Does Culture Matter? Assessing Response Biases in Cross-National Survey Research

GERARD J. TELLIS AND DEEPA CHANDRASEKARAN*

Author Notes

Gerard J. Tellis is Professor of Marketing, Neely Chair in American Enterprise, and Director of the Center of Global Innovation, Marshall School of Business, University of Southern California, Los Angeles, CA 90089. Email: tellis@marshall.usc.edu

Deepa Chandrasekaran is an Assistant Professor of Marketing, Lehigh University, 621 Taylor St., Bethlehem, PA 18015 Email: dec207@lehigh.edu.

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ABSTRACT

Survey research is fraught with serious response tendencies. This study examines the extent and impact of three important response tendencies: socially desirable responding, yea-saying, and nay-saying, in cross-national research. From a survey of 5569 respondents across 15 countries, the study finds evidence of substantial differences across countries. Socially desirable responding is highest in Singapore and Italy, yea-saying is highest in Brazil and India, and nay-saying is highest in Netherlands and Japan. These response tendencies lead to erroneous conclusions about innovativeness based on surveys as compared to that based on market penetration of new products, over-reporting or under-reporting of innovative traits and over-reporting of adoption of new products. Overall, negatively valenced items show the least susceptibility to these response tendencies, can help predict both actual penetration at the aggregate level as well as individual probabilities of adoption, and should be included in cross-national surveys.

Keywords: Response styles; Biases; Socially desirable responding; Cross-national research; International marketing; Consumer innovativeness; Survey research; Cross-cultural research

1. Introduction

Survey research uses the terms response styles or response biases to refer to tendencies of respondents to systematically respond to questionnaire items on some other basis than the specific item content (Baumgartner & Steenkamp, 2001). We use the term response tendencies synonymously with the word biases to reflect the differing styles of communications that characterize a culture (Smith 2004). Three types of response tendencies seem to be particularly relevant in the context of cross-national survey research.

First, consumers tend to over-report favorable attitudes and under-report unfavorable attitudes. The literature refers to this response tendency as socially desirable responding (Baumgartner & Steenkamp, 2001; Baumgartner & Steenkamp, 2005; Fisher, 1993; Krosnick, 1999; Mick, 1996). Further, in as much as it varies across countries, researchers may mistake differences in socially desirable responding as differences in the measured consumer trait across countries. Second, consumers tend to agree with survey items or respond positively to questions irrespective of content. The literature refers to this response style as acquiescence or yea-saying (Krosnick, 1999). A scale that fails to account for yea-saying may not discriminate the true consumer trait from yea-saying, leading to over-reporting of the trait for specific consumers or countries. Third, some consumers have a tendency to answer all questions negatively, irrespective of content. The literature refers to this tendency as nay-saying (Baumgartner& Steenkamp, 2001; Greenleaf, 1992). Again, a failure to control for nay-saying will lead to under-reporting of the true trait of specific consumers and countries.

The broader literature on survey methods suggests measures for assessing these response tendencies and some corrections for them. However, these measures and corrections are either not simple, or not adequately used or tested in the context of cross-national survey research.

More importantly, there is not much clarity on how, if at all, response tendencies distort survey results. This paper uses the specific context of consumer innovativeness to empirically demonstrate how response tendencies distort self-reported innovativeness and new product adoption across countries.

Specifically, the current study has three goals: First, it compares the extent of these response tendencies across major countries of the world. Second, it examines the impact of these response tendencies on self-reported innovativeness and new product adoption. Third, it examines the individual and country level drivers of response tendencies. We use a large sample of 5569 respondents across 15 countries, both developed and developing, to address these issues. Our data are drawn from Tellis, Yin, & Bell (2009) though our objective, analysis and results are entirely different. While that study focuses on the patterns of adoption of new products across categories and countries, our study focuses on the response tendencies that could affect such results.

We contribute to the extant literature on response tendencies, consumer innovativeness and cross-nation survey research by demonstrating the following. Our results indicate the presence of systematic differences in response tendencies across countries. Not accounting for the presence of response tendencies lead to the distortion of the survey results, due to the over-reporting or under-reporting of the measured traits and stated behavior. For instance, in the specific context of innovativeness, we find that response tendencies lead to the following problems: 1) over-reporting or under-reporting of innovativeness for specific consumers or countries, 2) over-reporting of adoption of new products, and 3) distortion of the differences in innovativeness across countries. The method of standardization often suggested by survey researchers to correct for yea-saying and nay-saying may be neither valid nor effective. The use

of negatively valenced items can mitigate some of the above issues as these items seem to be less susceptible to any response tendencies.

The following sections describe the context of the study, the nature and measurement of response tendencies in survey research and the method, findings, and implications of this study.

2. Context of Consumer Innovativeness

Consumer innovativeness is one of the most important constructs related to the study of consumer behavior. It has been described as the stimulus that gives the marketplace its dynamic nature (Hirschman, 1980). Being a broad concept, it has been variously defined in the literature. For instance, Rogers (1995) defines innovativeness as the degree to which an individual is earlier in adopting new ideas than other members of the system. In this sense, the measurement of innovativeness predicts the timing of adoption. This focus has been central to the research on the diffusion of innovations (e.g., Bass 1969; Rogers 1995), as well as marketing practice[1] (Euromonitor Reports 2007). This study defines consumer innovativeness as the tendency of consumers to embrace new products. Our definition is consistent with a long tradition in the literature of defining various traits of innovativeness (Tellis, Yin and Bell, 2009). In this sense, consumer innovativeness is a complex phenomenon, which is elaborated in the literature through a variety of constructs (See Table 1).

Consumer innovativeness is an important driver of the innovation and growth of firms, the economic progress of a country and its' position in the global market (Chandrasekaran & Tellis, 2008; Steenkamp, Hofstede & Wedel, 1999; Tellis, Stremersch and Yin, 2003). Millions of dollars are spent annually on surveying consumer attitudes, behavior and expenditure in the

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[1] "Early Adopters – why you can't afford to ignore these consumers", Euromonitor Reports, 7 Nov 2007

context of adoption of new products and technologies, with an increasing focus on global

consumers. Prior research has found that survey-based dispositional innovativeness measures can

help explain purchase behavior in an international context (Gielens & Steenkamp, 2007).

This broad, rich, and important domain of consumer innovativeness provides a good

context in which to study the nature and impact of response tendencies on cross-national survey

research. This study also seeks to bridge the gap between cross-cultural research that examines

the extent of response tendencies, but do not demonstrate their impact in the specific domain of

consumer behavior, and survey research on global consumer attitudes and behavior which

ignores some or all of the response tendencies or does not demonstrate the impact of these

response tendencies across countries.

For instance, the extant cross-cultural literature has typically focused on within US

comparisons of response styles of people from different ethnic origins (e.g., Marín, Gamba, &

Marín, 1992). Only a few studies (Clarke III, 2001; De Jong et al., 2008; Harzing, 2006;

Johnson, Kulesa, Llc, Cho and Shavitt, 2005; Van Herk, Poortinga, and Verhallen, 2004)

empirically examine the extent and drivers of responses tendencies across countries, and fewer

studies focus on their impact on observed scores and relationships between scales (Baumgartner

& Steenkamp, 2001; Steenkamp, De Jong & Baumgartner, 2010). However, these studies do

not provide an assessment of all three response tendencies or empirically demonstrate the

distortions in results in a specific context relating to consumer behavior, across as wide a

selection of countries as the present study.

