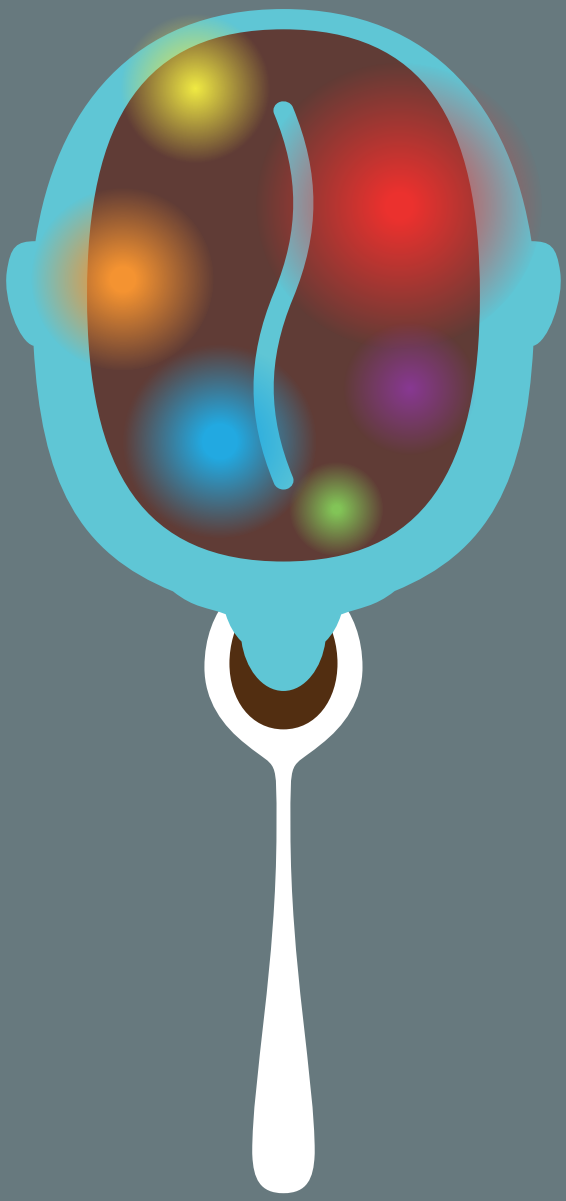
CoffeeMind

SENSORY FOUNDATION



This book is an introduction to sensory methodology for coffee professionals and covers SCA's Sensory Foundation Curriculum.

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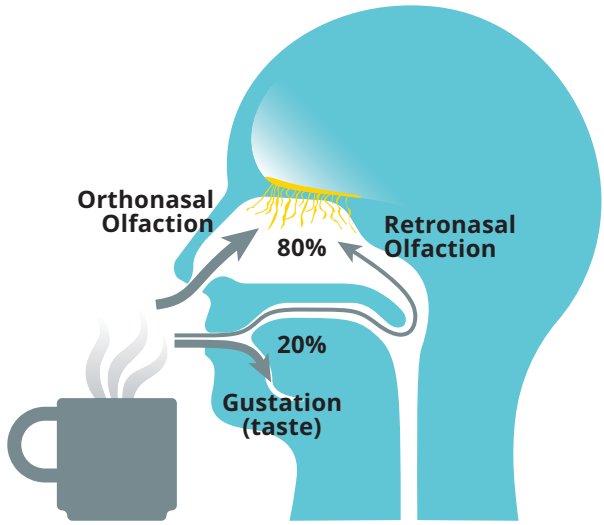
Ida would like to acknowledge Jesper Alstrup for his contribution to this book, especially chapter 2.1.4 The Sense of Touch where Jesper applied his knowledge from his Master Thesis project. During Jespers' time as a student he assisted Ida in sensory training and profiling. The many great experiences led to a growing interest in the speciality coffee industry. This inspired Jesper to conduct research projects about coffee, and finally to write his Master's thesis on the effect of roast profile modulations on the sensory perception of 'body' in the coffee brew.

CONTENTS

1

FLAVOUR:
TASTE AND AROMA

When you take your first step into sensory science it is important to understand the difference between taste and aroma. A popular definition of taste are the sensations in your mouth during eating. A good example of how it is used in everyday language is to say *"this ice cream tastes like vanilla"*. However, If you look at this scientifically it does not **taste** like vanilla, it has a vanilla **aroma** that is perceived by our retronasal system – which makes us think of it as a taste.



Taste and aroma: As a general rule, 80% of the flavour of a cup of coffee is perceived through our nose whereas only 20% is perceived in our mouth.

WHAT IS TASTE?

Taste is what we perceive in our mouth as the five basic gustatory sensations; bitter, sweet, sour, salty and umami (savory). Whereas aroma can be perceived either as orthonasal, through our nasal cavity, or retronasal, through our oral cavity and up to the olfactory epithelium. Retronasal aroma perception is activated only when breathing out through the nose between chewing or swallowing (Mozell et al., 1969).

TIP: Remember to breath through your nose during cupping if you don't swallow!

TIP: Pinch your nose if you want full focus on the taste and mouthfeel of the coffee!

WHAT IS FLAVOUR?

Flavour is a useful word that includes all the sensory impressions in the mouth. This means that if you describe the flavour of a cup of coffee, you are talking about the perceived combination of taste, aroma and mouthfeel. Although the definition of flavour varies from author to author, this book considers the definition of flavour to include:

