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Journal of CONSUMER PSYCHOLOGY

Journal of Consumer Psychology xx, x (2012) xxx – xxx

Research Report

Malleable conjoint partworths: How the breadth of response scales alters price sensitivity ☆

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Received 17 December 2011; received in revised form 29 October 2012; accepted 30 October 2012

Abstract

In one laboratory study and one field study conducted with a large, representative sample of respondents, we show that seemingly innocuous questions that precede a conjoint task, such as demographic and usage-related screening questions can alter the price sensitivities recovered from the main conjoint task. The findings demonstrate that whether these prior questions use broad response categories (i.e., few scale points) or narrow response categories (i.e., many scale points) systematically influences consumers' price sensitivity in a CBC (Choice Based Conjoint) study. We suggest that this may occur because the narrow (vs. broad) response categories in the prior questions lead to consideration of a greater (vs. fewer) number of attributes during the key conjoint task. Since both groups of consumers readily consider the naturally salient price attribute, responding to previous questions with narrow (vs. broad) response categories leads to a greater (vs. fewer) number of non-price attributes being considered, and consequently, decrease the weight afforded to price and reduce price sensitivity.

Keywords: Response scales; Number of scale points; Categories; Price sensitivity; Conjoint; Pricing

Introduction

Eliciting the price that consumers are willing to pay for a product is one of the key objectives of many marketing research instruments, like pricing surveys and conjoint tasks (Green & Rao, 1971; Green & Srinivasan, 1990; Johnson, 1974; Nagle, Hogan, & Zale, 2010; Winer, 2006). Conjoint analysis is an especially popular tool that is commonly used to learn about consumers' preferences and willingness to pay for various product offerings (Mahajan, Green, & Goldberg, 1982; Page & Rosenbaum, 1987). Given the widespread use of conjoint and other pricing surveys and the critical decisions managers make based on their results, it is important to understand the factors that systematically affect their results.

To that end, we document a simple, yet novel effect. Seemingly innocuous questions that precede the main task of a conjoint study, like demographic and usage-related screening questions, systematically affect consumers' responses that follow in the main task. Specifically, whether these prior questions have broad (i.e., few scale points) or narrow (i.e., many scale points) response categories, influences consumers' price sensitivity as measured in a Choice Based Conjoint (CBC) survey.

☆ The order of authorship is alphabetical. The authors gratefully acknowledge the helpful comments from Lan Luo, Bryan Orme, and participants at the 2008 AMA ART Forum and the 2009 Sawtooth Conference.
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1057-7408/$ -see front matter
http://dx.doi.org/10.1016/j.jcps.2012.10.013

We offer preliminary evidence that this effect occurs because narrow (vs. broad) response categories in prior questions lead to consideration of a greater (vs. fewer) number of attributes during the main conjoint task, consequently altering the importance associated with price. We show that most consumers readily consider price since it is naturally salient in a consumption context. However, responding to previous screening questions with narrow (vs. broad) response categories, leads to a greater number of non-price attributes also being considered, which in turn decreases the weight accorded to price and reduces price sensitivity.

We next review briefly the relevant literature on conjoint analysis and highlight the key contribution of the documented effect. Then we explicate the theoretical underpinnings of our key hypothesis and research predictions in greater detail. Finally, we present two studies, a field study that provides empirical evidence for the proposed effect, and a lab study that offers preliminary evidence for the underlying process.

Literature review and research contribution

Like many other market research tools, conjoint analysis is based on the implicit assumption that respondents have stable preferences (Liechty, Fong, & DeSarbo, 2005). A well-documented problem in pricing surveys in general and specifically in conjoint studies is the reliability of the price sensitivities recovered from these exercises (e.g., Burke, Harlam, Kahn, & Lodish, 1992; Gabor, Granger, & Sowter, 1970; Nagle, Hogan, & Zale, 2010; Nevin, 1974; Wright, Gendall, & Lewis, 1999), and the subsequent effects on market share (mis)forecasts (Gilbride, Lenk, & Brazell, 2008).

