Sensory Evaluation in Food Product Development (Lecture: 4)

What is Sensory Evaluation?

A scientific discipline used to evoke, measure, analyze and interpret those responses to products that are perceived by the senses of sight, smell, touch, taste and hearing. Sensory analyses are used in industry and discover details on:

- Flavor and taste
- Texture
- Appearance – color, shape, size
- Smell/Aroma
- Sounds

Sensory analysis includes three main areas

- What does the product taste like?
- What are its sensory characteristics?
- How does a change in production, packaging or storage affect sensory characteristics

Sensory analysis in the food industry

- Sensory analysis is used at several stages during product development
- Companies can compare a competitor's product
- Improve products by modifying or changing the ingredients
- Check that the specification is being met
- Monitor quality control by checking regular samples against a specification
- Detect differences between products from different runs or batches
- Profile the characteristics of new products
- Describe specific characteristics
- Demonstrate new products to the marketing team
- Promote new or reformulated products to consumers
- Sensory analysis is carried out in controlled conditions

Which senses are used in the analysis

- **Sight** – Appearance
- **Smell and taste** – Aroma and flavor
- **Touch** – Texture and mouthfeel
- **Sound** – Noise

Taste areas of the tongue

How is Sensory Evaluation Used?

In a food company, sensory scientists work closely with the product developer's to understand:

- What consumers like and why
- If consumers can tell a difference when they change a product (e.g. substitute an ingredient)
- Try to understand how our senses work and how our senses respond to stimuli (both from food and chemicals)
- Improve testing methodology

Why is Sensory Evaluation Used?

- It reduces uncertainty and risks in decision making
- It ensures a cost-efficient delivery of new products with high consumer acceptability
- Human observers are good measuring instruments
    - People can sometimes detect odorants at levels lower than what can be detected by an instrument

- Instruments cannot measure liking (although they can be used to determine what characteristics of a food correlate with liking - e.g. with many beverages – up to a point - as sweetness increases so does liking).

Principles of Good Practice

1. Facilities should be well designed

- White or off-white color
- Lighting should be controlled
- There should be good ventilation

2. Samples should be prepared properly

- Temperature should be controlled and the same for all samples
- Volume served should be equal for all samples
- Samples should be served at equivalent shelf-life or time since cooking/preparation

3. Experimental design considerations

- Samples should be labeled with random 3-digit codes to avoid bias
- Samples should be served in random or counterbalanced order
  - ✓ Counterbalanced order means that if 2 samples are served, half of the subjects receive one sample first and the other half receives the other sample first.

Sensory Evaluation Methods

The basic goal is to match the right test with the right question

Question	Method
Are products different?	Discrimination Tests
If products are different, how are they different?	Descriptive Analysis
What is the acceptability of a product? Is one product preferred over another?	Consumer Acceptance Tests (9-Point Hedonic Scale)

1. Discrimination Tests

Basic question: Are two products different from one another?

Basic setup

- 25-50 panelists
- Screened for acuity (keenness or sharpness of perception, i.e. can they smell and taste well?)
- Given triangle, duo-trio or paired comparison tests
- Analysis is done using tables which compare results to chance – this analysis ensures that the difference was real and not because people chose the correct sample by luck/chance

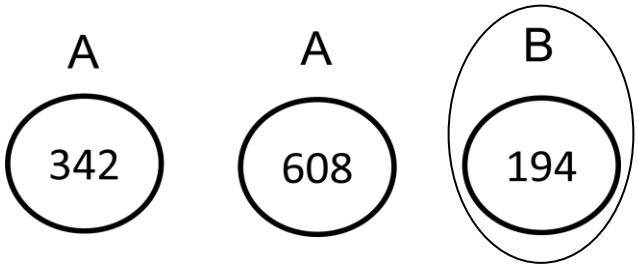
Advantage

- Quick and simple

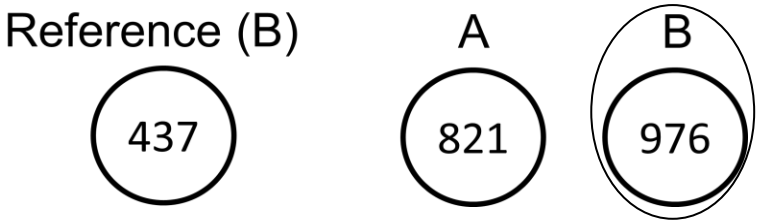
Limitations

- Limited results – only yes they are different or no they are not.

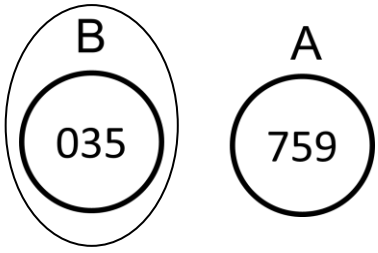
(a) Triangle Test: Choose the sample that is most different



(b) Duo-trio Test: Choose the sample that matches the reference



(c) Paired Comparison Test: Which sample is sweeter?



2. Descriptive Tests

Basic Question: How do products differ in all sensory attributes?

Basic Setup

- 8-12 panelists
- Screened for acuity
- Trained
- Asked to rate intensity for all sensory attributes
- Analysis is done using a t-test to determine if the means are statistically different

Advantages

- Detailed quantitative information

Limitations

- Time consuming
- Most food companies have a panel that is trained on each of their products
- To train a panel takes several weeks to months
- There are several different methods of training
  - ✓ Quantitative Descriptive Analysis
  - ✓ Sensory Spectrum
  - ✓ Flavor Profile

What does trained mean?

- ✓ It means that the panelists are trained to evaluate products similar to how any instrument would give a reading.
- ✓ In essence, the panelists are calibrated so that they have an understanding of each attribute and the range of intensity.

For example, a trained panel would be a given a sample of grape juice and would be able to rate the level of turbidity, color, viscosity, etc.

3. Consumer Acceptance Tests (Hedonic Tests)

Basic Question: Are the products liked?

Basic Setup

- 75-150 consumers per test
- Screened for product use (Do they buy the product? And how often?)

- Asked degree of liking (how much do they like it) and/or preference questions (Color, Flavor, Taste and Overall Acceptability)

Advantages

- Provides essential information – Do they like it or not?

Disadvantages

- May be difficult to get a representative sample of consumers

9-PointHedonic Scale:

- **9-** Like extremely **8-** Like very much **7-** Like moderately
- **6-** Like slightly**5-** Neither like nor dislike **4-** Dislike slightly
- **3-** Dislike moderately**2-** Dislike very much **1-**Dislike extremely

Note: It is very important to rinse your mouth thoroughly with distill water before taking next sample into your mouth.