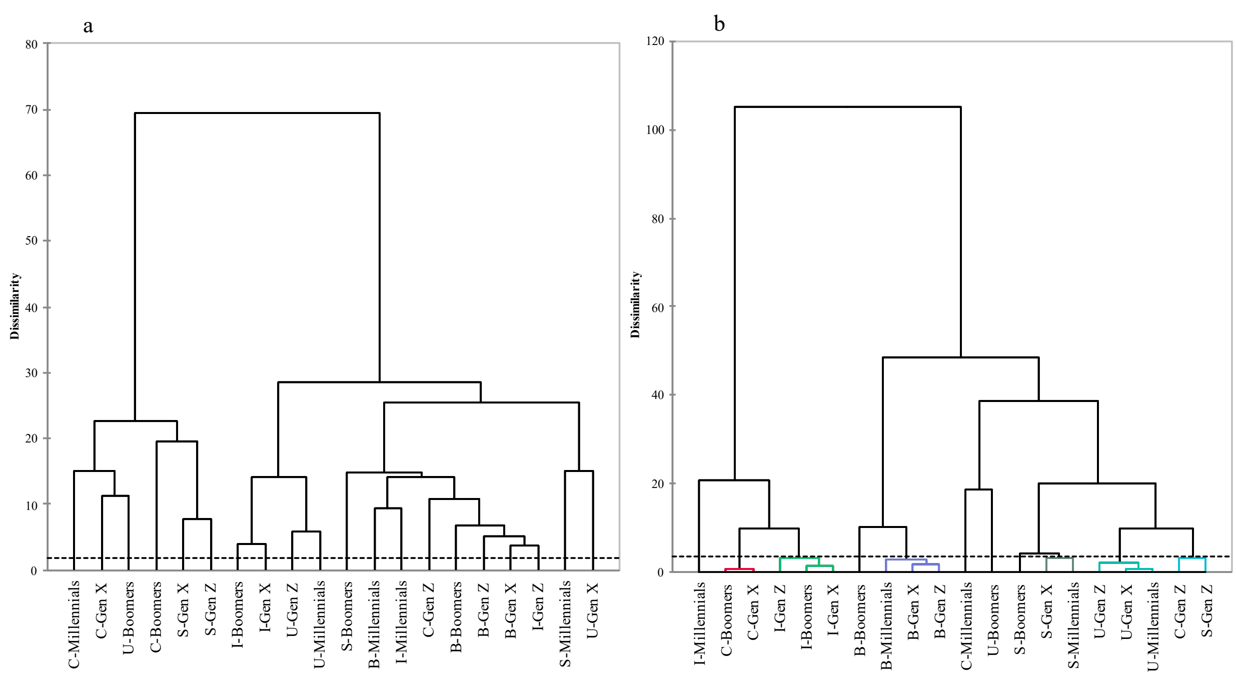


Figure E4b. Principal Component Analysis (PCA) biplots of the 20 consumers' age group combinations for (a) RATA and (b) RATING for the protein-rich foods category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

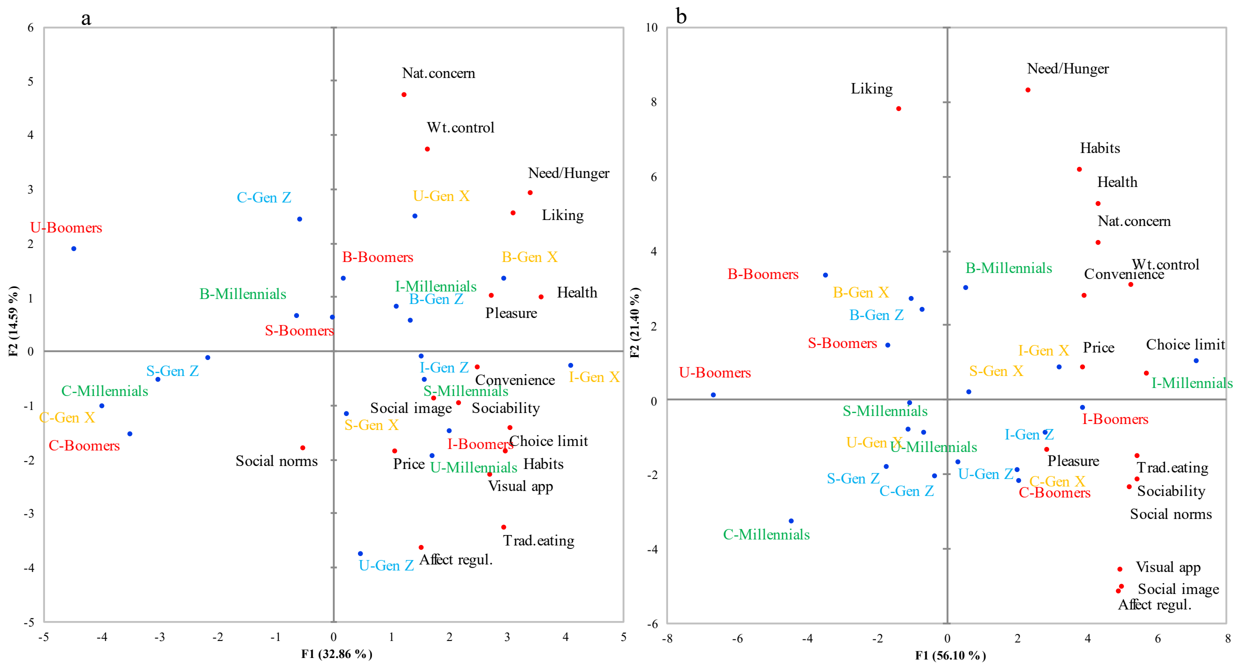


Figure E5a. Agglomerative Hierarchical Clustering (AHC) dendrograms of the 20 consumers' age group combinations for (a) RATA and (b) RATING for the Starch-rich foods category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

