

## **Sensory Evaluation - definition and use in product development**

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Global Sensory Director**

# Sensory evaluation – definition and use in product development

- 01** Origins and definition of sensory evaluation
- 02** Examples of descriptive sensory methods for use in product development
- 03** Looking beyond liking in product development

# Origins of sensory evaluation

- World War II to the 1960's

*Realisation that just because food was safe and nutritious it was not always accepted. New processing methods changed traditional sensory properties of food. Quality of food was defined by government or industry.*

- 'Principles of Sensory Evaluation of Food' (1965)

*by Amerine, **Pangborn** & Roessler*

*"Our philosophy has been that **sound methodology** for the sensory analysis of foods rests on a thorough knowledge of **sensory physiology** and an understanding of the **psychology of perception**. Essential in addition is careful **statistical design and analyses** of data"*

- 'Quantitative Descriptive Analysis' (1974)

*Stone and Sidel, Tragon Corporation (USA)*

# Sensory evaluation - definition

What is sensory evaluation?

Umh! Show off!

**Sensory evaluation is the application of scientific principles to the measurement, analysis and interpretation of the reaction of assessors to those inherent characteristics of materials as they are perceived by our senses of sight, smell, sound, taste and touch**

# Uses of sensory evaluation

**The primary function of sensory testing in any business is to conduct valid and reliable tests, which provide data on which sound decisions can be made**

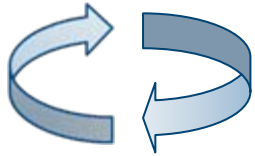
for example.....

- In studying the effects of ingredients, formulations and processes
- For measuring and predicting shelf life
- Quantifying sensory effects eg malodour coverage

**And so sensory evaluation is a useful tool that can be used at all stages of design, development, production, control and marketing of products**

*( Meilgaard, Civille & Carr 1987)*

# Product Development Process



| Ideas & Concepts | Process/ Formulation Development | Specification/ Quality Control | Consumers buy and re-buy |
|------------------|----------------------------------|--------------------------------|--------------------------|
|------------------|----------------------------------|--------------------------------|--------------------------|

Product Intelligence

Descriptive Sensory Profiling

Benchmarking

Market research

Practical Consumer Views

Consumer Guidance Tests

Specifications

Competitor benchmarking

Qualitative Research

Product Optimisation

Troubleshooting/ Taints

Consumer insights

**The sensory characteristics of products are important at all stages of product development and production**

# SE = People + Facilities + Methods

## Where?

Standard conditions

Identical facilities - booth to booth

Reduce biases  
Focus attention

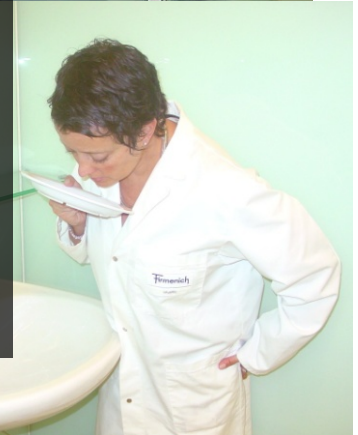
Technically controlled  
vs home use

## Who?

Assessors  
Selected assessors  
Expert assessors  
Experts

Panellists  
Evaluators  
Consumers

Untrained  
Semi-trained  
Trained



**02**

## **Examples of descriptive sensory methods for use in product development**



# Sensory methods fall into three main types

## Discrimination tests

- *Triangle test*
- *Paired comparison*
- *etc*

## Descriptive techniques

- *QDA - Quantitative descriptive analysis*
- *Free choice profiling*
- *Consensus profiling*
- *Time intensity profiling*
- *OPDA – Odour profile descriptive analysis*
- *Similarity scaling*
- *Napping*
- *Flash Profiling*
- *TDS - Temporal dominance of sensations etc*

## Acceptance tests

- *Acceptability and preference*
- *etc*

Are Products Different?

How Do Products Differ?

**'Objective'**



*Linked by statistical tools eg Preference Mapping*



**'Subjective'**

How Well are Products Liked?

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*Linked by statistical tools eg*  
**Preference Mapping**



**'Subjective'**

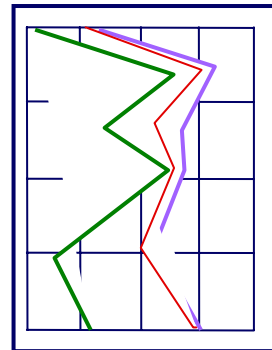
How Well are Products Liked?

# QDA – Quantitative descriptive analysis

# QDA – Quantitative descriptive analysis

02

**A description of the sensory properties of a sample, consisting of the sensory attributes in the order of perception, and with the assignment of an intensity value for each attribute**





**Fatty Savory:**

Taste from animal fat and their breakdown products . Fatty acid, fatty mouth coating. e.g., lard, tallow, butter.

**Fatty sweet:**

Taste from plant fats and oils and their breakdown products. Waxy and citrusy. e.g. citrus, avocado, coconut.

**Fermented:**

Character of fermented fruits, vegetables, or sugars, rotten or spoiled.e.g., overripe fruits, grains, vegetables, beer, cider.

**Fermented Fish:**

Amine, animalic, rotten character. Product with an overwhelming fishiness due to the natural fermentation of mackerel, croaker, herring, catfish. e.g., fermented haring.

**Fishy:**

Characteristic odor of fish and seafood. Fresh fish have a slightly green odor. Sometimes more pronounced and unpleasant notes increase with exposure to heat and air. e.g., fish, seafood.

**Flochy:**

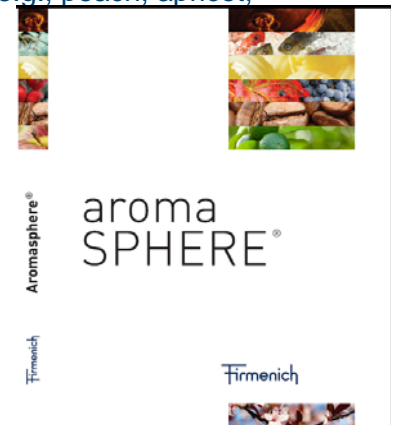
Taste characteristic given by the soft, juicy or pulpy part of a fruit. e.g., peach, apricot, cherry.

✓ The aromaSPHERE® encompasses **155 sensory descriptors to name/describe products attributes:**

