

# Reliable Profiling for Chocolate and Cacao

## Models of Flavour, Quality Scoring and Cultural Profiling

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# History: Blended Bars, Informal Systems

## Past Objectives: Reproducible Profiles

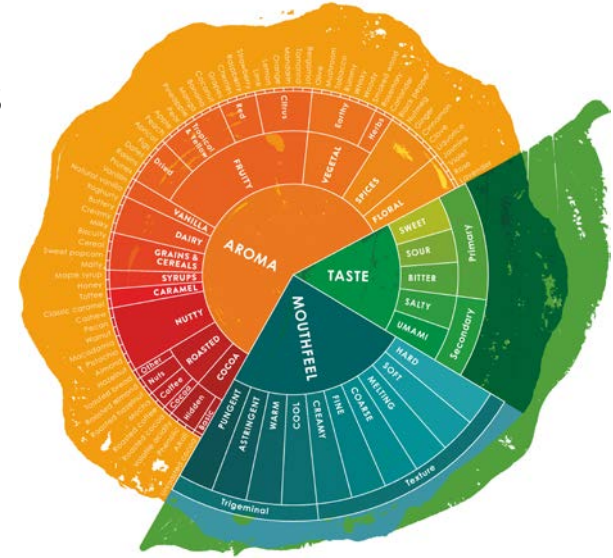
- Fine flavour beans chosen by market/experts
- Mostly bulk beans: emphasis on 'quality'
- Flavour not systematically quantified
- Work focussed on consistency in bulk

## Simple Flavour Representations

- Flavour wheels, often constructed ad-hoc
- Spider diagrams, usually with arbitrary axes
- Text descriptor lists based on expert opinion

## Early Attempts at Scoring

- 'Finger-in-the-air' single marks relying on expert consensus
- Technical scores not based on flavour
- Combination scores with no formal rules



Callebaut Flavour  
Wheel, 2018

# Today: Stratified Markets, Precision Profiling

## Diverse Objectives

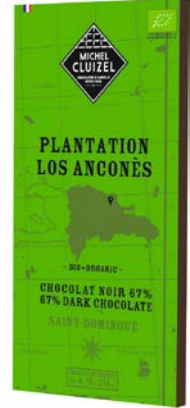
- Consistent assessment of bulk beans
- Rapid field assessment of quality & potential
- Detailed profiling of fine beans
- Sorting into markets

## Needed: Reliable Flavour Profiles

- Systems that mirror human flavour sense
- Systems that classify flavours separably
- Systems usable with minimal prior expertise

## Needed: Reproducible Scores

- Weighted sum of scores
- Statistically significant number of evaluations
- Scores based on factors correlated to actual quality



# IICCT Profiling – Evolved System: Since WCC 2016

## Refined Attribute Map

- Based on PCA of flavours from a neural network model

## Added Defect Map

- Same as attribute map, for defects.  
Still in development

## Structured Routing

- Based on how we taste
- Starts with basic like/dislike
- Asks for progressively refined detail

## Global Quality Score

- Builds a score from exponentially weighted sum of components

# How does it work?

## Level 1: Like/Dislike

- Like/Indifferent/Dislike/Unsure
- (~50% of score)

## Level 2: Level of Like/Dislike

- 1-5 scale from vague to strong like/dislike
- (~25% of score)

## Level 3: Detailed Profile

- Flavour/defect map points
- Scored by +/- points detected
- (~12.5% of score)

## Level 4: Technical Points

- More 'traditional' attributes used by experts
- (~12.5% of score)

English

English

Italiano

Quality score  
0

Quality score  
3.76

Group sessi

My Choco

+ Sar

Befo  
mak

Is th

most  
you r

### Group session sample \*

- Choose a sample/batch |

[Add a new flavour profile](#)

Sample	Date (GMT)	This profile	Personal overall profile	Group	Score	Edit
My Chocolate - My Bar	21/04/18 9:59pm				3.96	<a href="#">Edit</a> - <a href="#">Edit</a>
My	20/04/18				3.96	<a href="#">Edit</a>

Quality score  
4.07

# What do you get?

## Global Score

- Weighted sum from each level
  - 0-4=defective
  - 4-5=commodity
  - 5-7=premium commodity
  - 7-8=fine
  - 8+=world-class

