

Attention to health cues on product packages

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ABSTRACT

The objectives of the study were (a) to examine which information and design elements on dairy product packages operate as cues in consumer evaluations of product healthfulness, and (b) to measure the degree to which consumers voluntarily attend to these elements during product choice. Visual attention was measured by means of eye-tracking. Task (free viewing, product healthfulness evaluation, and purchase likelihood evaluation) and product (five different yoghurt products) were varied in a mixed within-between subjects design. The free viewing condition served as a baseline against which increases or decreases in attention during product healthfulness evaluation and purchase likelihood evaluation were assessed. The analysis revealed that the only element operating as a health cue during product healthfulness evaluation was the nutrition label. The information cues used during purchase likelihood evaluation were the name of the product category and the nutrition label. Taken together, the results suggest that the only information element that consumers consistently utilize as a health cue is the nutrition label and that only a limited amount of attention is devoted to read nutrition labels during purchase likelihood evaluations. The study also revealed that the probability that a consumer will read the nutrition label during the purchase decision process is associated with gender, body mass index and health motivation.

1. INTRODUCTION

That policy makers are interested in healthy food choice makes a good deal of sense; any improvement in the healthfulness of the citizen's diet will lead to more welfare through fewer cases of lifestyle related diseases and associated medical costs and perhaps even an increase in productivity since a healthier diet has been shown to improve cognitive performance (Benton et al., 2003). That consumers in general are not interested in healthy food choice does also make a good deal of sense; first of all it seems much harder to create preferences for healthy foods since these foods generally contain less of the nutrients that we associate with palatability such as fat, sugar and salt. In a study by Raghunathan and colleagues it was demonstrated that unhealthy foods which often contain these nutrients are associated with palatability while healthy foods are not (Raghunathan, Naylor, & Hoyer, 2006). Also one has to remember that unhealthy foods are often less expensive and perhaps even more convenient than healthier foods (Drewnowski & Darmon, 2005), both of which are strong incentives for most consumers. This conflict of interests has naturally been the object of much research in the past, and the present study is no exception to that. The study focuses on one particular aspect of healthy food choice that is under-researched: consumer attention and interest in health cues on product packaging.

This study contributes to the research on consumer attention and interest in food labelling by asking a very fundamental question: what does actually constitute a product health cue and to what degree are consumers voluntarily attending to these health cues during purchasing? To answer the question an eye tracking experiment was carried out in order to objectively measure consumer attention to packaging and design elements on food products. The idea behind the experimental design is based on previous results from eye tracking showing that visual attention is strongly influenced by specific viewing tasks: any change in top-down processing of the visual scene will alter the visual scanpath (Pieters, Rosbergen, & Wedel, 1999; Pieters & Wedel, 2007; Wedel & Pieters, 2006; Yarus, 1967).

The experiment capitalizes on this effect by manipulating the viewing task (three experimental conditions). In each condition the participants see the same range of dairy products. In the first condition participants are asked to look freely at the products, in condition two they evaluate their purchase likelihood for each product, and in condition three they perform a product healthfulness evaluation. The

three experimental conditions are expected to result in different scanpaths and this difference is used to identify areas on the product package relevant for information uptake in terms of product healthfulness (health cues) and purchase likelihood (purchase cues). The free viewing condition is used as the baseline condition for identifying which packaging areas are relatively over- or under-attended in the purchase likelihood and product-healthfulness conditions.

The idea behind using the free viewing condition as a baseline is that this viewing task is more open to bottom-up visual saliency (Einhäuser, Rutishauser, & Koch, 2008) so that the free viewing condition can be used to control for visual saliency as well as surface size of the health and purchase cues. Furthermore, a fixed exposure time of 10 seconds was used in all three conditions to create a competition for attention among the packaging areas under scrutiny. The assumption is that areas with a higher relevance to the specific viewing task will attract and retain a higher number of fixations than low-relevance areas. Hence, our research questions were:

RQ1: Which packaging elements do consumers use as health cues, i.e. which elements are relatively over-attended in the product healthfulness evaluation condition compared to the free viewing condition?

RQ2: Which packaging elements do consumers use as purchasing cues, i.e. which elements are relatively over-attended in the purchase likelihood condition relative to the free viewing condition?

RQ3: To what extent do consumers attend to health cues during purchase likelihood evaluation, controlling for health motivation, gender and body mass index?

2. METHOD

2.1 *Participants and procedure*

The experiment used a three-group mixed within-between subjects design where the stimuli varied within-subjects and the viewing task varied between-subjects. The three viewing tasks were a free viewing condition, a purchase likelihood evaluation, and a product healthfulness evaluation.

60 participants (30 male and 30 female) were recruited among Aarhus University students and received a small payment for their participation. Data from 5 participants were later discarded due to low data quality.

