

SENSORY METHODOLOGICAL DEVELOPMENTS & INDUSTRY PARTNERING

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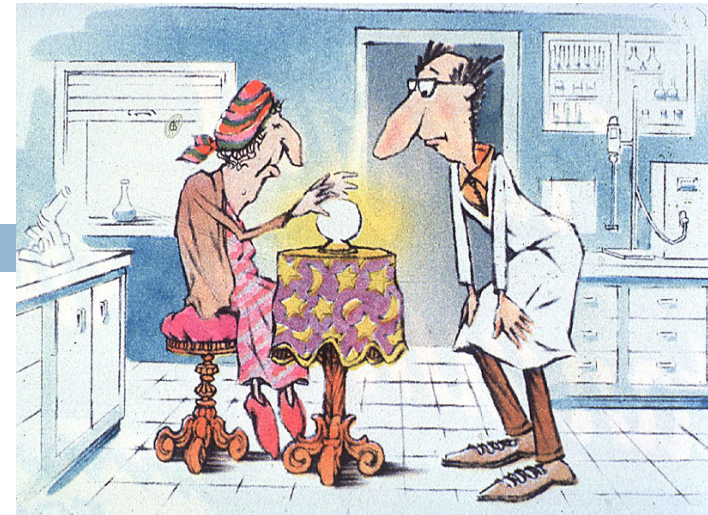
Society of Sensory Professionals
Transforming Science to Strategy
Napa, October 27-29, 2010

Doing Great?



- Scientific discipline or combination thereof
- Central role in R&D and Marketing
- Integral part of university curricula
- Strong cadre of sensory service providers
- Fast-growing professional associations & well-attended professional meetings
- Established journals and publications

Paradigm Shift



Sensory → Consumer

Product sensory properties

Consumer behavior

A Model for the Study of Consumption Behavior

Product Variables

- Sensory properties
- Functionalities
- Marketing mix
- Brand equity

Guinard, 2008

Consumer Variables

- Demographics
- Psychographics
- Physiology & Genetics

Culture

Context Variables

- Physical context
- Convenience/effort
- Societal pressures

Consumption Behavior

- Likes & dislikes, preferences
- Choice
- Purchase/Repeat purchase
- Consumption
- Pleasure/Satiety

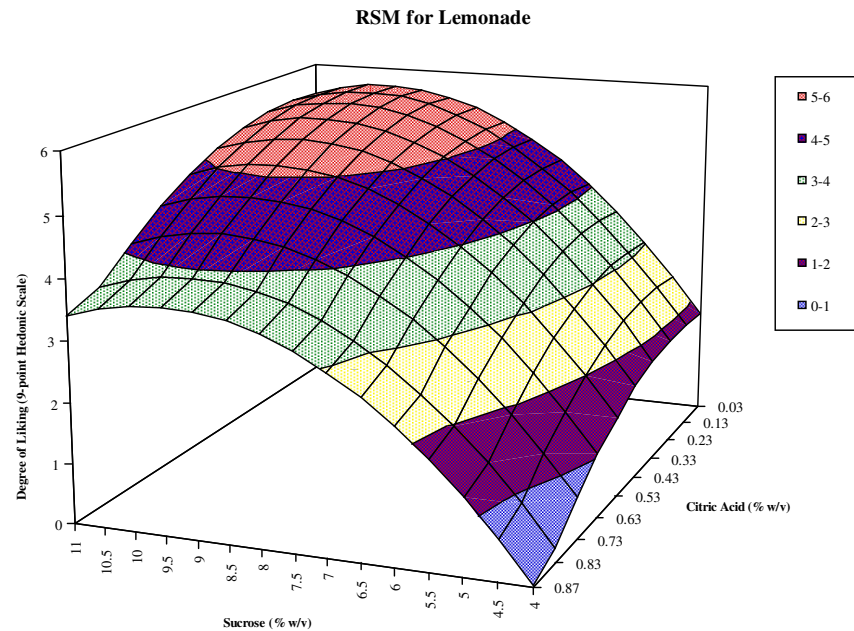
Multivariate
Trends, not cause-effect
Quantitative &
qualitative
Dynamic

Sensory Methodological Developments

- Discrimination testing
- Descriptive analysis
- Consumer testir

□ Sensometrics

□ Marketing



Discrimination Testing



No preference
option

Similarity
testing,
Type I & II
Errors and
power

Descriptive Analysis



Sorting
Napping
Sorted
napping

CATA
(Check-All-
That-Apply)

