



Contents lists available at ScienceDirect

Food Quality and Preference

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

Short Communication

The influence of illuminance level on perception and willingness to buy during the tasting of sweetened natural yoghurt

Rubén Rebollar^{a,*}, Iván Lidón^a, Rafael Guzmán^b, Ignacio Gil^a, Javier Martín^{c,d}^a Departamento de Ingeniería de Diseño y Fabricación, Escuela de Ingeniería y Arquitectura, Universidad de Zaragoza, c/ María de Luna 3, C.P. 50018 Zaragoza, Spain^b Departamento de Expresión Gráfica, Diseño y Proyectos, Escuela de Ingenierías, Universidad de Málaga, c/ Doctor Ortiz Ramos, s/n, C.P. 29071 Málaga, Spain^c Departamento de Estadística, Universidad de Salamanca, c/ Espejo 2, C.P. 37007 Salamanca, Spain^d Bioestadística Unit-IBSAL, Instituto de Investigación Biomédica de Salamanca, Paseo de San Vicente 58-182, 37007 Salamanca, Spain

ARTICLE INFO

Keywords:

Food perception
 Illumination
 Illuminance level
 Gender differences

ABSTRACT

This paper analyses the influence of the illuminance level of a light source on how consumers evaluated certain attributes of sweetened natural yoghurt and on their willingness to buy during product tasting. It also seeks to identify whether or not gender differences played a role in these evaluations. To do this, we conducted an independent within-subjects experiment (N = 69) where illuminance level (low versus high) was studied. Participants had to assess one sensory attribute ('Sweet'), three non-sensory attributes ('Healthy', 'Natural' and 'Quality') and willingness to buy for sweetened natural yoghurt. The results show that illuminance level influences the evaluation of some attributes and that there are discernible gender differences. In general, the consumers perceived the yoghurt to be healthier under low illuminance conditions and women perceived the yoghurt to be sweeter under high illuminance. Although the effects identified were not numerous, these findings suggest that illuminance level can influence consumers' tasting experiences as well as their willingness to buy. The limitations of this research are discussed as well as their possible practical implications.

1. Introduction

Among the environmental factors that affect food consumption, illumination has frequently attracted the interest of researchers. One of the properties of illumination that has been analysed with respect to how consumers perceive food is illuminance level. Some evidence suggests that illuminance level influences the eating behaviours (Wansink, 2004; Wansink & van Ittersum, 2012) and physiological processes of consumers (Jin, Katsuura, Iwanaga, Shimomura, & Inoie, 2007; Katsuura, Jin, Baba, Shimomura, & Iwanaga, 2005). A high illuminance level shortens the amount of time people stay in a restaurant (Sommer, 1969), while a low level creates favourable conditions for people to stay longer and enjoy their food more and discourages consumption (Ross, 2014; Wansink, 2004; Wansink & van Ittersum, 2012). One possible explanation for this is that low illuminance conditions may promote behavioural disinhibition (Kasof, 2002). Two seminal studies in this field, Gregson (1964) and Wilson and Gregson (1967), explored the influence of illuminance level on the way consumers perceive the sensory attributes of a particular food. These experiments found that modulating the illuminance level of a light source can affect the consumer's capacity to discern the acidic flavour

of a drink. In another more recent study, Gal, Wheeler, and Shiv (2007) found that illuminance level affects both coffee flavour perception and coffee consumption. Interestingly, they discovered that habitual consumers of strong coffee drank more under bright lighting whereas habitual consumers of weak coffee drank more under dim lighting. Only a few studies analyse the relationship between illuminance level and the evaluation of a product's sensory attributes. In one such study, Katsuura et al. (2005) analysed the influence of illuminance level on the taste threshold of the four basic tastes in Japanese and Chinese subjects. It was found, in both cases, that sensitivity to sweet and bitter tastes was lower under lower illuminance conditions. Moreover, although some studies have demonstrated that other environmental factors can affect willingness to buy (Spence, Puccinelli, Grewal, & Roggeveen, 2014), there are no studies that examine the relationship between illuminance level and willingness to buy.

Therefore, considering the scope of the literature published to date, it seemed pertinent to study the way in which the illuminance level of a light source can affect how a food is perceived. For this experiment, sweetened natural yoghurt was chosen because it is a product that is well-known to a large portion of the population yet not frequently consumed, meaning it would be difficult for the user to have a familiar

* Corresponding author.

E-mail address: rebollar@unizar.es (R. Rebollar).<http://dx.doi.org/10.1016/j.foodqual.2017.05.007>Received 29 August 2016; Received in revised form 15 May 2017; Accepted 15 May 2017
0950-3293/ © 2017 Elsevier Ltd. All rights reserved.

benchmark with which to compare its flavour (MAGRAMA, 2015). In order to explore the possible effects of illuminance levels, key attributes of the product (sweetened natural yoghurt) were chosen. The attributes studied were the sensory attribute ‘Sweet’, the non-sensory attributes ‘Healthy’, ‘Natural’ and ‘Quality’, as well as willingness to buy.

Earlier studies that analysed the influence of illumination on consumer sensory perception have shown that sensitivity to some basic tastes can increase under high illuminance (Gregson, 1964; Katsuura et al., 2005). Therefore, we hypothesise:

H1. The sweetened natural yoghurt will be rated as more ‘Sweet’ under a high (vs. low) illuminance level.

