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How Preferences Change After Receiving New Product Information in an Experimental Choice Task

Harmen Oppewal, Monash University, Harmen.Oppewal@buseco.monash.edu.au
Mark Morrison*, Charles Sturt University, mmorrison@csu.edu.au
Paul Wang, University of Technology, Sydney, Paul.Wang@uts.edu.au
David Waller, University of Technology, Sydney, David.Waller@uts.edu.au

Abstract

Discrete choice experiments typically assume that preference structures remain stable over time and over multiple exposures to information about choice alternatives. However, this assumption may not be valid when the study concerns a new product, which individuals are less familiar with. This paper tests how attribute preferences shift when respondents are exposed to new product information in an experimental choice task. The findings indicate how attribute utilities vary across the before and after exposure conditions; further analysis however shows these effects to partly disappear when the effect of information on the scale constant is accounted for.

Keywords: choice experiments, choice models, preference stability, new products

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Introduction

An assumption that is typical for most discrete choice experiment applications is that respondents have well defined preferences. It is assumed that participation in the experimental choice task allows respondents to reveal their preferences for a range of alternatives and attributes, including new alternatives that are not in the current domain of experience. The ability to probe preferences over this wider domain is one of the key benefits of experimental choice methods. The assumption that preferences are stable over this domain of attributes and attribute levels may be deemed valid for applications where respondents are at least somewhat familiar with the presented attributes and their range.

However, when respondents are not so familiar with the attribute it is less clear what their responses represent. To overcome this problem, researchers may choose to provide explanatory information about the attributes to inform the respondent. For example, it is common practice in stated choice experiments to include attribute glossaries that respondents either study prior to the task or can access during the stated preference task (Hensher, Rose and Greene, 2005). In some studies more elaborate attempts to inform respondents were made, ranging from the provision of visual attribute information to better convey attribute meanings (e.g., Crouch et al, 2009), to the use of full virtual reality techniques, as for example in the studies using 'information acceleration' (Urban, Hauser and Roberts, 1990; Urban et al., 1997). How does accessing such additional information, which allows the respondent to learn about the attributes, influence attribute valuations and model performance? This paper aims to address this issue by comparing choice models estimated from discrete choice responses before and after respondents were exposed to product information that allowed them to better understand the nature of a new product feature.

Literature review

Modelling variation in preferences

Choice experiments measure preferences as being determined by a systematic and a random utility component, as proposed in Random Utility Theory (e.g., Louviere, Hensher and Swait, 2000). The random component is assumed to capture preference variations across respondents and/or across measurement occasions, as well as variation due to measurement error. In contrast, the systematic utility captures the more enduring and stable preference component of individual respondents. Models have increasingly become available that allow capturing variation in systematic utility across respondents. Traditionally a limited number of sociodemographic and other background variables were included to account for at least some respondent heterogeneity. Nowadays however random coefficients and latent class models are increasingly used to capture respondent heterogeneity (e.g., Boxall and Adamowicz, 2002; McFadden and Train, 2000; Revelt and Train, 1998). Models have also been developed that include attitudinal and other dispositional variables in addition to traditional sociodemographic variables (Ben Akiva et al., 2002). These models, however, all still assume that a single respondent's systematic utility remains stable across task conditions and across choice sets in a stated preference task. Advances in modeling have also led to better

incorporating random utility variations across choice conditions. Accounting for different scale levels of random utility has been a major focus of research in choice modeling for more than a decade, as researchers realized that differences in error variance are directly related to the scale in which the systematic utility component is expressed (e.g., Swait and Louviere, 1993; Louviere, 2001; Sonnier et al., 2007). Significant progress in this area has resulted in models now being available that can account for differences in scale, such as the heteroscedastic logit model (DeShazo and Fermo, 2002; Hole, 2006).

Learning from new attribute background information

The above studies all focus on effects of task complexity, learning and fatigue as design artifacts. Far fewer studies seem to have looked at genuine learning effects as occurs when respondents are provided with additional product information. In stated preference studies additional attribute information is often provided in the form of glossaries of attribute definitions. In addition there is a rich tradition of concept testing for new product development, in which stated preference related methods such as conjoint analysis have been used for decades to assess consumers' early responses to new product features and designs. This includes a range of attempts to use pictorial information to describe attributes that are difficult to verbally represent, extending to the early work by Urban et al. in 'information acceleration' (Urban et al. 1990, 1997). Nowadays with the advent of online surveys it is increasingly possible, and cost effective, to provide larger groups of respondents with such rich descriptions (see e.g. Savage and Waldman, 2008), creating ample opportunities to introduce respondents to alternatives and attributes they were hitherto unfamiliar with. Despite this tradition in the neighbouring area of new product development relatively little work in choice modeling seems to have focused on these more dynamic aspects of learning and preference change.

