Appetite 57 (2011) 753–757

Contents lists available at ScienceDirect

Appetite

journal homepage: www.elsevier.com/locate/appet

Research report

Crossmodal correspondences in product packaging. Assessing color–flavor correspondences for potato chips (crisps)☆

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ARTICLE INFO

Article history:
Received 23 May 2011
Received in revised form 1 July 2011
Accepted 21 July 2011
Available online 29 July 2011

Keywords:
Crossmodal correspondences
Packaging color
Flavor perception
Implicit Association Test (IAT)
Congruency
Consumer behavior
Expectation

ABSTRACT

We report a study designed to investigate consumers' crossmodal associations between the color of packaging and flavor varieties in crisps (potato chips). This product category was chosen because of the long-established but conflicting color–flavor conventions that exist for the *salt and vinegar* and *cheese and onion* flavor varieties in the UK. The use of both implicit and explicit measures of this crossmodal association revealed that consumers responded more slowly, and made more errors, when they had to pair the color and flavor that they implicitly thought of as being "incongruent" with the same response key. Furthermore, clustering consumers by the brand that they normally purchased revealed that the main reason why this pattern of results was observed could be their differing acquaintance with one brand versus another. In addition, when participants tried the two types of crisps from "congruently" and "incongruently" colored packets, some were unable to guess the flavor correctly in the latter case. These strong crossmodal associations did not have a significant effect on participants' hedonic appraisal of the crisps, but did arouse confusion. These results are relevant in terms of R&D, since ascertaining the appropriate color of the packaging across flavor varieties ought normally to help achieve immediate product recognition and consumer satisfaction.

Introduction

Colors have a powerful effect on us (e.g., Elliot, Maier, Moller, Friedman, & Meinhardt, 2007; Spence, 2010). In fact, color is one of the most potent features in the design of product packaging in the food industry (e.g., Deliza, Macfie, & Hedderley, 2003; Hine, 1995; Hutchings, 2003). According to Hine, consumers perceive packaging color at three different, and, in practice, interrelated levels: the physiological, the cultural, and the associational. The associational level refers to those packaging color expectations that have become associated with a brand image or even a product category, through consumers having interacted with it over some extended period of time (see Cheskin & Ward, 1948; Garber, Hyatt, & Boya, 2008; Spence, 2011).

Consumers can often draw important clues as to a product's likely qualities on the basis of nothing more than the color of the packaging. Color can therefore be considered as an important source of sensory and hedonic expectations, especially for those products that are consumed directly from the packaging. A mismatch between the expected and actual attributes of the product can all-too-easily result in a negative "disconfirmation of expectation" (Cardello & Sawyer, 1992). If this occurs, consumers may well not buy the product again (Deliza & MacFie, 1996).

Numerous studies have been published over the years documenting the role that packaging color plays in driving consumer expectations (e.g., Ares & Deliza, 2010; Deliza et al., 2003; Marshall, Stuart, & Bell, 2006; Piqueras-Fiszman, Ares, & Varela, 2011). The reality is that people are affected by packaging, specifically by its color, in ways that they do not necessarily understand at a conscious level (see Cheskin, 1957). Researchers have demonstrated that shoppers often do not read the information that is presented on packages (Charters, Lockshin, & Unwin, 1999); they mainly recognize what they want or need in order to make a quick purchasing decision. Since color is perhaps the one feature of the packaging that triggers the fastest response (Swientek, 2001), it is essential to consider in the design process the associations and expectations that consumers have in order to ensure effectiveness and the successful communication of brand/sensory qualities.

On the other hand, such a strong impact on the minds of consumers can have negative side-effects too. In fact, even fairly subtle modifications to the color of the packaging can have

☆ Thanks to the Ministerio de Educación (Spain) and the UPV for the scholarships awarded to Betina Piqueras-Fiszman. Thanks also to Cesare Parise for his collaboration with the programming.

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doi:10.1016/j.appet.2011.07.012

dramatic emotional consequences. Hence, when a company decides to change the style of a product's packaging, or to introduce a new item to a product line, designers should collect insights about how consumers' expect the product to be represented. In many cases, there are already well-established conventions about what colors are more appropriate to certain product categories, and in certain cultures/geographical regions (e.g., Sacharow, 1970; Spence, 2010; Wheatley, 1973).