Academic researchers have given considerable attention to this problem and have attempted to improve the overall accuracy of conjoint studies in three ways. One approach has been to compare the accuracy of the results for different types of conjoint models and measurement procedures (e.g., rating vs. ranking task, choice vs. rating, etc.; Darmon & Rouzies, 1999; Ding, Grewal, & Liechty, 2005; Dong, Ding, & Huber, 2010; Elrod, Louviere, & Davey, 1992; Huber, Wittink, Fiedler, & Miller, 1993). A second approach has been to increase the predictive power of conjoint analysis by using better estimation techniques (e.g., fast polyhedral adaptive conjoint analysis; Allenby & Ginter, 1995; Bradlow, Ye, & Ho, 2004a, 2004b; Gilbride et al., 2008; Kohli & Mahajan, 1991; Toubia, Hauser, & Garcia, 2007). Increasingly, however, research has examined how conjoint techniques can be vastly improved once consumer input is incorporated (Huber et al., 1993). Thus, it is increasingly common to ask a series of questions *prior* to the conjoint task (De Bruyn, Liechty, Huizingh, & Lilien, 2008; Ding, 2007; Huber et al., 1993; Jedidi & Zhang, 2002; Johnson & Orme, 1996; Park, Ding, & Rao, 2008; also see Sawtooth Software Technical Paper Series "CBC v6.0"). These include demographic questions, attribute importance assessments that are used to better calibrate the model, preference elicitation tasks used to narrow down the possible profiles to be shown, or other "warm-up" exercises.

In contrast to this research, which has mostly looked at factors that are *integral* to the conjoint task itself (e.g., rating vs. ranking of conjoint profiles, use of images and descriptions vs. descriptions alone; Huber et al., 1993), our findings show that seemingly innocuous questions that *precede* the main conjoint task (e.g., age, occupation, etc.), can systematically affect the partworths obtained from the conjoint task.

Theoretical framework and research predictions

Our conjecture is that whether the screening questions that precede the main conjoint task have broad (i.e., few scale points) or narrow (i.e., many scale points) response categories, systematically influences consumers' price sensitivity as measured in a CBC survey. Specifically, we predict that conjoint surveys in which these prior questions have narrow (vs. broad) response categories will elicit lower (vs. higher) price sensitivity from consumers in the main conjoint task. Our prediction is based on the following logic. First, we argue that exposure to narrow (vs. broad) response categories in prior questions leads to consideration of a greater (vs. fewer) number of attributes during the key conjoint task. Second, we believe that both groups of consumers would readily consider price since it is naturally salient in a consumption context. Naturally then, responding to previous screening questions with narrow (vs. broad) response categories, should lead to a greater (vs. fewer) number of non-price attributes being considered, and consequently, decrease the weight accorded to price and reduce price sensitivity. We expand on this logic below.

The effect of number of response categories associated with unrelated, prior questions

The issue of whether the number of response categories can affect responses to the *current* question has been amply investigated by scale design researchers. This research has shown that responses to an item can vary depending on the number of points on the response scale (Garner, 1960; Green & Rao, 1970). The consensus is that scale reliability increases as the number of scale points increase, but only up to six or seven point scales (Miller, 1956; Nunnally, 1967; Preston & Colman, 2000; Simon, 1974). These results concur with findings from research on the validity of conjoint analysis measurement procedures (Darmon & Rouzies, 1999). Additionally, Burson, Larrick, and Lynch (2009) have shown that whether options are described on expanded or contracted scales can systematically affect preferences for those options.

However, recent research has shown that differences in the number of scale points in one survey can also systematically affect responses to *subsequent*, *unrelated* questions in a different survey. For example, Chakravarti, Fang, and Shapira (2011) found that the fine-grained nature of the response categories in one survey affected people's responses in a subsequent and unrelated change detection task. More pertinent to the current investigation, Ülkümen, Chakravarti, and Morwitz (2010) found that answering questions that have either narrow (i.e., many scale points) or broad (i.e., few scale points) response scales systematically alters respondents' information processing style in subsequent, unrelated tasks. Respondents in the broad

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scale condition tend to base their subsequent decisions on fewer, salient pieces of information, while those in the narrow scale condition employ multiple pieces of information, both salient and less salient, in subsequent decisions. Thus, first, we propose that exposure to narrow (vs. broad) response categories in prior questions leads to consideration of a greater (vs. fewer) number of attributes during the target conjoint task.

Response categories of unrelated, prior questions and effects on price sensitivity

Second, we believe that both groups, broad and narrow, would readily consider price since it is naturally salient. In fact, price is one of the most important attributes for the majority of purchase decisions, and is one of the first attributes to be considered (Erickson & Johansson, 1985; Hauser & Shugan, 1983; Srinivasan, 1982).

