

From Sensory to « Censory » data, the inevitable drift

Me, Myself and I

S. Lê - L'Institut Agro Rennes - Angers

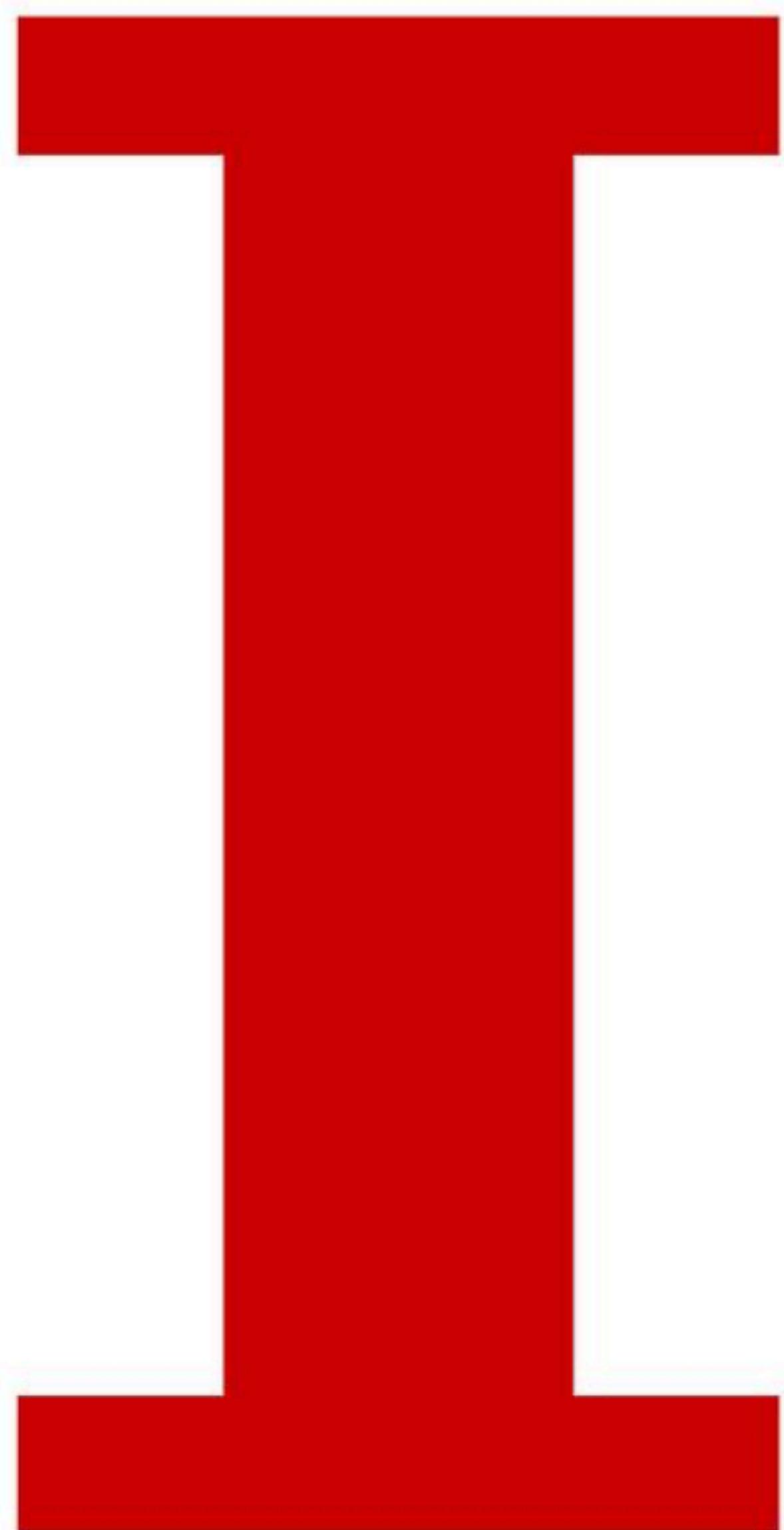
« Censory » data

The inevitable drift

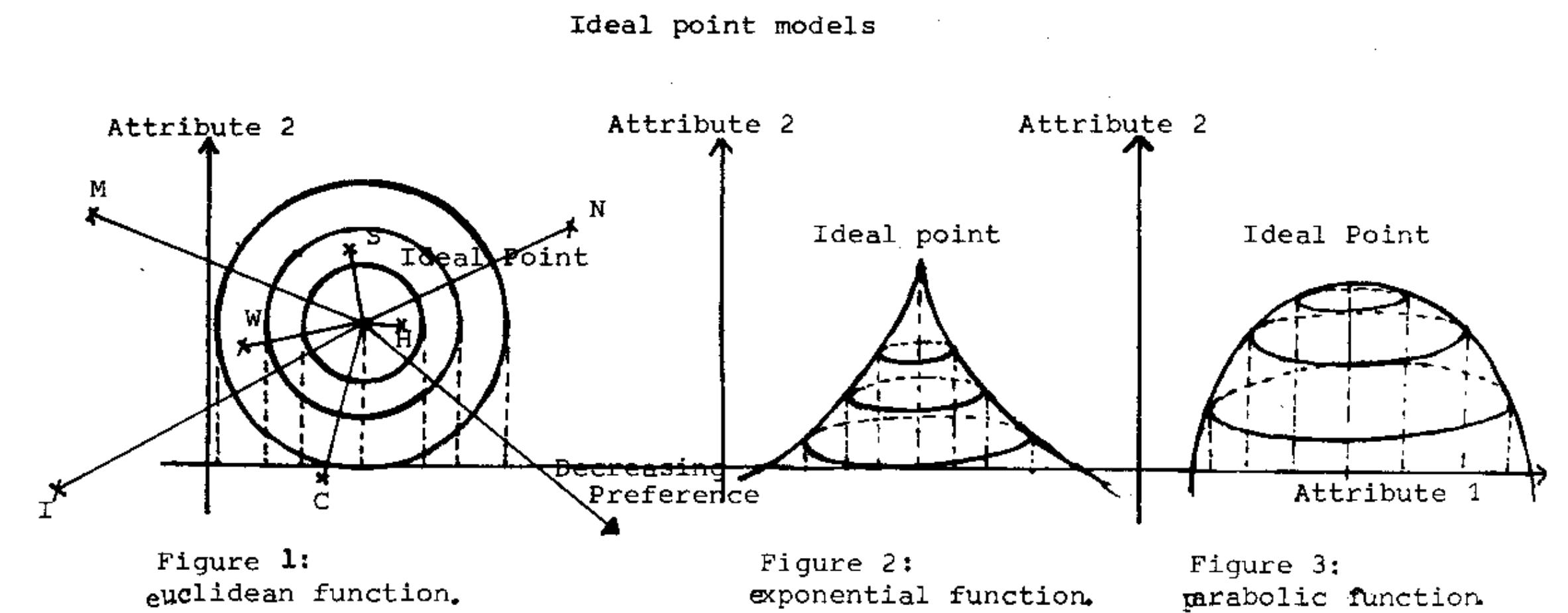
- During the last two decades a new model has emerged in which the Consumer plays an ever greater role in product development.
- This change of paradigm has led to new ways of getting sensory information, as the consumer was constantly giving their opinion during the process of developing a new product.
- Hence the idea of « Censory » data, a word coined to express the notion of sensory data provided by the Consumer.

Outline

- Ideal, Ideal point, Ideal product, Imaginary product
- Immense, Influence
- Individual differences
- Influence (nudge), Implicit
- Intelligence, Interpretability
- Implicit



Me, myself and I
I for Ideal, Ideal point, Ideal product, Imaginary product



Genius is talent provided with ideals. (W. Somerset Maugham)

The ideal pair method



Ideal product, Imaginary product

The Ideal Profile Method : a quick reminder

- 3 pieces of information are collected from (usually) a consumer panel, amongst which 2 are “classical”, a third one very original
 - Sensory profile
 - Hedonic data
 - A description of their ideal, each time consumers taste a product
(very important to assess the reliability of the data)

The Ideal Pair Method, an Alternative to the Ideal Profile Method Based on Pairwise Comparisons

- To adapt the Ideal Profil Method to make it accessible for children How can we ask children to describe products and in particular an **imaginary** product such as their ideal product ?

The Ideal Pair Method, an Alternative to the Ideal Profile Method Based on Pairwise Comparisons

- To adapt the Ideal Profil Method to make it accessible for children
 - 辣椒 How can we ask children to describe products and in particular an **imaginary** product such as their ideal product ?
 - 辣椒 辣椒 How can we be sure that they understand the concept of **ideal** product ?

Wear perfume wherever you want to be **kissed!**

Coco Chanel

- 105 children ranging from 5 to 11 years old
- Complex products : 7 fragrances (perfumes for kids) + the **ideal product** (materialized with an empty brown flask)



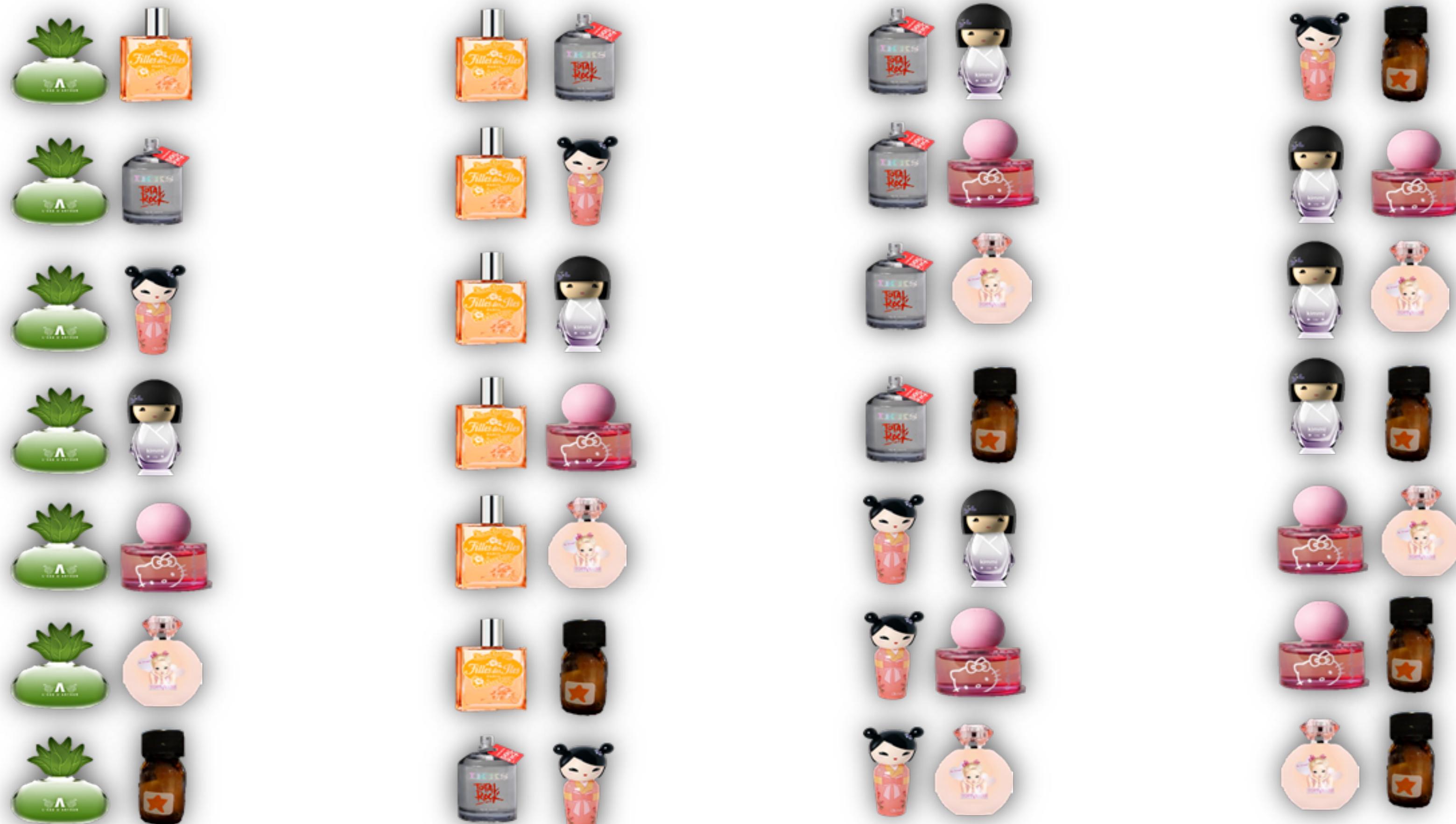
- 8 olfactory & sensory descriptors

Ideal product, Imaginary product



How can we ask children to describe products and in particular an **imaginary** product such as their **ideal** product ?

The pairs...



Ideal product, Imaginary product

The pairs...



Ideal product, Imaginary product

A gamification based on cooperation



Ideal product, Imaginary product

A gamification based on cooperation

- 8 sensory descriptors represented by cards
- 5 pairs per kid
- 2 red/green stickers
- 1 hedonic stair to climb

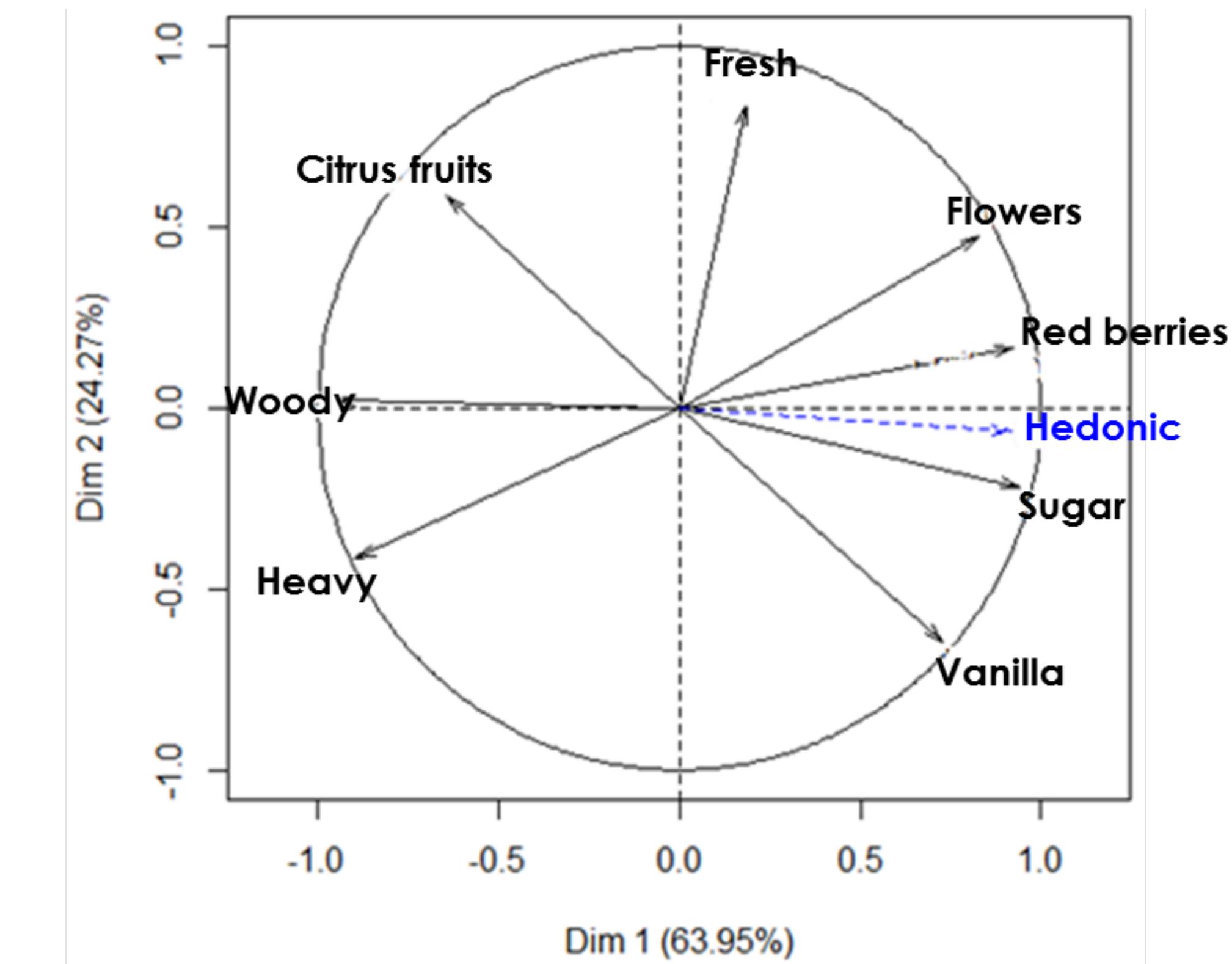
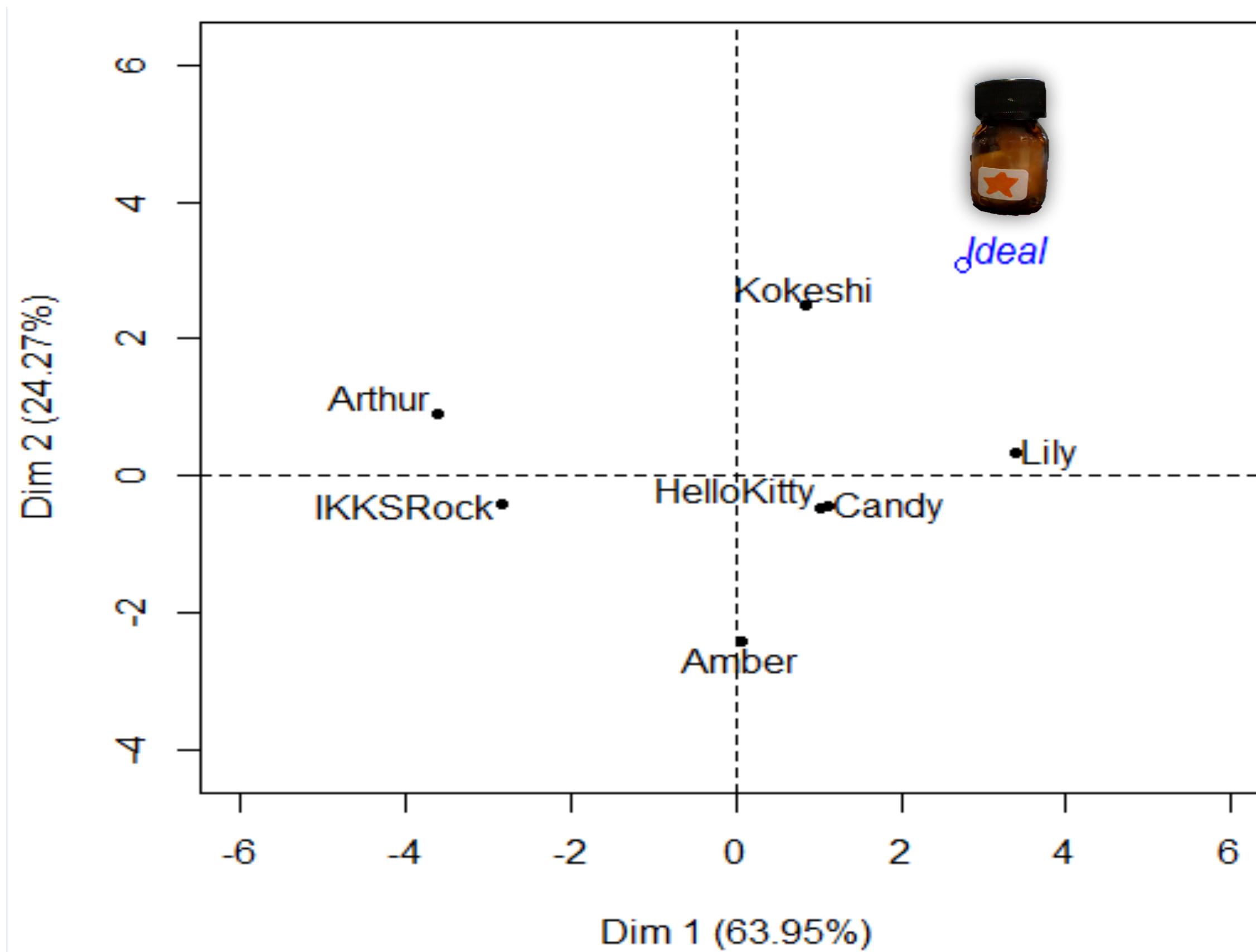


A Bradley-Terry model for each descriptor...

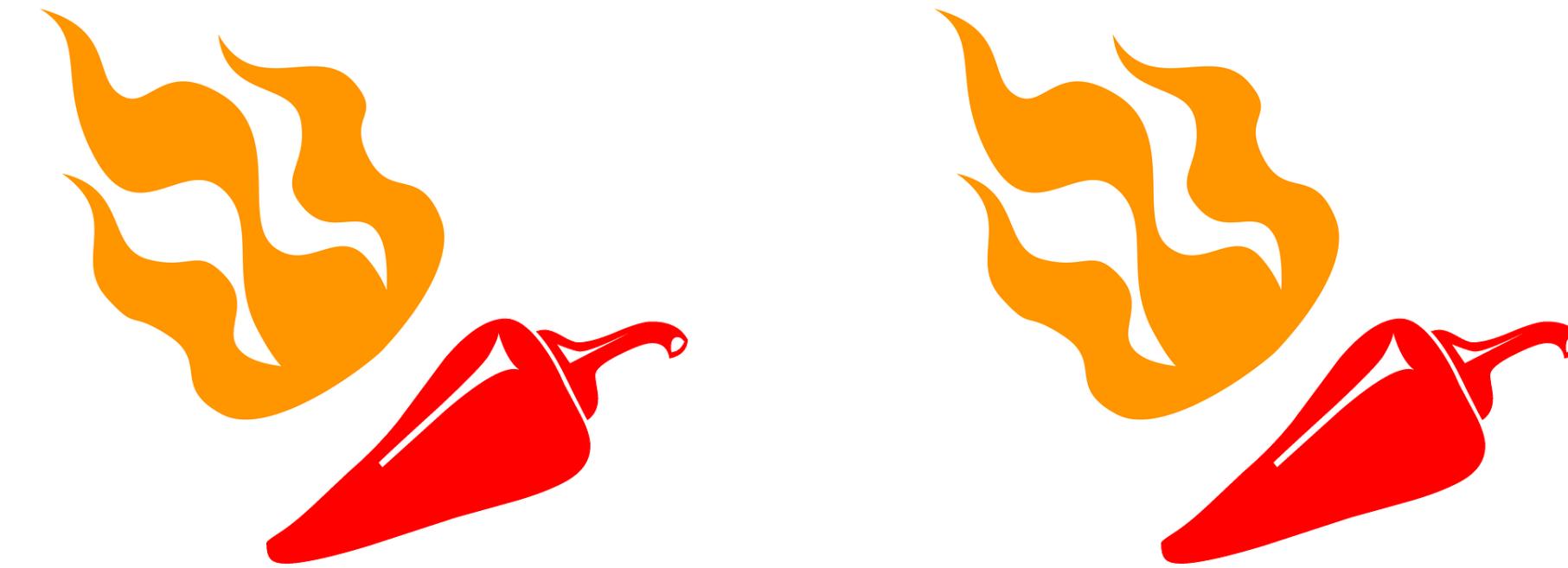
	Descriptor 1	...	Descriptor M
Product 1			
Product i		ability of i	
Product I			

**Quantitative
data**

...to get a sensory profile of the products



Ideal product, Imaginary product



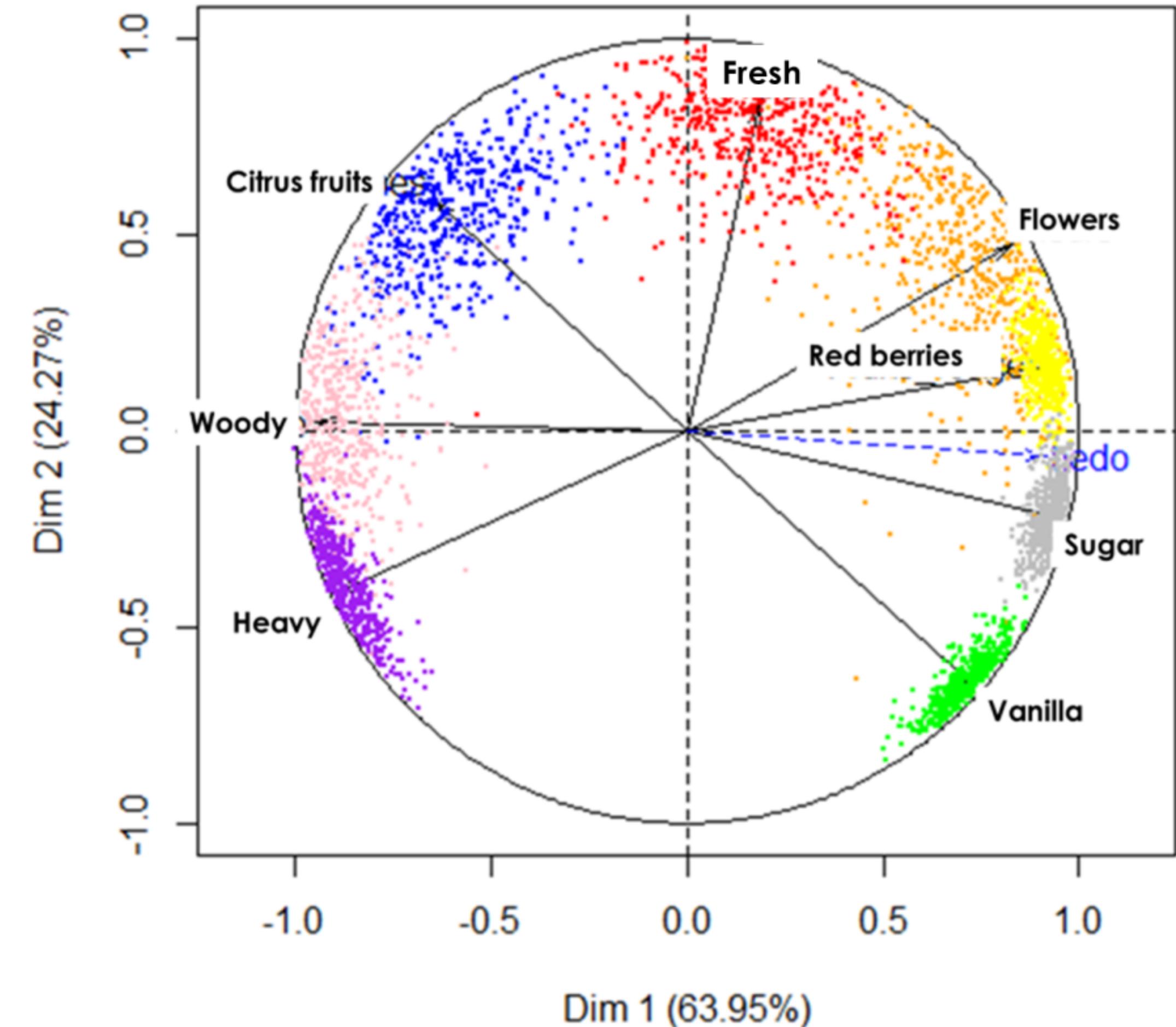
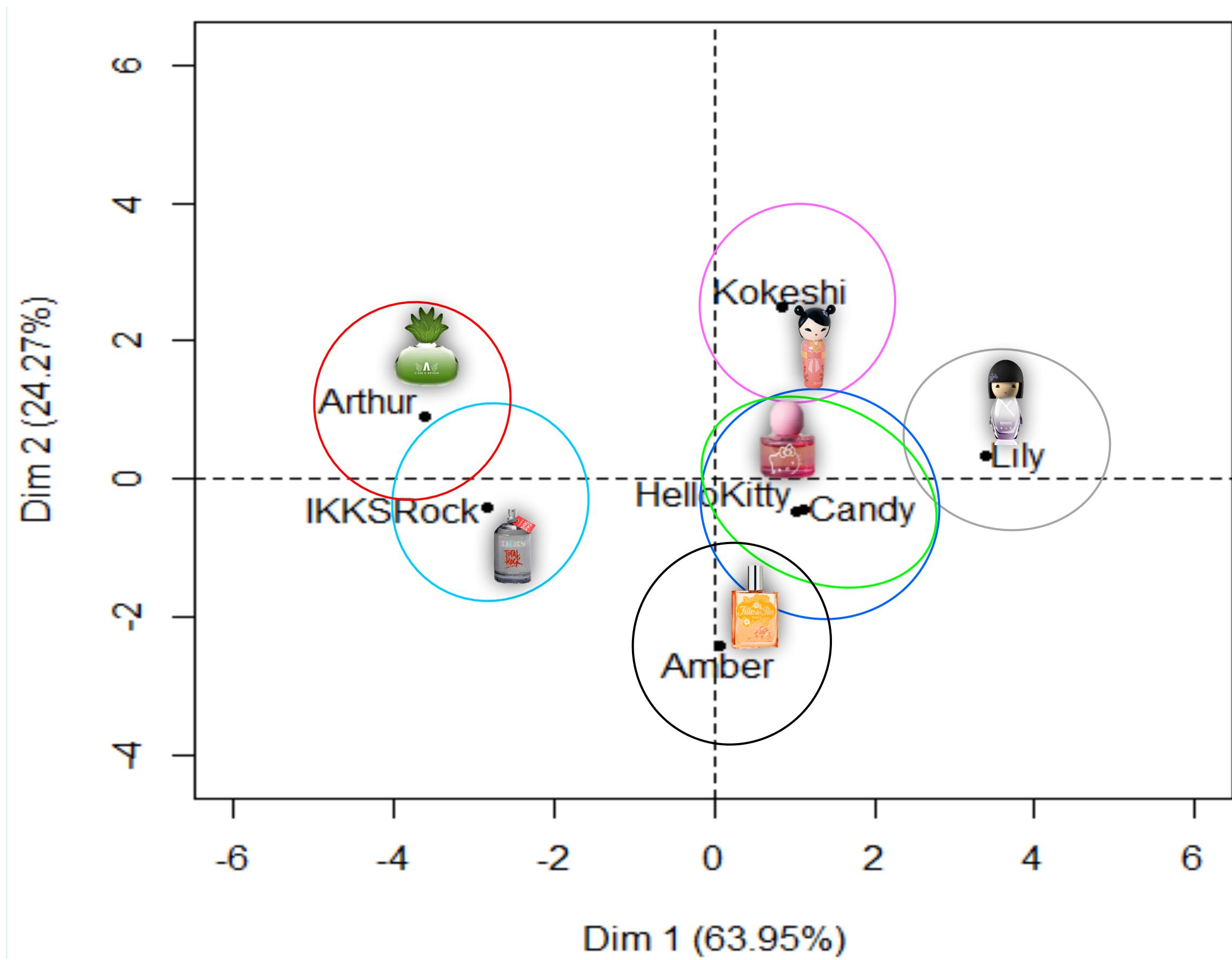
How can we be sure that they
understand the concept of **ideal**
product ?