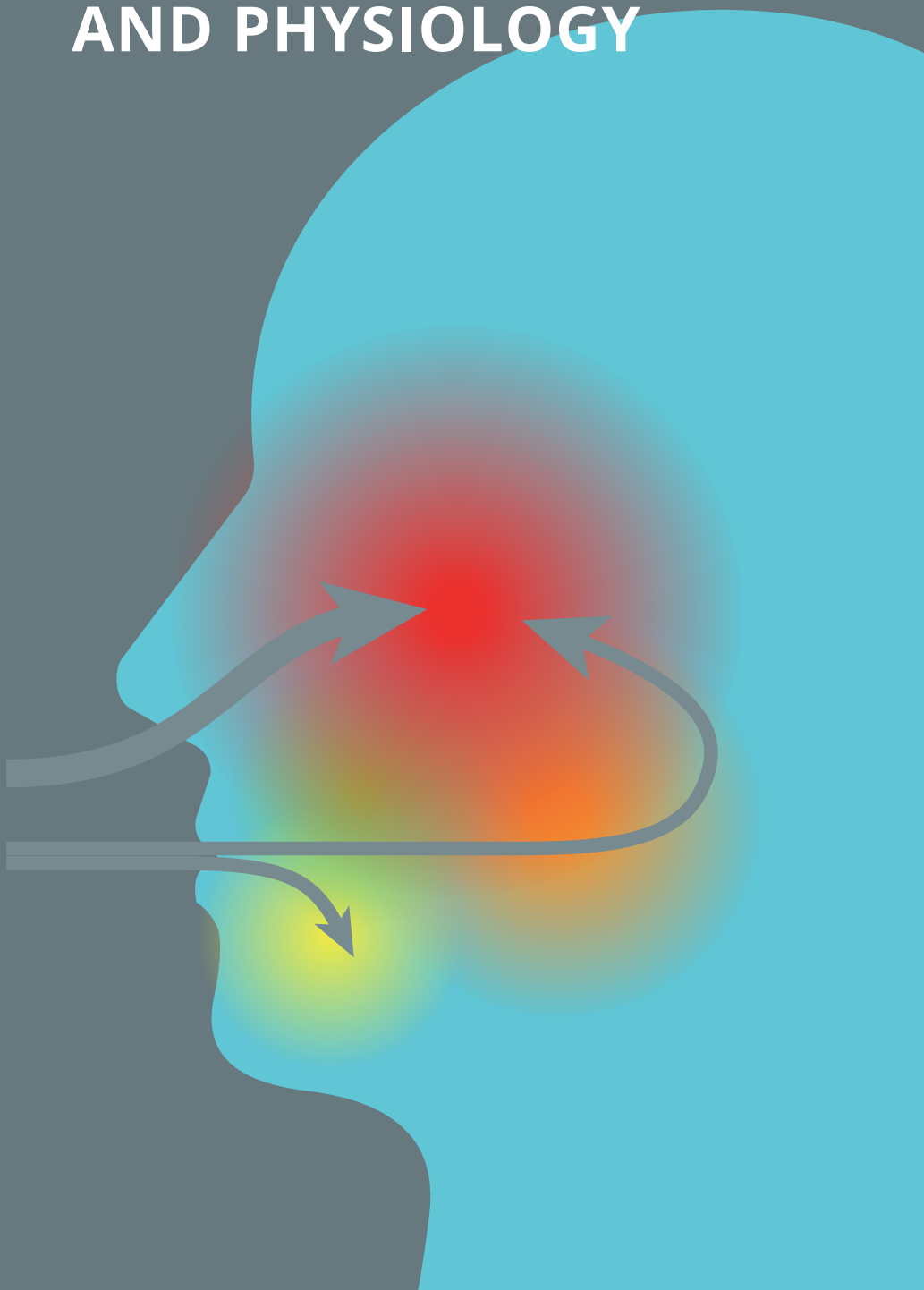
- *Aromatics:* Olfactory perceptions caused by volatiles released from the coffee either by orthonasal or retronasal detection.
- *Basic tastes:* Gustatory perceptions caused by coffee in the mouth.
- *Somatosensory system:* Chemical feelings that stimulate trigeminal nerve ends and include sensations such as astringent, pungent, spice, heat, cooling etc.

EXPERIMENT

Firstly, pinch your nose before taking a flavoured jelly bean (cinnamon works very well) and chew it a couple of times. Notice that you can only taste the basic tastes as sweet and acidic. Maybe you also feel a bit of chemesthesis on your tongue which are sensations that arise from chemical compounds activating receptors associated with other senses such as thermal perception. Even so, you are still not able to describe the aroma of the jelly bean. Now breathe through your nose and experience how the aroma is flowing to your olfactory epithelium retronasally – suddenly the aroma description is obvious!

2

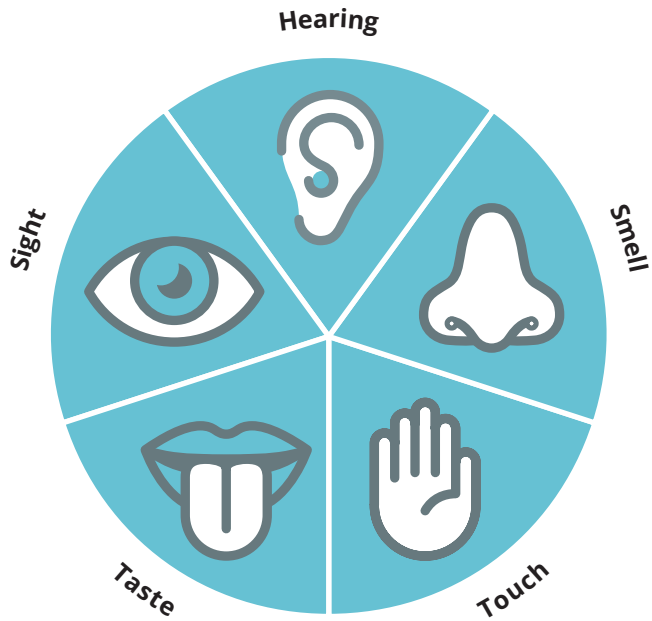
SENSORY ANATOMY AND PHYSIOLOGY



2.1 THE SENSES

The basics of sensory science is to use all of our senses to evaluate a product, and sometimes to isolate just one sense at a time in order to focus on specific sensory attributes. Without being aware of it, we are using all of our senses to judge the final cup of coffee. From the moment we *hear* the coffee start brewing and the milk being steamed we start to build an impression. This is enhanced when we *see* the golden brew or the perfectly made latte art. As we start to *smell* the aroma of the coffee, we *feel* the warmth of the cup and finally we *taste* the coffee and summarize the impressions in a final perception of the brew. The wider context of the sensory impression (e.g. interior design, brand culture, social circumstances etc) is also a strong determinant of the sensory impression itself but fall outside the scope of this book.

As sensorists we are interested in all these impressions that led to the sensory perception of coffee. Yet, to know exactly how we describe the coffee, and whether the description is similar to another taster's perception, we need to use standardized methods. This is where sensory science becomes extremely useful. However, let us first look into the different senses.



2.1.1 THE OLFACTORY SENSE

Volatile odorants are sensed either through orthonasal or retronasal detection by the olfactory epithelium located in the roof of the nasal cavity (see figure on page 6). Optimal contact between aromas and the olfactory epithelium is obtained by moderate inhalation (e.g sniffing) for one or two seconds. At the end of two seconds the receptors have adapted to the new stimulus. Five to 20 seconds or longer are required for them to readapt before a new sniff can produce a full-strength sensation (Laing 1983). In general, we all have good odour memory, we can perfectly remember a smell, but a common problem is that we tend to forget the name of the smell (Jönsson and Olsson, 2003). To name what we smell is exactly what we need to train, to become better coffee tasters.

TIP: Try to smell only for 1-2 seconds when evaluating the aroma of a cup of coffee, and wait 5-20 seconds before you smell again!
TIP: Ask a friend to cover different food products and try to detect the smell.

