Motivation, Ability and the Influence of Nutrition Information Formats

Ninya Maubach, Massey University, ninya.m@gmail.com
Janet Hoek, University of Otago, janet.hoek@otago.ac.nz
Benjamin Healey, Inquisio Limited, message2ben@gmail.com
Phil Gendall, Massey University, p.gendall@massey.ac.nz
Duncan Hedderley, Crop and Food Research, HedderleyD@crop.cri.nz

Abstract

Placing nutrition information on food packages assumes consumers have the motivation and ability to use this, and that they will act on the information provided. However, because its format is not easily accessible, even skilled consumers often do not use nutrition information. This study used an online stated preference choice experiment to explore whether alternative front of pack labels could offset differences in motivation and ability. The findings suggest that discriminative stimuli, such as traffic light labels, counterbalance lower levels of motivation and numeric ability, and promote better differentiation between healthy and less healthy products. Labelling that uses easily recognised visual heuristics is more likely to compensate for differing motivation and numeric abilities, and reduce health disparities.

Key Words: consumer, decision, motivation, public health

Motivation, Ability and the Influence of Nutrition Information Formats

Introduction

Over the last two decades, governments have responded to consumers' concerns about food content by requiring manufacturers to provide nutrition information panels on their products. The increasing prevalence of obesity has also focussed attention on food labelling, which is assumed to promote knowledge of food ingredients and support healthier food choices (Wilkinson & Marmot, 1998). Both the food industry and consumer groups endorse this move in principle on the grounds that nutrition labels inform consumers and lead to better health outcomes.

However, several factors influence consumers' use of nutrition information; foremost among these are their ability and motivation to acquire and use additional information. Disclosure regulations assume consumers will evaluate and then act on the information provided (Hadden, 1991; Jacoby et al. 1978; Russo et al. 1986). But consumers will only benefit from food labelling if they read and understand the information provided and then behave in accordance with it (Mazis *et al.*, 1981). This paper reviews research into consumers' use of nutrition information on food products, before outlining an experiment that used two measures: survey paradata to estimate motivation, and self-assessed confidence in using nutrition information, to examine how these variables influenced consumers' food choices.

Ability and Motivation to Use Nutrition Information

Although American consumers have expressed a desire for nutrition information and have had access to it since the 1970s, research suggests they refer to it less frequently than expected (Jacoby *et al.*, 1977; Klopp & MacDonald, 1981; Schrayer, 1978). Several studies have examined whether variations in consumers' opportunity, motivation or ability could explain this apparent discrepancy. Consumers themselves often say that the time required to use nutrition information when shopping is more than they have available or are willing to dedicate to the task (Grunert & Wills, 2007; Petrovici et al. 2006; Signal *et al.* 2008). Observational studies support these self-reported explanations and reveal that most consumers undertake little external information search when grocery shopping, make brand selection decisions within a few seconds of approaching a display, and consider only a small number of brands (Hutchinson & Alba, 1991; Moorman 1996). Thus, even consumers who have the skills and knowledge to use nutrition labels may not do so if they lack the time to find, compare and evaluate product offerings (Klopp & MacDonald, 1981).

Researchers who have examined consumers' motivation to use nutrition information have suggested that social desirability could lead consumers to overestimate the likelihood they will search for information, particularly if they do not have specific nutritional concerns (Dunning, Heath, & Suls, 2004; Tanner & Carlson, 2009; Seggebruch, Brecheisen, & Jensen, 2006). Consumers who believe they enjoy good health and provide their families with balanced meals may also think it unnecessary to review nutrition profiles, irrespective of whether their beliefs are well founded. Thus 'unrealistic optimism' and other cognitive biases may depress motivation to use nutrition information and explain the lower than expected uptake of this (Sparks and Sheppard 1994). Furthermore, because consumers purchase many fast-moving-consumer-goods habitually, familiarity may also reduce use of nutrition

information (Jacoby *et al.* 1977; Klopp & MacDonald 1981; Signal *et al.* 2008). Finally, consumers are less likely to process numeric messages (Witt 1976; Yalch and Elmore-Yalch 1984); instead they rely on easily accessed peripheral cues that reduce their cognitive burden. (Russo *et al*. 1986). These findings imply that reformatting nutrition information to feature graphics rather than numbers may increase motivation, result in greater use of label details, and increase consumers' ability to choose between healthier and unhealthier foods. Our first hypothesis was thus:

H_1: Labels featuring simple visual heuristics will compensate for lower levels of motivation and enable better differentiation between healthy and less healthy products than labels featuring numeric details.