A few studies test measures of consumer attitudes in a global marketplace (such as

Alden, Steenkamp & Batra, 2006; Gielens & Steenkamp, 2007; De Jong, Steenkamp & Fox,

2007; De Jong & Steenkamp, 2010) but do not emphasize the differences in specific response

styles. Other researchers have developed or used various scales in the context of innovativeness (Roehrich, 2004). In reviewing these scales, we found that they shared four characteristics. First, each scale uses a large number of very similar items for the same construct. Second, the studies use predominantly positively valenced items. Third, few studies test for yea-saying or nay-saying. Fourth, few studies focus on international comparisons (Table 2).

3. Nature of response tendencies in survey response

We next describe the nature of the three response tendencies that may frequently occur in survey research and techniques used to assess or correct for them. We also elaborate on the specific indices we use to assess and compare response tendencies in the context of global consumer innovativeness.

3.1 Socially desirable responding

Socially desirable responding is the tendency of the respondent to present a desirable image of self to others. Socially desirable responding may occur intentionally or unintentionally (Paulhus, 1991). For example, a consumer, who does not possess Internet service when many people do have it, may agree when asked if he/she had subscribed to the service. This could be done intentionally in order to impress the researcher (impression management or the tendency to give favorable self description to other). But this type of responding can also occur unintentionally when respondents honestly perceive themselves to be more innovative than they really are (self-deception or the tendency to give favorably biased but honestly held self descriptions).

The simplest techniques to reduce socially desirable responding are to assure respondent anonymity, indirect questioning (Fisher, 1993), and to keep some distance between the

respondent and the researcher (through a telephone or mail survey). However, even these techniques are unable to fully control socially desirable responding. One reason might be the strength of the tendency among some respondents. Another reason might be the unintentional tendency to exaggerate the possession of socially desirable traits and behaviors among other respondents.

The frequently used test for socially desirable responding is the Marlowe-Crowne Scale (Crowne & Marlowe, 1960), especially in research in marketing (Steenkamp, De Jong & Baumgartner, 2010). This scale consists of 33 items that describe rare desirable traits or common undesirable traits. Respondents who suffer from socially desirable responding are likely to deny undesirable but common traits and affirm desirable but rare traits. The extent of socially desirable responding in a respondent is assessed by summing up such responses. Although this scale is reliable (Baumgartner & Steenkamp, 2001), the large number of items makes it burdensome for large cross-national studies. Shorter versions of the Marlowe-Crowne scale have been proposed in recent research (e.g., Strahan & Gerbasi, 1972), consisting of 10-20 items. Paulhus (1991), in a factor study of 10 socially desirability scales, concludes that the Marlowe-Crowne measure is primarily an impression management scale. In contrast, the Balanced Inventory of Desirable Responses (Paulhus 1984) can separately assess impression management and self-deceptive enhancement. This scale consists of 40 items, 20 to assess each dimension (an extended version includes 20 additional self-denial items). Fisher (2000) concludes that the current socially desirable responding scales are long and unwieldy to administer, contain items that may be inappropriate for some respondents, or contain items that are too general to be relevant to the consumption context. Further, the researcher does not know for sure what the true behavior might be.

While the knowledge of the true motivation or behavior may be hard to assess in the context of some psychological traits, we find a way to determine this, which is suitable in the context of innovativeness. In the surveys, we question the respondents for their level of awareness and adoption of several products: surround sound system, mobile telephone, high definition television, digital camera, online banking, automobile navigation system, combination washer-dryer, bread maker, organically grown vegetables, alcohol free beer, and cholesterol-reducing butter. We include two as yet unavailable products: home dry cleaning machine and home liver testing machine. The liver testing machine is entirely fictitious. The home dry cleaning machine was not yet available in the markets at the time of the survey. In spirit, our approach is similar to those in the above two scales. However, it differs from the above scales in that we know *for sure* what the response should be. The two products selected are functional, distinct, and not familiar in the realms of popular fiction or entertainment and any responses to the affirmative can pose a strong test of socially desirable responding. For each item, we use a four-point scale (never seen, seen but not bought, bought once, repurchased).

We use the following scoring system to capture the degree of socially desirable responding based on the responses to the two fictitious products. We score responses of seen but not bought, bought once, or repurchased, all of which are implausible, as one, two and three points respectively, else zero. The magnitude of the response tendency is captured by assigning points to capture the degrees of implausible responses. By summing up each respondent's scores on these two products, we measure the degree of socially desirable responding from a low of zero points to a high of six points.

3.2 Yea-Saying

Yea-saying is the tendency of respondents to agree with items regardless of content. Respondents may do so for a number of reasons including a desire to please, impulsiveness, deference to the researcher, uncritical reading of items, or difficulty with the scale itself (Baumgartner &Steenkamp, 2005). Regardless of the reason, the tendency becomes an issue for survey research only when a respondent systematically exhibits this response style across items. The literature proposes three ways of dealing with yea-saying: within-respondent standardization, regression of behavior on attitudes, and balancing valence of items.

One approach suggested by the literature to assess the amount of yea-saying is to assess the overall mean across the different items (Greenleaf, 1992; Hofstede, 2001). However, the mean itself may not capture all of yea-saying and may treat yea-saying and nay-saying as polar opposites. A second approach is to balance positively and negatively valenced items in the overall scale (Baumgartner & Steenkamp, 2001; Baumgartner & Steenkamp, 2005; Johnson et al., 2005; Leavitt & Walton, 1975; Martin, 1964; Winkler, Kanouse & Ware, 1982). Here, agreement with contradictory statements is presumed to reflect acquiescence (Winkler, Kanouse & Ware, 1982). Ideally, the researcher should have a negatively valenced item and a positively valenced item that are identical in content. However, such duplication may be difficult in marketing research (because some items may not have an exact opposite) and involves item redundancy. This problem is accentuated in cross-national surveys where time and cost is of the essence.

So the next best alternative is to have a balanced number of negatively and positively valenced items, even though they may not be exact polar opposites (Baumgartner & Steenkamp, 2001). While balanced scales have a built-in control for yea-saying they do not eliminate yea-

saying (Baumgartner & Steenkamp, 2005). Yea-saying can be simply captured by the extent of agreement to the heterogeneous items (Baumgartner & Steenkamp, 2001; Baumgartner & Steenkamp, 2005; Martin, 1964). The assumption here is that if a respondent consistently agrees with different items, he or she is reflecting yea-saying rather than any true position on the items (Baumgartner & Steenkamp, 2001; Baumgartner & Steenkamp, 2005). In a comparison of different yea-saying measures, the measure based on agreement with many heterogeneous items was found to have less skew and greater reliability in cross-national research than other measures (Baumgartner & Steenkamp 2005). Hence, we use this measure of yea-saying and develop the score as follows: If respondents strongly agree with an item, they receive a score of 2, if they agree with an item, they receive a score of 1, else 0. We then take the mean of these score across the 10 items (with five positively valenced and five negatively valenced items). The magnitude of yea-saying ranges from 0 to 2.

3.3 Nay-saying

Nay-saying is the tendency of respondents to disagree with items regardless of content. Nay-saying may occur due to lack of involvement, excessive modesty or reserve, or antagonism to the researcher. The motives for nay-saying are not the exact opposites for yea-saying. Hence, nay-saying cannot be regarded as the exact opposite of yea-saying. We measure the extent of the nay-saying using the opposite of the scoring of yea-saying, as in prior literature (Baumgartner & Steenkamp, 2001): If respondents strongly disagree with an item, they receive a score of 2, if they disagree with an item; they receive a score of 1, else 0. We then take the mean of these score across the 10 items. The magnitude of nay-saying ranges from 0 to 2.

In a later section, we assess the effectiveness of developing a 'net yea-saying score' which captures the overall difference between yea and nay-saying, as measured above. The net

yea-saying measure may be considered as a measure of a respondent's overall tendency to agree rather than disagree.

4. Method

This section explains the development of the instrument in the context of consumer innovativeness, the sampling, the procedure for administering the questionnaire across countries, and the analyses done to assess the extent, impact and drivers of response tendencies.

