
A Consumer-Centred Sensory Vocabulary for Open-Food Innovation

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Abstract

Through crowdsourcing and open innovation, product manufacturers are exploiting digital technologies to communicate with their consumers, drawing on the crowd to propose new products and designs. The food industry has struggled with adopting this model due to the lack of an effective language around the taste and texture of food. Existing sensory vocabularies are complex and target food professionals instead of consumers. To address this, we created a new consumer-centred sensory vocabulary aimed at underpinning future crowdsourcing platforms for open innovation in food manufacturing, with a focus on cake.

Author Keywords

Open innovation; food manufacturing; sensory; vocabulary; consumer-centred

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous

Introduction

In the last few years product design and manufacturing has undergone a significant paradigm shift in the domain of new product development. Consumers are increasingly having more input into the processes that shape products. Companies as diverse as Ikea, Fiat and

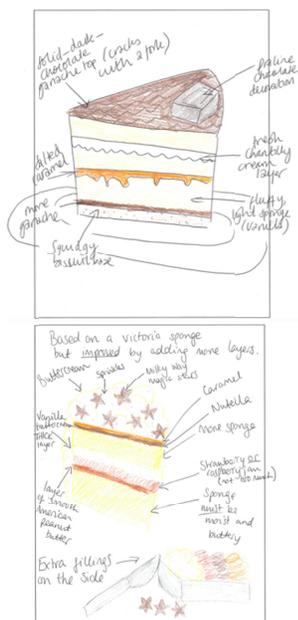


Figure 1: Two examples of cake designs by focus group participants.

Nike used on-line communication to turn to the crowd, developing innovation approaches where customers have a direct say in creating novel and personalized products. The food industry is not an exception. Large food companies currently face a situation where new products routinely fail in the market place. In fact, estimates of failed products in the food industry range from 75% [1] to 90% [4]. However, the success of open innovation in food manufacturing has not matched that of other industries.

One possible reason for lack of prevalence of open innovation success stories in the food industry is that the basis upon which companies elicit consumer preferences differs from the basis upon which products are evaluated. More specifically, evaluation of food products occurs at a sensory level with the sensory attributes of taste, appearance, aroma and texture being key factors in determining the success of products [5]. In contrast, innovation in the food industry happens mostly at the ingredient or flavour level, i.e. consumers are asked to come up with new flavour configurations for products they are familiar with. There is thus a need to communicate with consumers about food preferences at a sensory level.

Unsurprisingly, the food industry has developed a rather sophisticated and standardised vocabulary to convey the key properties of taste and texture. However, this vocabulary is designed for use by trained professionals and is highly technical in nature. As such it may not be suitable for use by end consumers, and there have been various calls for a more effective and broadly understood vocabulary [2, 3].

We wished to examine the possibility of eliciting consumer preferences through the means of a sensory vocabulary. As such we set out to design the means to support this, in other words, we wished to establish a suitable vocabulary for describing the sensory experience of food, focusing on cake, i.e. describe the desired taste and texture that a food product would have.

Establishing a consumer vocabulary

We set out to establish a vocabulary that is consumer-driven and that focused on how a consumer would describe a cake they desired. We did this by starting with a set of words used by our industry partners in food manufacturing, consulting a professional baker and conducting our own participatory focus groups with cake consumers designed to enrich and expand the existing vocabulary.

Our focus groups were 90-minute sessions where groups of 4-5 members of the public were asked to perform a series of activities designed to make them talk about their cake preferences in very specific terms. Our main objective was to find words that are: a) relevant for consumers' wants and needs including those perceived negatively, and b) expressive enough to distinguish different cakes from each other.

Participants were thus invited to perform three tasks. The first task was to design their ideal cake by drawing it using colour pencils and labelling it with details about its components, features and attributes (see Fig. 1 for examples of participants' cake designs). This was done over two phases, each lasting 10 minutes and followed by a short discussion where each participant showcased their cake and discussed it with the group. In the first

Ca.Ke.Y.U. com
Perfect cake every time

I want my cake to be:

	A bit	A lot
sweet	<input type="radio"/>	<input checked="" type="radio"/>
dry	<input type="radio"/>	<input checked="" type="radio"/>
refreshing	<input type="radio"/>	<input checked="" type="radio"/>
light	<input type="radio"/>	<input checked="" type="radio"/>
healthy	<input type="radio"/>	<input checked="" type="radio"/>

Figure 2. The desired attributes parts of the web interface sketch.