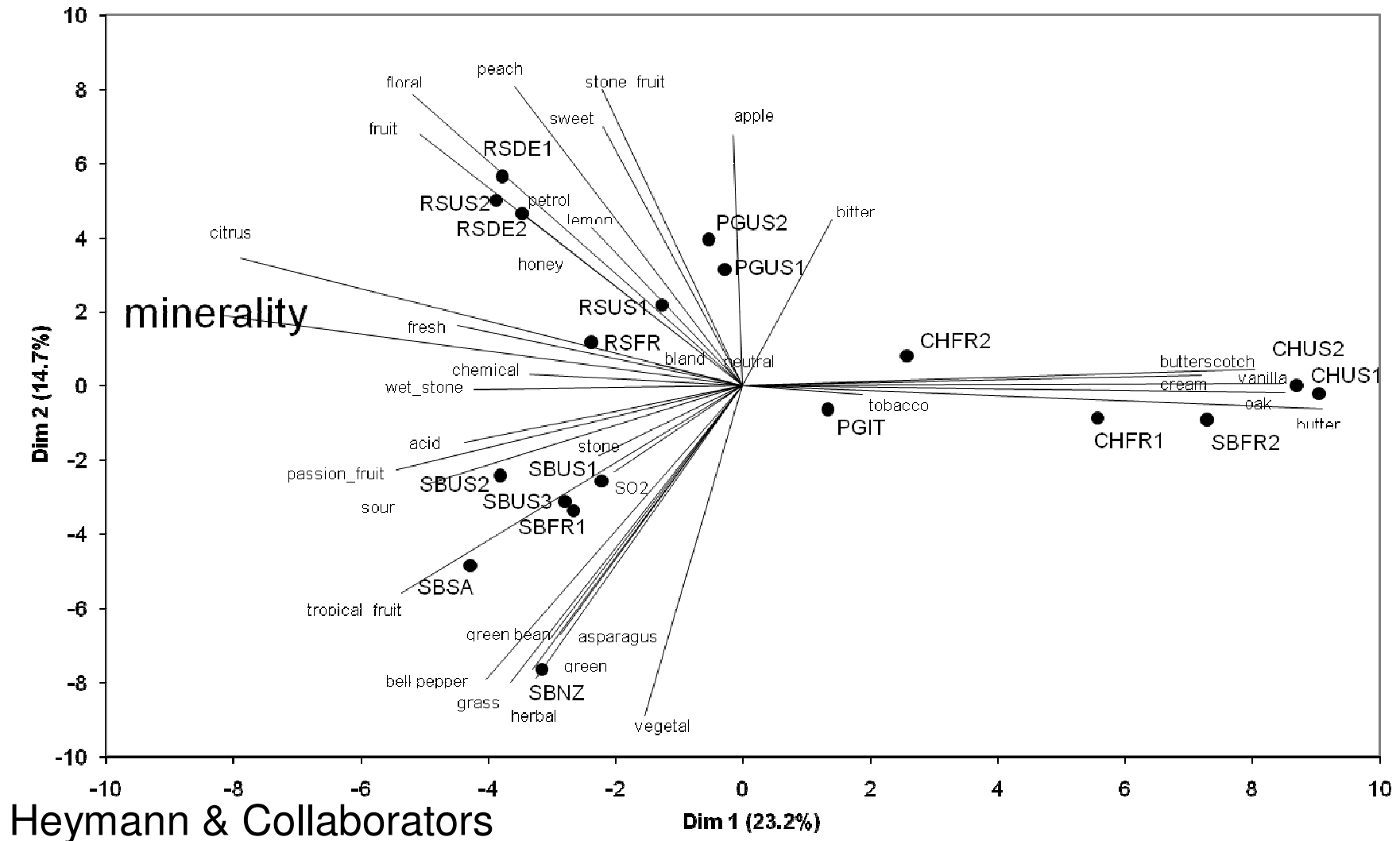
Fast(er)
methods

Napping Minerality in White Wines



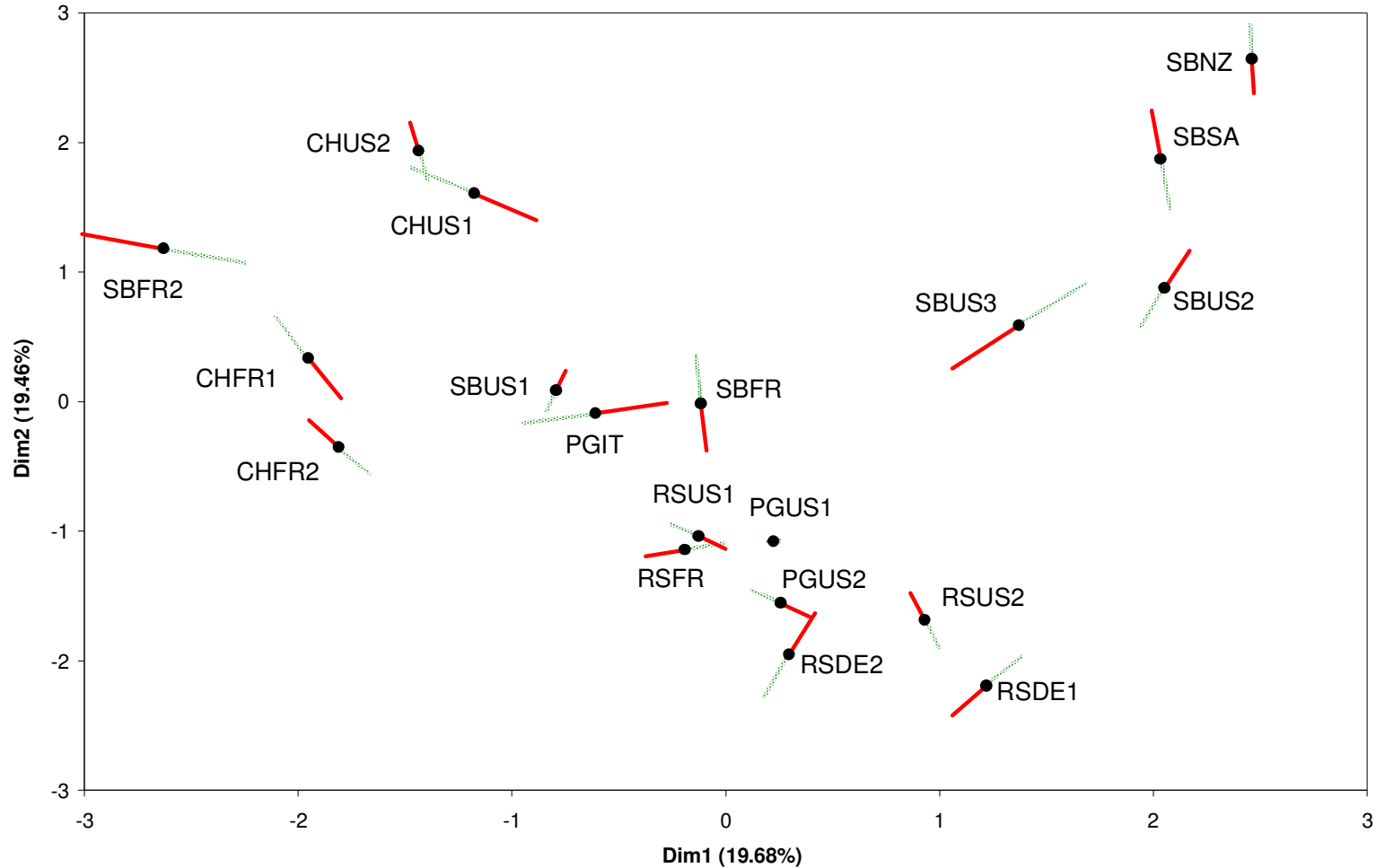
Heymann & Collaborators

MFA: Nappe Consensus Map



Heymann & Collaborators

MFA: Nappe and DA comparison



Projective Mapping Panel MFA Descriptive Analysis CVA

Consumer Research

Internet
YouTube
Skype, iChat
Social
networks

Intangibles:
Emotions
Values

Context

Psychographi
cs

Advances in
'...omics'

