# Comparison of rapid methodologies for sensory characterization

**Lucía Antúnez, Leticia Vidal, Luis de Saldamando, Ana Gimenez, Gastón Ares**

**Sensometrics & Consumer Science**
**Food Science and Technology Department**
**Universidad de la República**
**Montevideo, Uruguay**

4th SPP Technical and Professional Conference
17 - 19 Sep, 2014, Tucson

UNIVERSIDAD DE LA REPÚBLICA URUGUAY

Sensometría & Ciencia del Consumidor

# INTRODUCTION

Interest in rapid methodologies for sensory characterization has largely increased in the last decade.

They can be performed with semi-trained assessors or even naïve consumers, are less time consuming, more flexible and can provide direct feedback from consumers.

Rapid methodologies can be divided into three main types:

- Individual attribute evaluation (CATA, flash profiling)
- Holistic (sorting, projective mapping)
- Comparison with references (PSP, PPM)

Before these methodologies get established as standard tools, it is necessary to study their applicability, reliability, and reproducibility for characterizing products with different sensory complexity.

The aim of the present work was to compare four rapid methodologies with consumers and descriptive analysis for sensory characterization of powdered drinks.

UNIVERSIDAD DE LA REPÚBLICA URUGUAY

Sensometría & Ciencia del Consumidor

# MATERIALS AND METHODS

# SAMPLES

Two sets of six commercial powdered drinks were considered:

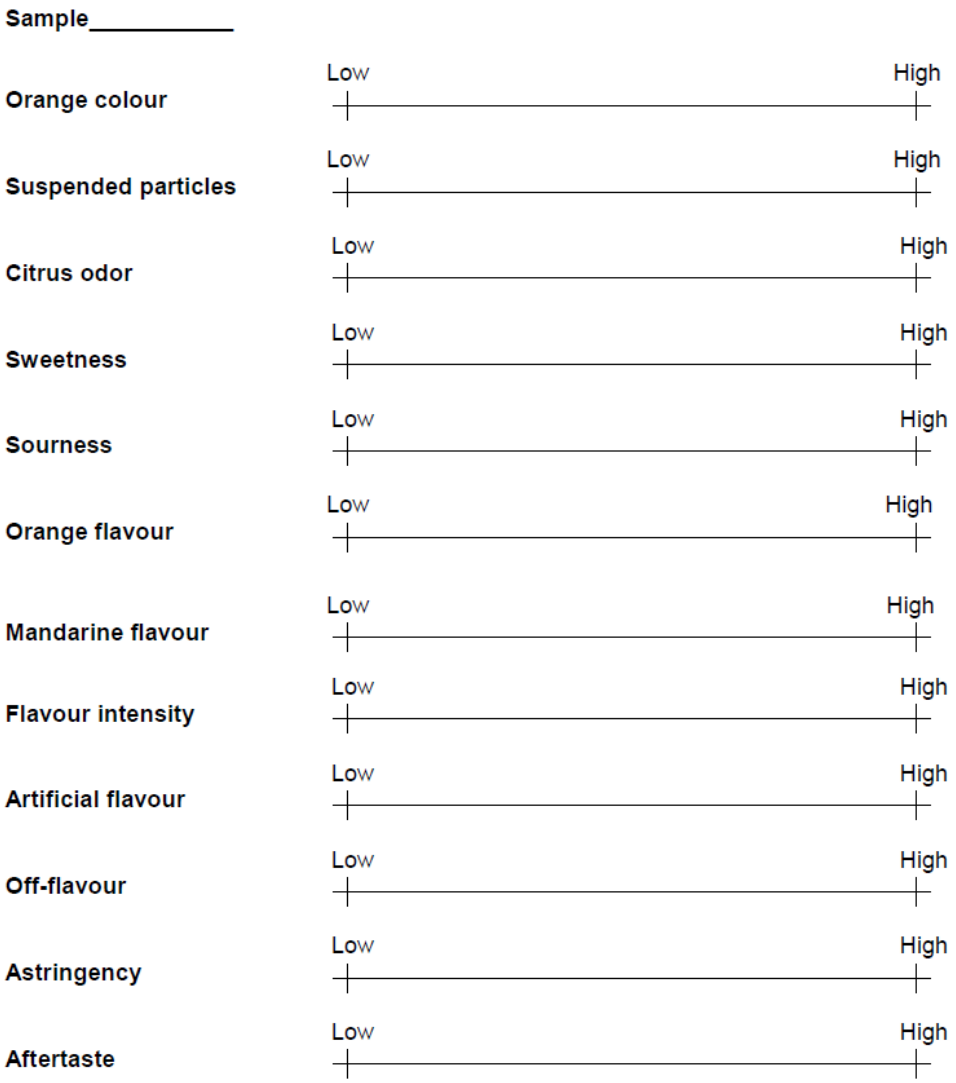
One with large differences among samples and the other with small differences.