However, even consumers who are highly motivated to review and use nutrition information, may lack the numeric ability to do so. For example, most consumers have little knowledge of nutrition science (Jacoby *et al.* 1977; Klopp & MacDonald, 1981; Ni Mhurchu & Gorton, 2007) and many lack the mathematical skills required to interpret nutrition panels and compare different products (Daly, 1976; Levy *et al.,*, 1998; Byrd-Bredbenner *et al.* 2001; Rothman *et al.* 2006). As a result, label formats that do not require these skills are more likely to help consumers, particularly those with lower numerical ability. Our second hypothesis was thus:

H_2: Labels featuring simple visual heuristics will compensate for lower levels of numerical ability and enable better differentiation between healthy and less healthy products than labels featuring numeric details.

These hypotheses were designed specifically to recognise the emerging debate between food manufacturers and public health nutritionists, whose views on appropriate food labelling differ sharply. The food industry favours highly numeric Percent Daily Intake (PDI) labels, which members argue will promote consumer responsibility and informed choice. By contrast, health researchers argue the PDI format is too complex and instead support the Traffic Light Label (TLL), a visual heuristic developed by the British Food Standards Agency (FSA 2006). Our research tested these alternative formats by examining their utility under varying motivation and ability conditions.

Methodology

An online experiment was conducted in October 2008 with a random sample of 800 caregivers drawn from New Zealand's largest online research panel. A stated preference discrete choice experiment was designed to estimate the effect of nutrition format on consumers' choice behaviour. The research tested parents' evaluations of a fictitious children's breakfast cereal, a high penetration product category with nutritionally diverse and ambiguous options. The 3 x 2 experimental design involved nutrition information format and nutritional profile (poor and good). The three nutrition information formats were a Nutrition Information Panel (NIP) on the side of the pack, and a PDI and a TLL on the front of the pack. These attributes were paired using a row-column design (Bailey, 2007) that resulted in thirty pairs. To avoid respondent fatigue, we split these into three subsets of ten pairs, and each respondent saw one subset. Conducting a choice experiment electronically allowed the presentation order to be randomized; this was balanced using a Latin square design (MacFie, et al. 1989). Respondents were asked to select the product variant they would buy for their

children, if they had to make a choice from the two options given (a 'Neither' option was available to make the task more realistic and improve data quality (Dhar and Simonson, 2003). The data were analyzed using a multinomial logit model.

As well as standard HTML forms, the online questionnaire employed two JavaScript functions to provide for dynamic data presentation and collection in each respondent's browser. The LightBox2 JavaScript library (Dhakar, 2007) allowed respondents to view the side of each cereal packet 'on demand' as an overlay on the web page. A mouse click on the front-of-packet image initiated presentation of the overlay, while a mouse click outside of the overlay, or on a 'close' link in the overlay itself, closed the image and returned focus to the underlying questionnaire page. Additionally, a modified version of Heerwegh's (2003a) *client-side paradata* JavaScript function automatically collected user input paradata) for key items throughout the questionnaire (see Couper, 2000; Heerwegh, 2003b). This enabled analysis of specific behavioural metrics, including whether or not the package side overlay (containing the NIP) was viewed and the number of times it was opened and closed.

