

**Taking into account the consumers experience in
a free sorting task : question and data treatments**

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Context

- In sensory sciences, several studies on the impact of expertise onto perception
 - Trained panel versus novices (Faye *et al.*, 2004 ; Lelièvre *et al.*, 2008 ; Chollet *et al.*, 2011)
 - Professionals versus novices (Giboreau *et al.*, 2001 ; Soufflet *et al.*, 2004 ; Parr *et al.*, 2007 ; Ballester *et al.*, 2008)
- Free sorting task : relevant procedure to study the perception of consumers (Lawless *et al.*, 1995 ; Faye *et al.*, 2006 ; Cartier *et al.*, 2006)
- Statistical treatments
 - MDS (Borg I. and Groenen P., 1997; Lawless, 1989; Faye *et al.*, 2004)
 - Recent works integrating individual responses as CC-Sort (Qannari *et al.*, 2010) or Distatis (Abdi *et al.*, 2007)

Research questions

■ Hypothesis

- Experience and knowledge of wine have an impact onto the consumer perception of wine glasses
- Properties that structure the perception of the glasses differ between the most and the least connoisseurs in wine

■ Questions

- How to measure and synthesize the knowledge of consumers ?
- How to study the link between the knowledge and the consumers practices ?
- How to compare product perception between different groups of consumers ?

Experimental procedure



- 30 photos of wine glasses (ARC)
 - Differences in size, volume, design and usage (Champagne, Red or White wine)
 - Presented on a grey tablecloth according to a Williams balanced block design
- 209 wine consumers
 - Well balanced in consumption frequency, age, gender, professional activity
 - Questionnaire in two parts
 - Knowledge in wine and wine tasting
 - Practices and consumptions habits, expertise self evaluation
- Procedure
 - Perceptual free sorting task
 - Verbalization task



Q6. Which of the following grapes varieties are used for the AOC wine from Burgundy? (+)

1- Pinot noir

2- Gamay

3 - Grenache

4- Hermitage

5- Chardonnay

6 -Cabernet Sauvignon

7- No answer

B2. Compared to other people, I know less about wine. (*)