However, as consumers consider additional, non-price attributes, the importance they place on price can decrease. In choice contexts where both price and non-price information is available, factors that influence their salience can influence their relative weight. For instance, while price advertising increases price sensitivity, non-price advertising decreases price sensitivity (Kalra & Goodstein, 1998). Discount retraction can increase price sensitivity by drawing more attention to price as opposed to other attributes (Wathieu, Muthukrishnan, & Bronnenberg, 2004). In contrast, innovative products have lower price sensitivity, because consumers' focus on innovation decreases the attention on price (van Heerde, Mela, & Manchanda, 2004). Similarly, De Wilde, Cooke, and Janiszewski (2008) have shown that in a conjoint task, increasing the number of levels of an attribute can draw respondents' attention to it, and thereby increase its importance weight. A common process underlying these findings is that one type of information has a negative impact on the weight of the other type of information (Huber, Holbrook, & Kahn, 1986). Thus, we propose that as respondents in the narrow condition consider a greater number of non-price attributes, they will become less price sensitive than their counterparts in the broad condition.

Thus in the broad condition price is likely to be one of the few attributes being considered, whereas in the narrow condition price is likely to be one of the many attributes being considered. This difference in the total number of attributes considered should influence the relative decision weight of price, and therefore, price sensitivity. Naturally then, we expect participants who have responded to previous questions with narrow (vs. broad) response categories to be less price sensitive in a subsequent conjoint task.

Next, we present a field and a lab study that test these predictions.

Study 1: impact of questions asked before a choice-based conjoint task on price sensitivity

For this large field experiment, we collaborated with a market research company that routinely conducts CBC studies. The experimental conditions were designed to have either relatively few or relatively many scale points for the screening questions that preceded the main task. We expect to find higher (lower) price sensitivity and lower (higher) willingness to pay for enhanced product features when the screening questions include a fewer (greater) number of scale points.

Data collection

Six hundred twenty six respondents from a large Internet panel participated in this study in exchange for $1 CAD. The study was fielded on the Angus Reid Forum, an on-line panel of Canadians that mirror the demographics of the Canadian population. Respondents were selected to be balanced on age and gender within region.

Survey design

Participants were first told that we were interested in their opinions about how they use technology in their daily lives and that they would "get a sneak peek at some new technology products not yet available in stores." Respondents were directed to a web site and asked to respond to questions on the site.

Prior questions and scale manipulation

The key manipulation of response scale width was administered in this part of the survey. Before moving on to the target conjoint task, participants responded to a series of screening and usage related questions about their decision-making role in their household, gender, age, occupation, their ownership and purchase intentions for common consumer electronics products, how often they used their electronic devices, and their intended frequency of usage for devices they planned to purchase. To ensure a relevant and involved sample, those who were not involved in decision making for any of these categories, those under 18, and those who did not own or intend to buy any portable electronic devices were excluded from the survey.

Respondents were then introduced to the product concept they would be evaluating in the conjoint task: a Mobile Internet Device. They were told, "Mobile Internet Devices (MIDs) are a new type of portable handheld device providing Internet access on the go. Larger than a Smartphone but smaller than a laptop, MIDs provide the full Internet in a small package." They were also provided with information about what they could do with these devices (e.g., "Make phone calls, Send e-mail, use Instant Messaging and video conferencing, Access all your favorite web sites," etc.) and what most MIDs come with (e.g., "TV tuner for watching your favorite shows on-the-go, Video out ports to display content on a larger screen, Built-in still and video camera for taking photos and videos," etc.). Respondents next indicated how appealing the MID concept is, and their level of agreement with a series of statements about the concept: "This is a unique idea — I don't know of any other devices like it; I would like to learn more about it; This device is for people like me; This is something I have always wanted but never been able to find; I would go out of my way to find this device."

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Attributes and Levels in the CBC Task

Internet Connectivity	Wi-Fi only	Anytime/Anywhere			
Internet Browsing	Limited Web Browsing	Full Web Browsing			
Email	Webmail	Full eMail			
GPS	Basic GPS	Full GPS			
Phone	VOIP only	Full Cell phone			
Storage	8GB	16 GB	32 GB		
Price	$99.99	$199.99	$299.99	$399.99	$499.99