In contrast, the effect of the illuminance level of a light source on healthiness perception has not been explicitly studied before. However, there is reason to believe that the possible effect of illuminance level on sensory perception may also be reflected in healthiness perception. Consumers tend to use heuristics that allow them to simplify their mental tasks. Thus, the evaluation of one attribute may have an impact on the evaluation of other attributes not necessarily related to the first. For example Lee, Shimizu, Kniffin, and Wansink (2013) found that consumers believed that a cookie that had been labelled as ‘organic’ had fewer calories than the same cookie labelled as ‘regular’. In this context, the relationship that exists between the sugar consumption and some illnesses, such as diabetes and obesity, has been well known for some years now, by both researchers as well as consumers (Lustig, Schmidt, & Brindis, 2012). As such, it is reasonable to posit that consumers may infer that the sweeter the yoghurt, the less healthy it is. Hence we propose that:

H2. The sweetened natural yoghurt will be rated as more ‘Healthy’ under a low (vs. high) illuminance level.

In this study we are also interested in exploring the effect that illuminance level may have on other relevant non-sensory attributes such as ‘Natural’ and ‘Quality’, as well as willingness to buy, which have not been explicitly studied before. In recent years there has been a growing trend among consumers to prefer natural and less processed foods since these are believed to be higher quality products and more suitable for a healthy diet (Machiels & Karnal, 2016), so we cannot rule out that a halo effect may occur (Nisbett & Wilson, 1977). We therefore propose that:

H3. The sweetened natural yoghurt will be rated as more ‘Natural’, of higher ‘Quality’ and will have a higher ‘Willingness to buy’ under a low (vs. high) illuminance level.

There are reasons to believe that gender may have an influence on the consumer’s response to changes in the source of illumination. It has been proven, for example, that illumination provokes a different emotional response in women and men (Knez & Kers, 2000). Cho et al. (2015) found that lighting colour had a greater effect on willingness to eat in men than in women, since men consumed smaller quantities of food under blue lighting than under yellow or white lighting, whilst this same effect was not found in women. In addition, with regard to sensory perception we know that women may be more sensitive to flavours than men (Bartoshuk, Duffy, & Miller, 1994; Oliveira-Pinto et al., 2014). For these reasons, we believe that there will be gender differences in the participants’ reactions to illuminance level and propose that:

H4. Women will be more sensitive than men to the hypothesised effects caused by different illuminance levels.

2. Material and methods

2.1. Participants

This experiment was conducted in the city of Zaragoza (Spain).

Participants were recruited from students and staff at the University of Zaragoza who showed interest in participating in the study. 69 volunteers participated, of which 42% were male and 58% were female. They had a mean age of 27.5 years, with a standard deviation of 10.7 years.

2.2. Experiment set-up

In order to conduct the experiment, a tasting room (booth) was constructed in accordance with the design specifications in International Regulation ISO 8589:2007. The work plane was placed at a distance of 747 mm from the floor. Within the room, a light fixture was installed 1000 mm away from the work plane, which was designed especially for this experiment. The light fixture comprised an extruded aluminium body and three lines of LEDs with different colour temperatures, each independently controllable by means of Modbus protocol and software specifically designed for that purpose. The light could provide the work plane with illuminance values from 0 to 1108 lx and colour temperatures from 2951 to 6063 K, although this did not allow a continuous regulation of illuminance and colour temperature at the same time, i.e. it was not possible to achieve all of the levels of illuminance with all of the levels of colour temperature at the same time. To calibrate this lighting fixture, a Mavolux 5032 C lux meter, a USB2000 and an OceanOptics Spectrometer were used.

The tasting booth was installed in a room where the ambient conditions for general illumination, temperature and relative humidity were constant during the experiment.

2.3. Procedure

The experiment consisted of conducting a tasting experiment of sweetened natural yoghurt and followed a within-subjects experimental design. All participants participated in the test voluntarily and anonymously. To ensure the evaluations were independent, each participant did the test alone.

The participants were led to the tasting room where the booth was installed. Once there, they were told they were going to participate in a tasting experiment of sweetened natural yoghurt for a commercial brand which was going to be testing two different formulas before launching them in the market. To do this, participants had to try both formulas and give their opinions in a survey. They were told the brand was going to remain anonymous in order to ensure the study results were not skewed.

The participant then sat in the tasting booth and was served the first sample of 15 g of sweetened natural yoghurt that had been previously prepared in the sample preparation area next to the tasting room and served in an opaque white bowl with a white plastic teaspoon. The decision was made to use sweetened natural yoghurt made by the brand Aliada. This yoghurt was used since, although sweetened natural yoghurt is a frequently purchased product, this commercial brand is not very well-known, meaning it was less likely that the users would recognise its taste. As such, we believed it would help convince the participants they were involved in the process of a new product being launched in the market. The serving temperature was 5 °C. To ensure this temperature was maintained, the yoghurt was kept in a refrigerator that was placed next to the tasting booth for at least 24 h. Participants could interact freely with the bowl and eat the quantity of yoghurt they desired. There was no set time for the tasting session, thus when participants decided they had finished, they filled in a survey on their impression of the yoghurt sample.

When the participants had completed the first tasting, they were asked to leave the tasting booth and were led to another room with the excuse of participating in another experiment in which they observed the labels of this yoghurt using eye-tracking. This test was completely fictitious and unrelated to the aims of the experiment. It was scheduled to last approximately five minutes, allowing enough time for the

Download English Version:

<https://daneshyari.com/en/article/5736044>

Download Persian Version:

<https://daneshyari.com/article/5736044>

[Daneshyari.com](https://daneshyari.com)