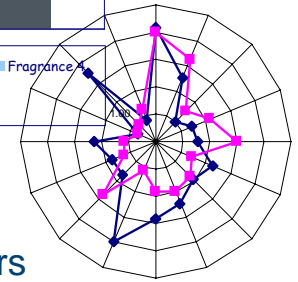
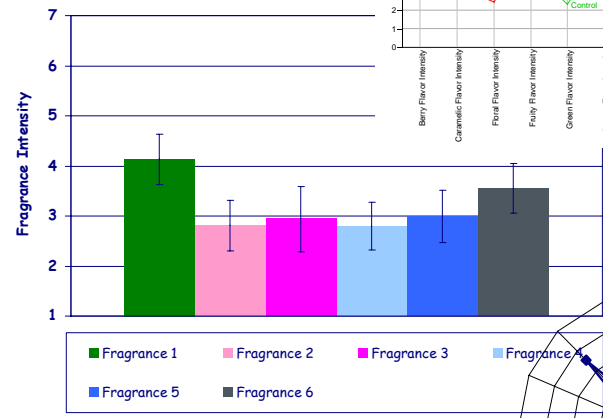
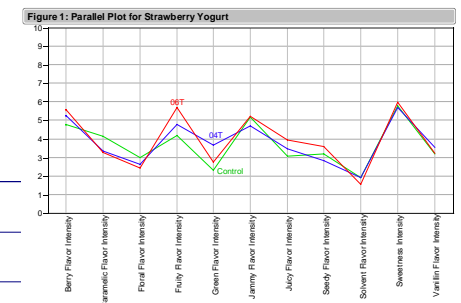
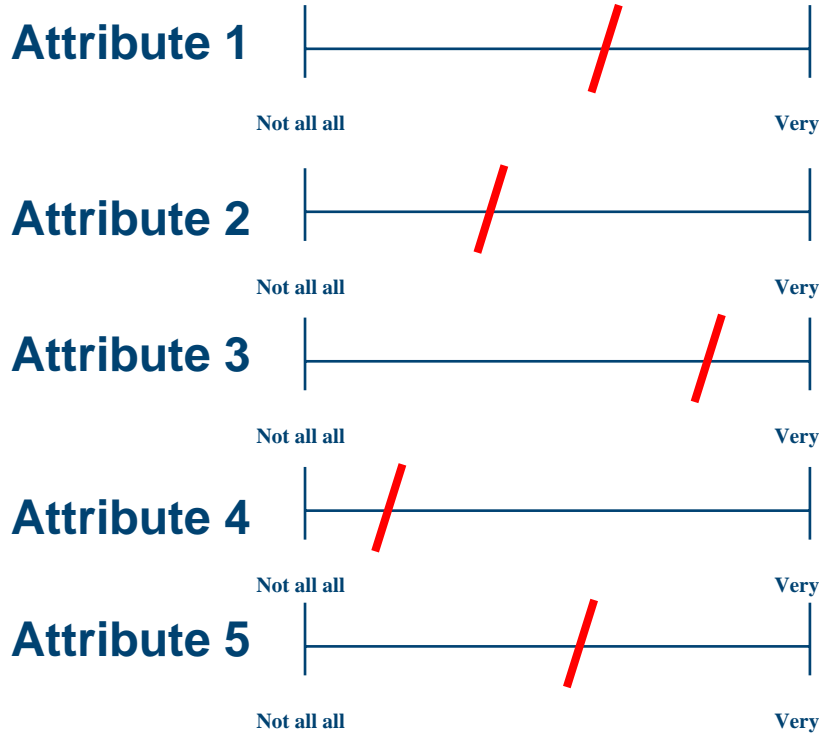
✓ A set of **standard references** ensures that the same olfactive sensation is systematically described by the same flavor attribute/descriptor.



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# QDA – Quantitative descriptive analysis



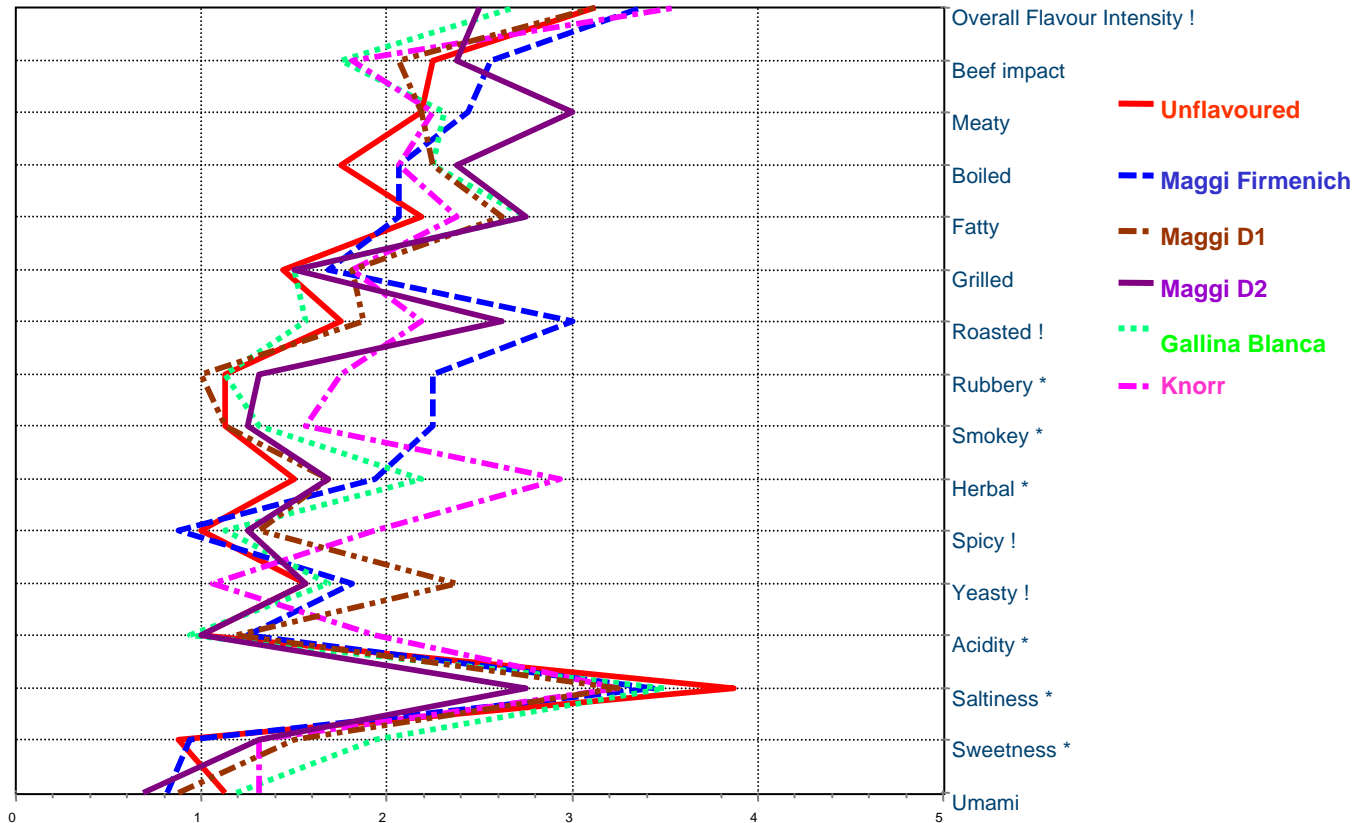
x replicates  
x number of assessors



## Advantages of a common language in product development/improvement

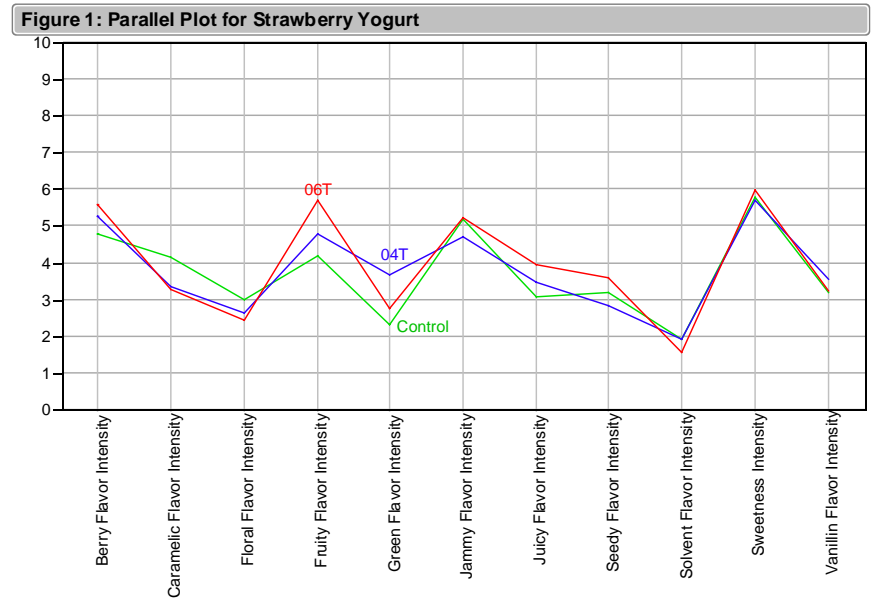
*Familiarize our clients with our vocabulary/references...*

Overall Flavour Intensity  
 Beef impact  
 Meaty  
 Boiled  
 Fatty  
 Grilled  
 Roasted  
 Rubbery  
 Smokey  
 Herbal  
 Spicy  
 Yeasty