Consumer Research

Ethnography

Holistic
approaches

Conjoint
analysis

Combining
qualitative &
quantitative

Multivariate
statistics

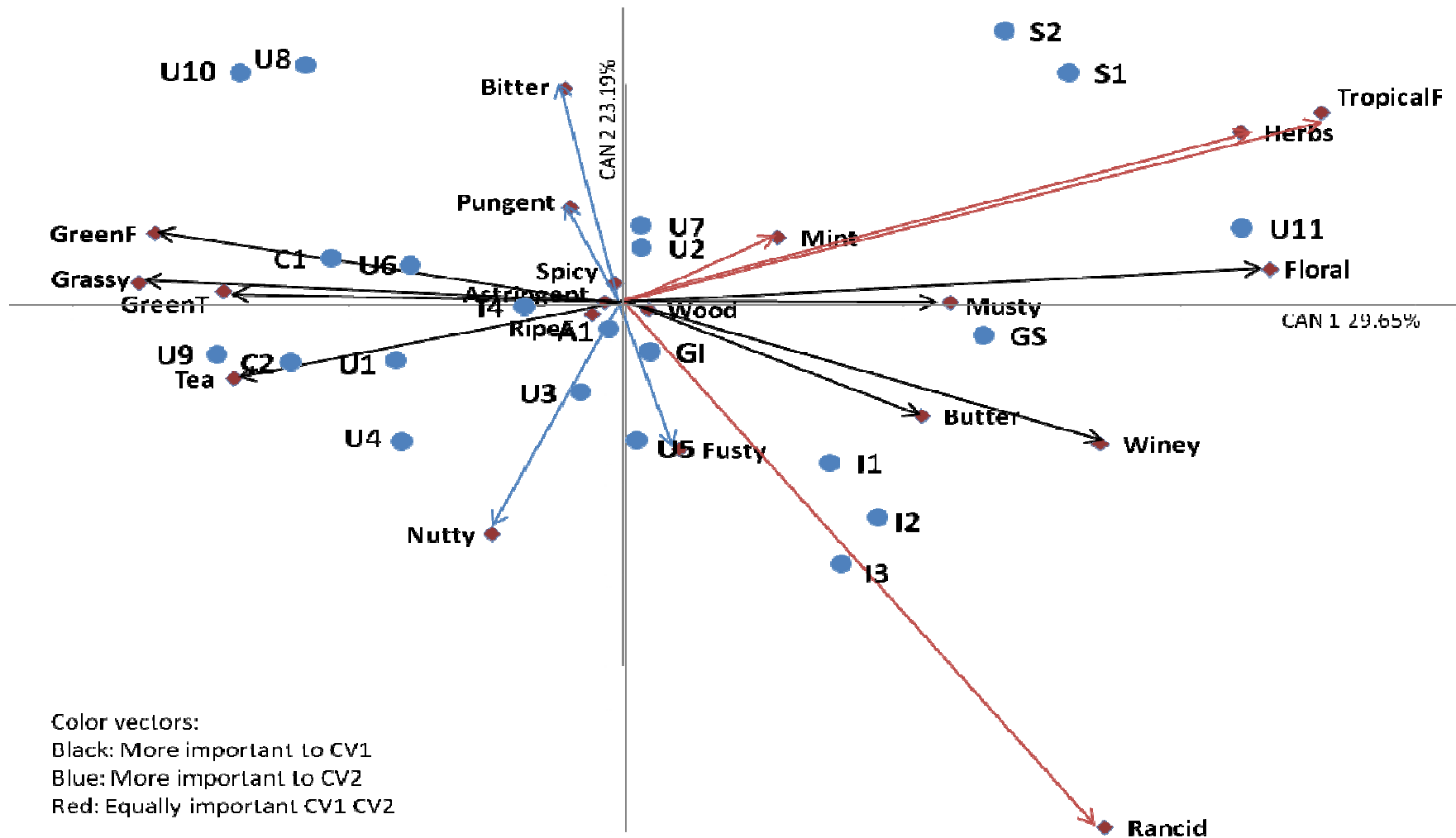
Segmentation
n

Olive Oil Research at UC Davis



- Sensory properties and consumer acceptance of extra-virgin olive oil (Delgado, 2010)
 - ▣ Descriptive analysis
 - ▣ Consumer hedonic ratings
 - ▣ Expert quality ratings
- Consumer perceptions of olive oil (Santosa, 2010)
 - ▣ Focus groups
 - ▣ Means end chains analysis
 - ▣ Sorting
 - ▣ Survey research

Extra Virgin Olive Oils – The Products (CVA)



The Consumers – Focus Group Insights

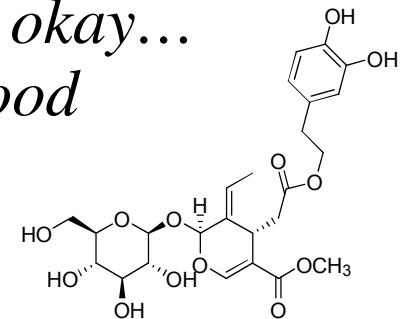
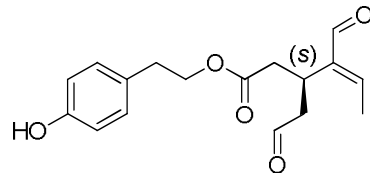
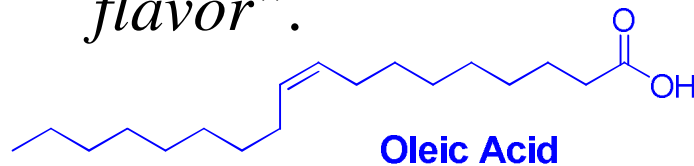
Most (US) consumers do not know what ‘extra virgin’ means.

