Are questionnaires the best way to measure emotions for food products and beverages?

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Abstract

There is a growing awareness in the field of consumer and sensory research to include emotional measurements when evaluating food products and beverages. The present paper provides an overview of the recent measures used for emotional measurements within the context of food products and beverages. Further, it discusses to what extent questionnaires might be the best measurement to capture consumer's emotions in the field of food science by focusing on three aspects of emotion measurement, namely (i) what do we want to measure, (ii) how do we measure it and (iii) what is the added value of the measurement.

1. Introduction

While measuring liking/acceptability/preference has been a standard in the sensory field for over fifty years, it still lacks the efficiency to be a good prediction for determining which acceptable products will be in the supermarket shelves over a longer period (Prescott, 2017). This has given fuel in the last decade to the development of novel methods to gain insights in how consumers perceive food products (Valentin et al., 2012, Varela and Ares, 2012). Some of these methods even go beyond the sensory properties of the products, with an increased interest in the emotions associated with the consumption of foods and beverages (Prescott, 2017).

Several studies showed that the inclusion of such emotional measurements provided additional information beyond overall acceptance (Cardello et al., 2012, King and Meiselman, 2010, Schouteten et al., 2015, Spinelli et al., 2014) and significantly improved food choice prediction (Dalenberg et al., 2014, Gutjar et al., 2015, Schouteten et al., 2018).

While it has been clear that emotional measurements have an added value in consumer and sensory science, there have been some questions if the tools are actually measuring emotions (Jaeger et al., 2013, Prescott, 2017). The key lies then in the definition of what we understand as "emotions", but there is no consensus on a single definition of emotion (Köster & Mojet, 2015). One needs to acknowledge that the focus in consumer and sensory science in food science lies in applied emotion measurement, so therefore the Conceptual Act Theory (CAT, Barrett (2006)) comes in the picture. This theory sees emotions as "constructions" made by individuals to give meanings to the sensations that they experience, which of course would be related to food products when assessing emotions in food science. According to CAT, three basic elements contribute to emotions namely (i) representations of sensations from inside the body (known as affect), (ii) representations of sensations from outside the body (known as exteroceptive sensations), and (iii) concept knowledge used to make those sensations meaningful in context (Lindquist, MacCormack, & Shablack, 2015).

This paper provides an overview on the most applied methods to measure emotions with consumers, in respect with applications in the food and beverages context. Further, it discusses if the use of questionnaires might be the best way to capture the emotions perceived by consumers for food and beverages.

2. How measure emotions in consumer and sensory research for food products?

Two different types of methods can be used for the assessment of emotions in consumer and sensory research namely explicit and implicit methods (de Wijk et al., 2012, Köster and Mojet, 2015). Explicit methods are either verbal or visual self-reported measurements that ask participants to report their emotions upon consumption, smelling or seeing food products and beverages. Implicit methods, on the other hand, are "a measurement outcome that reflects the to-be-measured construct by virtue of processes that have the features of automatic processes" (De Houwer & Moors, 2007). Those automatic processes are characterized as "unconscious, unintentional, uncontrollable, effortless and fast" (De Houwer & Moors, 2007).

Explicit methods rely on self-reported measurements and make use of some kind of questionnaire to collect data of participants. In the course of the last decade, several explicit methods have been developed in order to obtain insights in which emotions consumers perceive when consuming food products and beverages. One method is the use of verbal terms and participants are then asked to indicate which terms are applicable when they consume a certain product. These terms can be either based upon a predefined list, of which the EsSense Profile® (King & Meiselman, 2010) is most often used. A second option is to work with a lexicon developed for the products under study which is also known as a consumer-defined or product-specific list (Ng, Chaya, & Hort, 2013). Besides asking for the applicability (check-all-that apply (CATA) response format), some studies ask consumers to rate the intensities of the applicable emotions (rate-all-that-apply (RATA) response format). Jager et al. (2014) introduced the concept of temporal dominance of emotions (TDE) to capture the temporal evolution of dominant emotions over time. Recently, even a single-response questionnaire was proposed by Jaeger et al. (2020) so that only a single emotion has been collected when evaluating a stimulus. Next to using single emotional terms, Spinelli et al. (2014) suggested to work with full sentences instead of adjectives in order to reduce ambiguity in emotion questionnaires. Some innovations in the questionnaire format can also be mentioned, like working with animated cartoon characters (PrEmo® (Desmet, 2003, Desmet et al., 2016, Gutjar et al., 2015)) and the use of wheel questionnaire format (e.g. EmoSensory® Wheel (Schouteten et al., 2015) & emotion circumplex model (Jaeger, Spinelli, Ares, & Monteleone, 2018)). Further, the raise of mobile communication introduced emoji. Several studies have examined the potential of using emoji instead of verbal terms during food research with emotions (Jaeger et al., 2017). This is particular of interest when working with children, as they might not possess the vocabulary to express the emotions they perceive (Gallo, Swaney-Stueve, & Chambers, 2017).