Example Screen Shot of Dual Response Type CBC Question

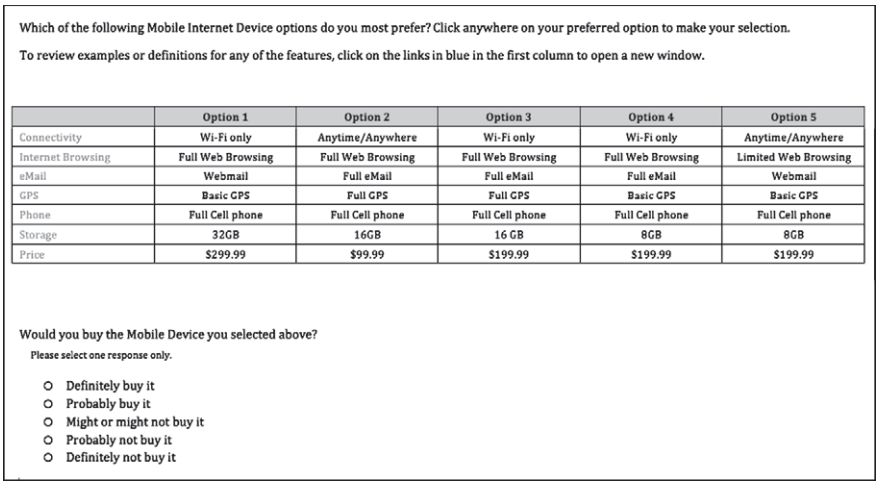

Fig. 1. Study 1: attributes, levels and conjoint profiles used in the CBC task.

CBC task

To acquaint participants with the MID concept, they were provided with pictures and demonstrations of MIDs. The attributes and attribute levels were selected because they emerged as important in a previous study conducted by the market research agency (Fig. 1, top panel). For the non-price attributes, "base level" refers to the least advanced attribute level. The conjoint tests whether consumers are willing to pay a premium to upgrade from "base" levels to other "advanced" levels that have more desirable features. Note, at this point participants were not shown the different price levels that would be used in the conjoint profiles (Fig. 1, top panel, last row).

Next all participants evaluated the conjoint profiles. Respondents were randomly assigned to one of the 15 blocks in a randomized block design. Using dual response questions (Brazell et al., 2006), in each choice task, respondents were asked to choose their most preferred configuration among the five displayed MID options and to indicate their intent to purchase that option (see Fig. 1, bottom panel). Each respondent repeated the CBC task six times.

Key manipulation

Respondents were randomly assigned to one of the two experimental conditions: Narrow (i.e., questions with many, narrow response options) and Broad (questions with a few, broad response options). The scale breadth manipulations involved making changes to the response options for the screening, device usage, and concept evaluation questions, which preceded the main conjoint task. Please see Fig. 2 for the number of response options for these questions, and an illustration of the manipulation.

The market research company also included a few other experimental conditions for their own research purposes, which were not of central interest to our research and thus are not discussed further.[4]

Results

We used Sawtooth Software's CBC Hierarchical Bayes (HB) to estimate the models because this method is commonly used in marketing research practice and because the marketing literature suggests that it is as good as or better than other estimation approaches for fit and prediction (Andrews, Ansari, & Currim, 2002; Moore, 2004; Orme, 1998). We also estimated the model using a standard aggregate multinomial logit model and obtained the same results. To conserve space, we will only discuss the results from the HB analyses. Since the choice frequency at each of the different prices followed a linear trend

[4] These conditions were: (1) respondents are simply exposed to information about typical prices for comparable products in the marketplace (Marketplace), (2) respondents are asked what price they would expect to pay for the product (Expected Price), (3) respondents are asked a series of four questions that are often used in market research practice to determine an optimal price for the product (van Westendorp), and (4) base-level condition to compare the effectiveness of these additional conditions.

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Number of Scale Points Used In Screening Questions

	Broad Condition	Narrow Condition
Age	4	14
Occupation	4	39
Devices own / plan to buy	8	20
Frequency of usage	4	10
Evaluation of MID concept	3	10

Examples of Broad and Narrow Scale Manipulations for Age

Broad Condition	Narrow Condition
Under 18 years old	Under 18 years old
18 to 34	18 to 24
35 to 54	25 to 29
55 or older	30 to 34
	35 to 39
	40 to 44
	45 to 49
	50 to 54
	55 to 59
	60 to 64
	65 to 69
	70 to 74
	75 to 79
	80 or older

Fig. 2. Study 1: scale breadth of screening questions.

within each condition (see Fig. 3), we estimated one linear price parameter. We also applied utility constraints throughout. The more advanced (versus less advanced) level of each feature was restricted to have a higher partworth. We processed each design cell independently. 100,000 iterations were used in the preliminary burn-in period, and an additional 10,000 iterations were used in the model estimation process.

Model fit

We compared the root likelihood and hit rates to ensure that the model fits equally well across conditions. We randomly held out one of the choice tasks in each block, estimated the model, and calculated the holdout hit rate on the random holdout task. Broad and Narrow conditions did not differ in terms of model fit or hit rate (Table 1, top panel).