# Descriptive analysis (DA)

A panel of 12 trained assessors evaluated the samples using descriptive analysis.

Two replications of each sample were evaluated by each assessor.



# Consumer-based sensory characterization

400 consumers participated in the study.

200

Sample set with large differences among samples

200

Sample set with small differences among samples

Each sample set was evaluated by 4 groups of 50 consumers

Session 1

50

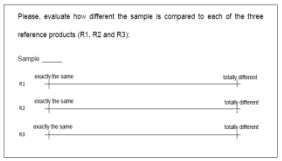
50

50

50








CATA

PM

PSP

PPM

Session 2

One week later

# Check-all-that apply (CATA) questions



**Sample _____**

From the following list, check all the attributes that describe the powdered drink you just tasted:

| | | | |
|---|---|---|---|
| Diluted | ☑ | Sour | ☑ |
| Intense colour | ☐ | Intense flavour | ☐ |
| Off-flavour | ☑ | Orange flavour | ☐ |
| Astringent | ☐ | Sweet | ☑ |
| Concentrated | ☐ | Smooth | ☐ |
| Soft colour | ☐ | Bitter | ☐ |
| Artificial | ☑ | Mandarine flavour | ☐ |
| Aftertaste | ☐ | Natural | ☐ |

# Projective mapping



X 321

X 795
sweet

X 142
concentrated

# Polarized sensory positioning (PSP)



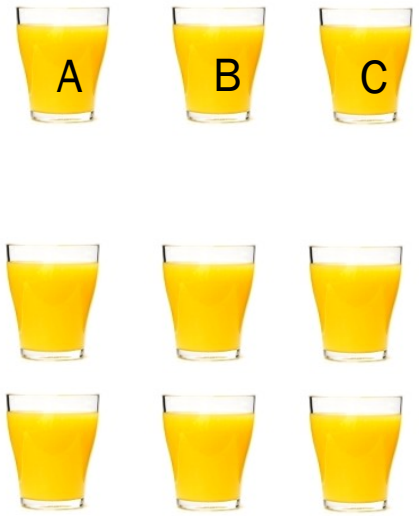


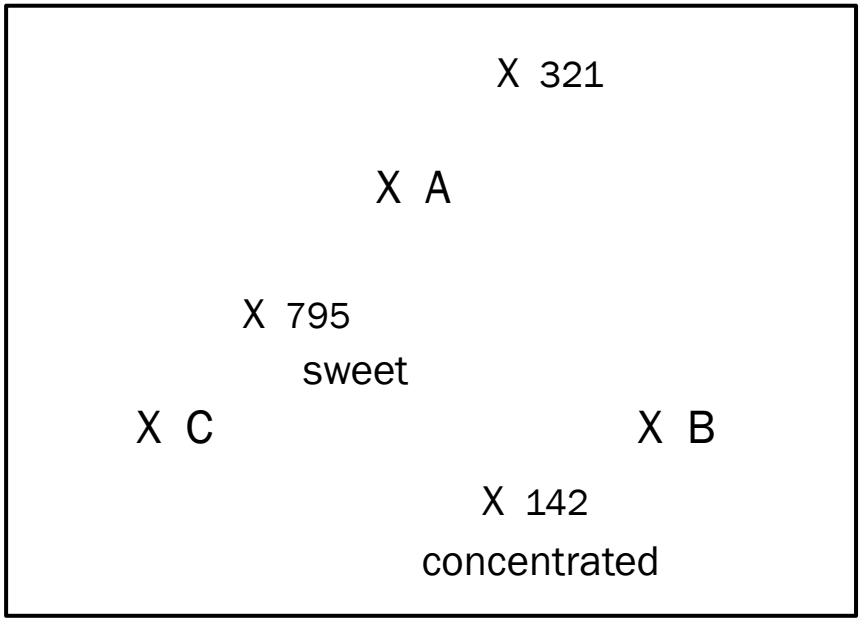

Please, evaluate how different the sample is compared to each of the three reference products (A,B and C)

Sample _____

| | exactly the same | totally different |
|---|---|---|
| A | X | |
| B | | X |
| C | X | |

# Polarized projective mapping (PPM)



UNIVERSIDAD DE LA REPÚBLICA URUGUAY

Sensometría & Ciencia del Consumidor

# RESULTS

# DESCRIPTIVE ANALYSIS (DA)

Significant differences ($p<0.05$) among samples were identified

Large differences among samples: 11 of the 12 sensory attributes
Small differences among samples: 10 of the 12 sensory attributes

Differences among samples in the intensity of the attributes ranged from:
0.2 to 6.0 points (large differences among samples)
0.2 to 4.8 points (small differences among samples)

The smallest differences were identified in attributes suspended particles, mandarine flavour, aftertaste, off-flavour and astringency.

# CATA

Significant differences among samples were found in the frequency with which consumers used 12 of the 16 terms.