- *“I just always heard that cold press is absolutely something you have to have in oil. And I guess... is there another press that is hot press? Hahaha... So I guess I don’t know anything...”*
- *“I feel I don’t know anything about it. [...] Initial perception was the better kind, but then, it morphed into... it’s the kinds of less flavor, the less intense flavor. And I really don’t know”.*
- *“I guess in my mind extra virgin didn’t necessarily mean cold press, that it could be extra virgin and not necessarily cold press. [...] I have no idea.”*
- *“I just thought it had stronger taste. I don’t think less processed, but stronger taste.”*
- *“I know I read an article about it a couple years ago. I have an impression that extra virgin is what I should get.”*

The Consumers – Focus Group Insights

(US) consumers know that olive oil has **health benefits** but they are usually unaware of the specifics.

- *“You have to have some fats in your diets. And you want to be careful about which ones those are. And that’s the nutritious one to have. So it tastes good and you need it. Your body needs it and it’s a good one for you”.*
- *“Olive oil ... actually was healthier than those oils. And actually had flavor and was interesting to cook with. So I remember thinking, oh... feeling relieved, like, oh okay... here’s a fat that actually is healthy and it has a good flavor”.*

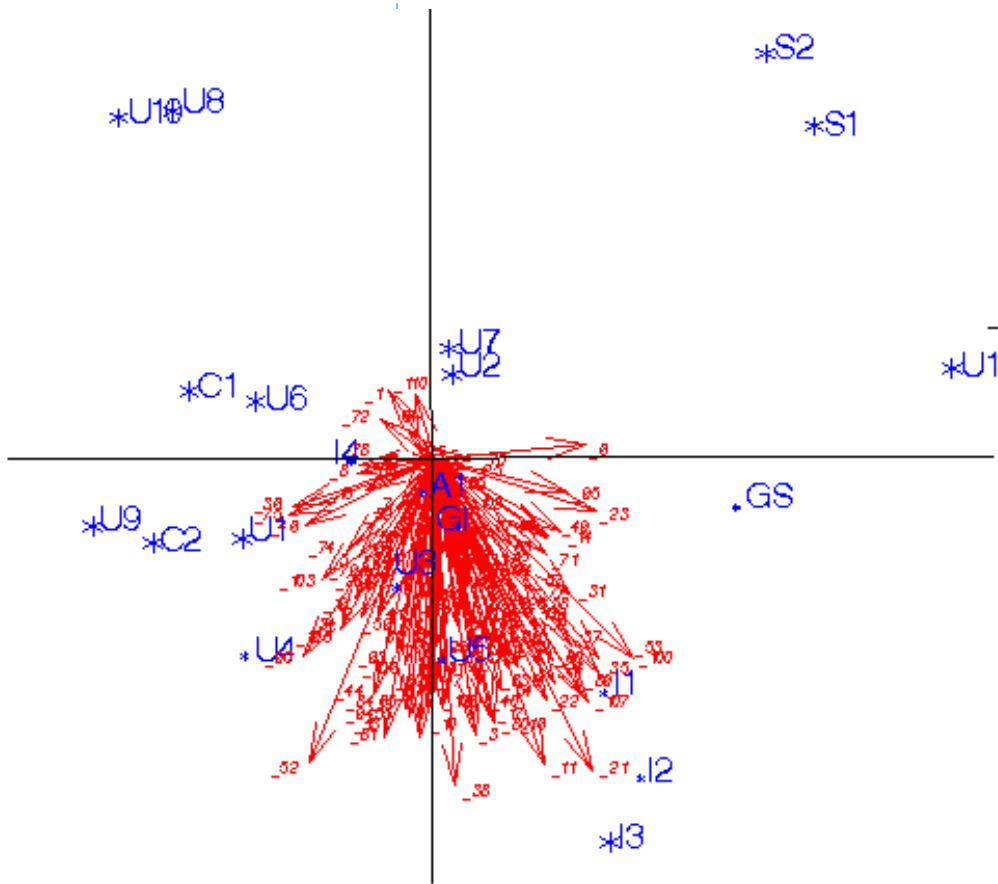


The Consumers – Focus Group Insights

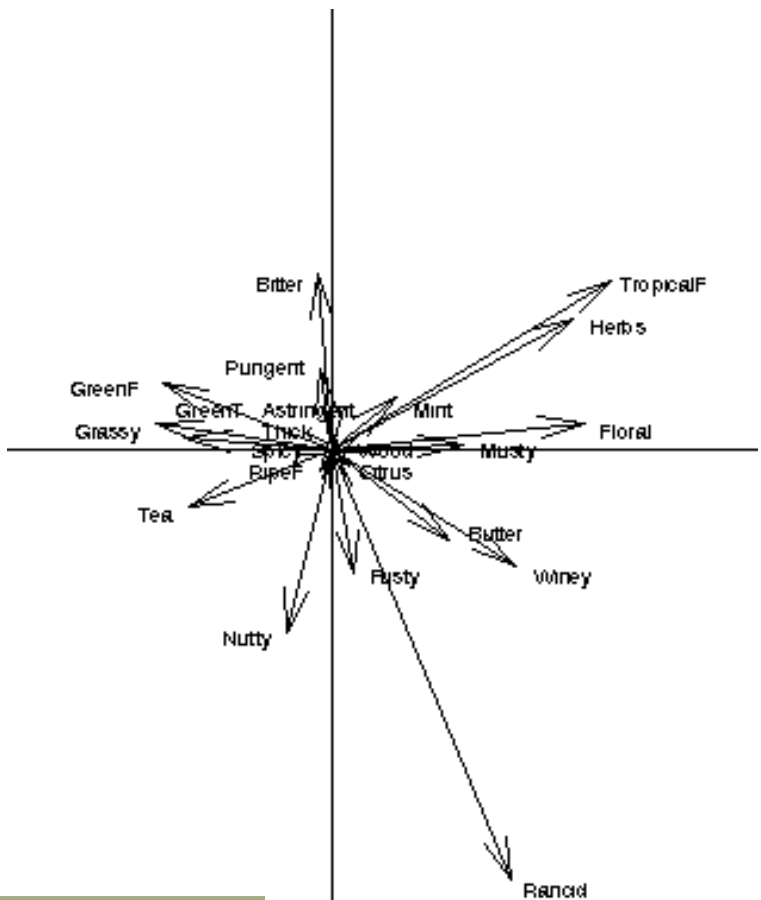
- (US) consumers have a limited vocabulary to describe the sensory properties of olive oil
 - ▣ Across all four groups, consumers were able to come up with a higher number of descriptors of negative attributes than of positive ones.
 - ▣ Consumers came up with some specific terms (e.g., ‘rancid’ or ‘oxidized’) as well as some ambiguous ones (e.g., ‘smelled good’, ‘pleasant taste’, ‘smooth’, ‘delicious’, ‘very nice’ and ‘smooth’).
 - ▣ ‘Fruitiness’ was the only positive attribute to appear in all four groups.
 - ▣ The specific olive oil attributes that most participants viewed negatively were ‘bitter aftertaste’, ‘hotness’, and the burning sensation consumers perceived after tasting the oil...

Consumer preference map (left) and descriptive panel sensory map (right)

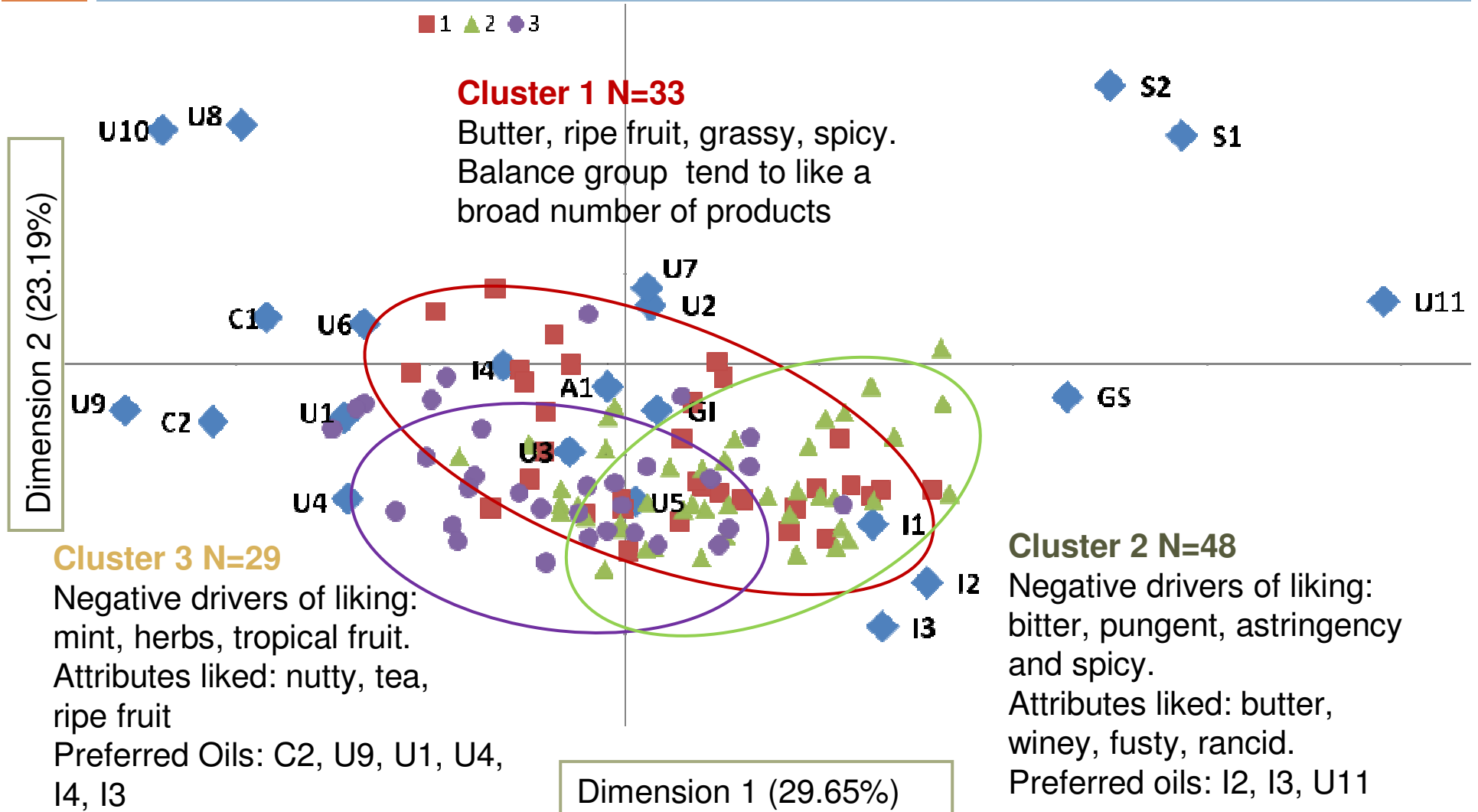
Dimension 2 (23.19%)