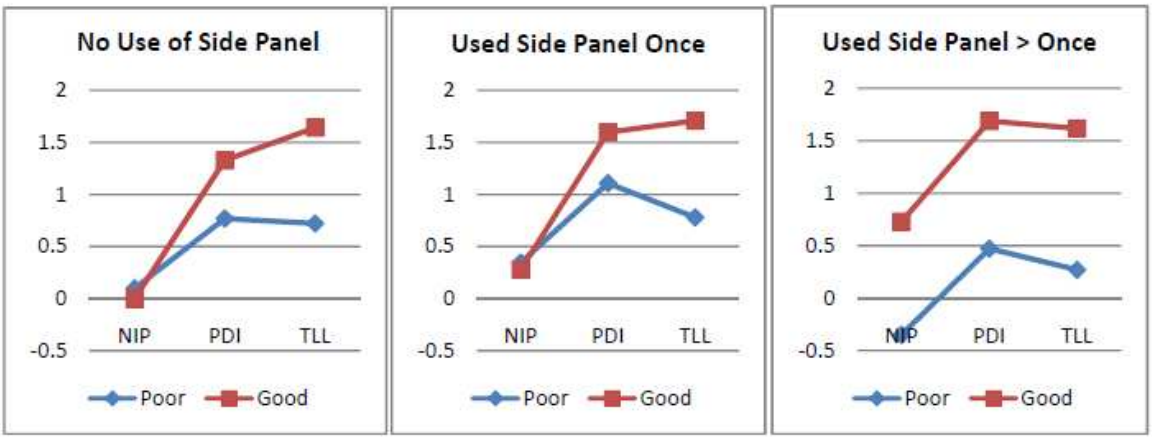
Results and Discussion

Collection of paradata enabled us to examine whether the side overlay containing the NIP had been opened and the number of times respondents accessed this. This data was used as a behavioural measure of motivation and we tested the first hypothesis by examining whether product utility values varied according to respondents' use of the side panel and the front-of-pack information provided. Figure 1 shows these results.

Those who did not use the side panel at all or who used it only once regarded the products as virtually identical (this was predictable for those who did not use the NIP at all since they had no way of differentiating between the products). As expected, those who used the NIP more than once were better able to differentiate between the products in the absence of any front-of-pack labelling. The PDI increased respondents' ability to differentiate between the profiles, and the TLL enhanced this further. Irrespective of whether they accessed the NIP, respondents' reaction to the good profile was very consistent once front-of-pack labelling was introduced.

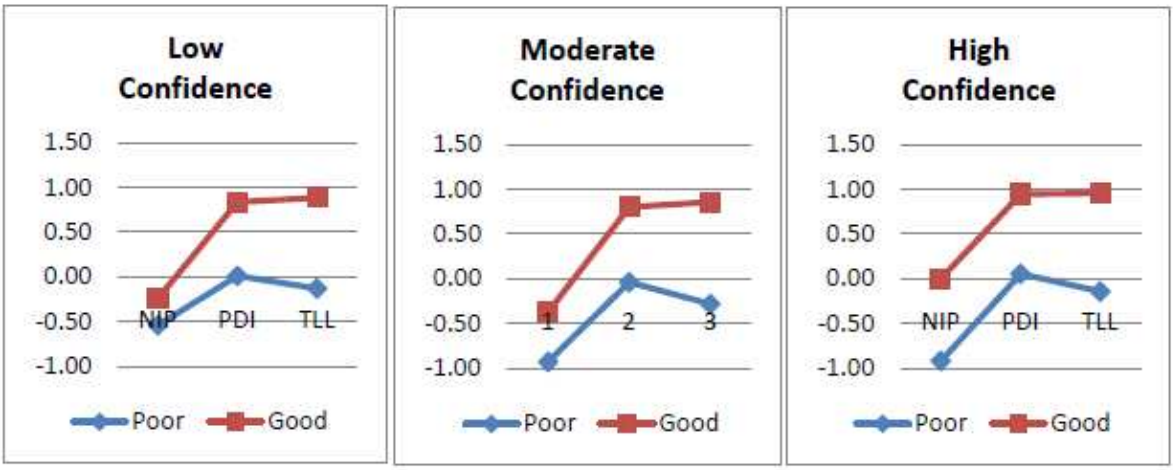
However, the mere presence of front-of-pack labelling enhanced perceptions of the poor profile product, and the addition of the PDI sharply increased the poor product's utility among all groups. Although the TLL reduced this effect and enhanced discrimination, it still inflated the attractiveness of the poor product. Overall, however, the TLL elicited the highest levels of discrimination, even among those who had not been motivated to use the side panel. The results thus support our first hypothesis, that simple visual heuristics would compensate for lower levels of motivation and promote better differentiation between healthy and less healthy products.

Figure 1: Motivation and Product Differentiation



To test the second hypothesis, we used consumers' self-reported confidence in assessing nutrition information as a measure of their numerical ability, and examined the product utilities of groups with different confidence levels. (Confidence in assessing nutrition information was measured by presenting respondents with a 9-point scale and asking them how confident they were when using nutrition information.) Figure 2 shows these results.