Bootstrap / Resampling techniques



Ideal product, **Imaginary** product

Sensory stability

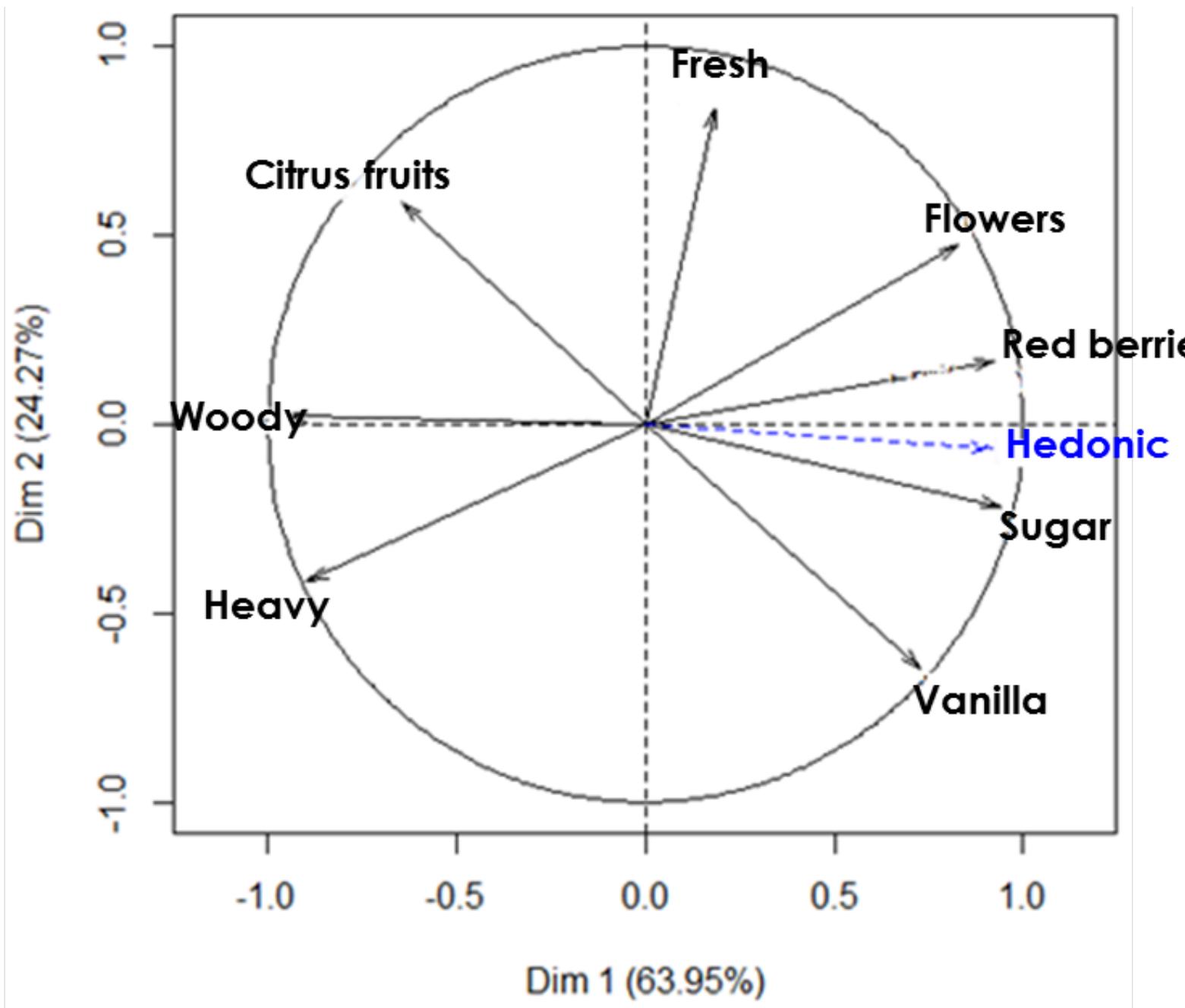
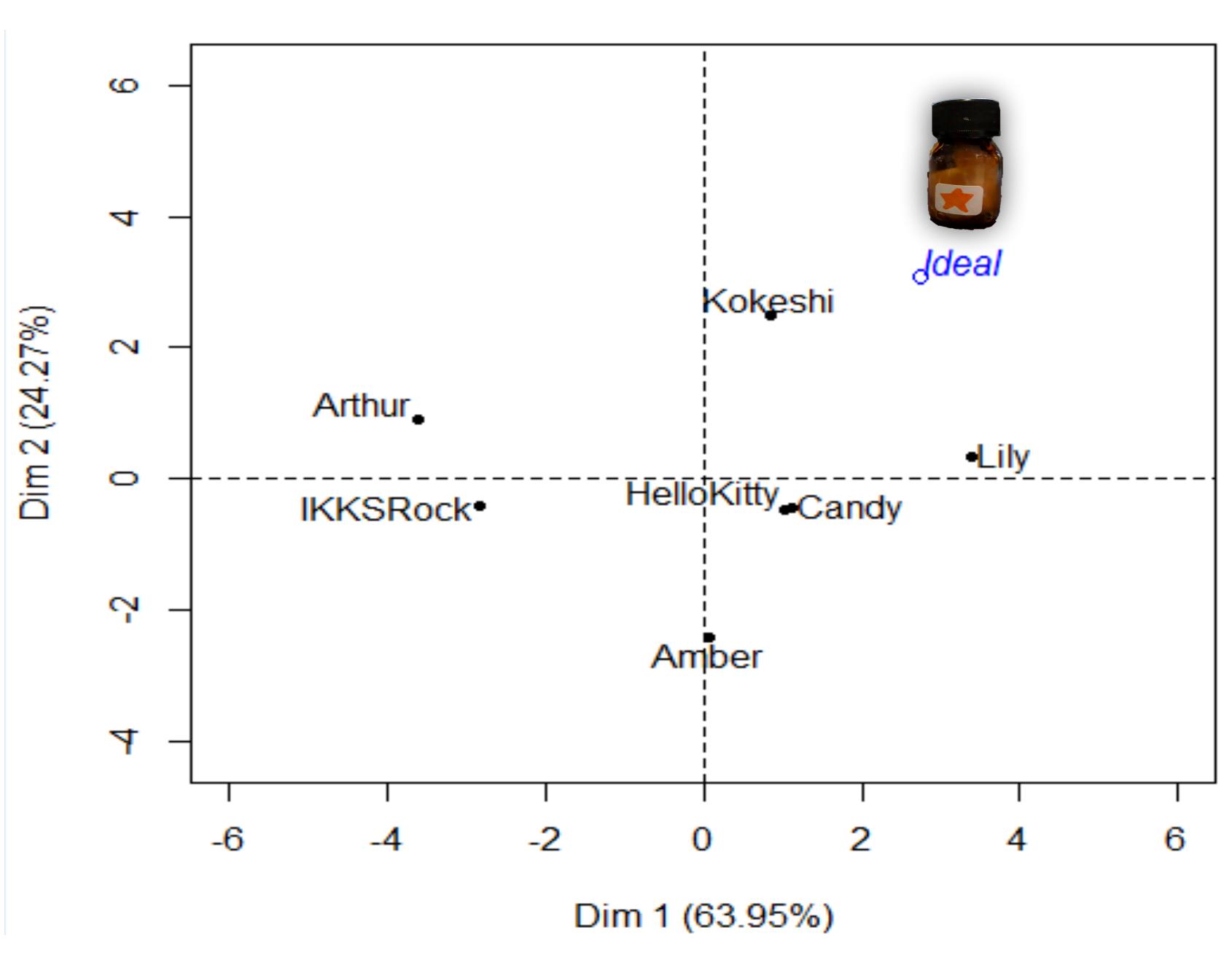


Ideal product, Imaginary product

Sensory consistency

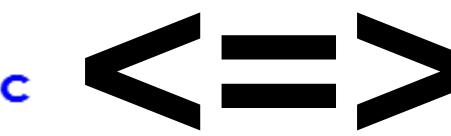
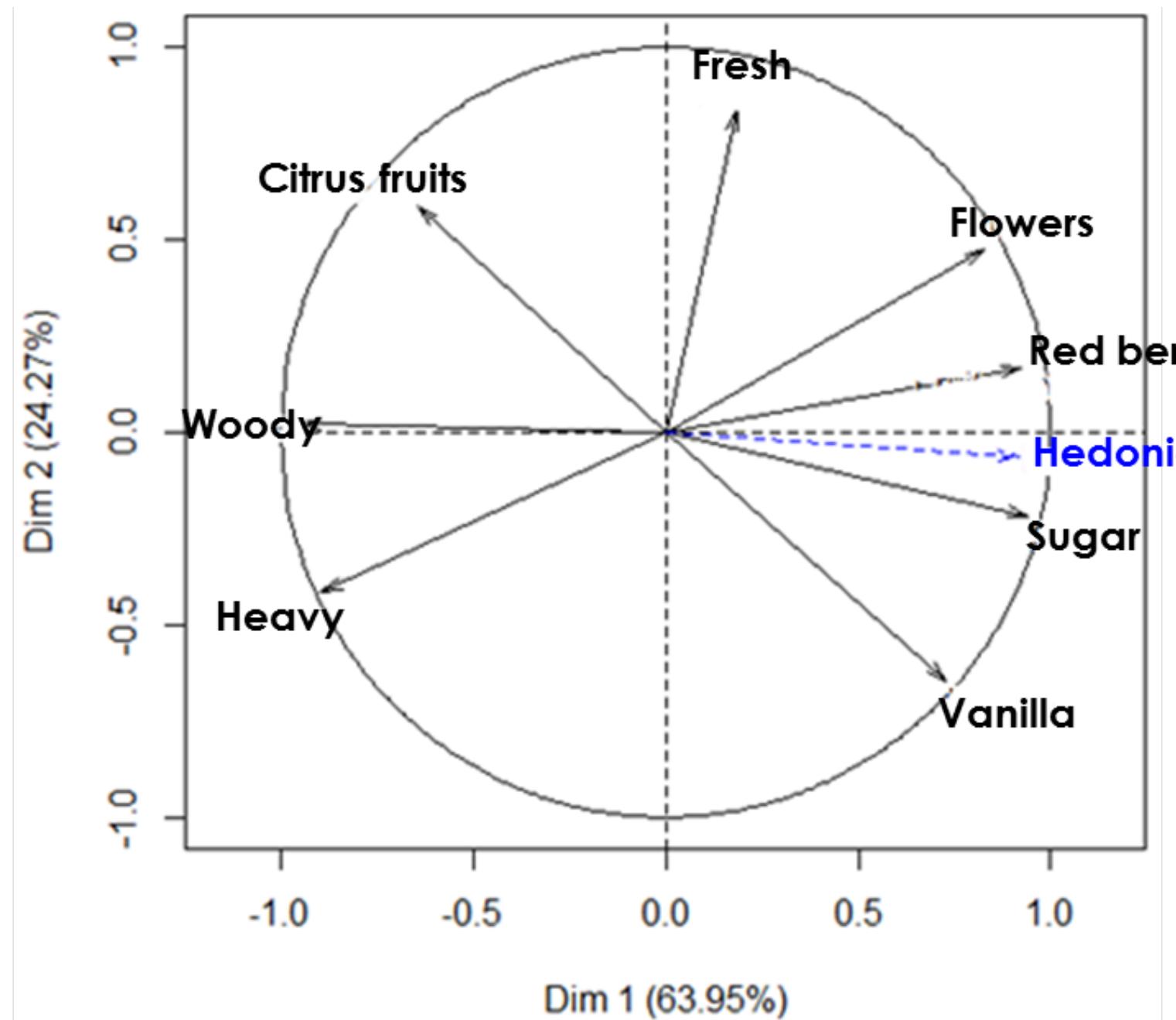
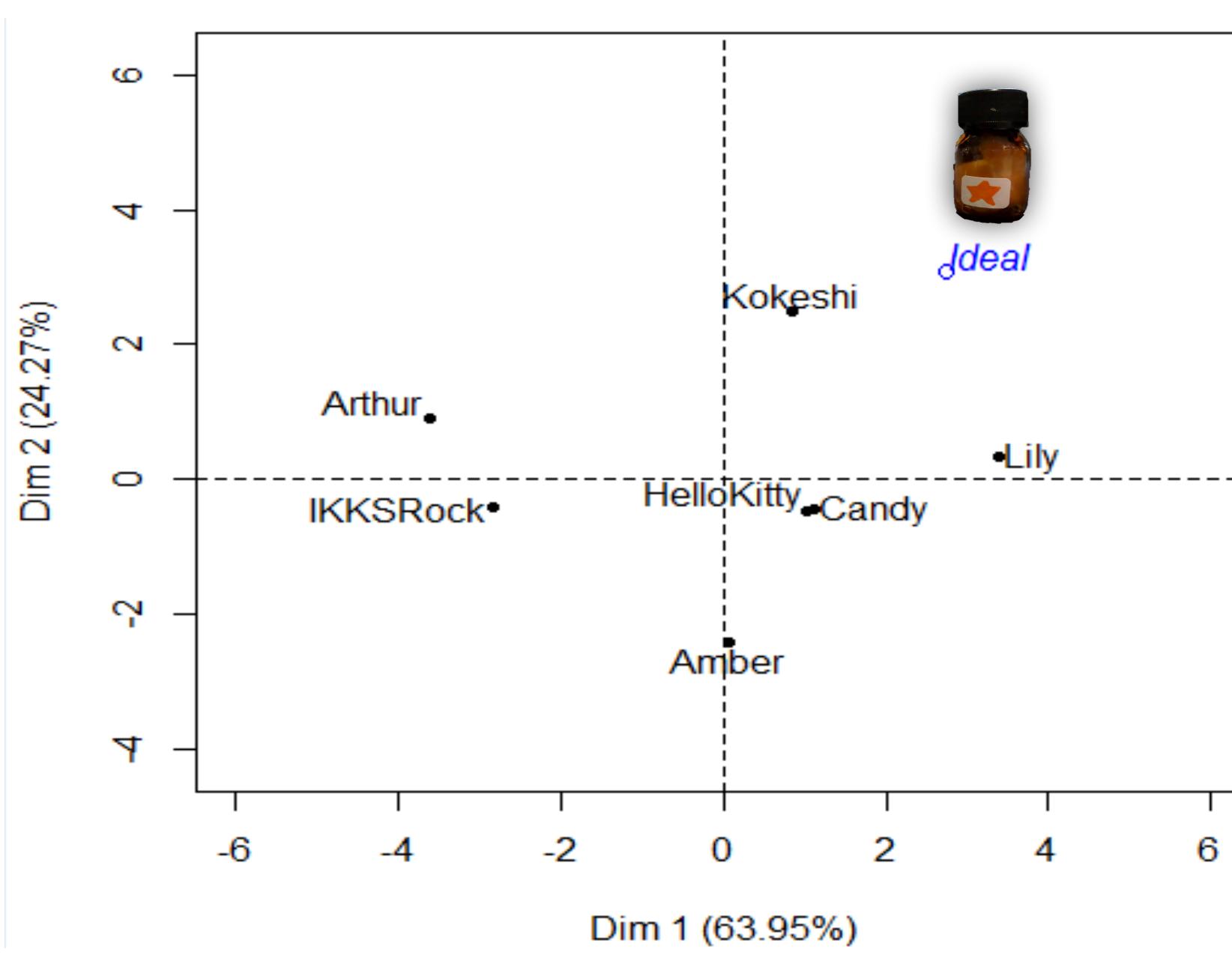
- The ideal data provided by a consumer are “sensory” consistent if the sensory profile associated to this ideal has similar sensory characteristics as the most appreciated product.
- From an attribute point of view, this means that consumer who said they have a higher appreciation for the products perceived as sweeter should also rate their ideals as rather sweet.
- We need to investigate whether the ideal is making the link between the sensory and the hedonic.

Sensory consistency



Ideal product, Imaginary product

Sensory consistency




Descriptor	
1	Vanilla
2	Sugar
2	Flowers
4	Red berries
5	Fresh
6	Citrus fruits
7	Woody
8	Heavy

Rankings of the characteristics the most associated with the ideal product

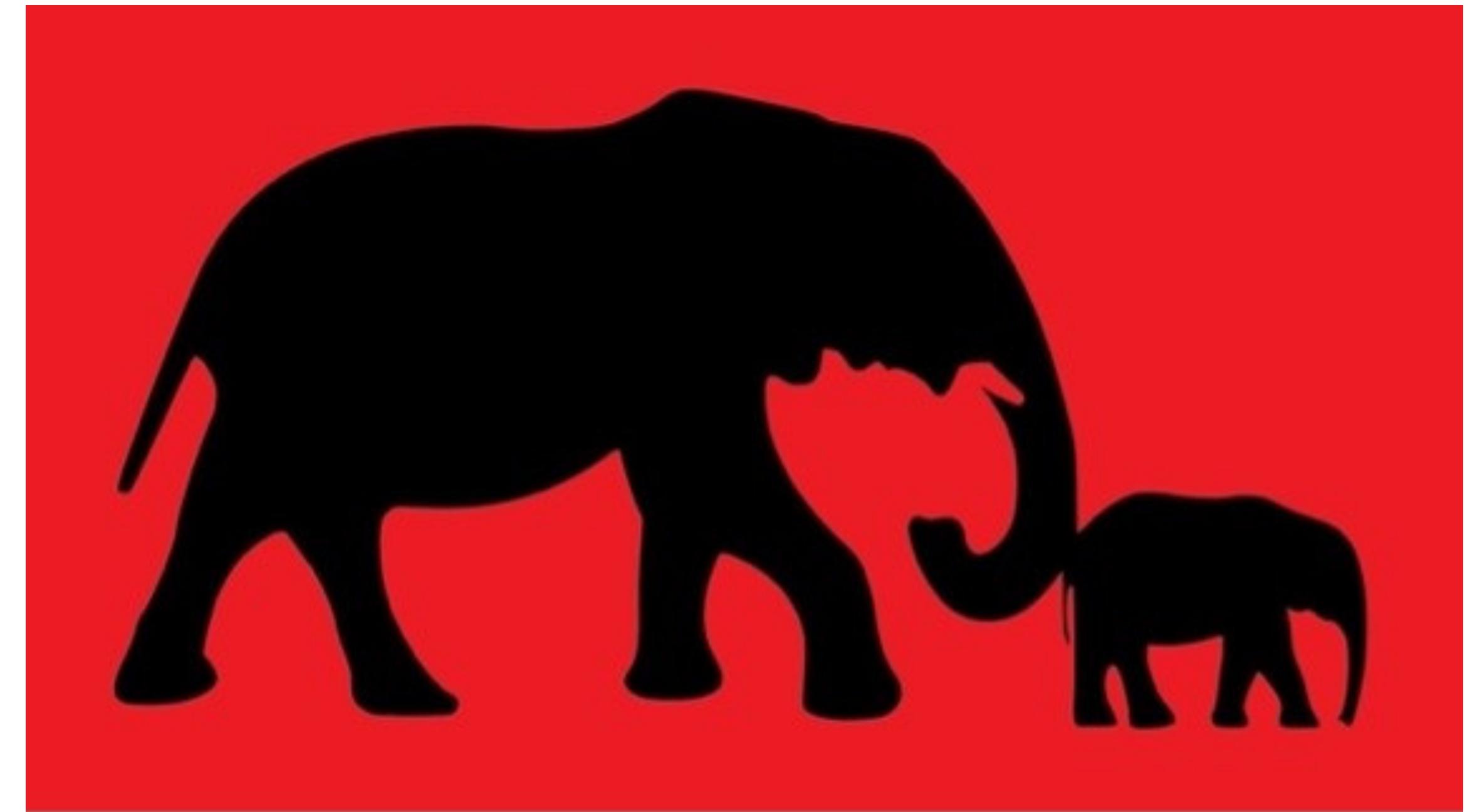
Interlude

Ideal product, Imaginary product

- Sensory evaluation can be done with children and adapted methods such a **pairwise comparison**
- Consumers can provide a description of an **Imaginary** product such as an **Ideal** product

I

Me, myself and I
I for Influence (nudge),
Implicit



Every small, unselfish action nudges the world into a better path. An accumulation of small acts can change the world. (Robin Hobb)

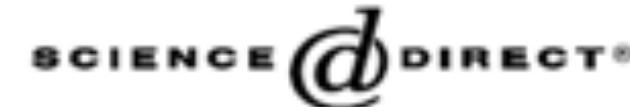
What is a nudge?

- To nudge is « to push mildly or poke gently in the ribs, especially with the elbow. » (R. Thaler)
- « A nudge (...) is any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options (...) » (R. Thaler)

Napping®



Available online at www.sciencedirect.com



Food Quality and Preference 16 (2005) 642–649

Food Quality
and Preference

www.elsevier.com/locate/foodqual

Collection and analysis of perceived product inter-distances
using multiple factor analysis: Application to the study
of 10 white wines from the Loire Valley

Jérôme Pagès *

Laboratoire de mathématiques appliquées, Agrocampus Rennes, 65 rue de Saint-Brieuc CS 84215, F-35042 Rennes cedex, France

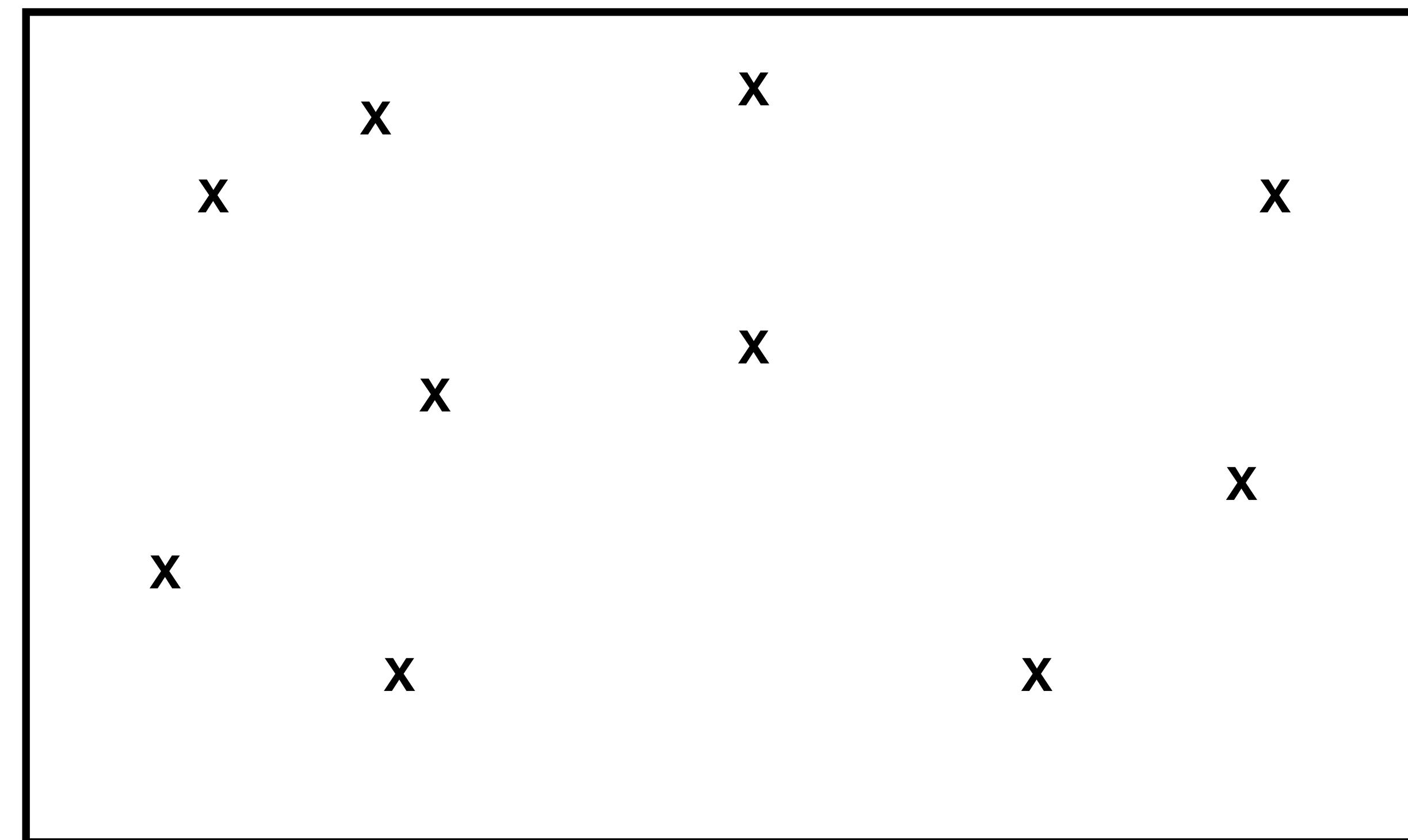
Received 17 November 2003; received in revised form 23 August 2004; accepted 31 January 2005