Step 1		Step 2				
Characteristic 1: <i>sticky.</i> Write here which cakes match this characteristic and which don't? <i>A - B don't</i> <i>C does</i>		Cake A:	2	3	4	5
		Cake B:	1	2	4	5
		Cake C:	1	2	3	4

Figure 3. For each set of cakes and for each cake, participants filled in a box describing how one of the cake differs from the two others.

phase the participants were asked to describe their ideal cake, and in the second phase were given a one of five specific scenarios (wedding, birthday, family picnic, cheering up a friend and dinner party) and asked to design a perfect cake for that occasion. In both subtasks participants were instructed to “*be as detailed as possible and describe as best as you can the different features of the cake: flavours, textures, aromas, sponges, frostings, fillings, toppings, etc...*”.

In the second task, participants were given a sketch (Figure 2) of a barebones web interface for a fictional website that would create the perfect cake for them based on their specification. The website allowed them to specify five attributes they wished their ideal cake to possess and five attributes they did not want their cake to have. Additionally the website allowed them to prioritize these attributes by specifying the degree to which they desired them (or not).

The third and final task involved sampling two separate sets of three different pieces of cake each. For each set, participants were asked to find a word that describes one cake but not the two others, and to do that once for each cake. The cakes chosen were all chocolate cakes that were fairly similar in structure in order to ensure that the descriptors they used to differentiate the cakes were not trivial due to one cake being of totally different flavour than the others (e.g. “this cake is lemony and these are not”).

The first task was meant to generate a large corpus of vocabulary terms that are grounded on what consumers imagine when free to choose what they wish to eat. The unconstrained and loosely structured nature of the task allowed us to explore, with minimal priming,

what words come to participants’ minds when describing the desired properties of cake. The second task aimed at finding terms that were seen as desirable by some by undesirable by others. These terms would be of particular importance for designing systems where users would be able to specify their cake preferences as they are not universally positive attributes that any consumer would desire (e.g. delicious). The third task was designed to find terms that consumers would normally use to differentiate different cakes from each other. These terms help us focus on what consumers can perceive as distinguishing characteristics of certain types of cake.

We conducted five focus groups with a total of 23 participants (average age 30.5, 52% female). Words used by the participants were coded into 4 different categories:

1. Components: e.g. sponge, buttercream, jam.
2. Flavours: e.g. chocolate, vanilla, strawberry.
3. Sensory descriptors: e.g. moist, fluffy, sweet.
4. Aesthetic/functional: e.g. green, easy to cut, colourful.

The vast majority of words fell into a single one of these categories with the exception of some components such as strawberries or chocolate, that were categorized as both components and flavours. Our focus however is on the sensory descriptors. By combining the output from the three different tasks and in consultation with a professional baker as well as in keeping with the industry word list as a starting point, a consumer-based vocabulary, shown in Table 1, was determined. This included words that are significant from a consumer standpoint because they: appear very frequently as mostly desirable qualities of cake (e.g.

Attractive	Moist
Bitter	Natural
Chewy	Nutty
Crumbly	Sickly
Crunchy	Soft
Dry	Sour
Fluffy	Sticky
Fruity	Sweet
Intense	Tasty
Light	

Table 2: The Consumer-Centered Cake Vocabulary, with the five attributes used in our study highlighted.

moist, light, attractive), or appear frequently as mostly undesirable (e.g. dry, bitter, sickly) or controversial attributes i.e. desired equally by some but not by others (fruity, nutty, crumbly). The resulting vocabulary includes all the words that appeared with high frequency as words that distinguished different cakes from the others in the third task.

Discussion and Future steps

In this paper we proposed that there is a lack of common language on sensorial attributes of taste and texture between consumers and food manufacturers, which hinders direct communication between the two as well as the leveraging of crowdsourcing for open food innovation. To address this, we have developed a vocabulary that is informed by the prevalent industry language but grounded in consumer needs. The next steps in this work would require the evaluation of this vocabulary based on two main criteria:

1. Is this vocabulary capable of consistently distinguishing different cake products from each other?
2. Can a food manufacturer produce a satisfactory product based on consumer preferences encoded with this vocabulary?

To answer these questions we plan to conduct a series of studies aimed at evaluating the vocabulary. First we will conduct a large scale cake-rating study where members of the public are invited to try a piece of cake and rate it across all words in the vocabulary. The results will be modelled into cake profiles for the different types of cake, which will then be compared to see if they are sufficiently distinct from each other. The second evaluation will involve creating an open-kitchen setup where consumers are invited to order a piece of

cake using the vocabulary. A professional baker would then attempt to create the cake product for the consumer who will then evaluate it.

We hope that the outcomes of this work will provide a sensorial vocabulary that is grounded on consumer needs and wants and that is expressive enough to allow for meaningful, rich communication between consumers and manufacturers via digital or other crowdsourcing media. Apart from its value to the food manufacturing industry, we believe that engaging consumers with food at a sensorial level can also be very empowering and educational as it can allow for re-conceptualizing food consumption and new appreciations of food products.

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