



Culinary Institute  
of America

# Introduction to Taste, Flavor, & Global Flavor Profiles



# Learning Objectives

- Define the physiology of taste.
- Describe the role papillae, taste buds, and saliva play in taste.
- Identify the five basic tastes and their culinary and physiological significance.
- Differentiate between true tastes and trigeminal sensations such as spiciness, astringency, and alkaloid bitterness.
- Explain what and how senses influence flavor.
- Define sensory fatigue and how it can be avoided.
- List different global flavor profiles.

# Please Note:

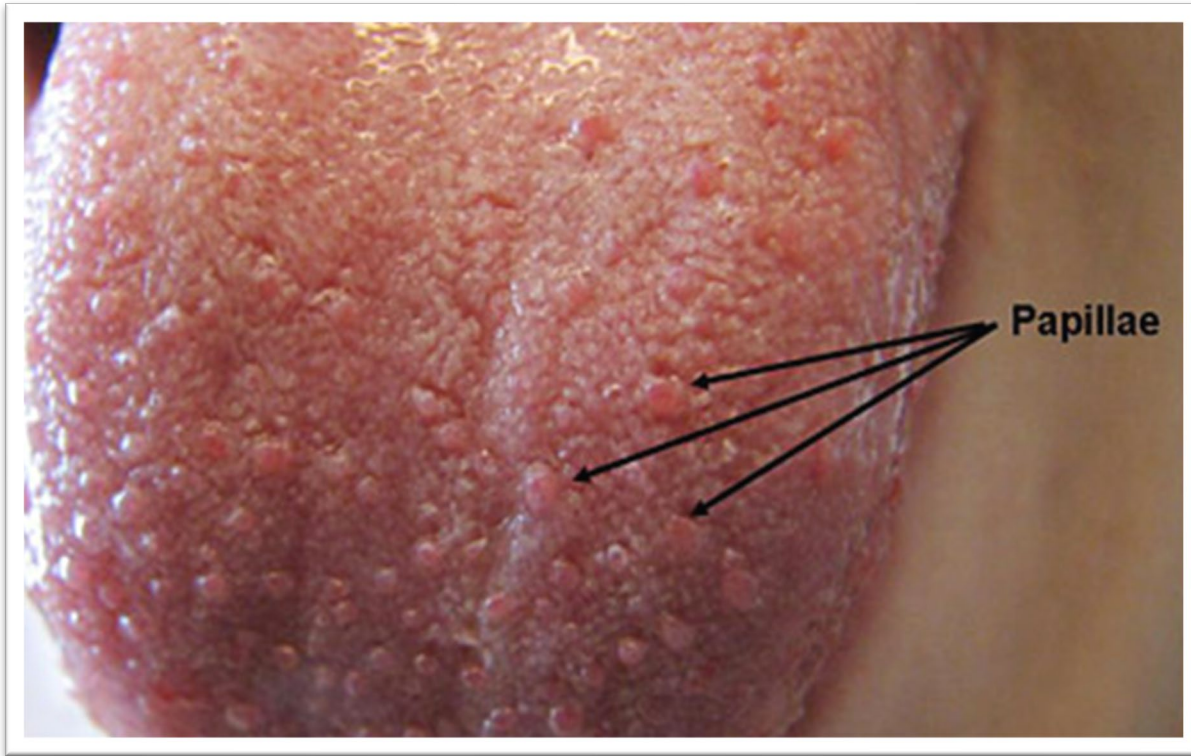
- As part of this presentation, you will be asked to taste a series of unlabeled food products.
- All products used in this session are plant based.
- Please inform the instructor if you have any special concerns or allergies.