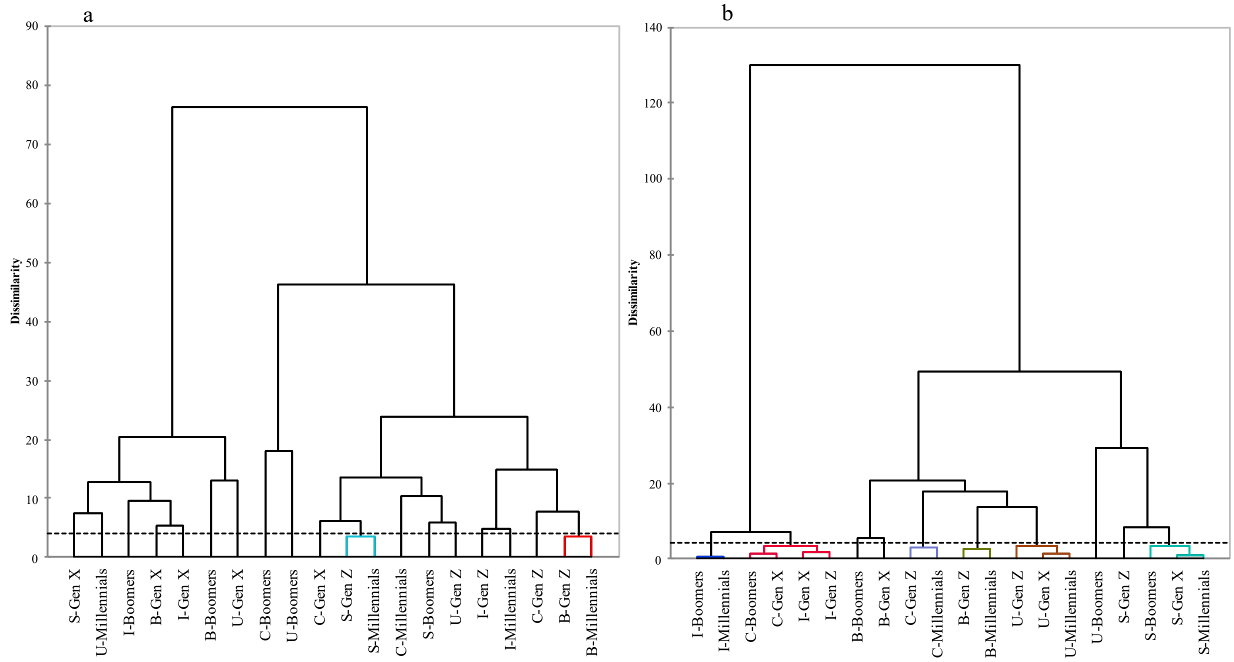


Figure E5b. Principal Component Analysis (PCA) biplots of the 20 consumers' age group combinations for (a) RATA and (b) RATING for the Starch-rich foods category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

