



Sensory Analysis, Beer, Hops and Grains

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Today's Agenda

- Introduction and Overview
- The Basics of Sensory
 - Basic Tastes
 - Aromatics
 - Mouthfeels
- Sensory Characteristics of Hops and Grains
- Example of Current Sensory and Science Research: Hops

The Big Picture

Brewers must meet four critical areas to experience sustained success:

Communicating a promise/image of an appealing product

Delivering
flavor the
consumer
wants:

Quality

(Ingredients +
Brewing)



Delivering
flavor the
consumer
wants:

Consistency

(Packaging +
Distribution)

Producing and distributing the product economically

We Have Major Knowledge Gaps to Fill

Practices and Environment

Hops and Grains

Brewing

Beer Drinker



Gap

Gap

Gap

- What factors in and out of our control affect crop quality and how?
- How can we manage these factors?

- What ingredients will deliver to my customer/ brewer needs?
- How can we adjust farming practices to maximize crop quality?
- How do we measure sensory quality?

- What ingredients will give me the aroma and flavor I need?
- How do I measure sensory quality before brewing?
- Brewing parameters?

- What beer aroma and flavor drives beer behavior?
- Translation to specifications?
- How do we monitor changing needs?

Sensory directed science is helping to fill the gaps.



Basics of Sensory



Basics of Sensory

Sensory analysis is:

The use of people as instruments to measure sensory response to stimuli



Basics of Sensory

Everything is Safe to Smell and Taste



Basics of Sensory

Flavor is comprised of three components:

1

Basic tastes

2

Aromatics

3

Mouthfeels

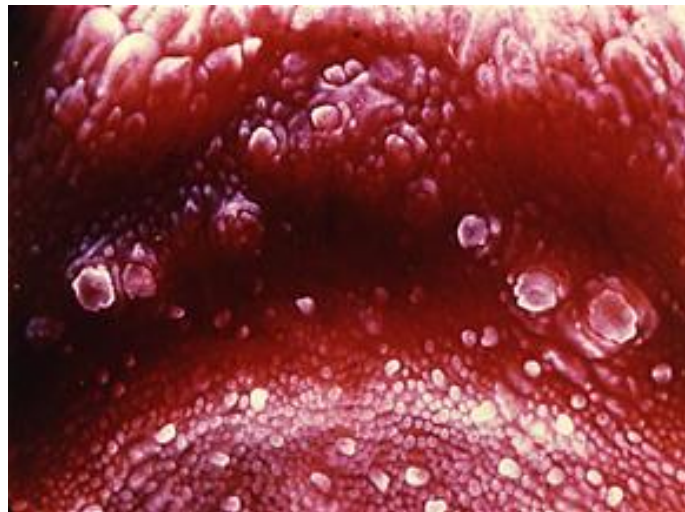


Basics of Sensory

1

Basic tastes

Taste refers to those sensations perceived through the stimulation of the receptor cells enclosed within the taste buds on the tongue.



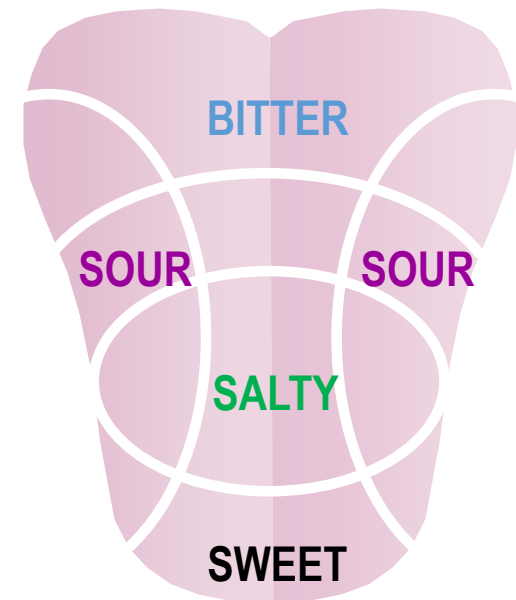
Basics of Sensory

1

Basic tastes

Basic Taste	Sensed more on...
Sweet	...tip of tongue
Sour	...back sides of tongue
Salty	...all over tongue
Bitter	...back of tongue
Umami	...middle of tongue

We have all the taste buds all over the tongue...

