
Culinary Institute
of America
The Physiology
of Taste

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Physiology of Taste

Starring Remi & Friends

Learning Objectives

- Define the terms *taste* and *flavor* and differentiate between the two.
- List and describe the primary taste sensations.
- State the five human senses and discuss the effects they have on your ability to perceive flavor.
- Identify methods in which flavor can be developed and enhanced.
- Discuss the concepts of contrast and balance as it relates to flavor.

Once upon a time…

- Democritus
- 460 BC – 370 BC
- Co-father of the Atom
- Founder of “Taste”

And then there was…

- Georges August Escoffier
- 1846 - 1935
- Father of Modern Cuisine
- Perfector of Jus de Veau Lié

And then there was…

- Professor Kikunae Ikeda
- 1864 - 1936
- Tokyo Imperial University
- Founder of Umami

Taste

"One of the special senses which perceives and distinguishes the sweet, sour, bitter or salty quality of a dissolved substance and is mediated by taste buds on the tongue…"

-Webster's New Collegiate Dictionary

Taste

...is a big source of pleasure in most lives, a complex realm of satisfaction both physiological...

Taste

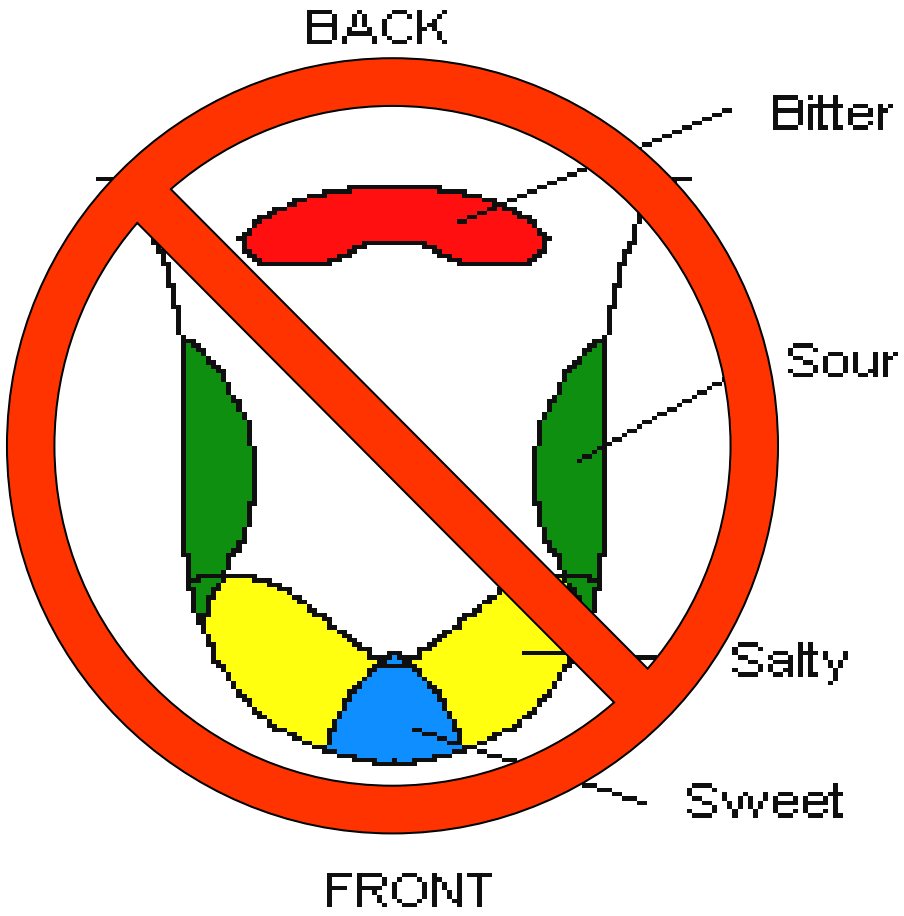
...and emotional, much of which involves memories of childhood."

Source: Ackerman, Diane, A N

Primary Tastes and the Tongue Map

- Bitter
- Sour
- Salty
- Sweet

- Umami?
- Alkaline?
- Metallic?



