A General Review on Recent Trends In

"Food Sensory Science"

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Abstract

Sensory food science has evolved from the need for scientifically sound and systematic sensory evaluation of foods. Capitalising on its multidisciplinary nature, it has to accommodate to many research traditions and interests. In the past 15–20 years the field has made substantial progress in developing new methods and approaches and in advancing our understanding of consumer responses to foods. Sensory food science can contribute to understanding responses of different consumer segments to emerging trends in food production, processing and consumption. Favourable progress of the field requires proper university training programmes, funding for basic research, and multidisciplinary collaboration.

Keywords: Food, Sensory science, techniques, panelists, senses, food science, acceptability.

What is sensory science?

Sensory analysis (or sensory evaluation) is a scientific discipline that applies principles of experimental design and statistical analysis to the use of human senses (sight, smell, taste, touch and hearing) for the purposes of evaluating consumer products. The discipline requires panels of human assessors, on whom the products are tested, and recording the responses made by them. By applying statistical techniques to the results, it is possible to make inferences and insights about the products under test. Most large consumer goods companies have departments dedicated to sensory analysis. Sensory analysis can mainly be broken down into three sub-sections:

- Analytical testing (dealing with objective facts about products).

- Affective testing (dealing with subjective facts such as preferences).

- Perception (the biochemical and psychological aspects of sensation).

Successful innovation is vital for company survival and growth, yet it is estimated that 75-90% of new food and beverage products fail in their first year. Sensory properties of food and beverages are key benefits that must be liked and preferred by consumers for repeat purchase and hence market success.

Food sensory science is a multidisciplinary field investigating how humans perceive and respond to food and beverages. It is applied throughout the NPD process to link sensory attributes to ingredients, benefits, values and emotional elements of the brand to design products to meet the sensory quality preferences of sensory-based consumer segments. Sensory science is also applied in QA to set and meet consumer-relevant sensory specifications. In marketing, sensory science can help ensure sensory properties work in synergy with brand communication and advertising, and is also used to support sensory-based marketing claims.

Organisation of sensory science

Sensory science is a relatively new discipline that is still defining its field, expanding its role and developing an organisational network. Global Sensory and Consumer Connection (GSCC) is a newly-established network enabling existing sensory groups to collaborate on important global issues in the field. It is focused on three initiatives: professional development leadership, communication and student involvement.

Many other journals include articles on sensory science, such as those related to food, flavour, perfumery, the chemical senses, perception, psychophysics, psychology and neuroscience.

Sensory standards are published by the International Standards Organisation via ISO TC/34 SC 12 Sensory Analysis. Some national standards agencies choose to adopt ISO standards, as does the British Standards Institute. The American Standards for Testing and Materials (ASTM) International Committee E18 on Sensory Evaluation is a notable exception, being a dynamic, prolific and wide-ranging group that meets twice a year to work on American standards in sensory evaluation.

Trends and future themes in food sensory science

Sensory science has always been a dynamic discipline, evolving to meet the needs of industry and society. It is therefore not surprising that current emerging trends and future themes in food sensory science reflect the demands of global industry, increasing populations and ever-changing demands of today's consumers.

Global food security and sustainability

Currently over 800 million people have inadequate access to safe, nutritious food. The demand for food continues to grow with the global population and is predicted to increase by 70% by 2050. The challenge is to provide a sustainable and secure supply of good quality food. Currently there is much focus on volume and nutritional quality, but there is a key role for sensory science in ensuring that solutions to maintain the world's food supply are sensorially acceptable. Cheap, nutritious, available food must taste good enough, otherwise opportunities to feed those in need will be lost and there will be unacceptable amounts of food waste.

Health and wellness

Where there is sufficient food, the challenge is in providing heathier products. Sensory scientists have been involved for many years in ensuring that low fat, low sugar, high fibre foods match their less healthy counterparts for sensory quality.

Organising a Test

Why use sensory evaluation in foods?

Sensory evaluation can be used to:

- evaluate a range of existing food products;
- analyse a test kitchen sample for improvements;
- gauge consumer response to a product;
- check that a final product meets its original specification