# The Study of Taste

- **Physiology:** the scientific study of the bodily functions of living organisms and their counterparts
- **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
  - Often is a source of pleasure in most lives
  - Complexly provides both physiological and emotional satisfaction

# The Human Tongue



## Papillae

- Contain 1 to 300 taste buds
- About 6,000 per mouth
- Amount varies dramatically among individuals
- Amount varies with age
  - Few when born
  - Increase steadily
  - Declines around age 40
- Life expectancy of a taste bud is 10 days

# What Type of Taster Are You?

## Non-tasters

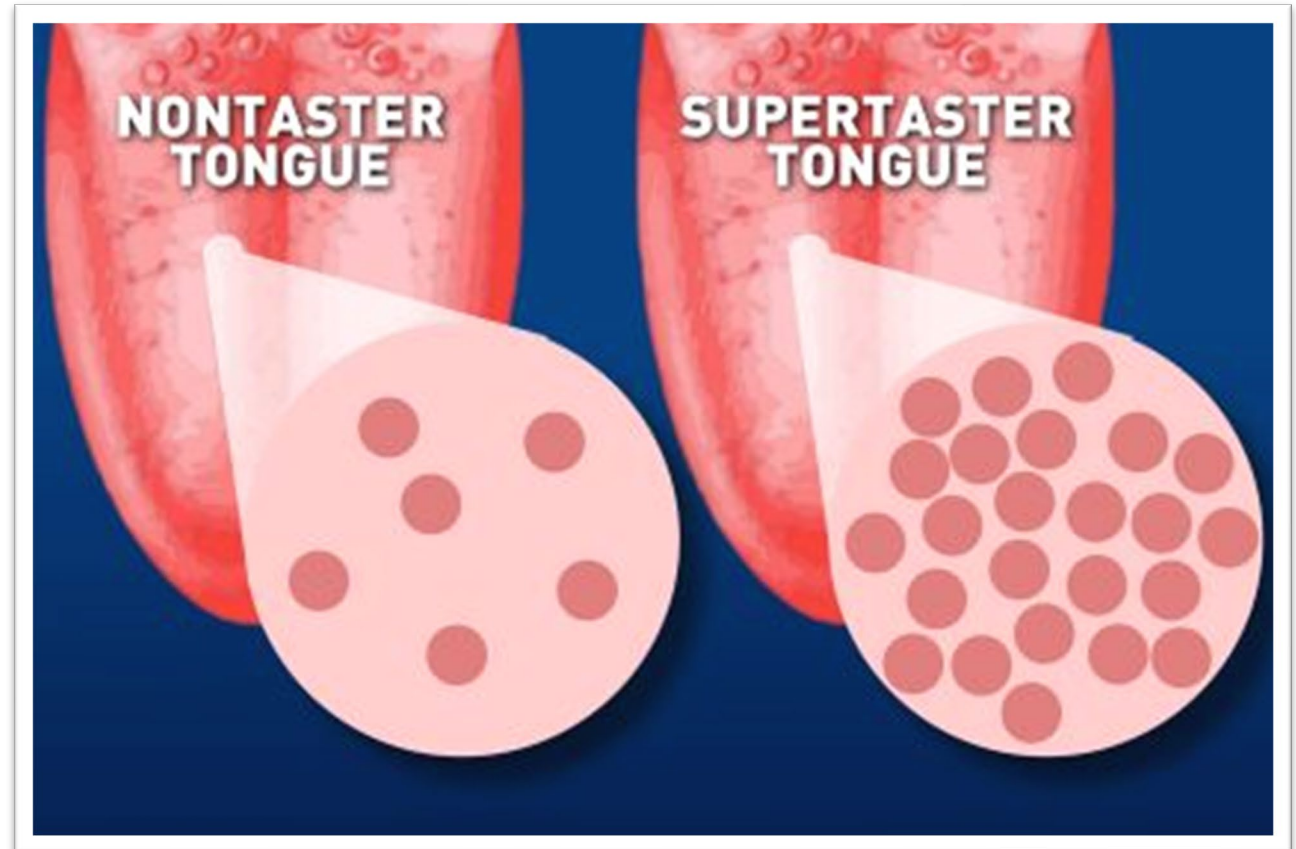
- 2000 taste buds
- 25% of the population

