

# CUPPING REVISITED

A PRIMER FOR ADVANCED COFFEE TESTING

BY  
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CUPPING, SAMPLING, TRYING, testing, analyzing.

Whichever term you use, the process is generally the same. Coffee professionals and hobbyists seek to determine coffee quality and compare coffees in a process that is fun, exciting and somewhat easy to complete.

We visually inspect the coffee, smell it, sip, savor and spit—much like the sensory testing for tea, wine, beer or other beverages. Studying sensory science and learning how to determine flavor and aroma perceptions will help cuppers, quality controllers and product developers use basic sensory testing practices to enhance their operations.

*continued on page 22*





## THE SCIENCE OF CUPPING

Cupping is the purest way to evaluate coffee's basic attributes—fragrance, aroma, sweetness, acidity, body, aftertaste, uniformity and cleanliness—and to experience and appreciate the individuality of each coffee. The coffee is unadulterated and unfiltered to ease the identification of defects. Before making a purchasing decision, cupping is the best way to assess quality and determine each coffee's distinctive flavor and aroma profile. It can also be used as the first test for product development and quality control.

During the past generation, the coffee industry has grown considerably as hundreds of new roasters and roaster/retailers have opened for business. This is certainly an exciting time to be working in coffee, yet these new business owners, managers and employees are not always given the opportunity and time-honored tradition of learning coffee sensory testing in a controlled manner. Much of the time, the priority when operating a coffee business—while directed by quality—is efficiency, profitability and customer satisfaction, with sensory science and testing being an afterthought. However, we as an industry have a history of apprenticeship and learning from those more senior and experienced.

Cupper training at the side of our mentors and teachers is an efficient way to learn coffee evaluation and has served our industry well for decades. Recently, the coffee industry has embraced formal training for cupping and grading via coffee schools and trade conferences. Even so, learning by doing (or on-the-job training)—where cuppers design and judge their own training expertise—is often the norm. This individual process does not take advantage of calibrations with other cuppers and may produce unsatisfactory results.

With any training program, students must practice daily the ritual of evaluating flavor and aroma and comparing coffee quality if they choose to keep their sensory abilities as keen as possible. Cupper trainings tend to focus on identifying flavor and aroma attributes rather than studying the scientific principles of sensory testing. However, cuppers must also determine the best way to reach their desired conclusion about each coffee. Deciding which coffee test to use is essential. Testers must also keep strict control over the testing and data collection processes to ensure the most accurate results. Cuppers who learn about the various types of sensory

*continued on page 24*



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testing will work more efficiently and make faster, more accurate decisions about quality and purchasing.

Embracing the principles of the scientific method will help cuppers work more efficiently and effectively. The scientific method is a process used when conducting experiments. Food scientists, chemists, biologists and other professionals use this systematic approach to investigate,

test and collect data.

Think of each cupping as a mini-experiment. Only through the collection of data can a final decision be made on coffee quality—whether for commercial interests, product development or quality control.

## INDIVIDUAL PERSPECTIVE

Is your coffee cup half full or half empty? An optimistic or pessimistic personality will be the first guide, or stumbling block, to sensory testing. When you approach a new coffee, are you silently thinking, “Give me a reason to reject this coffee”? Having high standards is wonderful, and an important part of specialty coffee, but having the mindset to seek reasons for rejection is biased. On the other hand, do you think to yourself, “Give me a reason to accept this coffee”? This perspective is just as biased, as it will cloud your judgment for sensory testing.

When testing for quality, cuppers should be neutral in their opinions, striving to remove any personal bias, historical issues or prejudicial opinions for an origin, shipper, importer, region or varietal. Approach each coffee with an open mind, let the coffee test be true, and judge each coffee fairly, allowing the actual flavors and aroma to guide the evaluation.

## COMPONENTS OF A GOOD TEST

Many pitfalls can affect the outcome of a test. Cuppers need to understand all of the variable elements and control for them to ensure that the data collected is not compromised or inaccurate. Variable elements include anything that may change during a test, such as water temperature, coffee dose, fineness of coffee grind, coffee profile roast, air temperature of the testing room and lighting intensity. Once these elements are managed to be exactly the same for each test, they are no longer variable factors but controlled items.