Hypothesis formulation

We hypothesise that while the target (new) attribute becomes more important, other attributes will become less important when respondents receive explanatory information about a new and unfamiliar product feature. This will especially apply to so-called extrinsic attributes, which are attributes that generally signal product quality such as prices and warranties, and brand names (Purohit and Srivastava, 2001; Rao and Monroe, 1988; Suri and Monroe, 2003). However, once they have received more information and understand what the attribute means respondents can judge the attribute on its own merits and the extrinsic attributes lose their role as quality cues. Thus we expect:

> *The relative importance of attributes will shift, with attributes for which additional information was provided becoming more important and other attributes, especially extrinsic attributes such as brand names and warranties, becoming less important after the respondents have received relevant new product information.*

Methodology

Choice data were obtained from members of an online panel recruited to participate in a survey regarding new electronic goods. Panel members were recruited according to a sampling frame that is representative of the population on key demographic characteristics

such as age, income and residential location. A random sample of panel members was approached of which 406 completed the survey (response rate 32%).

Choice scenario design

A situation was presented where respondents have to assume they have received a $1000 special gift voucher from a well-known and reputable loyalty program. The voucher would allow them to obtain a new DVD recorder, to be selected from a limited set of recorder options. Respondents were then asked to make their selection of how to use the voucher by choosing from pairs of DVD recorders. For each pair they indicated which of the two alternatives they would choose if these were the only available DVD recorder options for voucher purchase, or whether in that case they wished to purchase neither option. All new product alternatives varied across eight attributes designed according to an orthogonal plan. One of these was a new product feature at the time of surveying, being the competing disk technologies, BluRay and HD-DVD. Each respondent received four choice tasks that were randomly selected from an orthogonal master design comprising 128 DVD recorder profile pairs, with attributes brand name (4 brands), price (9 price levels), warranty (1 year or 3 years), hard drive capacity (none, 100 or 200Gb), disk technology (Blu-Ray, HD-DVD, both of these, or none), firewire (yes/no), number of disks (1 or 5), and combo player (yes/no).

Providing product information

After completing the four choice sets respondents were exposed to a mix of briefs with background information about the product in the form of a product review as can appear in newspapers or consumer magazines. There was one review that, while also providing general information about recorders, specifically argued that Blu-Ray was the most likely candidate to win the 'war' between the two formats, Blu-Ray and HD-DVD. Another review argued the opposite and predicted that HD-DVD would be the winner. The third review similarly provided general product information but without an indication about which technology would become the new standard. It was determined by random draw which of the three reviews a respondent would receive. We included these different briefings in order to test a wider range of information briefs than if we had used only one brief. After receiving and reading the information brief respondents answered eight more choice sets, randomly drawn from the same master set of 128 choice sets.

Results

The sample consisted of an equal number of males and females and represented a wide range of respondent groups: 35.7% were aged 35 or under, 46.7% between 35 and 55, and 17.6% were over 55 years old. Also relevant is the proportion of respondents who indicated if they had been aware of the two disk technologies before participating in the survey. For HD-DVD, 68.1% reported they already knew this technology existed, and for BluRay it was only 33.2%. Hence we regard BluRay as the product attribute that respondents are least familiar with.

Shifts in attribute importance

To test for differences in attribute preferences before and after receiving additional product information we first estimated logit models that included the attribute parameters and, in addition, 'before-after-dummy'-by-attribute interactions to pick up differences in constants,

attribute effects between the choice sets before and after the background information was provided (Table 1). Price was included as a single numerical price variable, relative to a base price of A\$600, which was the middle price level in the master design. We first estimated a conditional model with all attribute effects and all their interactions with a generic 'before-after' dummy. The model fit is quite acceptable with a Pseudo R-square of .179 and a Likelihood Ratio Chi-square of 1890.24 (df=27, p<.001).