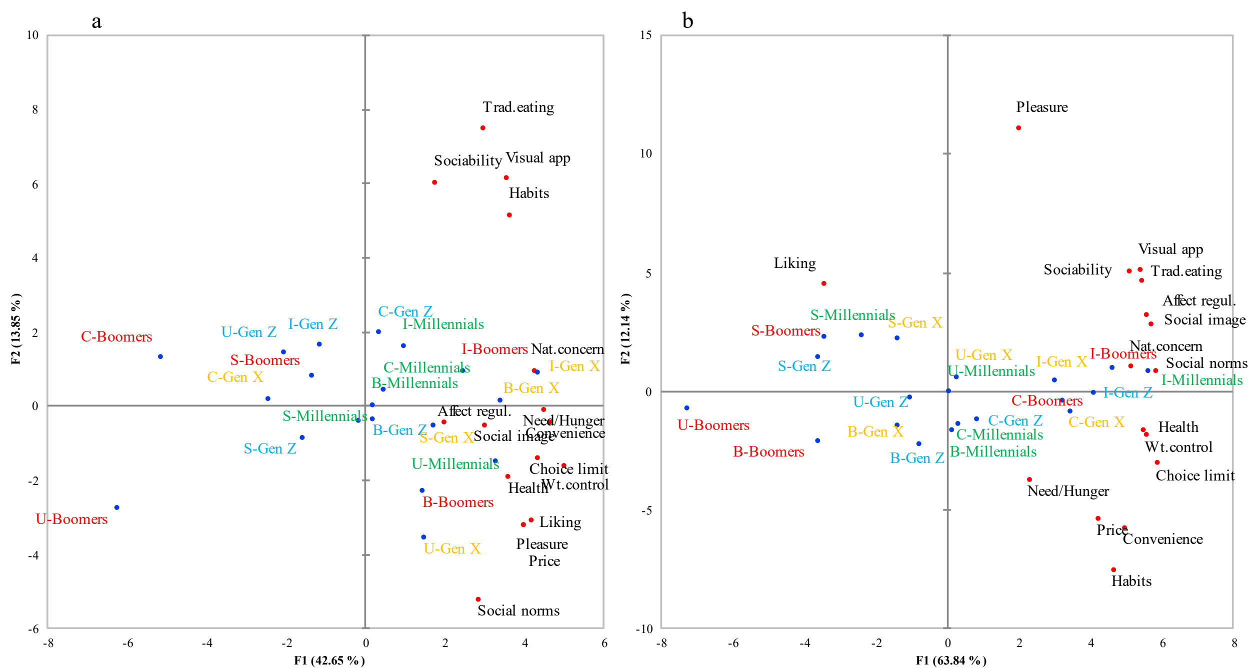


Figure E6a. Agglomerative Hierarchical Clustering (AHC) dendrograms of the 10 consumers' gender combinations for (a) RATA and (b) RATING for the protein-rich foods category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

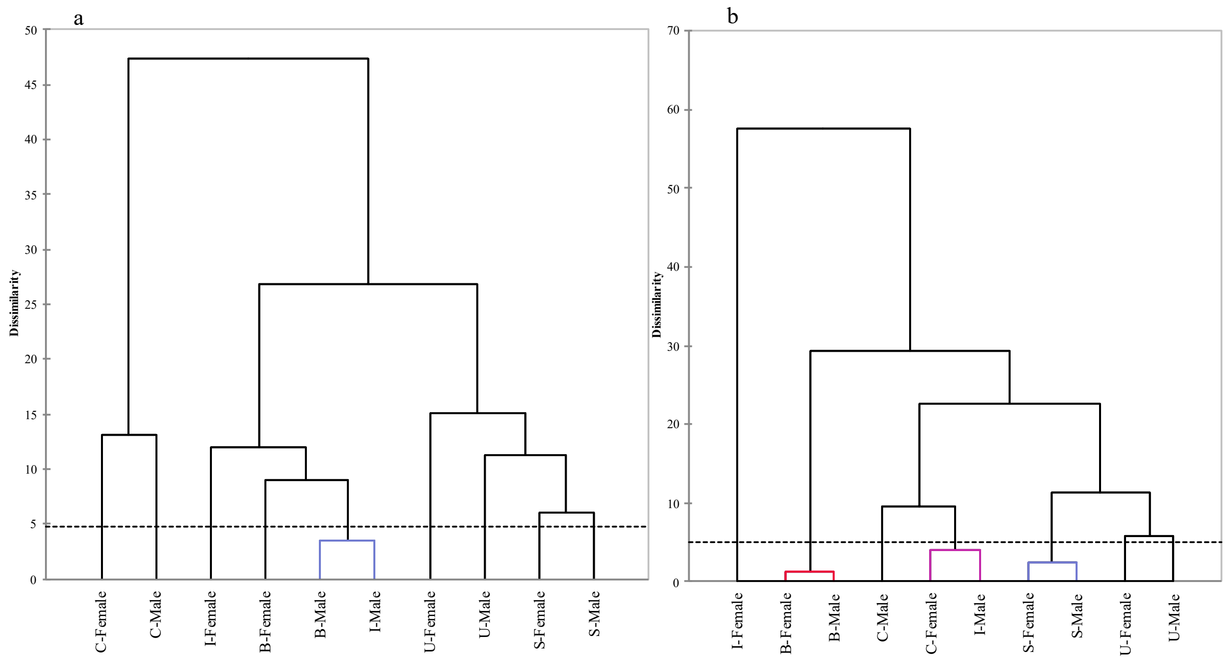


Figure E6b. Principal Component Analysis (PCA) biplots of the 10 consumers' gender combinations for (a) RATA and (b) RATING for the protein-rich foods category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

