Sensory Workshop–How to Get to the Next Level

Brewing Summit 2014

Sensory Workshop Agenda

- Lindsay Guerdrum - Descriptive Analysis in a Production Setting

- Ian McLaughlin – Threshold Testing and the ASBC Flavor Calculator

- Teri Garvin – Raw Materials Testing

- Suzanne Thompson – Running a sensory program in a multi-facility/multi-beverage brewery

Before you take the next steps…

- Your panel must be:
  - Numerous – Need at least 10 panelists to generate meaningful data.
  - Experienced and confident – Panelists need to be familiar with the brand and comfortable describing products.
  - Trained and validated – Attribute recognition must come before attribute scaling.
  - Supported
- You must…
  - …understand why you are using DA, how you will analyze the data, and what you want to gain from this work.

Tests

- Discrimination – Is the product true to brand?

- Difference – Are the products different?

- Descriptive Analysis – How do products differ?

The test method must match the objective

What is Descriptive Analysis

- Descriptive Analysis…
  - Is not appropriate for production release
  - Utilizes quantitative data to allow the researcher to describe and simplify large multivariate data sets.
  - Allows the structure and interrelationships of variables to be revealed by condensing large sets of data.
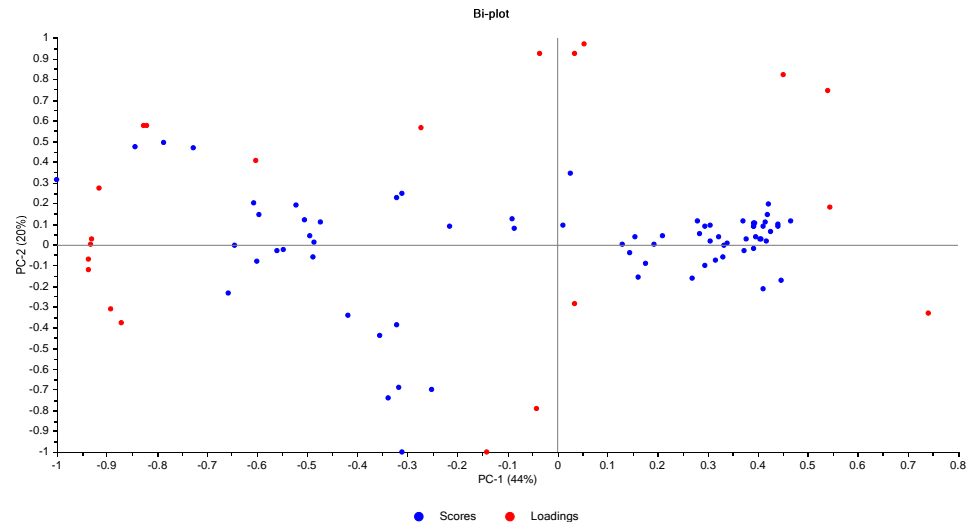
Descriptive Analysis

Answers the question: what is the nature and degree of difference? How do products differ?

Appropriate for:
- Brand Fingerprinting
- Shelf life determination
- Product mapping/modeling
- Raw material evaluation
- Test validation
- Sensory and Analytical Correlation

Some Applications
- Principal Component Analysis
- Partial Least Squares Regression
- Cluster Analysis

Descriptive Analysis

- Training
  - Attribute development and reference standardization
  - Scale development and standardization
- Validating
  - Find outliers - Sensitivity, repeatability and reproducibility
- Utilizing
  - Attribute scaling
  - Data visualization and interpretation

Training

- Language Development – Develop and standardize terms

- Scale Development – Frame of reference for intensities

- Achieve panel consensus on the scale and definitions of terms

- Continue training at a regular intervals

Vocabulary Generation

- How to generate terms
  - Select samples that span the range of concern
  - Brain dump
- As the panel leader you must…
  - …act only as the facilitator
  - …direct the discussion
  - …supply reference materials
  - …insure terms are singular and orthogonal
  - …revisit and retrain on each attribute

Language Development

| Attribute	Definition	Reference
Geraniol	Aroma reminiscent of the sweet, heavy smell of floral, like roses, or citronella? Or pine sol?	Geraniol
Green Tea	Grassy green aroma like wheatgrass juice, with faint citrus. Herbal and lightly woody.	Moistened green tea leaves
Grass	Fresh, juicy smell like fresh-cut grass or torn green leaf volatiles; herbaceous, chlorophyll	Cut grass, grassy standard
Grapefruit Peel	Zesty citrus with a pithy, bitter smell	Grapefruit peel
Linalool	Light floral, like lavender, and a more sweet fruitiness, like Froot Loops, citronella?	Linalool
Myrcene	Hop aroma associated with herbaceous, resinous, woody, spicy, and piney.	Myrcene