No significant differences in:

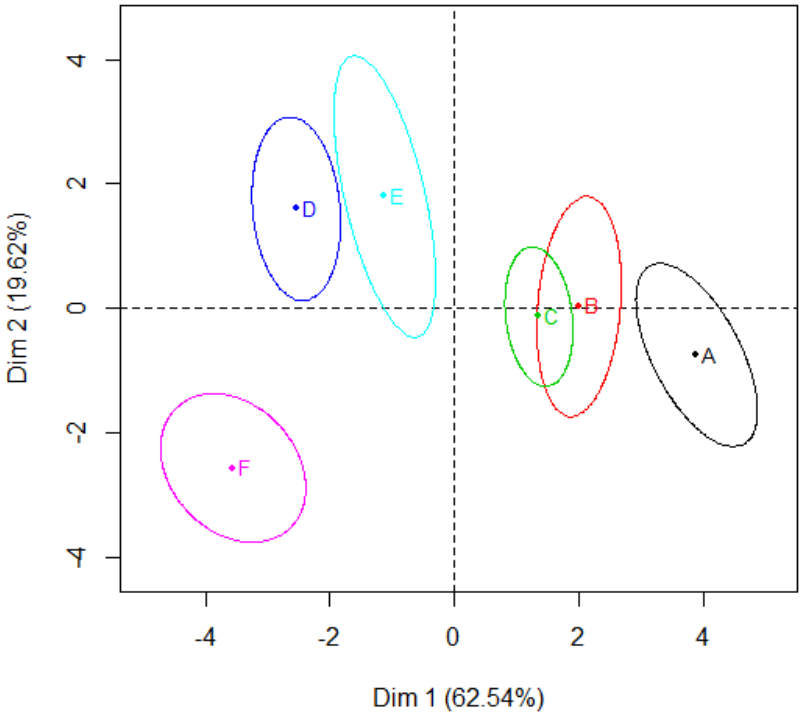
bitter, natural, aftertaste and mandarine flavour (large differences among samples)

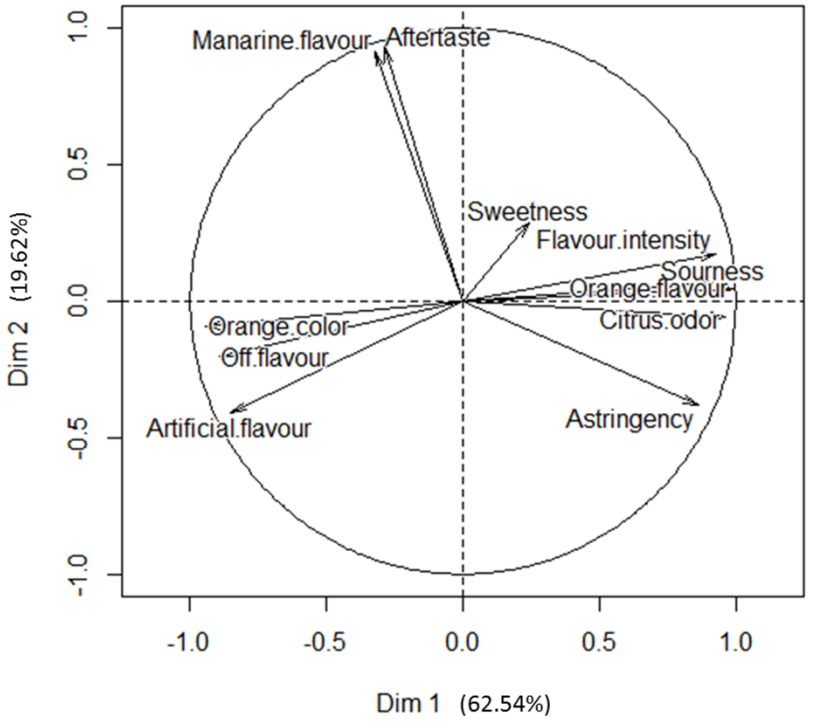
artificial, astringent, natural and mandarine flavour (small differences among samples).

