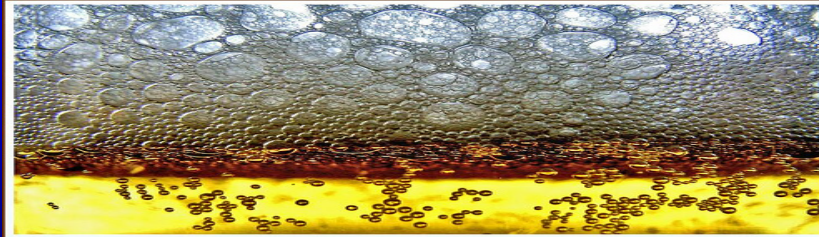


Sensory Panels for Brewers



**Christopher Bird
&
Dr. Gary Spedding**

Principles of Sensory Evaluation

- **Sensory Evaluation is defined as the examination of the sensory attributes of a product by assessors. Sensory attributes commonly evaluated:**
 - appearance
 - odor / aroma / fragrance
 - tactile or trigeminal sensations
 - taste

Principles of Sensory Evaluation

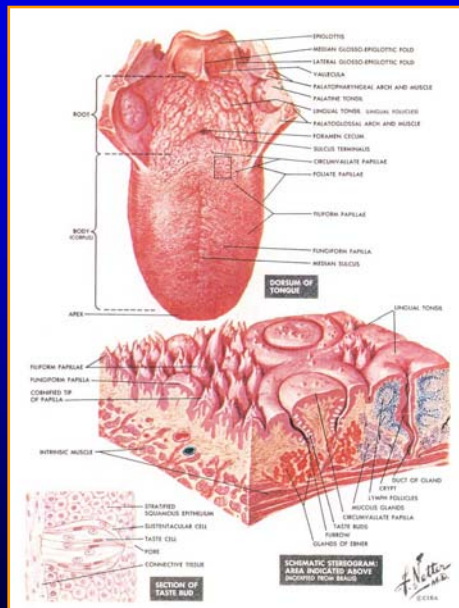
- We use sensory evaluation as a quality control tool to help define a products' attributes, to monitor and maintain a products' consistency, and to identify any off-tastes that might present themselves over time.
- We also use sensory evaluation to formulate new products and to compare existing products with those of competitors.

Principles of Sensory Evaluation

- **Basic taste: salty, sour, sweet, bitter**
- **10,000 taste cells located in mouth**
 - children have more, older people less
- **~ 100 receptor cells called taste bud**
 - taste molecules stimulate receptors which in turn stimulate nerve endings inside the tongue

Anatomy of the tongue showing the three types of taste papillae and the organization of taste receptor cells into a taste bud.

(From Netter, F.H., *The CIBA Collection of Medical Illustrations*, CIBA Pharmaceutical Company, 1983 (with permission).



Principles of Sensory Evaluation

- Certain proteins on surface of mouth act as receptor sites for specific molecules
- this is done by virtue of particular shape
 - molecule attached
 - protein changes configuration becoming permeable to certain ions
 - gives rise to small electrical charge
 - charge is picked up by nerve fibers
- nature and overall pattern of currents produced by tongue thought to be info brain uses to determine taste

Principles of Sensory Evaluation

- Most of what we perceive as flavor is detected via the olfactory sense
- Humans can discriminate between thousands of odors
- From childhood we establish odor memory:
 - can elicit vivid memories - Grandma's house
 - can elicit reactions - chocolate / onions
- Odors commonly classified by object that produce them
 - fruity, grassy, woody, papery