Available online 11 March 2005

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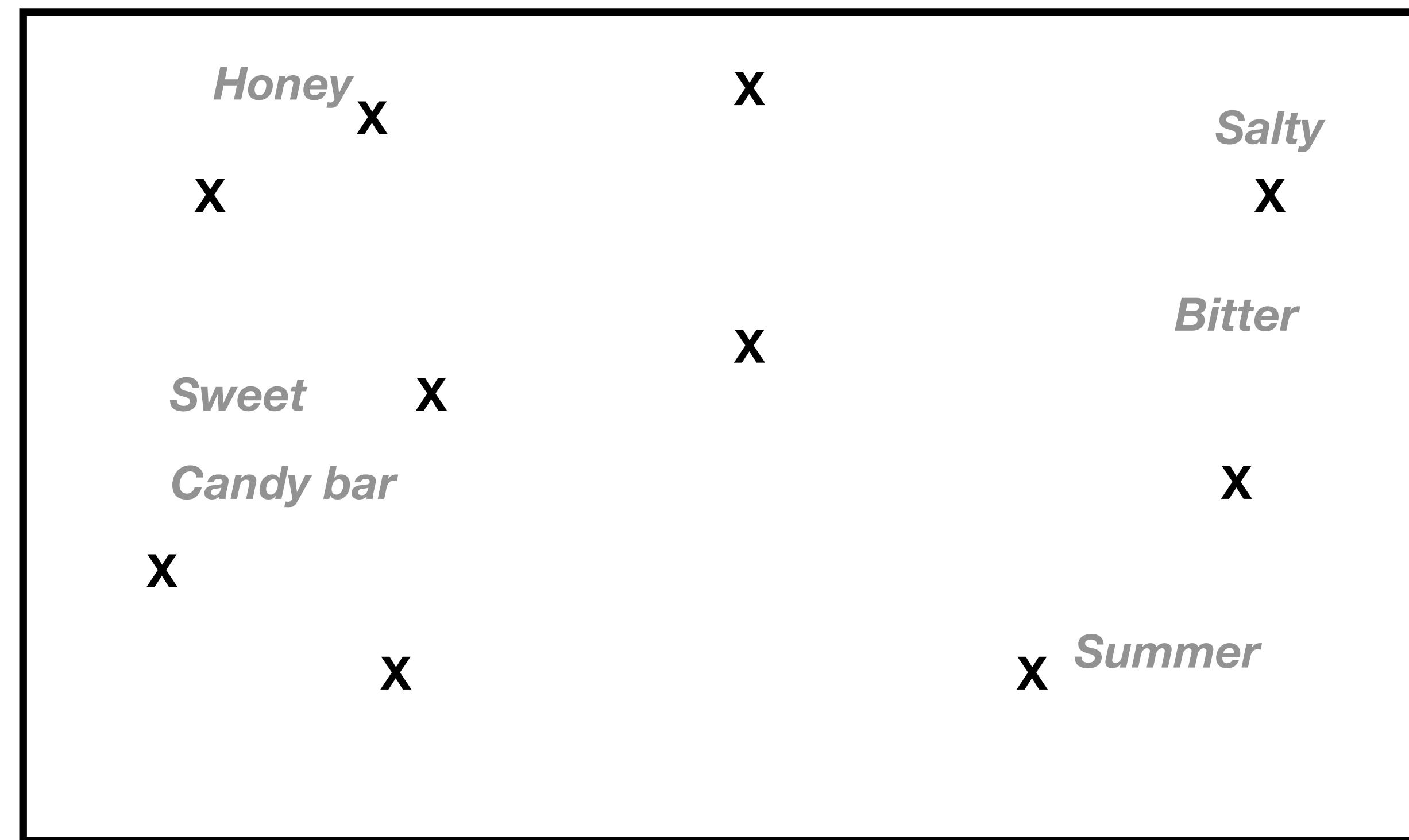
- « Principle : you are asked to evaluate the similarities (or dissimilarities) between several wines. You have to do this according to your own criteria, those that are significant for you. You do not have to indicate your criteria. There is not good or bad answer. »
- « Procedure : You have to position the wines on the tablecloth in such a way that two wines are very near if they seem identical to you and that two wines are distant one another if they seem different to you. Do not hesitate to express strongly the differences you perceive by using the most part of the sheet. »

Napping®



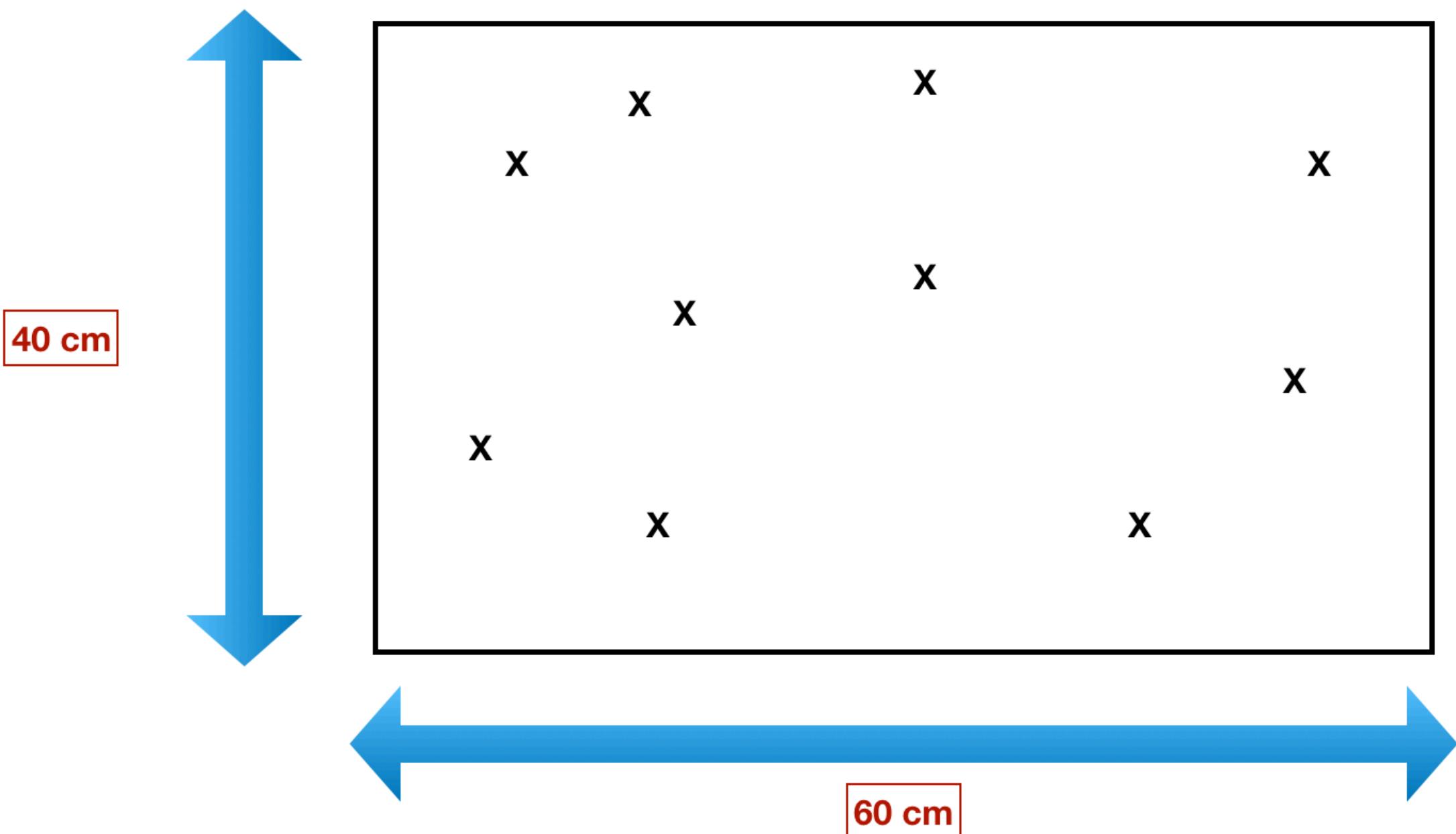
I for Influence (nudge), Implicit

Napping®



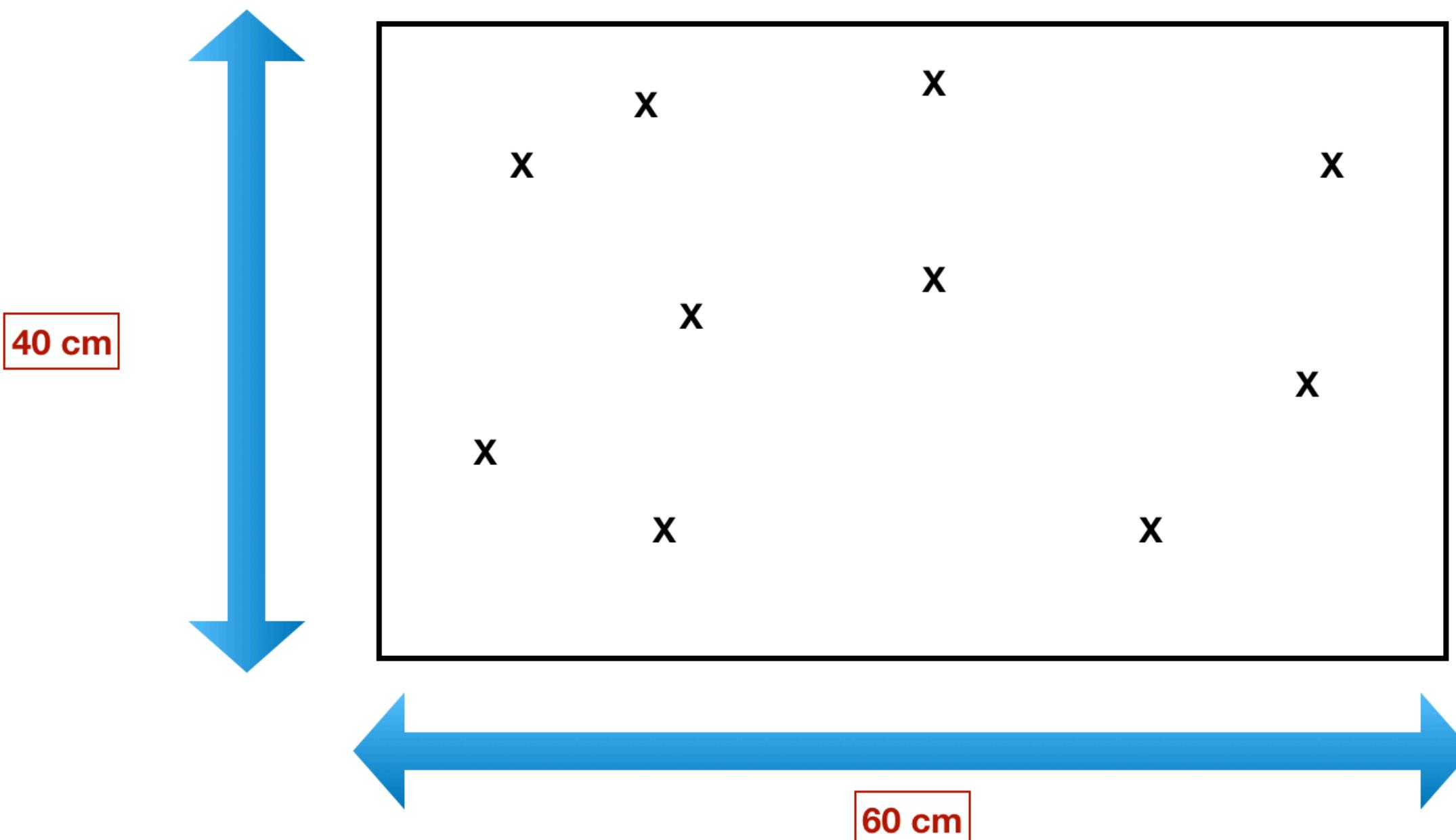
I for Influence (nudge), Implicit

Napping® - the nudge



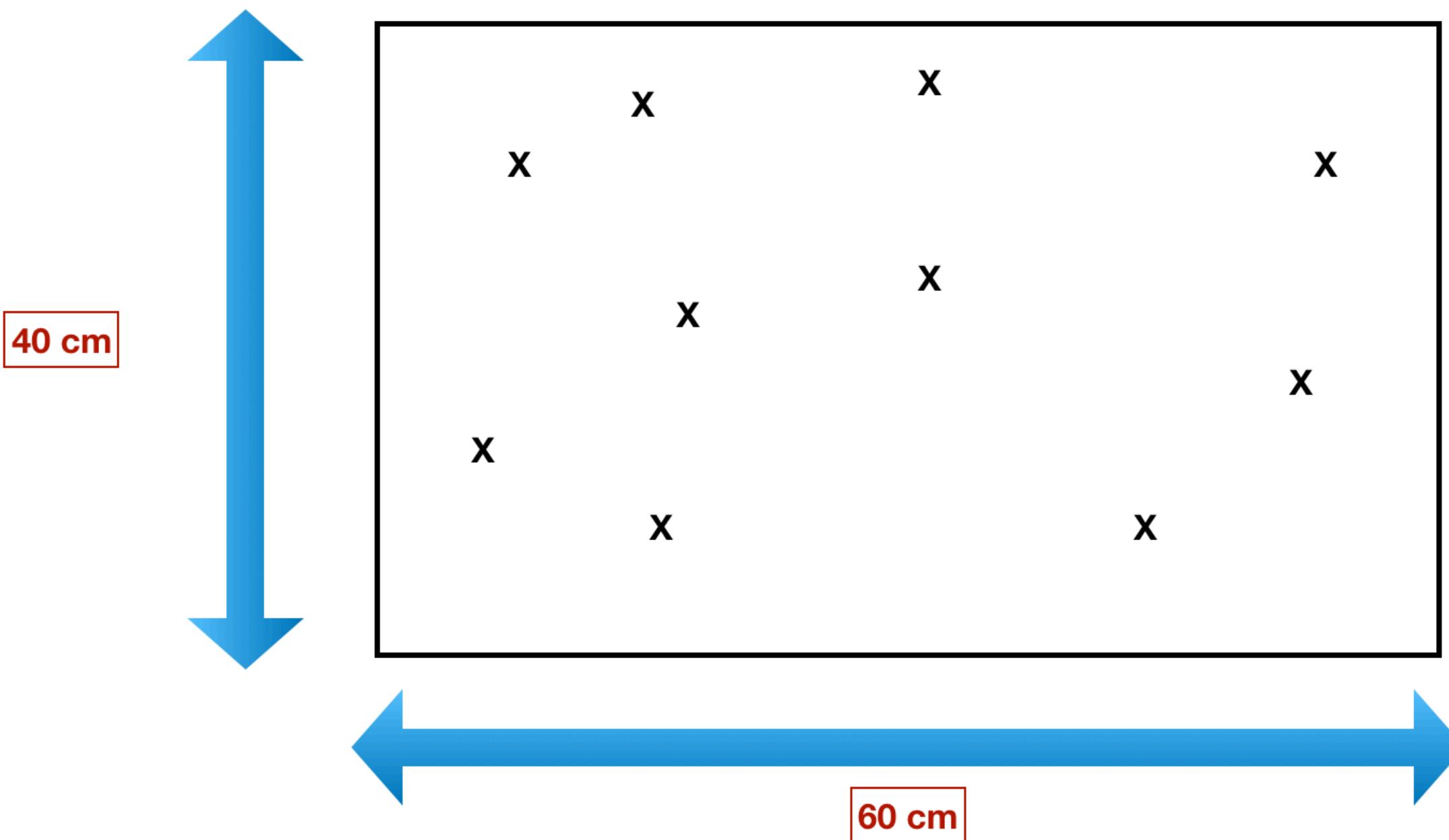
« A nudge (...) is any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options (...) »

Napping® - the nudge



- This architecture/design will encourage the consumers to express their main axis of variability on the X-axis
- Therefore, their axes of variability are **implicitly** ranked

Napping® - the nudge

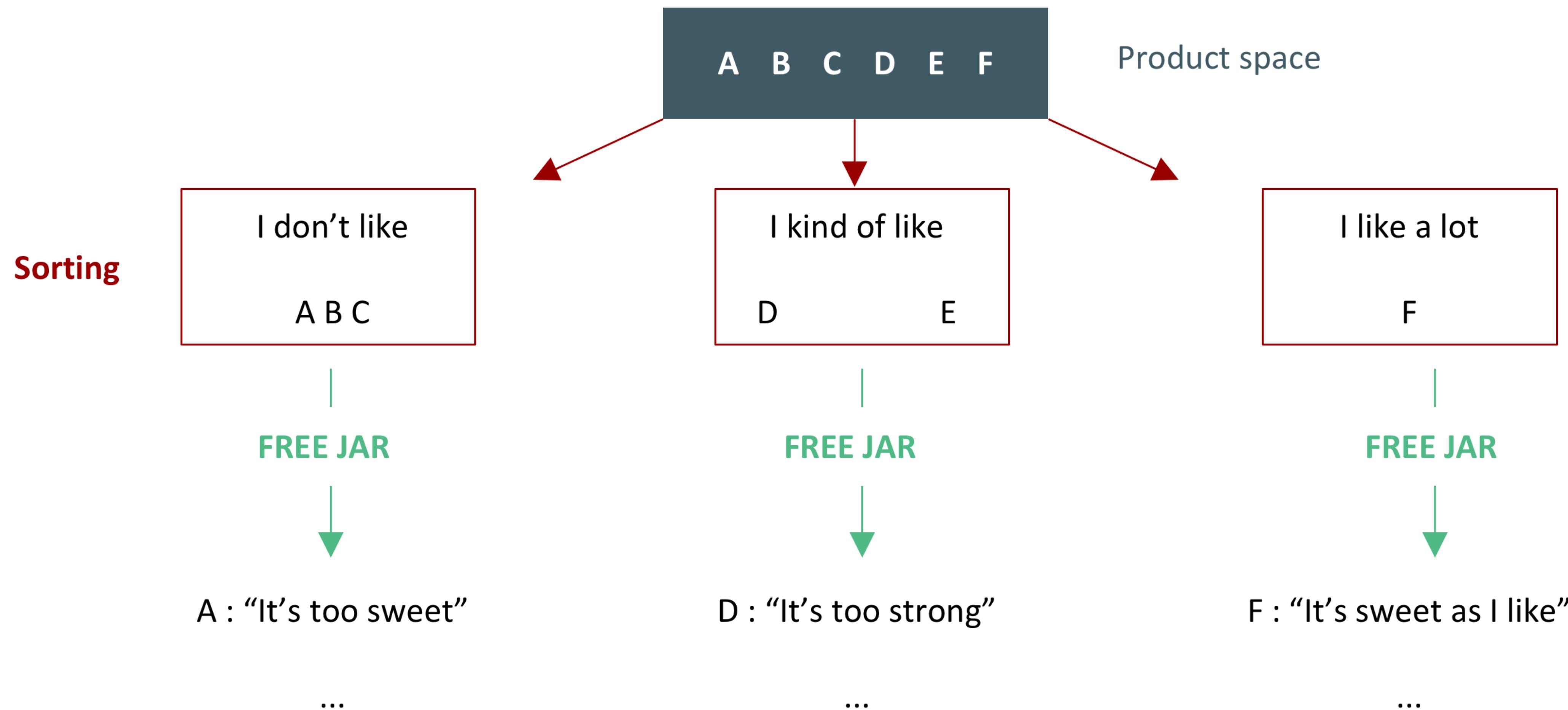


- This architecture/design will encourage the consumers to express their main axis of variability on the X-axis
- Therefore, their axes of variability are **implicitly** ranked
- Once the products are positioned, it is more easy for the consumers to describe the products as they have a global perception of the product space

Free JAR profiling

- Sorting the products according to liking
 - Projection in 3 sub-spaces: I don't like / I kind of like / I like it a lot
 - Each sub-space has its own vocabulary
- Suggesting the beginning of sentences based on JAR method
 - The sentences should suggest the notion of Too much / Not enough / JAR

Free JAR profiling



Free JAR profiling - the nudge

- This architecture/design encourages the participants to project himself in an hedonic mind setting
- In this mind setting, although it is still free, he should use a more limited vocabulary

Interlude

I for Influence (nudge), Implicit

- Consumers can provide the « right » data without being asked
- Consumers can be put in the « proper » mind setting without being asked
- If you want a flavor of Free JAR: <https://sensorydatascience.netlify.app/chapter4>

I

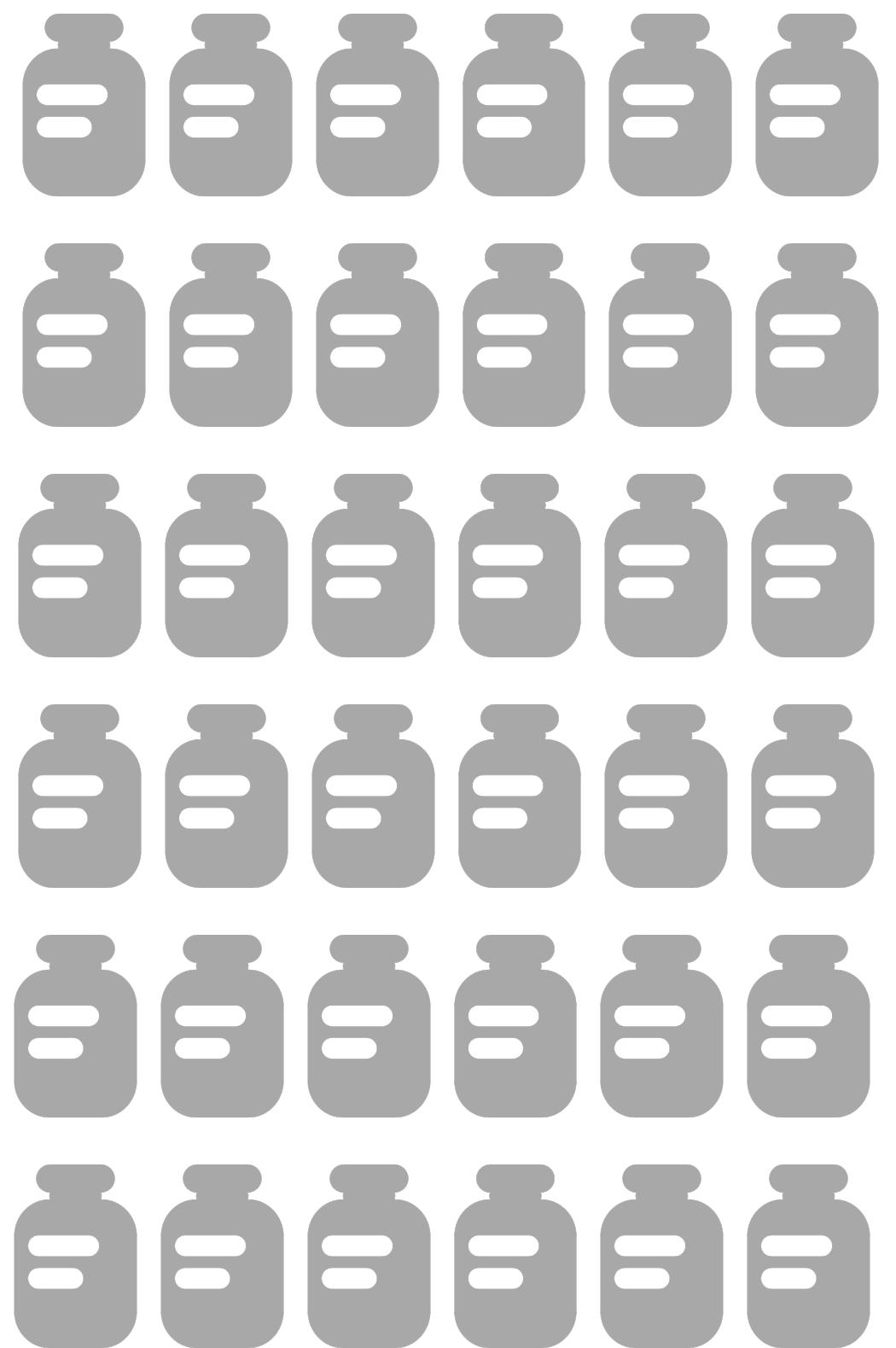
Me, myself and I
**I for Immense (extremely
large), Imposing, Influence
(nudge)**



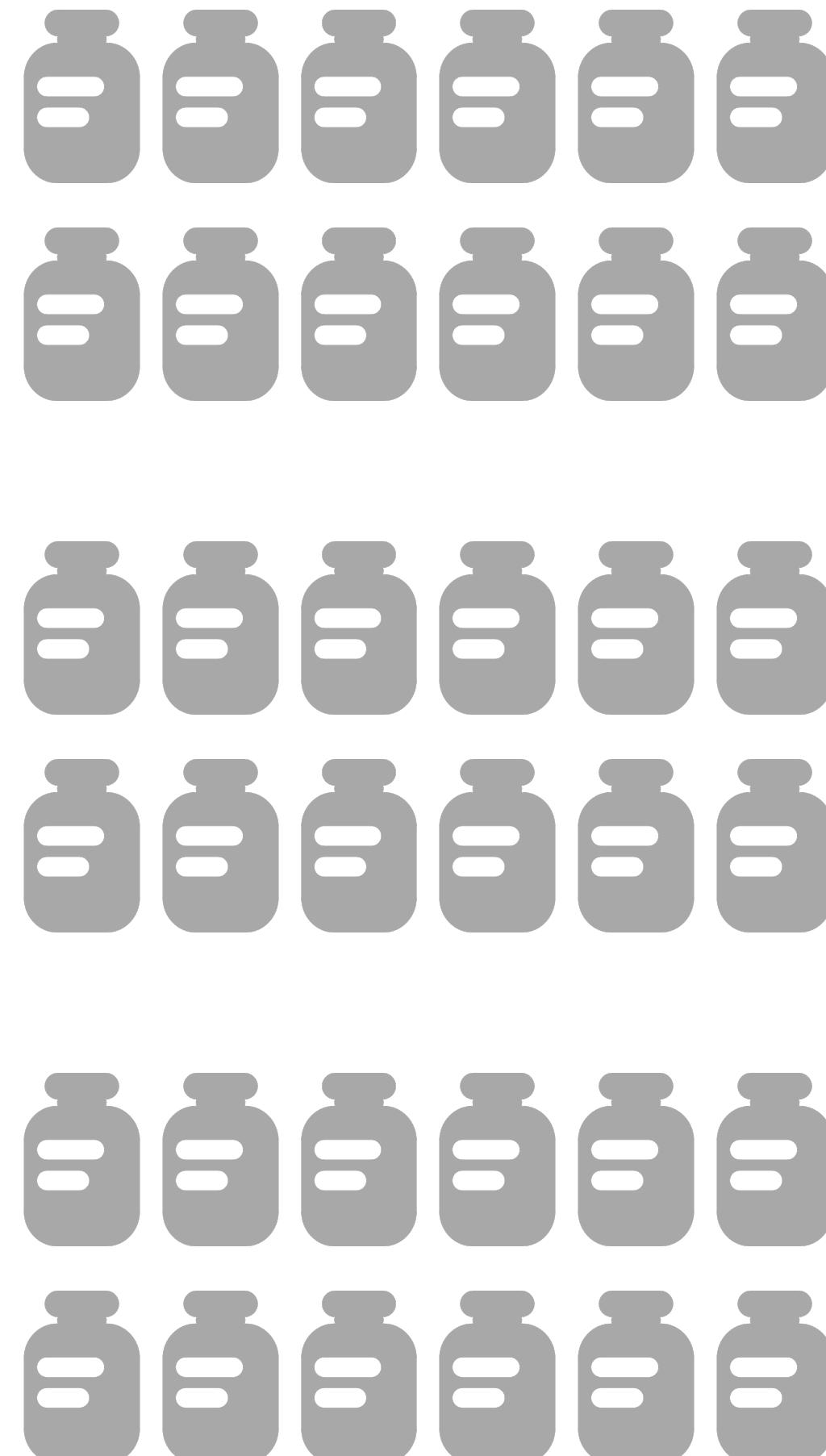
Truth lies within a little and certain compass, but error is immense.
(Henry St. John)