Taste

"We can taste something only when it begins to dissolve, and we cannot do that without saliva."

-Diane Ackerman, *A Natural History of the Senses*

Want to prove this?

Aroma

"a distinctive and usually pleasant or savory smell…"

-Webster's New Collegiate Dictionary

Taste + Aroma = Flavor

Sensory Perception Analysis

- Hold your nose closed.
- “Chew” on jellybean slowly and thoroughly…
- Analyze what you can taste…
- What do you taste?

Flavor

"A food's flavor includes its texture, smell, temperature, color, and painfulness (as in spices), among many other features."

-Diane Ackerman, *A Natural History of the Senses*

Experiencing Flavor

Are you surprised to hear that you can also…

- See flavor
- Hear flavor
- Smell flavor
- Feel flavor

Seeing Flavor

Hearing Flavor

The sounds that food makes influences the perception of its flavor:

- Sizzling platter of fajitas
- Fizzle of champagne
- Crunchy potato chips
- Crisp apples

Smelling Flavor

Smell has a **very** important role in flavor

- Often your first impression of food
- Hundreds of aromas recognized
- Often aromas stimulate memories
- Loss of sense of smell limits flavor depth

Feeling Flavor

- Fingers/ utensils play first role: resistance, slipperiness, crunch
- Tongue and rest of mouth (teeth, interior surface, lips)
- “Spicy/ hot” pain from exposed nerve endings via trigeminal nerve
- Other sensations:
  - Carbonation
  - “Coolth”

Temperatures

- Lose ability to taste at extreme temp. limits
  - 32°F Lowest
  - 170°F highest
- Optimal tasting temp. between 72°F - 105°F

Sensory Perception Analysis

- Take a sip of item #2 (open nose).
- “Chew” slowly and thoroughly…
- Analyze what you can taste…
- What do you taste?

Seasoning vs. Flavor Enhancing

Seasoning is like a volume switch

- Acid
- Salt
- Spice

Flavor development and enhancement

- Balance
- Contrast
- Depth

*Vivaldi – Four Seasons Winter Allegro non molto (Itzhak Pearlman)

Sensory Perception Analysis

- Take a sip of item #3 (close nose)
- “Chew” slowly and thoroughly…
- Analyze what you can taste…
- Now open your nose and taste…
- What do you taste?

Sensory Perception Analysis

- Take a bite of item #4 (open nose)
- Chew slowly and thoroughly…
- Analyze what you can taste…
- What do you taste?

Sensory Perception Analysis

- Take a bite of item #5 (close nose)
- “Chew” slowly and thoroughly…
- Analyze what you can taste…
- What do you taste?

Sensory Perception Analysis

- Take a sip of item #6 (close nose)
- “Chew” slowly and thoroughly…
- Analyze what you can taste…
- What do you taste?

"Umami"

- By Monosodium Glutamate
- First described by a Japanese scientist in 1908
- Literally "the presence of glutamic acid" translated to mean "deliciousness or wonderful taste"
- Considered to be a 5th taste as well as having the property to enhance the flavor of savory foods
- Little effect on sweet foods

“Umami”

Forms:

- **Glutamates** (glutamic acid in vegetables): kombu, tomatoes
- **Inosinates** (inosinic acid in animal proteins): fish - bonito
- **Guanylate** (gualylaic acid in fungi): mushrooms, cheese