Scale Development

Anchor by giving intensity scale of reference

Attribute: Linalool

Reference: Beer with the addition of linalool

Position:

150ppb   600ppb   3000ppb
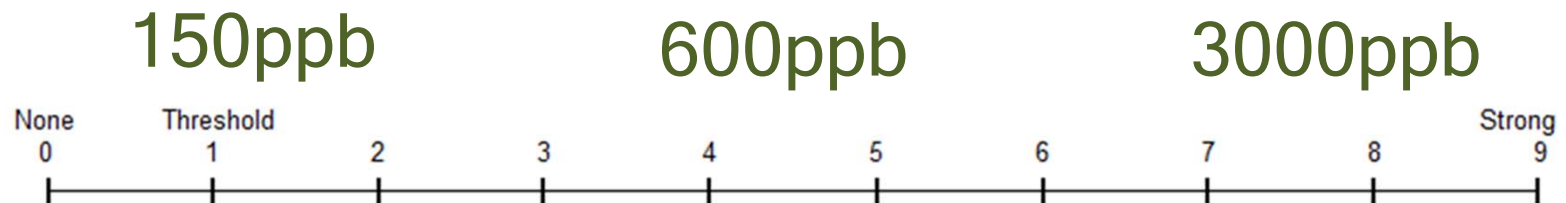
Panelist Validation

Your descriptive analysis panelists must…

- …be sensitive – have the ability to identify differences between products

- …be repeatable – have the ability to score repeats identically

- …be reproducible – have agreement with the rest of the panel

Data is meaningless if not validated.

Sources of Variation

Have confidence what you are measuring is not due to panelist variation.

| Variation Source	Definition	Caution
Sensitivity	The panelists ability to distinguish between two different products	The products must be different
Repeatability	The panelist's ability to give identical assessments for a given single product	Account for sources of laboratory variation
Agreement	The individual panelist's ability to agree with the panel	Make sure the panelists understand the scale

Validation - Outlier Detection

- Be Practical and Realistic
  - Look at your panel as a whole to determine what it means to be validated.
  - Understand the risk and draw a line in the sand
- Give feedback and retrain on attributes
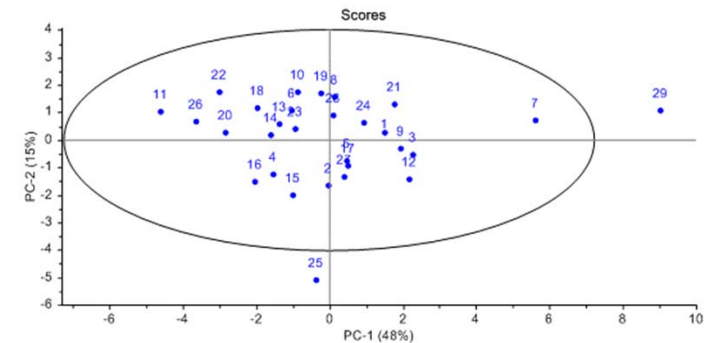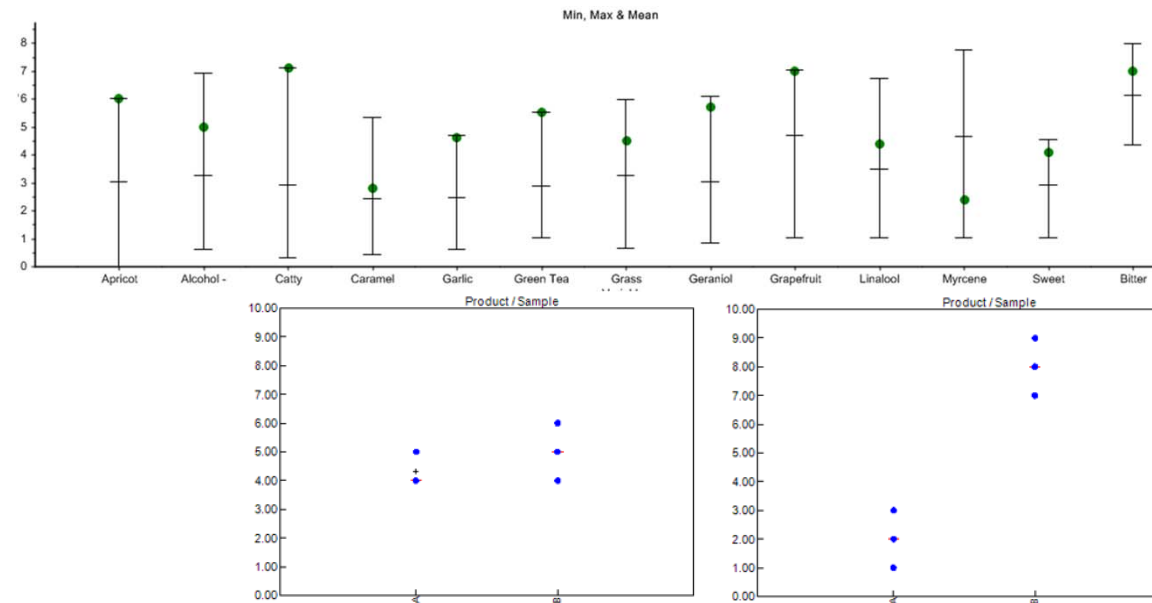
Data Visualization