2.1.2 THE SENSE OF GUSTATION

THE BASIC TASTES

The sense of gustation or the sense of taste involves the detection of five recognised taste qualities:

- sweet
- sour
- bitter
- salty
- umami

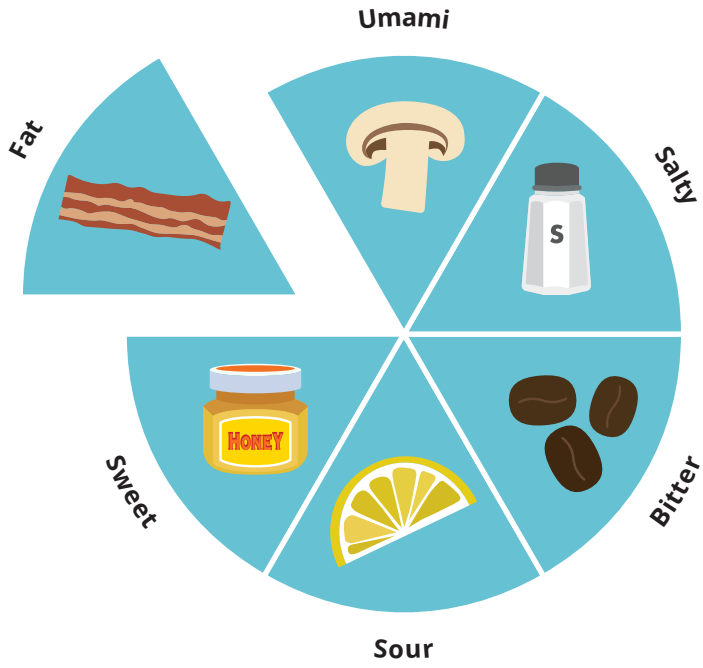
These tastes are detected by taste buds that are primarily located on the surface of our tongue, specifically in the mucosa of our palate and areas of our throat. Our ability to recognise and distinguish the basic tastes guide us to identify and consume nutrients while avoiding toxins (Chaudhari & Roper, 2010).

Sweet taste is stimulated by sucrose and other sugars (e.g. fructose, glucose) and sweet substances (e.g. saccharin, aspartame) and signals sugars and carbohydrates. A bitter taste is thought to protect us against ingesting poisons. For this reason, we need to learn to appreciate bitter products such as coffee for example by repeated exposure. Bitter taste is stimulated by chemical compounds including quinine and caffeine.

Umami taste is stimulated by l-amino acids and nucleotides (e.g. monosodium glutamate (MSG) and is assumed to reflect food protein content. The taste of salt is stimulated mainly by sodium salts (e.g. sodium chloride, sodium glutamate) and controls the intake of sodium and other salts essential for maintaining the body's water balance and blood circulation.

Sour taste signals the presence of dietary acids and is stimulated by organic acids such as citric, lactic, malic, acetic, tartaric and phosphoric acid for example (Chaudhari & Roper, 2010). There is some evidence that free fatty acids may also be detected by taste buds via dedicated receptors, but fat is yet to be included as a basic taste (Mattes, 2009).

The basic tastes



TIP: Take small sips of coffee and keep each sip in the mouth for only a couple of seconds. Wait for 15-60 seconds before tasting again. The first and second sips are the most sensitive. Try to train yourself to accomplish your sensory evaluation in those first sips!

UMAMI

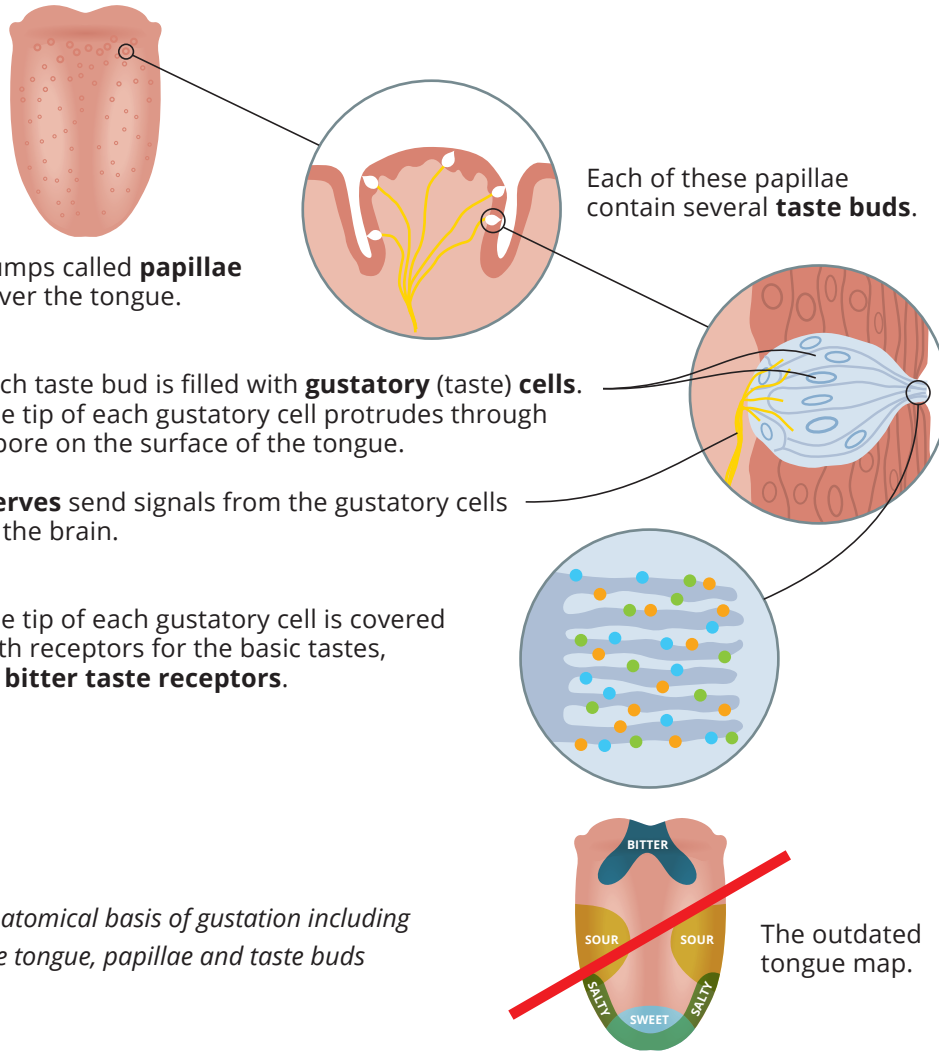
The word *umami* is japanese, and roughly translates as 'delicious taste'. Even though it is not that pleasant in its pure form, it can enhance other flavours which makes it desirable. Umami is attributed to the taste of monosodium glutamate (MSG) and ribosides such as salts of 5' inosine monophosphate (IMP), and 5' guanine monophosphate (GMP) (Kawamura and Kare, 1987). Alternative descriptions of the taste of umami is a *savory* or *meaty* taste (Nagodawithana, 1995).

EXPERIMENT

Familiarise yourself with the basic tastes by tasting them in watery solutions:

Sweet:	24 g sucrose (sugar) per liter water
Sour:	1.2 g citric acid per liter water
Salty:	4 g NaCl (salt) per liter water
Bitter:	0.54 g caffeine per liter water
Umami:	2 g monosodium glutamate per liter water

These solutions are quite strong, try to dilute them into lower concentrations to train your detection of the basic tastes.



Anatomical basis of gustation including the tongue, papillae and taste buds

The outdated tongue map.