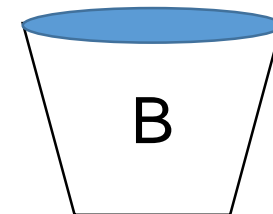
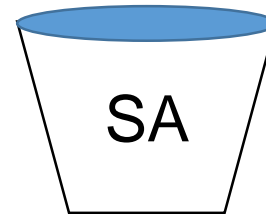
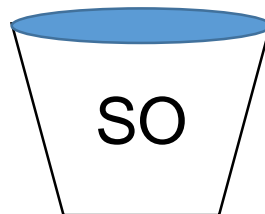
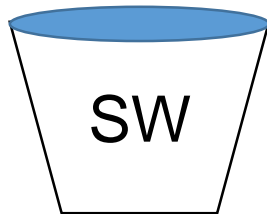


however, we sense the different basic tastes more in some regions than others.

Basics of Sensory

1

Basic tastes



Basics of Sensory

2

Aromatics



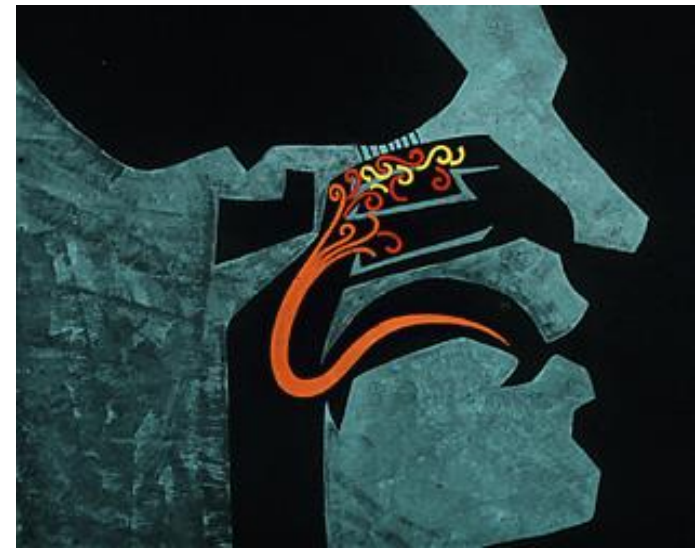
Basics of Sensory

2

Aromatics



Aroma Aromatics are perceived through stimulation of the olfactory receptor cells and the free nerve endings of the trigeminal nerve.



Flavor aromatics are compounds volatilized in the mouth, travel up the back passage, and are detected in the olfactory region of the nose.

Basics of Sensory

3

Mouthfeels

Mouthfeels are chemical or physical sensations which are detected in the mouth, nose, or throat.

- Astringent
- Dry
- Tannin
- Harsh
- Bite and burn
- Yeasty



What is Beer Flavor?



BASIC TASTES

Sweet
Sour
Bitter*
Salt (rare)

AROMATICS

Hops*
Yeast
Grain*
Fruity

MOUTHFEELS

Astringent
Dry/Tannin*
Yeasty



The Brewing Process



- Malt
- Mill
- Mash Tun
- Wort
- Brew Kettle
- Cool Liquid
- Pitch Yeast
- Fermenter
- Lager
- Pasteurize/CF and/or Fill