## Taster

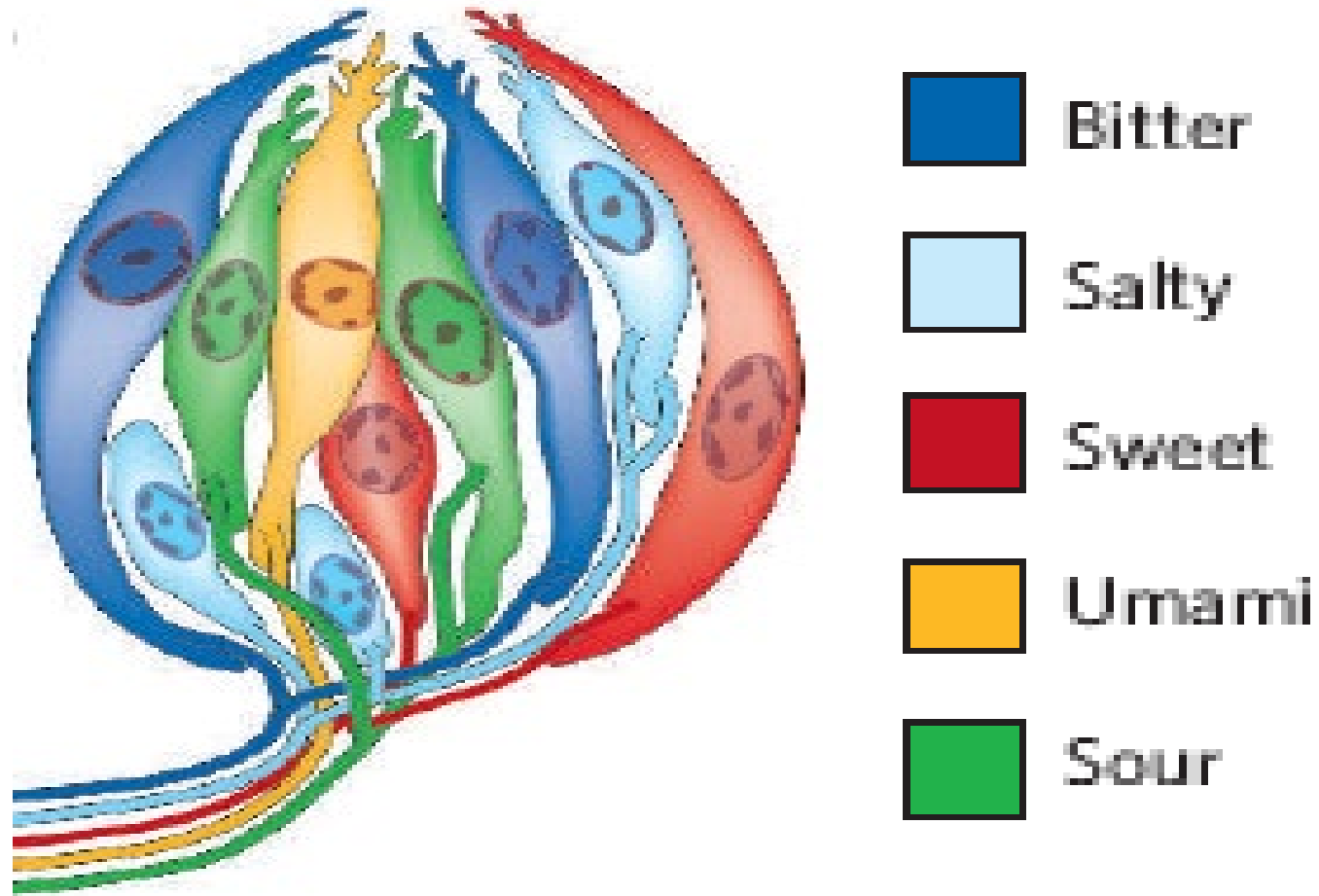
- 5,000 taste buds
- 50% of the population