THE TASTE BUDS

Our tongue is covered with papillae, which are the bumps that you can see on your tongue. Each of these papilla contain multiple taste buds that are filled with gustatory – or taste – cells. The tip of each gustatory cell, that protrudes through a pore on the surface of the tongue, is covered with receptors for the basic tastes. You can imagine these receptors as keyholes. For example, when a matching key (i.e. a basic taste) reaches the keyhole for that specific taste, a signal is sent to the brain that we are eating something that corresponds to one or more of the five basic tastes such as bitter (Chaudhari & Roper, 2010). We are able to detect all basic tastes across the whole tongue, which challenges the outmoded representation of the tongue map in the illustration above.

2.1.3 FUNCTIONAL PROPERTIES OF TASTE AND SMELL

Three sensory phenomena that are important to be aware of already at the Foundation level are the functional properties of taste and smell called adaptation, mixture suppression and release from suppression.

Adaptation is a lesser response of the senses at constant stimulation and will result in a weaker sensory perception. This is something that we all experience everyday without noticing. If you work in a roastery or a café you might notice costumers commenting on the nice smell in the room, while you are not able to smell anything. Maybe you smelled it in the morning, but after some time you do not notice it any longer. This is because you have adapted to the smell of coffee. From a biological point it makes good sense, since it is not important for us to notice a constant stimulation but is only necessary to be aware of it when there is a change.

Mixture suppression occurs when single taste and aroma impressions are less intense in a mixture compared to when they are tasted or smelled alone. This is a good example of why we need trained sensorists to perform sensory evaluations and not machines. If we have a sample with pure sugar and another sample with the same amount of sugar but also acidity added, a machine would tell us that they are equally sweet – but a human will perceive the pure sugar sample as more intense. From a sensory perspective, it is the human perception that we are interested in.

Finally, we have the property that we call *release from suppression*. Release from suppression happens after adaptation to a component in a mixture, the other components are less suppressed and therefore their intensity increases. An everyday example of this is to eat a Danish pastry together with a glass of orange juice. After taking a bite from the pastry, you get adapted to its sweetness and therefore do not perceive the sweetness in the orange juice, while other tastes and sensory perceptions of acidity are released (Lawless & Heymann, 2010).

These functional properties are the reason why it is strongly recommended to use palate cleansers and take recuperation time in between each sample when cupping coffee. If you are evaluating two cups of coffee, the chances are that you will perceive the first coffee you taste more intense in both taste and aroma compared

to the second coffee. To make a fair judgment it is also recommended to randomize the order of samples between tasters, to even out the 'carry-over' effect.

CARRY-OVER EFFECT

Carry-over effect is the influence a previous sample can have on your perception of the next sample tasted. This is best avoided with recuperation time in between each sample and with the use of palate cleansers.

EXPERIMENT

Prepare three solutions below:

Sweet:	24 g sucrose (sugar) per liter water
Sour:	1.2 g citric acid per liter water
Sweet + sour:	24 g sucrose + 1.2 g citric acid per liter water

First, experience mixture suppression by tasting each solution alone and rinse your mouth with water in between. Then experience release from suppression by tasting the sweet sample before going directly to the sweet + sour. Notice how the taste changes to just being sour? Now try the opposite with the sour and the sweet + sour sample.

EXPERIMENT

Make a cinnamon and vanilla milkshake and serve a vanilla and a cinnamon stick next to it. First taste the milkshake and notice its flavour. Then smell the vanilla and take a sip of the milkshake – do you only perceive the cinnamon flavour? Then, try the opposite and smell the cinnamon before taking a sip of the milkshake, now do you only perceive the vanilla flavour?!

2.1.4 THE SENSE OF TOUCH

Our sense of touch plays a large role in the sensory perception of coffee; both in terms of mouthfeel but also through our fingertips. The sensation of heat, the material and shape of the cup all influence in the overall experience. This is why leading restaurants, such as Noma in Copenhagen, offer a variety of dishes that can eaten using our fingers. (Spence & Piqueras-Fiszman, 2016)

The overall experience of drinking a cup of coffee involves the combination of multiple senses. The most well-known are the basic tastes (e.g. sweet, salty, sour, bitter, umami – or savoury) that we can perceive along with a large variety of aromas. A third element is mouthfeel, which can be described as the tactile perception of the coffee in our mouth. This sensation is part of our sense of touch, which plays a major role in how we perceive the world around us. Mouthfeel is different from tastes and aromas as it is sensed by nerve endings on the surface of our skin such as our lips and tongue.

Mouthfeel is a very broad term that includes a variety of different sensations. An important mouthfeel that we often describe in the coffee industry is called 'body'. We usually define body as the perceived viscosity, weight or fullness of the coffee as we swirl it around our mouth. We try to describe body by using descriptors ranging from 'thin' or 'watery' to 'thick' or 'heavy'.

Another type of perceived mouthfeel is grittiness, which is the sensation of small particles present in the coffee. For example, you will often find a small amount of sediment in the bottom of the cup when brewing coffee by means of a French Press. Research has found that particles down to the size of six micrometers can be sensed by our tongue and hard palate (Bourne, 2002). To put this into perspective, a human hair has the diameter of around 50 micrometers.

Other examples of mouthfeel are chemical feelings such as astringency, heat and cooling:

- Astringency is often described as the dry, puckering mouthfeel caused by substances such as tannins. The tannins bind to our salivary proteins that cause proteins to aggregate, leading to a dry sensation.
- Heat is the burning sensation in the mouth caused by certain substances such as capsicum found in chilli or peperin from peppers.
- Cooling is the cool sensation in the mouth or nose produced by substances such as menthol or mints.

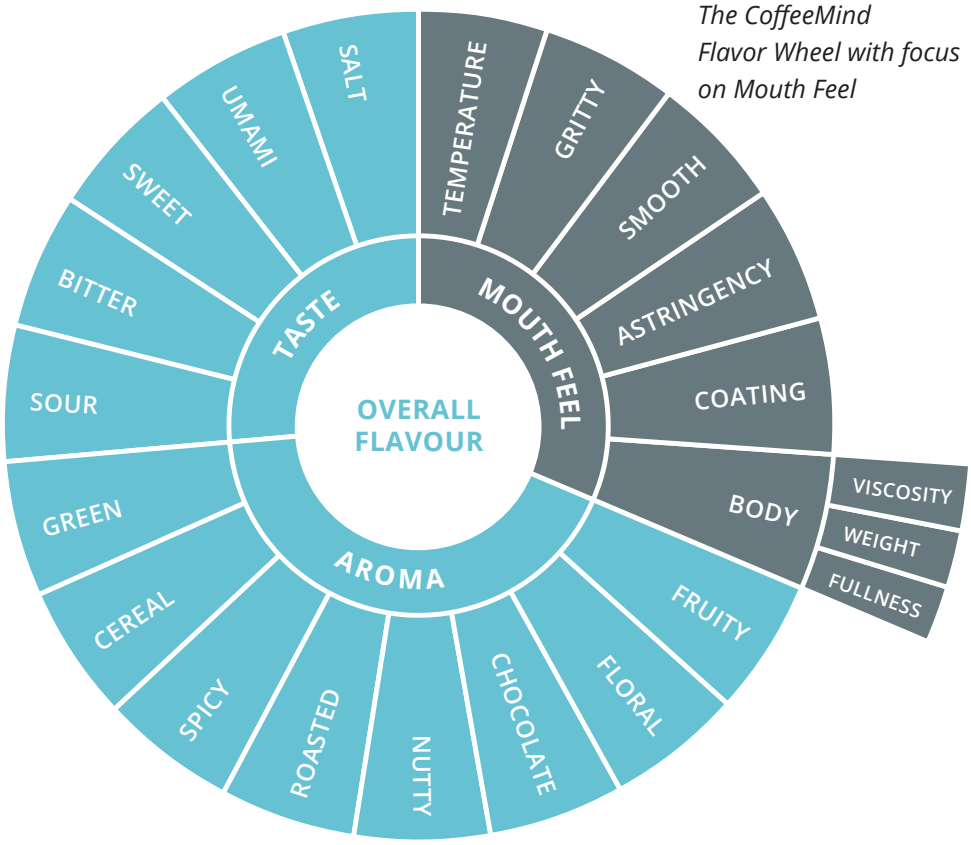
Mouthfeel and body are used as synonymous descriptors on the SCA quality cupping form, thus involving a large range of perceptions under the same term. The focus on the cupping form is to assess the perceived quality (i.e. a subjective evaluation of pleasantness of the mouth feel of the coffee). For example, higher quality body' or mouthfeel can be smooth, soft and juicy - as opposed to rough, hard and astringent.