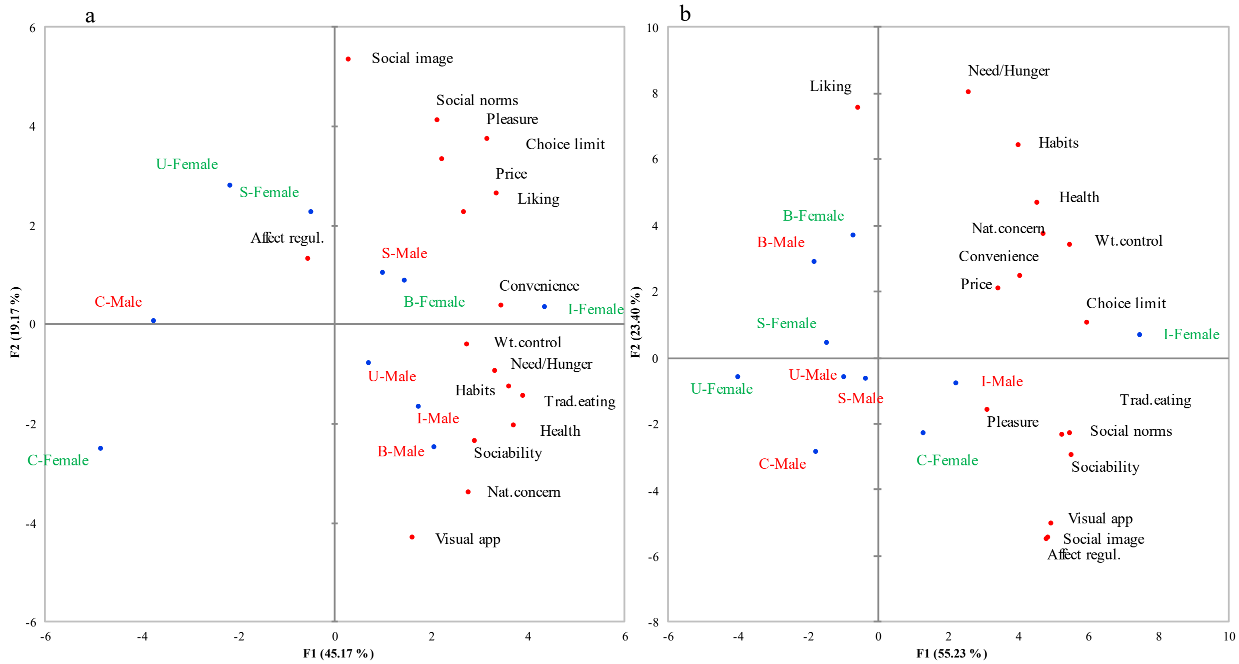


Figure E7a. Agglomerative Hierarchical Clustering (AHC) dendrograms of the 10 consumers' gender combinations for (a) RATA and (b) RATING for the Starch-rich foods category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

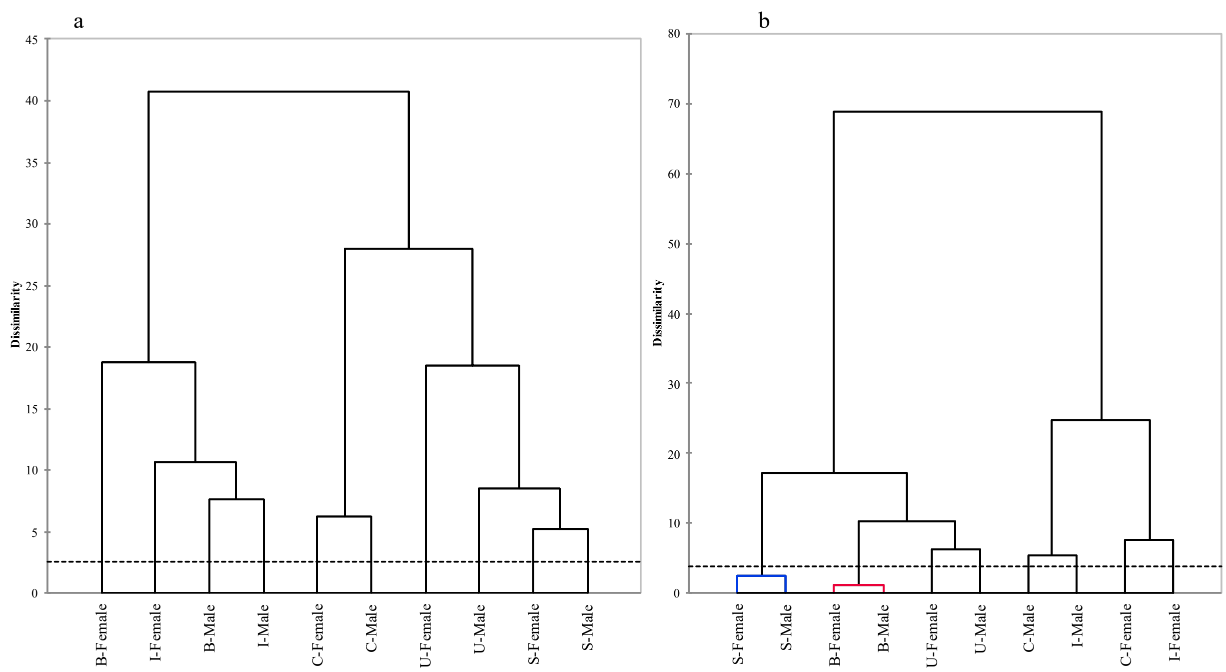


Figure E7b. Principal Component Analysis (PCA) biplots of the 10 consumers' gender combinations for (a) RATA and (b) RATING for the Starch-rich foods category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

