# 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 (14 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 elements operating as health cues during product healthfulness evaluation were the nutrition label and the product category. The information cues used during purchase likelihood evaluation were also the product category and the nutrition label. However, the nutrition label was significantly less attended to under purchase likelihood evaluation than under the healthfulness evaluation. 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 reading nutrition labels during purchase likelihood evaluations. The study also revealed that the probability that a consumer will read the nutrition label during a purchase decision process is associated with gender, body mass index and health motivation.

Keywords: eye tracking, consumer behavior, product packaging, food choice

## 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 a general increase in 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 extent 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; Yarbus, 1967).

The experiment capitalizes on this effect by manipulating the viewing task in 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 variation in visual saliency and 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.

70 participants (43 male and 27 female) were recruited at Aarhus University campus area and received a small payment for their participation. Age of participants ranged between 20 and 30 years ($M$ = 25.7, $SD$ = 2.5) and the educational level ranged between 0 and 8 years beyond elementary school ($M$ = 6.0, $SD$ = 2.2).

All participants completed an informed consent form. 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, yoghurt, butter) and included a wide range of Danish dairy brands. The stimuli were the same in all three conditions and consisted of 30 color slides each showing both front-of-pack and back-of-pack of the products.


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The main dependent variable was the number of fixations to 34 predefined packaging elements which were assessed for 14 different yoghurt packages. 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

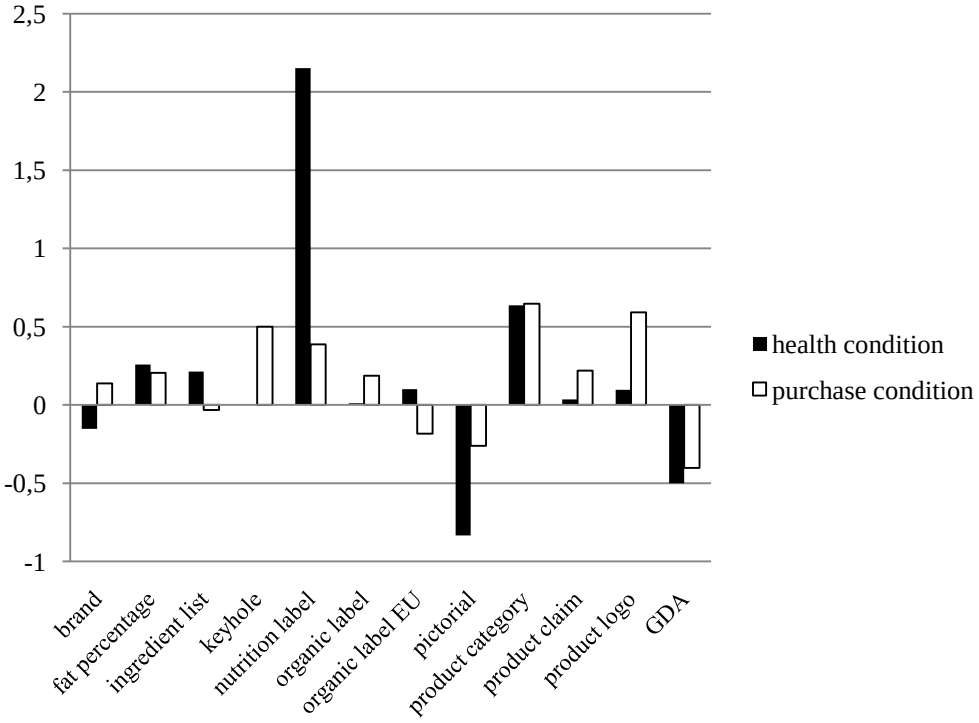
An initial manipulation check showed a significant interaction effect between viewing task and packaging cues on fixation counts, $F(70, 7196) = 4.30$, $p < .001$, which revealed that the manipulation of viewing task did in fact change the scanpath as predicted. For conceptual reasons the 34 product-specific areas were regrouped into 12 general areas including brand, fat percentage, GDA, ingredient list, keyhole label, nutrition label, organic label, EU organic label, pictorial, product category, product claim and product logo. The areas selected for analysis were either brand related (brand, pictorial, product logo), nutrition related (nutrition label, fat percentage, GDA [guided daily amount], ingredient list, keyhole label [Danish nutrition label indicating whether a product is considered healthful within its category]), production related (organic label, EU organic label, product claim) or category related (product category). Certain areas like the barcode, production date, and production stamp were excluded from the following analyses due to low theoretical interest.