Participants were recruited on the campus area and received a small incentive for their participation. Participants with special dietary status were screened out. All data collection took place at the ConsumerLab facilities where the participants were assigned randomly to one of the three experimental conditions: free viewing, purchase likelihood evaluation, and product healthfulness evaluation. Depending on the condition the participant received the following instructions: "Please look freely at the images." (free viewing), "Imagine that you are shopping in a supermarket. Please look at each product and in the subsequent questionnaire select how likely or unlikely it is that you will purchase the product." (purchase likelihood evaluation). "Please look at each product and in the subsequent questionnaire select how healthy or unhealthy you believe this product to be." (healthfulness evaluation). All participants were exposed to the same color slides for a fixed exposure time of 10 seconds each showing one dairy product at a time. Before viewing a product the participant saw a fixation cross for 1000 msec. to avoid any attention bias due to repeated exposure of similarly positioned stimuli. After the eye tracking test, participants were asked to complete a questionnaire measuring different individual-difference characteristics.

2.2 *Materials and measures*

The stimuli consisted of a broad sample of dairy products varied across product categories (skimmed milk, full-fat milk, skimmed yoghurt, full-fat yoghurt, yoghurt with fruit flavors, butter) and included a wide range of Danish dairy brands. The stimuli were the same in all three conditions and consisted of 31 color slides each showing both front-of-pack and back-of-pack of the products.

The main dependent variable was the number of fixations on 34 predefined packaging elements which were assessed for five natural flavored skimmed milk yoghurts. Besides the attention measures, participants were administered a questionnaire assessing demographic characteristics (Drichoutis,

Lazaridis, & Nayga, 2006) and general health motivation (Moorman, 1990; Moorman & Matulich, 1993; Moorman, 1996).

3. RESULTS

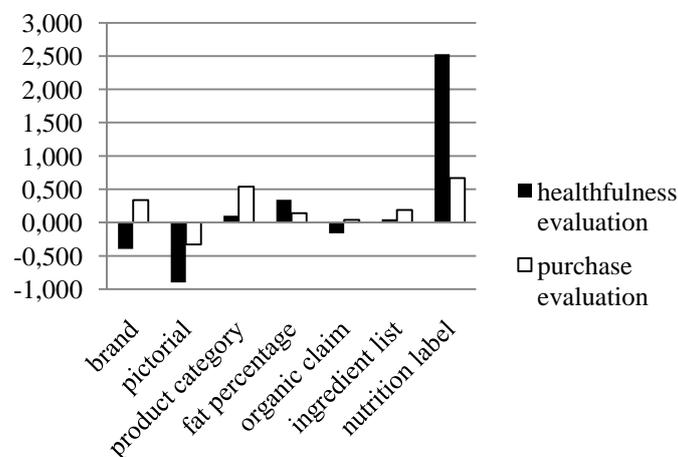
An initial manipulation check showed a significant interaction effect between viewing task and packaging cues in total gaze duration, $F(62, 2653) = 2.40, p < .001$, which revealed that the manipulation of viewing task did in fact change the scanpath as predicted. For conceptual reasons the 34 product-specific areas were regrouped into seven general areas including the brand, pictorial, product category, fat percentage, organic claim, ingredient list, and nutrition label. Certain areas like the barcode, production date, and production stamp were excluded from the following analyses due to low theoretical interest. An additional manipulation check using the seven regrouped packaging areas in a two-way ANOVA showed a significant main effect of packaging area on total gaze duration, $F(6, 1906) = 67.32, p < .001$, and a non-significant effect of viewing task on total gaze duration, $F(2, 1910) = 1.07, p = .345$. There was a significant interaction effect between packaging area and viewing task on total gaze duration, $F(12, 1900) = 8.48, p < .001$.

To answer *RQ1* and *RQ2* a two-way ANOVA was carried out comparing fixation counts under the three viewing conditions to the seven packaging areas. The analysis revealed a significant interaction effect between viewing task and the package area, $F(12, 3101) = 9.15, p < .001$. To answer *RQ1* concerning which areas could be considered as health cues, pairwise comparisons were carried out for each packaging area under the free viewing and the healthfulness evaluation conditions. The fixation counts were similar across the two viewing tasks for the brand, fat percentage, organic claim, and ingredient list; however, the fixation counts for the pictorial were significantly lower under the healthfulness evaluation ($M = .89, SD = 1.25$) than under the free viewing condition ($M = 1.79, SD = 1.96$), for the nutrition label the fixation count was significantly higher under healthfulness evaluation ($M = 4.50, SD = 3.31$) than under the free viewing condition ($M = 1.98, SD = 2.91$).