The 'main' attribute effects in the model represent the effects across all choice sets after controlling for the effect of information provision in the later choice sets, so in fact represents the effects before information exposure. All attributes except two of the brand dummies are significant in the model and have the effects in the expected direction. The largest effect by far is observed for the presence of a hard disk (of 100Gb) compared to not having a hard disk. Having a 200 GB instead of a 100Gb hard disk provides the largest increase in utility. The next largest effects are for the Sony brand (relative to the Yamaha base brand), and the availability of HD-DVD disk technology (relative to standard disk technology). BluRay has also a large effect but has a substantially smaller utility than HD-DVD. The significant negative interaction between BluRay and HD-DVD indicates a diminishing utility if a recorder is presented as being able to use both BluRay and HD-DVD disks. Having a three-year warranty is more attractive than a one-year warranty. The smallest effects are observed for the other two technical features, number of disks and the availability of firewire. These effects are all somewhat as expected, interesting is that they indicate that respondents were not interested in the flexibility of having the equipment to use both competing new disk technologies in one device.

Looking next at the interactions with the information conditions, the table shows firstly a significant increase in overall likelihood of choosing either of the options, instead on none, after receiving the extra product information; respondents apparently felt more ready to accept or purchase having this extra product information. This increase however should not be judged in isolation as there are several significant before-after-dummy interactions with attributes. As expected, apart from the BluRay and HD-DVD attribute, all of these interactions are negative, although not all are statistically significant. The largest decreases in utility are observed for the NEC brand and price. The main increase is for BluRay – after receiving product information respondents' the utility of this feature has substantially increased. In contrast, there was little (and no significant) increase for the HD-DVD technology. So the new information explaining the nature of DVD recorders and their new technology features was very influential in increasing the interest in BluRay but not for HD-DVD. This is consistent with our sample statistics, which showed that only one third of our respondents had ever heard of BluRay. These findings overall confirm our hypothesis, with additional information about the new attribute making the attribute more important while decreasing the valuation of other attributes, in particular the valuation of extrinsic attributes such as brand names and warranty.

We next re-estimated the model to account for possible variation in scale. The findings reveal a significant decrease in scale (LR=6.7, df=1, p<.01), with μ being .451 for the post information condition (while set to 1 for the pre-information condition). Hence, there is a significant decrease in scale, which is equivalent to an increase in error variance after respondents received new product information (Swait and Louviere, 1993). An additional effect of allowing for scale differences is that previously significant effects for warranty and number of disks are no longer significant, while the effect of the presence of a hard disk becomes significant. The BluRay and brand effect remain significant.

Conclusion

This paper presented results of a discrete choice experiment where respondents received additional background information about a product and its attributes between completing two equivalent choice tasks. Our prediction was that as respondents become better informed about a new attribute not only the attribute is more likely to have an influence on their choices but also that it will decrease the effect of other attributes. Our results showed confirmation for this prediction in that the utility of the most prominent brand name as well for product warranties decreased, although the latter effect disappeared after accounting for information effects on scale. The latter effect indicated an increase in model error variance after information had been presented.

The main implication of our findings is that if respondents are unfamiliar with an attribute, providing explanatory information about the attribute will not only result in parameter shifts for the particular attribute but it will also affect the estimates of the remaining attributes and the scale unit of the utility function. This means that during a new product launch different attributes should be highlighted in different stages of a marketing campaign. It may also mean that heterogeneity among consumers manifests itself differently early and later in a campaign, hence possibly requiring different types of segmentation.

This study was only a first attempt to model the effects of providing information about new products on choice model estimates. Further analysis needs to look into additional ways of accounting for possible effects of information exposure on the utility scale of the model. Another issue is to account for possible effects of the initial exposure to the choice task on the way respondents interpret and utilise the provided new product information. Future work should also look into whether effects as observed here generalise to other product categories.

Table 1: Parameter estimates for conditional logit model.

	Main attribute effects		Post-information shifts	
Attribute	Coefficient	z	Coefficient	z
constant	0.506	3.67	0.531	5.11
price	-0.097	-4.78	-0.021	-1.04
nec	0.127	1.16	-0.243	-1.81
sony	0.504	5.02	-0.330	-2.65
philips	0.050	0.50	-0.016	-0.13
blu_ray	0.352	4.18	0.478	5.61
hd_dvd	0.461	4.90	0.017	0.17
blu_hd	-0.285	-2.93	n.a.	n.a.
combo	0.320	4.96	-0.031	-0.39
ndisc	0.253	3.90	-0.147	-1.84
fwire	0.225	3.48	-0.123	-1.55
no hard disk	-1.223	-8.18	-0.174	-0.95
200Gb hd	0.424	5.54	-0.015	-0.16
warranty	0.248	7.64	-0.257	-3.23

Model stats
N=14457   LR chi2(27)=1890.24 $p < .001$
Log likelihood = -4349.0932   Pseudo R2 = 0.1785

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