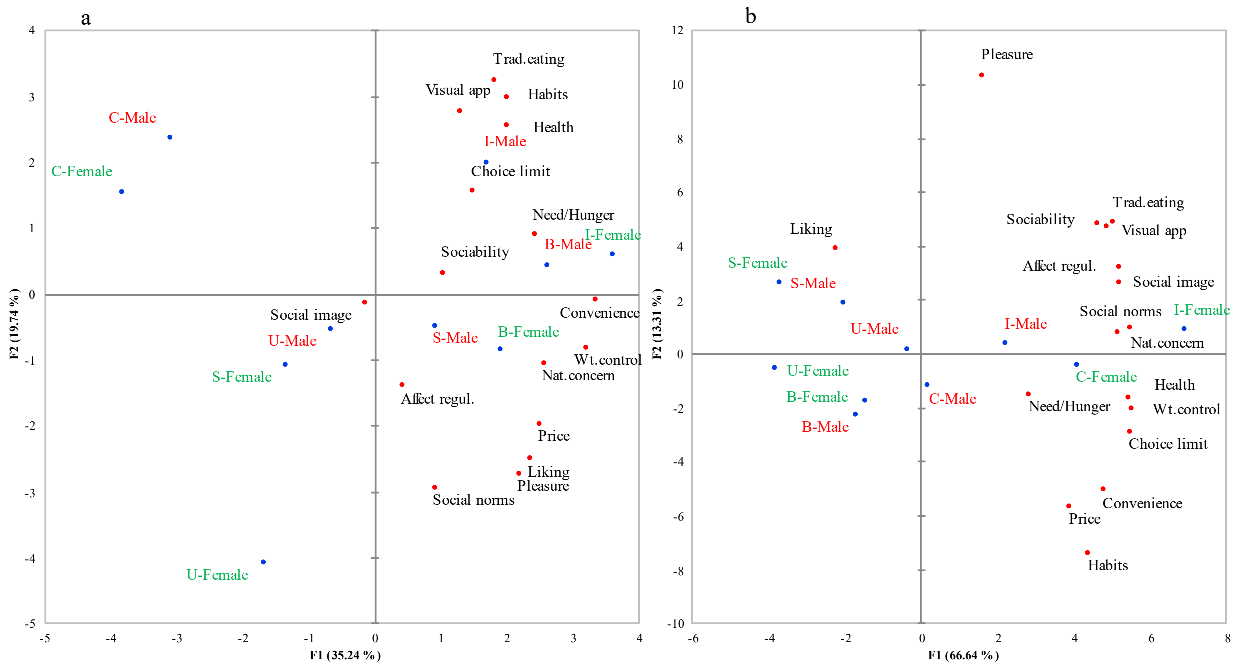


Figure E8a. Agglomerative Hierarchical Clustering (AHC) dendrograms of the 10 consumers' gender combinations for (a) RATA and (b) RATING for the dairy foods category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

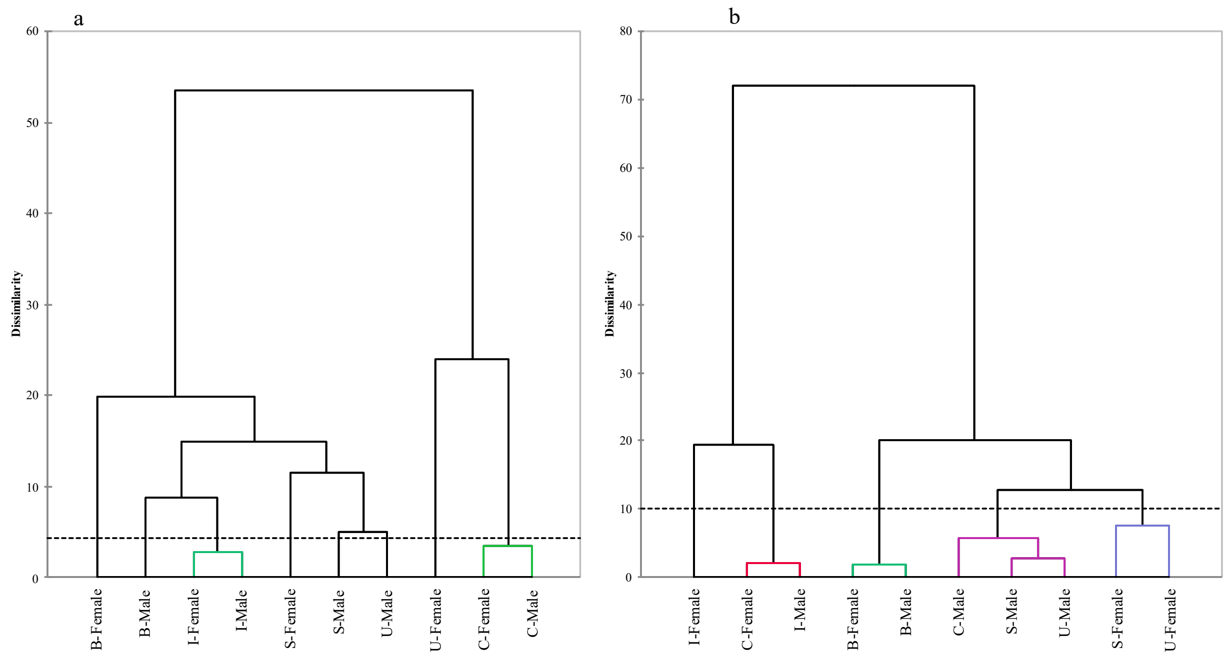


Figure E8b. Principal Component Analysis (PCA) biplots of the 10 consumers' gender combinations for (a) RATA and (b) RATING for the dairy foods category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