When mixed together, umami amplify each other

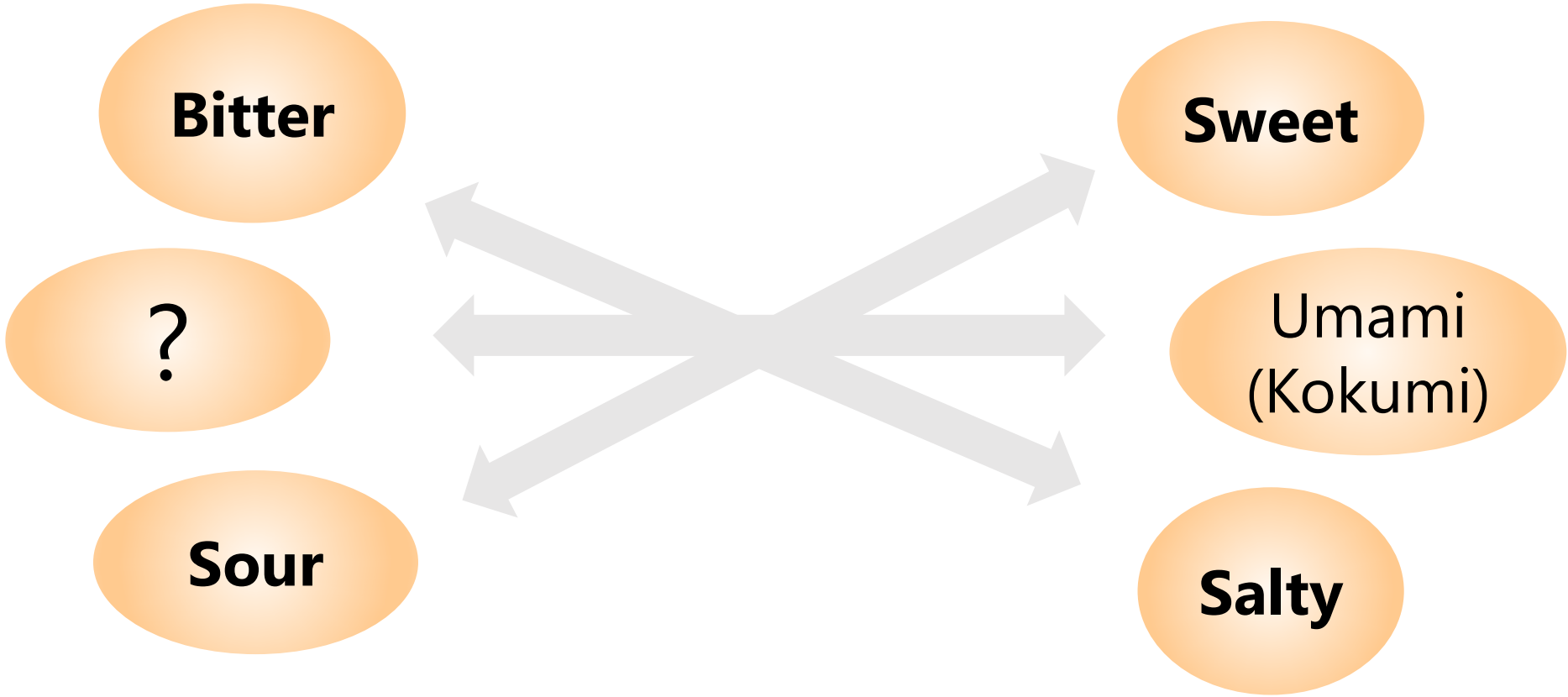
Dashi =
Bontio flakes – Inosinates
Kombu seaweed - glutamates

Sources of Umami/ Kokumi

- Ripened cheese
- Aged meat
- Cured meats
- Dried fish
- Fish sauce (garum)
- Maillard reaction
- Fermented vegetables
- Mushrooms (esp. dried)

If Umami/ Kokumi leverage decomposition for the purpose of enhancing flavor…

… is there a counterplay?



…Can (or do) we counterbalance the flavor contributions of umami/ kokumi?

- Fresh Herbs
- Citrus
- Green Olives
- Green Chilis & Tomatillos

Is the opposite true?

- Under-Ripe Fruit (Papaya)
- Vegetables – As the Star

…Let's call it "**Vigor**!"

Sensory Perception Analysis

- Take a sip of item #7 (close nose)
- “Chew” slowly and thoroughly…
- Analyze what you can taste…
- What do you taste?