In total, three different types of implicit measures can be distinguished (Lagast, Gellynck, Schouteten, De Herdt, & De Steur, 2017). First, one can apply physiological measures (e.g. heart rate, brain responses, skin conductance) to tap into biological responses that accompany emotions. Second, one can use expressive measures such as facial reactions which accompany emotions. Third and lastly, implicit behavioral tasks can be used to register emotional responses.

3. Selection of the method to measure emotions for food and beverages

The difference between explicit and implicit methods lies in the fact that explicit methods acquire emotions of which participants are conscious of while implicit methods try to capture unconscious emotional responses. Explicit methods, thus questionnaires, are seen as more quick and user-friendly, but might be cognitively biased due to the nature of the task (Köster & Mojet, 2015). This leads to the question which method might be best suited for measuring emotion evoked by food products and beverages. In my opinion, answering this question requires that we delve a bit deeper into three facets of measuring emotions in food science, namely (i) what do we want to measure, (ii) how do we measure it and (iii) what is the added value of the measurement.

The first issue we need to address is what do we want to measure when measuring emotions in response to food products and beverages? One point to reflect on the definition of emotions but, as mentioned previously, there is a lack of consensus regarding what could be seen as an emotion. Coppin and Sander (2016) presented different theoretical approaches to emotions and point out that there is a growing consensus to see emotion as a multicomponent phenomenon (composed of an expression, action tendency, bodily reaction, feeling, and cognitive appraisal) in a synchronous way triggered in response to an event considered relevant to an individuals' needs, goals, and/or values. Keeping this in mind, all measures (explicit or implicit) are relevant to understand emotions and are valuable (Mauss & Robinson, 2009). However, we need to keep in mind that we focus on studying emotions in the field of food science which is of course different compared to studying emotions in several other fields, like psychology. For example, one can expect that studying emotions related to a psychological trauma, break-up or racism requires other methods than studying emotions about consumers eating a biscuit or drinking a cup of coffee. Implicit methods might help to uncover when a person is providing socially desirable answers, but this is more relevant in aforementioned psychological situations than in the field of food science where there is often no reason to hide the emotions which one perceive. This is especially the case when emotions are used in an applied context like in the food industry, as an additional measure besides liking. Furthermore, one also needs to reckon that implicit methods (such as physiological methods and facial scaling) focus on a small number of (primarily negative) emotions (Meiselman, 2017). In food research, and especially for applied product research, questionnaires enable the use of a broader emotional vocabulary and might be better suited to capture and distinguish between positive emotional experiences.

Second, we need to reflect on the implementation of emotion measurements in food research. Needless to say, using questionnaires is more user-friendly and rapid compared to implicit measurements. Several studies have stipulated that participants found it easy to specify which emotions they associate with their food consumption using questionnaires (Jaeger et al., 2018, Schouteten et al., 2017), although a study by Jaeger et al. (2013) mentioned that some participants found it rather an odd task to perform. This stresses the importance of making the instructions clear to the participants, but also to make the task itself more ‘natural’. Since the publication of that study in 2013, novel methods have been developed for measuring emotions in food science using questionnaires and some of those methods might be feeling more natural as they use for instance a language which consumers convey. One example is the growing use of emoji, which are used in our daily life by young

and old. Research indicate that children (Sick, Spinelli, Dinnella, & Monteleone, 2020) and adults (Jaeger et al., 2017) find it easy to use emoji in eating contexts. Recent work also showed the potential of emoji in open-ended questions in product research, illustrating that the use of emoji feels as natural for participants (Vidal, Ares, Le Blond, Jin, & Jaeger, 2020). Given the variety of implicit methods, the easiness of the task depends on which measurement is used. Physiological measurements (e.g. heart rate, brain responses, …) require additional sensors/equipment which make them less user-friendly both for the participant and the researcher. The use of facial reactions has been most popular in food research regarding the implicit methods but it might require participants to adapt the way they consume food products in order to allow a good registration of facial expressions. Further, measuring the reaction time during an implicit behavior task is a rather repetitive task which is undoubtedly less user-friendly and more tedious.