EXPERIMENT: INVESTIGATING MOUTHFEEL

Prepare small samples of low and full fat milk, natural and sparkling water, over-extracted earl grey tea, or even a small drop of tabasco sauce. Taste the sample, and focus on how it feels on the skin of the lips and inside the mouth - not how it tastes or smells.

Tip: Practice sensing and identifying the various types of mouthfeel. Ideal reference materials include:

Body:	Use a hand mixer to dissolve 1-2% xanthan gum in water
Coating:	Olive oil, or milk with different levels of fat content
Astringency:	Brew a cup of over-extracted earl grey tea and notice the dry sandpaper-like feeling in your mouth
Gritty:	Dissolve a small amount of flour in water
Smooth:	Compare the 'gritty' reference with pure water
Heat:	Bite a chili - if you dare!
Cooling:	Try a menthol sweet.



The CoffeeMind Flavor Wheel with focus on Mouth Feel

Brew temperature is an often forgotten parameter but plays an important role in sensing mouthfeel. Research has revealed that temperature has a big influence on our ability to perceive flavours. Most evidence points towards a U-shaped detection threshold as a function of temperature. This means that our ability to detect basic tastes is higher in the 20-30°C range. Therefore, tasting coffee at too high or too low temperatures might have a negative influence on our sensory performance (Spence & Piqueras-Fiszman, 2016).

2.1.5 THE SENSE OF VISION

The appearance of food or a beverage has a large impact on perceived flavour. For example, colouring a beverage red leads a lot of western consumers to believe that the drink is sweeter, and even has a strawberry flavour. The extent of these expectations does vary between individuals, and especially between cultures. The surrounding environment therefore has a profound influence on the flavours that we receive from visual cues in a food or drink (Piqueras-Fiszman & Spence, 2014).

DID YOU KNOW?

THE STORY OF YELLOW JELL-O

In World War II, a navy chef became unpopular amongst his diners due to the lack of red, cherry-flavoured Jell-O on the ship. People complained that the only available Jell-O was the yellow, lemon flavoured kind. The chef resorted to a creative sensory approach and added red food colouring to the lemon Jell-O. The response from his guests was overwhelmingly positive and some even complimented him for finally putting the right cherry-flavoured Jell-O back onto the table. Although anecdotal, it is an interesting example of how easily we can be fooled by our eyes. This is called 'expectation assimilation' which means that what we taste is biased by our own imagination (Wansink, 2010).

2.1.6 THE SENSE OF HEARING

Several studies have shown that the sounds around us influence our gustatory perception (Zampini & Spence, 2010). Evidence shows that auditory cues have a big influence on how we perceive our food and drink. The sound of milk steaming in a café, for example, can create predictions of whether it will be a good or bad cappuccino. This is true for several foods as we may have certain expectations as to how they should sound. When biting into a crisp or potato chip, we may expect a pleasant crispy texture followed by the sound of the cracking between your teeth. If the crisp is soft, however, it will not provide the sound that we expect, leading to feelings of disappointment.

Songs and stories about products all feed into the overall perception of a product. If we believe it to be something special, then we may be predisposed to like it more, and are probably even more willing to pay a premium price for it. This is why a variety of attractive adjectives are used in the food industry to trigger expectations, and the reason why large amounts of money are invested into branding. Research shows that if the consumer believes the product to be of high quality, they will have a preference over cheaper alternatives, even if they cannot taste the difference in a blind test.

CASE STUDY

Researchers have shown that music and storytelling influences sensory preference. In the study (Carvalho, F. R. et al., 2015), participants were exposed to four different situations when tasting a chocolate sample. The four different situations are described as follows:

A: Tasting chocolate while listening to a song

B: Tasting chocolate while listening to a song, and the sounds of the chocolate being produced

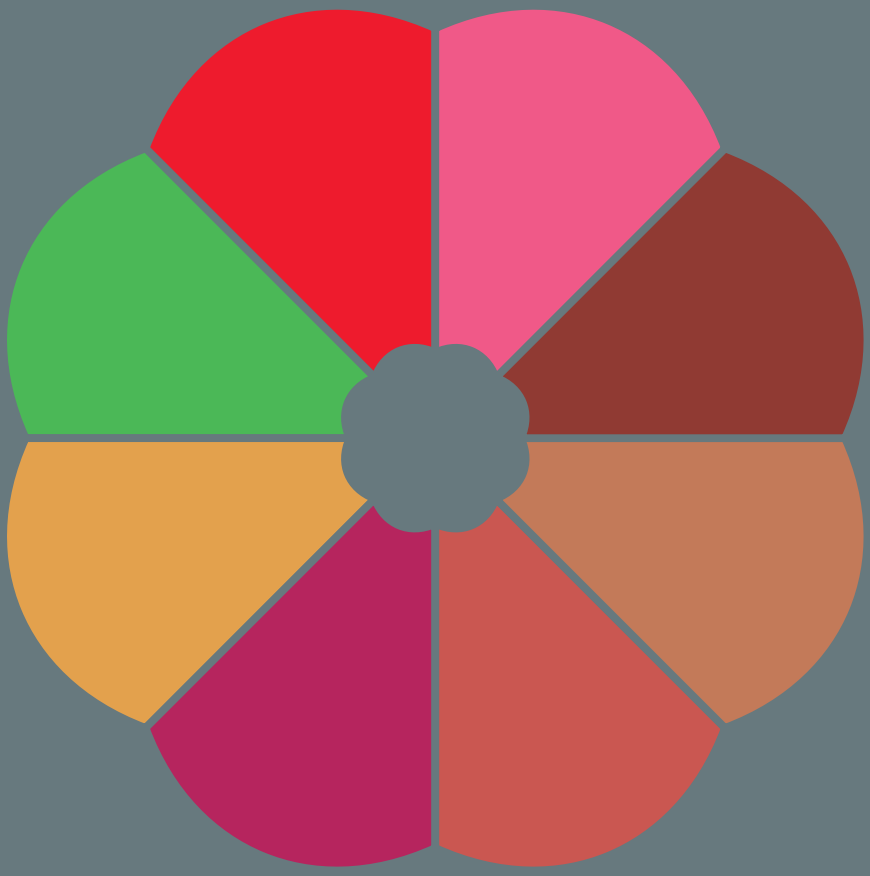
C: Tasting chocolate while listening to a song, and told that the song had inspired the chocolatier to create the chocolate sample

D: Tasting chocolate while listening to a song, and told that scientists had selected the chocolate sample to see how it influences taste.