Sensometría & Ciencia del Consumidor

## Large differences among samples

# DA

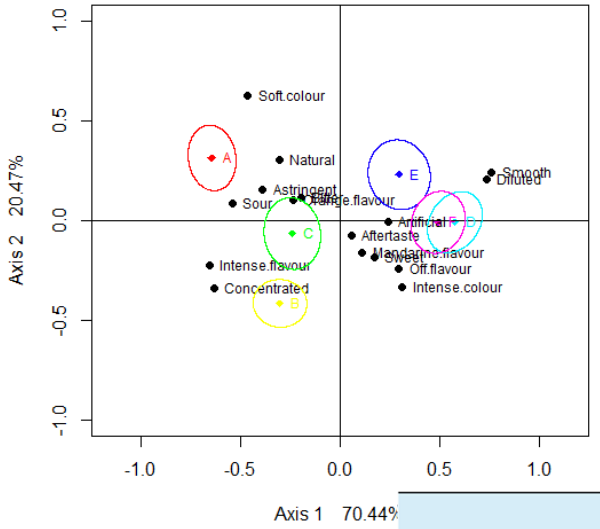


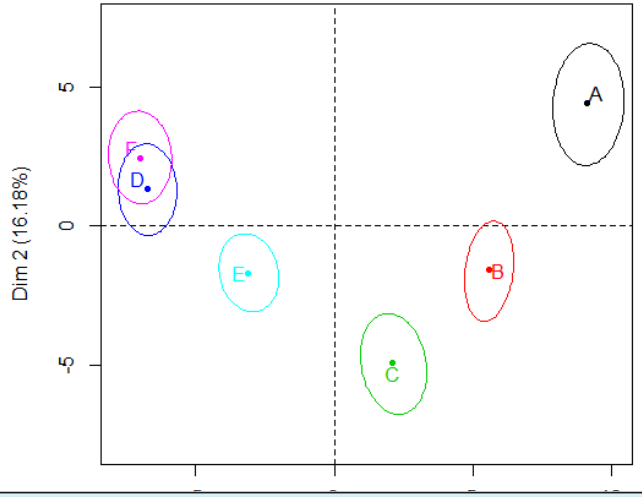
Sensometría & Ciencia del Consumidor

# Large differences among samples

CATA

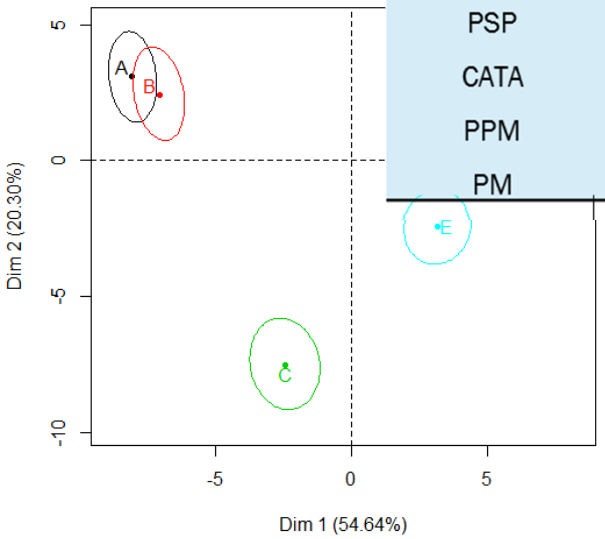


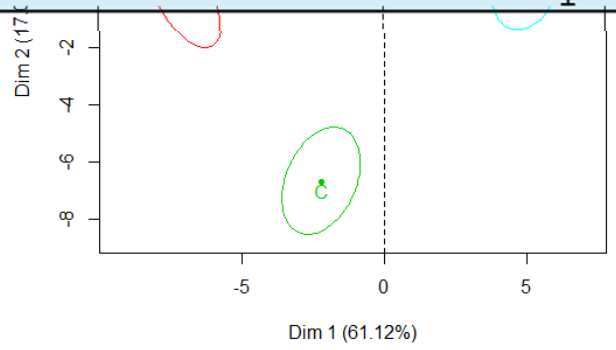

PM




| RV Coefficient | |
|---|---|
| | DA |
| PSP | 0.78 |
| CATA | 0.79 |
| PPM | 0.80 |
| PM | 0.87 |