Impact on taking the no choice option

Respondents in both conditions were equally likely to take the no choice option. Specifically, based on the dual-response question and responses to the bottom three boxes to the purchase intentions question, 63.35% of respondents in the broad condition and 63.96% in the narrow condition took the no choice option.

Impact on price elasticity

We derived price elasticities through an algebraic simulation using a general share of preference (logit) rule.[5] We simulated the choice share of a MID at $99 and one at $499, and held all other factors at the neutral level to eliminate their impact.[6] As shown in Fig. 4 (top panel) only one product was assumed to be in the market with all features set at the neutral level, and respondents choose between purchasing that product and not purchasing at all. We defined price elasticity as the percentage change in share of preference over the percentage change in price. The obtained price sensitivities are shown in Fig. 4 (bottom panel).

To test for statistically meaningful differences in price elasticities across the experimental cells we generated *p*-values based on bootstrap samples (conducted after the CBC). The results are shown in Table 1 (bottom panel).

As predicted, the estimated price elasticity for participants in the Broad condition (−.871) was more extreme than those in the Narrow condition (−.668), ($t(624)=2.78$, $p=.006$, see Table 1, bottom panel). This is consistent with our argument that those who responded on narrow scales would go beyond price and one or two other attributes and consider a greater number of attributes which would in turn reduce price sensitivity.

Impact on price premium for advanced features

We calculated the price premium respondents would pay for an advanced feature over the base level of that feature algebraically using the share of preference simulation (Orme, 2001). Within each factor the more advanced level was considered the focal product feature and the less advanced level was considered the competing product. For example, to calculate the premium for the "anytime/anywhere" over the "Wi-Fi only" feature, we first set up the simulation scenario as shown in the top panel of Fig. 5. We then increased the price for option 1 until there was no difference in shares (defined as a difference of less than 1%) between options 1 and 2 (see middle panel of Fig. 5). The difference in prices between the two options was considered to be the premium of the advanced feature over the base feature.

As shown in the bottom panel of Fig. 5, respondents assigned to the Narrow condition were willing to pay more for most features (e.g., anytime/anywhere connectivity: $323, full cell phone: $221, full web browsing $193) than those assigned to the Broad condition (anytime/anywhere connectivity: $221, full cell phone: $133, full web browsing $127), consistent with the notion that they place less weight on price and more weight on these non-price attributes. There were only two exceptions to this pattern of results: for GPS the result was only directionally consistent with predictions, and for 32 GB storage there was no difference between conditions.

[5] Since the logit model lets respondents choose products in a probabilistic manner, compared to a simple first-choice rule, it captures more information from each respondent and yields more stable share estimates (Orme, 2010).

[6] "Neutral level" is a mathematical construct within conjoint modeling when effects coding is used. It's the level where the respondent received neither positive nor negative utility for that factor; thus, it's the point where the factor has no impact on choice selection.

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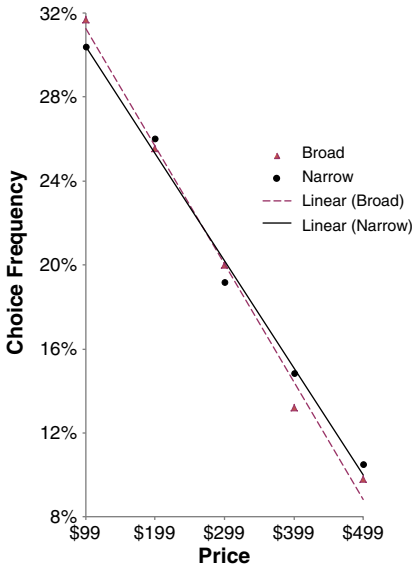

Note: A comparison of the linear trend lines fitted through choice percentages shows that the slope is steeper in the broad condition than in the narrow condition.

Fig. 3. Study 1: testing the linearity assumption.

Discussion

The results from this field experiment demonstrate that questions asked prior to the main conjoint task can change responses during the conjoint task. Those who answered prior questions on narrow scales were less price elastic and were willing to pay more for advanced product features than those who responded to the same questions on broad scales.

To obtain preliminary evidence for the underlying process for these effects, we next present a more controlled lab experiment.

Study 2: the effect of broad versus narrow response scales on consideration of price and non-price attributes

The aim of this lab study is to more directly test our proposed process account that responding to prior questions with broad or narrow response scales differentially affects the number of attributes (price and non-price) considered in a subsequent product evaluation task. Since price is generally important to consumers, we expect participants in the broad condition to focus primarily on price and one or two other product attributes. In contrast, we expect participants in the narrow condition to go beyond what is salient, focus on more product attributes, and thus become less sensitive to price.