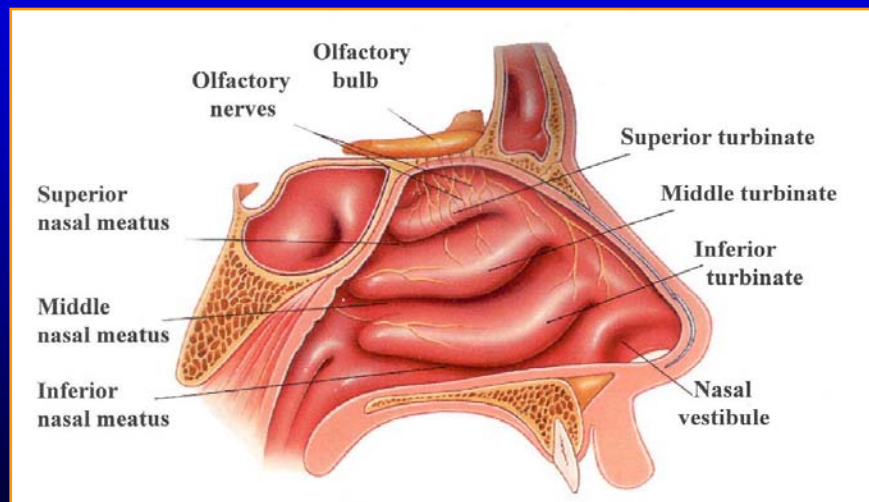




Principles of Sensory Evaluation

- Nose is most acute sense
 - .02 ppt
- Most difficult are those odors we are most familiar with
- More we concentrate, more difficult to recall
- Odor recognition is odor memory
- Requires frequent practice

Septum of Nose



Principles of Sensory Evaluation

- Complications can arise
 - many terms can be ascribed to a single compound
 - thymol = herb-like, green, rubber-like
 - multiple terms used to describe the same compound at varying concentrations
 - DMS = malty, veggie-like, tomato juice, oysters
 - many compounds can be associated with a single term
 - lemon = alpha-pinene, citral, linalool, alpha-terpeneol

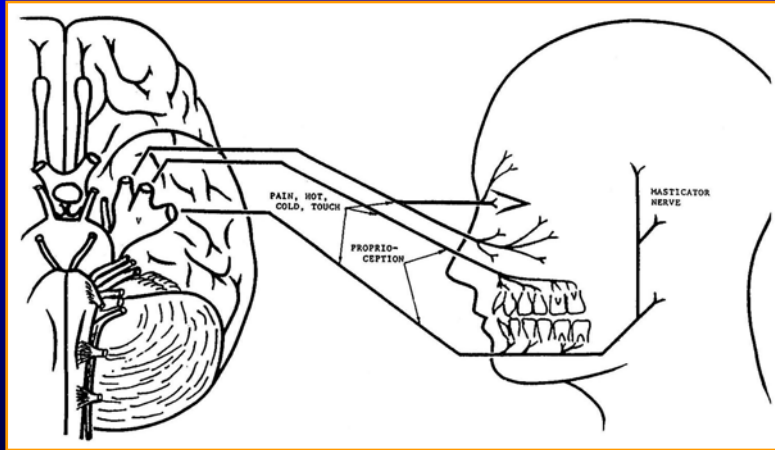
Beer Flavor Wheel



Principles of Sensory Evaluation

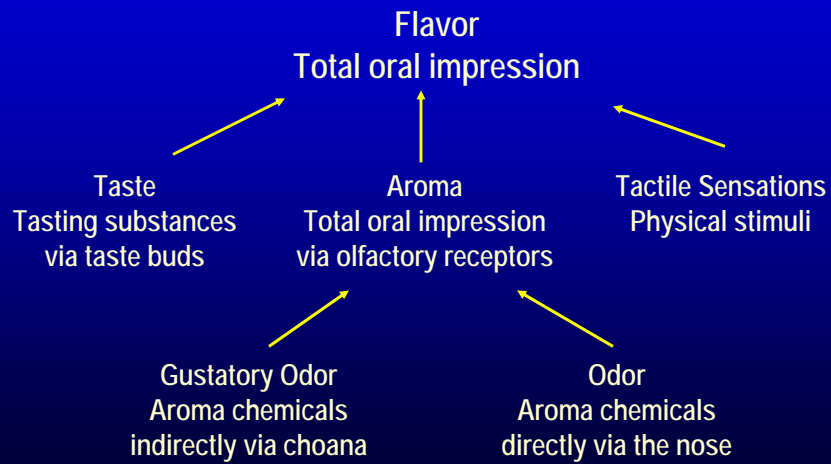
- Chemical Sense associated with irritation, pain
 - referred to as Trigeminal Sensations after trigeminal nerve which mediates their perception
 - burning, tingling, cooling brought about by trigeminal stimulants horseradish, ginger, vinegar
 - trigeminal nerve splits into several branches to innervate the tongue, oral mucosa, nasal mucosa, throat, and other areas of the face
 - reflex responses to trigeminal stimuli serve to reduce exposure to irritants and include sneezing, increased salivary flow, sweating

Pathway of the trigeminal (V) nerve



(Redrawn from Netter, F.H., *CIBA Collection of Medical Illustrations*, Vols. 1 and 3, Ciba-Geigy Corporation, Summit, NJ, 1973)