4.1 Development of the Instrument

We design our instrument to serve three goals: First, we want to use at least one item from the large variety of different constructs used in the context of consumer innovativeness. Second, we also want a broad set of items to cover constructs that are important in specific regions of the world, such as developing economies. For example, suspicion may not be a dominant factor in studies of innovativeness in the US. However, it may be an important trait that discourages adoption in totalitarian or some developing countries. Three, we need a set of items that is reasonably parsimonious. Extensive redundancy in items puts a huge burden on research especially when it is applied in a variety of countries and languages. For one, differences in the predictive validity of single-item and multi-item measures may be minimal in specific circumstances (Bergkvist & Rossiter, 2007; Bergkvist & Rossiter, 2009; Rossiter, 2002). For another, given a fixed number of questions, the use of multiple-item measures does not add much incremental information but may reduce the number of different constructs that can be investigated (Drolet & Morrison, 2001). With these three goals in mind, based on past studies, extensive discussions with managers, and extensive pre-testing across countries, we identify ten items for studying innovativeness across countries. We take care to ensure that half are positively

valenced and the other half negatively valenced. These ten items represent a variety of constructs associated with innovativeness proposed by many authors (see Table 1; Tellis, Yin and Bell 2009). We ask respondents to answer these ten items anchored for electronic products.

For the purpose of this study, the most important issue is not the items per se, but to assess the degree of response tendencies, if any, across various countries of the world.

4.2 Sampling

We conduct the survey in the following 15 countries across four continents: U.K.; France; Germany; Italy; Netherlands; Sweden; China; India; Japan; Korea; Singapore; Australia; U.S.; Canada; Brazil. We refine our questionnaire, consisting of the items relating to innovativeness, based on an extensive literature review and pre-tests with consumers in Australia, China, Finland, and US. We translate and back-translate the questionnaire into twelve different languages (Portuguese, Dutch, Swedish, French, German, Italian, Hindi, Urdu, Tamil, Mandarin, Japanese and Korean). In the interests of speed, response rate, and convenience, we survey consumers using telephone interviews. The target respondents' telephone numbers were generated through random digit dialing from a phone list of consumers purchased by our practitioner collaborator. We end up with a sample of 5569 respondents, distributed across 15 countries, ranging from 340 (smallest) to 430 (largest) country samples.

4.4 Analyses

The analysis proceeds as follows. First, we carry out descriptive analyses to assess the extent of and relationship among the key response tendencies across countries and to rank countries on these response tendencies. Second, we examine the effectiveness of the standardization correction. Third, we test in the context of consumer innovativeness how the

presence of response tendencies impacts the measures of innovativeness and country rankings. Fourth, we examine the drivers of response tendencies among individuals.

5. Results

We discuss the results in the following subsections: assessing socially desirable responding, yea-saying, and nay-saying response tendencies, relationships across response tendencies, effectiveness of standardization correction, effects on self-reported innovativeness, and drivers of variations in response tendencies.

5.1 Assessing socially desirable responding

As described earlier, we calculate the degree of socially desirable responding using the 7-point score (0 to 6) wherein for the two fictional products, we responses of seen but not bought, bought once, or repurchased, all of which are implausible, as one, two and three points respectively, else zero. We sum each respondent's scores on these two products to measure the degree of socially desirable responding.

A sizable number of respondents (2281 representing about 41 %) indicate they owned, repurchased, or had seen at least one of these products, though that situation was not possible. 27% of these 2281 respondents exhibit mild socially desirable responding in that they reported to have seen at only least one of these products. The correlation between the two products, though positive, across the entire sample is only .22, with an average of .31 for emerging countries and .18 for developed countries. The mean level of socially desirable responding in Italy and Singapore are significantly higher than the mean for respondents from other countries (Table 3). U.S. and China also exhibit high levels of socially desirable responding. At the other extreme, respondents from Australia, Canada, India, Sweden and U.K. have low mean levels of socially

desirable responding, which are significantly different from the mean for respondents from other countries.

Recent literature has unearthed complexities underlying socially desirable responding. Both self-deceptive enhancement and image management are described by Paulhus (1998) as distinguishing between two differing interpretations of socially desirable response. We test the correlation of the socially desirable responding measure with the Eysenck Personality Questionnaire (EPI) lie scale for 13 countries. Means on the Lie Scale of the Eysenck Personality Questionnaire (Eysenck & Eysenck, 1975) were taken from Van Hemert et al. (2002), who report means for this measure across 38 countries. The EPI lie scale loads on impression management rather than self deceptive enhancement (Paulhus, 1991). The correlation with the lie scale is a high .48, adding validity to the measure, and indicating that the socially desirable responding measure corresponds substantially but not perfectly with impression management.

Paulhus (2002) also classified socially desirable responding by domain of content. Egoistic response tendencies are a form of responding when people engage in agency-related contexts, such as assertiveness, status, control and independence. Moralistic response tendencies are when people engage in socially desirable responding in communion-related contexts, such as affiliation or connectedness. Steenkamp et al. (2010) determine the mean country scores for 26 countries for these two dimensions. We find a high positive correlation of .71 with the egoistic response tendency while the correlation with moralistic response tendency is a lower .48. The high correlation with the egoistic context adds further validity to our findings.

5.2 Assessing yea-saying

Recall that we measure yea-saying as the extent of agreement with items that are heterogeneous in content. We first check that the items are indeed heterogeneous in content. Item heterogeneity can be demonstrated by low correlations across *all* items (Baumgartner & Steenkamp, 2001; Baumgartner & Steenkamp, 2005). The average absolute correlation across all the 10 items across all 5569 respondents is only 0.05, with a range of -0.18 to 0.27. It is clear from the examination of the correlation across the 10 items and the underlying factor structure that the items do not form one specific factor. For the yea-saying measure if respondents strongly agree with an item, they receive a score of 2, if they agree with an item, they receive a score of 1, else 0. We consider the mean yea-saying score across the 10 items. We also estimate the overall mean across the ten items, which has also been thought in prior literature to be indicative of yea-saying (Greenleaf, 1992; Hofstede, 2001). The correlation between the overall mean and yea-saying is a high .8, indicating that the new measure has convergent validity with prior measures proposed in the literature.

Table 3 shows the variation of yea-saying across countries. The mean response tendencies of respondents in Brazil, India, China, Italy and South Korea are significantly higher than the mean for respondents in other countries. The mean level of yea-saying is significantly lower for respondents in Germany, Netherlands, Singapore, Sweden and U.K., than the respondents in other countries.

5.3 Assessing nay-saying

We measure nay-saying as the extent of disagreement with items that are heterogeneous in content. If respondents strongly disagree with an item, they receive a score of 2, if they disagree with an item, they receive a score of 1, else 0. We compute the mean nay-saying score

for each respondent. Table 3 shows the results for nay-saying. Netherlands and Japan show the highest levels of nay-saying. The mean response tendencies of respondents in Netherlands and Japan are significantly higher than the mean for other respondents. These countries are followed by Korea, Italy and Canada. Brazil, Singapore, and India show the lowest levels of nay-saying. The correlation of nay-saying with the mean across all items is -.8, across all respondents.