Table 1
Study 1: model fit and price elasticities and inferential statistics derived through bootstrap simulation.

Model Fit Summary Statistics

Condition	Broad	Narrow
RLH	525	532
Hit Rate	51.27%	50.11%

Price Elasticities and Inferential Statistics Derived Through Bootstrap Simulation

	Broad	Narrow
Price Elasticity	-0.87	-0.67
	Broad vs. Narrow	
Average Difference	-0.20	
SD Difference	0.07	
t Statistic	-2.78	
p-value	<0.01	

Method

One hundred and five undergraduate students participated in this study for partial course credit. Participants completed two, ostensibly unrelated studies. In the first, they answered questions about themselves (e.g., personality, eye color) by marking their responses among many (few) response alternatives (Ülkümen et al., 2010). Thus in the narrow (broad) condition participants answered questions with more (less) fine-grained response scales (Fig. 6).

In the next study participants read a paragraph that described MIDs and were asked to assume they were in the market for such a device, and list, in an open-ended way, the different attributes, features, dimensions, or other things that they would consider.

Results

We coded the different attributes participants mentioned. Direct mentions of price (e.g., "cost," "price") and indirect references to price (e.g., "deposit amount," "subsequent monthly payments") were coded as price-related responses. All other responses were coded as non-price related responses (e.g., "Internet access," "video camera"). Even without being prompted, a significant proportion (63%) of participants mentioned price-related attributes, regardless of the prior scale width manipulation. As expected, the proportion of respondents who

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Calculation of Price Elasticity

	Option 1	Option 2
Connectivity	Neutral	Would not purchase MID
Internet Browsing	Neutral	
eMail	Neutral	
GPS	Neutral	
Phone	Neutral	
Storage	Neutral	
Price	$99	

	Option 1	Option 2
Connectivity	Neutral	Would not purchase MID
Internet Browsing	Neutral	
eMail	Neutral	
GPS	Neutral	
Phone	Neutral	
Storage	Neutral	
Price	$499	

Price Elasticity Results

		Broad	Narrow
Simulated Choice Share (all other factors at neutral)	**$99**	18.2%	20.5%
	$499	4.8%	7.9%
Price Elasticity		-.87	-.67

Fig. 4. Study 1: price elasticity.

mentioned price-related attributes did not differ across conditions (p_{Broad}=57.1%, p_{Narrow}=67.9%; z=.93, p>.1).

Supporting our predictions, Narrow condition participants mentioned a greater number of attributes (M=7.34) than Broad condition participants (M=5.00); (F(1, 103)=32.59, p=.000). We conducted a 2 (Condition: Broad, Narrow)×2 (Attribute Type: Price, Non-price) mixed ANOVA, where attribute type was a within subjects measure. This analysis revealed a main effect of condition (F(1, 103)=23.59, p=.000), a main effect of attribute type (F(1, 103)=300.93, p=.000), and importantly, a significant interaction effect (F(1, 103)=13.11, p=.000). Narrow condition participants mentioned significantly more non-price related attributes (M=6.43) than Broad condition participants (M=4.31), (F(1, 103)=19.43, p<.001). Narrow condition participants (M=.91) also seemed to mention more price-related attributes than Broad condition participants, but this difference was not significant (M=.69); (F(1, 103)=2.08, p=.153). We obtained similar results for the average number of times each attribute was mentioned, and the percent of subjects who mentioned the attribute (see Table 2).

Discussion

This study demonstrates that responding to questions with narrow (vs. broad) response categories in a previous, unrelated context leads to consideration of more attributes in a subsequent product evaluation task. This difference is due to the consideration of non-price related attributes, as both groups were equally likely to consider the already salient price attribute. These results provide preliminary process evidence for the price sensitivity results demonstrated in Study 1.

General discussion

In a field study conducted with a large, representative sample of respondents, we show that the number of scale points used in seemingly innocuous questions that precede a conjoint task can alter the price sensitivities recovered from the main conjoint task. We suggest this happens because responding to previous questions on narrow (versus broad) scales increases the number of attributes that consumers consider in the subsequent conjoint task, and consequently, decreases the importance weight of price and reduces price sensitivity. In contrast, participants who responded to questions on broad (versus narrow) scales were more price sensitive, and were also willing to pay less for the important product features.