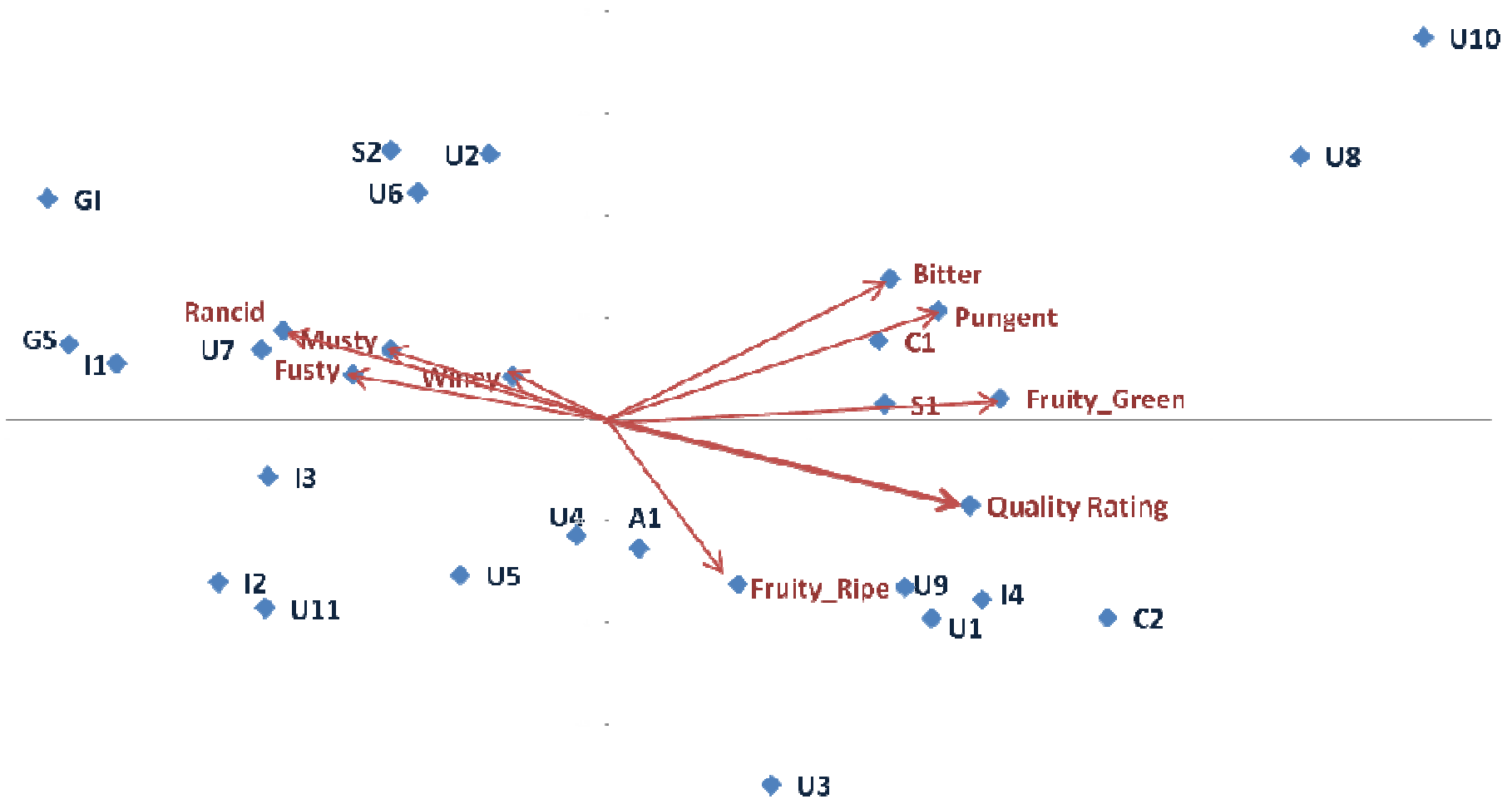
Dimension 1 (29.65%)