The Sequential Agglomerative Sorting task

- A new variant of the sorting task designed for huge product space, where huge means up to 40-45 products

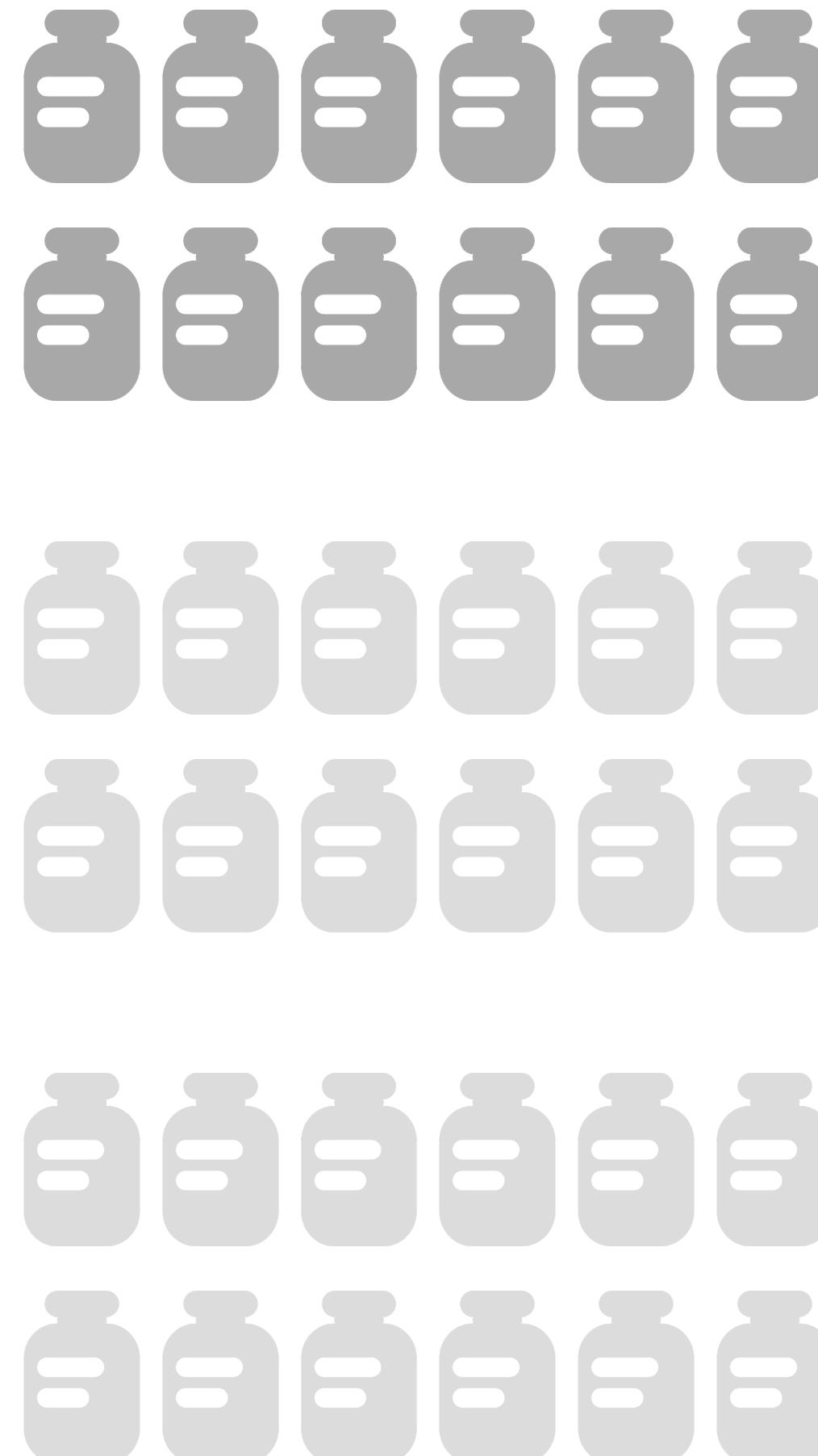


The Sequential Agglomerative Sorting task



- The set of products is divided into subsets
- A **first** subset is assessed by the subjects using a « plain » sorting task
- The **other** subsets are assessed using an « association » task

The Sequential Agglomerative Sorting task



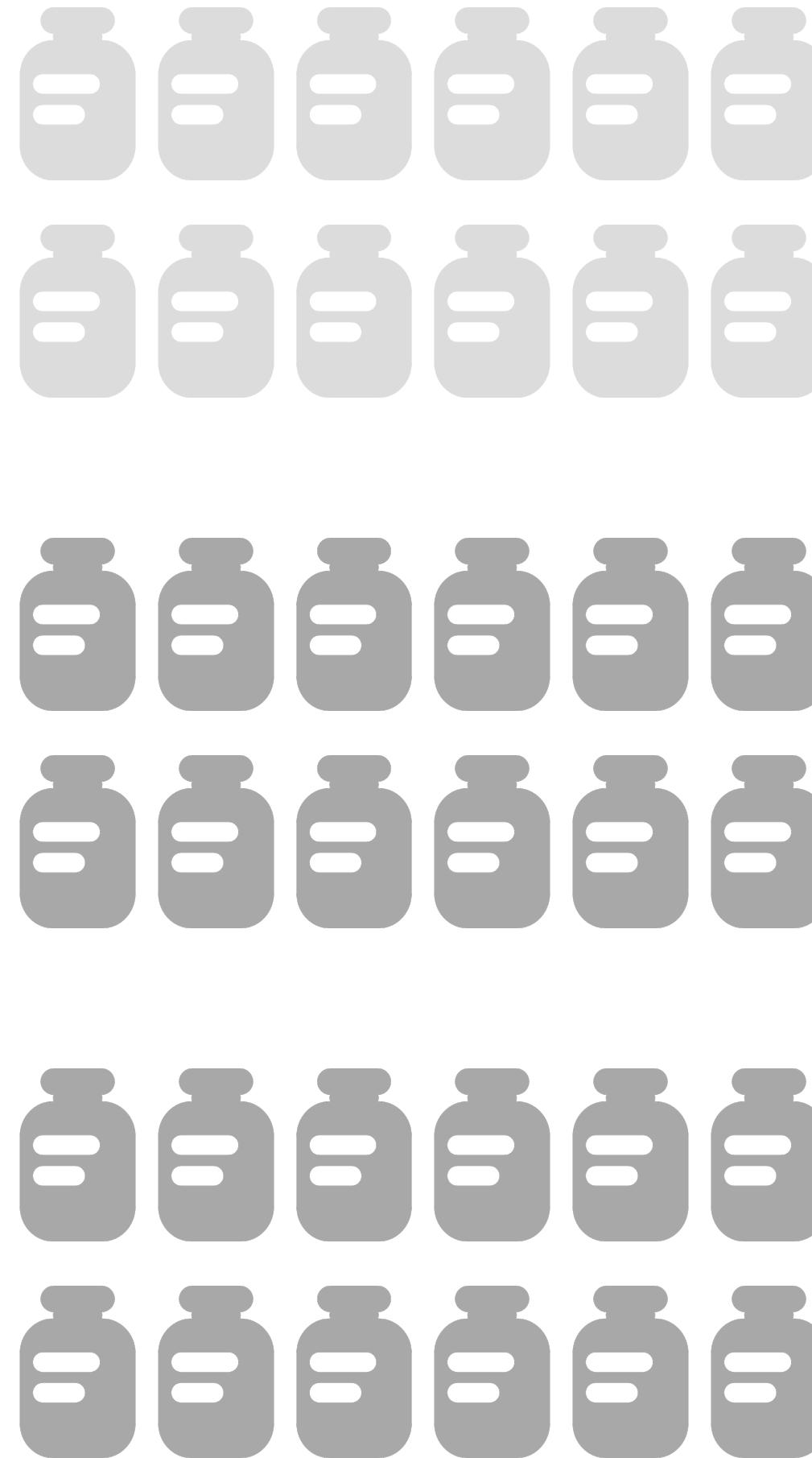
- The first subset is presented to the participant who is asked to sort it and to verbalise the characteristics of each group of stimuli constituted
- Thus, at the end of this stage, each group of stimuli is synthesized through its characteristics

The Sequential Agglomerative Sorting task



- For each new subset, the participant is asked to **agglomerate** the new stimuli to the groups created during the previous stages

The Seq. Agglomerative Sorting task - the nudge



- This architecture/design encourages the participants to work at a **group level** and not at a stimulus level
- This facilitates the task and reduces saturation and fatigues problems as the number of groups is much smaller than the number of stimuli

The Seq. Agglomerative Sorting task - the nudge



- Anchors are created by the consumer himself
- These anchors can be considered as good anchors

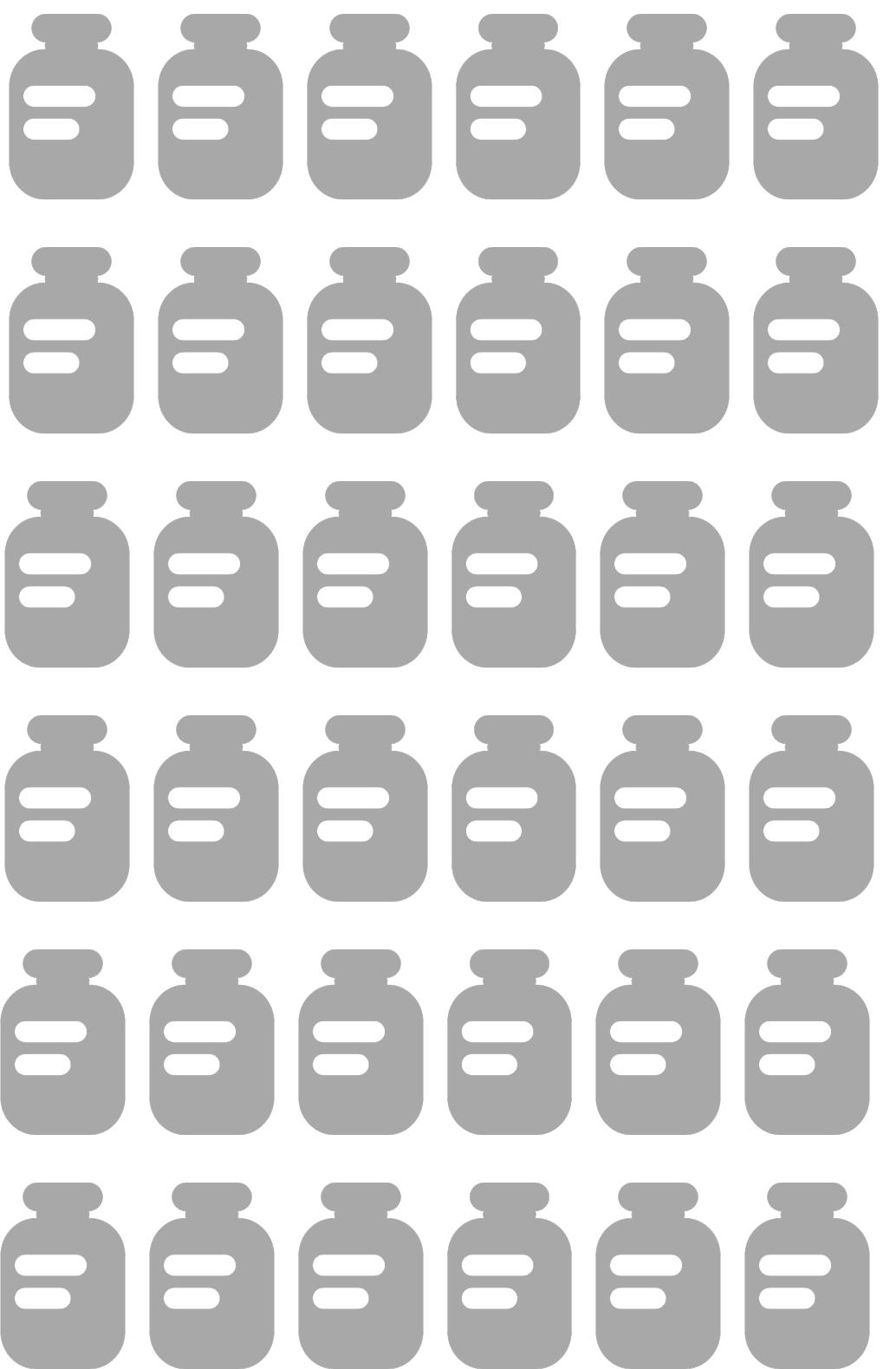
I innovation in pâtisserie



I for Immense, Influence

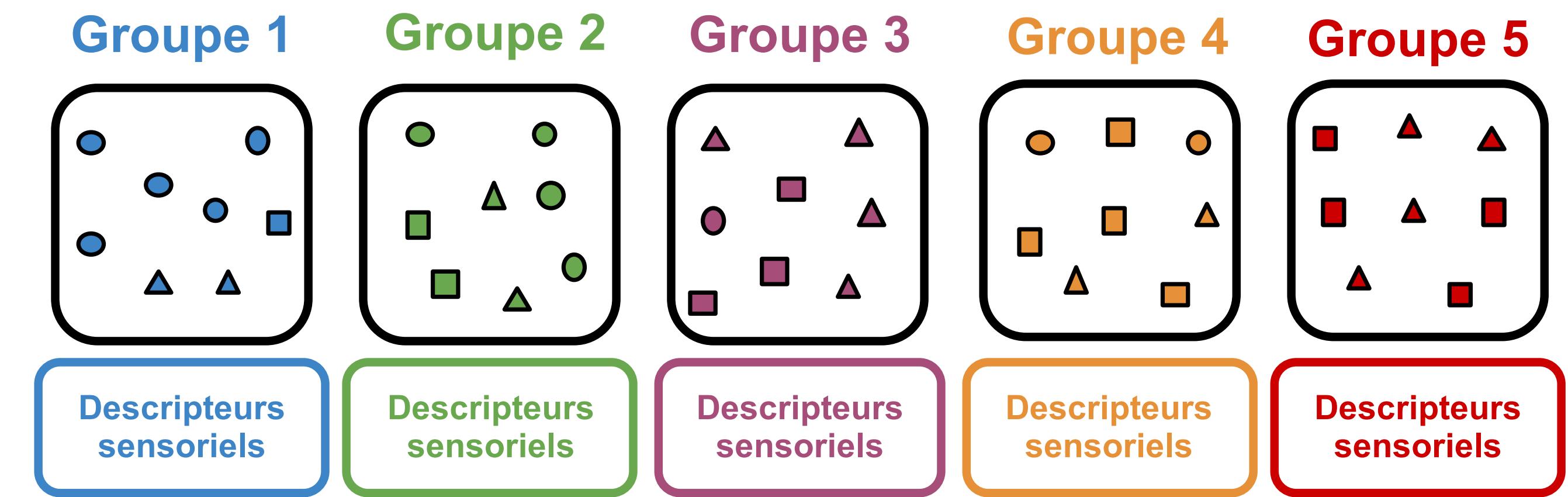
The hedonic SAS

- How to get hedonic scores for huge product space, where huge means up to 40-45 products?



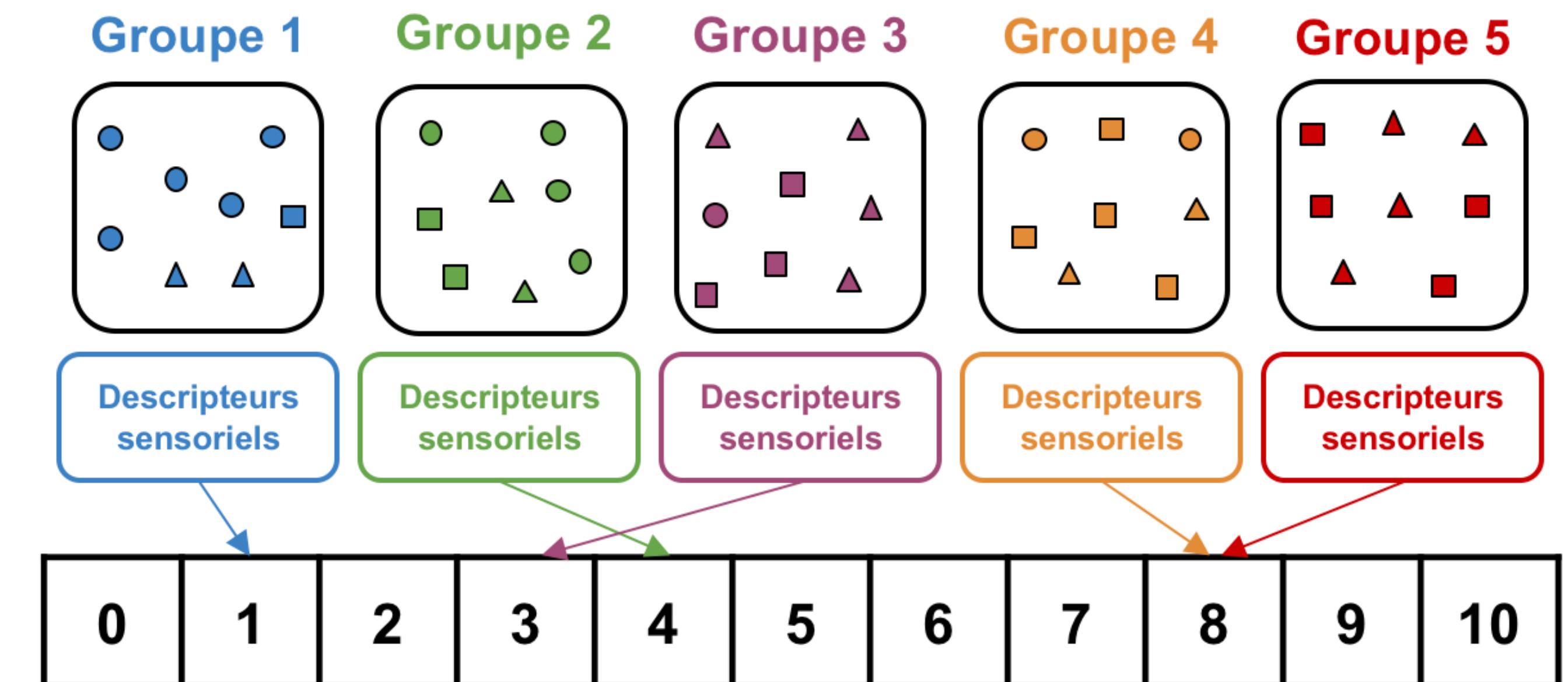
The hedonic SAS, step 1

- We start with a SAS in order to obtain groups of products, described by words
- Each « bag of words » is the description of a concept
- Each concept, as a set of characteristics, is going to be assessed on a hedonic scale



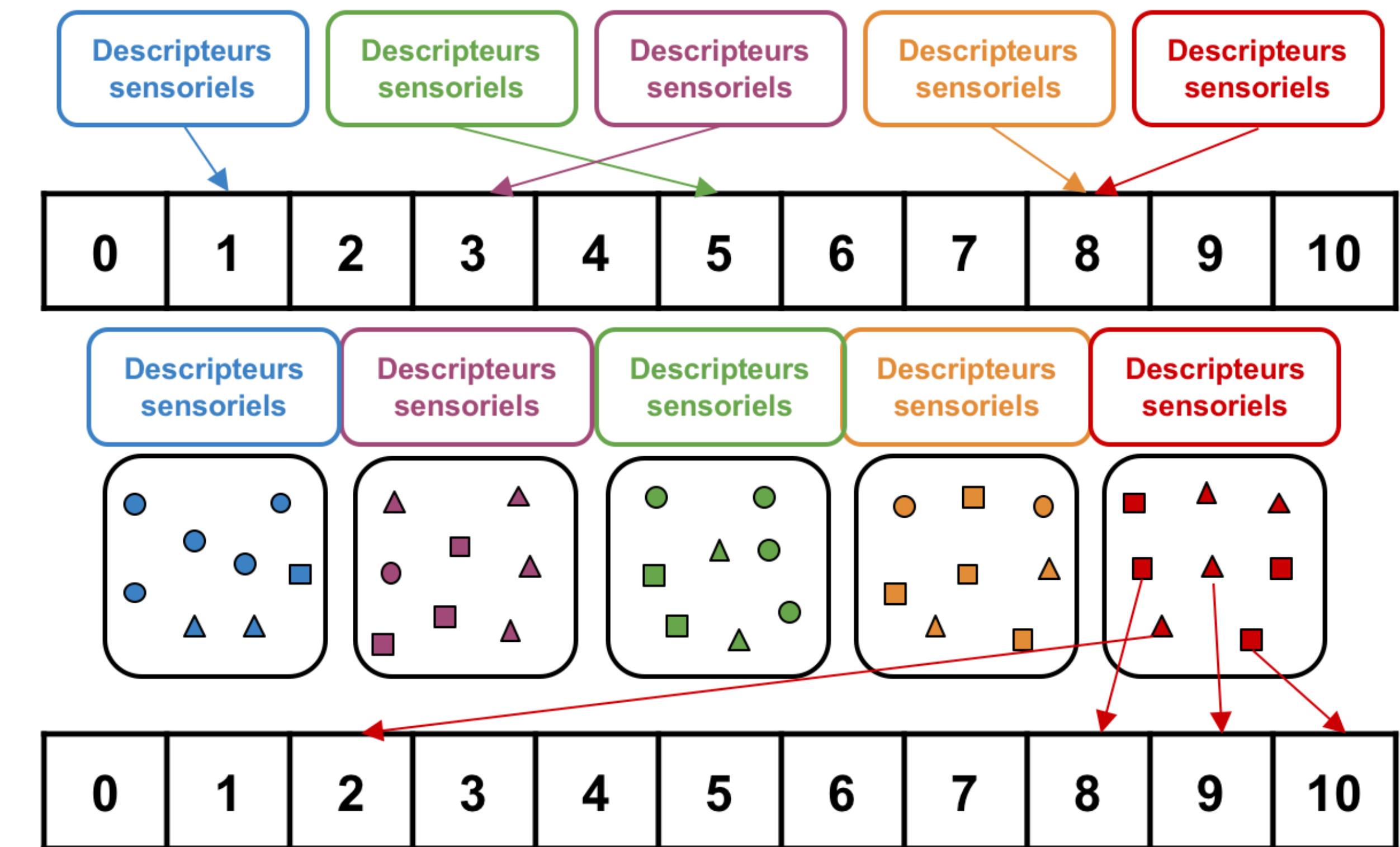
The hedonic SAS, step 2

- Each concept, as a set of characteristics, is going to be assessed on a hedonic scale



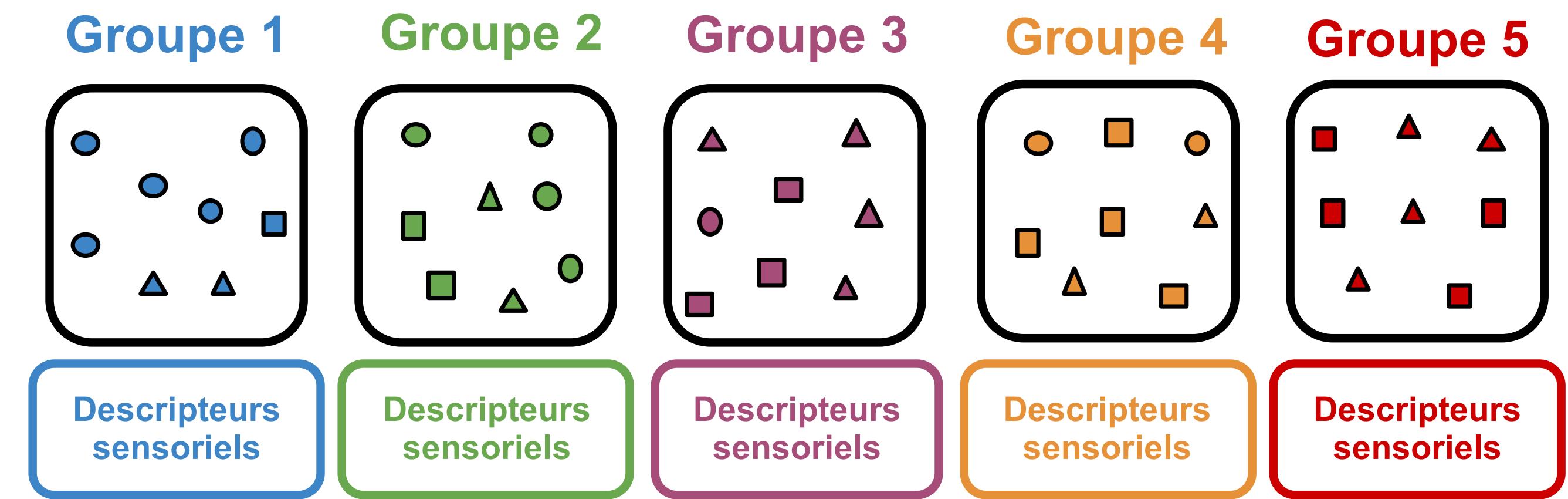
The hedonic SAS, step 3

- Then each product is assessed on a hedonic scale



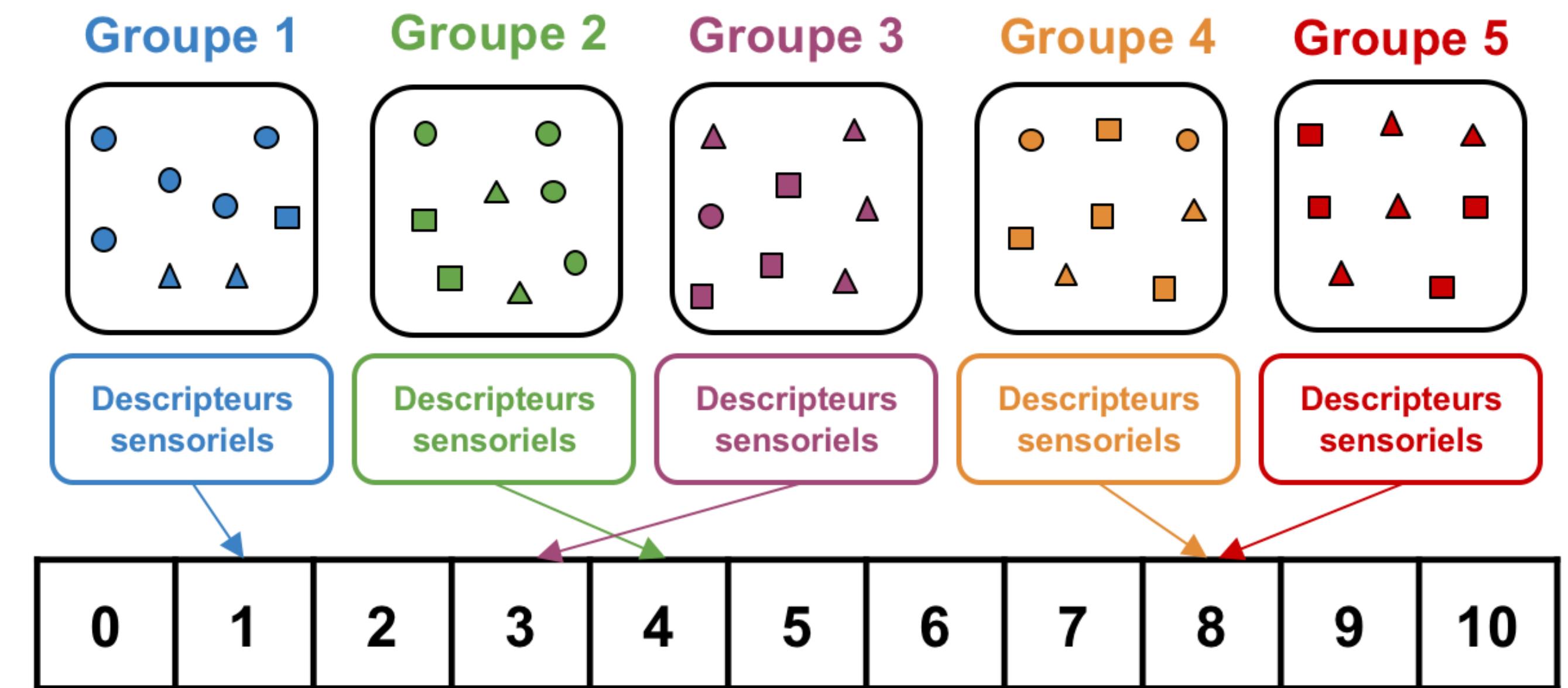
The hedonic SAS, step 1 - the nudge

- This architecture/design encourages the participants to have a global understanding of the product space in terms of **sensory** dimensions that structure the product space
- The number of products has drastically changed as we have as many prototypes as we have clusters