5.4 Relationships across response tendencies

We find that Asian countries, especially India, China, and to some extent Japan (for nay-saying), do respond in one extreme end of the spectrum, as indicated by their score on the various measures discussed above. This finding contradicts prior beliefs that people from Asian cultures tend to avoid the extreme ends of the scale to avoid diverging from the group (Hanges, 2004). We arrive at this observation by separately assessing yea-saying and nay-saying and not resorting to the standard deviation. A low standard deviation could reflect not only mid-point responding, but also high yea-saying or nay-saying, if the scale does not contain negatively valenced items. Some researchers suggest that East Asian cultures may seek to minimize dualities and encourage holistic and dialectical thinking (Wong, Rindfleisch, & Burroughs, 2003). Hence, East Asians may be more likely than Westerners to allow contradiction in their responses, as indicated by yea-saying or nay-saying response tendencies. This result is further supported by examining the degree of extreme-aversion (or mid-point responding), which is computed as follows: a respondent is assigned 1 if he or she answers at the midpoint of the 5-point Likert scale and 0 otherwise, for each item. The mid-point responding score is the mean of the points across items. Table 3 shows that India, China, and Korea actually score lower on the midpoint scales than other countries, though not Japan and Singapore.

We compare the correlation of the three response tendencies across all 5569 respondents. There are three important findings. First, the correlation between socially desirable responding and yea-saying, while positive and significantly different from zero, is only 0.06 (see Table 4). Second, the correlation between nay-saying and socially desirable responding is almost zero. Third, yea-saying and nay-saying are not strictly mirror images. The correlation, while negative and significantly below zero, is only -.31. This low correlation is also reflected in prior research (Baumgartner and Steenkamp, 2001). Countries which are high or low on one do rank in the middle for the other. Thus, even though both of these response tendencies may lead to respondents scoring high on the right side of certain scales, they are independent from each other. This is the first time that this independence has been shown empirically across so many consumers and countries of the world.

We can use the difference between the yea-saying and nay-saying measures to construct a net yea-saying measure. This measure captures the *overall* tendency of a respondent to agree with a statement, rather than to disagree. Table 3 ranks the countries on this dimension. Note that Korea and Italy scores high on mean yea-saying response, but they also score high on net nay-saying response, i.e., they reflect an overall tendency to extreme responses on both ends of the spectrum. This anomaly is captured in the net yea-saying measure, which shows that the mean scores of Italy and Korea are in fact *not* significantly higher from the mean of respondents in other countries. The net yea-saying measure has a very low correlation with two other response tendencies (that we do not analyze in this paper), - mean extreme responding (derived by coding a response of either strongly agree or strongly disagree as 1 and the rest as 0), and mid-point responding, as compared to the separate measures of yea or nay-saying (Table 4).

5.5 Effectiveness of standardization correction

The popular technique for correcting for yea-saying across heterogeneous items is standardization (Fischer 2004; Hofstede, 2001). For example, one of the most common standardization techniques, within-respondent standardization involves subtracting the mean and dividing by the standard deviation across all items for each respondent (Fischer, 2004; Greenleaf, 1992; Hanges, 2004; Hofstede, 2001). The proposed strength of this correction is that it is also supposed to correct for other response tendencies in survey response such as nay-saying, extreme value response, or mid-point responses. The thinking is that nay-saying represents low standard deviation and low mean and yea-saying represents low standard deviation and high mean (Baumgartner and Steenkamp, 2005; Greenleaf, 1992). The problem with this correction is that the researcher could well throw out the baby with the bath water. To appreciate the limitation of this correction, compare the results for a highly innovative respondent with one who suffers from yea-saying. Assume both answer four and five on several five-point positively valenced Likert items. The within-respondent standardization will not be able to discriminate between these two respondents and will correct for both of them in the same way. Note that the standardization correction does not by itself require that the instrument have both negatively and positively valenced versions of items.

Greenleaf (1992) suggests an elegant correction to resolve this problem *if the researcher has knowledge of the true or unbiased behavior* of the respondents. The correction involves regressing true behavior on the mean and variance of the item scores of attitude. The size and direction of the coefficients indicate the type and degree of bias in the responses. However, for many studies, only self-report behavior is available, true behavior is not. This is our situation,

where we study the innovativeness of consumers across nations, without access to their true individual behavior.

To check the validity of the standardization approach, we compare our estimate of these response tendencies with average standard deviation across respondents. Table 4 shows that the correlation between standard deviation and yea-saying is significantly above zero at 0.37. Further, note that the correlation between nay-saying and standard deviation is also high at 0.67. Thus, neither high yea saying nor nay-saying are associated with low standard deviation. Hence, division by standard deviation will not correct for either yea or nay-saying

These results become clearer when we examine the country averages for standard deviation. Table 3 shows that Italy, Japan, Korea, and Canada have high standard deviation. Now, the standardization correction would treat the variance in these countries alike. However, the actual distribution of response tendencies varies across these countries. For instance, Italy and Korea scores high on both yea-saying and nay-saying. Japan and Canada score high on nay-saying but rank midway on yea-saying. Indeed, the standard deviation correction may not fully capture these nuances. We demonstrate in the next section how the standardization correction may in fact further distort self-reported innovativeness scores.

5.6 Effects on self-reported innovativeness

Response tendencies can cause a non-trivial distortion of observed scores on constructs (Baumgartner & Steenkamp, 2001). We next examine three types of impacts: 1) over-reporting or under-reporting of innovative traits for specific consumers or countries, 2) over-stating of self-reported adoption of new products, and 3) distorting the differences in innovativeness across countries.

5.6.1 Over-reporting and under-reporting of innovative traits

T o validate the measures of innovativeness while controlling for response tendencies, ideally we needed observed (true) measures of the innovative traits of our respondents with respect to new products (Greenleaf, 1992). Unfortunately, such data is very difficult to get. Often, as in our case, the collection of self-report data proceeds precisely because true measures are unavailable. However, we have secondary data on the penetration of new products (Chandrasekaran & Tellis, 2008; Tellis, Yin & Bell, 2009). We collect the market penetration data of 7 key radical innovations from the Global Marketing Information Database of Euromonitor Inc., World Development Indicators and Dealerscope.

The products and services are: auto-navigation system, DVD player, digital camera, Internet, Broadband, mobile phone and CD player, and we collect the market penetration data from the year of introduction to 2005. Following Dekimpe, Parker & Sarvary (1998), we match countries on the time origin, and hence compare the market penetration data for the different countries based on the time since introduction using the following procedure. First, we consider the market penetration level 5 years post introduction for the most recent categories- digital camera, DVD player, and broadband, and 10 years post introduction for mobile phone, internet, CD player and satellite TV. For auto-navigation, introduced most recently, we consider the year four years post introduction. Second, we take the average market penetration for each country across these products, for the year determined as above (See Table 3). Third, we compare the country averages of each survey item with this market penetration data. For positively valenced item, we would expect a positive correlation, and for negatively valenced items, we would expect a negative correlation. .

The results (Table 5a) indicate that of all the items, only three negatively valenced items- inertia, nostalgia, and suspicion, have correlations with average market penetration that are in the

expected direction. The results in Table 5a present two findings. First, the positively valenced items suffer more from yea-saying and socially desirable responding than negatively valenced items. Thus, positively valenced items are strongly correlated with market penetration but in the wrong direction! Second the presence of response tendencies leads to over-reporting and under-reporting of innovative traits in specific countries, leading to false or low correlations with objective measures.

Would the standardization correction help correct these distortions? We examine the correlation of market penetration with the country averages of individual items after the standardization correction in Table 5a. The positive items, except venturesomeness, still exhibit the wrong sign (negative relationship with market penetration), though to a lesser extent than before. All the negative items show much weaker or positive relationships with market penetration. This result further supports our contention that the standardization correction may suppress the actual variance.

5.6.2 Impact on stated probabilities of purchase for available items

We have demonstrated that the presence of response tendencies leads to over-reporting or under-reporting of specific innovative traits. We next examine whether the presence of socially desirable responding may lead to the over-reporting of stated adoption of new products. Specifically, we compare self-reported adoption of new products between those respondents showing socially desirable responding (SDR) and those free of it. We code for each respondent, a response of purchase or repeat purchase of new products (such as surround sound, HDTV, bread maker) as 1, else 0. We then compare the means of this measure across respondents who exhibit the response tendency to those who do not.

