



Temporal Drivers of Liking



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ABSTRACT

Generally liking is measured overall but is likely to vary over the food intake, like sensory perception. Replacing the attributes in Temporal Dominance of Sensations (TDS) by the categories of a usual ordinal liking scale makes it possible to monitor liking changes while eating a product (Sudre et al., 2012). This methodology allows for a better understanding of the influence of temporal dominance of sensations on liking and liking evolution over the time of product intake. Thus, it is possible to associate hedonic temporal data and descriptive temporal data (TDS profiles), which would identify drivers of liking, that is attributes which, when cited as dominant, would lead to a decrease or an increase of liking. Sixty-eight French consumers participated in four lab sessions. During the 1st session, the subjects had to taste six flavored fresh cheeses and to indicate their overall liking for each product. Temporal liking of the same products was evaluated throughout the tasting in the 2nd session. The 3rd session was a measure of TDS for the same products and only dominance was recorded (no intensity recorded). Finally, in the 4th session, the measure of liking of the same products was recorded 1 min after the beginning of tasting of each sample. Measures of liking showed that temporal liking is more discriminative than classic liking, and that classic liking scores may have been given before swallowing. However, waiting for 1 min before asking a liking score decreases discrimination of the products. Furthermore, combining temporal liking and TDS data obtained from the same consumers allowed to suggest the attributes and the times to which the perception of those attributes is responsible for the liking or disliking of the product. This is a new concept of “positive or negative Temporal Drivers of Liking” (TDL). The paper proposes to compute individual average liking scores while a given attribute was perceived as dominant (LWD) and to average those LWD values over the subject for extracting the TDLs of a specific product or of a group of products.

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1. Introduction

In sensory analysis, various techniques can be used by the food industry to gain a better understanding of what sensory characteristics of food products are responsible for the perceived quality of the products. Among these methods, descriptive techniques are usually used for a simple evaluation of the sensory characteristics of the product in its entirety. Yet, during the consumption of a food product, physical and physiological phenomena, such as mastication or salivation, cause dynamic sensory processes that may change the organoleptic properties of the product. This means that oro-sensory perceptions (such as aroma, taste or texture) are dynamic processes.

Time–Intensity (TI) (Lee & Pangborn, 1986) was the first method developed to study temporality in sensory perceptions.

However, TI measures the evolution of a single attribute at a time, and can be biased by halo-dumping effects (Clark & Lawless, 1994) or by individual signatures in TI-curves (Van Buuren, 1992). Other methods evaluating the various descriptive sensations perceived during a product tasting have been developed. The first method that measured the intensity of two attributes over time continuously during the tasting of a product is the “Dual Attribute Time Intensity” (Duizer, Bloom, & Findlay, 1996). Other methods have also emerged such as Discontinuous Time–Intensity (Clark & Lawless, 1994), Progressive Profiling (Jack, Piggott, & Paterson, 1994) or Sequential Profiling (Methven et al., 2010.). Temporal Dominance of Sensations (TDS) (Pineau, Cordelle, & Schlich, 2003) has been used by many authors to assess the temporality of sensations of various food products. The innovation of this method is to allow the subject to choose by himself from a list of attributes the most dominant one, that is to say the one that attracts the most attention at every moment during the tasting of the product. It has been shown that TDS can be complementary to other methods such as TI or descriptive analysis (DA)

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(Sokolowsky & Fischer, 2012). Moreover, it appears that results of TDS and DA are not in contradiction (Ng et al., 2012). In this study, authors have shown that it is appropriate in a business context to use TDS method in tandem with DA to obtain more informative profiles. Recently two other approaches to capture multiple attributes over time have emerged: Multiple Attribute Time Intensity (MATI) (Kuesten, Bi, & Wu, 2012) and Temporal Order of Sensations (TOS) (Pecore, Rathjen-Nowak, & Tamminen, 2011). There have been many published applications of TDS methodology, illustrating several advances in this approach to multi-attributes temporal analysis. Moreover, TDS requires almost no training, provided that the attributes are simple enough to be understood by naive consumers (Albert, Salvador, Schlich, & Fiszman, 2012) and provided that no intensity is asked. Finally, Dinnella, Masi, Zoboli, and Monteleone (2012) have highlighted the ability of TDS to establish a precise temporal sensory profile for the interaction of various food components.