Principles of Sensory Evaluation



Principles of Sensory Evaluation Rules of Tasting

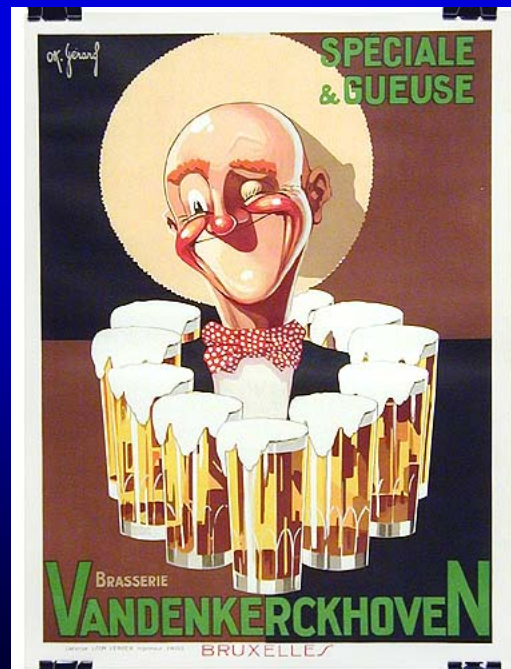
- Clean, quite room with no competing stimuli
- No eating, drinking, smoking 1 hr. before tasting
- Be prompt
- Gently swirl sample taking short sniffs to record aroma impression first
- Take small sips swirling with tongue throughout mouth
- To avoid oversaturation, allow 15 - 60 seconds for re-adaptation

Principles of Sensory Evaluation Rules of Tasting

- Taste samples from left to right
- Arrange samples from lighter to heavier
- Judge similar samples at the same time
- Panelists are asked to remain in room until all ballots are turned in for review
- Panelists should be familiar with the ballot and what is required of them

Types of Sensory Evaluation Panels

- Three main classes of sensory analysis
 - Discriminative tests
 - Are products different?
 - Affective tests
 - Preferences
 - Likes / dislikes
 - Product performance
 - Descriptive tests
 - How are products different
 - Detailed product description



Types of Sensory Evaluation Panels

- **Discriminative tests**
 - Three levels of questioning
 - Does a difference exist
 - How would you describe the difference
 - How large is the difference
 - Useful to include section for recording comments providing information on the reasons for the responses
 - Assessor can be directed to specific attribute
 - mouthfeel, aftertaste etc.

Types of Sensory Evaluation Panels

- **Descriptive tests**
 - qualitative aspect
 - attributes / characteristics / descriptors
 - quantitative aspect
 - intensity of attribute present
 - time aspect
 - order of appearance
 - integrated aspect
 - overall impression

Types of Sensory Evaluation Panels

- Recommended minimum number of assessors

Type of Test	Assessors	Trained Assessors
Difference		
paired	30	20
triangle	24	18
2 out of 5	-	12
duo-trio	32	20
Ranking	30	5
Rating	20	8
Descriptive	-	8
Acceptance		
2 sample preference	50	-
multi sample ranking	50	-
hedonic rating	70	-
magnitude estimation	70	-

Sensory Evaluation in Quality Control

- Program Guidelines
 - Items tested
 - water - pre / post filtration
 - malt, hops, yeast
 - wort
 - beer - end ferment / end storage
 - final product
 - rinse waters, blow-off, CO₂

Sensory Evaluation in Quality Control

- Program Guidelines
 - Frequency
 - each batch, daily, weekly, monthly, quarterly
 - Sample procedures
 - technique
 - preparation, handling of samples
 - Special instructions
 - Data
 - collection
 - interpretation

Sensory Evaluation in Quality Control

- What to look for:
 - changes in appearance
 - changes in smell
 - changes in taste

 - anything out of the ordinary
- Pass / Fail

Training and Selection of Sensory Evaluation Panelist

- **Consumer Panels**
 - + **Positives**
 - good attitude
 - interested in work
 - consider work important
 - have the time
 - **Negatives**
 - not enough training
 - use preference in evaluations
 - not available at short notice
 - money / product compensation

Training and Selection of Sensory Evaluation Panelist

- **In House Panel**
 - Panelist require extensive training
 - Provide descriptive data
 - May be used to screen, eliminate products
 - Function of Quality Control
 - Once trained, no longer considered average consumer



Sensory Evaluation Panelist Screening

- Ability to discriminate & describe product differences
- Ability to discriminate & scale attribute intensity
- Healthy, no allergies etc.
- Availability and promptness
- Curiosity