To answer *RQ1* and *RQ2* a three-way ANOVA was carried out comparing fixation counts to the 12 packaging areas under the three viewing conditions controlling for product specific effects. The analysis showed a significant main effect of packaging area on fixation counts, $F(11, 6326) = 53.64$, $p < .001$, a non-significant effect of viewing task on fixation counts, $F(2, 6326) = .85$, $p = .43$, a significant effect of product on fixation counts $F(13, 6326) = 18.83$, $p < .001$ and a significant interaction effect between viewing task and packaging area on fixation counts, $F(22, 6326) = 10.02$, $p < .001$. 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, GDA, ingredient list, keyhole label, organic label, EU organic label, product claim and product logo; however, the fixation counts for the nutrition label were significantly higher under the healthfulness evaluation ($M = 5.06$, SD = .99) than under the free viewing condition ($M = 2.91$, SD = 1.04), for the pictorial the fixation counts were significantly lower under the healthfulness evaluation ($M = 2.22$, SD = 1.15) than under the free viewing condition ($M = 3.05$, SD = .83) and for the product category the fixation counts were significantly higher under the healthfulness evaluation ($M = 3.15$, SD = .82) than under the free viewing condition ($M = 2.52$, SD = .68).

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, fat percentage, GDA, ingredient list, keyhole label, organic label, EU organic label, product claim and product logo. For the product category the purchase likelihood condition resulted in a significantly higher number of fixations ($M = 3.16$, SD = .74) than for the free viewing condition ($M = 2.52$, $SD = .68$), and also for the nutrition label the purchase likelihood condition was significantly higher ($M = 3.30$, $SD = 1.07$) than for the free viewing condition ($M = 2.91$, SD = 1.04).

The relative differences in fixation counts between healthfulness evaluation and purchase likelihood evaluation have been illustrated in table 1 below. The difference scores were calculated by subtracting the free viewing condition from the healthfulness evaluation and the purchase likelihood conditions respectively. It is worth noting that although non-significant there is a tendency to fixate on the fat percentage and ingredient list under the healthfulness evaluation and on the brand, fat percentage, keyhole label, organic label, product claim and product logo under the purchase likelihood evaluation. What is 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 participants to identify and decode the organic label in the parafoveal visual field which would result in no significant differences between viewing conditions. 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.

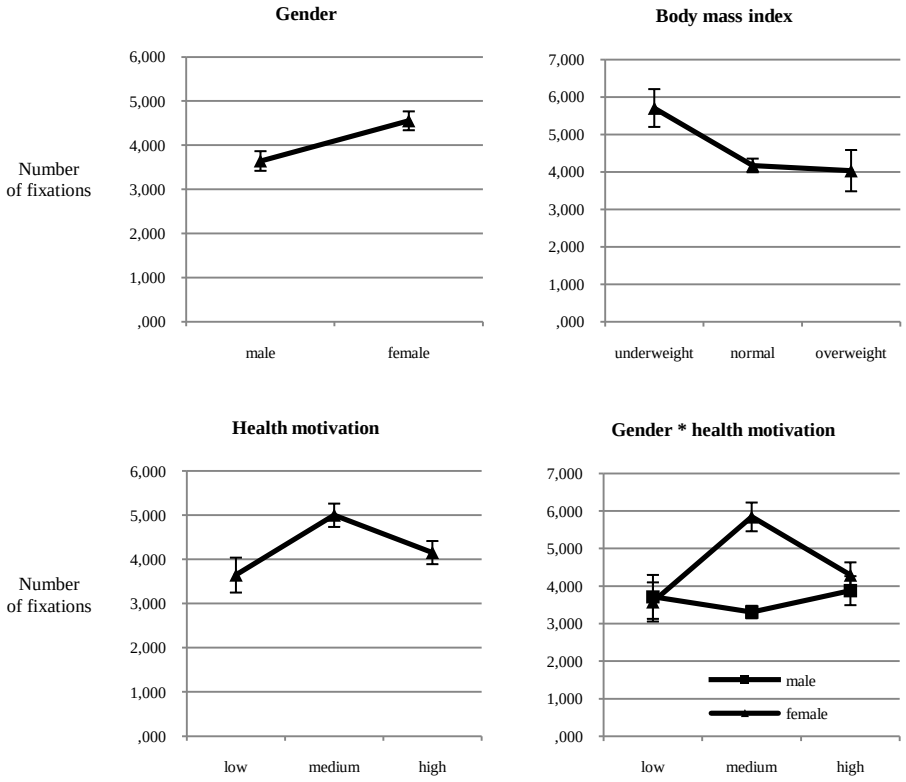
**Table 1.** *Relative number of fixations under product healthfulness and purchase likelihood evaluations.*