We provide preliminary evidence that these effects occur because the differences in the scales lead to consideration of different attributes. Previous research (Chakravarti et al., 2011, Ülkümen et al., 2010) also supports this explanation. However, given the nature of our field study, there are other possible alternative explanations for the results. For example, completing the screener questions using the narrow (versus broad) scales may be more cognitively taxing, and may lead respondents to

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How Price Premia are Calculated

	Option 1	Option 2	Option 3
Connectivity	Anytime / Anywhere	Wi-Fi only	Would not purchase MID
Internet Browsing	Neutral	Neutral	
Email	Neutral	Neutral	
GPS	Neutral	Neutral	
Phone	Neutral	Neutral	
Storage	Neutral	Neutral	
Price	$99	$99	
Simulated Choice Share	29.38%	4.25%	66.37%

	Option 1	Option 2	Option 3
Connectivity	Anytime / Anywhere	Wi-Fi only	Would not purchase MID
Internet Browsing	Neutral	Neutral	
Email	Neutral	Neutral	
GPS	Neutral	Neutral	
Phone	Neutral	Neutral	
Storage	Neutral	Neutral	
Price	$451	$99	
Simulated Choice Share	9.91%	8.93%	81.16%

Price Premia Results

Advanced Level	Base Level	Broad Condition	Narrow Condition	$t(624) =$	$p =$
Anytime/Anywhere	Wi-Fi only	$221	$323	2.22	0.03
Full Web Browsing	Limited Web Browsing	$127	$193	2.70	<0.01
Full eMail	Webmail	$59	$41	-2.31	0.02
Full GPS	Basic GPS	$19	$23	0.94	0.35
Full Cell phone	VOIP only	$133	$221	3.30	<0.01
16 GB	8GB	$11	$3	-2.54	0.01
32 GB	8GB	$35	$32	-0.60	0.55

Fig. 5. Study 1: price premia.

pay less attention, lowering price sensitivity. However we think this is unlikely for several reasons. First, in both the field and the lab studies, there was no significant difference in the study completion times between conditions. Second, past research that used a similar broad vs. narrow manipulation (e.g., Chakravarti et al., 2011; Ülkümen et al., 2010) found no differences in completion times, processing difficulty, or mood across conditions.

Similarly, one might observe that for the screening question on age (Fig. 2, bottom panel), the mid-point of the scales differs across conditions. Could differing age midpoints induce participants in one condition to feel younger or older than those in the other condition, and in turn, make them more or less price sensitive? We think it unlikely that this difference explains the price sensitivity results. First, age was the only screener question where there was a difference in the scale midpoint. Second, since our participants came from a large, representative sample of the Canadian population, the samples are likely to be *similarly distributed* above and below the midpoints of the age scales in *both* conditions. Thus, differing mid-points are unlikely to strongly influence the data.

It could be argued that people may have responded differently to the screener questions in the different conditions, which in turn might affect their price sensitivity in the main conjoint task. For example if they responded differently to devices owned, this could make them more or less price sensitive when thinking about buying a new device. However, when we compared answers to the devices owned questions for broad and narrow, grouping the narrow responses back to the broad level, the responses did not differ significantly. Still we urge future research to examine more fully other possible reasons why differences in the breadth of screener questions lead to differences in price sensitivity.

It is also possible that participants in the narrow (versus broad) condition place less importance on price, because they perceive greater differences between (non-price) attribute levels. While our data does not allow us to test this nuanced version of our account, past research provides some indirect evidence that narrow condition participants tend to *perceive* a greater amount of change than do broad condition participants, given the same objective level of change (Ülkümen et al., 2010; Study 4, face-processing study).

An interesting question is whether an increase in non-price attribute weights in the narrow condition could be amplified for attributes deemed important to begin with. Alternatively one could argue that in the narrow condition, the importance of the most important attributes might not change, given their already high salience. Unfortunately we do not have a priori