During food intake, the sensory characteristics of the product can modulate hedonic appreciation or depreciation. Overall liking of a product can be measured easily; however, temporal liking assessment is much less common. Lee and Pangborn (1986) were the first authors to mention that liking could be a temporal event. The first study measuring this event using the TI method was for chocolate milk (Taylor & Pangborn, 1990). In another study aiming at comparing intensity of flavor and liking, 24 subjects were asked to score continuously, during tasting, flavor intensity (during a first session) and pleasure (in a second session) for three solutions of different concentrations of quinine sulfate (Veldhuizen, Wuister, & Kroeze, 2006). The authors confirmed the possibility of studying the temporal response of liking by establishing a liking profile. Thus, using a liking scale over time is possible for the subject. In addition, the authors demonstrated that temporal liking is not a simple copy of the temporal curve of flavor intensity of a given product. Indeed, the intensity response peaked before the maximum response of pleasure, suggesting serial processes. A simpler approach has been proposed to measure temporal liking for different gums (Delarue & Loescher, 2004). In this approach, liking scores were collected discontinuously at three different mastication times: 1, 5 and 30 min. Results of this study showed that evolution over time of liking was product-dependent.

Recently, a study compared continuous and discontinuous approaches of temporal liking measurements (Sudre, Pineau, Loret, & Martin, 2012). In this study, two methods were developed to record liking of three different types of cereals over time. In the first method, panellists were asked to score their liking at four specific tasting times on a seven-point hedonic scale ranging from “I like extremely” to “I do not like at all.” The four selected times were: (i) beginning of mastication, (ii) middle of mastication period, (iii) just before swallowing and (iv) after swallowing. In the second method, attributes of TDS were replaced by the categories of a usual ordinal liking scale, and panellists were asked to score their liking continuously throughout the tasting. In both methods the interaction “time by product” was significant, meaning that the evolution of liking during the tasting depends on the products. In the first method, this was due to an increase of liking over time for one of the three cereals; in the second method, it was the case for two of the three cereals. These results highlighted that subjects are able to assess continuously their hedonic feeling for a food during consumption, and that replacing attributes in TDS by the categories of a usual ordinal liking scale makes it possible to monitor continuously liking changes while eating a product.

It seems interesting to bring the hedonic temporal profile closer to the descriptive temporal profile in order to better understand how sensory characteristics modulate the liking of a product during the tasting. In our study, sixty-eight French consumers participated in four lab sessions. In the 1st session, a classic liking test of

six flavored fresh cheeses was performed. In the 2nd session, temporal liking of the same products was evaluated. The 3rd session was a measure of TDS for the same products and only dominance was recorded (no intensity recorded). Finally, in the 4th session, the measure of liking of the same products was recorded 1 min after the beginning of tasting of each sample. The aims of such a design were to define the moment when the liking is formed in the mind of the taster during the tasting of a product and to develop a method based on TDS and liking data obtained from the same subjects. Such an approach would allow for the defining of “Temporal Drivers of Liking” (TDL) as sensory attributes inducing a positive or negative trend of liking when they become dominant.

2. Methods

2.1. Participants

Sixty-eight naive consumers (32 men, 36 women) of flavored fresh cheese (at least once every 3 months) from 19 to 66 years of age, participated in this study. Only 64 subjects participated in the third session, and 54 in the fourth session. Half of the subjects had a professional activity, while the other half was made up of students and retirees. The subjects were compensated for their participation (10 € per one-hour session).

2.2. Products

Six commercial flavored fresh cheeses representative from the French market were selected and named P1, P2, P3, P4, P5 and P6. These six products were sampled from Dijon supermarkets.

Each product sample (9 g each) was placed into a plastic spoon and presented on a plastic plate coded with a three-digit random number. The samples were prepared about 2 h before each session and stored at 4 °C.

2.3. Procedure

Consumers participated in one session a week during 4 weeks. The sessions occurred at the same time in isolated sensory booths and lasted about 1 h. Products were presented under red light, according to Williams Latin Square experimental designs. Data were captured by the TimeSens© software. The subjects came between 11 am and 1pm. Specific instructions per session, described in the following sections, were given to subjects. Throughout the session, the subjects were allowed to drink water at any time. In addition, to eliminate persistent aftertaste, subjects had to consume a spoonful of plain cottage cheese, a piece of Granny Smith apple, and then a sip of water between each product.

2.3.1. Classic liking measurement

During the first session, the consumers completed a classic liking test of the six products presented monadically. They had to taste each sample and to indicate their overall liking on a 9-point hedonic scale ranging from “I do not like it at all” to “I like it very much”. No instruction was given to the subjects regarding the moment to give their response: they could answer during or after the tasting of the product. However, when putting the sample in the mouth, the subjects clicked on the “In mouth” button. Fig. 1 shows the measurement screenshot for this session. The “In mouth” button triggered a timer allowing to record the time(s) at which the subject gave their liking score(s) (the timer recorded the time of the first score given by the subject and the time(s) of any scoring change(s) that the subject may have made before validating his/her response). This collection of temporal data was not told to the subjects. The button entitled “I confirm my choice” stopped the timer, and then validated the score.

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