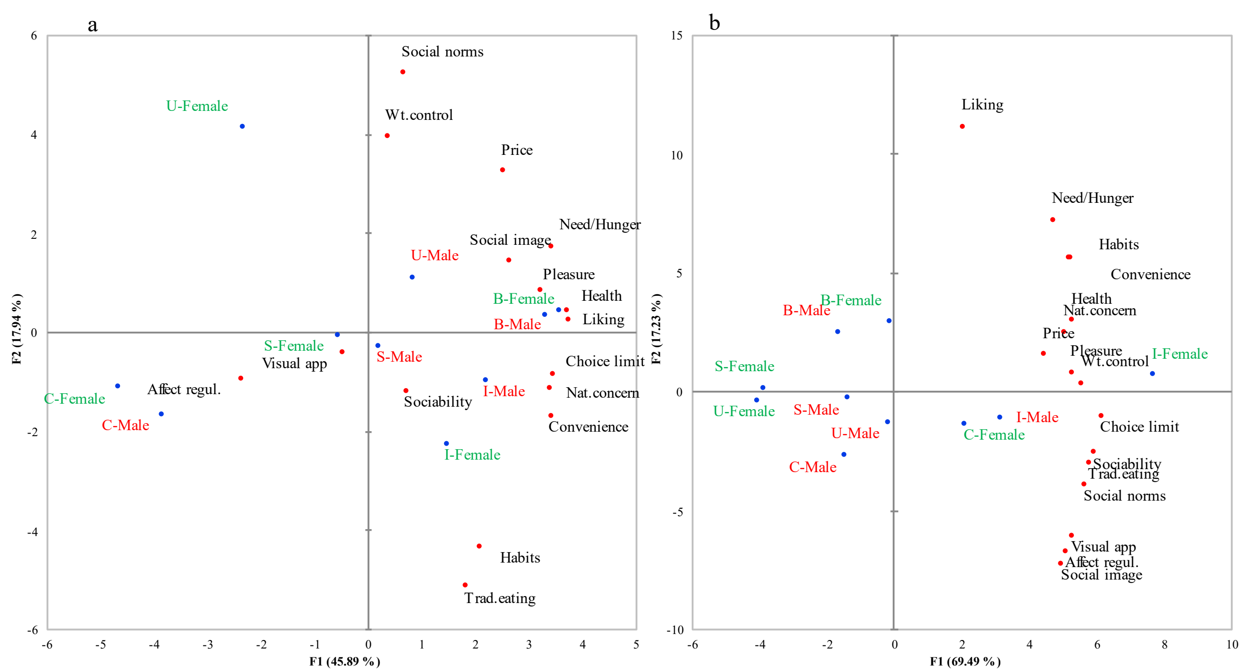


Figure E9a. Agglomerative Hierarchical Clustering (AHC) dendrograms of the 10 consumers' gender combinations for (a) RATA and (b) RATING for the fruits category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

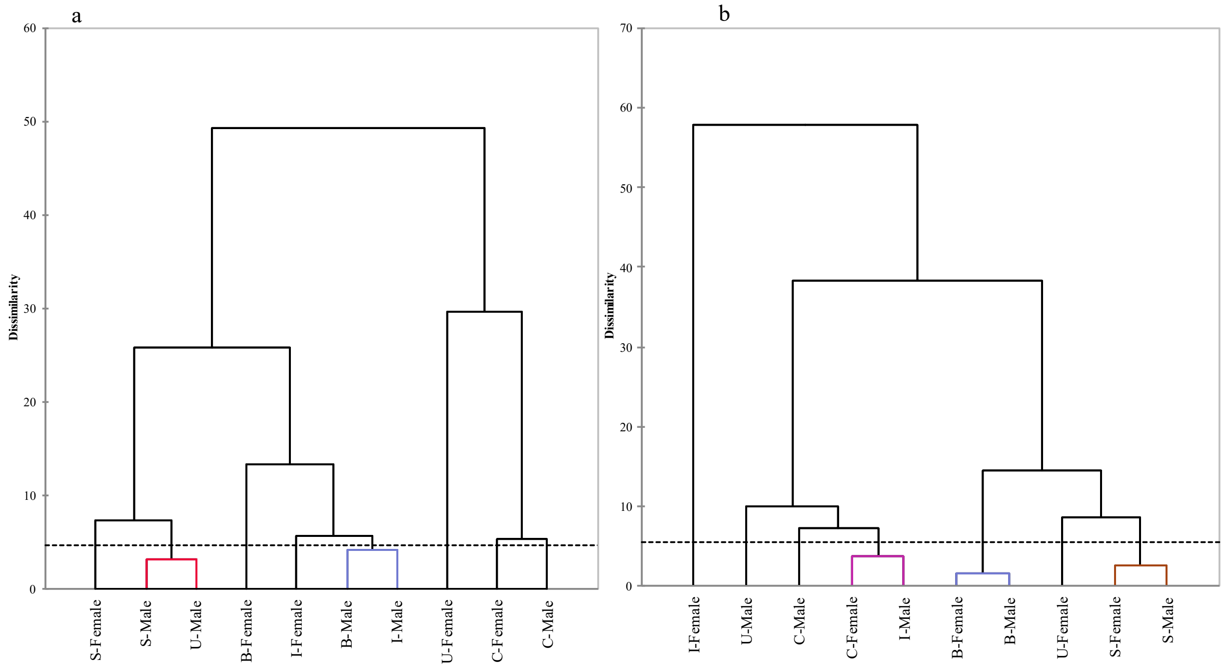


Figure E9b. Principal Component Analysis (PCA) biplots of the 10 consumers' gender combinations for (a) RATA and (b) RATING for the fruits category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