- Line graphs can be used to screen for outliers.

- Histograms allow you to understand if your data is normally distributed.

- Correlation plots allow you to see redundant attributes and visualize patterns.
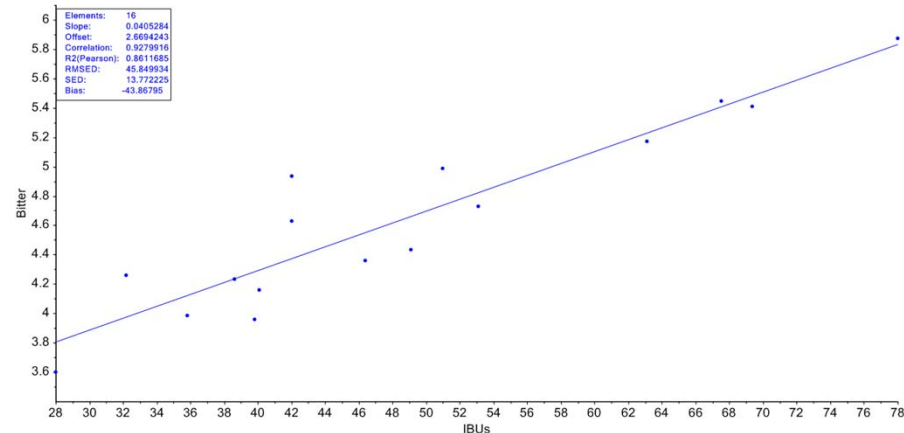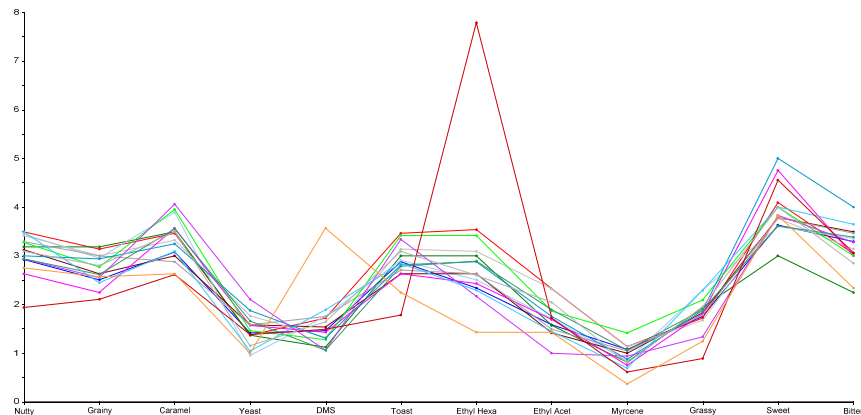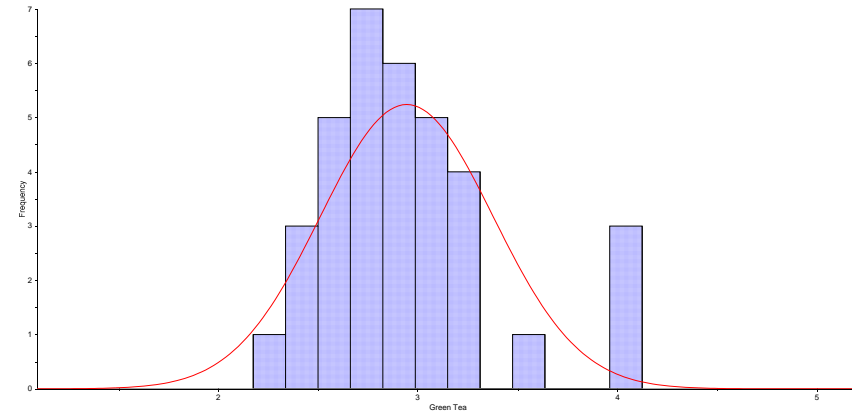
Shelf Life Application Example

- There is not one number that can tell you everything about the shelf life cut off.
  - After analytically picking apart a beer it is difficult and confusing to then synthesize an overall score.