PSP



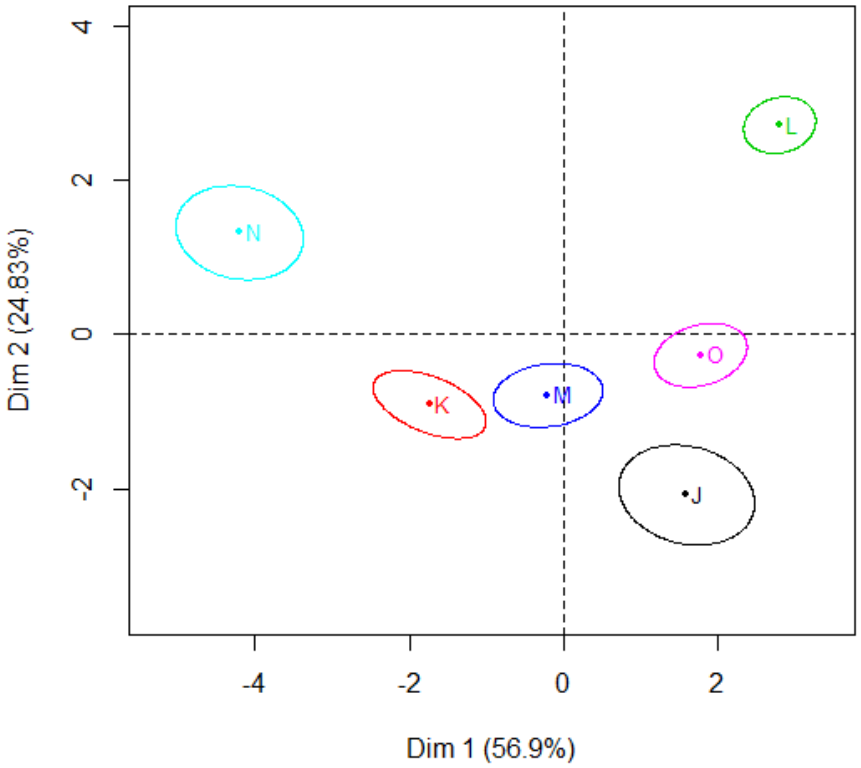



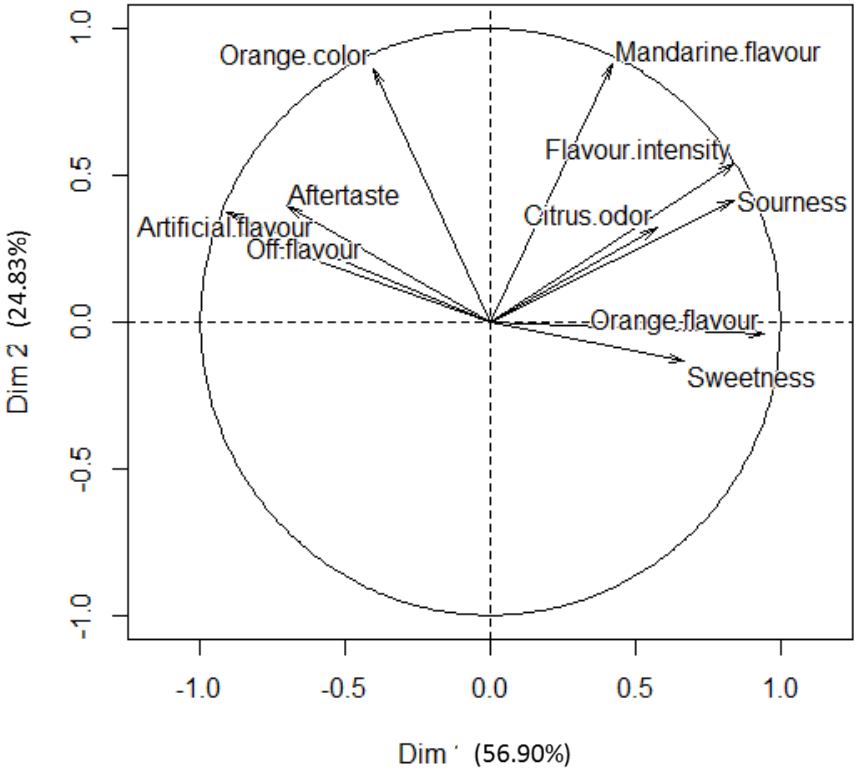

| RV Coefficient | | | | |
|---|---|---|---|---|
| | PSP | CATA | PPM | PM |
| PSP | 1 | 0.92 | 0.92 | 0.95 |
| CATA | | 1 | 0.98 | 0.94 |
| PPM | | | 1 | 0.95 |
| PM | | | | 1 |