## Super-taster

- 8,000 taste buds
- 25% of the population
- $\frac{2}{3}$  are women



# A Taste Bud and Its Receptor Cells



# Saliva

- A clean, tasteless, odorless, slightly acidic, viscous fluid
- Produced by salivary and mucus glands
- Has anti-bacterial properties
- Lifetime output about 6,000 gallons

## What does it do?

- Lubricates food for digestive passage
- Maintains pH balance
- Initiates digestion
- Helps us taste by dissolving salt, sugar, etc.



# Classification of Tastes

Sweet

Salty

Umami

Bitter

Sour



# Sweet

- Humans have a high tolerance for sugar
- Recognition threshold is 1 part per 200
- Sugar and sweetness is usually perceived as pleasant
- Newborns naturally prefer sweetness, showing a biological tendency
- Sweetness signals simple carbohydrates; a quick energy source
- In excess, sugar contributes to obesity, diabetes, and heart disease



# Sour

- Recognition threshold is 1 part per 130,000
- Causes enhanced saliva flow
- Potentially corrosive to tooth enamel

## Indicates

- Potential spoilage
- Fermentation
- Presence of vitamins
- Presence of acid (pH < 7)

## Culinary uses

- Preservation
- Flavor enhancement
- Fresh appeal



# Salt (Sodium Chloride)

- An essential nutrient
- Recognition threshold is 1 part per 400

## **Physiological tasks**

- Intercellular fluid balance
- Minimum intake varies per person

## **Culinary uses**

- Flavor and color enhancement
- Food preservation
- Sausage making
- Muting bitterness



# Bitter

- Human have a very high sensitivity
- Recognition threshold is 1 part per 2,000,000

## Indicates

- Presence of toxins/ alkaloids
- Potentially harmful to health

## Most preferences for bitter are acquired tastes

- Coffee
- Beer
- Bitter vegetables



# Umami

- *Umami* = *Umai* (delicious) + *Mi* (taste)
- Coined by Professor Kikunae Ikeda
- Recognized in 1985 as the fifth basic taste (not universally accepted)
- Caused by glutamic acid
- Glutamic acid is the base for MSG
- MSG is added to processed foods for flavor
- Umami being a taste is controversial due to MSG concerns



# Umami Forms

## Glutamates

- Glutamic acid in vegetables
  - Kombu, tomatoes

## Inosinates

- Inosinic acid in animal proteins
  - Fish – bonito

## Guanylate

- Guanylic acid in fungi
  - Mushrooms, cheese

## Synergistic flavor enhancement

- When different forms are mixed, they amplify each other
- Example: Dashi = Bonito Flakes (Inosinates) + Kombu seaweed (Glutamates)



# Umami-Rich Foods

- Aged cheese
- Seafood
- Vegetables
- Aged, fermented, cured meats
- Green tea
- Mushrooms
- Tomatoes
- Grapefruit
- Soy products
- Seaweed



# Trigeminal Sensations Misidentified as Taste

## **Astringency**

- Dry, puckering, or chalky mouthfeel
- Caused by tannins (bind to salivary proteins)
- Found in unripe fruits, green tea, red wine

## **Spiciness (Pungency)**

- Burning or irritating sensation, reduces with exposure
- Caused by capsaicin or piperidine
- Activates pain receptors, not taste buds
- Found in peppers, chiles, peppercorns

## **Alkaloid Sensations**

- Bitter, metallic, or scratchy mouthfeel
- Caused by plant alkaloids such as piperine
- Detected via trigeminal nerve
- Found in spices, herbs, nightshades

# Flavor Sensory Perception Analysis

- Hold your nose closed.
- Slowly and thoroughly chew on the jellybean.
- Analyze what you can taste.
- On my mark, gently inhale through your mouth.
- Release your nose and gently exhale through your nose.
- What do you taste?