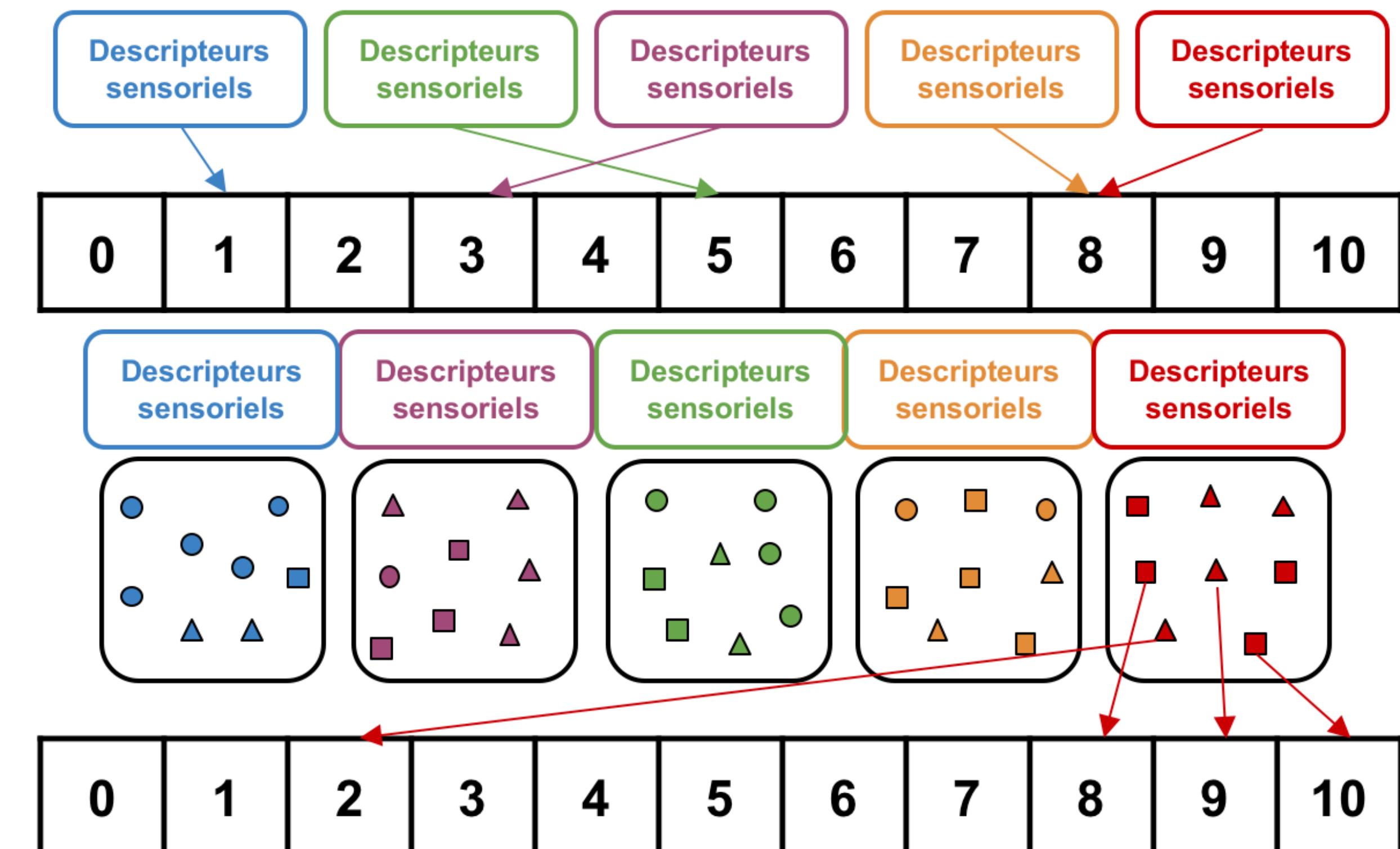
The hedonic SAS, step 2 - the nudge

- This architecture/design encourages the participants to have a global understanding of the product space in terms of **hedonic** dimensions that structure the product space



The hedonic SAS, step 3 - the nudge

- This architecture/design helps the participants to provide a hedonic score for each products
- Each cluster of products can be assessed independently



The hedonic SAS - the nudge

- In this task, the consumer is **implicitly** asked to get his own sensory expertise on the products
- Based on his expertise, he's able to give a score (anchor) for each product category/cluster
- This anchor (as well as the anchors of the scale, 0-10) should help him giving a score for each product of the category

Imposing product space

- 40 samples of shower gels
- Various brands: Axe, Le Petit Marseillais, Nivea, Dove...
- Different universes: fruity, floral, masculine, care, fresh, gourmet
- Different markets: foreign, French, men, women...



Interlude

I for Immense, Influence

- Consumers can provide a representation of an **imposing, immense**, product space from a sensory point of view, or from a hedonic point of view

I

Me, myself and I
I for Individual differences
(subjectivity), Immense



Truth does not belong to an individual. (Jiddu Krishnamurti)

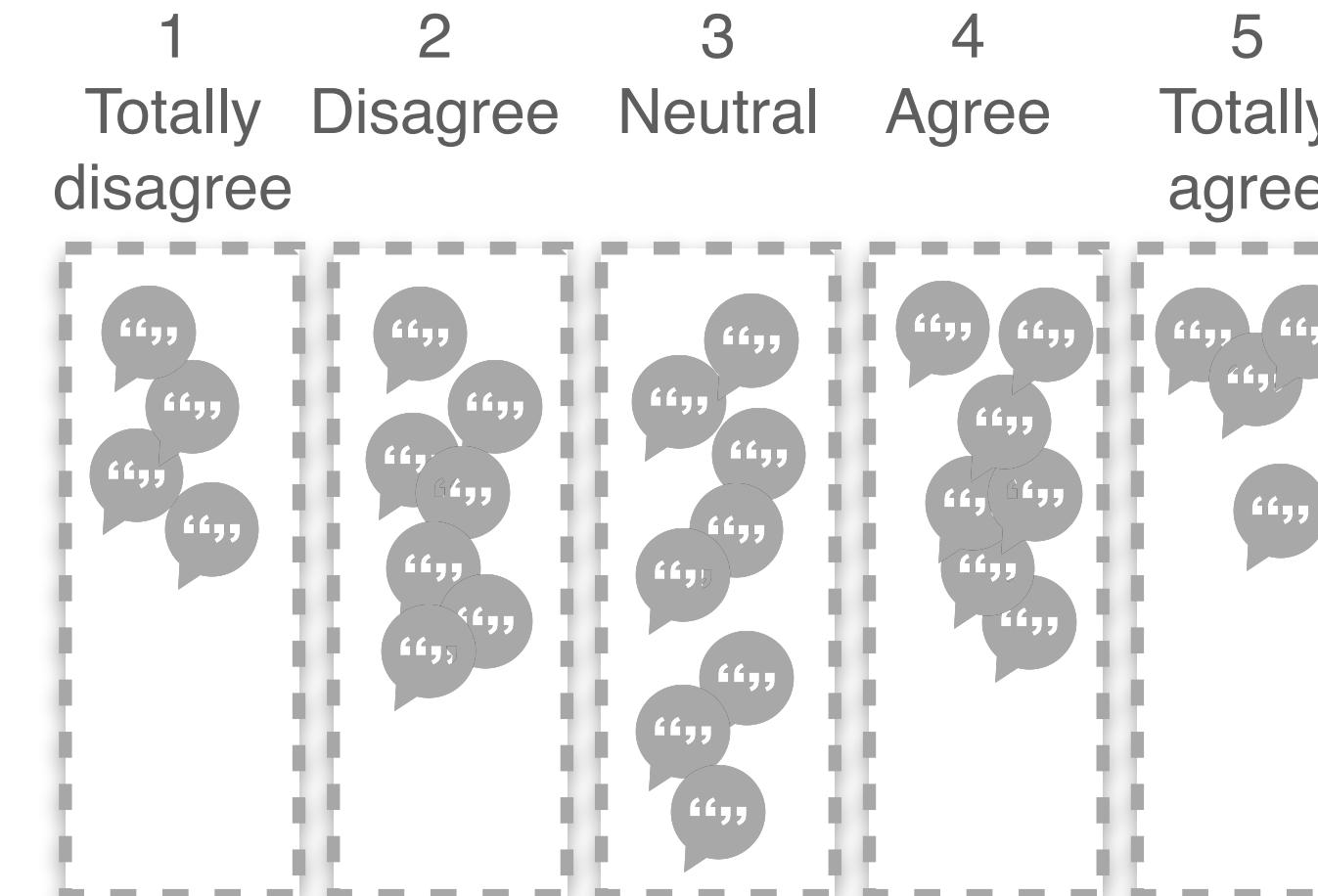
The Q-methodology to study human subjectivity



Stimuli = Statements



Sample set as large and exhaustive as possible

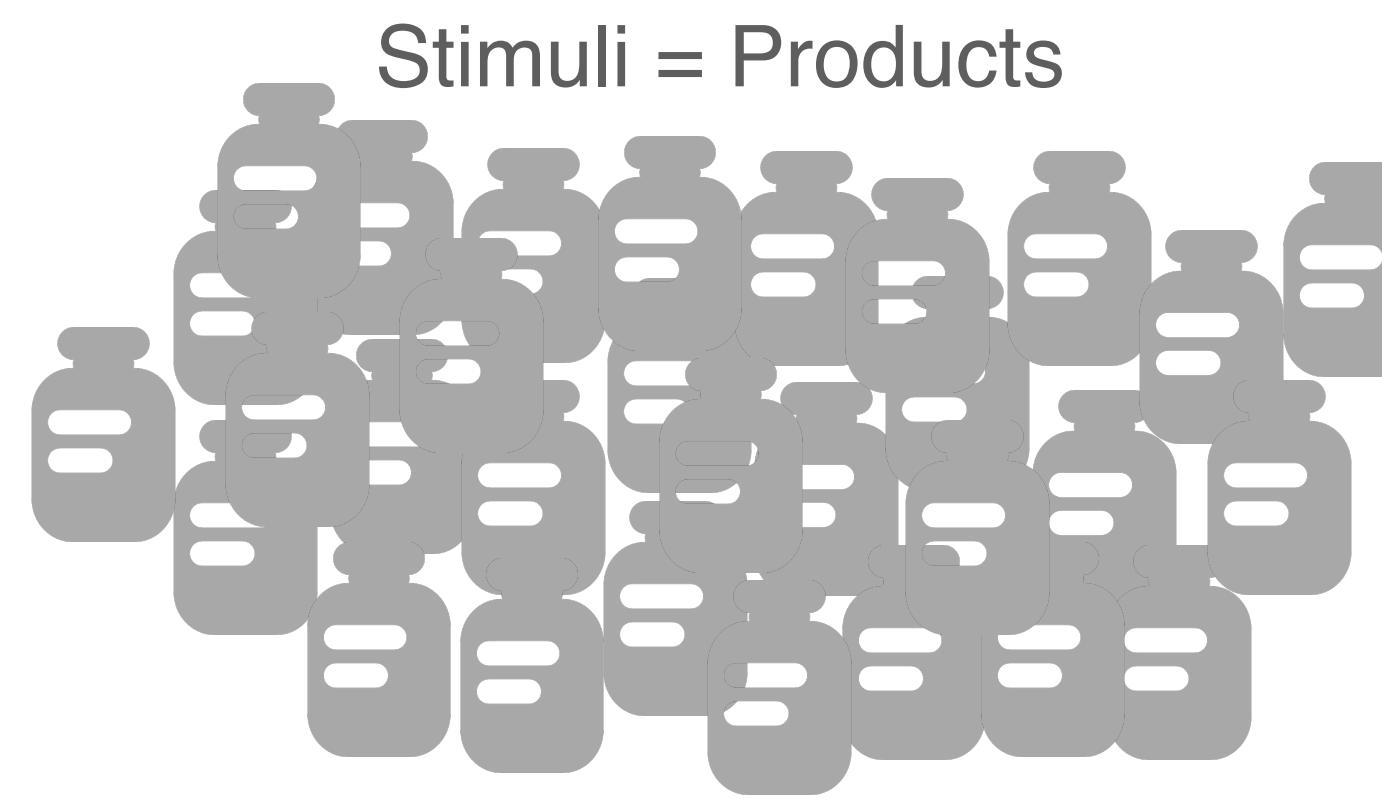


Adapted to quantitative data
[factor analysis applied to the Pearson product-moment correlation matrix]

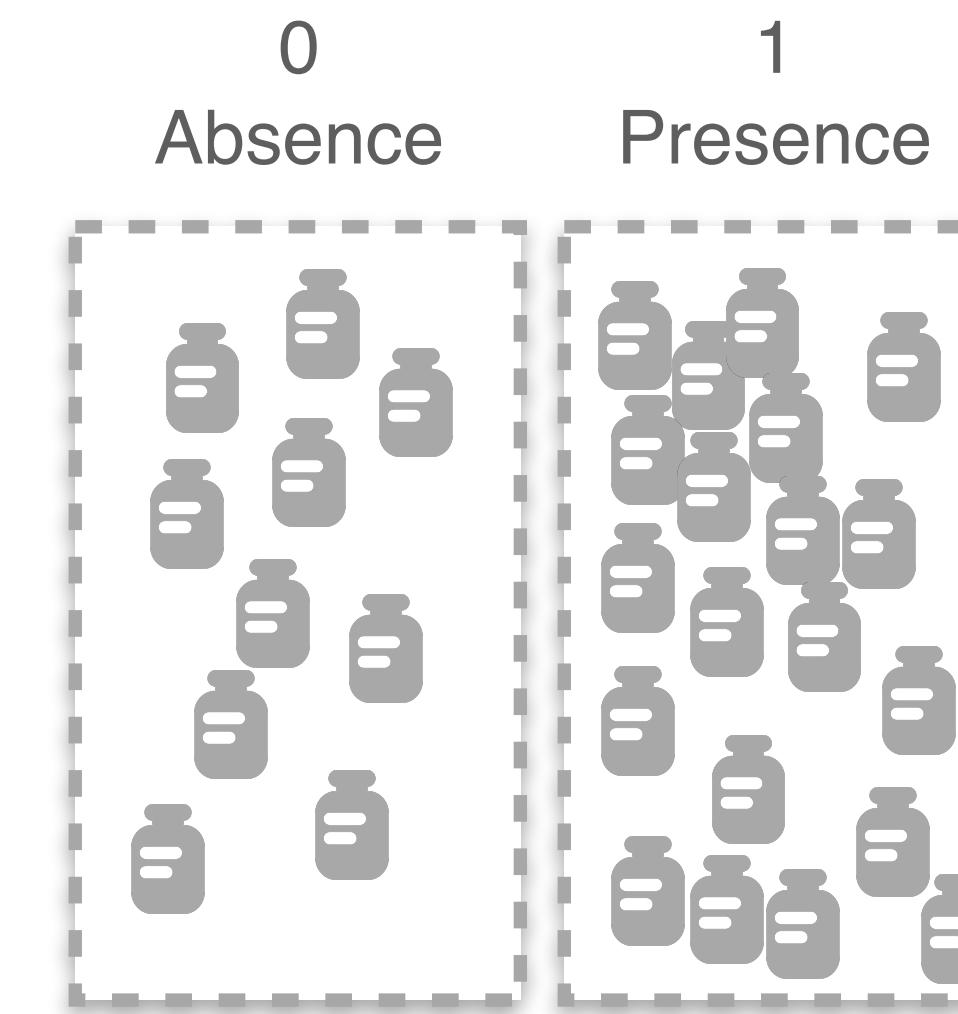
Subjects representation ✓

Stimuli representation ✗

The QC-methodology to study subjectivity about a concept within a pool of stimuli

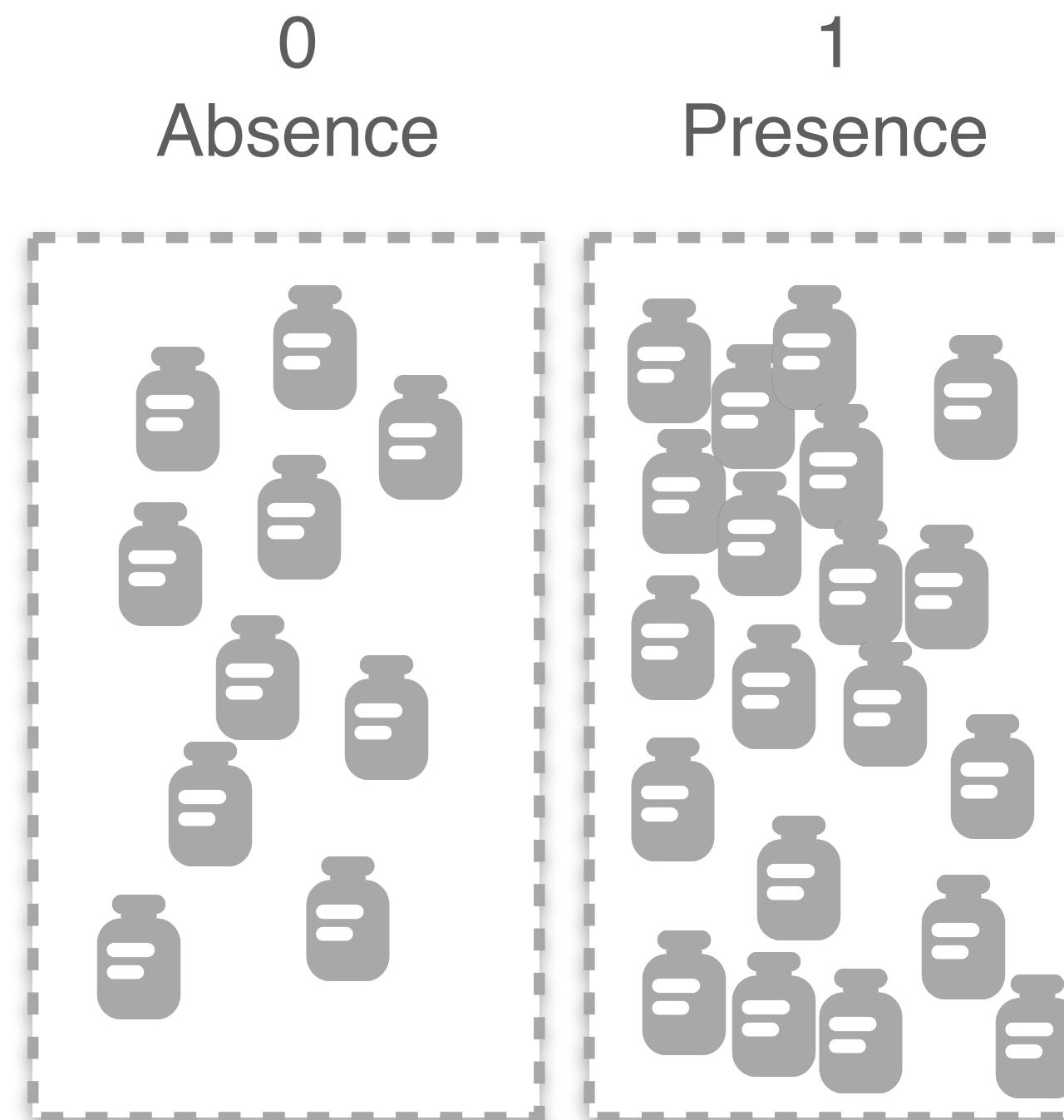


Sample set as large and exhaustive as possible



The specificities of the data result from the task

The QC-sort can be seen as...



A variant of the sorting task...

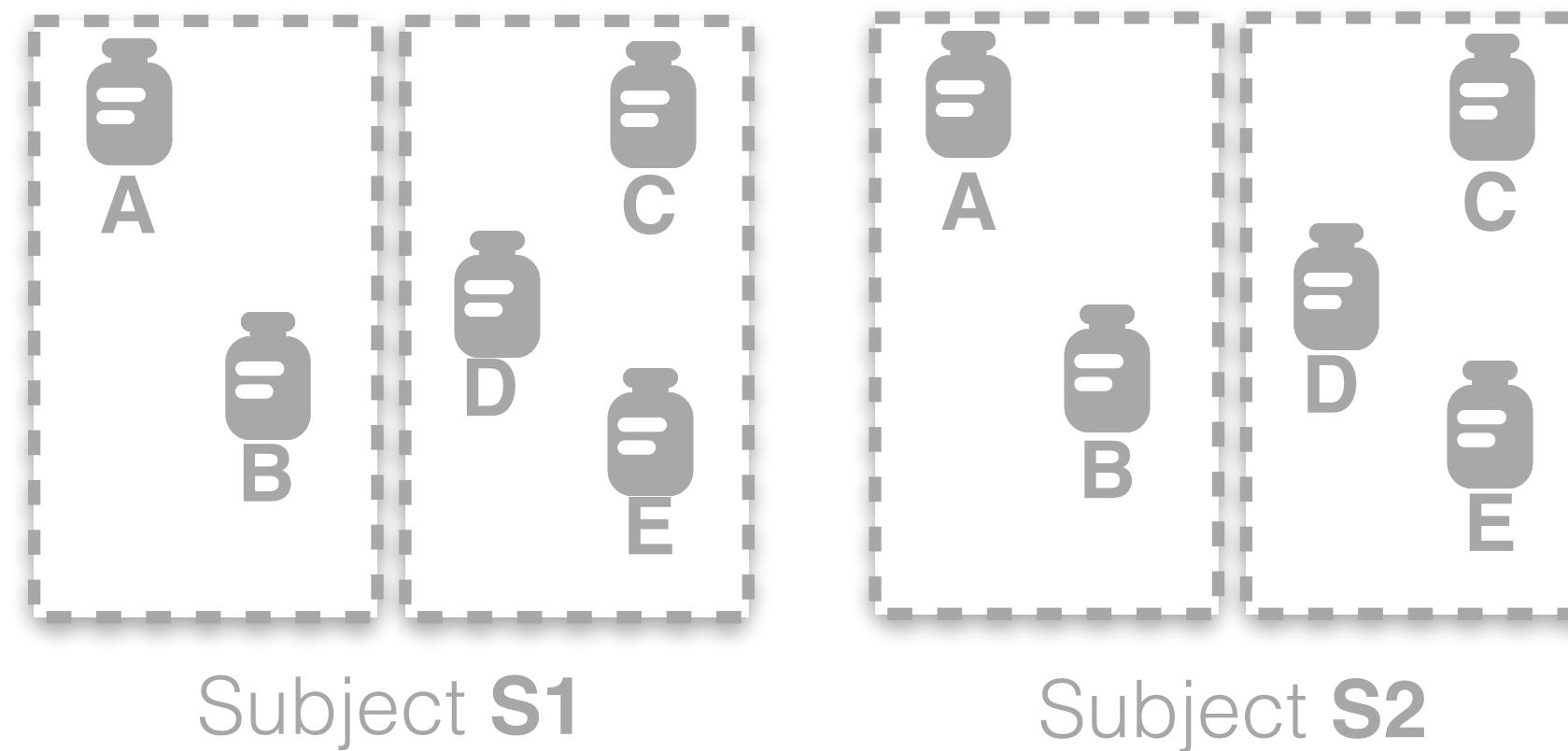
... with categories defined a priori and identical from one subject to another

The informations provided by the data are of two types

QC-sort

A variant of the sorting task...

... with categories defined a priori



QC-data

Groups of similar objects

	S1	S2
A	Gr 1	Gr 1
B	Gr 1	Gr 1
C	Gr 2	Gr 2
D	Gr 2	Gr 2
E	Gr 2	Gr 2

The informations provided by the data are of two types

QC-sort

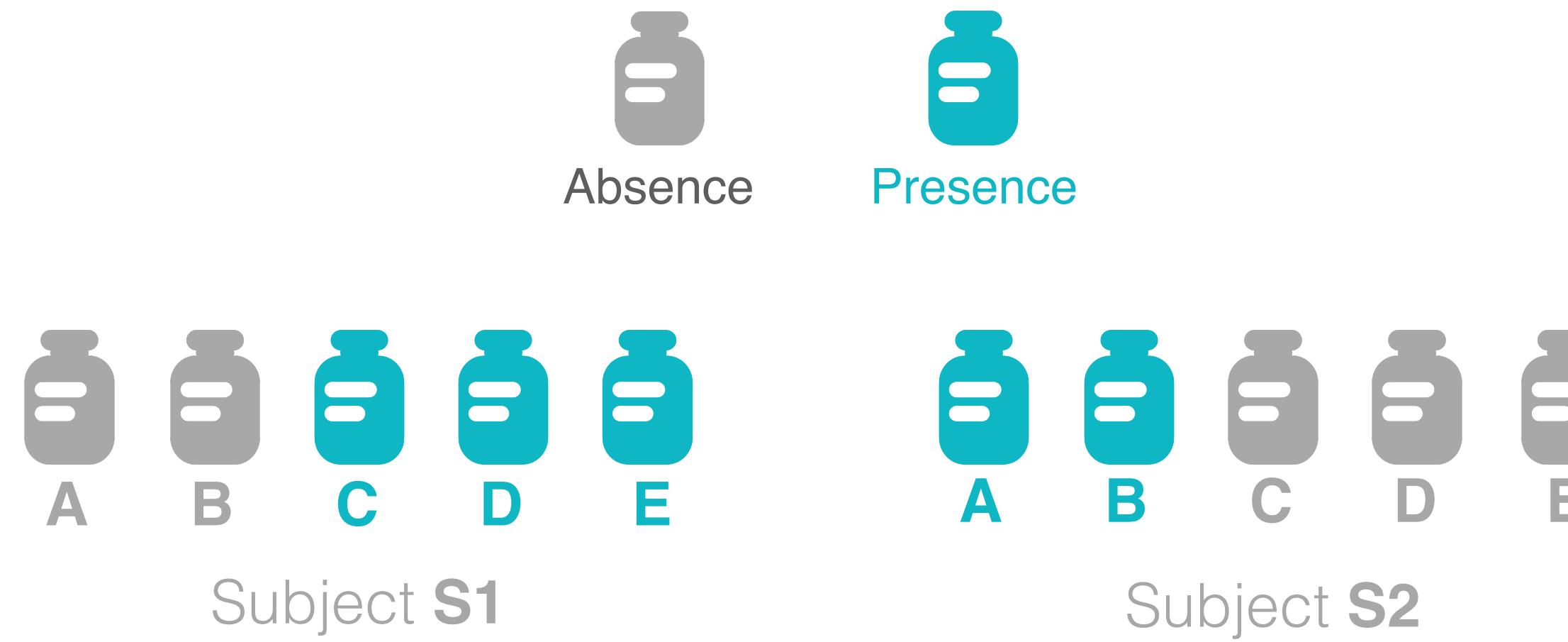
A variant of the sorting task...

