Research Article

Influence of Interpretation Aids on Attentional Capture, Visual Processing, and Understanding of Front-of-Package Nutrition Labels

Lucía Antúnez, Eng[1]; Ana Giménez, BS[1,2]; Alejandro Maiche, PhD[2]; Gastón Ares, PhD[1,2]

ABSTRACT

Objective: To study the influence of 2 interpretational aids of front-of-package (FOP) nutrition labels (color code and text descriptors) on attentional capture and consumers' understanding of nutritional information.

Design: A full factorial design was used to assess the influence of color code and text descriptors using visual search and eye tracking.

Participants: Ten trained assessors participated in the visual search study and 54 consumers completed the eye-tracking study.

Main Outcome Measures: In the visual search study, assessors were asked to indicate whether there was a label high in fat within sets of mayonnaise labels with different FOP labels. In the eye-tracking study, assessors answered a set of questions about the nutritional content of labels.

Analysis: The researchers used logistic regression to evaluate the influence of interpretational aids of FOP nutrition labels on the percentage of correct answers. Analyses of variance were used to evaluate the influence of the studied variables on attentional measures and participants' response times.

Results: Response times were significantly higher for monochromatic FOP labels compared with color-coded ones (3,225 vs 964 ms; $P < .001$), which suggests that color codes increase attentional capture. The highest number and duration of fixations and visits were recorded on labels that did not include color codes or text descriptors ($P < .05$). The lowest percentage of incorrect answers was observed when the nutrient level was indicated using color code and text descriptors ($P < .05$).

Conclusions and Implications: The combination of color codes and text descriptors seems to be the most effective alternative to increase attentional capture and understanding of nutritional information.

Key Words: nutrition label, traffic light system, eye tracking, visual search, attention (*J Nutr Educ Behav*. 2015;47:292-299.)

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INTRODUCTION

The incorporation of front-of-package (FOP) nutrition labels as a complement to traditional nutrition information has been suggested as an effective way of improving attentional capture and understanding.[1-6] Different formats of FOP labels have been recently developed,[7] which can be classified into 3 main categories according to the degree to which they allow consumers to draw conclusions about the healthfulness of products: directive, semi-directive, and nondirective labels.[8] Considering this criterion, guideline daily amount labels can be classified as nondirective labels,[9] the traffic light system as a semi-directive approach,[10] and health logos as directive labels.[8] Little consensus has emerged as to the most effective approach, which makes it necessary to study the effect of different formats of FOP nutrition labels on consumer perception and behavioral change.[2,8]

Two interpretational aids are commonly used in semi-directive FOP labels: color codes and text descriptors. Color-coded FOP labels classify the content of each nutrient as high, medium, or low using different colors. The most extensively used semi-directive FOP label is the traffic light system, which uses the traffic light color code.[10] One of the main concerns about using this color code is the implicit associations of traffic light colors.[11] Red is associated with

[1]Departamento de Ciencia y Tecnología de Alimentos, Facultad de Química, Universidad de la República (UdelaR), Montevideo, Uruguay
[2]Centro de Investigación Básica en Psicología (CIBPsi), Facultad de Psicología, Universidad de la República (UdelaR), Montevideo, Uruguay

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Address for correspondence: Lucía Antúnez, Eng, Departamento de Ciencia y Tecnología de Alimentos, Facultad de Química, Universidad de la República (UdelaR), General Flores 2124, CP 11800 Montevideo, Uruguay; Phone: (+59) 82 9248003; Fax: (+59) 82 9241906; E-mail: lantunez@fq.edu.uy

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danger and could be interpreted as a message to avoid consuming that food product, whereas yellow usually is related to caution and green is associated with healthy products.[12,13] Therefore, an alternative to avoid misinterpretation of the color code would be to replace it with text descriptors to indicate the level of each nutrient.

Text descriptors indicate the level of each nutrient using the corresponding word: *high*, *medium*, or *low*. Color code and text descriptors may have a different impact on attentional capture and understanding of nutritional information. Using color-coded labels may improve consumers' attentional capture, whereas including text descriptors may make understanding of nutritional information easier for consumers.

Consumers' perception of nutrition labeling has traditionally been based on self-reported methodologies. These approaches have been reported to overestimate attention, comprehension, and use of nutrition information.[1,4,5,14-16] To obtain more reliable information in relation to consumers' processing of food labels, visual search[3,4,17] and eye-tracking techniques[4,5,14,18-22] are increasingly being applied.