Trying to judge flavor, aroma, quality

and character to make a purchasing decision or quality approval from memory may be challenging, even for the most skilled cuppers. Cuppers should compare the unknown coffee to a known sample (or a standard quality sample) to test for quality. Testers should aim to use a fresh sample or recent arrival of the known/standard sample so that age and green staling are not factors in determining character differences.

Cuppers should evaluate their coffee independently of other testers in the room and follow good cupping etiquette by minimizing discussion and any other distractions. They should also avoid over-analyzing a coffee sample by placing more cups than normal on the table, cupping the table an extra time “just to be sure” or asking additional cuppers to join the test. When coffee testers increase the number of cups sampled or the number of times each sample is tasted, the resulting data may change. This increases the likelihood of finding a reason to upgrade to an approval or downgrade to a rejection.

## HOW TO CREATE AN EXPERIMENT

### ● DETERMINE THE QUESTION

Specifically, what are you hoping to learn? Are you testing coffees for purchase approval? Judging the acceptability of a new blend? Evaluating production samples for quality control, or testing the operation of new equipment on your coffee products? Completing descriptive analysis for retail marketing? Each question will require a unique testing protocol and process.

### ● DESIGN THE TEST

Once you settle on your question, you can determine the best test to reach your conclusion. Will you be testing one coffee, two coffees, comparing two or more coffees, evaluating component percentages for a blend, or evaluating brew strength options? For each question, there may be a different

test that is best suited to collecting the right data (see page 30 for more on this). Before testing begins, you must determine the standard for acceptance. If you will be using the Specialty Coffee Association of America (SCAA) cupping quality scale, what is the score necessary for an approval? When using other testing methods or scales, the criteria for success and failure must be

predetermined before you begin cupping.

Next, determine who will complete the testing: a coffee expert, trained panel or consumer panel. For small to medium coffee operations, one cupper (“the expert”) may make the decisions. In many coffee companies, a group or team of cuppers (“trained panel”) might make purchasing

*continued on page 26*

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decisions, and a separate group of coffee enthusiasts may be asked to emulate the consumer experience for product development tests. Consumer marketing groups may be enlisted to perform actual consumer testing.

● CONDUCT THE TEST / COLLECT THE DATA

Coffee sensory testing should use quantitative analysis for data collection, which means using measurable scales for the amount of perceived character, as opposed to qualitative analysis where subjective judgment is recorded.

To collect measurable data, use a cupping score chart or custom-created chart to indicate the perceived tastes and character intensity of each sample. For example, a scale of 1 (no character) to 10 (intense character) is often used for sensory analysis. Qualitative analysis—using one’s judgment or opinion to describe the coffee—is best used for descriptive analysis and not for purchasing or quality questions.

Care must be taken when preparing coffees for sensory testing. The goal is to manage for all of the variables so that the only aspect actually tested is the quality or character and the intensity of the quality and character. Examples of variables to manage and control for include water temperature and quality; cup shape, size and composition; and waiting time before testing. For green coffee testing, a representative sample of a lot (full container) is required to be drawn from at least 10 percent of the bag count from several different locations to prevent testing of just one “pocket” of coffee. Green samples must be mixed to be sure that all beans, including defects, are randomly located within the sample before testing.

Keeping a consistent roast level for all samples is critical. Small changes in the roast profile will impact a coffee’s flavor development, acidity, body and sweetness. Any differences in roast profile may cause unfounded bias for or against particular samples that bear no reflection upon the inherent quality of the cup and thus change the test results and conclusions. The date and time of roasting should also be the same for all coffees so that roasted staling is not a variable in the test.

The SCAA cupping protocols recommend using a light roast (58–63 Agtron) to provide the best opportunity to identify defects. Many roasters use a production roast level for their cuppings to allow the coffee to demonstrate its character from the consumer perspective.

Cuppers should begin by documenting all measurable variables—the external factors and unforeseen issues that may influence the outcome of the test. When repeating tests over time, it will become obvious which variables need to be measured and which factors will not affect the outcome. Noting all measurable variables may be difficult when conducting informal testing, such as developing drinks at the barista bar or testing brewing processes. Nonetheless, cuppers must understand the details of the test to replicate it for further evaluation.

