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Research Report

Sensory-specific satiety, its crossovers, and subsequent choice of potato chip flavors

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Abstract

We investigated the influence of liking and flavor intensity on the development of sensory-specific satiety (SSS) to different potato chip flavors, and the influence of these measures, as well as measures of want-to-eat and similarity, on the subsequent choice of a potato chip flavor. In the first study, 35 subjects participated first in a taste test to measure flavor intensity, liking and similarities among six different flavors of potato chips. They then completed six SSS sessions, ending each session by choosing one of the six flavors for additional consumption. SSS varied among the six chip flavors, but was poorly related to either liking or flavor intensity. Subjects chose better-liked flavors, flavors dissimilar to recently consumed flavors, flavors differing in intensity from the recently consumed flavor, flavors that produced less SSS and flavors that produced less change in wanting-to-eat them. In the second study, we used data from a consumption diary panel, and replicated the key finding that when people switch flavors, the similarity to the flavor consumed on the previous occasion decreases the probably of that chip being chosen. Thus switching among flavor choices was driven by liking, the desire for variety and the desire for a product that produced less SSS.

Keywords: Sensory-specific satiety; Variety seeking; Hedonics; Choice behavior; Food choice

Introduction

How many 'flavor' choices should a store offer in a product category? What should those choices be? Given limitations of shelf space, which products should be selected to be part of a satisfying category assortment available to consumers? How does one logically determine this assortment? To better answer these questions we must understand the factors that drive flavor choice and switching among flavors within a product category.

One reason consumers switch among products in a category is to satisfy a need for variety (McAlister, 1982; Baumgartner & Steenkamp, 1996; van Trijp, 1995; Van Trijp, Hoyer, & Inman, 1996). Variety-seeking behavior has been defined as the tendency for a person to switch away from an item consumed during the last occasion (van Trijp, 1995; Ratner, Kahn, & Kahneman, 1999). When offered a variety of food products, people often switch among them (Van Trijp et al., 1996; Inman, 2001). Variety-seeking behavior has been hypothesized to come from both implicit and explicit processes (McAlister, 1982; Baumgartner & Steenkamp, 1996; van Trijp, 1995; Van Trijp et al., 1996). The implicit process is hypothesized to include internal mechanisms such as attribute satiation (McAlister, 1979; McAlister, 1982), curiosity about non-chosen alternatives (Raju, 1980), or boredom with the previously chosen product (Loewenstein, 1994). In contrast, the explicit process deals with external factors such as purchase strategy, display format (Simonson & Winer, 1992), price changes (Gupta, 1988), and changes in the social or situational constraints (Menon & Kahn, 1995). Relatively less is understood about the implicit factors affecting variety seeking, as their identification and measurement

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depend on experimental protocols in which people actually consume the products and thus experience attribute satiation, boredom, etc.

The idea of an optimum level of stimulation has served as a basis for understanding variety-seeking behavior (Zuckerman, 1979; McAlister, 1982; van Trijp, 1995). When the level of stimulation falls below a specific point, individuals respond by seeking additional stimulation, often by adding variety or novel stimuli to their life. In contrast, if the level of stimulation is above the optimum, then the individual tends to avoid novel stimuli or variety (Berlyne, 1960; Berlyne, 1966). The level of stimulation that a consumer derives from using a product in a category depends in part on the difference between the currently chosen product and the previously consumed one. By selecting alternatives that have not been chosen recently, individuals may increase their level of stimulation, as well as prevent boredom and satiation, two negative psychological consequences of repetition (Berlyne, 1970; Inman, 2001). Switches between two highly similar alternatives (e.g., two similar flavors) may not yield the desired level of new stimulation.

The level of stimulation that a consumer derives from a specific flavor option is also related to the overall intensity of the flavor. Although little research is available on this topic, people appear to tire of intensely flavored products more rapidly than they tire of bland products (Drewnowski, Grinker, & Hirsch, 1982; Vickers, 1999). Few other sensory-specific satiety (SSS) studies have been designed to measure the effect of flavor intensity on the extent of SSS. Those that allow such a comparison generally show no effect of odor or flavor intensity on SSS (Vickers & Holton, 1998; Rolls & Rolls, 1997; Guinard, Caussin, Campo Arribas, & Meier, 2002). One of the objectives of our research was to examine the influence of flavor intensity on SSS.

Inman (2001) observed that within a product category, consumers sought variety in the sensory attributes of products (e.g., flavor) more than in the non-sensory attributes. He proposed SSS as an implicit factor that may drive variety seeking among flavors within a product category. SSS is the temporary drop in liking of a food produced by eating that food, whereas uneaten foods remain pleasant when tested under the same conditions (Rolls, 1986). Thus, Inman suggested that people tiring of, or temporarily growing to dislike, specific flavors causes some of the observed switching among products.

Liking is one of the major drivers of consumers' food choices (Rozin & Vollmecke, 1986; Tuorila & Pangborn, 1988; Lähteenmäki & van Trijp, 1995; Tuorila, Kramer, & Engell, 2001; Hirsch & Kramer, 2001). Lähteenmäki and van Trijp (1995) observed that well-liked filled sandwiches were chosen more often than were the less-liked options. In a series of studies of military rations, Hirsch and Kramer (2002) measured the relationship between differences in hedonic ratings of pairs of food items and choice between the food items. They found that initially better-liked foods were more frequently chosen.

Some of our participants in previous SSS studies have told us they still liked the food after eating it; they were just tired of eating it and did not want to eat more. When we only allowed them to give one response (liking), they may have 'dumped' their wanting into those liking ratings. Evidence from experiments with animals and growing evidence from human studies support a differentiation of liking from wanting (Berridge, 1996; Berridge & Robinson, 1998; Mela, 2006). Berridge (1996, 2004) has provided considerable evidence that liking and wanting are separate neural processes even though they are often highly correlated. Blundell and Rogers (1991), Mela (2001) and Mela and Rogers (1998) have suggested that eating a food in the typical SSS laboratory protocol may primarily influence the wanting of the food as opposed to the liking of the food. One of our objectives for this research was to examine both the liking and want-to-eat ratings of foods in a SSS protocol.

The overall goal of our research was to measure the SSS of different potato chip flavors and relate measurements from this protocol to taste test measurements of these potato chips and to the choice of these potato chips in both a laboratory and a field study. First, we hypothesized that flavors that were perceived as higher in intensity would generate greater SSS and greater changes in want-to-eat. Second, we tested the impact of SSS for the eaten chip on the change in liking of other flavors of potato chips and hypothesized that this 'SSS crossover' would be related to the similarity of the other flavors to the eaten chip. Third, we tested the assertion that consumption in a SSS protocol generates greater changes in wanting the food than liking of the food. Fourth, we examined how the following influenced the subsequent choice of a potato chip flavor: difference between the flavor intensity of the chosen chip and the eaten chip, liking of the chip, the similarity of the chip to the eaten chip, and SSS and the change in want-to-eat of the chips. We hypothesized that people would be more likely to choose better-liked flavors, less intense flavors, flavors that produced less SSS, and flavors that were more dissimilar to the just-eaten potato chip. Finally, we compared our laboratory choice data with data taken from a large diary study that used the same six potato chip flavors. The greater external validity of the diary study enabled us to test the generalizability of our findings regarding the frequency of the choices and the influence of sensory differences among the chips on subsequent choices. In conjunction, the two studies yield more confidence in our results than either of them in isolation.

Study 1

Material and methods

Subjects: One hundred students and staff from the University of Minnesota (56 females and 44 males; mean age, 31, range 20–56) participated in the taste test portion of the study. Of these, 35 participated in the SSS and choice