Sensory Evaluation Panelist *Initial Screening*

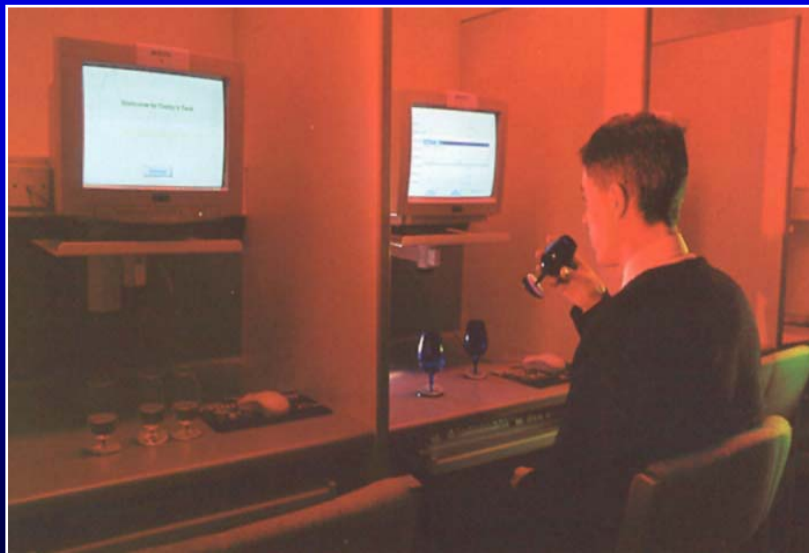
- **Test each candidate's perception and recognition of the primary tastes**
 - sweet, sour, salty, bitter
- **Test the recognition and description of odors utilizing odor bottles**
 - citrus, eugenol, banana
- **Candidates should be asked to identify each odor by name, offer a general description, or to report any recognized associations**

Sensory Evaluation Panelist *Advanced Screening*

- **Check the performance in descriptive tests by presenting each assessor with a number of products that are known to differ. Ask them to describe, in writing, the sensory characteristics of each.**
- **Performance indicators considered:**
 - the number of descriptors written down
 - range of terms - did they involve all 5 senses?
 - type of descriptors used - objective vs subjective
 - individual's willingness to contribute to group discussion
 - individual's ability to verbalize
 - individual's willingness to listen

Sensory Evaluation Panelist Training Goals

- **Develop familiarity with the product and its characteristics (attributes)**
- **Develop a common language to express these characteristics**
- **Improve individual's and groups ability to provide consistent judgement**
- **Eliminate judgement based on personal preferences**
- **Provide organized practice sessions**



Sensory Evaluation Panelist Selection Criterion

- **Successful candidates should score:**
 - **Discrimination tests (predetermined number) 60 % or greater**
 - **Basic tastes 100 %**
 - **Odorants 70 %**
 - **Rank order 75 %**
 - **Product description 5 or more descriptors**
 - **Interview subjective**

Sensory Evaluation Panelist Orientation

- **Explanation of task**
 - **assessment of product characteristics in terms of identity, intensity, and order of perception**
 - **looking for perceivable characteristics, not ingredient statement**
- **Describe the components of the evaluation: appearance, aroma, flavor, texture**
- **Establish technique for product examination**
 - **develop standard procedure**
 - **develop terminology**
 - **develop scales**
 - **assess performance**

Lager Beer

Bohemian - Style Pilsener

- Slightly more than medium bodied with slightly sweet maltiness. A balance between moderate bitterness and noble type hop aroma and flavor. Light straw to light amber in color. Chill haze, fruity esters should be absent. Diacetyl is very low amounts is accepted.
- O.G. 11 -14 °Plato
- IBU 30 - 45
- Alc. By w/w (v/v) 3.2 - 4 % (4 - 5)
- Color SRM (EBC) 3 - 7 (6 - 14)

	Low	-----	Correct	-----	High	
Hoppy	0	1	2	3	2	1 0
Malty	0	1	2	3	2	1 0
Bitterness	0	1	2	3	2	1 0
Body	0	1	2	3	2	1 0
Alcohol	0	1	2	3	2	1 0
						Total_____
Diacetyl	0	1	2	3		
Sulfidic	0	1	2	3		
Oxidized	0	1	2	3		
						Total_____
True to Style = $\frac{\text{Total upper} - \text{Total lower} \times 100}{15}$						
= _____%						
14 = 93% 13 = 87% 12 = 80% 11 = 73% 10 = 67% 9 = 60%						