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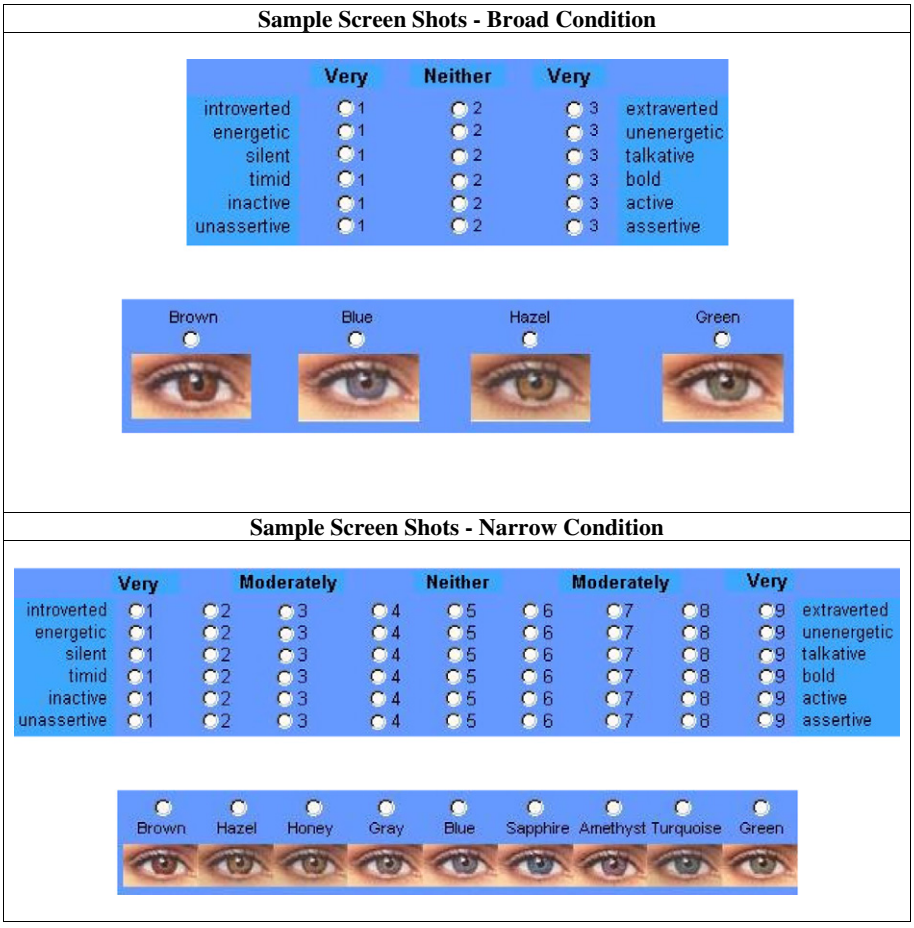

Fig. 6. Study 2: manipulating breadth of response categories.

attribute importance measures, and therefore leave this question for future research.

Our results suggest that the price sensitivity measures recovered from a conjoint study can be malleable, influenced by simple factors such as prior screening questions. Given the ubiquity of screening questions in conjoint studies, our findings are very important for the design of conjoint tasks, and the interpretation of partworths and price sensitivity results.

Users of conjoint studies should note that when the screening questions involve dichotomous choices, or rating scales that feature fewer scale points, the partworths derived for salient attributes (such as price) may be inflated. Further research should examine the extent of this bias. It may also be possible to explore ways to compare price sensitivity results derived from different conjoint studies by adjusting them for the number of scale points used.

Further research should compare price sensitivities recovered from conjoint studies conducted with different response scales, with actual price sensitivities in the market. Further research is also needed to explore how the effect reported here may be used to improve the accuracy of measured price sensitivities. Inaccuracies often arise because consumers attend to certain types of information more or less in a conjoint task than in a real

Table 2
Study 2: across condition comparison of attributes mentioned.

Attribute	Mean number of times mentioned			Percent of subjects mentioned			
	Broad	Narrow	*p*	Broad	Narrow	Chi-square	*p*
Price (any mention of price)	0.69	0.91	0.15	0.57	0.68	1.29	0.31
Design (color, shape, sleekness, etc.)	0.41	0.88	<0.001	0.39	0.68	8.91	<0.05
Portability (size, weight, portability, mobility)	0.31	0.54	0.05	0.27	0.45	3.71	0.05
Keyboard (keyboard vs. touch screen, key size)	0.24	0.46	0.05	0.22	0.39	3.44	0.09
Connectivity (wifi, wireless etc.)	0.24	0.70	<0.001	0.22	0.61	15.63	<0.001
Applications	0.18	0.41	<0.05	0.18	0.39	5.50	<0.05
Other Features	2.92	3.45	0.16	0.92	0.98	2.34	0.18

Note: We focused on the above attributes, because they were mentioned by more than 20% of the respondents. Other Features is the sum of all other attributes that were mentioned with lower frequency.

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consumption environment. For example, for certain product categories such as high-tech products, participants may attend to the product's functions (versus the price) during the conjoint task, but display more price sensitivity in real purchase situations. For more regularly purchased categories, consumers may not pay much attention to price in everyday shopping situations, but the research instrument may increase price sensitivity by drawing attention to price. In these situations, it is possible that screening questions may be used to increase or decrease the weight given to this information in a conjoint task to counteract the bias. Thus, firms may be able to use screening questions strategically to ensure that consumers attend more or less to certain types of information.

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