

# Exploring Sensory Brand Identity for Retail Coffees

## Abstract

Sensory benchmarking was conducted using 40 unflavored, U.S. retail coffees representing ground, whole bean, and instant coffees from the top 10 leading brands of each category. The coffees covered a range in degree-of-roast—light to dark and included both caffeinated and decaffeinated varieties. Principal Component Analysis was applied to the data as well as linear Discriminant Analysis to determine whether the sensory attribute ratings could be used to correctly identify the specific brand and type of coffee and the presence or absence of unique brand profiles.

## Introduction

The connection between sensory characteristics and brands of retail coffees was explored. Brand identity, a company's competitive advantage and strategic asset, encompasses many factors—brand name, image, associations, personality, logo, symbols, colors, jingles, etc.—that portray the perception of the brand and what the brand stands for to the consumer. The sensory profile has a strong influence on how the brand is perceived and is often used to communicate the brand identity and position. Successful companies establish a sensory brand identity.

## Materials and Methods

**Sample Preparation.** The coffees were purchased at retail and prepared as follows:

- All ground and whole bean coffee samples were standardized using the same amount of coffee to water ratio in the same Bunn® pour-over machine.
- Whole bean coffees were ground using a spinning blade type grinder for a specified length of time.
- All instant coffee samples were standardized using the same coffee to water ratio.
- All coffees were made using Poland Spring® water.
- Coffees were presented in preheated cups.

**Protocol.** The coffees were evaluated by a trained panel in a controlled environment as follows:

- Profile Attribute Analysis (PAA), a quantitative descriptive analysis method, was used to evaluate the coffees using the scales defined below.
- Coffee samples were randomized and coded for blind evaluation by the panelists.
- Panelists tasted the same amount of each sample and evaluated the specified attributes at their appropriate temperatures, aroma between 150°–160°F, and flavor between 140°–150°F.
- Panelists used spring water and unsalted crackers to rinse their mouths between samples and waited approximately 5 minutes between samples.

## Attribute Scales

Attributes are defined below:

**Color** is a measure of the visual gauge of a coffee's color intensity ranging from light to dark as perceived by the panelist.

**Cup Aroma** is a measure of the intensity of the aromatics present in the headspace of the cup using a scale of none to strong. Panelists describe the type of aromatics in their comments.

**Balance** is a measure of the blend of the product. It takes into account the basic tastes, aromatics, and mouthfeels. The scale ranges from unblended to blended.

**Fullness** measures the richness or body of flavor when tasting the product. The scale ranges from thin to full.

**Coffee Aromatics Intensity** is a measure of the strength and type of coffee-like flavor aromatics. Panelists score this none to strong and describe their notes which can include descriptions of coffee roast and mercaptans.

**Other Coffee Aromatics** is a measure of the strength and type of other coffee-related characteristics such as grainy, nutty, brothy (hydrolyzed vegetable protein) and burnt or green bean aromatics. The scale ranges from none to strong.

**Degree of Roast** is a measure of the perceived amount of roasting of the coffee character, from none to dark (espresso-like).

**Sweet Aromatics** measures sweet aromatics such as vanilla/vanillin, burnt sweet, and caramelized sweet. The scale ranges from none to strong.

**Sour Aromatics** measures sour aromatics such as vegetable-like, fermented, or fatty acid sour. The scale ranges from none to strong.

**Sweet** intensity is a measure of the level of sweet basic taste. The reference standards are sucrose solutions. The scale ranges from none to strong.

**Sour** measures the intensity of sour basic taste. The reference standards are citric acid solutions. The scale ranges from none to strong.

**Bitter** intensity is a measure of the level of bitter basic taste. The reference standards are caffeine solutions. The scale ranges from none to strong.

**Mouthfeel** is a measure of perceived amount of trigeminal effects such as astringency or tannins usually associated with coffee. The scale ranges from none to strong.

**Others** is a measure of basic tastes or aromatics (often off-flavors) that are not measured in any of the previous attributes. Panelists score this none to strong and describe their notes which can include Wet Ash Tray (WAT), woody, musty, Dirty Dishrag sour (DDR), and rubbery sulfide.

**Aftertaste** measures the intensity of the basic tastes, aromatics or mouthfeels still present in the mouth one minute after the last swallow. Panelists score this none to strong and describe the characteristics in their comments.

## Results and Discussion

The flavor attribute data were summarized into two flavor indices using Principal Component Analysis (PCA).