Sensometría & Ciencia del Consumidor

## Small differences among samples

# DA

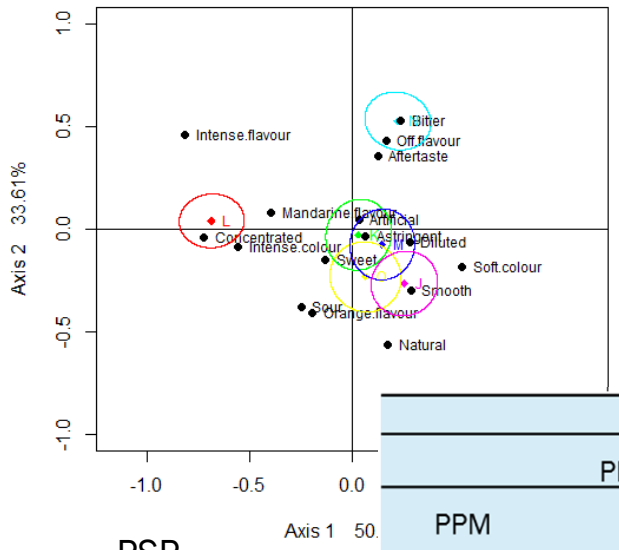


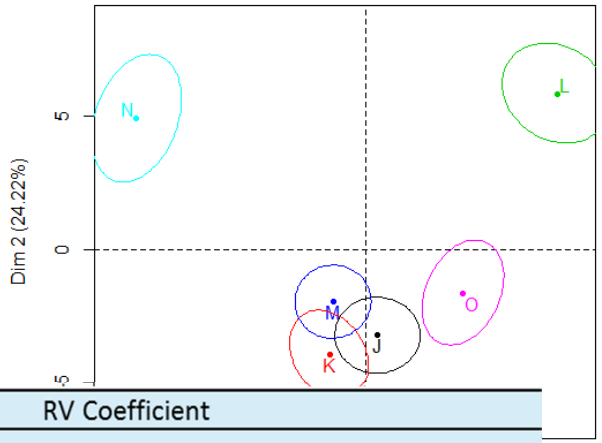
Sensometría & Ciencia del Consumidor

# Small differences among samples

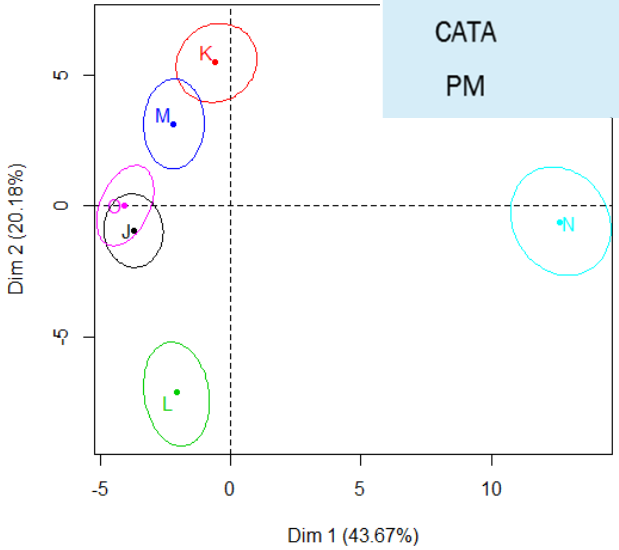
CATA

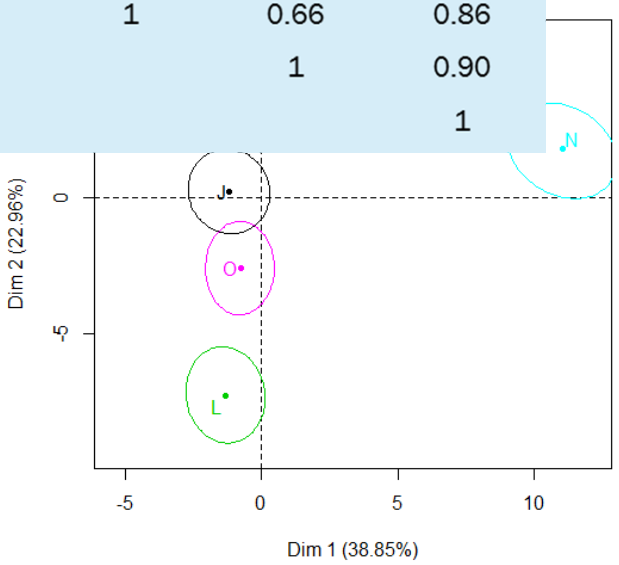



PM




PSP




| RV Coefficient | | | | |
|---|---|---|---|---|
| | PPM | PSP | CATA | PM |
| PPM | 1 | 0.90 | 0.71 | 0.82 |
| PSP | | 1 | 0.66 | 0.86 |
| CATA | | | 1 | 0.90 |
| PM | | | | 1 |

| RV Coefficient | |
|---|---|
| | DA |
| PPM | 0.74 |
| PSP | 0.80 |
| CATA | 0.82 |
| PM | 0.94 |

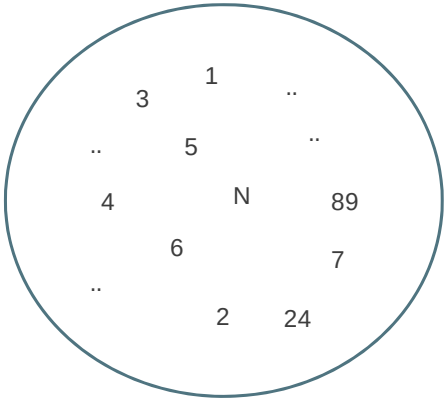
# Repeatability

| | Large differences among samples | | Small differences among samples | |
|---|---|---|---|---|
| | RV | pvalue | RV | pvalue |
| CATA | 0.98 | | | 0.017 |
| PSP | 0.99 | | | 0.008 |
| PM | 0.95 | 0.008 | 0.97 | <0.001 |
| PPM | 0.99 | <0.001 | 0.97 | <0.001 |

Repeatability was high for all methodologies

# Stability of sample configurations

Original dataset (N assessors)



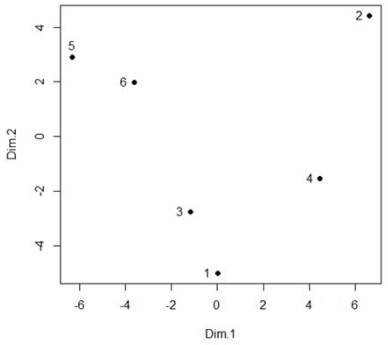

Random sampling with replacement

1000 subsets of size 5

1000 subsets of size 10

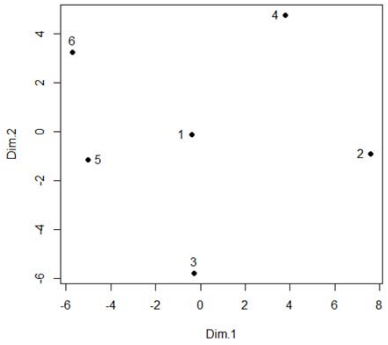
....