Hops

Practice Example: Aroma Characteristics of Hops



Hop Aroma

Common Hop Descriptors

Fruity

Citrus
Lemon
Grapefruit
Orange
Tropical

Cheesy

Stinky
Rancid
Sweaty
Body odor
Vomit

Herbal

Piney
Sage
Basil
Oregano
Thyme
Minty

Floral

Perfumy
Rose
Geraniol
Lavender
Tobacco

Vegetable

Cabbage
Broccoli

Green

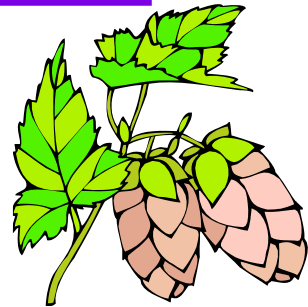
Grassy
Stemmy
Leafy
Tea

Spicy

Peppery
Ginger
Onion

Other

Skunky
Brothy
Urine
Briny
Musty
Earthy
Dirt
Hay
Resinous



Grain Aroma

Common Malt/Grain Descriptors

Roasted

Raw
Cooked
Caramelized
Toasted
Burnt
Smoky
Charred
Chocolate
Coffee
Resinous

Grainy

Starchy
Cereal
Crackers
Mealy
Mashy
Husky

Vegetable

Corn
Green Beans

Green

Grassy
Green Hay
Dry Hay
Straw

Other

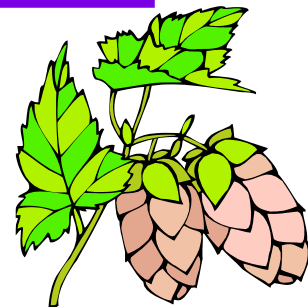
Oxidized
Nutty
Cardboardy
Goat
Barny
Dirty Barny
Brothy
Musty
Cheesy

Sweet

Vanilla
Marshmallow
Syrupy

Medicinal

Phenolic
Band-aid
Cresol



How Do We Understand Beer Drinkers?

“I like beer with
herbal piney
flavor...”