... with categories defined a priori

QC-data

Groups of similar objects

Labels



	S1	S2
A	0	1
B	0	1
C	1	0
D	1	0
E	1	0

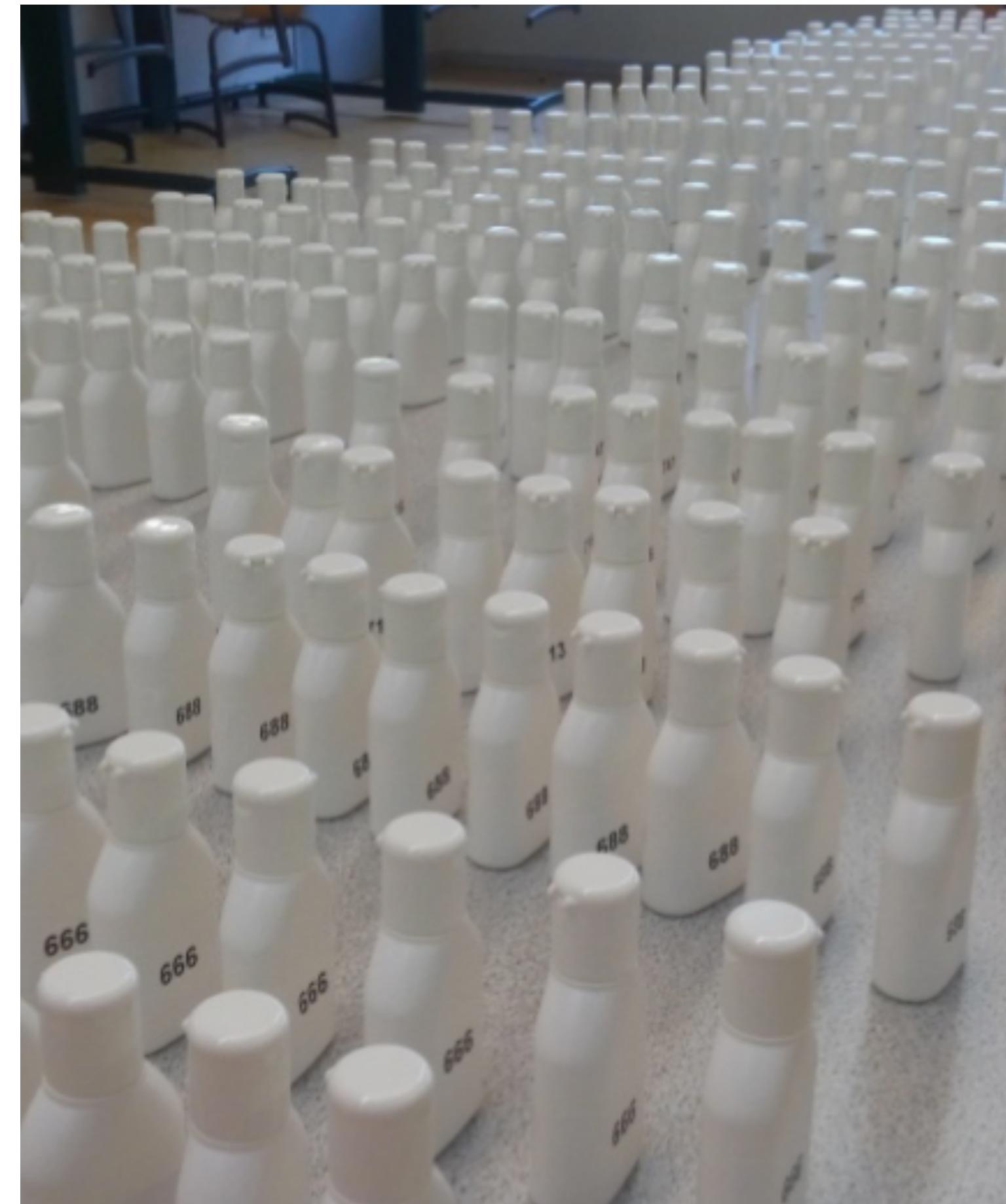
The distance has to combine both kinds of information

- ▶ 2 stimuli should all the more close that...
 - They were put together by a great number of subjects
 - They represent the concept in a same way
- ▶ The distance has to be a linear combination of a distance highlighting **the structure into groups of similar objects** and a distance representing **the labels of the stimuli**

$$d_{QC\text{-}analysis}^2(i, i') = a \cdot d_{groups}^2(i, i') + b \cdot d_{labels}^2(i, i')$$

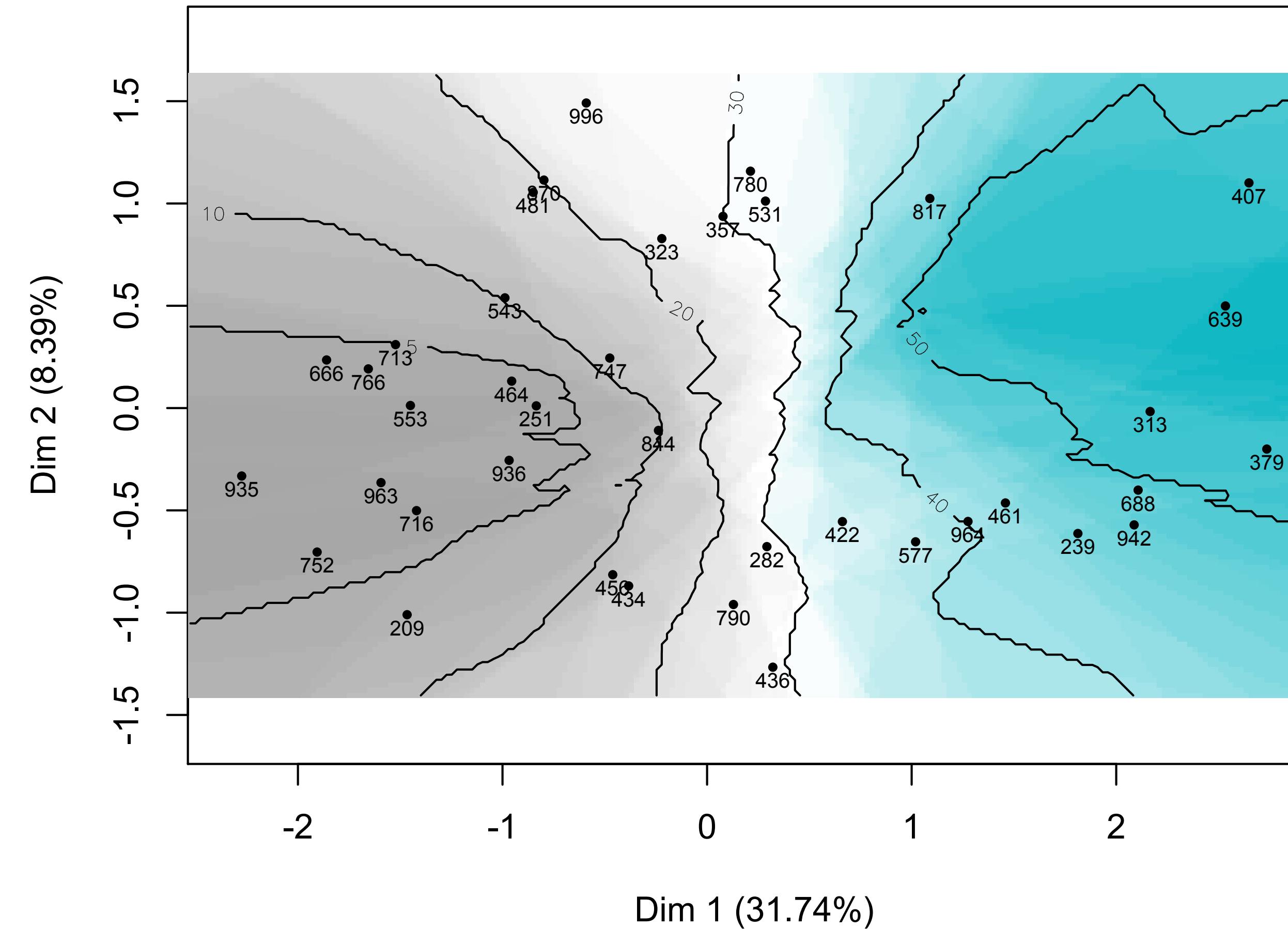
Is this fragrance innovative?

- ▶ 39 formulated different fragrances
- ▶ According to the formulators, 20 of them were innovative
- ▶ R&D people wanted to understand the perception of the consumers in terms of innovation (regarding fragrances)
- ▶ R&D people wanted to check whether this perception was matching their definition of innovation



Is this fragrance innovative?

Concept identification

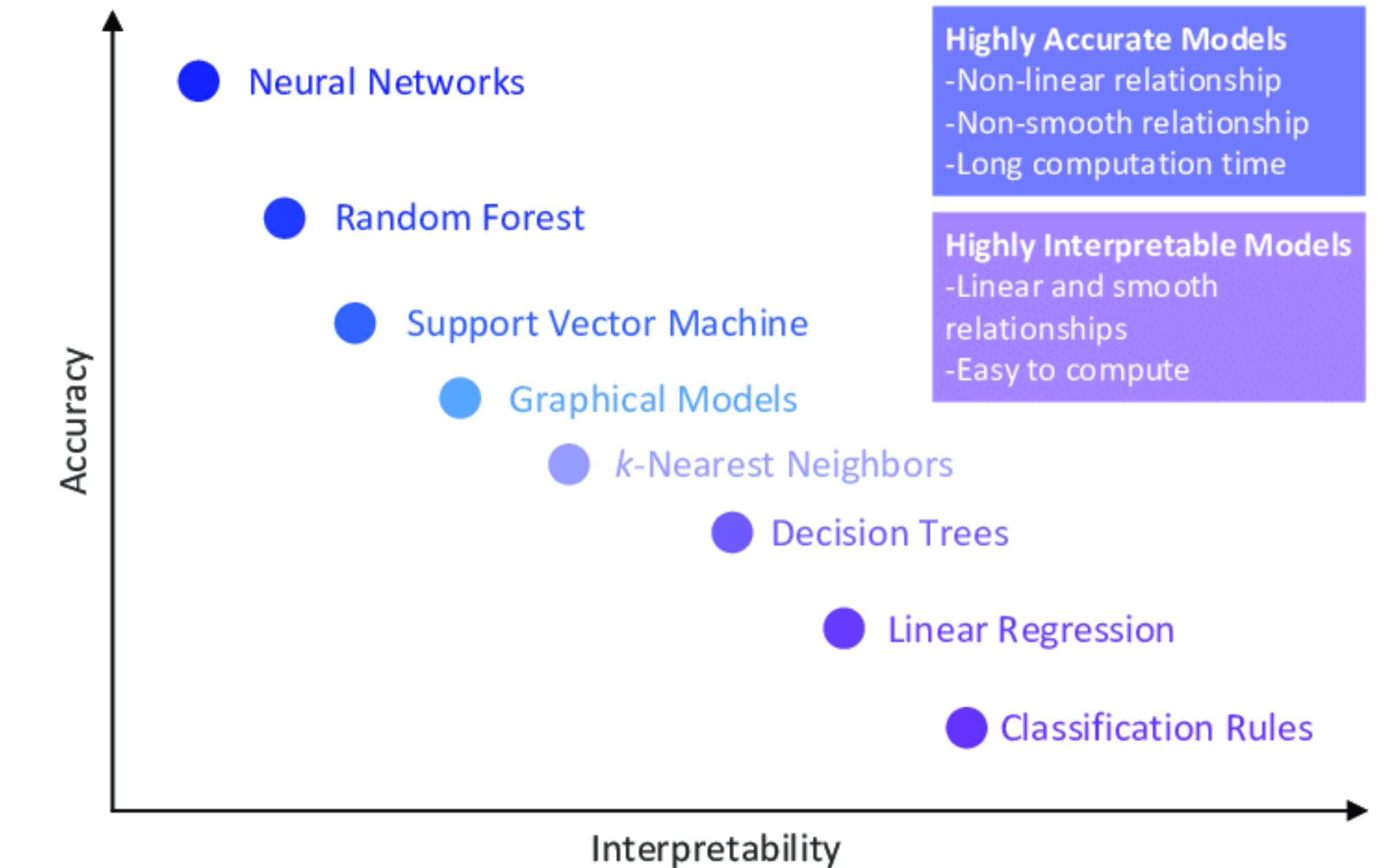


Interlude **I** for Individual differences

- The Q methodology is a method used in psychology and in social sciences to study people's « subjectivity ».
- It works perfectly well when stimuli are assertions, pieces of music, stimuli, fragrances, paintings...

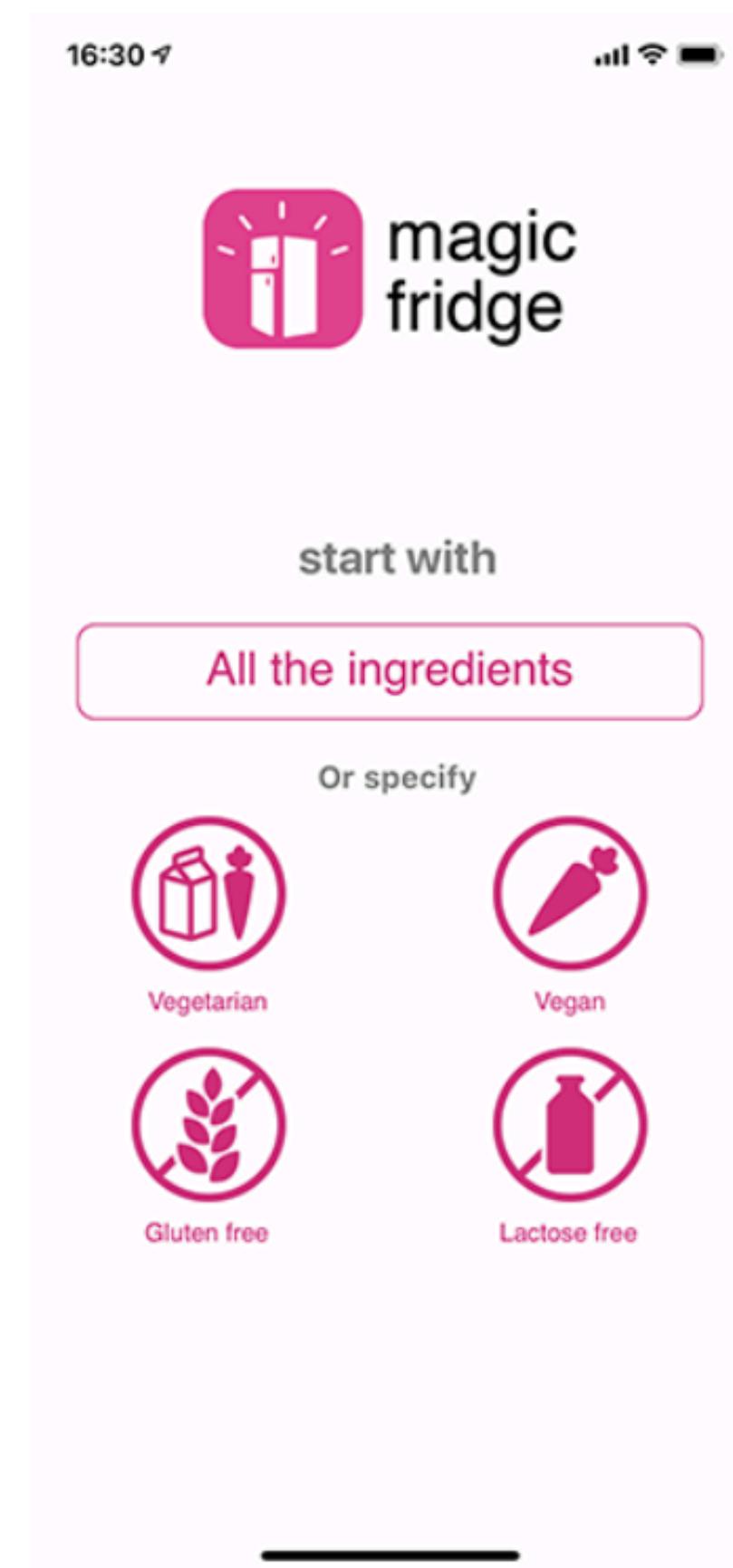
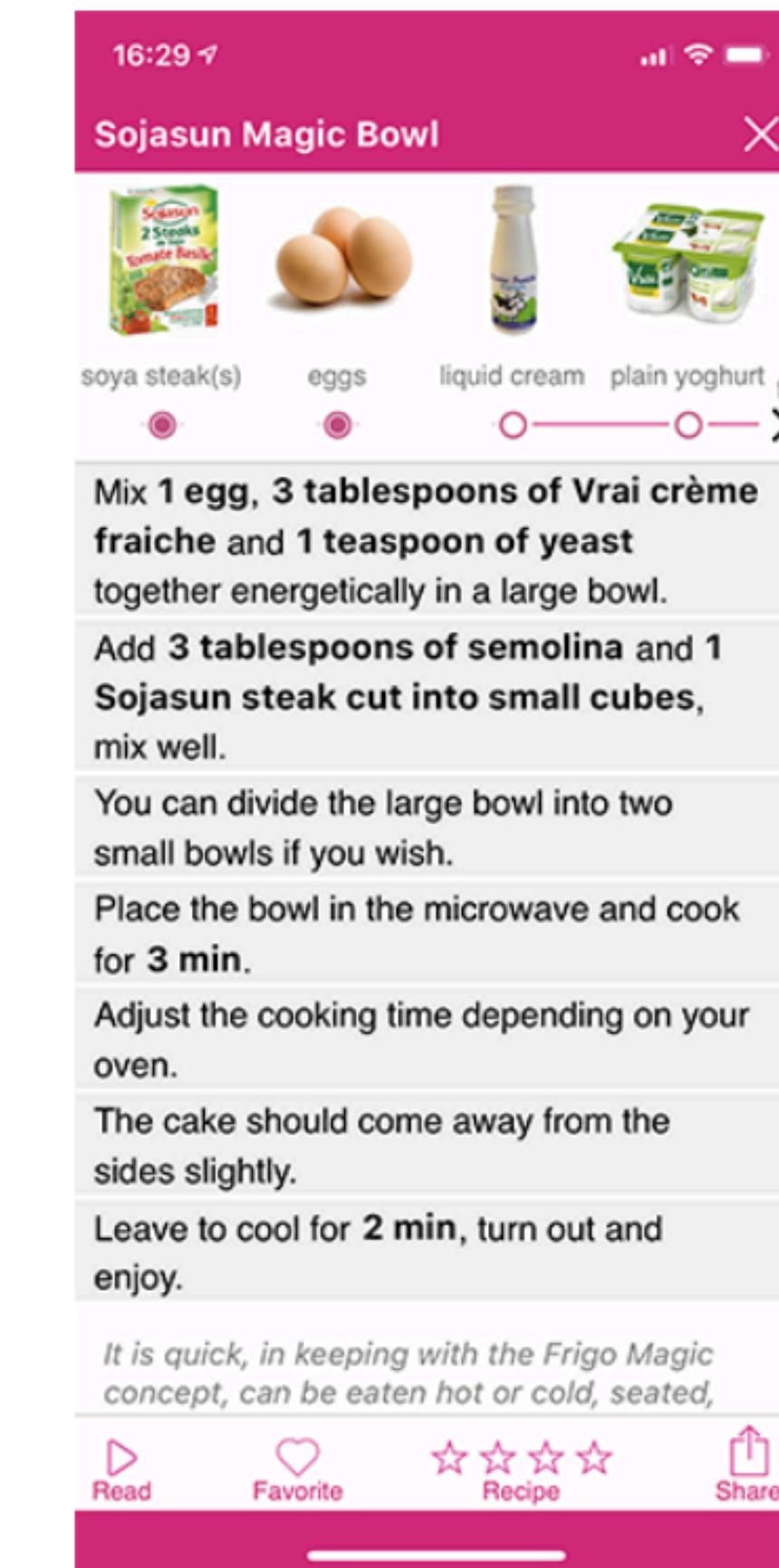
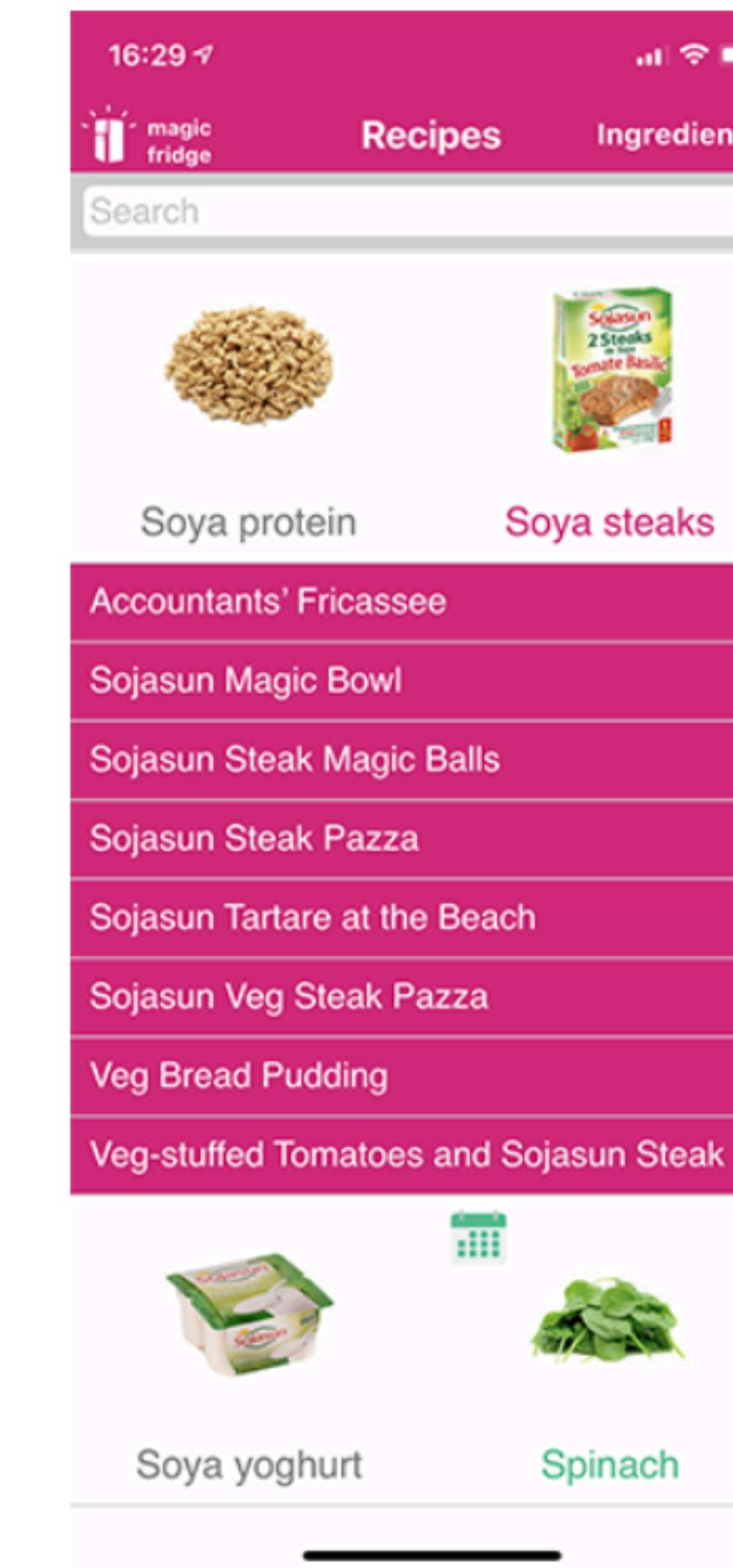
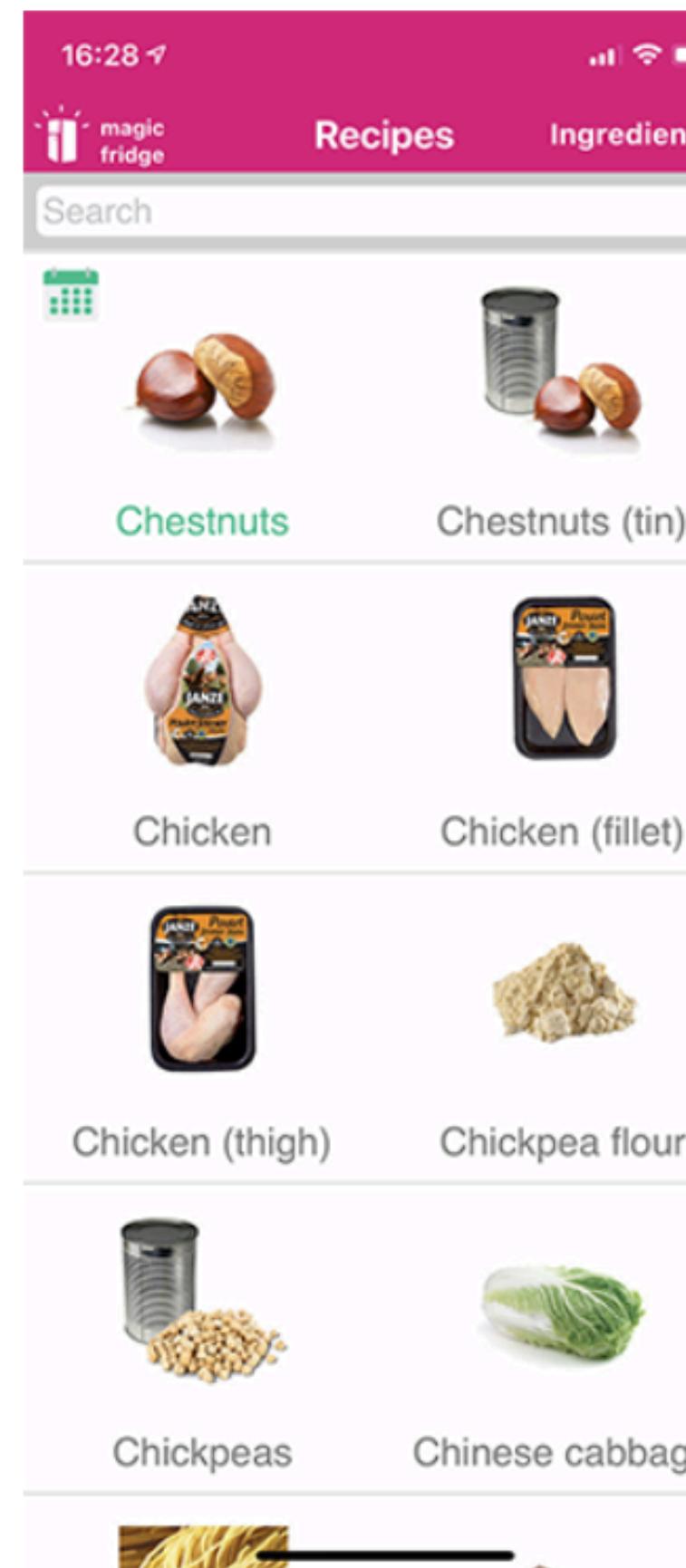
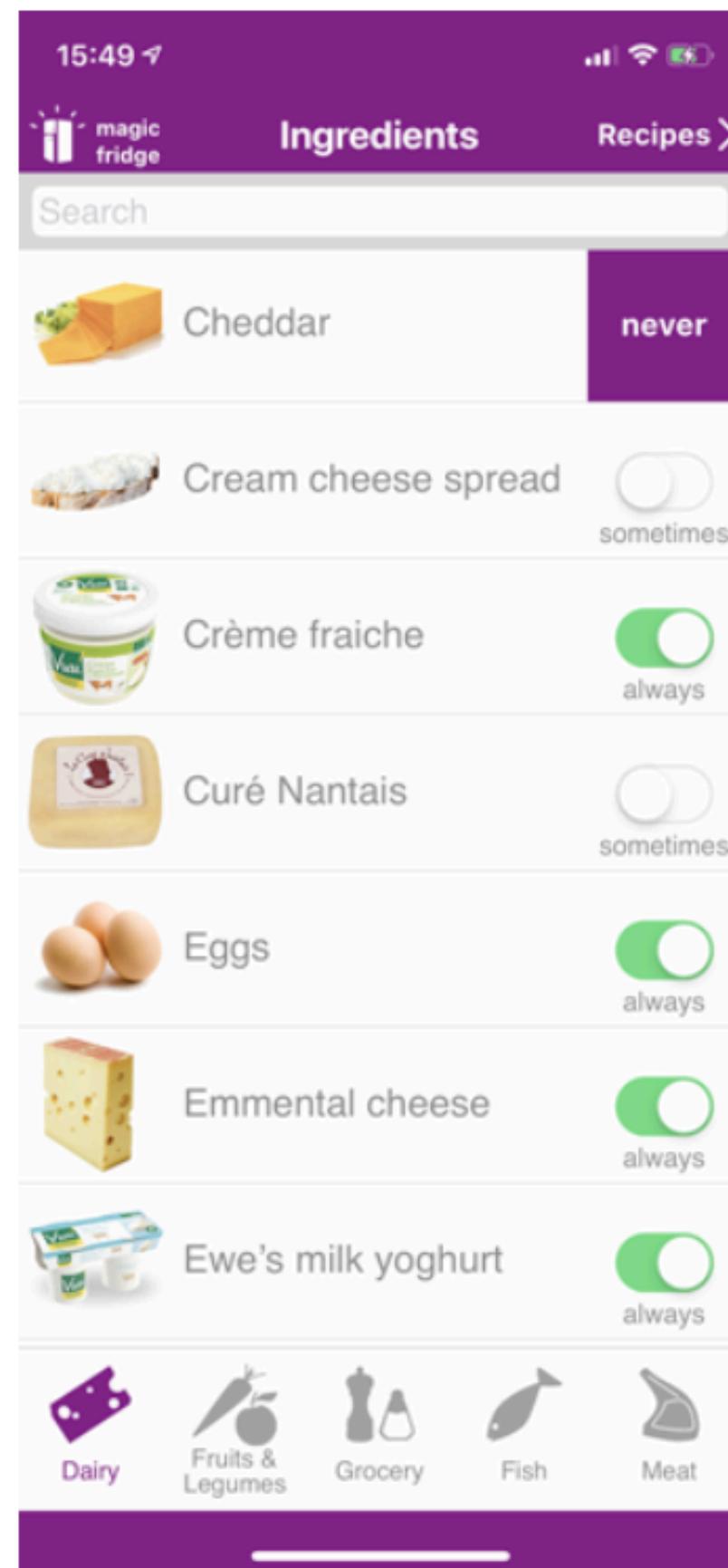
I