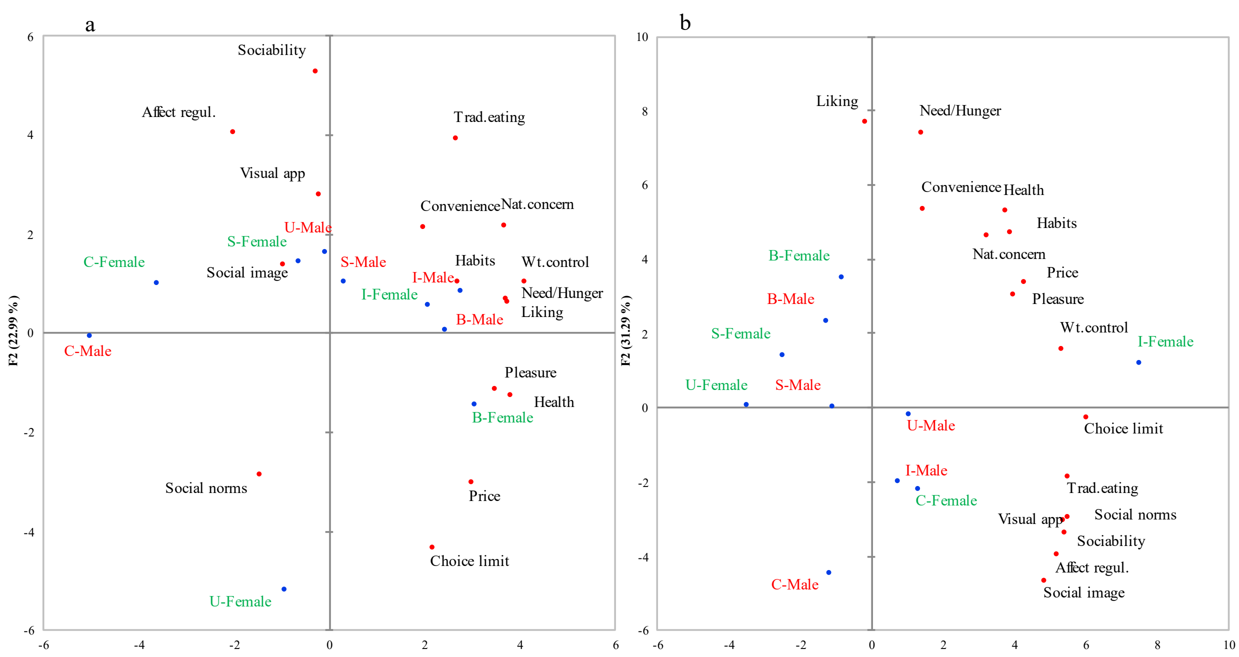


Figure E10a. Agglomerative Hierarchical Clustering (AHC) dendrograms of the 10 consumers' gender combinations for (a) RATA and (b) RATING for the desserts category (B= Brazil, C= China, I= India, S= Spain, and U= USA).