It was shown that situation 'C' had the greatest impact on the participant's multisensory experience. They rated their liking of the chocolate sample higher, and said they were willing to pay more for the experience. This demonstrates that auditory stimuli may actually contribute to the identity of a product, and its perceived value.

3

SENSORY ANALYSIS



Sensory analysis is a scientific discipline where a person measures or analyses products in a controlled and standardised way. A sensory analysis always follows a standardised preparation protocol and a product such as coffee is evaluated as it is perceived by the senses of sight, smell, taste, touch and hearing (Stone and Sidel, 2004). It is important that the panel evaluating the samples are calibrated and trained (Meilgaard et al., 1999). This means that sensory analysis relies on trained and regular tasters, and therefore panelists are often screened for their sensitivity of taste before participating in a sensory analysis (ISO 3972). Sensory analysis can be divided into three main categories which is covered in detail in the Sensory Intermediate curriculum:

- *Discriminative tests:*
  Is there a **difference** between products?
- *Descriptive tests:*
  What **characterises** the difference?
- *Affective test:*
  Does the difference have any **meaning** for the consumer?

EXPERIMENT

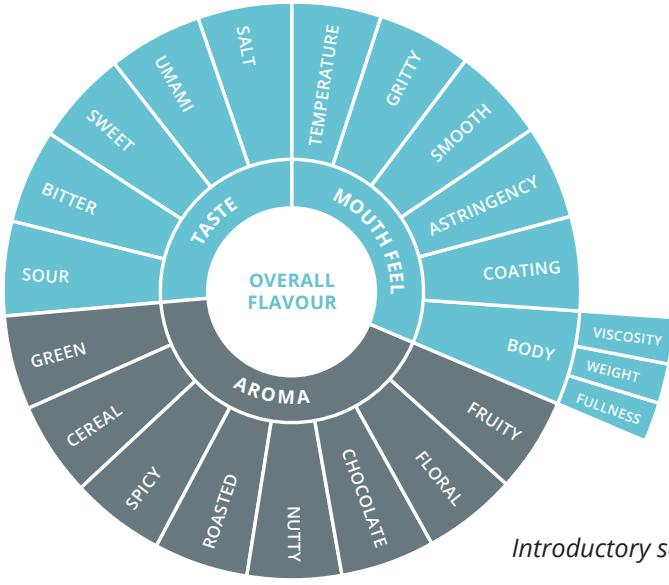
Evaluate two cups of coffee with all your senses.
Prepare two cups of very different coffees (e.g. a washed Brazilian vs. a natural Ethiopian coffee) and evaluate the difference between them by filling out a form like this:

	Sample 1	*Sample 2*
Appearance		
Smell (orthonasal)		
Basic taste		
Aroma (retronasal)		
Mouth feel		
Aftertaste		

3.1 FLAVOUR WHEELS

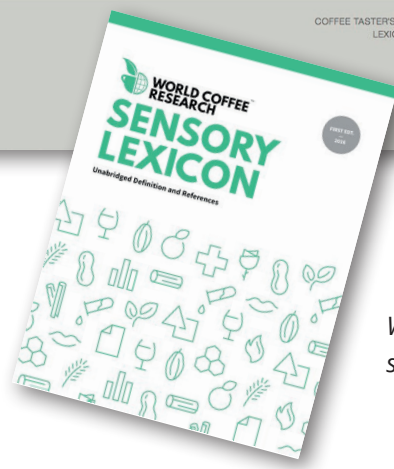
When performing descriptive tests where the aim is to describe the difference between coffee samples, it is important to calibrate the panel by using specific references. For example, if the coffee has a chocolate flavour, it is useful to have real chocolate as a reference to ensure agreement amongst the panel. For this approach, a flavour wheel can be a useful resource. Different flavour wheels have been released such as the recent SCAA Coffee Taster's Flavor Wheel where each descriptor on the wheel is to be found in the World Coffee Research sensory lexicon. By preparing these references, there can be no doubt about what is meant by each descriptor.

If you are not about to conduct a descriptive sensory analysis you can use a flavour wheel for training purposes to detect the flavours in coffee. The figure below illustrates the sensory descriptors that we in CoffeeMind has chosen for introductory courses as a training tool. At the foundation level we start in the inner circle and practice detecting fruity, floral, chocolate, nutty, roasted, spicy, cereal and green aromas in coffee samples. Ask a friend to prepare references for you by assessing one category at a time. Make sure you are able to detect each descriptor in its pure form. When you feel confident that you can use these overall descriptors consistently, you are ready to detect them in coffee.



Introductory sensory descriptors

The SCAA Coffee Taster's Flavor Wheel



World Coffee Research sensory lexicon

3.2 WHY IS SENSORY ANALYSIS IMPORTANT IN THE COFFEE BUSINESS?

If you are selling, producing or promoting great tasting coffee or related products, you will need to conduct sensory analysis to some extent if you are to achieve the best possible experience for your customer. There are three main types of evaluations; each with its own purpose and value for your business. These are discriminative tests, descriptive tests and consumer tests.

Your sensory skills as a salesperson are also crucial since they are central to selling specialty coffee as part of the dialogue with your customers. Cupping with customers is also a great way to establish a personal contact with them. More often than not, they will want to be convinced and feel comfortable that you are confident and knowledgeable from a sensory perspective – this is where your coffee expertise can help to leverage your sales success.

1) DISCRIMINATIVE TESTS

Discriminative testing is simple, easy to set up, and fast. The purpose of this test is to assess whether a difference exists between two or more products. This is a relevant assessment especially as an element of a quality control protocol. For example, you might want to know if your coffee brewing technique consistently produces the same great taste every time. Testing this with a group of people allows you to be confident that the coffee you are serving to your consumer consistently presents the cup profile that you intended. If there are inconsistencies in your brewing, the consumer may notice something different and enquire why it hasn't met their expectations.

2) DESCRIPTIVE TEST

Descriptive testing takes on the challenge of describing the differences between coffees. This type of testing takes longer, but allows you to create a detailed description of how one coffee differs from another. An example could be the purchase of new green beans. Once you have roasted the coffee, you will need to present a description to your customer. Here, it is important that the description is as truthful and objective as possible, so that the description and following expectations from customers match the flavour in the cup. This will also allow you to be more confident in your sales, as you present your product to potential customers. Your own description of the coffee might be different from other people, which is why including more people in the sensory evaluation can be beneficial. A good approach is to include staff members and a few friends, and see if you can agree on how you can describe the differences between the coffees. If the description leads to false expectations you may risk complaints and a lower appreciation of your product.