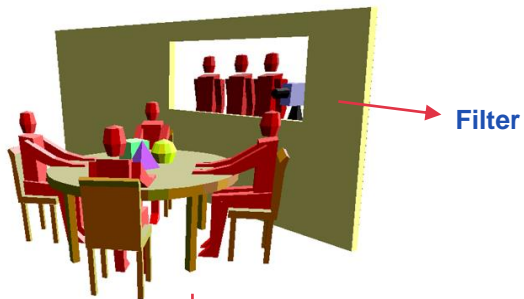


Innovative Consumer Research

Consumer

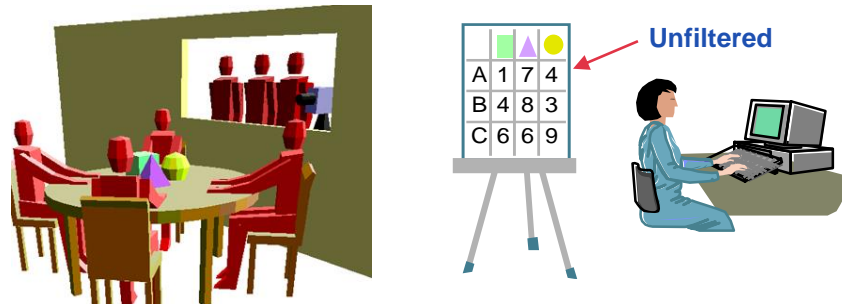


Traditional Focus Groups



Reactions, comments, responses

Innovative Focus Groups



	■	▲	●
A	1	7	4
B	4	8	3
C	6	6	9

Unfiltered

Reactions

+

Scoring

=

Data

Data

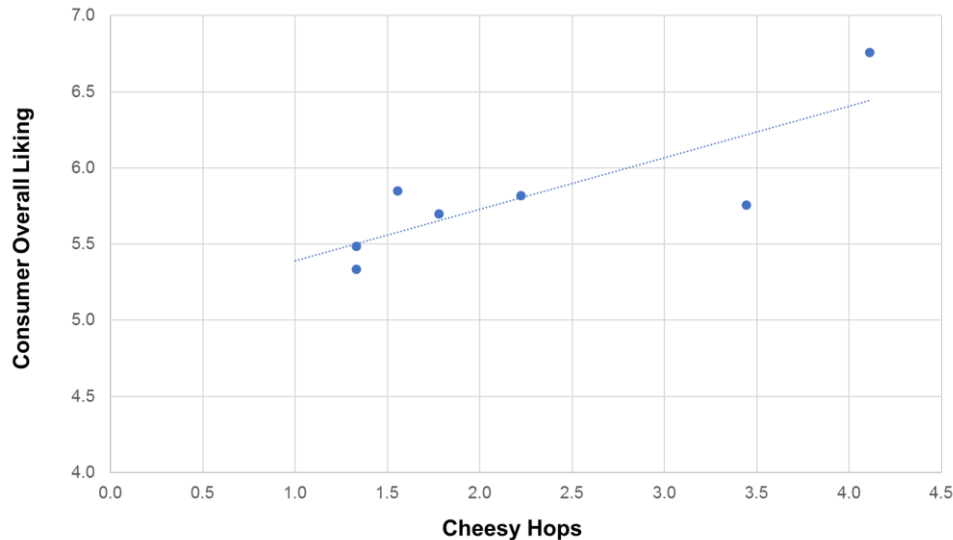
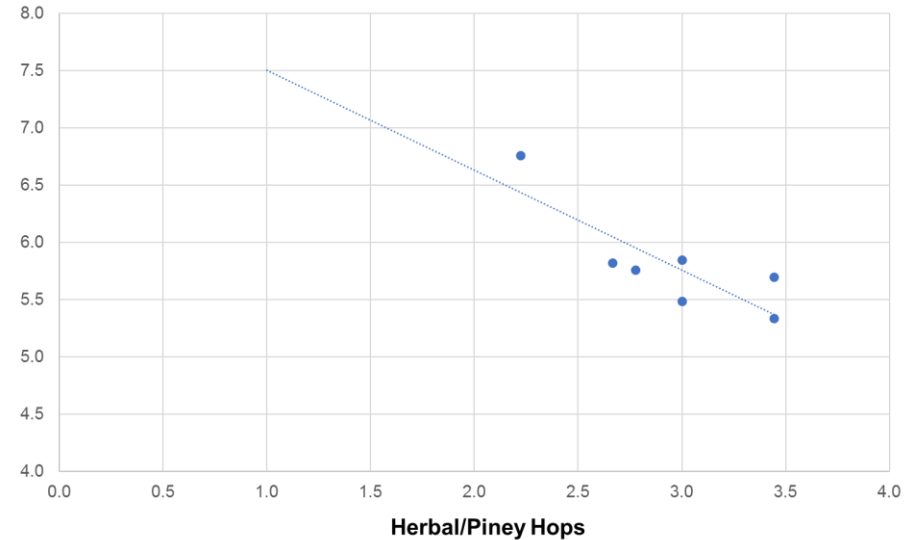
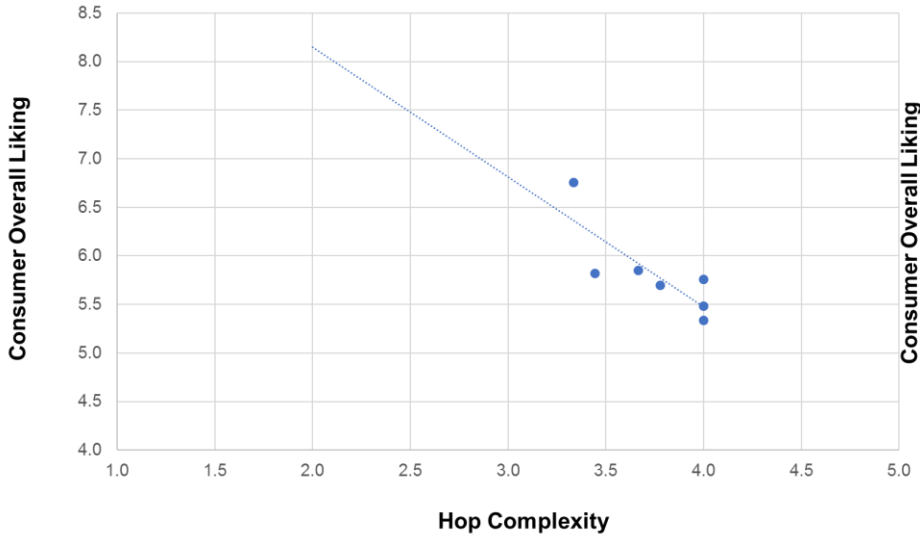
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Statistics