1000 subsets of size N



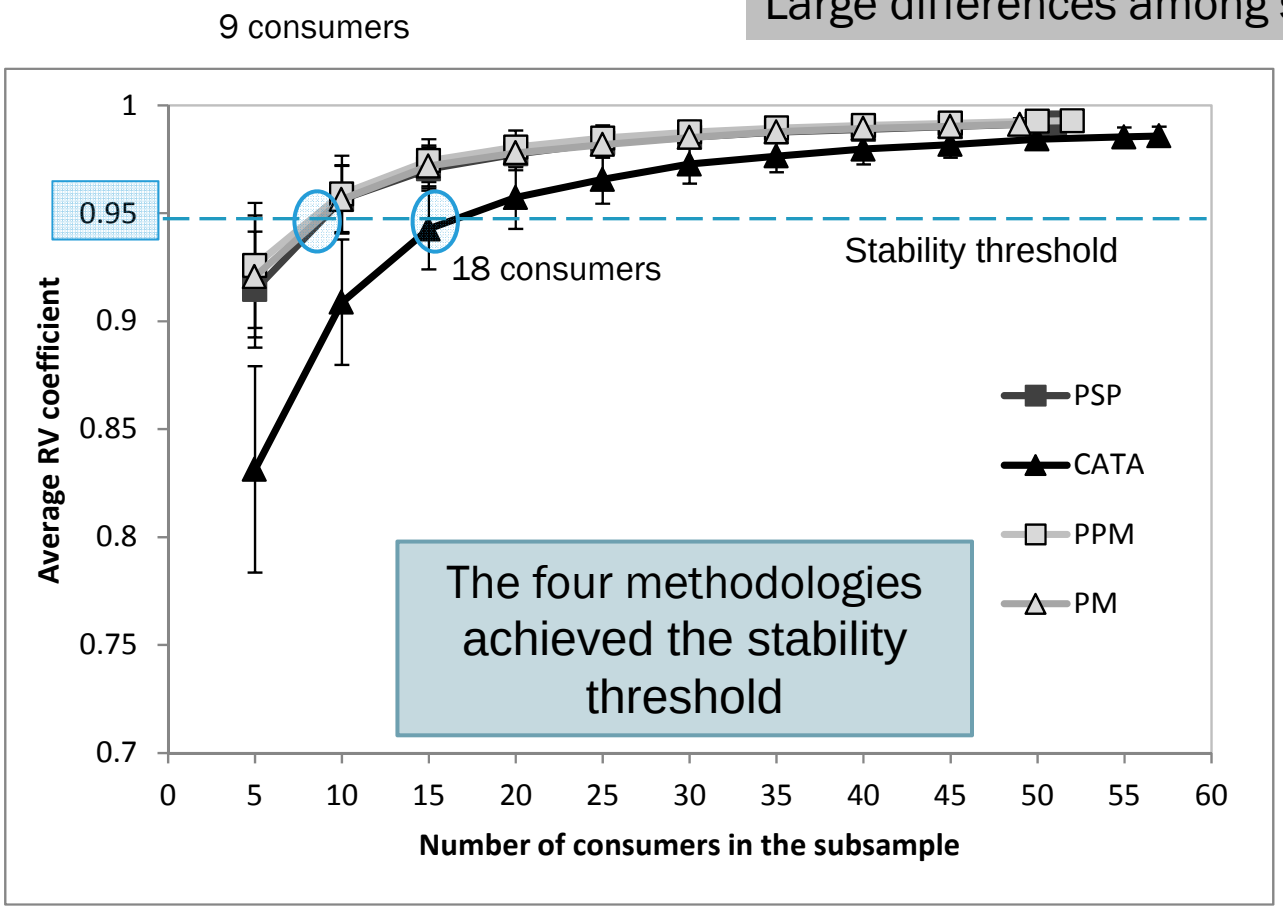

Reference configuration

The similarity between the two configurations is estimated using the RV coefficient