Me, myself and I I for Intelligence (artificial), Interpretability



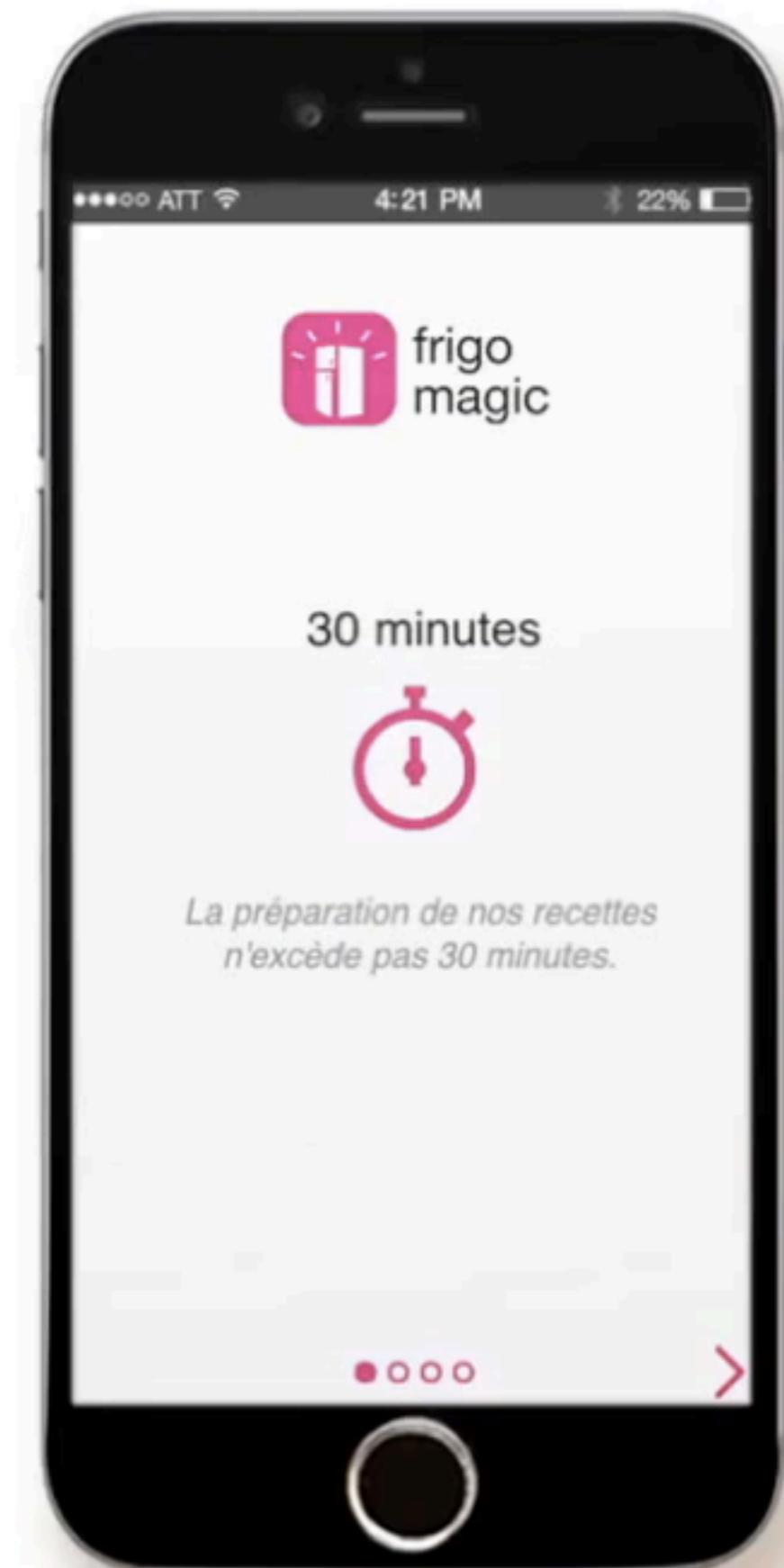
Creativity is intelligence having fun. (Albert Einstein)

Magic Fridge, quick and easy recipe idea to cook an economical meal in your kitchen.

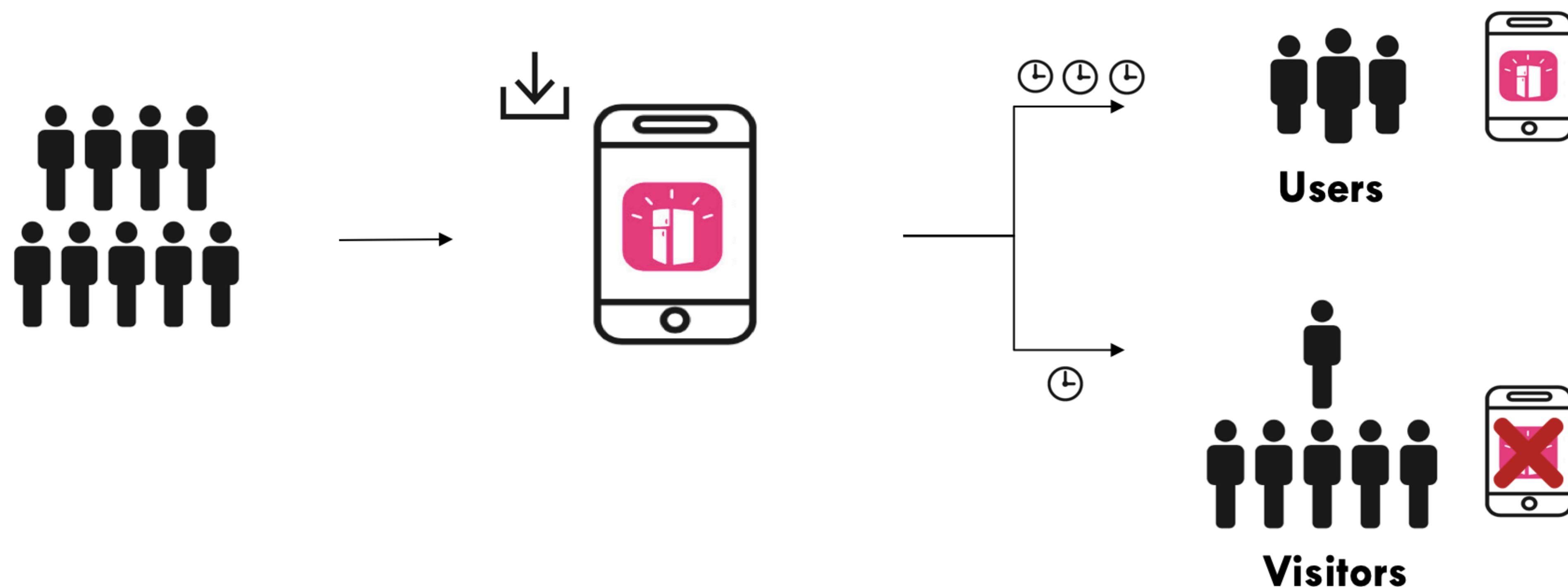


What about the data?

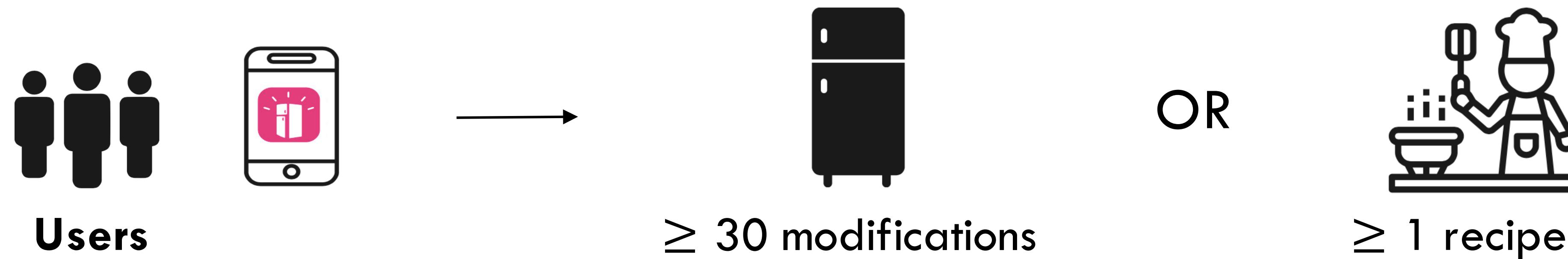
- Data related to the usage of the application
- Data related to the consumers
- Data related to the recipes
- Data related to the fridge



Two types of people

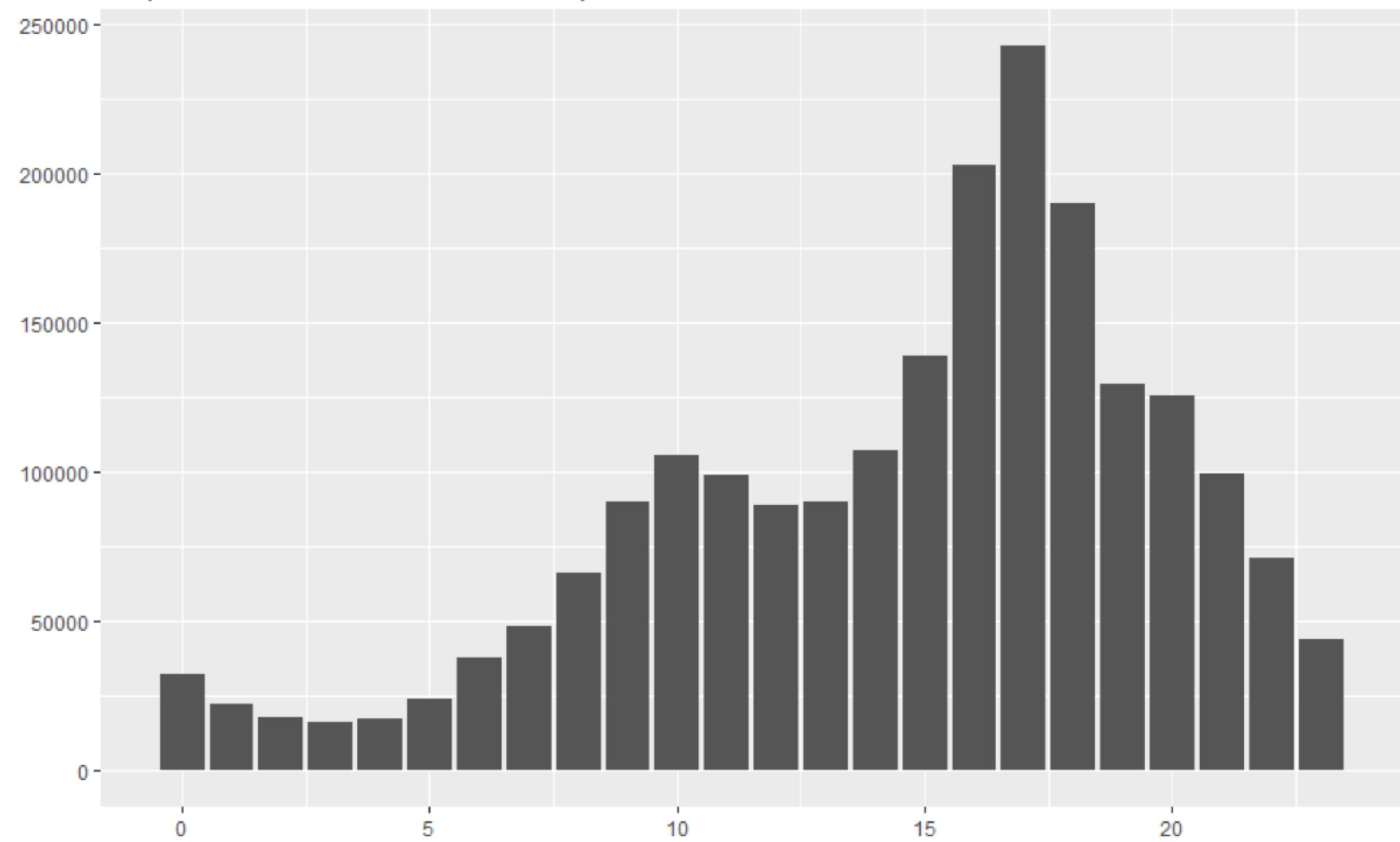


How to define/screen an active user?



Cooking more than 1 recipe?

- Analyses per day
- Analyses for each hour of the day
- Favorite recipes
- Time spent of a recipe



Cooking more than 1 recipe?

- Analyses per day
- Analyses for each hour of the day
- Favorite recipes
- Time spent of a recipe

Examples :

Day of the week	Time of the day	Favorite	Time spent	⇒ Recipe DONE
Thursday	19	TRUE	34	

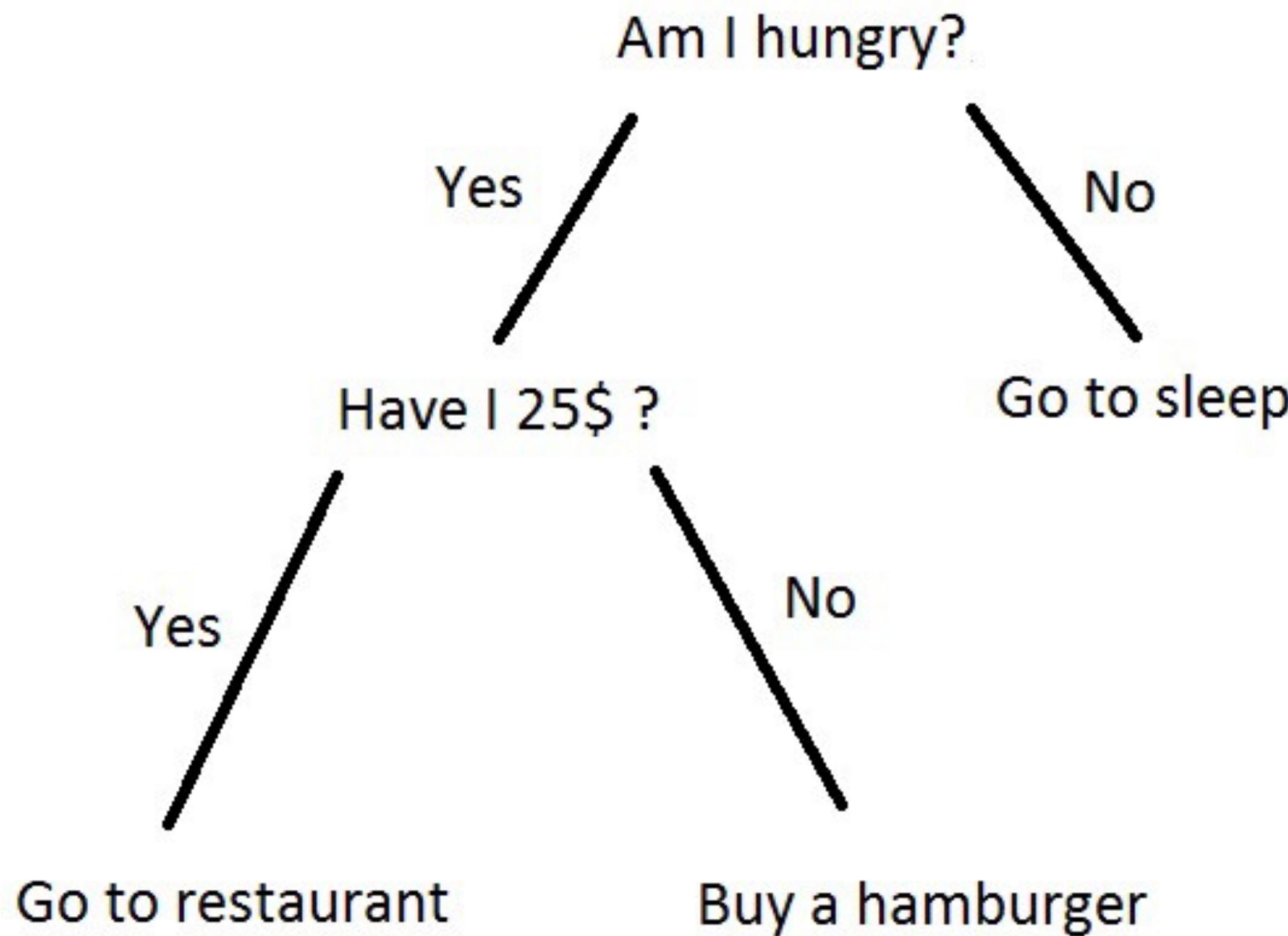
Day of the week	Time of the day	Favorite	Time spent	⇒ Recipe NOT DONE
Saturday	2	FALSE	0	

Day of the week	Time of the day	Favorite	Time spent	⇒ Maybe
Thursday	23	FALSE	4	

Building one's expertise

- By examining each log we have built an expertise in order to label the data
- To do so, we have trained a panel of four people
- Based on our expertise, we supposedly « know » whether someone has realized a recipe or not
- We managed to label « manually » thousands of logs of the dataset (amongst millions)

Decision tree: example



Decision tree: results

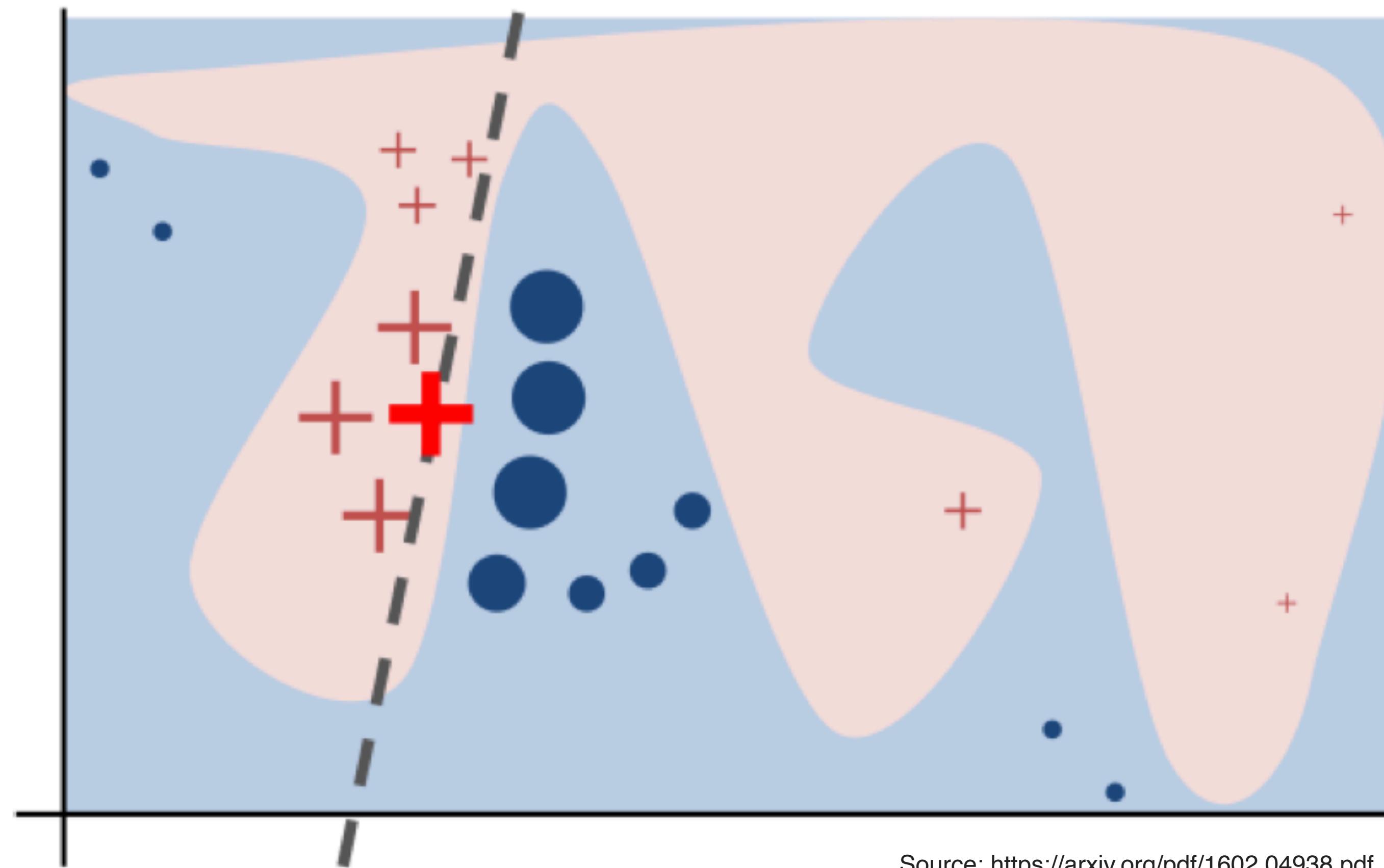
- Time spent on the recipe
- Day
- Time of the day
- Already consulted
- Favorite
- High score

Decision tree: what's next?

- Now that we can separate users from visitors, we can work on a recommendation system based on the users' data

I

nterpretability

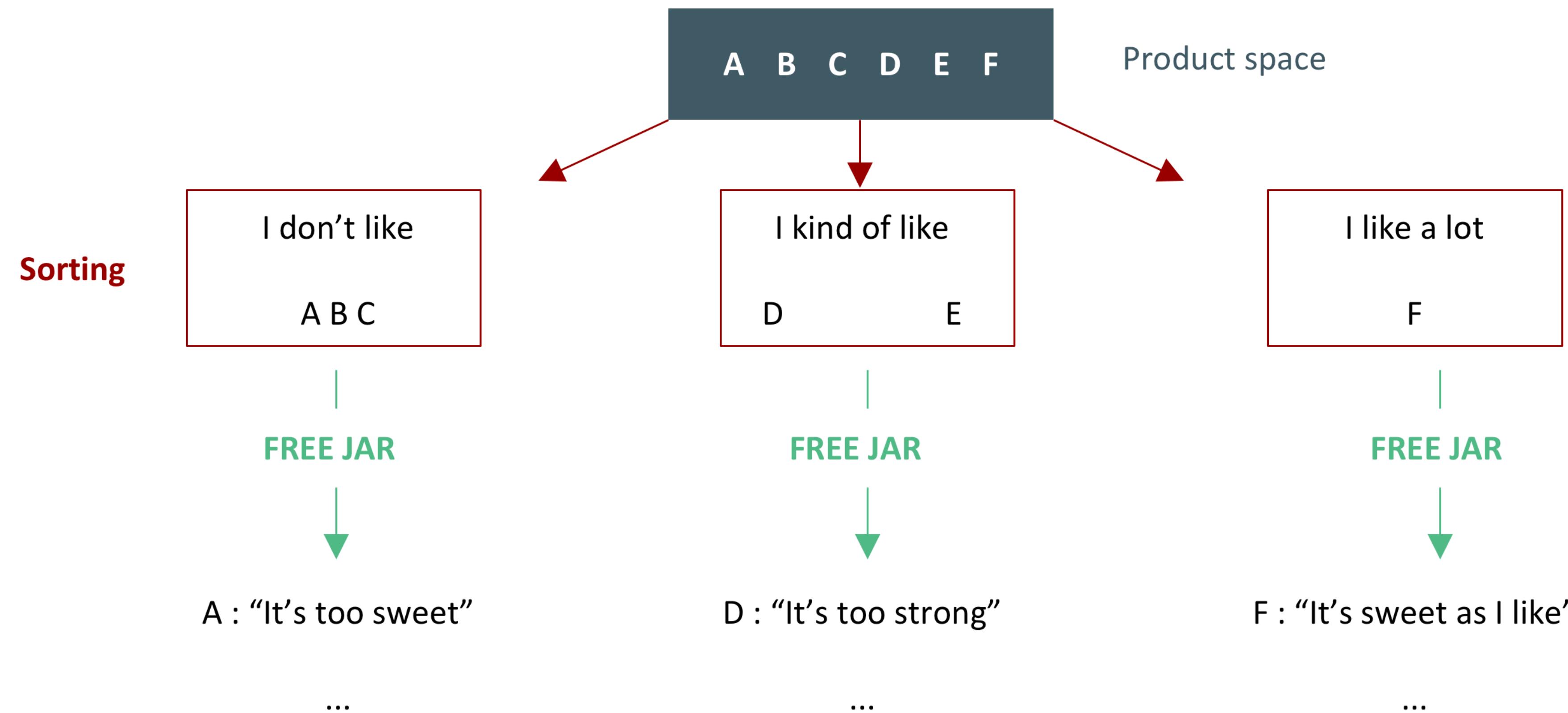


Source: <https://arxiv.org/pdf/1602.04938.pdf>

I for Intelligence, Interpretability

Interpretability: Free JAR profiling

Which words contributed to the assignment of a comment to the category "I don't like"?



