



Objective measures of meal variety lacking association with consumers' perception of variety with self-selected buffet meals at work



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ABSTRACT

Food variety has been linked to higher diet quality and increased food intake, but what constitutes variety for consumers is underexplored. The aim of the study was twofold: first to explore the relationship between objective measures of meal variety and subjective post-meal ratings of perceived variety, and second to explore the associations between subjective meal variety and decision-making rules and individual eating styles. Data consist of 510 meals compiled from workplace lunch buffets by 71 respondents over 31 optional days. Meals were photographed and coded according to the number of components (dishes served), food groups, colours, size and shape of food on the plates. A mixed model approach was used to analyse data due to the repetitive structure of the data. Results show that subjective variety was marginally associated with the number of food groups, but there was no association with other objective measures, such as the number of components or any of the visual cues of the meal. Subjective meal variety was linked with the decision-making rule of having many dishes when compiling buffet lunches. Participants with higher scores on uncontrolled eating and food neophobia were found to perceive their meals less varied than those with lower scores. Moreover, the rule of having many dishes was positively associated with uncontrolled eating and negatively associated with cognitive restraint. Consumers' perception of within-meal variety seems to be more linked to their idea of how to compose their meal and individual tendencies towards food and eating rather than the objective measures applied.

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1. Introduction

Variety is viewed as an important dimension of eating. Food policy makers and dietary experts underline the importance of variety in food intake. For instance, a varied diet is a part of the Danish dietary recommendations to secure a proper nutrient intake leading to better health. Three types of variety should be distinguished: *dietary variety* which refers to food intake across a long period of time, *across-meal variety* which refers to variety of food intake within a day or across days, and *within-meal variety* which is related to the variety of components in a meal (Meiselman, deGraaf, & Leshner, 2000). Dietary variety is essential to maintain an adequate intake of macro and micro nutrients (Weiss, Feinstein, & Dalbor, 2004). Consumers seek variety when they eat and most natural eating situations contain a decision about what to eat (Rozin & Markwith, 1991). When it comes to an everyday meal such as lunch at work, the catering industry is

an important actor to provide a healthy and varied assortment of food for its customers. Enhanced knowledge about how consumers perceive within-meal variety, catering companies could improve their food assortment to meet the demands of the consumers.

Several studies have found that variety increases food intake (Brondel et al., 2009; Hetherington, Anderson, Norton, & Newson, 2006; Levitsky, Iyer, & Pacanowski, 2012; McCrory, Burke, & Roberts, 2012; Rolls et al., 1981 for a review). This phenomenon is referred to as the variety effect, which describes the increase in food intake when offered multiple foods with different sensory characteristic such as taste, smell, texture and visual appearance (Epstein, Robinson, Roemmich, Marusewski, & Roba, 2010). Sensory specific satiety has been suggested as an explanation for the variety effect, which refers to a decrease in sensory pleasure of the food eaten while the pleasantness of uneaten foods remains unchanged. Hetherington and colleagues (2006) found that during eating the task of tasting and rating other foods delayed normal decrease in pleasantness of the food eaten, which could indicate that variety could increase intake by maintaining or extending pleasantness of the food eaten. Brondel and colleagues (2009)

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found that pleasantness decreased during eating a specific dish, but increased when condiments were added leading to higher intake compared to eating the dishes without condiments. These studies show that bringing variety to a meal can alter and delay the sensory-specific satiety with the food eaten leading to higher food intake.

Consumer perception of food is affected by the sensory properties of the food along with the expectations it creates. Within-meal variety proposes that the foods must be sufficiently dissimilar in terms of sensory properties such as taste, texture, smell and visual appearance. Many studies have explored variety within taste and flavour experience as contributing to food appreciation, acceptance and overall liking for the food (Zellner, 2014), although taste is only one variety dimension among others. Visual appearance is important as it is typically a consumer's first sensory contact with the food, which then provides expectations about the taste quality and liking (Hurling & Shepherd, 2003). Appearance properties comprise visual properties, including colour, physical form and shape, and mode of presentation (Hurling & Shepherd, 2003). For example, a visual cue such as the colour of foods has been shown to influence flavour perceptions and experience with the food (Spence, Levitan, Shankar, & Zampini, 2010; Zellner, 2013). According to Wadhera and Capaldi-Phillips (2014) many studies overlook the effect of visual cues of meals such as visibility, colour, perceived and actual variety, size of food items, number of food items, shape and surface area.