Consumer-brewing processes—drip, French press, extract or Clover—also provide valuable tools when testing for

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Floral, Chocolatey, Rich, Smoky, Biscuity  
Spicy, Fruity, Nutty, Slight, Pastry  
Earthy, Herbal, Winery, Vanilla-like, Flat

**B FLAVOR**  
1 2 3 4 5 6 7 8 9 10  
Chocolatey, Mellow, Cereal, Bristly, Cedar  
Caramelly, Earthy, Smoky, Clean, Tobacco  
Sweet, Grassy, Citrusy, Bitter, Woody  
Complex, Vanilla-like, Smoak, Laundry  
Tarry, Peary, Musty, Waxy  
Nasty, Mild, Cinnamon, Malty  
Fruit-like, Pungent, Spicy, Strong

**C ACIDITY**  
1 2 3 4 5 6 7 8 9 10  
Bright, Bland, Sweet, Papyon  
Fruity, Tangy, Nippy, Winery  
Sharp, Smoak, Soft, Flat  
Medium, Moderate, Mild, Slight  
Impassive, Pronounced, Delicate, Disappointing

**D BODY**  
1 2 3 4 5 6 7 8 9 10  
Oily, Bittery, Creamy, Thick  
Heavy, Full, Medium, Light  
Impassive, Disappointing, Thin, Watery

**E AFTERTASTE & FINISH**  
1 2 3 4 5 6 7 8 9 10  
Strong, Moderate, Weak, Negligible  
Clean, Fresh, Rinsed, Biscuity  
Floral, Spicy, Fruity, Winery  
Long, Fading, Thin, Astringent

**F ASSESSMENT**  
-5 -4 -3 -2 -1 +1 +2 +3 +4 +5  
Exceptional, Exemplary, Excellent, Average, Outstanding  
Very good, Good, Above Average, Average, Fair  
Fair, Poor, Deficient, Poor

**G CUPPING SCORE**  
This form is based on a 100-point scale. Combine all of the above scores and add 40 to determine the overall score.

**H NOTES**

September | October 2009 31

■ A simple cupping form, available for free download at [www.roastmagazine.com/cuppingform](http://www.roastmagazine.com/cuppingform)

consumer acceptability. Brewing tests should follow a similar scientific method, with consideration for how the consumer would individually brew and serve the coffee, or how the retailer would prepare the beverage for sale. Testing the coffees black and also garnished with sweeteners and dairy will help provide the full range of data needed to make consumer-oriented conclusions.

Using non-professional tasters in consumer tests may generate higher-value data. Regular consumers and frequent coffeehouse guests would be the best testers; non-coffee drinkers or those unfamiliar with the products may skew the results too far positive or negative. Even those who drink coffee regularly may have unforeseen biases or misunderstandings about quality. These factors should be taken into account when using these testers, as the results may be valid only for purchase preference, purchase intent or post-purchase satisfaction, without resulting in usable data for actual coffee quality.

● ANALYZE THE DATA AND MAKE YOUR CONCLUSION

When all aspects of the testing are complete, with confidence that all variables were managed and controlled for, the data can be reviewed against the predetermined success criteria to reach an ultimate conclusion. Let the coffee and the data—not personal opinion—determine the conclusion.