To answer *RQ2* about which areas could be considered purchasing cues pairwise comparisons were carried out for each packaging area under the free viewing and the purchase likelihood conditions. The comparisons showed no significant differences in fixation counts between the two conditions for the brand, pictorial, fat percentage, organic claim, and ingredient list. For the product category the purchase likelihood condition resulted in a significantly higher number of fixations ($M = 3.2500, SD = 3.3696$) than for the free viewing condition ($M = 2.71, SD = 3.00$), and also for the nutrition label the purchase likelihood condition was significantly higher ($M = 2.65, SD = 3.10$) than for the free viewing condition ($M = 1.98, SD = 2.91$).

The relative differences in fixation counts between healthfulness evaluation and purchase likelihood evaluation have been illustrated in Figure 1 below. It is worth noting that although non-significant there is

Figure 1. Relative number of fixations, y-axis, under product healthfulness and purchase likelihood evaluations.



a tendency to fixate on the fat percentage under the healthfulness evaluation and on the brand under the purchase likelihood evaluation. What is really surprising are the non-significant results for the organic label which might be a consequence of the organic label's pictographic qualities (bright red pictogram) which could have allowed the participant to identify and decode the organic label through either the parafoveal visual field or using a minimum amount of attention. To answer this question a follow-up analysis was carried out on a more detailed level differentiating between written organic claims and pictorial organic labels. The results were in fact non-significant for both the pictorial and the written organic labels, $F(3, 264) = .74, p = .530$, which means that the participants did not attend more to the organic labels or organic claims under the product healthfulness evaluation than under the free viewing condition.

To answer RQ3 about the extent to which consumers voluntarily attend to health cues during purchase likelihood evaluation a multiple regression was carried out using the number of fixations to the nutrition label as dependent variable and health motivation, gender, and body mass index as independent variables. Due to the significant inter-predictor correlations, a stepwise regression was estimated. Variables like age, income and education were excluded from the regression model because of the uniform nature of the sample (university students). The variables were entered hierarchically beginning with health motivation, gender and finally body mass index. All three steps in the regression model were significant at $p < .05$ with an adjusted $R^2 = .12$ for step 3 in the model (Table 1).

Table 1. Stepwise multiple regression results

		B	SE B	β
Step 1	(Constant)	6,017	1,453	
	Health Motivation	-1,233	,521	-,222*
Step 2	(Constant)	5,275	1,456	
	Health Motivation	-1,131	,512	-,204*
	Gender	1,455	,611	,219*
Step 3	(Constant)	6,196	1,473	
	Health Motivation	-1,179	,500	-,213*
	Gender	1,919	,627	,289*
	Body Mass Index	-7,421	3,039	-,231*

$R^2 = .049$ for step 1, $\Delta R^2 = .048$ for step 2, $\Delta R^2 = .048$ for step 3. * $p < .05$

The analysis revealed that health motivation was a significant predictor for the number of fixations to the nutrition label during purchase likelihood evaluation although in a somewhat surprising manner. An increase in health motivation would lead to a decrease in attention to the nutrition label which is contradictory to the theoretical background for the health motivation scale. Gender was also a significant predictor for attention to nutrition labels, $F(1, 109) = 6.39, p = .013$, with women ($M = 3.71, SD = 4.24$) having in general 1.6 more fixations to the nutrition label than men ($M = 2.15, SD = 2.26$). Finally, the analysis showed that body mass index was significantly negatively associated to attention to the nutrition label meaning that the more overweight the participants were the less they would attend to the nutrition label during purchase evaluation.

4. CONCLUSIONS

The contributions of this paper were both methodological and theoretical; through the manipulation of viewing task the relative informativeness of product packaging elements was either increased or decreased which allowed for an identification of specific task related cues. The method has earlier been used by Pieters and Wedel (Pieters & Wedel, 2007) to make inferences about the impact of processing

goals on attention to ad objects but has never been used for making inferences about stimulus relevance in general. The results show that the method can indeed be used to draw conclusions about the relevance of packaging and design elements in different evaluative situations like a purchase scenario or a product healthfulness evaluation.

The study also had important theoretical contributions, first of all it was demonstrated that with regards to health cues only the nutrition label can really be said to have an impact. Surprisingly neither the fat percentage nor the organic label were used as health cues by the participants. Under purchase likelihood evaluations consumers mainly attend to the product category and to some degree also to the nutrition label. There was a positive tendency for women to read the nutrition labels while an increase in body mass index or health motivation was associated with fewer fixations.

All in all the study confirms the strength of consumer decision heuristics: only a very limited selection of packaging cues was inspected during purchase consideration and even fewer were used as health cues. One might speculate that consumers in purchase situations to some extent retrieve health associations based on the product category, but a more conservative guess is that most consumers do not know enough or care enough to make such inferences about product healthfulness.

An important topic for research in food choice and nutrition labeling is therefore to investigate what it takes to override these entrenched heuristics and make consumers aware of healthy eating goals at the point of purchase. A possibility for future experiments could, for instance, involve manipulations of message relevance and visual salience with the purpose of developing better models of information uptake for what is considered as low-relevance messages by consumers, such as health communication.

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