To answer *RQ3* about the extent to which consumers voluntarily attend to health cues during purchase likelihood evaluation an ANCOVA was carried out using the number of fixations to the nutrition label under the purchase likelihood evaluation as the dependent variable and health motivation, gender, and body mass index as independent variables and income as a covariate. For ease of interpretation health motivation was recoded into a categorical variable with three groups; one group being one standard deviation below the mean, one group within one standard deviation from the mean and one group being one standard deviation above the mean ($M$ = 3.09, $SD$ = 0.37). Body mass index (BMI) was calculated using the formula weight /height$^2$ ($M$ = 23.17, $SD$ = 2.62) and recoded so that a BMI below 19 corresponded to underweight, a BMI from 19 to 25 corresponded to normal weight, and a BMI above 25 corresponded to overweight.

The analysis revealed a significant main effect of health motivation on number of fixations to the nutrition label $F(2, 531) = 12.06$, $p < .001$, a significant main effect of gender $F(1, 531) = 8.50$, $p < .001$, a significant main effect of body mass index $F(2, 531) = 18.61$, $p < .001$, and a significant interaction effect between health motivation and gender on fixation counts to the nutrition label $F(2, 531) = 24.77$, $p < .001$ when controlling for income. The covariate itself, income, was non-significant $F(1, 531) = .20$, $p = .66$. Contrasts showed that for health motivation participants with a medium level health motivation score had significantly more fixations to the nutrition label ($M$ = 5.00, $SD$ = 2.21) than participants with a low score ($M$ = 3.65, $SD$ = 3.30) and participants with a high score ($M$ = 4.16, $SD$ = 2.20). For body mass index underweight participants had significantly more fixations ($M$ = 5.70, $SD$ = 4.22) than normal ($M$ = 4.17, $SD$ = 1.52) and overweight participants ($M$ = 4.03, $SD$ = 4.61) and for gender women ($M$ = 4.77, $SD$ = 1.87) had significantly more fixations to the nutrition label than men ($M$ = 3.63, $SD$ = 2.00). A pairwise comparison for the health motivation and gender interaction effect showed that only at the medium level health motivation score did men ($M$ = 3.31, $SD$ = 1.40) differ from women ($M$ = 5.84, $SD$ = 3.20) on their fixations to the nutrition label.

**Figure 1.** *Number of fixations to the nutrition label under purchase likelihood evaluation for the factors gender, body mass index, health motivation and gender * health motivation.*




## 4. DISCUSSION

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 and the product category 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 the purchase likelihood evaluations consumers mainly attend to the product category and to the nutrition label. There was a positive tendency for women and underweight participants to read nutrition labels and an increase in health motivation score was positively related to reading nutrition labels although at the highest level of health motivation there was on average one fixation less to the nutrition label than at the middle level.

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 healthfulness evaluation. 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 the visual salience of different health messages 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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