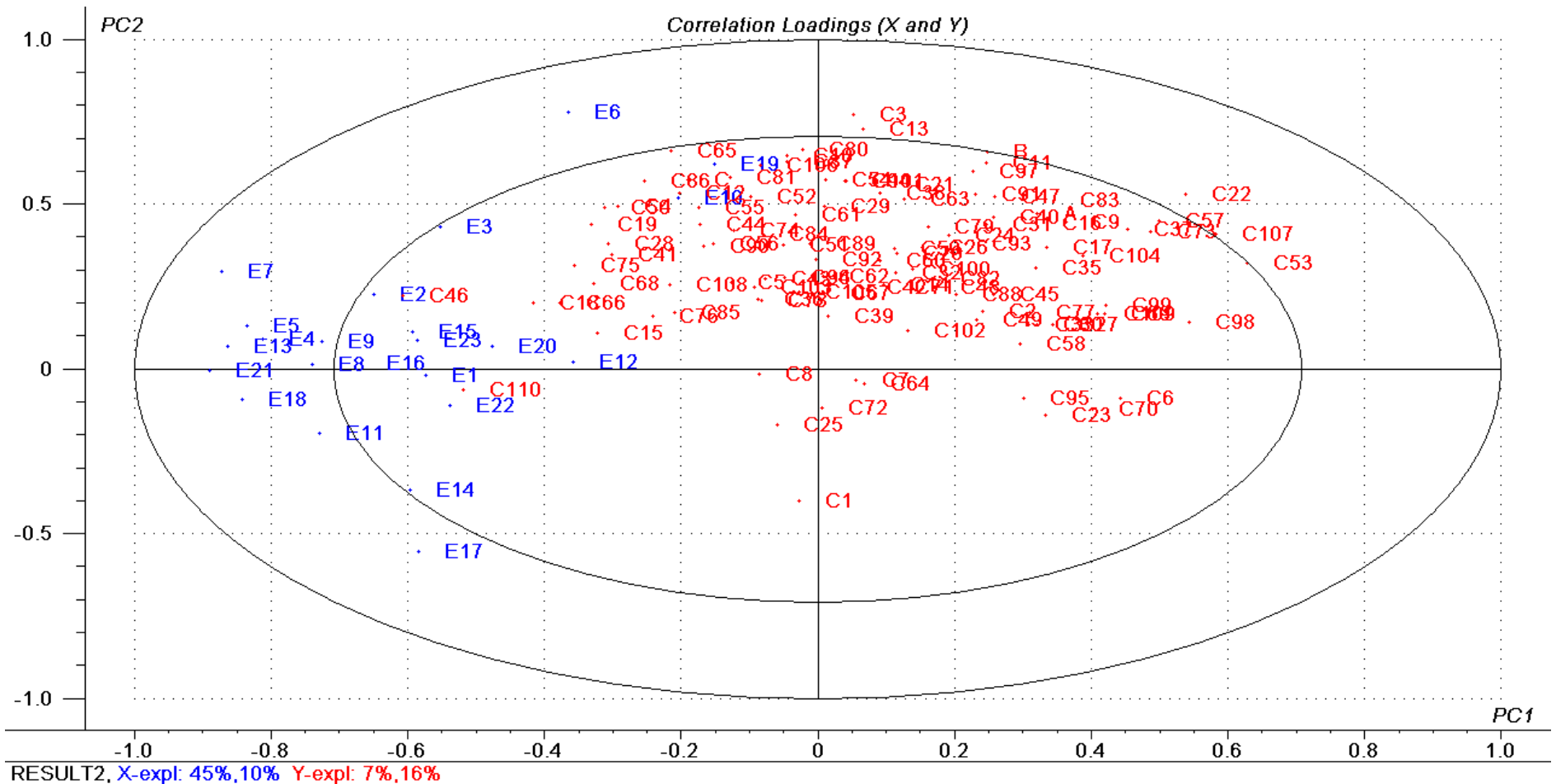
Three preference clusters emerged



The Experts – Quality Ratings vs. Sensory Attributes



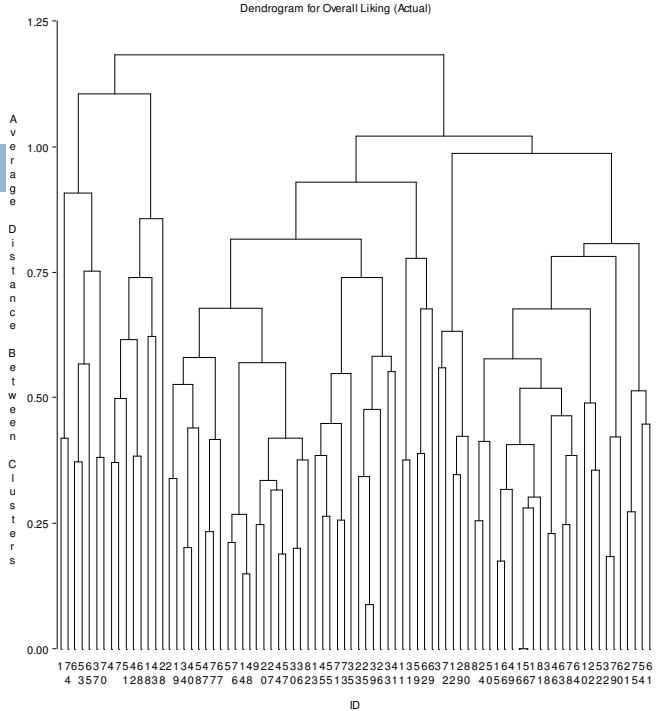
Expert Quality Ratings vs. Consumer hedonic ratings



Sensometrics

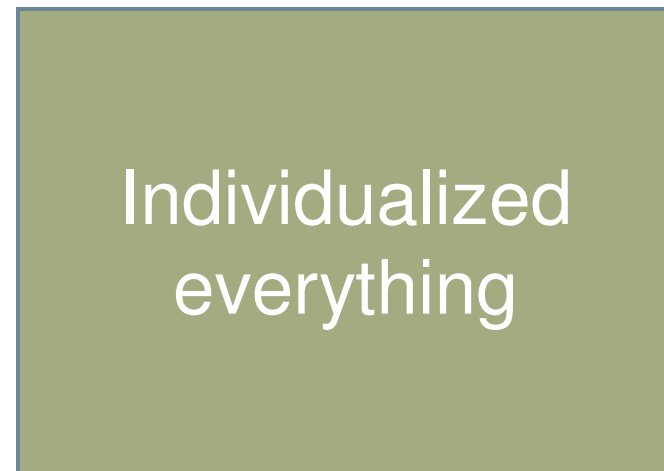
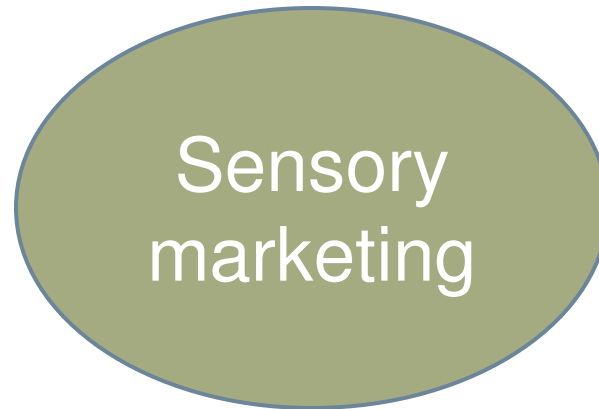
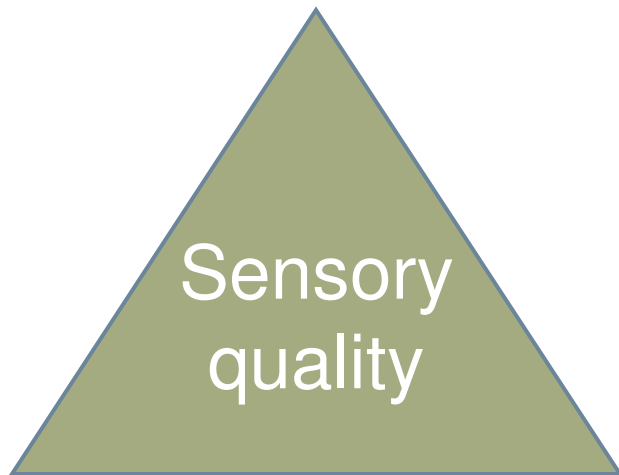


(Hierarchical)
Multifactor
Analysis



DISTATIS

Marketing



How Does Academia Serve the Needs of Consumer Product Industries?