# What Creates Flavor?

## Taste

The detection of the five basic qualities from dissolved substances by receptors on the tongue

+

## Aroma

The smell of food, sensed through receptors in the nose, which accounts for 80% of what we perceive as flavor

=

## Flavor

The overall sensory perception of a food

# Flavor

Flavor is created through a multi-sensory interaction that includes:

## **Taste:**

the five basic tastes detected by the tongue

## **Sound:**

affects our sense of food's texture, freshness, and appeal

## **Touch:**

the texture and physical feel of food in the mouth

## **Trigeminal sensations:**

physical reactions to chemical irritants

## **Smell:**

aromas that shape recognize as flavor

## **Sight:**

visual cues that influence how we expect food to taste

## **Temperature:**

affects how flavors are released and perceived

# Physiological Impacts on Flavor Perception

## **Medication:**

some drugs can alter taste or reduce saliva, dulling flavor perception

## **Age:**

taste and smell sensitivity often decline with age, reducing flavor intensity

## **Pregnancy:**

hormonal changes can heighten or distort taste and smell

## **Injury:**

damage to the mouth, nose, or nerves can interfere with flavor detection

## **Illness:**

conditions like colds or infections can block smell and alter taste

# Seeing Flavor



Bright colors indicate  
freshness/proper  
doneness



Steaming foods  
imply hot foods



Juicy looking foods  
hint at succulence

# Hearing Flavor

- The sounds a food makes influences the perception of its flavor
- Think of:
  - A sizzling platter of fajitas
  - The fizzle of champagne
  - Crunching potato chips
  - Biting a crisp apples



# Smelling Flavor

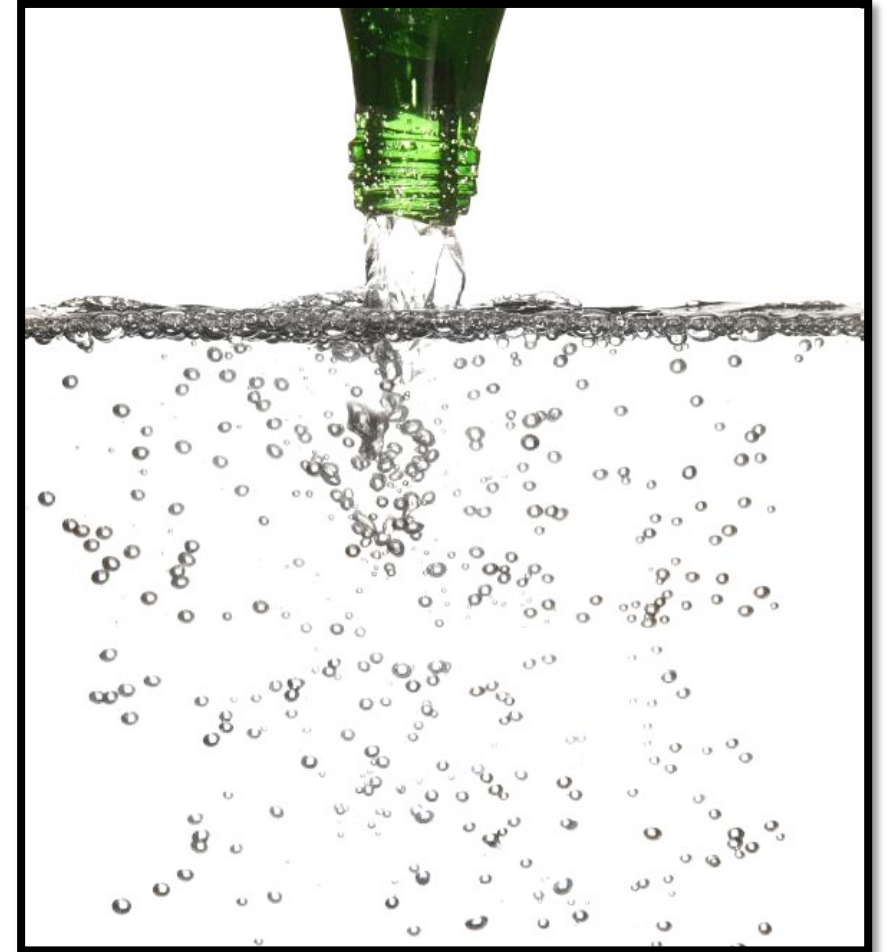
- **Very** important role in flavor
  - Accounts for 80% of what we perceive as flavor
- Often your first impression of food
- Hundreds of aromas recognized
- Often aromas stimulate memories
- Loss of sense of smell limits flavor depth