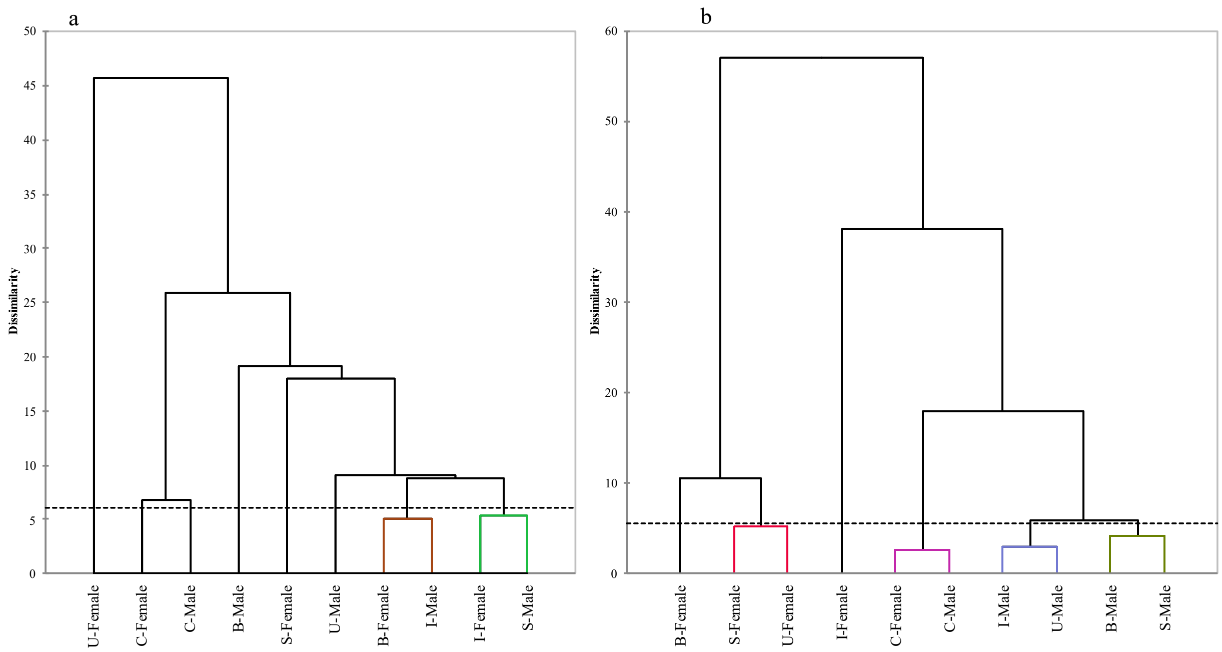
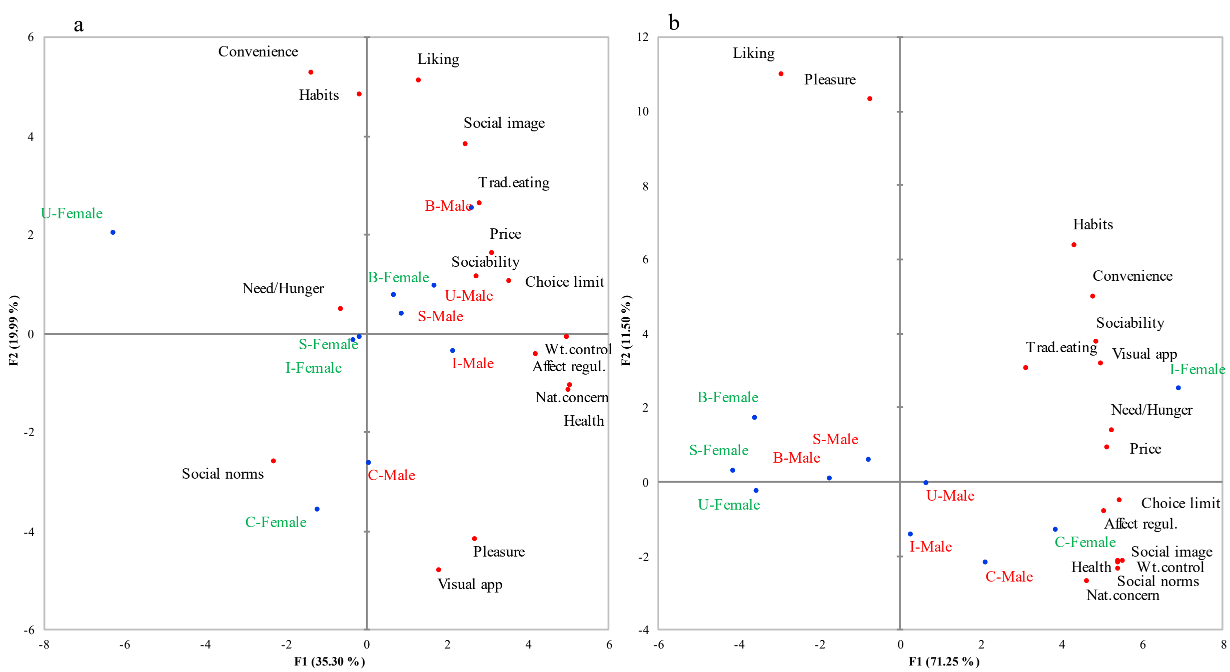


Figure E10b. Principal Component Analysis (PCA) biplots of the 10 consumers' gender combinations for (a) RATA and (b) RATING for the desserts category (B= Brazil, C= China, I= India, S= Spain, and U= USA).



Appendix F

p-values of sources of variation (age group, gender, question format and variable interactions) based on Type III Sum of Squares for survey mean duration, just-about-right (JAR) rating and liking.

*p-values for source of variation that was significantly different (p ≤ 0.05)

Survey mean duration	Country	Age group	question format	Age * Question format
	Brazil	0.378	0.268	0.795
	China	0.034*	<0.0001*	0.508
	India	0.892	0.336	0.241
	Spain	0.078	0.007*	0.079
	USA	0.326	0.611	0.468

Survey mean duration	Country	Gender	Question format	Gender * Question format
	Brazil	0.996	0.261	0.400
	China	0.525	<0.0001*	0.434
	India	0.897	0.293	0.164
	Spain	0.572	0.007*	0.532
	USA	0.257	0.567	0.370

Survey Just-about-right-(JAR) rating	Country	Age group	Question format	Age group * Question format
	Brazil	0.733	<0.0001*	0.674
	China	0.244	<0.0001*	0.637
	India	0.001*	0.007*	0.745
	Spain	0.006*	<0.0001*	0.016*
	USA	0.053	<0.0001*	0.108

Survey Just-about-right-(JAR) rating	Country	Gender	Question format	Gender * Question format
	Brazil	0.533	<0.0001*	0.946
	China	0.377	<0.0001*	0.499
	India	0.000*	0.005*	0.218
	Spain	0.943	<0.0001*	0.609
	USA	0.516	<0.0001*	0.545

Survey Liking	Country	Age group	Question format	Age group * Question format
	Brazil	0.697	<0.0001*	0.579
	China	0.552	<0.0001*	0.028*
	India	0.183	0.003*	0.869
	Spain	0.112	<0.0001*	0.073
	USA	0.102	<0.0001*	0.670

Survey Liking	Country	Gender	Question format	Gender * Question format
	Brazil	0.691	<0.0001*	0.606
	China	0.259	<0.0001*	0.154
	India	0.022*	0.002*	0.038*
	Spain	0.429	<0.0001*	0.564
	USA	0.070	<0.0001*	0.742

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