- Educating students – undergraduate, graduate and lifelong learners
- Conducting fundamental and translational research
- Implementing technology transfer
- Resource to government agencies
- State-of-the-art programs and facilities
- Strategic partnerships with companies

You build from a strong foundation and you adapt to market dynamics

- Foundation and tradition of academic excellence
 - ▣ Sensory science and consumer research at UC Davis – pioneering work of Rose Marie Pangborn, Maynard Amerine, Edward Roessler, Ann Noble and Howard Schutz
 - ▣ Critical mass of faculty and programs
 - ▣ Comprehensive research university context
- Multidisciplinary approach
- Land Grant mission
- Local and global bridges with other academic institutions, government agencies and Industry

Applied Sensory Science and Consumer Testing Certificate Program

- Distance learning certificate
- Launched in 2002; over 250 alumni
- Weekly lessons, assignments, quizzes
- Interactive forum
- Year long; 4 modules
 - ▣ Foundations of Sensory Science
 - ▣ Sensory Evaluation Methods
 - ▣ Consumer Testing Methods
 - ▣ Applications of Sensory Science and Consumer Testing Principles



http://extension.ucdavis.edu/unit/agriculture_and_food_science/certificate/applied_sensory_science_and_consumer_testing/

Multidisciplinary Approach to Research

□ UC Davis Foods for Health Institute



Objectives

The objectives of the FFHI are to guide multidisciplinary research programs drawing on the complementary strengths of the University of California, Davis and its partners to: (1) develop assessment technologies that accurately measure health; (2) discover the molecular targets of health that are modifiable by food and lifestyle; and (3) translate the discoveries at the molecular level to personalized food and lifestyle solutions.

Collaborations with USDA and CIA

- USDA funded research
- Joint research with USDA Laboratories
- Training of USDA inspectors



- Joint *World of Flavors* workshops
- Joint sensory and consumer research
- Joint outreach

Wine, Beer and now Olive Oil

- UC Davis has had a unique impact on the American wine and beer industries; those industries have given back and invested in UC Davis' future
- Robert Mondavi Institute for Wine and Food Science
 - ▣ Wine and beer industry endowed chairs and professorships
 - ▣ First LEED Platinum winery, brewery and food processing facility – 100% private funds



RMI
UCDAVIS

Robert Mondavi Institute for Wine and Food Science

Certification



at the Robert Mondavi Institute

The UC Davis Olive Oil Taste Panel



Certification of extra virgin olive oils following International Olive Council regulations and protocols

The UC Davis Olive Oil Taste Panel

- Serves three purposes
 - ▣ IOC certification
 - ▣ Full descriptive profile to producers
 - ▣ Research tool
- Scorecard components
 - ▣ IOC attributes – 10-cm scale
 - ▣ Full descriptive profile (44 attributes) – 0-10 numerical scale
 - ▣ Integrative attributes
 - ▣ Comments



UC Davis Olive Oil Taste Panel Scorecard – IOC Attributes

Intensity of perception of defects:

Fusty/muddy sediment	_____
Musty-humid-earthly	_____
Winey-vinegary-acid-sour	_____
Metallic	_____
Rancid	_____
Others (specify)	_____

Intensity of perception of positive attributes:

Fruity	_____
Ripe fruit	_____
Green fruit	_____
Bitter	_____
Pungent	_____

10-cm scale

UC Davis Olive Oil Taste Panel Scorecard Full Descriptive Profile, 0-10 scale

Ripe fruit

Ripe olive

Ripe banana

Ripe apple

Floral

Nutty

Buttery

Avocado

Tropical-pineapple

Apricot/peach

Green fruit

Green grass/freshly cut grass

Green apple

Green banana

Green olive

Tomato leaf

Artichoke

Green tea

Herbaceous/stemmy

Minty/eucalyptus

Pine

(Fresh) green vegetables

Bitter greens/nettle Green almond

Others

Citrus

Peppery (black pepper)

Spicy

Hay/straw

Woody/olive pit

Black walnut

Mineral oil

Burnt

Cucumber

Paint/solvent/petroleum/machine oil

Candle wax/paraffin/play dough

Cardboard

Wet wood

Canned/brined olives

UC Davis Olive Oil Taste Panel Scorecard Full Descriptive Profile, 0-10 scale

Taste

Sweetness
(bitterness)

Sourness/acidity

Aftertaste/taste persistence

Mouthfeel

Viscosity/thickness

Astringent

Greasy

Waxy

Persistence/oil residual/mouthcoating

Integrative measures

Total aroma intensity

Total flavor intensity

Balance

Complexity

Freshness

Circle one:

Mild

Medium

Robust

Comments:

Strategic Partnerships



- UC Davis
 - Mars
 - Agilent Technologies
 - Chevron

Action Items



- Visit campuses; meet with faculty, students and administrators
- Take advantage of professional development opportunities at universities
- Participate in university advisory boards
- Provide internships for undergraduate students; open your laboratories for graduate students to conduct research
- Participate in thesis and dissertation committees
- Keep track of the technical literature in your field(s) and beyond

Action Items



- Hire faculty as consultants, board members, researchers
- Teach in university programs – undergraduate, graduate, lifelong learning
- Conduct joint research
- Be active in your alumni associations
- Monitor university patents and startups
- Engage your company in strategic partnerships with universities