=

Flavor
Requirements

Overall Liking vs. Descriptive Panel

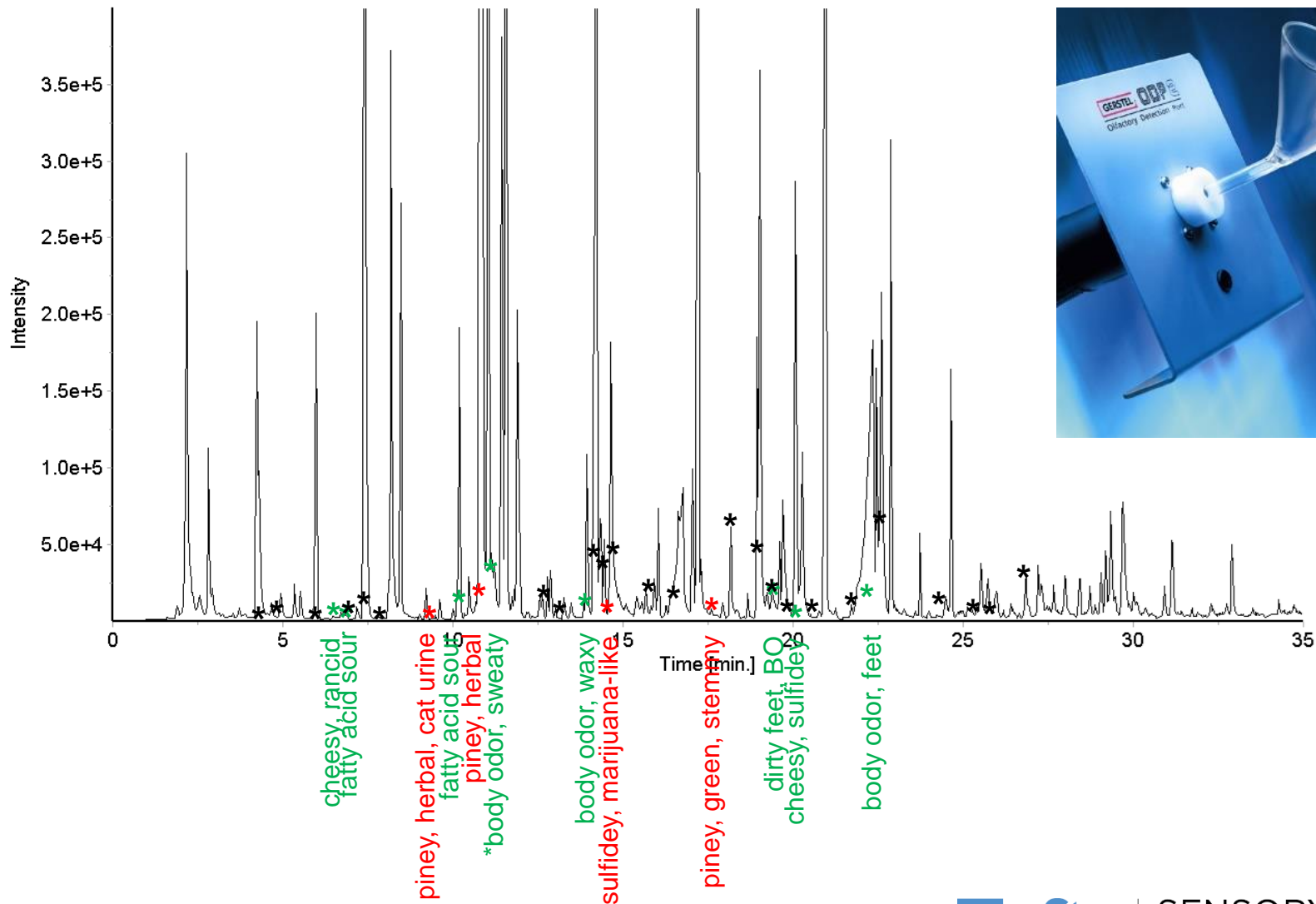


Attribute	Correlation
Hop Complexity	-0.7835
Herbal/Piney	-0.8662
Cheesy	0.8536

Sensory Directed Chemical Analysis



Sensory Directed Chemical Analysis



We Can Fill the Gaps

Practices and Environment

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What can you do?

Education (Sensory, Brewing, and Consumer)

Share information

Participate in Research

Have Fun! There is plenty of passion to go around.





Questions?