continued on page 28

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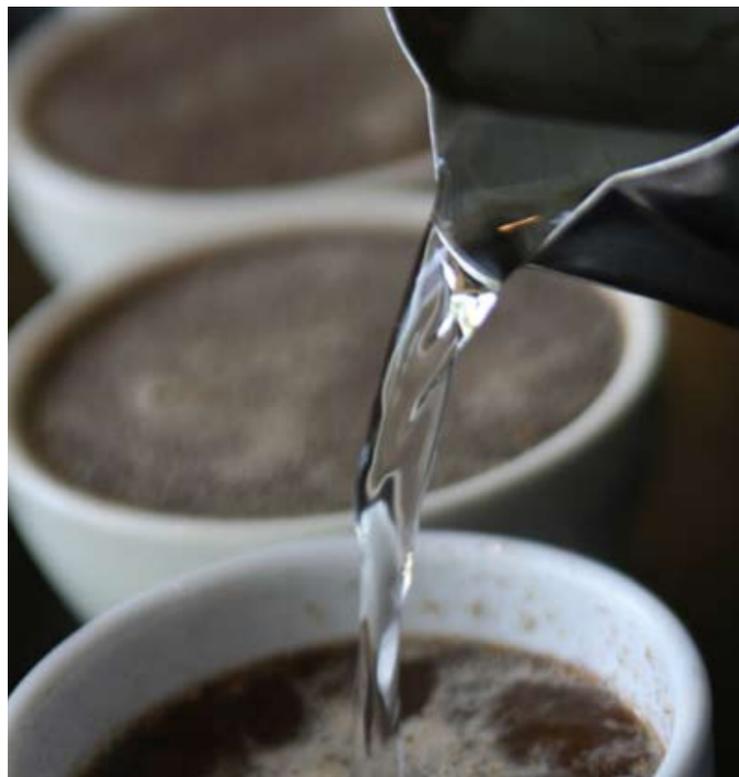
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● TEST THE RESULTS

In an often-overlooked last step, cuppers who repeat a test should compare the data collected and the conclusion to prior tests. Are they the same? If so, this verification process allows the cupper to be confident that the correct conclusion was reached.

If there is any inconsistency in the data or conclusion, one of the following problems may be to blame: 1) serious issues with the testing method, 2) calibration/consistency issues among the cuppers, 3) improper data analysis, 4) inconsistencies in the item being tested, or 5) the inability to confirm the conclusions.

When repeating tests, the order of the items being tested may be changed, reversed or randomized to ensure that results are true, accurate and independent of the testing order. It may be necessary to repeat tests, especially when using the consumer perspective, at various times throughout the day: mid-morning when taste buds are most sensitive, after lunch to replicate interference with other flavor and aroma factors, or late afternoon when fatigue sets in. Sensory perception testing is complicated, and human fallibility should be considered, especially when a single tester is used. Cuppers should take into account emotional factors that may influence

their judgment or distractions that may inhibit concentration. Again, a second testing may be necessary to verify the results and conclusions.

When conducting a series of sensory tests, the first item tested in a series sets the standard and may receive a higher rating simply because it is tested first. To protect against this, set a calibration sample to cup first before collecting any data, or repeat the first sample within the series to determine if the score is the same at both positions.

Conducting proper tests will not only help build confidence and expertise, but it will also help cuppers answer supplier and customer questions about quality evaluations. Testing will help to reject the coffee that should be rejected and to approve the coffee that should be approved, based on unbiased and scientific data collection. The opposite—approving a coffee that should be rejected because of a bad test or poor testing process—could be devastating to your business financially and your reputation among your suppliers and customers. Approving a bad coffee may set a precedent for quality that you are not proud of. This, in turn, affects the quality of future deliveries from suppliers because of inconsistent quality communications, or it may cause you to lose a customer based on what you thought was great coffee but, because of a bad test, is actually inferior. Who wants to reject great coffee and allow it to be sold to a competitor because of a bad test that yielded the wrong result?

Rejecting a coffee that should be accepted could also be financially devastating for a producer, particularly in relationship/direct trade purchases, since premiums may be lost or the coffee could ultimately go unsold. It is the duty of the tester to understand the importance of the test and its implications for the stakeholders of the coffee, and to remain true, unbiased and professional in all aspects of the evaluations.

Those new to the scientific testing method may find the process very detailed and cumbersome, but, with practice, these concepts will become as familiar to you as any other process in the roastery. Understanding the basics of sensory testing and choosing to apply these principles to cupping will advance the caliber and credibility of your quality testing. After all, specialty coffee is a matter of choice, not a beverage of chance.

*SPENCER TURER pulled his first shot of espresso in 1991 and first roasted coffee in 1995. He is a graduate of Johnson & Wales University with degrees in culinary arts and food service management and is a specialty coffee professional with Mitsui Foods in New Jersey.*

CHOOSE YOUR TEST: THE BASICS OF TESTING AND TESTING TYPES PAGE 30 ▶

# CHOOSE YOUR TEST

## THE BASICS OF TESTING

### ■ MONADIC

When one product is tested by itself without a comparison. For example, try this coffee and provide your cup results. A cupping table set with one flight each from different origins, without comparison to a standard or baseline, provides a series of monadic tests.