Figure 2: Numerical Ability and Product Differentiation



Comparison of the 'poor' and 'good' lines in Figure 2 reveals differences in the product-by-information-format utilities across the three confidence groups. As respondents' confidence in using nutrition information increased, they were better able to differentiate between good and poor products when given access to the NIP only. When the PDI was introduced, all consumers' ability to discriminate increased, but this discrimination was similar across all three confidence groups. The TLL further enhanced consumers' ability to discriminate between the two profiles, particularly among the low and moderate confidence groups when compared to the 'NIP-only' condition.

Figure 2 illustrates that, while the attractiveness of the good product was relatively consistent across the groups, respondents' ability to differentiate between products with poor and good nutrition profiles increased sharply when PDIs and TLLs were provided. TLLs produced the largest differences between the profiles and elicited very similar results from all three groups. The findings thus support our second hypothesis. The implications of these findings for low confidence consumers are particularly important, since this group showed the weakest

discrimination when provided with access to the NIP only, but exhibited very similar choice patterns to the high confidence group when provided with a TLL.

Discussion, Policy Implications and Conclusions

Regulators have traditionally assumed that consumers explicitly consider nutrition information and then draw on this to inform their food choices. Our findings question this assumption and are consistent with earlier studies that reveal such information is difficult for consumers to access and use. In our experiment, information format clearly influenced respondents' choice behaviour, and the presence of a visual heuristic, in the form of a traffic light label, greatly enhanced their ability to differentiate between healthy and less healthy products. This confirmed our expectation that consumers are more responsive to simple visual information than they are to complex numeric details. Perhaps most importantly, the fact that the traffic light label reduced natural differences in consumers' motivation and confidence in assessing nutrition information makes an important contribution to our understanding of how motivation and ability affect the use of this information.

We also question the assumption that consumers are motivated and able to actively process and use the nutrition information currently on food products. Instead, our findings are more consistent with peripheral processing, where front-of-pack information functions as a heuristic that elicits stimulus-response reactions, in line with classical conditioning theory. Given that many food products are low-involvement and appear in cluttered and distracting retail environments, consumers may be more likely to rely on heuristics and less likely to locate and then evaluate nutrition information on a side panel.

Our findings are also consistent with behaviour modification theory and suggest traffic light label heuristics that draw on learned associations reduce disparities that affect consumers' choices. More fundamentally, the results question the rational consumer model that regulators have adopted and suggest this requires urgent re-examination. Although our findings have emerged from a single study, this constituted a rigorous test, particularly of motivation, since it used behavioural data rather than creating artificial motivation contexts. Replication studies using assorted product categories, a wider range of nutrition profiles and product attributes, and focussing on actual rather than choice behaviour, are now needed to examine the extent to which these findings can be generalised. Further work is also required to explore the effect on consumers' product evaluations that the mere presence of front-of-pack nutrition information appears to have. Nevertheless, the findings raise timely questions about how regulators view consumers' behaviour and provide important insights into an on-going policy debate.

References

Bailey, R. 2007. Designs for two-colour microarray experiments. Journal of the Royal Statistical Society Series C, Royal Statistical Society, 56(4), 365-394.

Byrd-Bredbenner, C., Alfieri, L., Wong, A., Cottee, P. 2001. The inherent educational qualities of nutrition labels. Family and Consumer Sciences Research Journal, 29 (3), 265-280.

Couper, M. P. 2000. Usability evaluation of computer-assisted survey instruments. Social Science Computer Review, 18(4), 384-396.

Daly, P. 1976. The response of consumers to nutrition labelling Journal of Consumer Affairs 10 (2), 170 - 178.

Dhakar, L. 2007. LightBox2. Retrieved 17 June, 2009, from http://www.lokeshdhakar.com/projects/lightbox2/

Dhar, R. and Simonson, I. 2003. The effect of forced choice on choice. Journal of Marketing Research, 40 (May),146–60.

Dunning, D., Heath, C., Suls, J. 2004. Flawed Self-assessment: implications for health, education, and the workplace. 5 (3), 69-106.