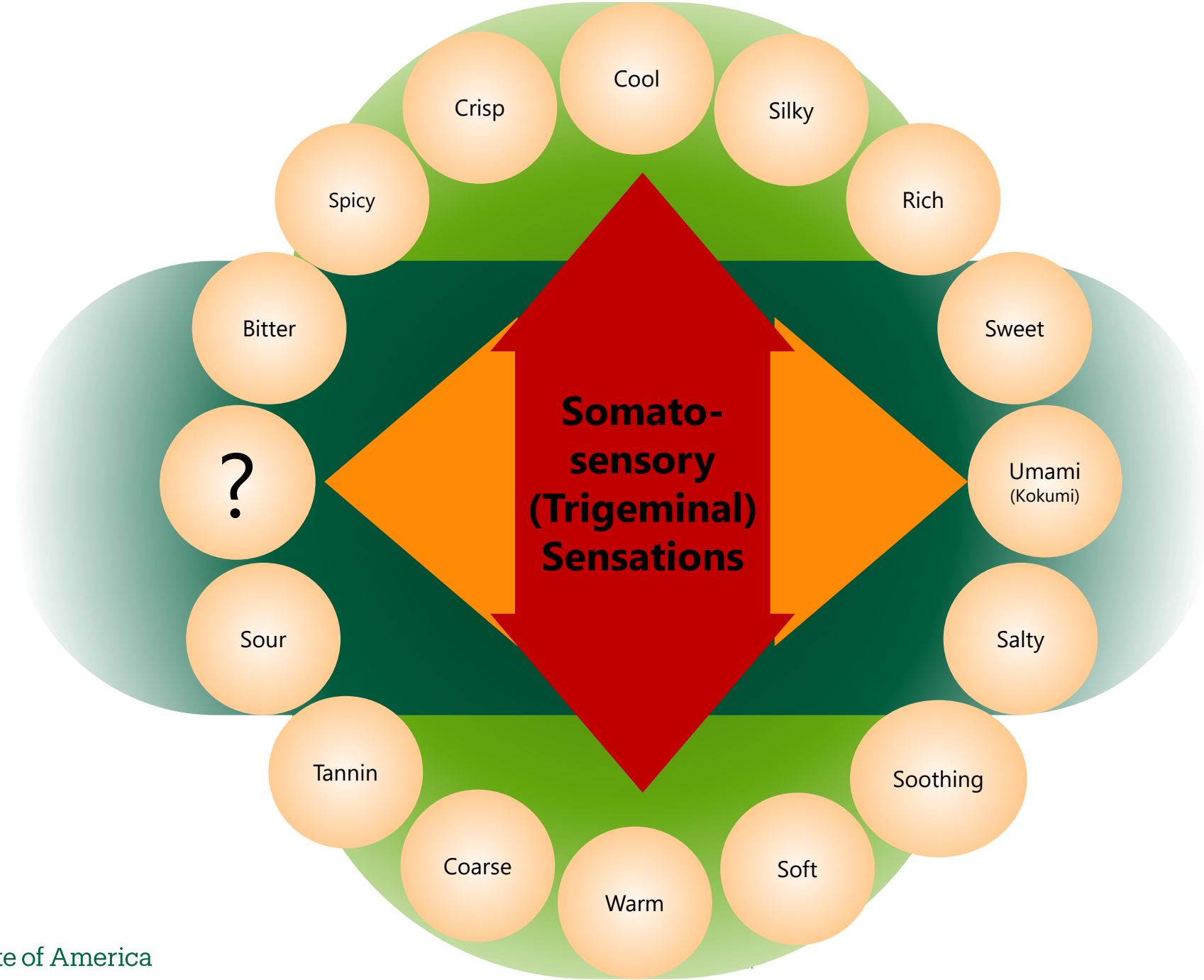
Sensory Perception Analysis

- Taste the hot sauce
- Pain is often a desired “flavor”
- Sensations dull with frequency

Too Much of a Good Thing…
Sensory Fatigue

"The sensory system reacts to ever-present stimulus by reacting less to it."

- Harold McGee, *On Food and Cooking*


Cool
Crisp
Silky
Spicy
Rich
Bitter
Sweet
Somato-sensory (Trigeminal) Sensations
?
Umami (Kokumi)
Sour
Salty
Tannin
Soothing
Coarse
Soft
Warm

Yin?


Crisp
Cool
Silky
Spicy
Rich
Bitter
Sweet
Vigor
Umami
(Kokumi)
Sour
Salty
Tannin
Soothing
Coarse
Soft
Warm

Yang?

Culin

Culin