Quality  
score  
5.10

Check  
score  
4.83

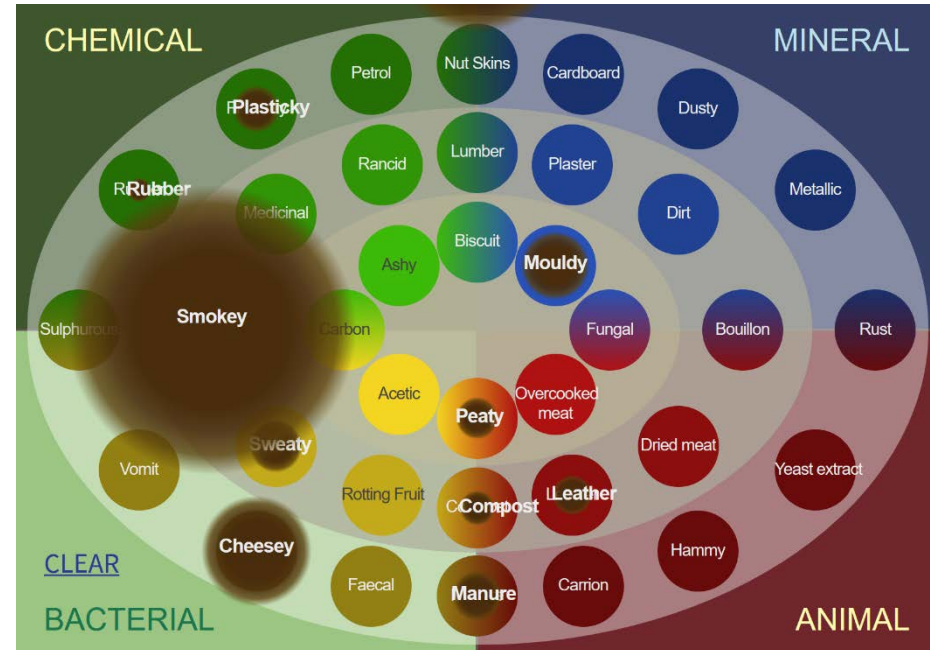
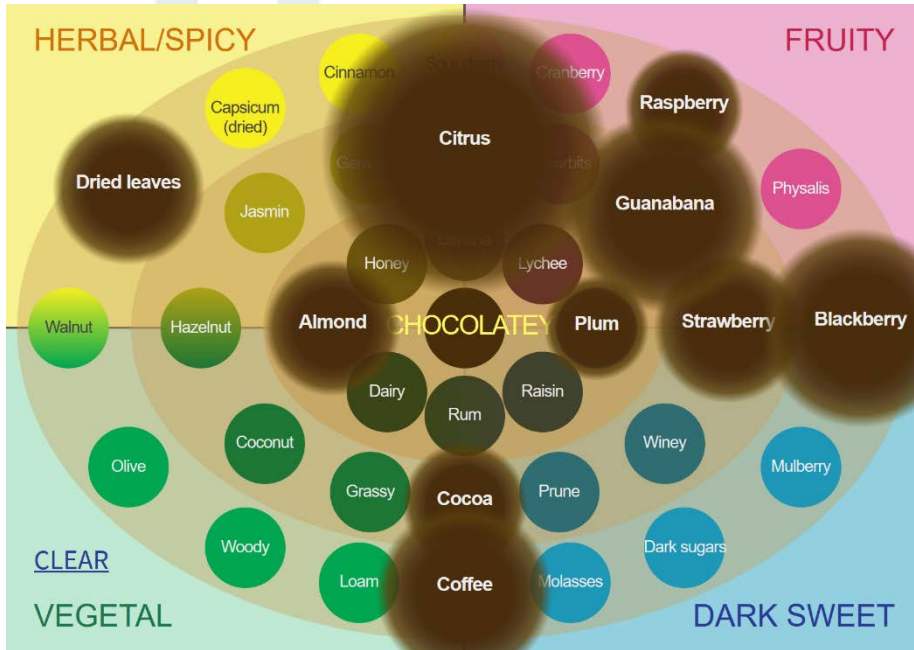
Devia-  
tion  
1.40



# What do you get?

## Aggregate Profile

- Attributes and defects shown as a group summary





# What do you get?

## Technical Marks

- Score and range indicated for characteristics, eg:
  - Acidity
  - Complexity
  - Astringency
  - Balance
  - Bitterness