	Lower scores are...	Higher scores are...
<b>Index 1</b> "Coffee Identity"	Less degree of roast Less coffee aromatics Thinner Less bitter Less aftertaste Less cup aroma Less blended	More degree of roast More coffee aromatics Fuller More bitter More aftertaste More cup aroma More blended
<b>Index 2</b> "Other Characteristics"	More others/off-notes More other coffee aromatics (i.e. grain, nuts, burnt or green beans)	Less others/off-notes Less other coffee aromatics (i.e. grain, nuts, burnt or green beans)

The "Coffee Identity" index includes attributes that are closely associated with coffee, i.e., Degree of Roast, Coffee Aromatics, Fullness, Bitterness, and Aftertaste.

The "Other Characteristics" index includes off-notes and other coffee aromatics (such as grain, nuts and green or burnt beans)

Fig. 2. PCA Indices

The 33 retail coffees selected for this study show a wide range of flavor characteristics.

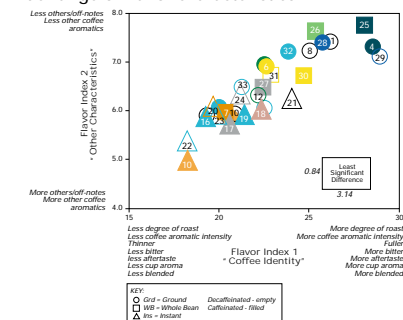


Fig. 3. PCA Flavor Map

Linear discriminant analysis shows the coffees may be correctly classified by brand membership using the sensory attributes.

- Brands are identified by color with individual products represented by form and caffeine level.
- The brand mean is represented by a diamond, color coded by degree of roast.
- The ellipses are centered at the brand mean and represent the average brand within product variation.
- Coffees demonstrating a strong sensory brand identity will fall within the brand ellipse.

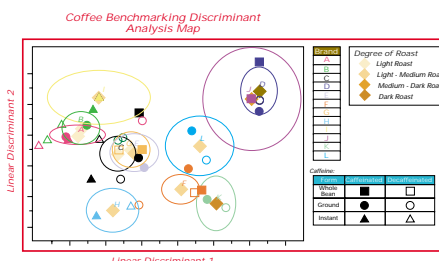


Fig. 4. Linear Discriminant Analysis Bi-plot

Results of the discriminant analysis shows:

- The sensory attributes found to be most important in predicting the coffee brand and type include cup aroma, coffee intensity and type, and sour aromatics.
- Evidence supports highly accurate brand classification based on the sensory data alone, though some misclassification for a few less discriminated brands exists.
- This confusion is most readily evident in the lighter roasted coffees which deliver less flavor intensity overall.

Attribute plots are useful for illustrating the similarity or differences in brand (or product) sensory profiles.

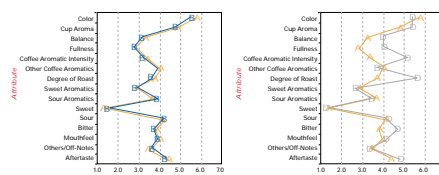


Fig. 5. Sensory Attribute Line Plots

Several key learnings from this study are summarized below:

- Locations within the map represent different sensory profiles and possibly different consumer taste segments.
- Cup aroma, coffee intensity and type, sour aromatics, balance, and bitterness are the sensory attributes most important in distinguishing and classifying brands.
- Consistency is key to ensuring sensory brand identity (illustrated by the relative size of ellipses).

- Five of the twelve brands showed similar sensory brand identity for their products, regardless of form or caffeine level.
- Remaining brands could improve sensory brand identity by delivering products that are more similar across different forms and caffeine levels.
- Some brands were notably less consistent than other brands; some products could be confused with neighboring brands.
- Decaffeination may change products enough to be noticeably different from the rest of the products within a brand.
- Brands that share a common sensory space, such as "light roast," probably compete in the marketplace for the same consumer taste segments; the consumer's perception of quality may be the final differentiator.
- Brands in a different sensory space, such as "dark roast," focus on a very different consumer segment.
- Manufacturers that produce more than one brand may intentionally design their brands to span different regions of the map, allowing them to reach consumer taste segments with targeted, well-defined sensory brand identities.
- The white space within the map suggests opportunities between light and dark roast coffees to establish additional products with a unique sensory profile.

## Conclusions

Sensory benchmarking using a trained panel with principal component and discriminant analyses can be used for guidance in selecting and maintaining a unique sensory brand identity in the marketplace.

## References

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