3) CONSUMER TEST

It is important to recognise that what you prefer in a cup of coffee might differ greatly from what your customers prefer. This is a primary reason why consumer testing is important. For example, if your customers prefer a darker roast it would be illogical to present them with a light roast, as the heightened acidity may be too much for their palate. Conducting tests with your core customer segment allows you to create a precise definition of the sensory attributes that they will prefer. This can be utilized in the product development process to tailor the products specifically to your target customer audience segment. If there is a disconnect between your product offering and customer preferences, it is unlikely to lead to business success.

4

PREPARE A CUPPING SESSION

"Coffee cupping is a method used to systematically evaluate the aroma and taste characteristics of a sample of coffee beans" (Lingle, 1992).

CUPPING PREPARATION

- **Weigh out 5.5 grams of coffee beans per 100 ml of water**
- **Weigh out samples as whole beans**
- **Grind particle size slightly coarser than typically used for filter coffee**
- **Place a lid on each cup immediately after grinding**
- **Grind immediately prior to cupping, no more than 15 minutes before infusion with water. If this is not possible, cover the samples and infuse not more than 30 minutes after grinding**
- **Prepare at least five cups from each sample to evaluate sample uniformity**

(SCAA cupping protocol, 2009)

We recommend you to wait for the coffee to cool down to below 55°C before starting the cupping. A coffee solution above 55°C will give you a very limited impression of the coffees and risk of scalding your tongue. If you decide to cup with a customer who is interested in buying an expensive specialty coffee, try comparing with a commodity coffee. Remember to allow the coffee to cool, as the customer may not be able to tell any difference between the two coffees at high temperatures.

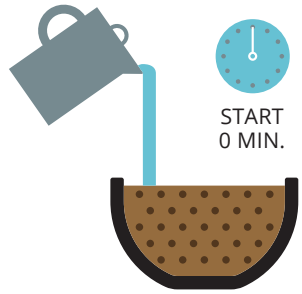
The steps in how to prepare a cup for cupping is illustrated below:

BREW PARAMETERS

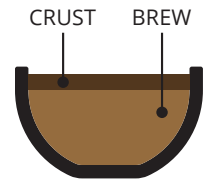
Grind size: Like course sand
Dosage: 5.5 grams per 100ml
Brew time: 4 minutes

Recommended cup size: 180 - 250ml

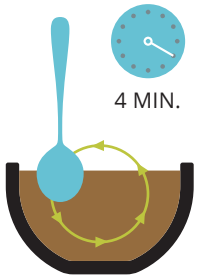
Pour ground coffee into the cup



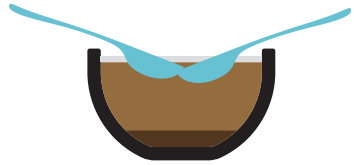
Pour water and start timing



Wait for 4 minutes (brewing)



Break the crust and stir 3 times with a spoon from top to bottom



Remove foam on surface of brew using two spoons

Taste the coffee by taking a small amount only from the surface

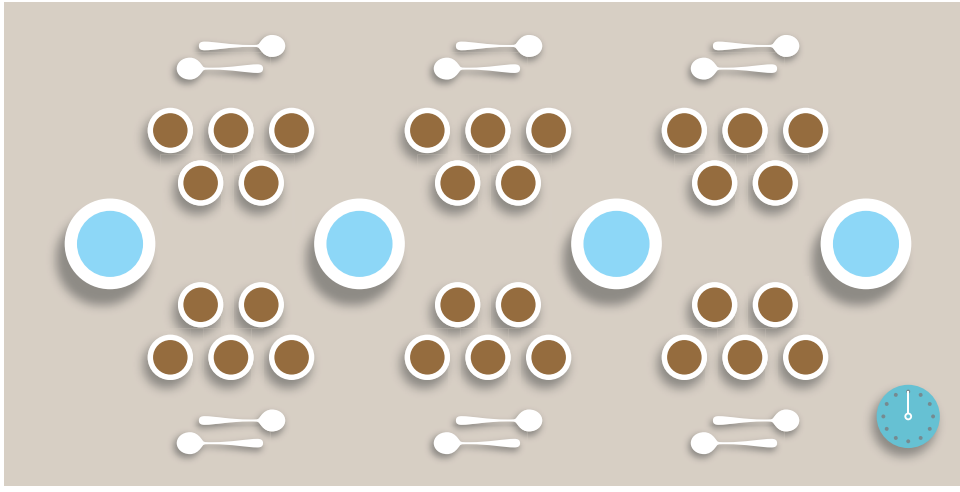
Cupping protocol

4.1 HOW TO SET UP A CUPPING TABLE

The most important aspect to remember when evaluating coffee is to do it 'blind'. Anything you know about the coffee and your previous experience will influence your perception of the sample. Therefore, you should always make sample codes, and also avoid putting either green or roasted beans on the table, as it will influence the judgment of the coffees. For example, if you spot Kenyan coffee beans next to a sample, the chances are that you unconsciously will rate the coffee sample more acidic.

For a blind cupping table set up you will need:

- Five cupping bowls for each sample (to test uniformity)
- Cupping spoons
- Glasses for rinsing
- Tissues
- Timer
- Sample coding



Cupping table

TIP: ***Hygienic cupping***
For a more hygienic cupping session, it is recommended that you use two spoons. The first little spoon that you use is to pour the coffee onto the bigger spoon from where you take the sip. This is to avoid the risk of picking up a cold.

4.2 CORE SENSORY EQUIPMENT

The table below lists suggestions for you to consider as part of your cupping protocol. All of the equipment is not absolutely necessary (e.g. you can do without a thermometer but it is helpful to use for checking brewing temperatures and when the coffees are at the optimum temperature to start cupping) but consider this as a guide to inspire you to furnish your cupping room with relevant equipment.

Roasting Preparation	Environment	Cupping Preparation
Sample roaster	Well lit	Balance (scale)
Handy containers for green sample size	Clean, no interfering aromas	Cupping glasses/ cups with lids
Handy containers for roasted samples size *(e.g. larger volume than green samples and avoid cross aroma tainting)*	Cupping tables	Rinsing bowls
Sample coding *(e.g. three digit random numbers can be obtained from www.randomizer.org)*	Quiet	Cupping spoons
Roast colour reading device	Comfortable temperature	Hot water equipment
Grinder	No distractions *(e.g phones in flight mode etc.)*	Forms and other paperwork
Roast log		Thermometer
		Timer
		Pencils and clipboards