## Advantages of a common language in product development/improvement

| Attribute | Sample            |                    |                    | P-Value |
|-----------|-------------------|--------------------|--------------------|---------|
|           | Control           | 04T                | 06T                |         |
| Berry     | 4.81              | 5.26               | 5.59               | 0.2633  |
| Caramelic | 4.17              | 3.35               | 3.28               | 0.3524  |
| Floral    | 3.00              | 2.63               | 2.45               | 0.6259  |
| Fruity    | 4.22 <sup>B</sup> | 4.79 <sup>AB</sup> | 5.70 <sup>A</sup>  | 0.0445  |
| Green     | 2.32 <sup>B</sup> | 3.70 <sup>A</sup>  | 2.76 <sup>AB</sup> | 0.0699  |
| Jammy     | 5.21              | 4.72               | 5.24               | 0.6968  |
| Juicy     | 3.08              | 3.47               | 3.95               | 0.2495  |
| Seedy     | 3.19              | 2.84               | 3.60               | 0.5308  |
| Solvent   | 1.94              | 1.92               | 1.56               | 0.6705  |
| Sweetness | 5.81              | 5.71               | 5.98               | 0.8117  |
| Vanillin  | 3.19              | 3.57               | 3.25               | 0.8193  |



Give precise information to flavourists / application technologists for product fine tuning.

In example, to be closer to the control, significantly reduce green note of 04T and significantly reduce fruity note of 06T



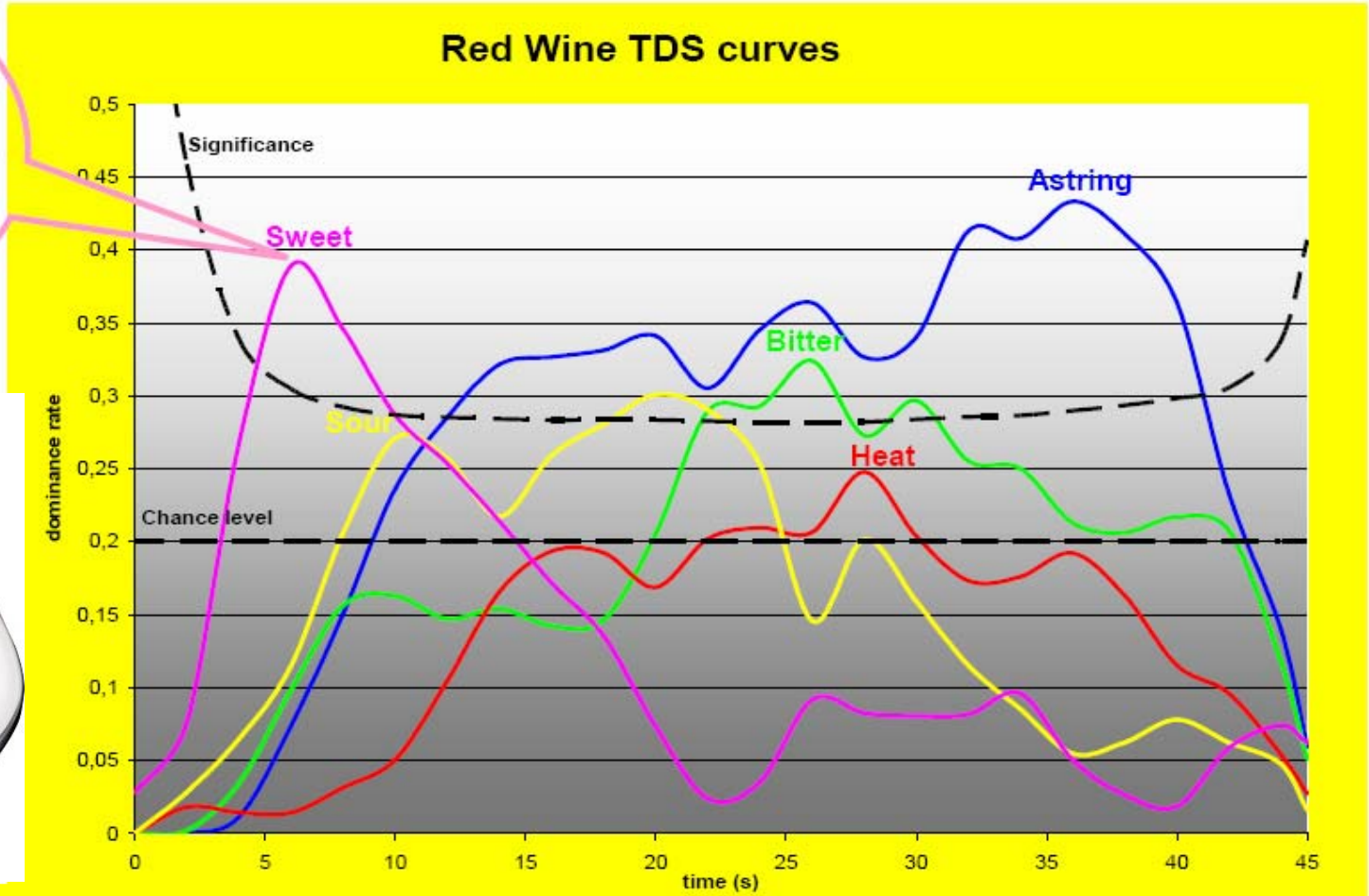
- ❖ Define the sensory properties of a target product for new product development
- ❖ Define the characteristics (specification) of a control or standard, for QA/QC and R&D applications
- ❖ Describe product attributes prior to consumer testing
- ❖ Track sensory changes over time to understand shelf-life, effect of packaging ...
- ❖ Map sensory attributes to relate to instrumental, physical and chemical properties, and also to consumer preference or acceptability
- ❖ Aid communication between departments

# TDS Temporal dominance of sensations



# TDS - Temporal dominance of sensations

At 6 seconds, 39% of the subjects perceived sweet as the dominant sensation in this wine



P Schlich Centre Européen des Sciences du Gout, France

The wine is first sweet, then sour and finally dominated by strong astringency and some bitterness