- Answer the question: how aged is too aged?
  - This is a tough question that can best be answered quantitatively with multivariate descriptive analysis data
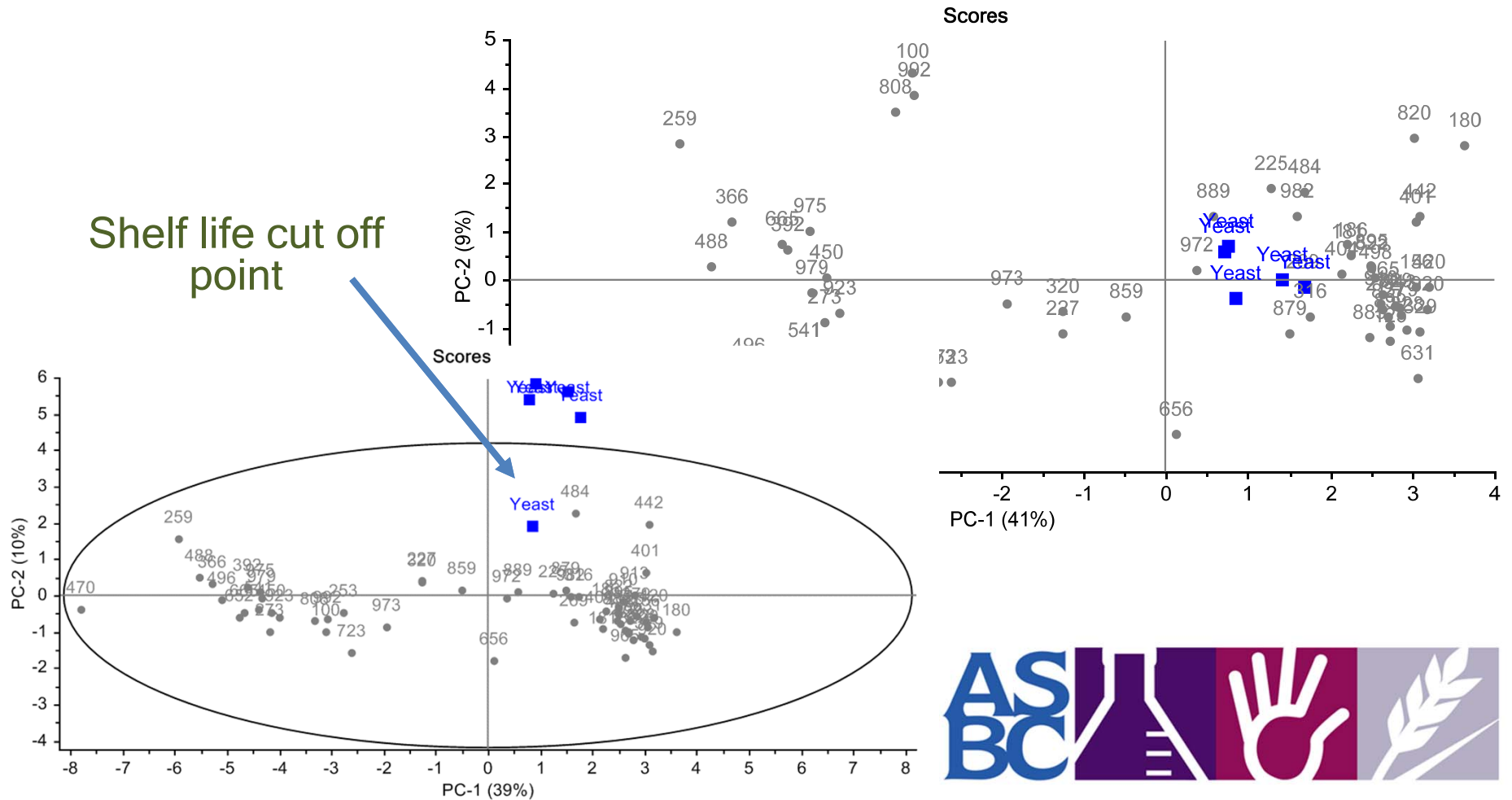 - A difference test will not answer this question.

Shelf Life Example

Shelf life model without yeast-conditioned samples

Some time within this region samples become very autolysed

Shelf Life Example

With autolysed down-weighted the yeast-conditioned samples get pulled back in to the model

Shelf life cut off point

Summary

If the researcher uses experienced, trained and validated panelists, continually trains and thoughtfully analyzes data, descriptive analysis can be a useful tool to model and visualize multivariate data in a meaningful way.

Thank you for your attention