The results of this analysis are reported in Table 5b. The null hypothesis tested is that the two means are the same (in the SDR present vs. absent groups) against the alternative that they are different. The 2-sample T test reveals that the SDR absent group has significantly lower means (at the 1% level) compared to the SDR present group for almost all the products. This analysis is replicated if we conduct it separately for *each* of the two SDR items. The differences point out to over-reporting of adoption of new products by those showing high socially desirable responding. This response tendency also probably accounts for the distorted ranking of innovativeness of countries, shown in the next analysis.

5.6.3 Distortion of innovativeness rankings

How does the presence of response tendencies lead to the distortion of rankings of innovativeness across countries?

Recall that the survey asks the respondents for their level of awareness and adoption of several products. For two of these products (digital camera and auto navigation), we cross-validate the results in the survey with market penetration data from Euromonitor reports (Global Marketing Information Database) across the same 15 countries for the same year. We assess the country rankings for consumer adoption of these two products in the surveys by summing up the percentage of respondents who either claimed to have *purchased* or *repeat purchased* these products. We compare this ranking of countries in adoption of these two products to those obtained from the market penetration data. Table 6a shows a comparison of the ranks based on the survey to that based on market penetration data. Since Euromonitor Inc. obtains the market data from several market sources, including national statistics and trade reports, and not consumer surveys, we may assume they do not suffer the same self-report issues that consumer

surveys suffer. Thus, comparisons of rankings of countries on adoption of products across the survey and market data enable us to assess the potential impact of survey response tendencies.

For digital camera, among the highest difference in country rankings between the survey and market penetration data is for Italy. Based on the survey, Italy ranks 2nd in the adoption of the digital camera across all 15 countries. However, based on the market penetration data, Italy's rank is much lower at 12th, just above Brazil, China and India. Recall also, that Italy was the highest on our measure of socially desirable responding. These results suggest that social desirable responding causes survey response to give a false high rank of market adoption for Italy. The ranking based on survey is also much higher for India and Korea, and much lower for Japan and Canada than that based on market penetration data. For instance, Japan ranks 12th based on the survey but 1st based on market penetration data and India ranks 10th based on the survey and 15th based on market penetration data. By way of explanation, the statistics in Table 4 show that Japan and Canada scores high on nay-saying while India and Korea scores high on yea-saying, accounting for the distorted rank in adoption based on the survey.

For auto navigation, Italy once again shows a higher rank in the survey than in market penetration data, as also Singapore. Both Italy and Singapore score high on socially desirable responding. At the other end, Netherlands, which scores high on nay-saying, has a lower rank in the survey than in market penetration data. Note: India also shows a lower rank in the survey than with the aggregate data, but at this time, the product was unavailable in the country, as in other emerging markets. The above results show that systematic under- or over-reporting of self-reported product adoption as assessed by our metrics of response tendencies may lead to a distortion in country rankings on innovativeness based on surveys.

We extend the above descriptive analysis to examine the impact of response tendencies on *individual* new product adoption via a logistic regression. The dependent variable in this analysis is the probability of a respondent stating that he or she has adopted a product (either purchased or repeat purchased, coded as 1, else 0). The independent variables are the extent of socially desirable responding, yea-saying, and nay-saying. For the control variables, we include demographic characteristics of the respondents, obtained from the survey, cultural dimensions obtained from the Global Leadership and Organizational Behavioral Effectiveness study (House et. al., 2004), a mean income variable (across respondents) reflecting wealth, and a stated innovativeness measure obtained from a factor analysis that we conduct across the 10 innovativeness items. We use principal components analysis with a Varimax rotation, wherein we find that the four negative valenced items (nostalgia, inertia, suspicion and frugality) form one of three factors. Since the negative valenced items show the most independence from response tendencies (Table 5a), we use this factor, reflecting "stated innovativeness", in the regression. We run the logistic analysis across the 5569 respondents (Table 6b) in two steps, first assessing the impact of the control variables, and then the additional impact of the response tendencies.

For digital camera, we first examine the results of Model 1A, which consists of only the control variables. The coefficient of the variable capturing stated innovativeness, comprising of the 4 negative valenced items, is negative and significantly different from zero (Table 6b). This result indicates that the probability of the respondent stating that (s)he has adopted a new product is related to the stated innovativeness level of the respondent. Male, younger, more educated and higher income respondents are more likely to report purchase of the digital camera. Among the cultural factors, we find a positive and significant coefficient for uncertainty avoidance. The

coefficient of mean income (across all respondents in a country) is also positive, reflecting an overall country wealth effect on adoption of the new product.

In model 2A, we add the impact of the three response tendencies. The probability of stated adoption is positively related to the extent of socially desirable responding and yea-saying and negatively related to the extent of nay-saying, controlling for the effect of stated innovativeness, cultural dimensions and demographic characteristics. We find that this model has lower AIC and SC figures as compared to the controls-only model.

 Similarly, for auto-navigation, in the controls-only Model 1B, we find a negative and significant effect of stated innovativeness. That is, respondents who report more of negative innovativeness traits are less likely to report purchase of the product. Male, younger, and higher income respondents are more likely to report purchase of the auto-navigation system (Table 6b). The coefficient of power distance is positive and significant. We think that the high correlation between power distance and collectivism may account for this unexpected sign. The coefficient of mean income is also positive and significant.

In Model 2B, we find a positive effect of socially desirable responding and yea-saying, over and above the effects of the control variables- stated innovativeness, gender, age, income and in-group collectivism. We find that this model has lower AIC and SC figures as compared to the controls-only model.

Hence, this analysis provides further support for the idea that the presence of response tendencies can lead to non-trivial distortion of self-reported adoption behavior across countries. However, we show that negative valenced items capture product adoption *independent* of the influences of response tendencies. Put another way, our analysis indicates that we can determine

the impact of the measured trait on stated behavior, *controlling* for the impact of response

tendencies, rather than *correcting* for them.

5.7. Drivers of variations in response tendencies

We next examine how the extent of response tendencies is related to important

demographic characteristics of respondents: gender, age, education and income, controlling for

country effects through dummy variables. We run the regression separately by response type

(Table 7a). We use fixed effects to capture country effects. The findings on the fixed effects

(with US as the base country) correspond strongly to the country rankings seen earlier, adding

validity to our earlier analysis.

Controlling for strong country effects, yea-saying is related more to men rather than

women, to younger rather than older respondents and to lower levels of education.

Controlling for country level fixed effects, nay-saying seems to be associated less with

men than with women, and more with older than younger respondents.

Controlling for fixed country effects, we find that socially desirable responding is

associated more with younger respondents and respondents in higher income groups.

What are the country characteristics that may reflect a cultural tendency towards yea-

saying? To understand this, we run an additional robustness analysis based on hierarchical linear

modeling (Littell et al., 1996; Raudenbush & Bryk 2002; Singer 1997). We consider the main

effect of two country-culture dimensions (Collectivism and Uncertainty Avoidance) of the

Global Leadership and Organizational Behavioral Effectiveness study (House et. al., 2004), that

have theoretical relevance to this research, controlling for person level predictors. The culture

dimensions are centered around the grand mean, while the individual level covariates are mean-

centered at the country level. We used SAS PROC MIXED (Littell et al., 1996; Singer 1997) to

estimate the models (Table 7b). For yea-saying, the coefficient for Collectivism is positive and significantly different from zero. Since collectivist societies are associated with consensus seeking and social harmony, individuals in such societies may be more likely to agree with statements, irrespective of content. The coefficient for Uncertainty Avoidance is negative and significantly different from zero. When there is high tolerance for ambiguity, individuals can be inconsistent with their responses, such as answering affirmatively to both positive and negatively valenced items. Male, younger, less educated respondents are likely to exhibit a greater amount of yea-saying. For nay-saying, only the coefficient for Collectivism is negative and significantly different from zero. Because collectivist societies seek harmony, individuals in such societies may be less likely to disagree with statements, irrespective of content. Female and older respondents are more likely to exhibit nay-saying. With respect to socially desirable responding, we find that the two cultural dimensions we include are not significantly different from zero, while we find effects for age (negative) and income (positive).