# PrefMap - Preference Mapping

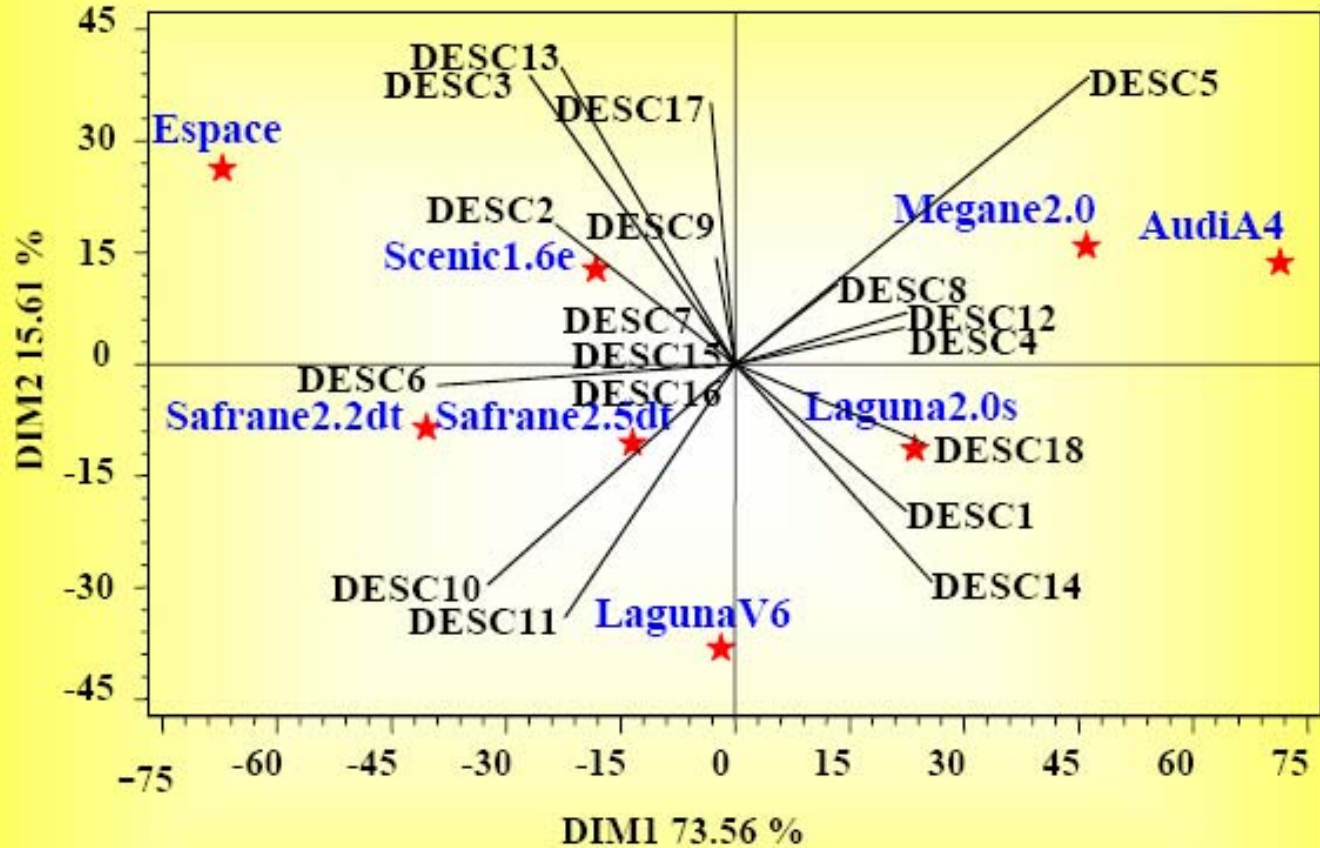




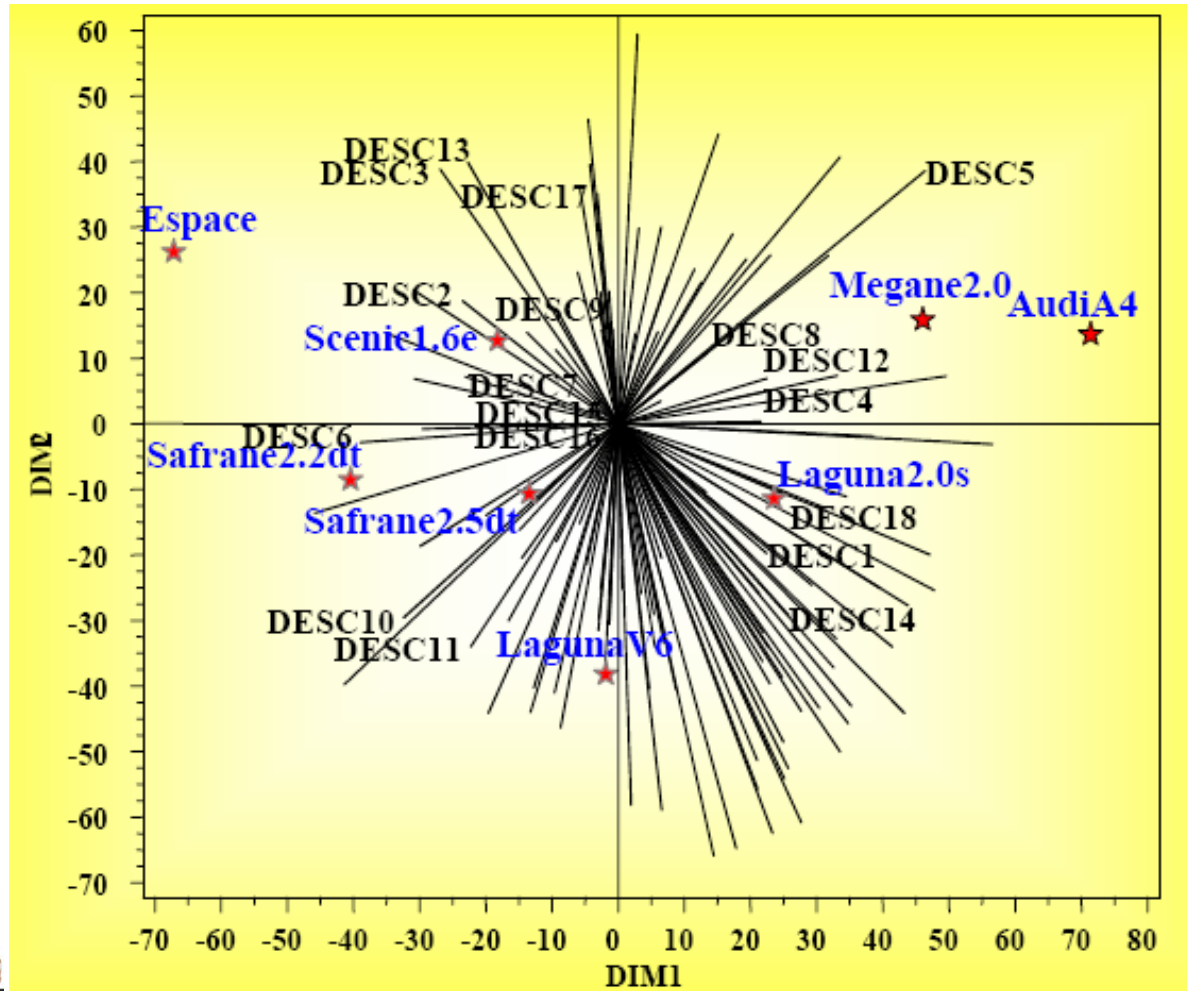
## A study on car braking perception

- 8 cars – same manufacturer, different models
- 18 attributes related to braking performance (noise, speed, vibration etc)
- 9 professional drivers ('the sensory panellists')
- 112 consumers drove each car and gave a liking score of braking sensation
- Study by Pascal Schlich, Centre Européen des Sciences du Gôut, France

# PCA of braking profile by professional pilots



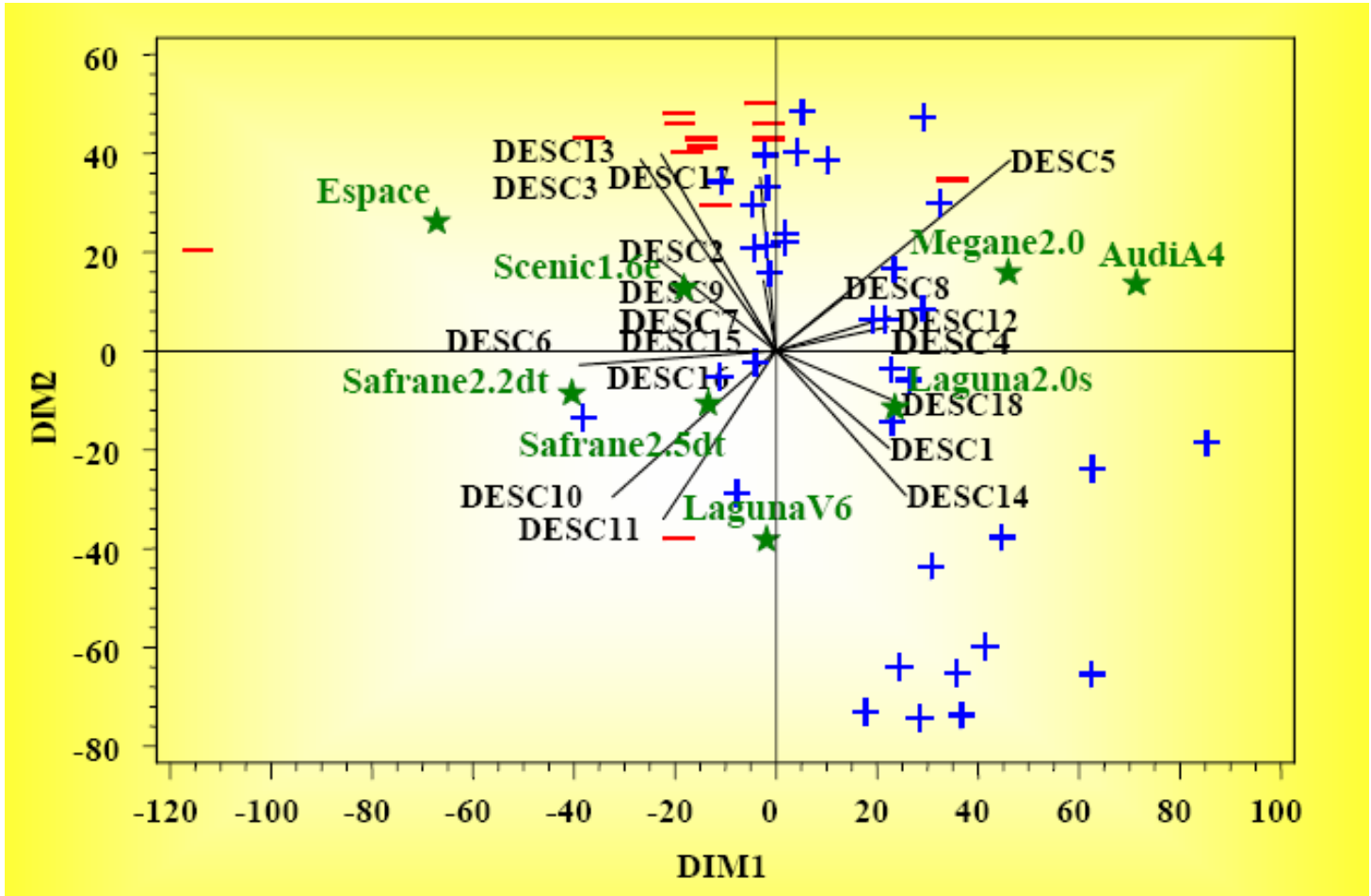
# External Preference Mapping by Vector Model