A clear example of this idea is provided by crisps (or potato chips). Here, each flavor variety is typically represented by an arbitrary color. The established convention (or crossmodal correspondence; Spence, 2011) linking the color to the flavor can help to facilitate a shopper's ability to rapidly and effortlessly identify the particular flavor that they want. According to the extant literature, a change in this color code would be expected to provoke disconfirmation of expectation and confusion in the minds of consumers.

Contrary to this expectation, however, in the early 1980s, Walkers switched the color of their *cheese and onion* (green) and *salt and vinegar* (light blue) flavored crisps packages to blue and green, respectively. The consequent confusion that arose in the minds of consumers actually led to an increase in sales of their recently introduced *salt and vinegar* crisps (h2g2, BBC, 2006). This 'new' color combination has been maintained ever since, and by so doing, challenges the association that is present for the majority of crisps brands found nowadays in UK supermarkets. Contemporary consumer forums are rife with disgruntled shoppers who report arriving home and opening what they thought was their favorite flavor crisps package only to find that they had actually bought the wrong crisps.

Such reports highlight the tendency for consumers to blindly rely on packaging color, and what information they believe it conveys about the product. Relevant here is Garber et al.'s (2008) observation that the enhanced attentional capture that can result from introducing novel packaging colors will not necessarily translate into increased purchase intention unless the new color happens to evoke a meaning that is consistent with favorable product performance for that particular category. It can be argued that the case of Walkers remains one of the few successful relaunches of incongruent color packaging that has made its way in the marketplace, probably due to the fact that the color matching for crisp flavors was relatively novel at the time and also essentially arbitrary.

The adverse consumer reactions that were reported earlier highlight the need for sensory R&D teams to try and find congruent combinations of sensory variables that are easily interpreted and, what is more, acceptable to consumers. However, this goal is not as easy to achieve as it might seem since consumers often find it difficult to articulate certain associations, principally due to their sometimes unconscious nature.

In this context, the use of the implicit association task (IAT) can be very useful. As opposed to self-report measures, in which participants are asked to express their attitude in a conscious deliberate way, implicit measures that are obtained indirectly are considered to be more sensitive to automatic stimulus evaluations (De Houwer, 2003, 2009; De Houwer, Teige-Mocigemba, Spruyt, & Moors, 2009). In the IAT, 'compatible' associations typically give rise to faster (and more accurate) responses than 'incompatible' ones. Thus, measuring implicit and explicit associations of the color of food packages, in addition to explicit ratings of pleasantness, may be expected to provide more detailed information, and may present a better reflection of consumers' spontaneous evaluations (e.g., as they occur in the supermarket setting).

The aims of the present study were therefore: (1) to investigate consumers' implicit flavor associations toward the color of crisp packages, namely the *salt and vinegar* and *cheese and onion* flavor varieties, using a variant of the IAT; (2) to test the crossmodal associations across a wide age range of participants in order to determine whether the associations that people hold have changed over time; and (3) to study whether the color of the packaging affects flavor identification and liking.

Materials and methods

Participants

Twenty five participants (16 female) ranging from 18 to 63 years of age (M = 33.6 years: SD = 13.3) took part in the study. All reported normal or corrected-to-normal vision. The experimental procedure was approved by the Ethics Committee of the Department of Experimental Psychology, University of Oxford. The experiment lasted for 20 min.

Apparatus and materials

For the IAT variant, a computer running E-Prime 2.0 (Psychology Software Tools, Inc.) was used. Participants were seated 50 cm from a 17″ CRT monitor with a resolution of 1280 × 960 pixels (refresh rate 60 Hz). The experiment was conducted in a quiet room under normal illumination conditions. Four visual stimuli were presented: two colored pictures and two word attributes. The two pictures showed two crisps packets: one blue and the other green (15 cm high × 10 cm wide), identical except for their color (see Fig. 1). In both images, the flavor label was removed using Adobe Photoshop CS 8.0 (Adobe Systems Incorporated, 2003). The word stimuli consisted of the flavors "cheese & onion" and "salt & vinegar" presented in black, uppercase Arial 24 pt font, all presented against a white background.

Procedure

IAT variant

Participants were instructed to maintain their fixation on the centre of the screen and to respond to the target stimuli as rapidly and accurately as possible. At the beginning of each block of trials, written instructions were presented on the screen informing the participants of the mapping for the upcoming block. In each block of trials, two of the stimuli, one figure and one word, were assigned to either the left or right response key, while the remaining two stimuli were assigned to the other response key. Participants responded by pressing one of two keys on a computer keyboard.

Figure 1. Images of the crisp packets presented during the IAT version.