6. Discussion

Our goals were to determine how and why three common response tendencies (socially desirable responding, yea-saying and nay-saying) vary across countries, and assess the impact of these response tendencies on measures of self-reported innovativeness and new product adoption. We used a sample of 5569 consumers drawn from 15 countries. This section presents the key findings, implications, and limitations of the study.

6.1 Key findings

Our analyses lead to five broad findings:

First, we find evidence of systematic differences in the level of response tendencies across countries, which have been largely overlooked in prior marketing literature. The mean level of socially desirable responding varies substantially across countries and is highest in Singapore and Italy. The extent of yea-saying varies dramatically across countries, being highest in Brazil and India. Netherlands and Japan have the highest mean-levels of nay-saying. Asian countries, especially India, China, and to some extent Japan (for nay-saying), do respond in one extreme end of the spectrum, as indicated by their scores.

Second, socially desirable responding and yea-saying show a low correlation. Socially desirable responding and nay-saying show no correlation. The correlation between nay-saying and yea-saying is much less than expected. A single remedy, such as standardization, may neither be valid nor effective in mitigating these response tendencies.

Third, the presence of these response tendencies in global surveys may lead to over-reporting or under-reporting of important traits and purchase behavior, and the distortion in distortion of key patterns across countries. In the context of innovativeness, we find that response tendencies lead to: 1) over-reporting or under-reporting of innovativeness traits, 2) over reporting of new product adoption and 3) distortion of the differences in innovativeness and new product adoption for specific consumers or countries.

Fourth, the analysis reveals that negative valenced items should be included in global surveys. We find that negatively valenced items provide the quadruple benefit of parsimony, lower susceptibility to response tendencies, applicability across many countries, with some predictive validity. On the other hand, positively valenced items do not do well. We suggest that the result may be because consumers (in some countries more than others) are more prone to respond honestly to negatively valenced rather than to positively valenced items.

Fifth, the response tendencies reflect association with both stable cultural traits, as well as individual differences. For instance, yea-saying is associated positively with Collectivism, and negatively with Uncertainty Avoidance. Nay-saying is associated negatively with Collectivism. Controlling for country effects, individual level variables (e.g. age, education, income and gender) provide some explanation for the differences in the degree of response tendencies across individuals. Yea-saying is related more to men rather than women, to younger rather than older respondents and to lower levels of education. Nay-saying seems to be associated less with men than with women, and more with older than younger respondents. Socially desirable responding is associated more with younger respondents and respondents in higher income groups.

6.2 Research implications

This study has implications for the broader domain of survey research, as well as the specific contexts of consumer innovativeness and new product diffusion.

First, we demonstrate that there is a dramatic variation across countries in all three response tendencies. We also demonstrate that a failure to account for these response tendencies may lead researchers to over-report or under-report the specific consumer trait under observation. Earlier meta-analysis (Baumgartner & Steenkamp, 2001) reveals that most marketing researchers are not overly concerned with response tendencies. No prior study has shown the actual extent of over-reporting or under-reporting of the consumer behavior under study; in the context of innovativeness, we show that this lack of concern may hurt the validity of the results.

Second, positively valenced items tend to suffer most from yea-saying and socially desirable response tendencies. They seem to have limited usefulness, especially if used alone. Negatively valenced items may help predict the phenomena under study, independent of the

impact of response tendencies. Thus, prior research that resorted primarily to positively valenced items needs to be re-evaluated. While positive valenced items seem to be used more often than negative valenced items in surveys, possibly because they seem easier to understand, this study points out at the importance of using negatively valenced items. Researchers should definitely include simply worded negatively valenced items in their scale, at least as much if not more than positively valenced items.

Third, the use of fictitious products, brands or ideas provides researchers a way to test or compare survey responses with responses they *know* to be true, and hence may help researchers assess the extent of socially desirable responding in self-reported innovativeness or new product adoption surveys. Further, the use of fictitious ideas/brands/categories can be tailored to suit the context of products/countries that are being surveyed, which makes the measure adaptable across contexts. Further research on the use of fictitious products or ideas can greatly help progress the research on socially desirable responding.

6.3 Limitations

Several limitations of the study suggest areas for future research.

First, we use two fictional, functional products to assess the extent of socially desirable responding, in the context of consumer innovativeness. The correlation between the two products is a low .22. While this is a cause for concern, we feel that this limitation is not fatal to our paper, given the findings of over-reporting of adoption of new products by those respondents showing high socially desirable responding, as well as high correlations with established measures. The measure may be improved by a more judicious choice of products and selection of a larger number of products (four or five, compared to just two). Further, the nature of socially desirable responding may be context specific. Future research can study the use of other

fictitious products to see what factors may cause the magnitude of socially desirable responding to vary both within a country and across countries. Further, the use of fictitious products can be generalized to cover other types of innovations and ideas.

Second, we tend to sample wealthier and better educated individuals, especially in less developed countries. This bias was primarily a function of mobile telephone and landline ownership, which was more severe in some countries such as India and China.

Third, post survey debriefings with interviewers revealed that some consumers from some nations were hesitant to answer questions of a personal nature (i.e., being suspicious of governments and firms). This was particularly the case in Japan and Korea. Thus, future research may focus on developing items and instruments that are better suited to such cultures. Further, the respondents' understanding of new products varied substantially across cultures. We think that meeting face-to-face with consumers or using a format that uses pictorial representation of new products, together with examples and detailed descriptions, may be more appropriate, as compared to the telephone interviewing technique we used, particularly in emerging markets (see Burgess & Steenkamp, 2006 for an assessment of data collection techniques suitable for emerging markets).

Fourth, our research indicates the need for caution in the use of scales dominated entirely or to a large extent by only positively valenced Likert scales, and the use of the standardization correction. This indicates a need for further methodological improvements in the area of survey research in identifying how to minimize the occurrences of, reduce the impact of, or better use the information derived from such response tendencies post facto.

Fifth, our measures of yea-saying and nay-saying are all based on equal weighting of each item. Recently, De Jong et al. (2008) show that in the context of extreme responding, equal

weighting is inferior to unequal weighting as different items may generate different levels of a response tendency. Future researchers may weigh this cost of equal weighting with the benefit of enhanced simplicity.

Sixth, we use a standard five point response format in our survey, labeled at the end points. A recent study (Weijter, Cabooter & Schillewaert, 2010) indicates that the choice of the number of response categories, as well as the labeling of the response categories may aggravate the occurrence of specific response styles. Future research might examine whether scale format interacts with culture to impact response styles.