P Schlich Centre Européen des Sciences du Gout, France

Each arrow indicates the optimal sensory direction for a given consumer. The length of the arrow is proportional to the quality of fit

# External Preference Mapping by Circular Model



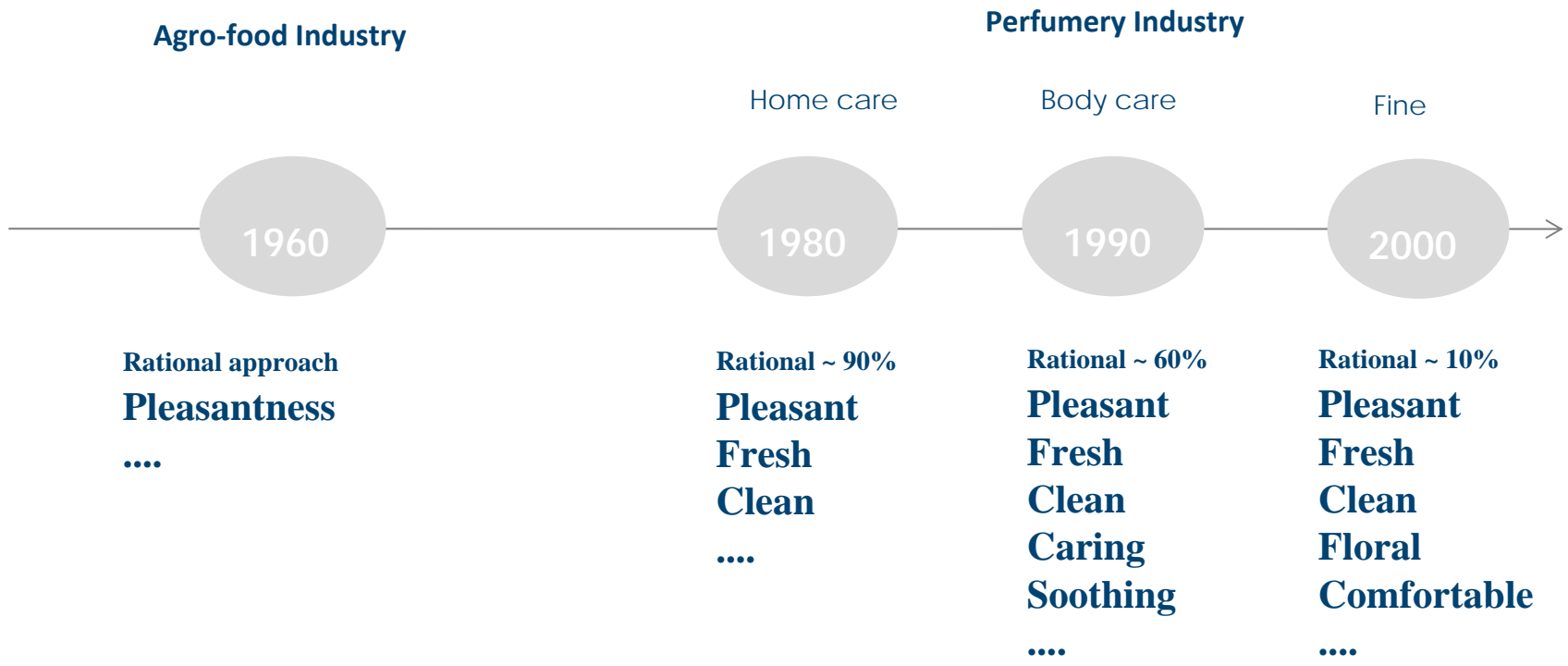
P Schlich Centre Européen des Sciences du Gout, France

Each + sign (resp. - sign) locates the ideal car (resp. anti-ideal car) of a given consumer. Consumers with non significant regression are not represented

**03**

## Looking beyond liking in product development

# Consumer and sensory research development in Perfumery



“functionality” to “emotionality”



# 4 dimensions of fine fragrance success

## APPROPRIATENESS

- EMOTIONAL APPROACH LINKED TO FRAGRANCE EVOCATION
- LINGUISTIC
- CATEGORIZATION

## Addictive Quality

The more I wear it, the more I like it..  
It's me....  
It makes me feel ....

## Likeability

I like it  
I would wear it...  
....

## QUALITATIVE & QUANTITATIVE

- CONSUMER TESTS
- SNIFF & USE tests
- ETC.....

Long lasting successes

## Uniqueness

Signature  
Personality  
Newness  
Mémorability

## Performance

Strength  
Long lastingness  
«Sillage» (diffusion)  
....  
....

## SENSORY ANALYSIS

- STRENGTH TEST
- LASTING TEST
- DIFFUSIVITY TEST
- DESCRIPTIVE

## IDENTIFY MEMORABLE FRAGRANCES

- MEMORI TEST (Test the fragrances' memorability)