Moreover, most studies focus on the influence of actual or objective variety on food choice and amounts eaten, and few include perceived or subjective measures of variety expressed by the participants. One of these studies was conducted by Kahn and Wansink (2004) who found that perceived variety of food assortment led to an increase in food intake even when the actual assortment variety was held constant. Moreover, many variety-related studies have been conducted in laboratory settings with pre-defined foods, which do not allow participants to compose their own meals as they do in real-life situations.

Consumers need variety in their diet to ensure proper nutrition, though too much variety in the consumption situation may lead to increased food intake and may cause excess intake of energy. When consumers are exposed to a variety of foods as, for instance, in a buffet context, the risk of overeating is present leading to weight problems and obesity in the long term. Whenever variety is communicated as part of the nutritional recommendations, it is important that consumers share the same view of meal variety as professionals.

The aim of the study is twofold: first to explore the relationship between objective measures of meal variety including the colours, sizes and shapes represented in the meal and subjective variety with the meal (conceptual model presented in Fig. 1), and second, to explore the association between subjective meal variety,

decision-making rules and individual eating styles (conceptual model presented in Fig. 2).

In addition to objective variability, we were interested in how important variety in its different forms is to consumers when making meal choices. As, to the best of our knowledge, no scale exists that measure this, we developed items that relate to different types of variety in a meal including different sensory aspects, functional properties and simply using numbers of foods as a basis for creating variety. These decision-making rules were tailored for buffet meals, and we expected the importance of variety to be positively linked with the number of components consumers chose to compile their meal of as well as how varied consumers perceive their meals.

Individual eating styles such as food neophobia, cognitive restraint, uncontrolled eating and emotional eating are expected to influence the type of decision-making rules that consumers use. Consumers with a high level of food neophobia and cognitive restraint are expected to choose fewer dishes compared to those with low levels of food neophobia or restraint, whereas uncontrolled eating is likely to have a positive association with the number of items. Individual eating style may also be reflected in subjective meal variety as a perception of variety rather than the objective number of components on the plate.

2. Method

2.1. Participants and meals

Data consist of 510 lunches chosen by 71 participants who were recruited from a centre hosting 50 different companies with approximately 1000 employees. Demographic characteristics of participants are shown in Table 1. Participants chose their meals (1–12 per participant, average 7.2) from their general lunch buffet; the study took place over a period of 10 weeks offering 31 options to participate. Participants had their research lunches paid for, which was used as an incentive to attract participants. Consent forms stating the participants' expected contribution and rights, including the right to opt out during the research period, were signed by participants.

2.2. Procedure

Participants were instructed to take part in 8–10 meals out of 31 possible days during a three-month period. On research days participants compiled their lunch plate from the canteen buffet as part of their normal lunch practices and then had their lunch plate photographed by research assistants. Besides taking lunch photos, the research assistants also took pictures of the buffet. Canteen staff provided a written overview of the lunch menu. The

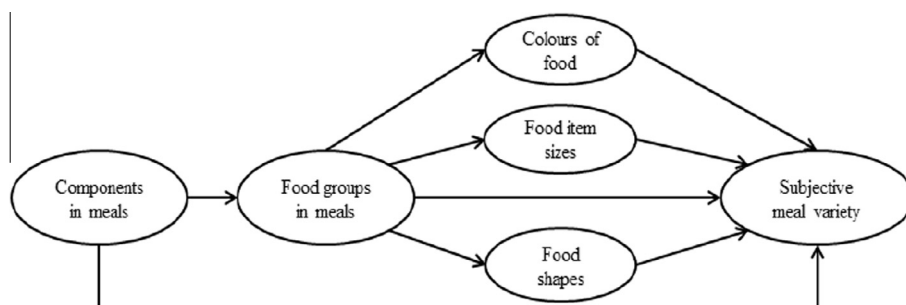


Fig. 1. Conceptual model – objective and subjective meal variety.

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