# Feeling Flavor

Flavor can be felt in a variety of different ways:

- Fingers or utensils: resistance, slipperiness, crunch
- Tongue and mouth: teeth, interior surface, lips
- “Spicy/hot” pain: from exposed nerve endings via Trigeminal nerve
- Other sensations: carbonation, “coolth”



# Temperature and Flavor

- Optimal tasting temperatures: between 72°F and 105°F
- We lose our ability to taste below 32°F and above 170°F
- Tastes such as sweetness, bitterness and umami are more intensely perceived at lukewarm temperatures
- Saltiness is more pronounced at colder temperatures



# Perception and Presentation

Presentation shapes what we expect to eat:

- **Color & contrast:** bright sauces and vibrant garnishes suggest freshness and intensity
- **Plating style:** clean lines and balance signal care and quality
- **Texture cues:** glossy, crisp, or smooth elements hint at mouthfeel
- **Aromatics:** visual hints like herbs or flowers suggest complex flavors
- **Emotion:** presentation evokes season, culture, or luxury



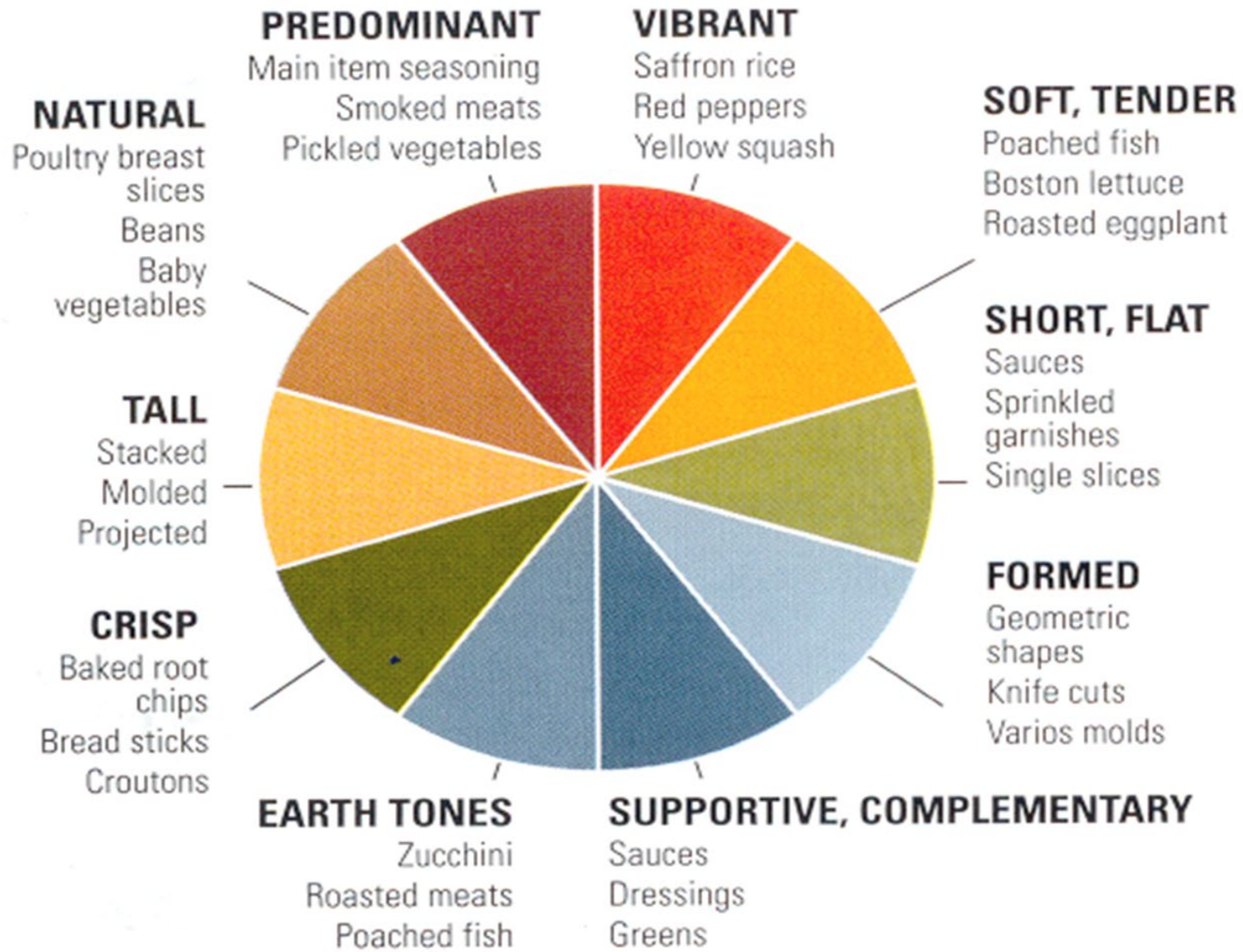
# Sensory Fatigue

- Too much information results in reduced sensitivity
- How to avoid:
  - Contrast and balances
  - Keep your food varied
  - Keep it interesting



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

--Harold McGee, On Food and Cooking



# Global Flavor Profiles

<b>Country</b>	<b>Flavor Profile</b>
Greece	Lemon + parsley; lemon + oregano
Southern Italy	Olive oil + tomato + garlic; mixed herbs
Spain	Saffron
Southern France	Mixed herbs