Interlude

I for Intelligence, Interpretability

- Predicting without interpreting is like acting without thinking
- Artificial Intelligence without interpretability is just artificial

I

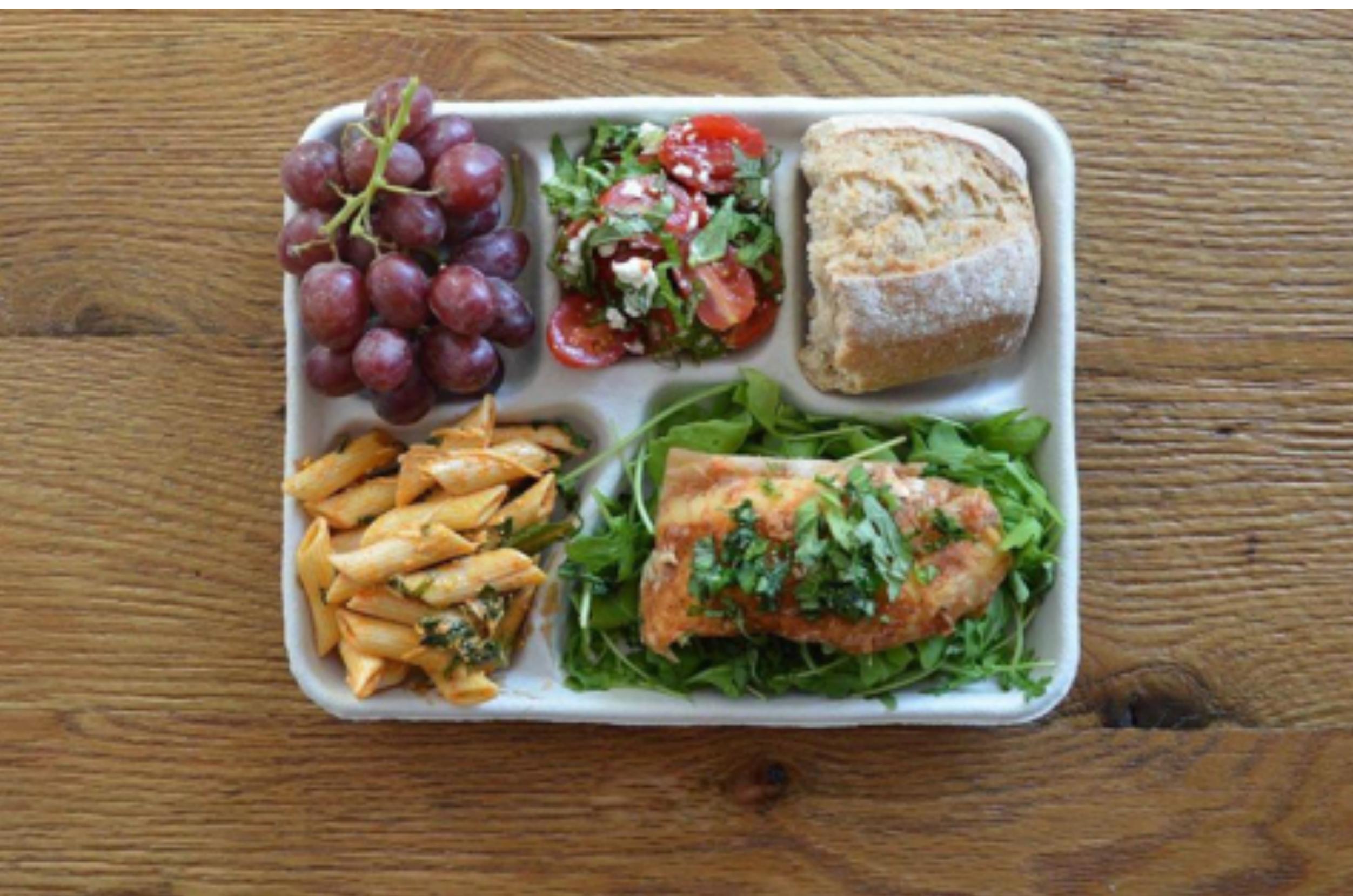
Me, myself and I I for Implicit

(Wadsworth Jarrell -
Revolutionary)



One sees that all explicit opposites are implicit allies—correlative in the sense that they "go with" each other and cannot exist apart. (Alan Watts)

Italy: buon appetito!



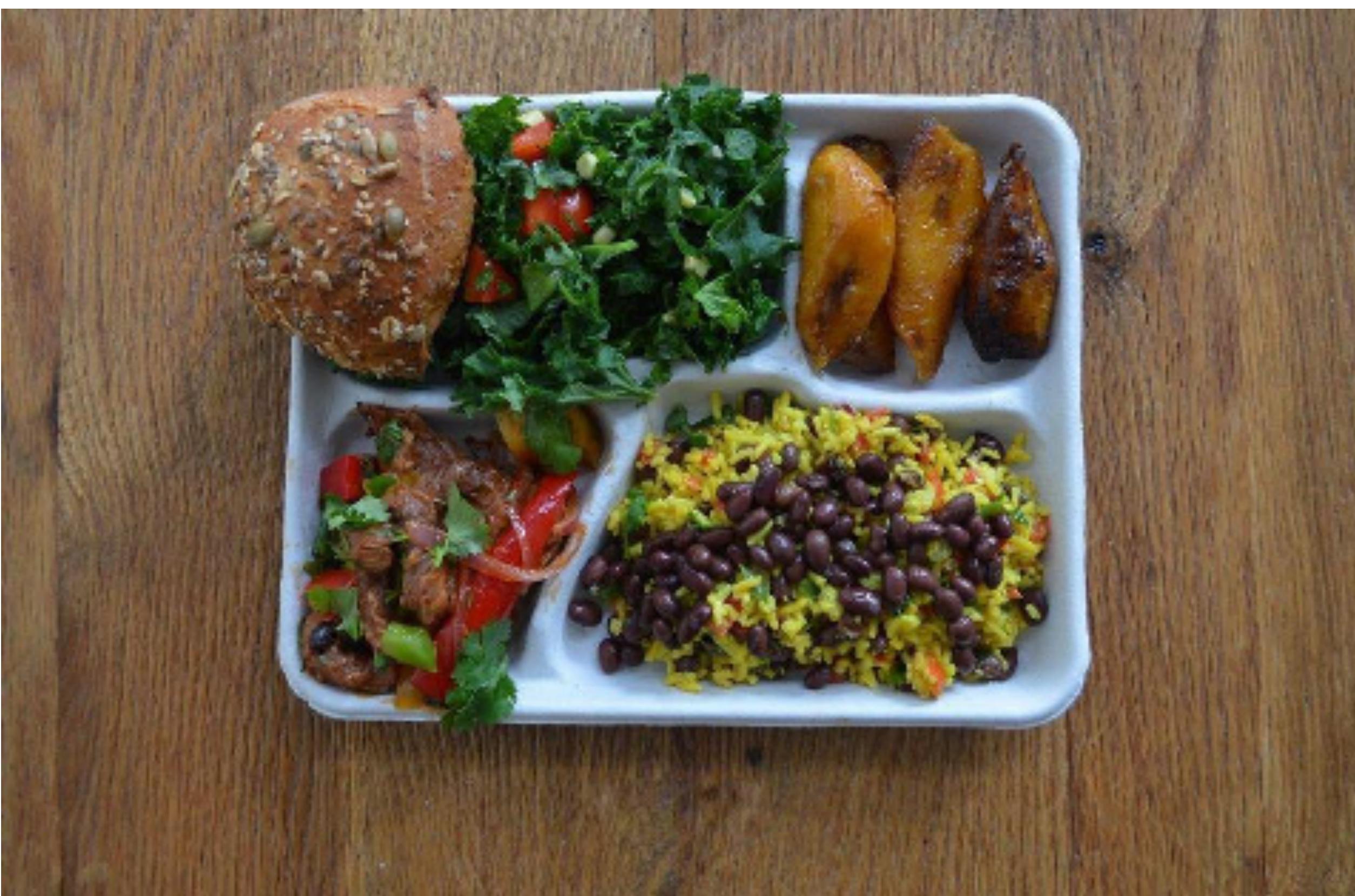
South Korea: 맛있게 드세요!



Greece: καλή όρεξη!



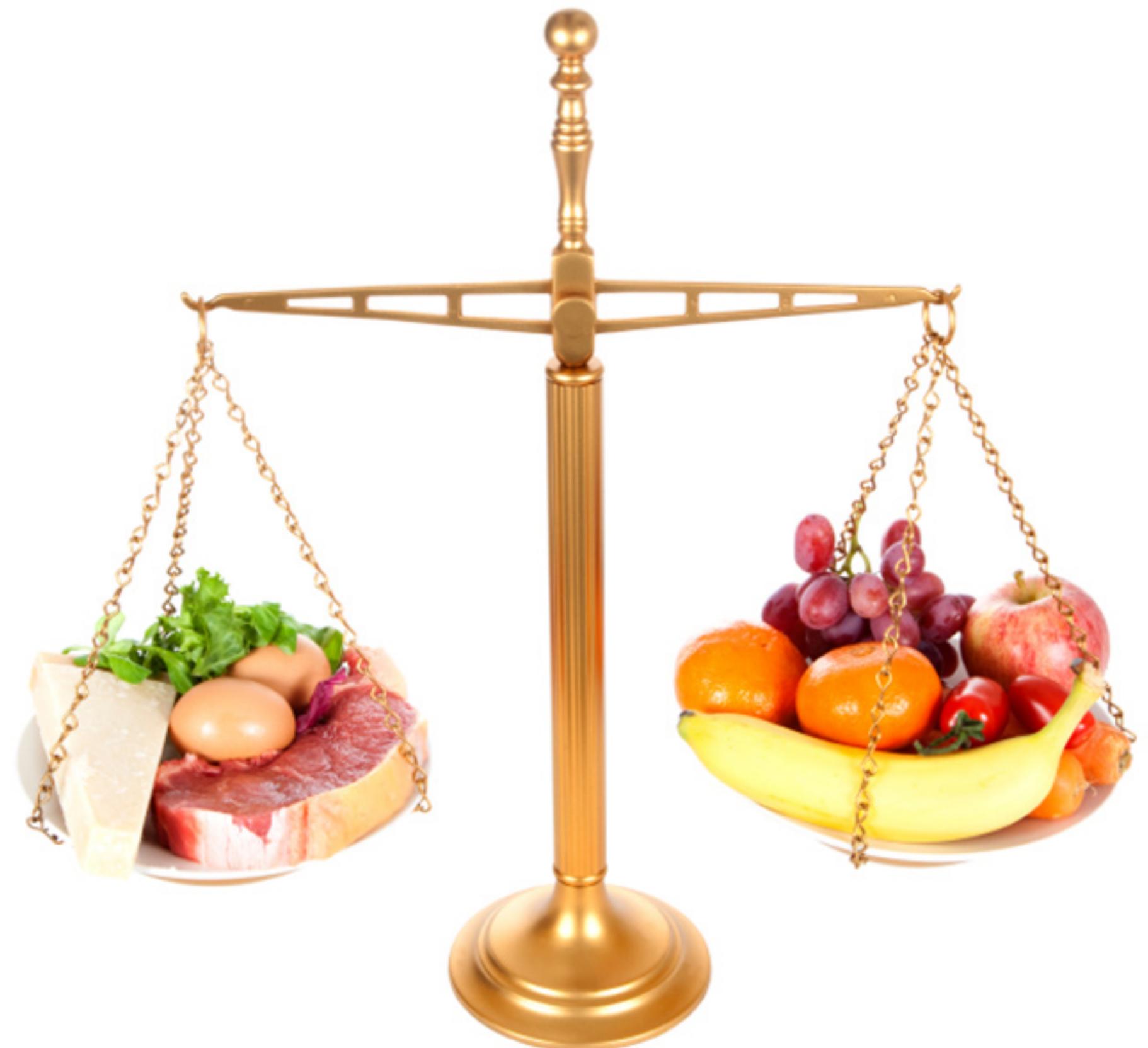
Brazil: bon appétit!



USA: enjoy your meal!



Nutritional balance



Eye tracking data

Is eye tracking an I tracker?

RealEye

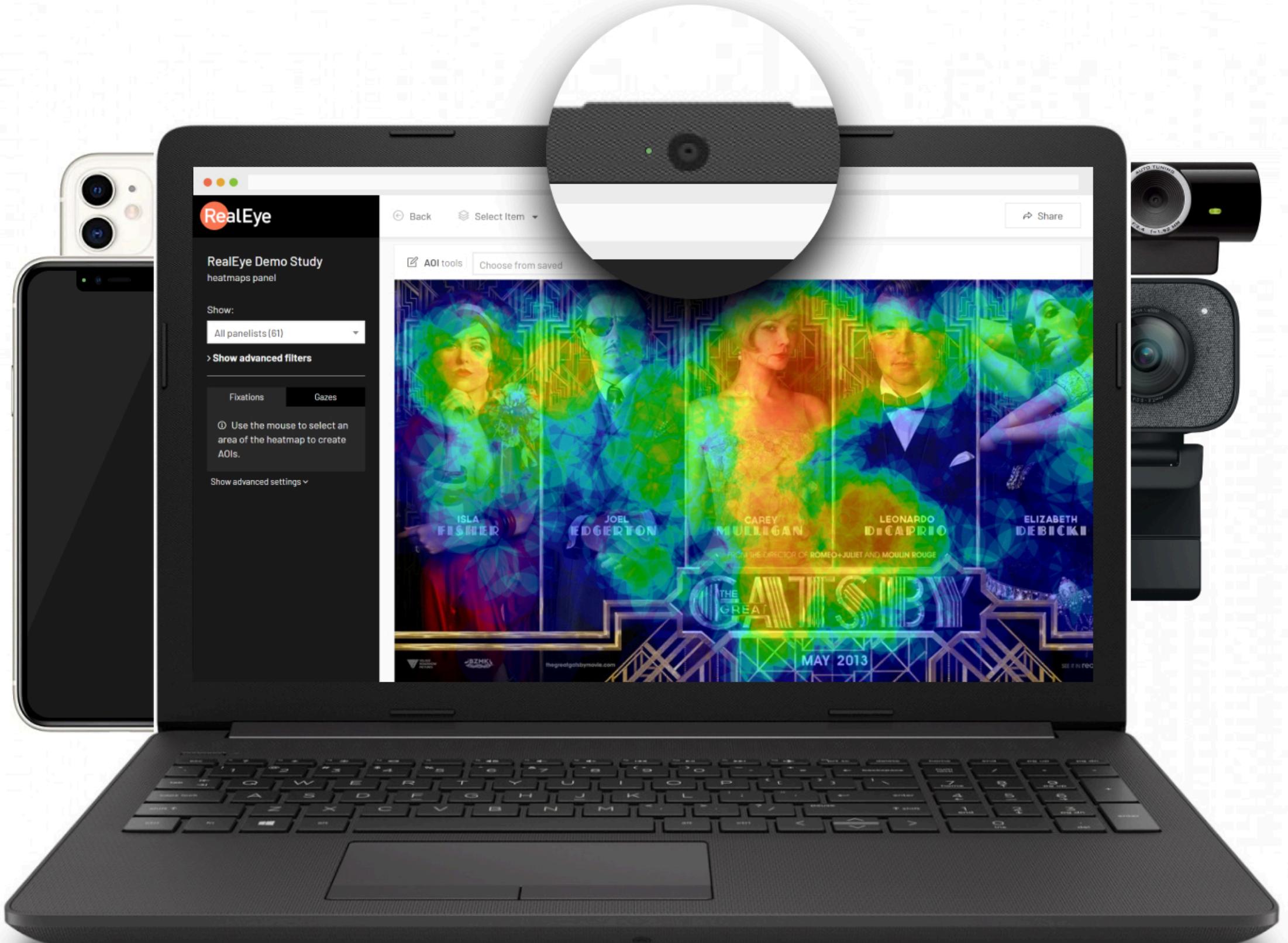
FEATURES ▾ PRICING FOR EDUCATION RESOURCES ▾ ONLINE VS. OFFLINE TRY FOR FREE

Online Research Platform with Webcam Eye-Tracking

See the platform's video overview

Try For Free Launch Demo

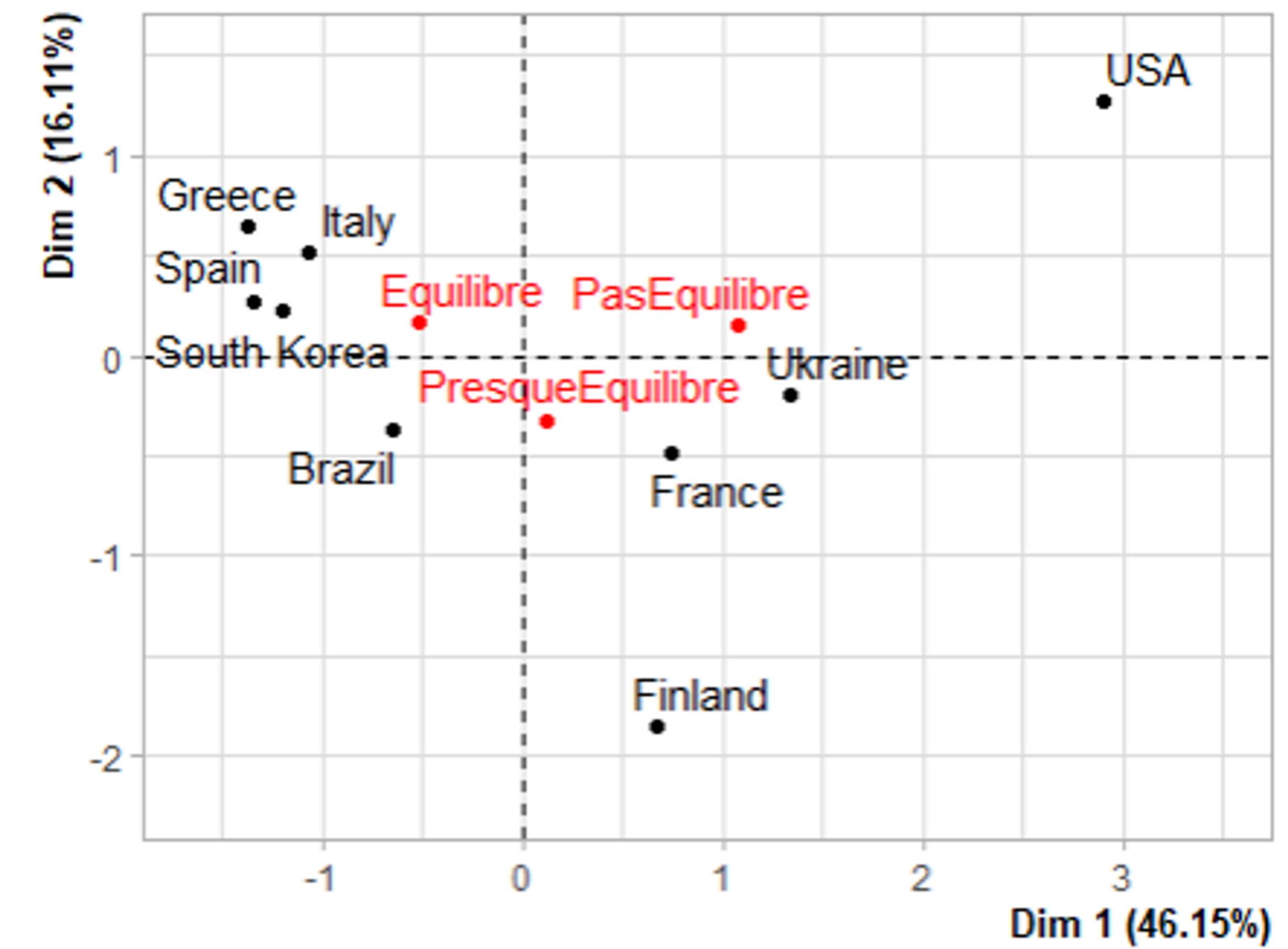
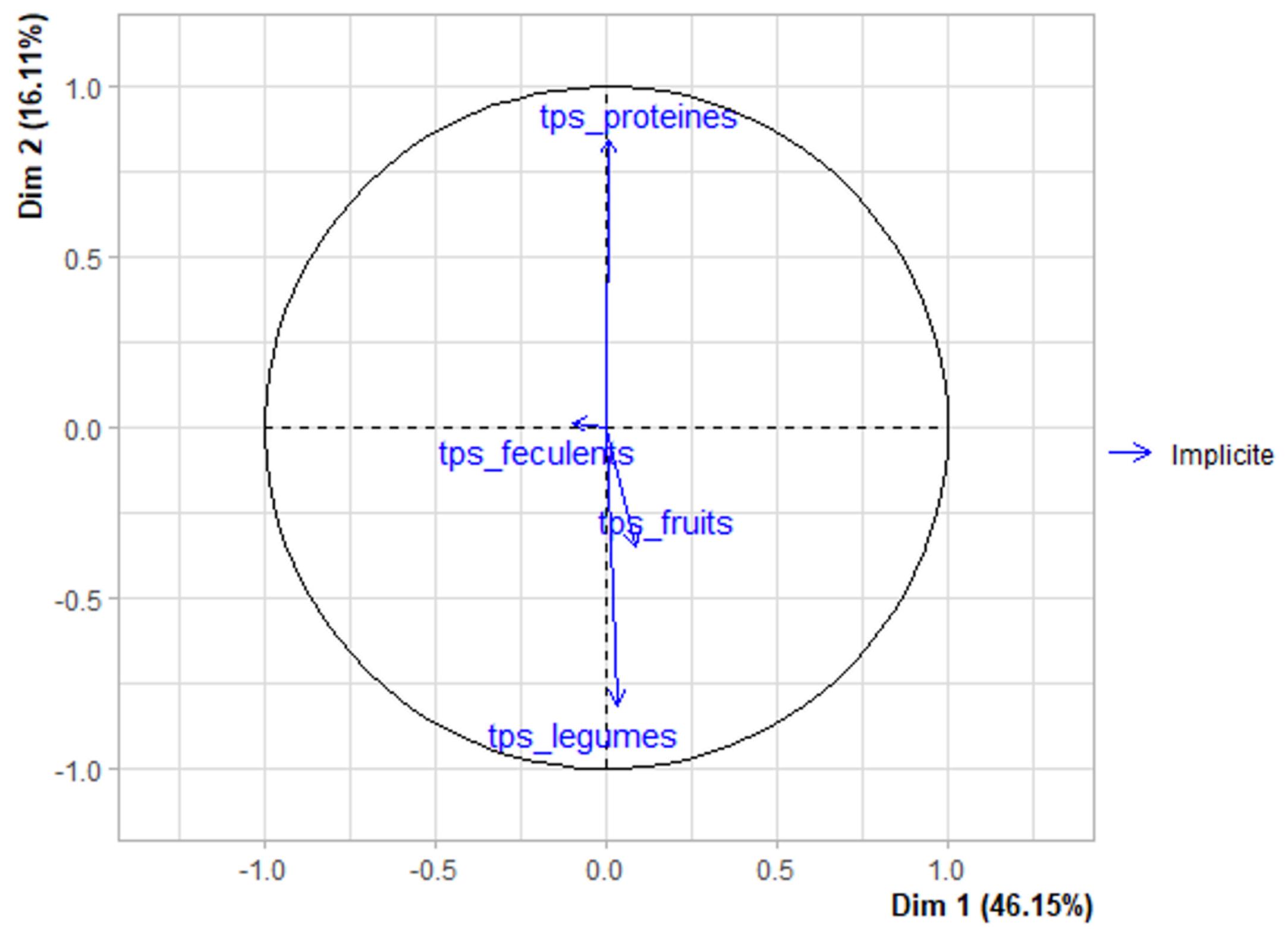
7-days free license



Eye tracking data



Implicit data at work...



Interlude

I for Implicit

- Results are...implicit ;-)
- Technology is still fragile
- Stimuli are too complex even though meal trays are divided into compartments

I

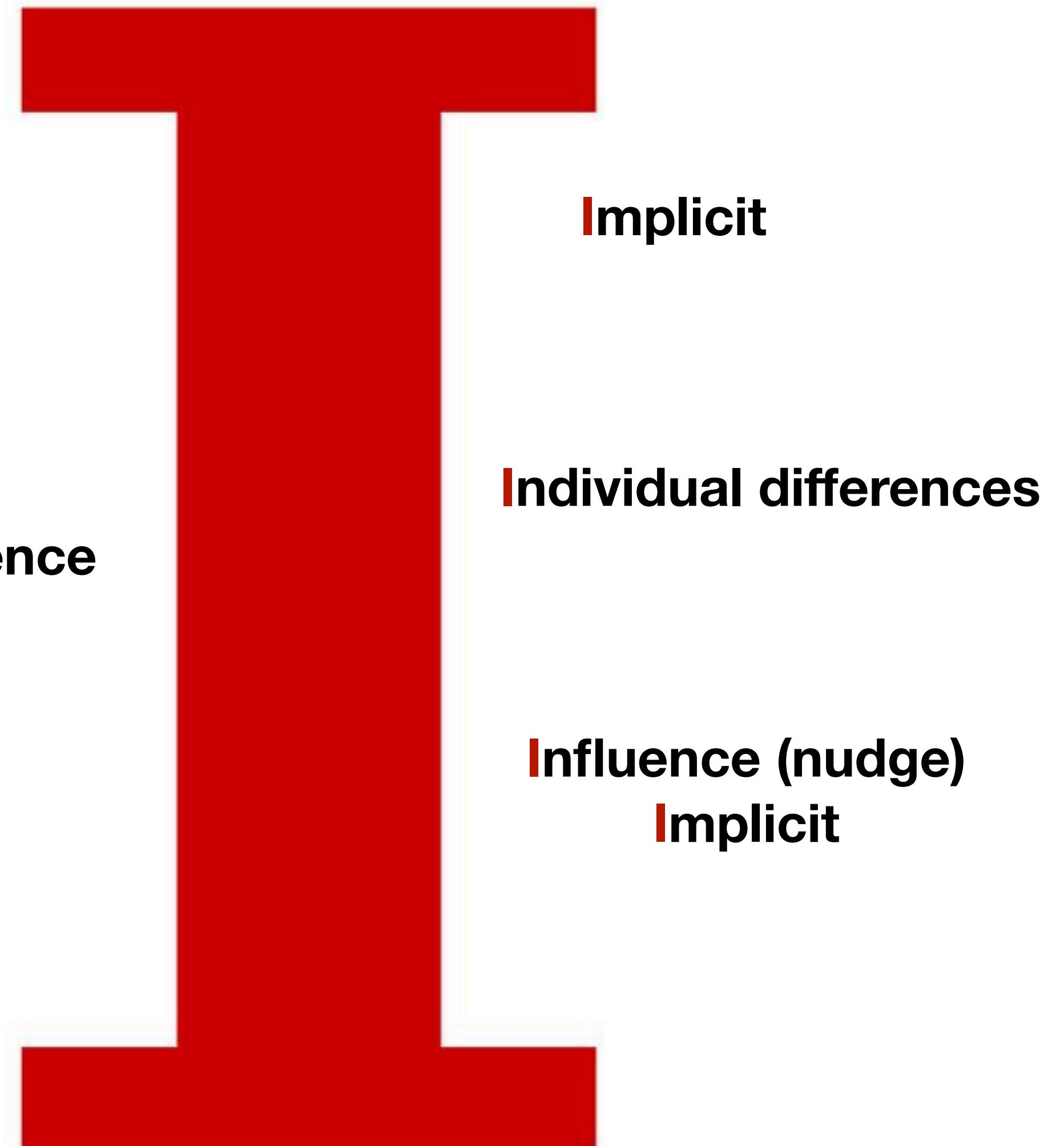
In conclusion

- Complex tasks can be asked to consumers, as long as they are properly guided. From our experience, consumers can:
 - Imaginary products according to real attributes
 - Real products according to latent variables
 - Assess immense product space...
- Indirect insights can also be obtained from consumers
- This variety of tasks and measures leads to numerous and complementary results, which in the long run allow us to understand the consumer as closely as possible to their needs

**Intelligence
Interpretability**

Immense, Influence

**Ideal
Ideal point
Ideal product
Imaginary product**



**My gratitude goes to my
students without whom I
could not have made this
presentation: Margot,
Cathleen, Morgane, Oscar,
Benjamin, Lisa, Jules, Phuc-
Loi, Laudine, Clara, Hélias,...**

Thank you for your attention!