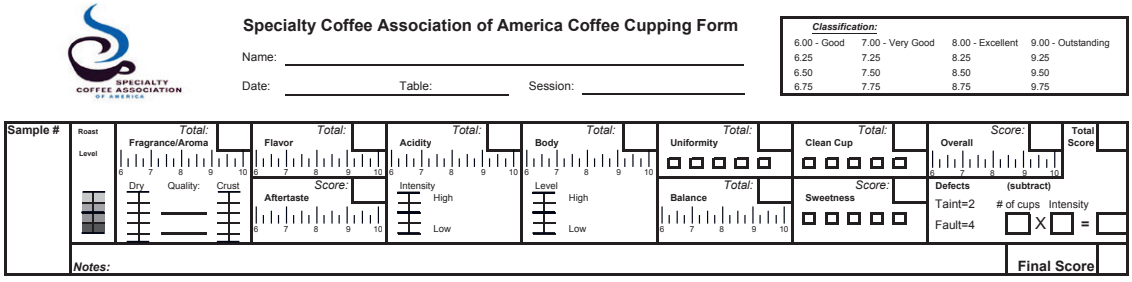
4.3 SCA CUPPING FORM AND PROTOCOL

Many different coffee cupping assessment forms already exist and a lot of companies have developed their own system to evaluate the flavour and quality of their coffees. The most well-known cupping form in the coffee industry is the SCA cupping protocol which is used to evaluate quality. It is also used for Q-grading with the purpose of giving feedback to the producer, and determining price.

When using the SCA cupping protocol, the quality of fragrance and aroma, flavour, aftertaste, acidity, body and balance are rated on a 10-point scale and then aggregated into a total score. Additionally, cuppers are required to mark if any of the five coffee samples are not uniform, clean and/or sweet. If a coffee is marked as not uniform, clean or sweet, two points per cup are subtracted.

HOW TO DEAL WITH DEFECTS

If a defect is identified in a cup, start by judging whether it is a small defect (e.g. a taint) or a more severe defect (e.g. a fault). Thereafter, you can multiply the number of defected cups with either a score of two if a taint is identified, or four points if it is a fault. You can then subtract from the total score, which gives the final score of the coffee. Usually, a taint is described when you can still taste the coffee, whereas a fault is when you can only taste the defect.


Specialty Coffee Association of America Coffee Cupping Form

Name:

Date: Table: Session:

Classification:

6.00 - Good	7.00 - Very Good	8.00 - Excellent	9.00 - Outstanding
6.25	7.25	8.25	9.25
6.50	7.50	8.50	9.50
6.75	7.75	8.75	9.75

Sample # | Roast Level | Fragrance/Aroma (Dry, Quality, Crust) | Flavor | Aftertaste | Acidity (Intensity: High/Low) | Body (Level: High/Low) | Uniformity | Balance | Clean Cup | Sweetness | Overall | Defects (subtract): Taint=2, Fault=4, # of cups X Intensity = | Total Score

Notes: | Final Score

The horizontal quality scales used is following this point system:

Each quality rating is then summarised in the total score. If any of the cups contains defects these are subtracted from the total score and the final score classifies the coffee sample by using the following quality classification system:

Final score: Quality classification		
90-100	Outstanding	Specialty coffee
85-89.99	Excellent	
80-84.99	Very good	
< 80	Below specialty quality	Not specialty

(SCAA Cupping Protocol, 2015)

TIPS IF YOU ARE SCORING FOR THE FIRST TIME:

- If you give all attributes a score of 7 + 30 points (e.g. all cups are uniform, clean and sweet) the coffee score will score 79 points in total, which is just below a specialty grade of 80 points or more.
- If you give all attributes a score of 8 + 30 points (e.g. all cups are uniform, clean and sweet) the coffee will score 86 points in total, which is considered specialty.
- If you give all attributes a score of 9 + 30 points (e.g. all cups are uniform, clean and sweet) the coffee will score 93 points in total, which is considered a very high-quality specialty coffee.

Please note: Specialty starts at 7 points that is defined as 'very good'. Therefore, you may need to adjust your idea of 'good' if you are used to high-end specialty coffees.

CUPPING IN THREE ROUNDS

In total, you should allow for 45 minutes to evaluate your coffee samples on the cupping table and score in three consecutive rounds:

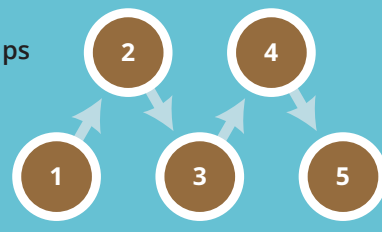
First round:	Evaluate and score aroma, flavour, aftertaste at 70 °C (e.g. between 8-10 minutes)
Second round:	Evaluate and score acidity, body, balance at 60 °C (e.g. between 10-12 minutes)
Third round:	Evaluate and score uniformity, clean cup, sweetness at 40 °C (e.g. between 18-20 minutes)

To avoid palate fatigue, be careful not to 'overcup'. Take only one sip from each cup per round and change direction for each evaluation (e.g. from cup one to five and then back from cup five to one). Try to stay focused and concentrate with no distractions!

BREWING TIPS:

- Calculate how many grams of coffee you need for your cups (5.5 g per 100 ml)
- Weight out the coffee as whole beans
- Grind slightly courser than typically used for filter coffee
- Heat your water to an optimum brew temperature of 92-95°C
- Always pour each cup in an 'M' shape
- Be very careful to add the same quantity of water in every cup
- Be sure that you have enough water for five cups in the kettle
- All brewers should agree to break in the same way, usually three times.

How to set up the five cups of each sample:



What's next?

If you are interested in obtaining an SCA certificate, you can sign up for a SCA Sensory Skills Foundation course. This will give you an opportunity to try most of the experiments explained in this book, and also taste a lot of coffees. We recommend you to practice the detection of the basic tastes and aroma categories before attending a course. The next steps in the SCA certification system are the Sensory Intermediate and Sensory Professional levels. A CoffeeMind curriculum will accompany each course to help you get the most from your investment.

The next Sensory Intermediate level will look more into sensory methodologies, especially discriminative tests as triangle and duo-trio tests, and in general different sensory methods useful in a daily business. At this level you should be able to distinguish different concentrations of the basic tastes and also achieve more precise aroma detection.

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Sød 1
Sød 2
Syre 1


Sød 3
Syre 2
CoffeeMind
Syre 3
Bitter 3

About CoffeeMind

CoffeeMind is a Copenhagen-based Coffee Academy established by Morten Münchow. The Academy provides leading educational coffee courses, as well as invaluable research and consultancy services within the various areas of the speciality coffee industry for individual customers and companies. As a scholar in Biology covering ten years of intense practical and scientific experience, Morten Münchow has gained a deep insight into the various aspects of the speciality coffee industry worldwide to deliver inspirational and effective coffee courses with a high level of expertise.

Ida Steen is passionate about sensory science and has been the sensory scientist of CoffeeMind since 2014. She is currently researching an industrial PhD project with the aim of investigating how to improve sensory performance using specific learning strategies. Ida is an Authorised SCA Trainer (AST) in Sensory Skills and is also involved in the SCA Sensory Skills group. As CoffeeMind's sensory scientist, Ida conducts research for industrial partners, trains CoffeeMind's sensory panel while teaching SCA courses. She consults roaster start-ups and supervises students who carry out research on different aspects of coffee quality at The Department of Food Science in Copenhagen, Denmark.

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