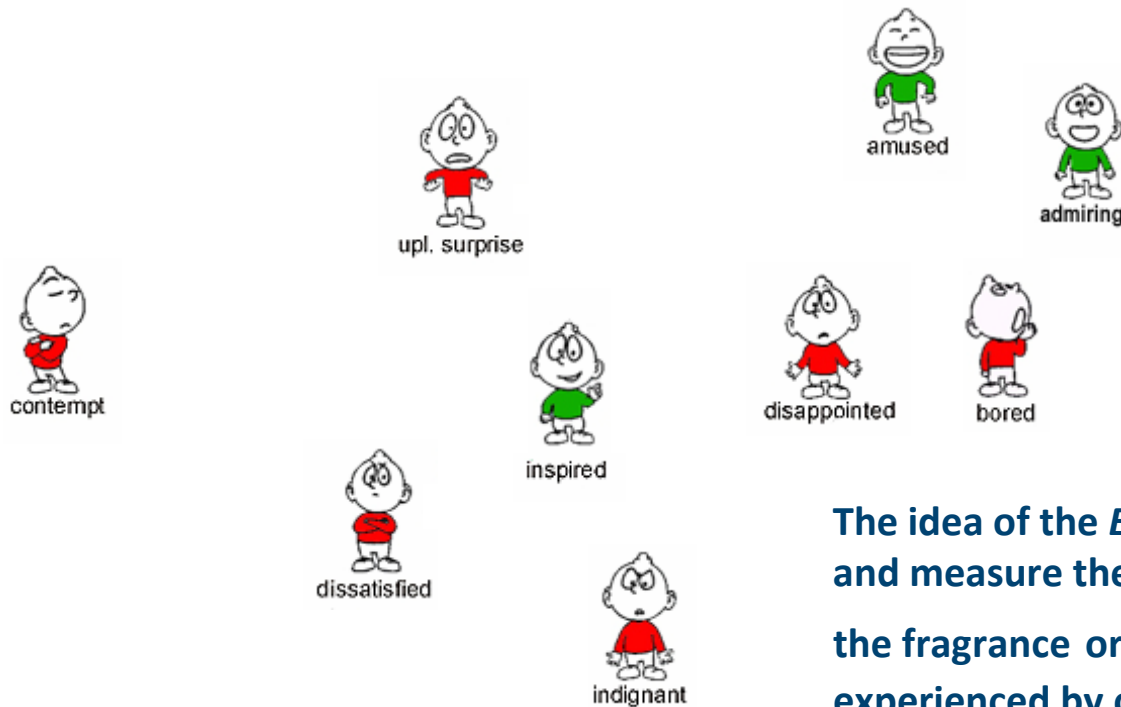
Need to develop specific tools dedicated to the measurement of each dimension

# Emotional profiling of brands and fragrances

03

Emotional equities profiling of brands and fragrances – achieving brand/sensory consonance

David Thomson, Chairman, MMR, Wallingford, UK ([www.mmr-research.com](http://www.mmr-research.com))



The idea of the *Emotional profiling* is to describe and measure the emotional equities **projected by** the fragrance or brand – not the emotions experienced by consumers in using/ owning the fragrance or brand

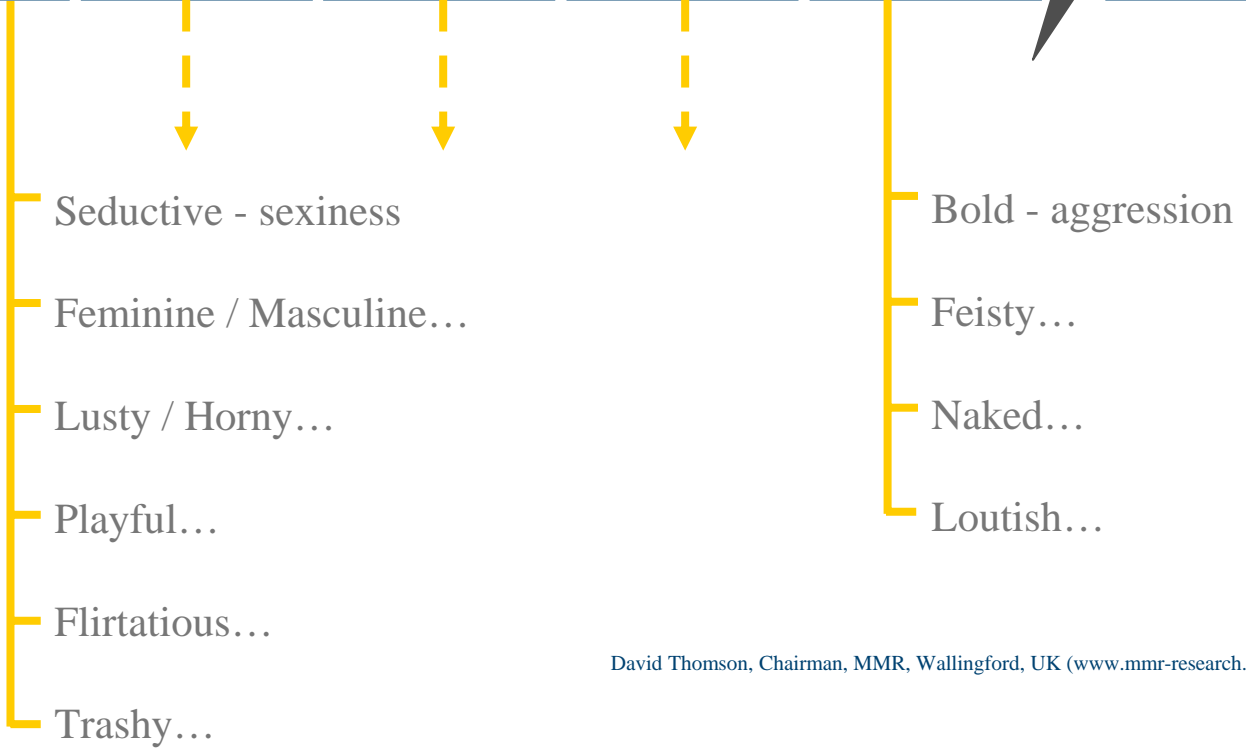
# Emotional profiling principle 1: Two-tier *Emotionalexicon*

The idea of the *Emotionalexicon* is to describe the emotional equities **projected by** the fragrance / brand – and so they have to be worded accordingly

## Tier 1



## Tier 2



David Thomson, Chairman, MMR, Wallingford, UK ([www.mmr-research.com](http://www.mmr-research.com))

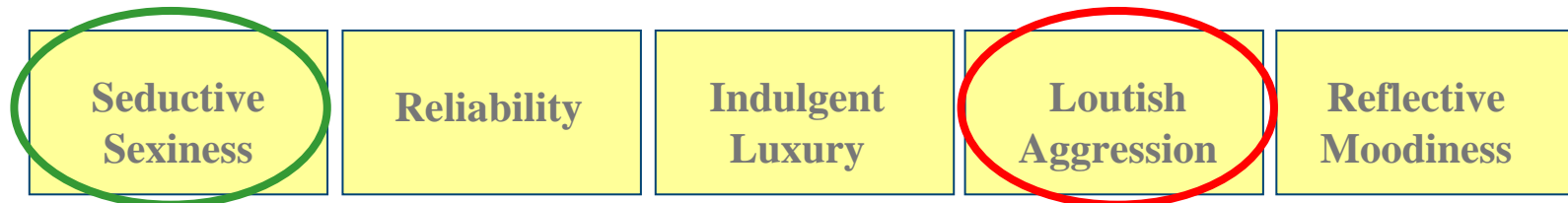
# Emotional profiling principle 2: Measurement using choice-based research tools

What does this fragrance suggest to you?

*(Best/Worst Scaling)*

**MOST**

**LEAST**



David Thomson, Chairman, MMR, Wallingford, UK ([www.mmr-research.com](http://www.mmr-research.com))

# Principle 2: Measurement using choice-based research tools

What does this fragrance suggest to you?

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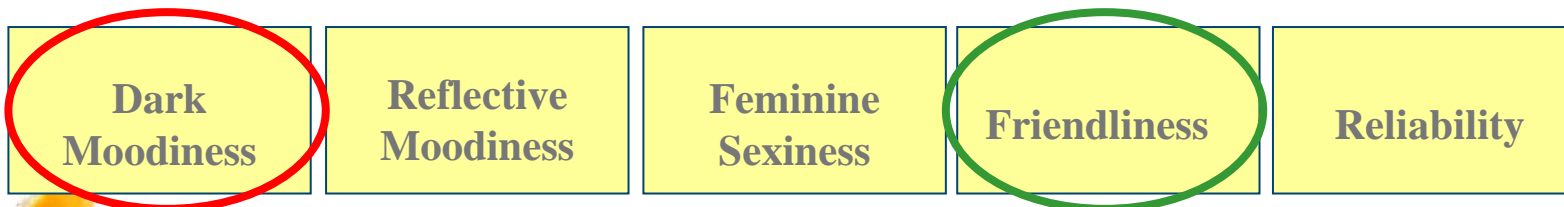
**MOST**