The aim of this work was to study, by means of visual search and eye-tracking technique, how 2 interpretational aids of FOP nutrition labels (color and text descriptors) influence attentional capture, visual processing, and understanding of nutritional information.

MATERIALS AND METHODS

The authors carried out 2 studies. The first was aimed at assessing the influence of color code and text descriptors on attentional capture of FOP labels using a visual search task. In the second study, the influence of color code and text descriptors on consumers' visual processing and understanding of FOP nutrition labels was assessed using 2 experimental tasks. The first task was related to application of the provided nutritional information to a particular case, whereas the second task involved a comparison of products on the content of a specific nutrient. The study was approved by the Research Ethics Committee of Facultad de Química, Universidad de la República, Uruguay.

Front-of-Package Label Design

The authors designed FOP considering 2 interpretational aids: color code and text descriptors. For each feature 2 levels were considered: monochromatic vs color labels and presence of text vs presence of guideline daily amounts without text, which resulted in 4 FOP labels (Figure 1).

Visual Search Study

Participants. The current study was carried out with 10 people (3 males and 7 females, aged 23–48 years), as is common practice in this methodology.[23] They were recruited among students and professors from the Food and Science Technology Department of Universidad de la República, Uruguay, based on their availability and interest in participating in the study. All participants self-reported normal or corrected-to-normal vision and full-color vision. They signed an informed consent form and received a small gift for participation in the study.

Stimuli. Stimuli presented to participants were sets of mayonnaise labels with FOP nutritional information. Two independent variables were considered for mayonnaise labels design: fat content and type of FOP label. Two levels (medium and high) were considered for fat content,[10] which was reflected in the relevant values, percentages, and color coding (yellow vs red) of the FOP labels.

To avoid repetition of nutrition information on labels, the researchers introduced small modifications for those corresponding to the same type of product (high or medium fat) so that labels differed in actual nutritional composition. The authors designed labels using GIMP 2.6 software (Free Software Foundation, Boston, MA).

For each type of FOP nutrition label, sets of mayonnaise labels were designed featuring 3, 5, or 8 labels. In half of the set one of the labels had high-fat content whereas in the other half only medium-fat content labels were included. Within each set, distribution of labels and the position of the label with high-fat content were

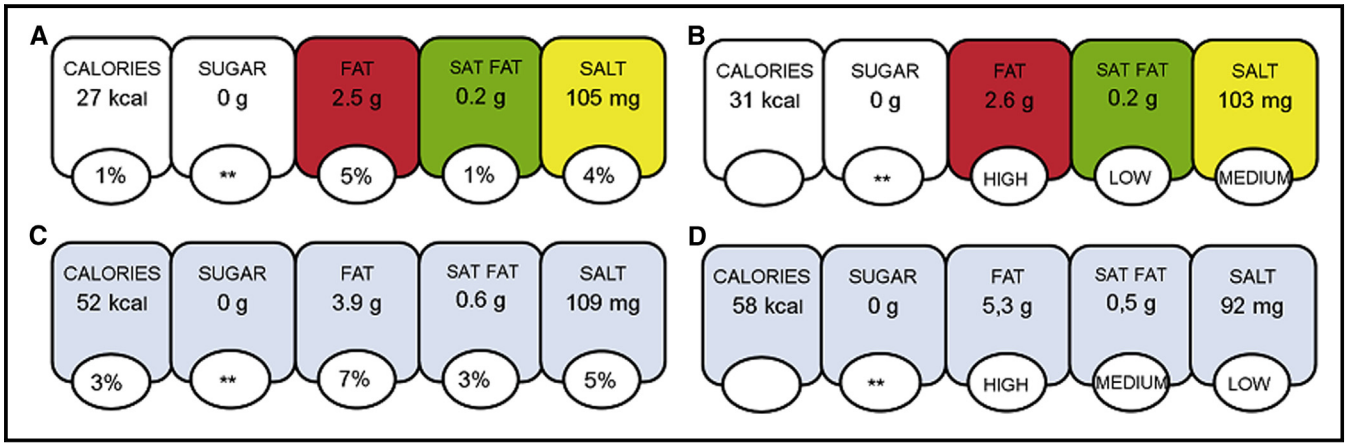

Figure 1. Example of front-of-package nutrition labels considered in the study: (A) color without text, (B) color with text, (C) monochromatic without text, and (D) monochromatic with text. **Guideline daily amounts for sugars were not clearly established when labels were designed.