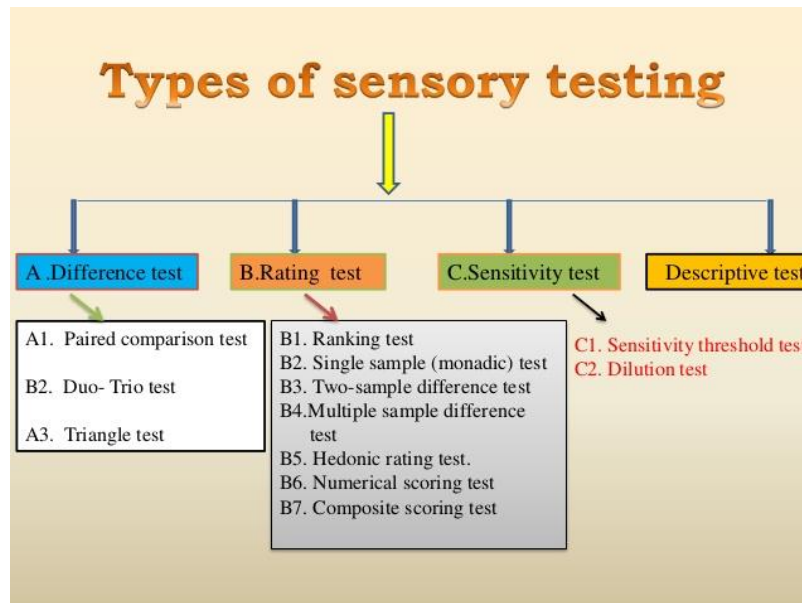## Types of test

What tests are used?

There is a set of standard tests which can be used by industry. These are laid down by British Standard (BS5929).

Preference Tests - these supply information about people's likes and dislikes of a product. They are not intended to evaluate specific characteristics, such as crunchiness or smoothness. They are subjective tests and include pair comparison, hedonic and scoring.

Discrimination Tests - these aim to evaluate specific attributes, i.e. characteristics of products (crunchiness). They are objective tests and include pair comparison, duo trio and triangle.

Hedonic Scale

1. Prepare the food samples.

2. Ask each person to taste each sample in turn and tick a box, from '1 Dislike Very Much' to '5. Like Very Much' to indicate their preference. Use the word file below to help.

3. The person may also wish to make remarks about the products appearance, taste, odour and texture.

4. Analyse the results. Which sample received the greatest/lowest scores?

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JUICINESS	MUSCLE FIBER AND OVERALL TENDERNESS	CONNECTIVE TISSUE AMOUNT
8 Extremely juicy	8 Extremely Tender	8 None
7 Very juicy	7 Very Tender	7 Practically None
6 Moderately juicy	6 Moderately Tender	6 Traces
5 Slightly juicy	5 Slightly Tender	5 Slight
4 Slightly dry	4 Slightly Tender	4 Moderate
3 Moderate dries	3 Moderate Tender	3 Slightly Abundant
2 Very dry	2 Very Tender	2 Moderately Abundant
1 Extremely dry	1 Extremely Tender	1 Abundant
FLAVOR INTENSITY	**OFF-FLAVOR CHARACTERISTIC**	**OFF -FLAVOR INTENSITY**

8 Extremely Intense	A Acid	8 Extremely Intense
7 Very Intense	L Liver	7 Very Intense
6 Moderately Intense	M Metallic	6 Moderately Intense
5 Slightly Intense	F Fish-Like	5 Slightly Intense
4 Slightly Bland	O Old (Freezer Burned)	4 Slightly Bland
3 Moderate Bland	U Rancid	3 Moderate Bland
2 Very Bland	B Bitter	2 Very Bland
1 Extremely Bland	SO Sour	1 Extremely Bland
	X Other (describe)	

Better insights

The 9-point hedonic and purchase intent scales are used routinely in consumer testing of foods, but are not good at predicting repeat purchase. As we try to understand more about

consumer motivations, new questions are being asked by investigators to get a better insight into the consumer's relationship with food. Some of these questions are related to health, wellbeing and emotion, as discussed above. Others are to differentiate between liking and want, as want is believed to be more related to motivation to eat. Information gathered can be used to build improved models of food choice.

Number of Panel members and samples required for sensory test

Sl.No.	Method	Panellists		No. of sample tests
		Type	Number	
A.	Difference			
1.	Paired Comparison	Trained Untrained	5-12 72-80	2
2.	Duo-Trio	Trained	5-12	3(2identical and 1 different)
3.	Triangle	Trained	5-12	3(2identical and 1 different)
B.	Rating			
1.	Ranking	Trained Semi-Trained Un-Trained	5-12 10-15 72-80	2-7
2	Single sample	Trained Un-Trained	6-25 72-80	1
3.	Two sample difference	Trained	6-25	4 pairs of Unknown and control sample
4.	Multiple sample and	Trained	6-25	3-6

Summary and conclusion

Sensory science has advanced significantly since its inception in the early half of the 20th century. It is continuously evolving to meet the needs of the 21st-century and adapting to give better, quicker predictions of product success. It will continue to have a vital role in enabling companies to maintain a healthy food supply and to gain competitive advantage by launching new, more successful products in a highly competitive and innovative food industry.

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