**LEAST**



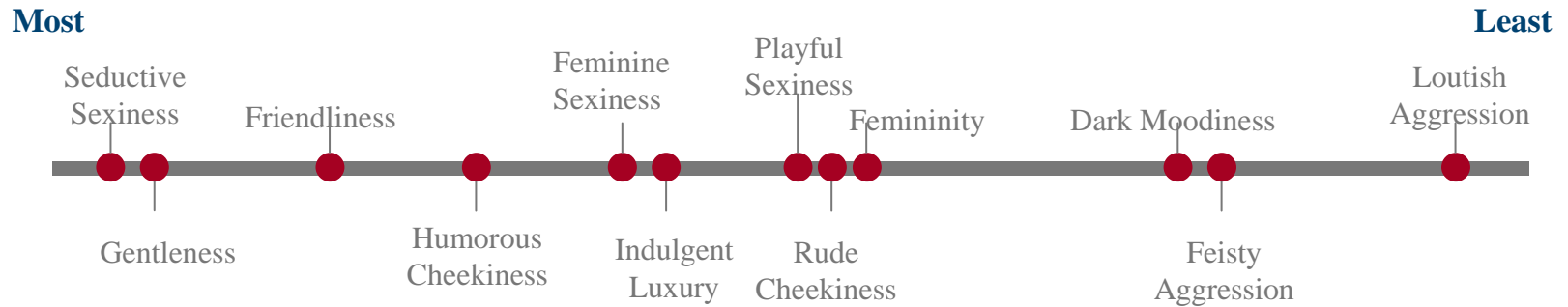
**LEAST**

**MOST**



# Emotional equities communicated by the fragrance

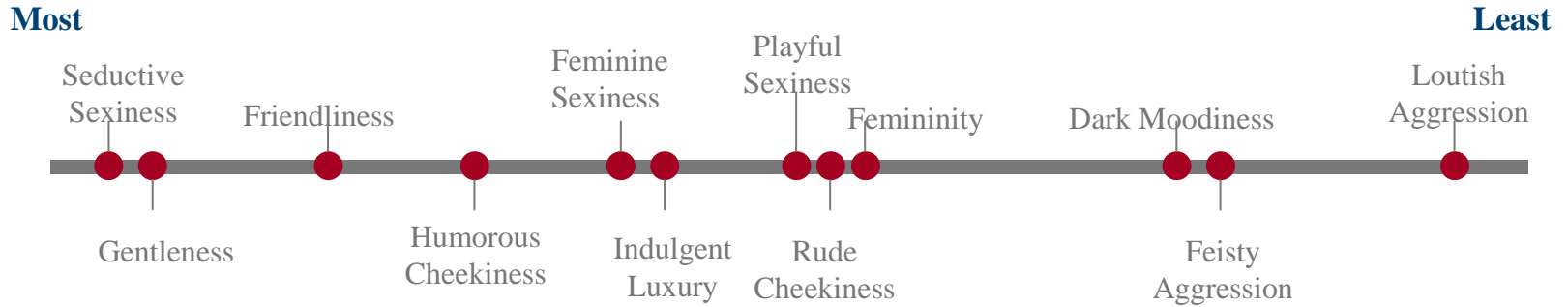
## Fragrance 1



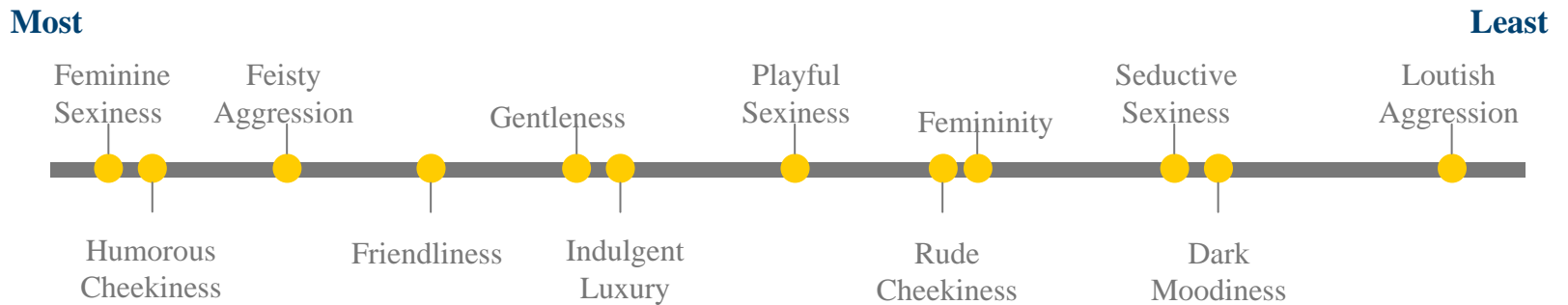
David Thomson, Chairman, MMR, Wallingford, UK ([www.mmr-research.com](http://www.mmr-research.com))

# Emotional equities communicated by the fragrances

## Fragrance 1



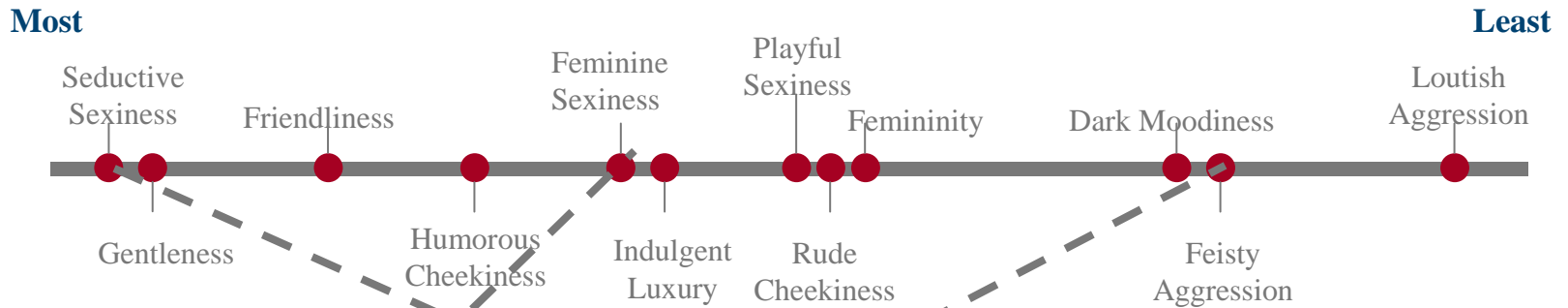
## Fragrance 2



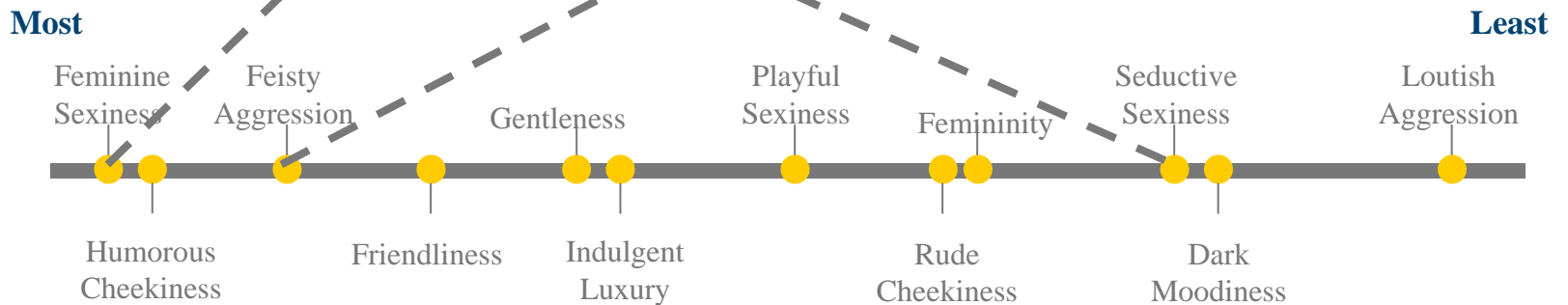
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# Emotional equities communicated by the fragrances