Balance



Complexity



Distinctiveness



Acidity quality



Astringency quality



Bitterness quality



Sweetness quality

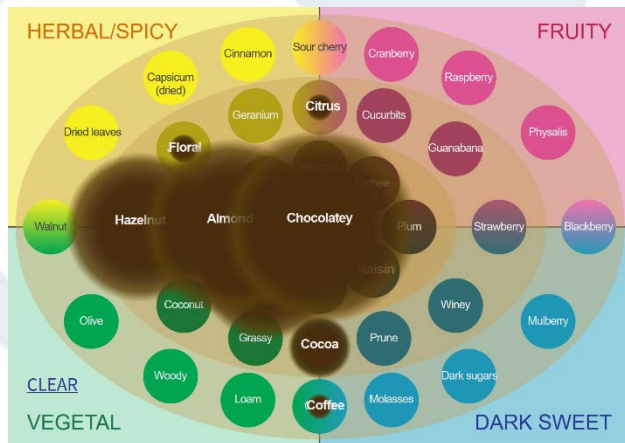


# Data

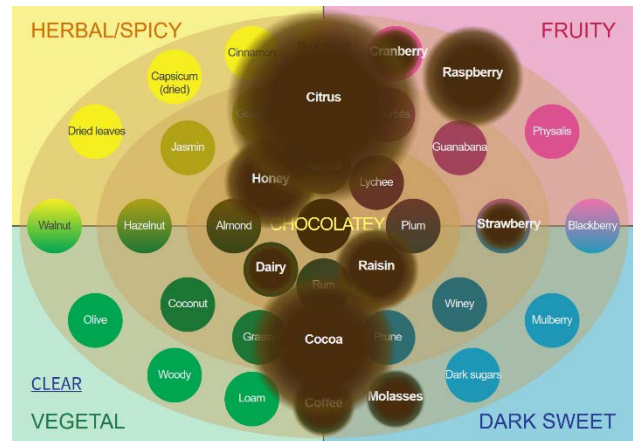
## Build Characteristic Profiles for:

- Origins
- Batches
- Harvests
- Chocolate makers
- Varieties

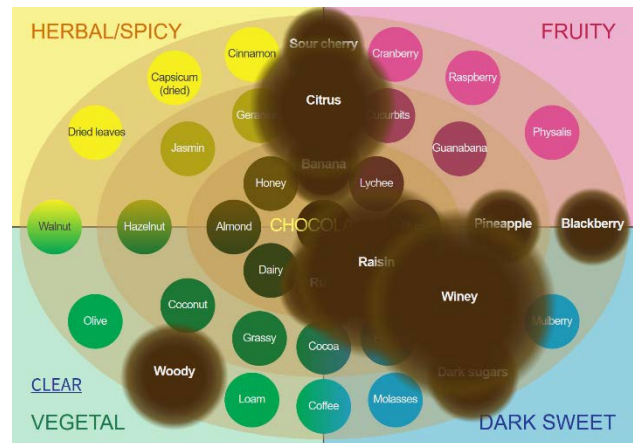
### Ara Chocolat – Porcelana, Venezuela



### Guido Castagna – Madagascar raw



### Shattel – Kimbiri, Peru



# What's next?

La Rifa, Mexico, white bean

## Roll out

- Field use and testing
- Chocolate library beta test
- Personal/group use

## Development

- More sophisticated models
  - Brain pathways
  - Chocolate flavour compounds
- Affective map
  - Associated emotions/feelings
- Improved Chemical Analyses



## Cultural Profiling

Creating a complete marketing package

## Marketing origin: flavour and cultural profiling

- Wholistic and flexible sensory evaluation approach
- Intuitive and visual system, layered design
- Archival reference and marketing tool for growers/makers
- Quality rating and flavour profiling are only one part of a marketing package for cacao
- Genetic, cultural, social, historical and geographical matrix of each cacao is just as important in the fine market

## Marketing origin: flavour and cultural profiling

- Evaluation and profiling exists to help sell quality cacao for a higher price
- New food products without a compelling story to tell have few chances to succeed
- Any evaluation system for cacao and chocolate should:
  - highlight virtues
  - pinpoint problems for corrections
  - provide tools for successful marketing