Data can be faster collected when using questionnaires, as there is less preparation compared to most implicit methods (e.g. think about positioning sensors for several implicit methods such like EEG). Also, it is easier to collect data of multiple participants at the same time with questionnaires while implicit methods mostly require that a researcher accompanies the participant during the data collection. This also favors questionnaires as being more cost-effective compared to implicit methods.

Researchers, regardless of whether they work in academics of industry, operate in a global world. This raises the question to which extent emotional measurements may be susceptible to cultural differences. Given that questionnaires make use of some kind of language, they are more prone to potential cultural influences as cultures do not verbally express their emotions in the same manner (van Zyl and Meiselman, 2015, van Zyl and Meiselman, 2016). One needs to be aware of such effects when conducting cross-cultural emotion research, especially when only using certain emotional terms which might have different cultural meanings. One potential solution lies in the use of sentences, as suggested by (Spinelli et al., 2014). Another option might be the use of emoji given that at least the language barrier disappears although more cross-cultural research with emoji is warranted to examine potential cultural differences.

Researchers want to measure emotions as a response to food products, but need to take into account that this response will also be depending on the context. While sensory research traditionally takes place in sensory booths in a laboratory environment, emotions might differ when measurements take place in more natural consumption contexts. There is a growing attention for ecological validity and to conduct sensory and consumer research bearing the consumption context in mind (Jaeger & Porcherot, 2017). This poses the question, to which extent are on one hand questionnaires and on the other hand other emotional measurements suitable to be measured in a more natural eating consumption context. It is clear, questionnaires have an advantage as they can rather smoothly be used in natural eating contexts. When working with physiological measurements, some measures might be hard to be used in natural eating contexts as they require special equipment which is not always that mobile. Some other implicit methods, like facial and implicit behavioral tasks are easier to be applied in a more natural eating context. Questionnaires might be less intrusive and alter the consumption context while this is less the case for the other measurements. The use of novel

technologies such as VR, immersive rooms,… might help to (partly) evoke a more natural eating context for several emotion measurements.

Third and lastly, we need to consider if the emotional measurements provide meaningful results and have added value. Data collected by questionnaires is normally easier to analyze and also interpret, which is in contrast with data obtained from implicit methods (Lagast et al., 2017). Data from physiological and facial measurements also contain noise when participants need to consume the food products, e.g. during chewing and swallowing (Lagast et al., 2017). The systematic review by Lagast et al. (2017) indicated that out of 70 studies examining emotions in food research, only 12 studies used implicit methods while 6 studies combined an explicit method or questionnaire with some kind of implicit measure. The most popular implicit measure was the registration of facial expressions, but it was mainly used with food names/pictures as the registration of facial movements might be disturbed when consuming actual food products as was the case in some research (Mojet et al., 2015). For questionnaires, it has been proven that they have an added value when measuring emotions such as providing additional discriminability between samples which are similarly liked (Spinelli et al., 2014). Moreover, studies have showed that using questionnaires with words (Dalenberg et al., 2014)/emoji (Schouteten et al., 2018) help to better predict the actual food choice compared to the sole inclusion of the overall liking. In regard with implicit methods, there has been evidence that implicit emotional measurements can deliver product information that is not related to product liking (Mojet et al., 2015). A study by Samant, Chapko, and Seo (2017) showed that combining emotion measurements of a questionnaire (EsSense 25) and facial expression increased the predictability of food preference. Further, they found that emotion measurements of the autonomic nervous system (ANS) had little contribution to the predictability. This suggests that the added value on preference predictability might differ depending on which implicit measure is used.

4. Conclusion

While the definition of emotion is still fuel for debate, it is clear that emotional measurements have an added value and are therefore relevant in food research. When the goal is to gain insight in which emotions a person perceives by himself, then only questionnaires can be used as self-reports are the only way to assess subjective experiences of emotions. Furthermore, questionnaires with emotions are normally more user-friendly, cost-efficient and are easier to implement considering the actual consumption context. Research showed that emotion questionnaires might help to better discriminate between samples and predict the food choice, but it is important to remember that combining questionnaires with certain implicit methods (e.g. facial reader) also led to a better food preference prediction. In conclusion, both questionnaires and implicit methods have their value in food research but one needs to mind the application and be aware of the caveats of both methods.

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