## Fragrance 1



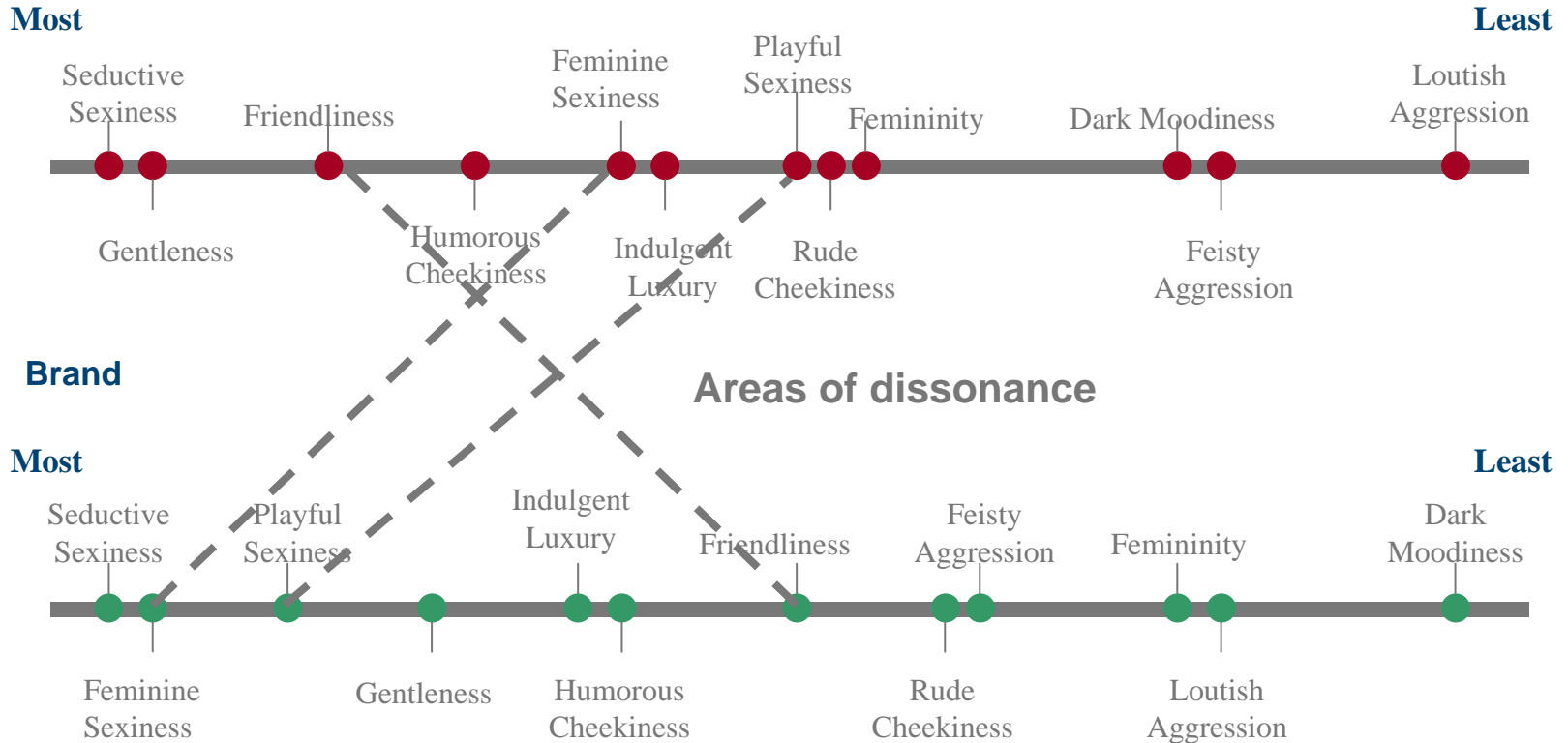
## Fragrance 2



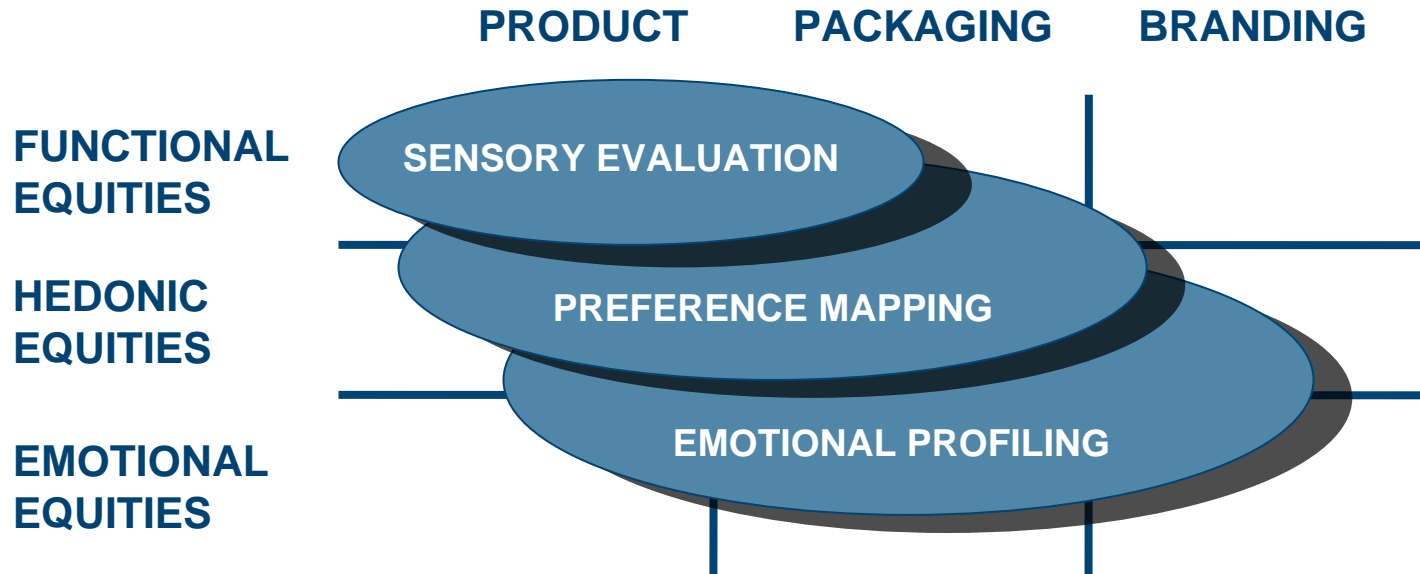
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# Brand/Sensory Consonance

## Fragrance 1



**The fragrance is not communicating feminine and playful sexiness in line with brand expectations. It is also over representing friendliness – these are the major areas of brand/sensory dissonance**



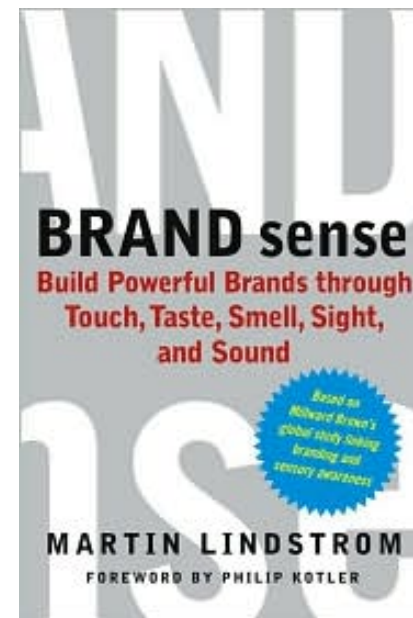
## Benefits of Using Sensory Evaluation in Product Development

- Better understanding of product behaviour
- Identifies sensory characteristics driving consumer preference
- Aids product optimisation
- Shorten development lead times

# Finally..... remember

- Sensory = haptics, optics, acoustic, olfaction, taste
- Sensory interaction: the senses do not act independently
- Success (product and brand) = sensory satisfaction at all levels\*

*\* “multi-sensory is the collective impact of all the signals we receive across our five senses upon both the conscious and our subconscious mind”*





**THANK YOU !**