### ■ COMPARISON

Tests two or more coffees—an unknown coffee against a known—to compare the cup character. Product development departments often use this type of testing when considering blend variations for product rationalization or new product development. Comparison will allow several different coffees to be tested next to each other. This type of test can be completed through cupping or with brewed coffee, either as an objective test by professional tasters or a subjective test by consumers.

## TYPES OF PRODUCT TESTING

### ■ PREFERENCE

Primarily used as a consumer test. With all aspects of the test controlled, the questions are: Which coffee do you like better, and why? Preference testing is purely subjective and based on opinion. It can be used to test brew strength, hold times, blend development or roast levels.

### ■ PAIRED COMPARISON

Used to compare two coffee samples side by side with a specific question asked. For example, which sample has higher acidity? This test forces the taster to make a firm decision. Paired comparison tests are fast and easy to conduct, but the success or failure criteria must be determined before the test begins. For instance: How many cuppers need to score the same for the results to be conclusive, and how many times can those cuppers reach the same results each time?

### ■ THRESHOLD

Determines the level that one can perceive a change or detect that a flavor or aroma is present. More detailed threshold tests assess the expert tester's ability to recognize or identify the change. The SCAA Sensory Skills Test uses this method. When seeking to change a coffee blend, a roaster will use a threshold test to compare two samples and identify at what level a variation in the blend can be detected.

### ■ SORTING

After the threshold test is complete and the cupper is able to identify variations in the coffee characters (acidity, sweetness, body), the sorting test allows cuppers to rank the intensity of each character (strong, medium, weak). In advanced sorting, cuppers must identify at least two different characters within each cup and rank them individually on the intensity scale. Again, this is part of the SCAA Sensory Skills Test.

### ■ TRIANGLE

A powerful test when determining if two items are virtually the same or different in character, flavor and aroma. Triangle tests are a series of duplications to ensure that the cupper is not guessing and can replicate the results in various orders. This gives true confidence in the data collection and conclusion. The three samples provided to the cupper are randomized to test the confidence of the scores and remove the cupper's opportunity to guess correctly.

To explain, Sample A and Sample B are being compared. Sample A must be placed in all three positions to test the cupper's real ability to determine a difference; the same format will be used to test Sample B in each position.

AAB BBA  
ABA BAB  
BAA ABB  
AAA BBB

When most or all of the cuppers score these samples correctly, there is confidence that the samples are identified as different. When most of the cuppers score incorrectly, there is increased confidence that the variations and differences between the coffees cannot be detected.

### ■ DUO-TRIO

Determine which of two test samples is the same as the reference sample provided. This test gives cuppers a greater opportunity for guessing correctly than the triangle tests, making it less powerful. To ensure accuracy in duo-trio tests, some tests must be designed with three identical samples and others where both samples are different from the reference sample.

Changing the sample positions—and creating all the same or all different sample sets—is not intended to confuse the cuppers. On the contrary, this is designed to increase the confidence in

the test results by providing the cupper the opportunity to accurately identify the differences and similarities in the coffees in a variety of ways.

### ■ DESCRIPTIVE ANALYSIS

A process used by sensory testers to communicate the specific flavor and aroma perceptions to a level where most individuals can detect the same perceptions. Descriptive analysis is intended to include flavor and aroma characteristics that most people can perceive; when they see the words written in a coffee description, it should make sense. For example, describing a particular coffee as exhibiting a "sweet fresh raspberry acidity with light caramel characters and a lingering chocolate aftertaste" is a descriptive analysis.

This test is controlled by a group of judges who first create individual lists of descriptive words to use. Next, the judges agree on a standard vocabulary list for the test. Finally, they evaluate the coffee, working in groups to reach a consensus for the coffee's profile. The group consensus is vital to create a descriptive analysis without using a single person's individual opinion for the coffee's profile.

The success of a good descriptive analysis is when the consumer is able to understand the coffee character by reading the menu description and then agrees with the description after tasting the coffee. A poor product description from this analysis includes references unknown to the consumer or flavor and aroma characteristics that are not perceived by most people, cause confusion, or reduce the purchase intent of the coffee. ■

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