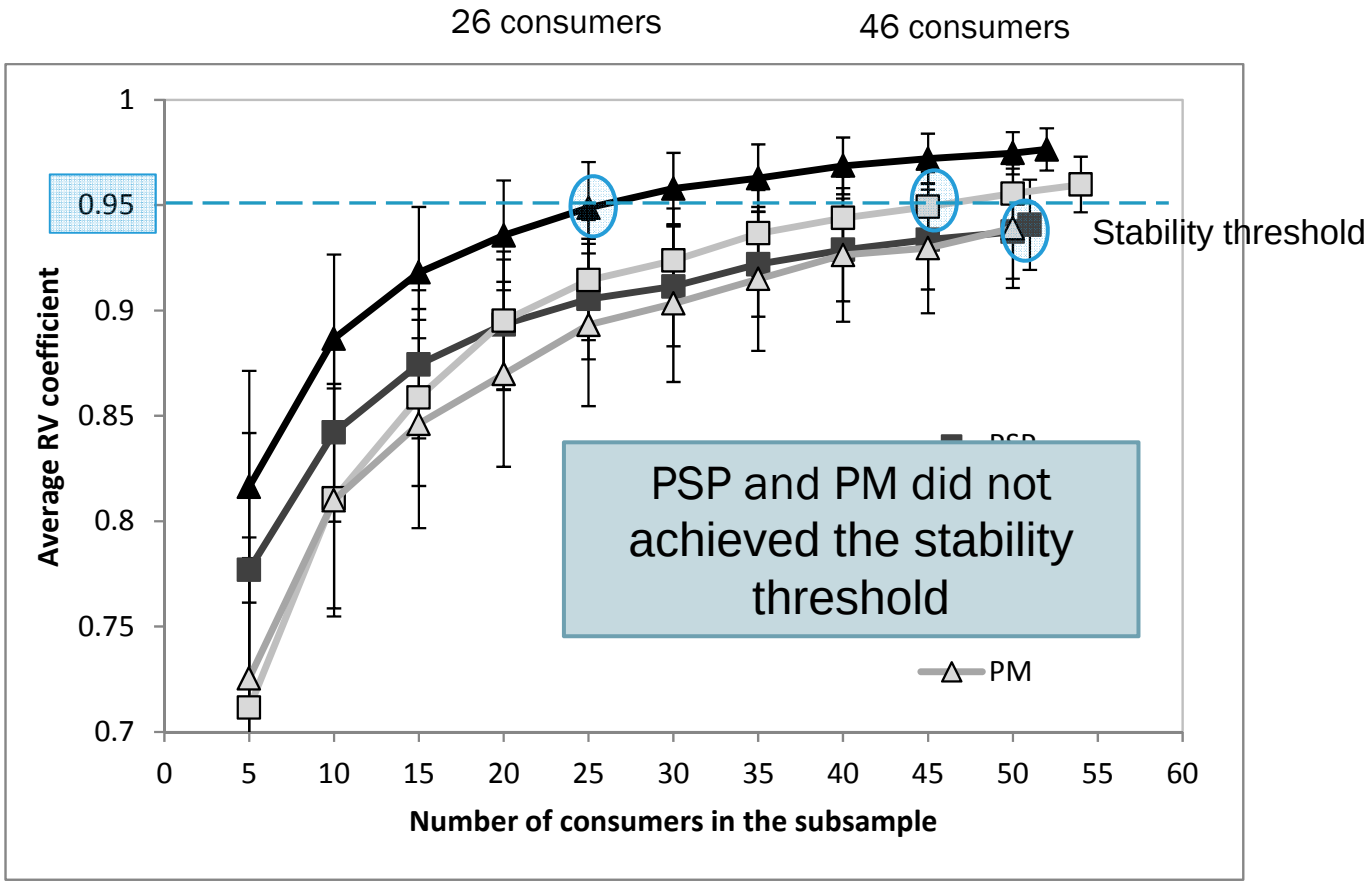
# Stability of sample configurations

Large differences among samples



# Stability of sample configurations

Small differences among samples



UNIVERSIDAD DE LA REPÚBLICA URUGUAY

Sensometría & Ciencia del Consumidor

# CONCLUSIONS

The four methodologies provided similar information to descriptive analysis.

The similarity between sample configurations from the different methodologies depended on the degree of difference among samples.

Repeatability was high for all methodologies.

CATA and PPM yielded stable sample configurations for the two datasets.

Sensory characterizations of powdered drinks can be obtained in short time frames and directly from consumers using rapid methodologies.

Further research is needed to confirm and extend the findings of the present work.


ThankYou
Merci
Salamat
Kop
Tack
Hvala
Xie
Gra
kun
Dankie
Dhanyavad
Khopjai
Kruthagnathalu
Arigatou
Dhonnobaad
Gamsahapnida
Shnorhakalutiun
Diolch
Kiitos
Sheun
umesc
Kasih
Mamnoon
Todah
Shokriya
Ngiyabonga
Spaas
Mul
Ači
Dank
Takk
Cam
or
al
Dakujem
Waad
Daw
Dhanyavaadaalu
Te°ekkür
Dekuju/Dekujeme
Dziękuję
Shokrun
Dhanyavaad
Go
Grazie
Faleminderit
krap
Or
ederim
Asante
Hain
Dhan
daa
Grazzi
raibh
Gracias
Nandree
Blagodariya
Gomapsupnida
Fyrir
Terima
Enkosi
Danke
dank
Euxaristo
Kun
Shukriya