Table 1
Constructs associated with innovativeness

Construct	Definition of the construct	Item used in this study	Literature support for the construct
Novelty Seeking	Novelty seeking is a desire to seek out new product information (Manning, Bearden, & Madden, 1995)	I enjoy the novelty of owning new products	Dabholkar & Bagozzi, 2002; Hirschman, 1980; Manning et al., 1995; Midgley & Dowling, 1993 ; Roehrich, 2004; Venkatraman & Price, 1990
Risk Taking (Venturesomeness)	Risk taking is a willingness to take risks in the purchase of new products (Robertson & Kennedy, 1968)	I relish the gamble involved in buying new products	Clarke III, 2001; Gatignon & Robertson, 1985; Ostlund, 1974; Raju, 1980; Robertson, 1971; Robertson & Kennedy, 1968; Rogers, 1995; Steenkamp & Baumgartner, 1992; Venkatraman & Price, 1990
Variety Seeking	Variety seeking is alternating between variations of a product on successive purchase occasions for stimulation or a change of pace(Steenkamp & Baumgartner, 1992)	I constantly find new ways of living to improve over my past ways	Baumgartner & Steenkamp, 1996; Gatignon & Robertson, 1985; McAlister & Pessemier, 1982; Raju, 1980; Steenkamp & Baumgartner, 1992
Opinion Leadership	Opinion leadership is the influence a few individuals exert on the purchasing behavior of others in a community(Flynn, Goldsmith, & Eastman, 1996)	Others often ask me for advice about new products	Burt, 1987; Flynn et al., 1996; Gatignon & Robertson, 1985; Midgley & Dowling, 1993
Stimulus Variation	Stimulus variation is a consumer's native preference for unfamiliar external stimuli over the familiar	I like being exposed to new ideas	Mittelstaedt, et al., 1976; Raju, 1980; Roehrich, 2004; Steenkamp & Baumgartner, 1992
Habituation	Habituation is consumer's resistance to change	I hate any change in my routines and habits	Kogan & Wallach, 1964; Robertson, 1971; Schaninger, 1976
Nostalgia	Nostalgia is a longing for the past and a preference for products and contexts that were prevalent in prior periods	Products are getting shoddier and shoddier	Holbrook. 1993; Holbrook and Schindler. 1994 Steenkamp, Hofstede and Wedel 1999
Suspicion	Suspicion is consumers' fear for their privacy or doubt of the intentions of marketers of new products and services	Many new products allow firms or governments to spy on individuals	Dickerson and Gentry 1983; Parasuraman, 2000
Inertia	Customer inertia is an absence of goal-directed behavior (Zeelenberg & Pieters, 2004)	Purchasing new products takes too much time and effort	Bettman, 1979; Fiske & Taylor, 1984; Shugan, 1980
Frugality	Frugality is consumers' reluctance to pay high prices for new products because of their desire to save money	New products have an unacceptably high price	Golder & Tellis, 1997

Table 2

Assessment of response tendencies in surveys relating to consumer innovativeness

Study	Explicit test for social desirability?[a]	Explicit test for yea-saying?[a]	Explicit test for nay-saying?[a]	Inclusion of negatively valenced items?[b]	# of items	Global Context?
Robertson & Kennedy (1968)	No	No	No	-	4	No
Ostlund (1974)	No	Yes	No	No	2	No
Leavitt & Walton (1975)	Yes	Yes	No	Yes	40	No
Mittelstaedt et al. (1976)	No	No	No	Yes	22	No
Hurt, Joseph & Cook (1977)	Yes	No	No	Yes	20	No
Raju (1980)	Yes	No	No	Yes	39	No
Dickerson & Gentry (1983)	No	No	No	No	60	No
Venkatraman & Price (1990)	No	No	No	No	16	No
Goldsmith & Hofacker (1991)/ Goldsmith & Flynn (1992)/Goldsmith, Hauteville & Flynn (1998)	Yes	Yes	No	Yes	6	No/No/Yes
Holbrook (1993)	No	No	No	Yes	20	No
Holbrook & Schindler (1994)	No	No	No	Yes	8	No
Manning, Bearden & Madden (1995)	No	No	No	Yes	14	No
Flynn, Goldsmith, & Eastman (1996)	No	Yes	No	Yes	6	No
Baumgartner & Steenkamp (1996)	Yes	No	No	Yes	20	Yes
Steenkamp, Hofstede & Wedel (1999)- subset of Baumgartner & Steenkamp (1996)	Yes	No	No	Yes	5	Yes
Parasuraman (2000)	No	No	No	Yes	36	No
Baumgartner & Steenkamp (2001)	No	Yes	Yes	Yes	60	Yes
Dabholkar & Bagozzi (2002)- based on Mehrabian & Russell's Arousal Seeking scale	No	No	No	Yes	6	No
Im , Bayus & Mason 2003 (2003) - subset of Kirton's scale	No	No	No	No	11	No
Steenkamp & Gielens (2003)	No	No	No	Yes	20	No
Tellis, Yin & Bell (2009)	Yes	No	No	Yes	10	Yes
This study	**Yes**	**Yes**	**Yes**	**Yes**	**10**	**Yes**

Notes:

[a]The term 'Explicit' refers to whether the study specifically mentions the inclusion of the test.

[b]Where negative valenced items were included, the inclusion of equivalent or near-equivalent number of positive and negative items is believed to reduce the occurrence of yea-saying

Table 3
Cross-country comparisons of response tendencies

Country	No. of respondents	Mean socially Desirable responding	Mean yea-saying	Mean nay-saying	Net yea-saying	Mean mid-point response	Standard Deviation across 10 survey items	Mean penetration[c]
Australia	395	0.28 [a]	0.57	0.41	0.16	0.25 [b]	1.15	14.04
Brazil	382	0.58	0.73 [b]	0.32 [a]	0.40 [b]	0.08 [a]	1.04	6.88
Canada	331	0.27 [a]	0.60	0.47 [b]	0.13 [a]	0.26 [b]	1.27	10.34
China	392	0.75 [b]	0.62 [b]	0.39 [a]	0.23 [b]	0.16 [a]	1.12	2.91
France	370	0.51	0.58	0.43	0.15	0.14 [a]	1.12	7.22
Germany	374	0.49	0.47 [a]	0.38 [a]	0.09 [a]	0.27 [b]	1.01	13.30
India	430	0.18 [a]	0.68 [b]	0.36 [a]	0.32 [b]	0.15 [a]	1.11	1.41
Italy	363	1.24 [b]	0.67 [b]	0.48 [b]	0.19	0.23 [b]	1.31	7.17
Japan	357	0.48	0.59	0.51 [b]	0.08 [a]	0.26 [b]	1.28	17.22
Korea	338	0.60	0.69 [b]	0.49 [b]	0.20	0.11 [a]	1.28	12.04
Netherlands	345	0.58	0.50 [a]	0.52 [b]	-0.02 [a]	0.22	1.17	15.53
Singapore	340	1.18 [b]	0.54 [a]	0.35 [a]	0.19	0.27 [b]	1.04	18.54
Sweden	346	0.32 [a]	0.55 [a]	0.44	0.12	0.29 [b]	1.21	16.20
UK	405	0.39 [a]	0.51 [a]	0.43	0.08 [a]	0.16 [a]	1.05	12.37
USA	401	0.75 [b]	0.61	0.44	0.17	0.21	1.21	12.88

[a] Mean for the respondents in that country is lower than the mean of respondents of all other countries (p<0.01) using the single-sample t-test
[b] Mean for the respondents in that country is higher than mean of respondents of all other countries (p<0.01)
[c] Mean penetration of 8 information, entertainment and communication products and services, considered 5/10 years after introduction
Note: Above analysis considered the average score over all respondents for a particular country

Table 4

Correlations of measures for response tendencies[a]

	Yea-saying	Nay-saying	Socially desirable responding	Standard deviation across 10 survey items	Net yea saying	Extreme responding	Midpoint responding
MEAN	0.6	0.43	0.57	1.16	0.17	2.29	0.2
STD	0.26	0.25	0.79	0.31	0.41	2.24	0.17
N	5569	5569	5569	5569	5569	5569	5569
Yea-saying	1						
Nay-saying	-0.31	1					
Socially desirable responding	0.06	-0.03	1				
Standard deviation	0.37	0.62	0	1			
Net yea saying	0.82	-0.8	0.05	-.14	1		
Extreme responding	0.49	0.48	0.03	0.86	0.02	1	
Midpoint responding	-0.43	-0.32	0	-0.33	-0.08	-0.11	1