France	Wine + herb Wine vinegar Garlic
Middle East/Balkans	Cinnamon and/or lemon
Mexico	Lime + chile + cilantro + cumin + chocolate
China	Soy sauce + ginger + garlic + scallion
Vietnam	Nuoc Mam + lime + chile + cilantro/mint/basil + (salad)
Thailand	Nam Pla/shrimp paste + ginger/galangal + cilantro + chile + Makrut lime + coconut

# Food for Thought

When the meal you have ordered (or the dish you have made) misses the mark, is it a case of...

- Good concept, deficient cooking?
- Good concept, good cooking technique, but bad ingredients?
- Good concept, good cooking technique, good ingredients, but the seasonings miss the mark?
- Fabulous ingredients, great cooking, but bad concept?



# Cooking is Eating with the Senses

Remember to consider all five senses when you cook...

- **Hearing:** listen for sizzling, boiling, or crunching
- **Seeing:** notice color, shape, and presentation
- **Touching:** feel texture, doneness, or temperature
- **Smelling:** detect aroma and freshness
- **Tasting:** balance flavors and seasoning



# Market Basket Project Guidelines

## On day five of this course, you will:

- Create a two-course menu using available kitchen ingredients that reflects the course's taught tastes and techniques.
- Teams have 3 hours to prep and plate.
- Menu must include:
  - **1st Course:** hot or cold soup, salad, or appetizer
  - **Main Course:** Must include a featured component, starch, vegetable, and sauce
- Yield 6 portions total: 1 show plate + 5 on platters



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Any Questions?