Food Standards Agency 2006. The nutrient profiling model. http://www.food.gov.uk/healthiereating/nutlab/nutprofmod, accessed 30 June, 2006.

Grunert, K., Wills, J. 2007. A review of European research on consumer response to nutrition information on food labels. Journal of Public Health, 15(5), 385-399.

Hadden, S. 1991. Regulating product risks through consumer information. Journal of Social Issues, 47(1), 93-105.

Heerwegh, D. 2003a. The CSP Project Webpage. Retrieved 17 June, 2009, from https://perswww.kuleuven.be/~u0034437/public/csp.htm#intro

Heerwegh, D. 2003b. Explaining response latencies and changing answers using client-side paradata from a web survey. Social Science Computer Review, 21(3), 360-373.

Hutchinson, J. W., and Alba, J. 1991. Ignoring irrelevant information: situational determinants of consumer learning. Journal of Consumer Research, 18(3), 325-345.

Jacoby, J., Chestnut, R., Silberman, W. 1977. Consumer use and comprehension of nutrition information. Journal of Consumer Research, 4 (2), 119-128.

Jacoby, J., Chestnut, R., Fisher, W. 1978. A behavioral process approach to information acquisition in nondurable purchasing. Journal of Marketing Research, 15 (4), 532-544.

Klopp, P., McDonald, M. 1981. Nutrition labels: an exploratory study of consumer reasons for nonuse. Journal of Consumer Affairs, 15 (2), 301-16.

Levy, A., Fein, S., Schucker, R. 1996. Performance characteristics of seven nutrition label formats. Journal of Public Policy and Marketing, 15 (1), 1-15.

Macfie, H., Bratchell, N. Greenhoff, K., Vallis, L. 2007. Designs to balance the effect of order of presentation and first-order carry-over effects in hall tests. Journal of Sensory Studies, 4 (2), 129 - 148.

Mazis, M., Staelin, R., Beales, H., Salop, S. 1981. A framework for evaluating consumer information regulation. Journal of Marketing, 45 (1), 11-21.

Moorman, C. 1996. A quasi experiment to assess the consumer and informational determinants of nutrition information processing activities: the case of the Nutrition Labeling and Education Act. Journal of Public Policy & Marketing, 15 (1), 28-44.

Ni Mhurchu C, Gorton D. 2007. Nutrition labels and claims in New Zealand and Australia: A review of use and understanding. Australian and New Zealand Journal of Public Health, 31,105-112

Petrovici, D., Ritson, C. 2006. Population, health and risk factors in a transitional economy. Journal of Consumer Policy29 (3), 279-300.

Rothman, R., Housam, R., Weiss, H., Davis, D., Gregory, R. Gebretsadik, T., Shintani, A., Elasy, T. Patient understanding of food labels: the role of literacy and numeracy, American Journal of Preventive Medicine, 31 (5), 391-398.

Schrayer, 1978. Consumer responses to nutrition labeling. Food Technology, 32(12), 42-45.

Seggebruch, A., Brecheisen, D., Jensen, T. 2006. Consumers' use of nutritional information in advertising: nutritional motives, knowledge, and endorsers. Paper presented at the American Marketing Association - Marketing and Public Policy Conference - Long Beach, Calif., June 8-10

Signal, L.N., Lanumata, T. Robinson, J. Tavila, A. Wilton, J. and Ni Mhurchu, C. 2008. Perceptions of New Zealand nutrition labels by Māori, Pacific and low-income shoppers. Public Health Nutrition, 2008. DOI: 10.1017/S1368980007001395.

Sparks, P., Shepherd, R. 1994. Public perceptions of the potential associated with food production and food consumption: an empirical study. Risk Analysis 14,799-806.

Tanner, R., Carlson, K. 2009. Unrealistically optimistic consumers: a selective hypothesis testing account for optimism in predictions of future behavior. Journal of Consumer Research, 35, 810-822.

Wilkinson, R., Marmot, M. 1998. Social determinants of health: the solid facts. Geneva: World Health Organization.

Witt, W. 1976. Effects of quantification in scientific writing, Journal of Communication, 26 (Winter), 67-69.

Yalch,R, Elmore-Yalch,R. 1984. The effect of numbers on the route to persuasion. Journal of Consumer-Research, 11(1), 522-527.