[a] Analysis considered the average score over all 5569 respondents

Table 5a
Correlation of average penetration with mean of individual items (before and after standardization)[a]

Items	Correlation of items with average penetration of 7 products n years after introduction before standardization	Correlation of items with average penetration of 7 products n years after introduction after standardization
Positively valenced items[b]		
Stimulus variation	-.45	-.23
Venturesomeness	.02	.45
Variety seeking	-.48	-.29
Novelty seeking	-.67	-.56
Opinion leadership	-.60	-.48
Negatively valenced items[c]		
Inertia	-.07	.16
Nostalgia	-.57	-.19
Suspicion	-.22	.09
Habituation	.29	.49
Frugality	.07	.41

[a]N=15
[b]Stimulus variation, Variety seeking, Novelty seeking, Venturesomeness and Opinion leadership are positively valenced items and are expected to be positively correlated with average penetration Note
[c]Habituation, Inertia, Nostalgia, Suspicion and Frugality are negatively valenced items and are expected to be negatively correlated with average penetration

Table 5b
Comparisons of means of stated purchase/repeat purchase of products for SDR and no SDR respondents[b]

Variable	Mean for No SDR respondents	Mean for SDR respondents
Surround sound	0.24	0.41[a]
Mobile phone	0.70	0.89[a]
HDTV	0.15	0.28[a]
Digital camera	0.31	0.46[a]
Online banking	0.32	0.37[a]
Auto navigation system	0.05	0.11[a]
Combination washer-dryer	0.19	0.30[a]
Bread maker	0.16	0.20[a]

[a] Denotes that the mean for the group of respondents not displaying socially desirable responding (SDR) are significantly lower compared to the group of respondents displaying socially desirable responding, based on a 2-sample t test, with a significance level of 1%
[b]Results are replicated if we run the analysis for each SDR item separately (except for online banking where we detect no significant differences between the two categories for liver testing machine)

Table 6a

Comparisons of survey and population penetration ranks for digital camera and auto-navigation systems

	Ranking of adoption of digital camera from survey[a]	Ranking of adoption of digital camera from aggregate penetration statistics[a]	Ranking of adoption of auto navigation from survey[a]	Ranking of adoption of auto navigation from aggregate penetration statistics[a]	Digital camera: Deviation of penetration rank from survey rank[b]	Auto navigation: Deviation of penetration rank from survey rank[b]
Australia	6	6	11	12	0	1
Brazil	15	13	14	12	-2	-2
Canada	13	7	10	9	-6	-1
China	14	14	13	11	0	-2
France	9	10	7	5	1	-2
Germany	8	8	1	6	0	5
India	10	15	15	12	5	-3
Italy	2	12	4	10	10	6
Japan	12	1	2	1	-11	-1
Korea	5	11	3	4	6	1
Netherlands	3	3	6	2	0	-4
Singapore	1	2	8	12	1	4
Sweden	7	9	9	3	2	-6
UK	11	4	12	8	-7	-4
USA	4	5	5	7	1	2

[a]A low rank indicates higher product adoption.

[b]High positive deviations indicate that the country scores higher on innovativeness rankings in survey compared to aggregate penetration statistics.

Table 6b

Impact of response tendencies on probability of a response of 'purchased' or 'repeat purchased'

	Digital Camera				Auto Navigation			
	Coefficient	P>Z	Coefficient	P>Z	Coefficient	P>Z	Coefficient	P>Z
	Model 1A		Model 2A		Model 1B		Model 2B	
Control variables								
Innovativeness factor- (4 Negatively valenced items)	-.06	.05	-0.33	<.0001	-.04	.40	-0.17	0.02
Male	.16	.01	0.11	0.07	0.53	<.0001	0.53	<.0001
Age	-.26	<.0001	-0.23	<.0001	-.13	.00	-0.12	0.01
Education	.31	<.0001	0.33	<.0001	.09	.15	0.09	0.14
Income	.38	<.0001	0.35	<.0001	.52	<.0001	0.50	<.0001
Uncertainty avoidance	.16	.01	0.15	0.02	.13	.22	0.16	0.14
In-group collectivism	.03	.57	-0.11	0.09	-.13	.26	-0.33	0.007
Power distance	.06	.56	0.10	0.37	.93	<.0001	0.97	<.0001
Mean income	.20	.03	0.17	0.07	.87	<.0001	0.77	<.0001
Impact of response tendencies								
Socially desirable responding			0.42	<.0001			0.5	<.0001
Yea-saying			0.9	<.0001			0.73	0.002
Nay-saying			-0.98	<.0001			-0.14	0.59
Constant	-3.27	<.0001	-3.09	.00	-11.24	<.0001	-11.14	<.0001
Observations	5569		5569				5569	
Pseudo R square	.11		0.16		.11		0.14	
AIC	6667.740		6460.647		2687.755		2611.097	
SC	6733.613		6546.281		2753.628		2696.732	
-2LL	6647.740		6434.647		2667.755		2585.097	

Table 7a
Drivers of response tendencies

	Yea-saying		Nay-saying		Socially desirable responding	
	Coefficient	T value	Coefficient	T value	Coefficient	T value
Male	0.03	4.21*	-0.02	-3.01*	0.02	0.89
Age	-0.01	-3.27*	0.01	4.35*	-0.01	-1.77***
Education	-0.01	-3.28*	0.00	.08	0.01	0.79
Income	0.00	1.23	-0.003	-.95	0.04	3.43*
Australia	-0.04	-2.61*	-0.03	-1.68	-0.47	-8.99*
Brazil	.11	5.92*	-0.11	-6.21*	-0.13	-2.44**
Canada	-0.01	-0.49	0.03	1.47	-0.48	-8.72*
China	0.01	0.27	-0.04	-2.15**	0.04	0.73
France	-0.04	-1.94***	0.00	-.29	-0.23	-4.21*
Germany	-0.15	-8.09*	-0.06	-3.26*	-0.25	-4.61*
India	0.06	3.29*	-0.07	-4.05*	-0.54	-10.12*
Italy	0.05	2.84*	0.04	2.15**	0.52	9.67*
Japan	-0.03	-1.37	0.08	4.40*	-0.26	-4.75*
Korea	0.07	3.81*	0.05	3.04*	-0.13	-2.43**
Netherlands	-0.12	-6.31*	0.08	4.60*	-0.16	-2.87*
Singapore	-0.08	-4.34*	-0.08	-4.64*	0.45	8.10*
Sweden	-0.07	-3.61*	0.00	-0.01	-0.41	-7.50*
UK	-0.10	-5.75*	-0.01	-0.59	-0.33	-6.30*
Constant	.66	31.98*	0.41	21.16*	0.65	10.77*
Observations		5569		5569		5569
R square		0.08		0.06		0.14

*p<.01, ** p<.05, ***p<.10

Table 7b
Hierarchical linear model

	Yea-saying		Nay-saying		SDR	
Independent variables	Estimate	P value	Estimate	P value	Estimate	P value
Intercept	0.60	<.0001	0.43	<.0001	.57	<.0001
Main effects (individual level)						
Gender	.03	<.0001	-0.02	.002	0.02	0.37
Age	-0.01	.001	.01	<.0001	-0.01	.08
Education	-0.01	.001	0.0003	.94	.01	.43
Income	0.004	.22	-0.003	.34	.04	.00
Main effects (country level)						
Collectivism	0.04	.00	-0.04	.04	.15	.23
Uncertainty avoidance	-0.08	.00	-.04	.16	.04	.82
Random effect						
Country mean (u_{oj})	.001	.02	.003	.01	.10	.01
Level-1 effect (r_{ij})	.06	<.0001	.06	<.0001	.54	<.0001

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