Strongly disagree

Disagree

Neither agree nor disagree

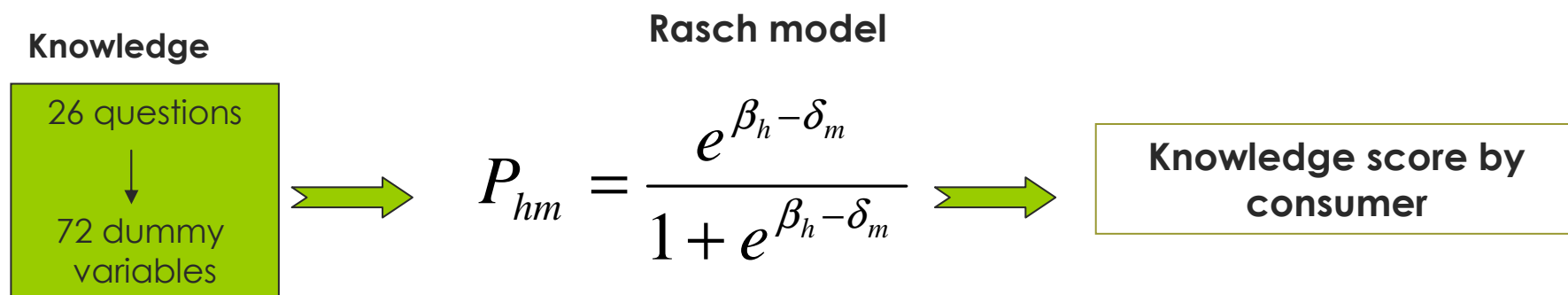
Agree

Strongly agree

Consumers groups based on the wine knowledge level

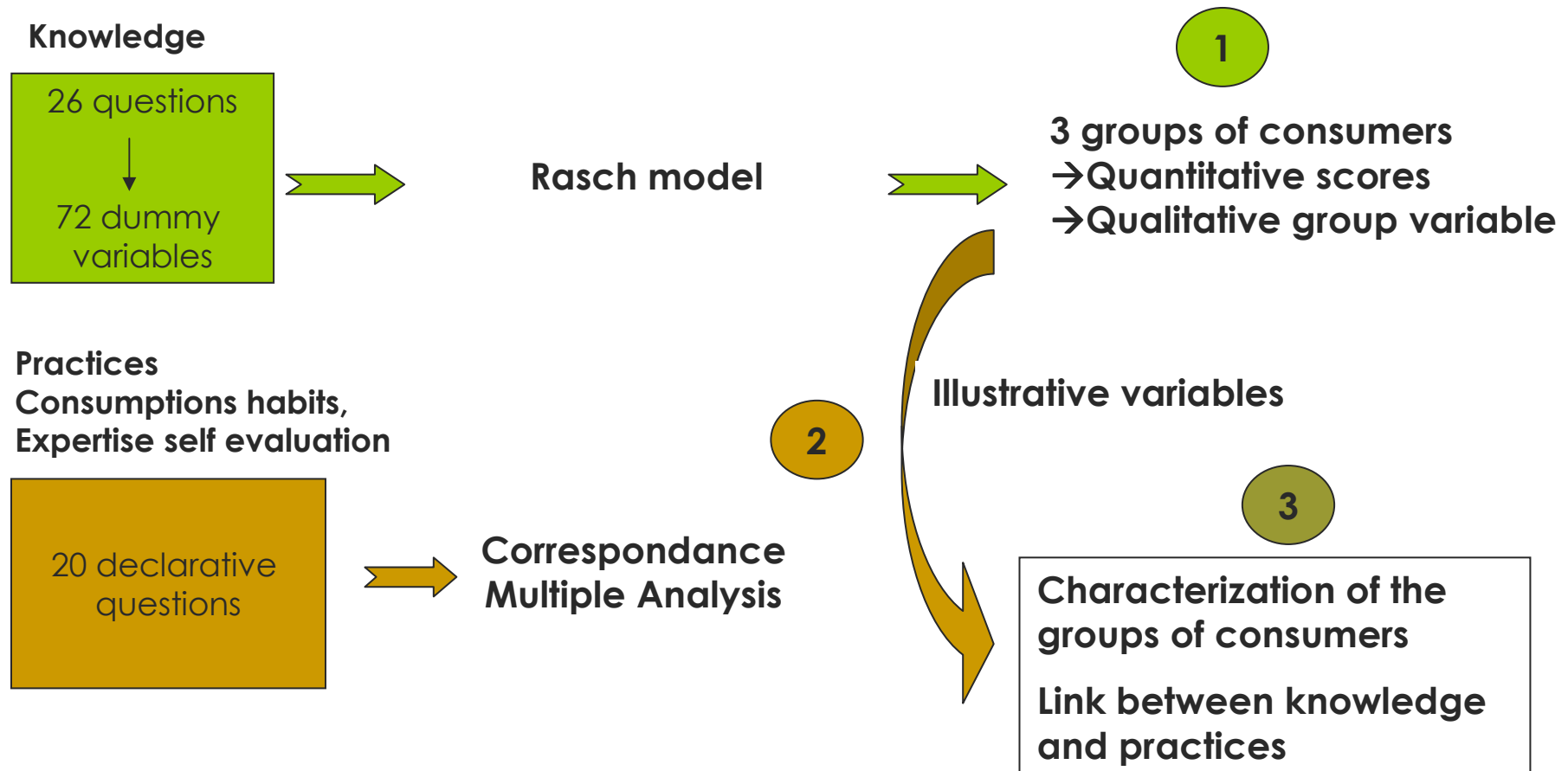
- Segmentation of consumers, “a priori”, based on their wine knowledge level
- Rasch model (Boomsma *et al.*,2000)
 - Item response theory (IRT), application in psychometrics
 - Right/wrong questions (0/1)
 - Probability of correct answer modelled according to two factors : subjects ability (“score”) and item difficulty

→ Integration of the difficulty of items in deriving the subjects scores : more efficient than summing the right answers



With P_{mh} probability of good answer
 β_h performance of subject h
 δ_m difficulty of the question m .

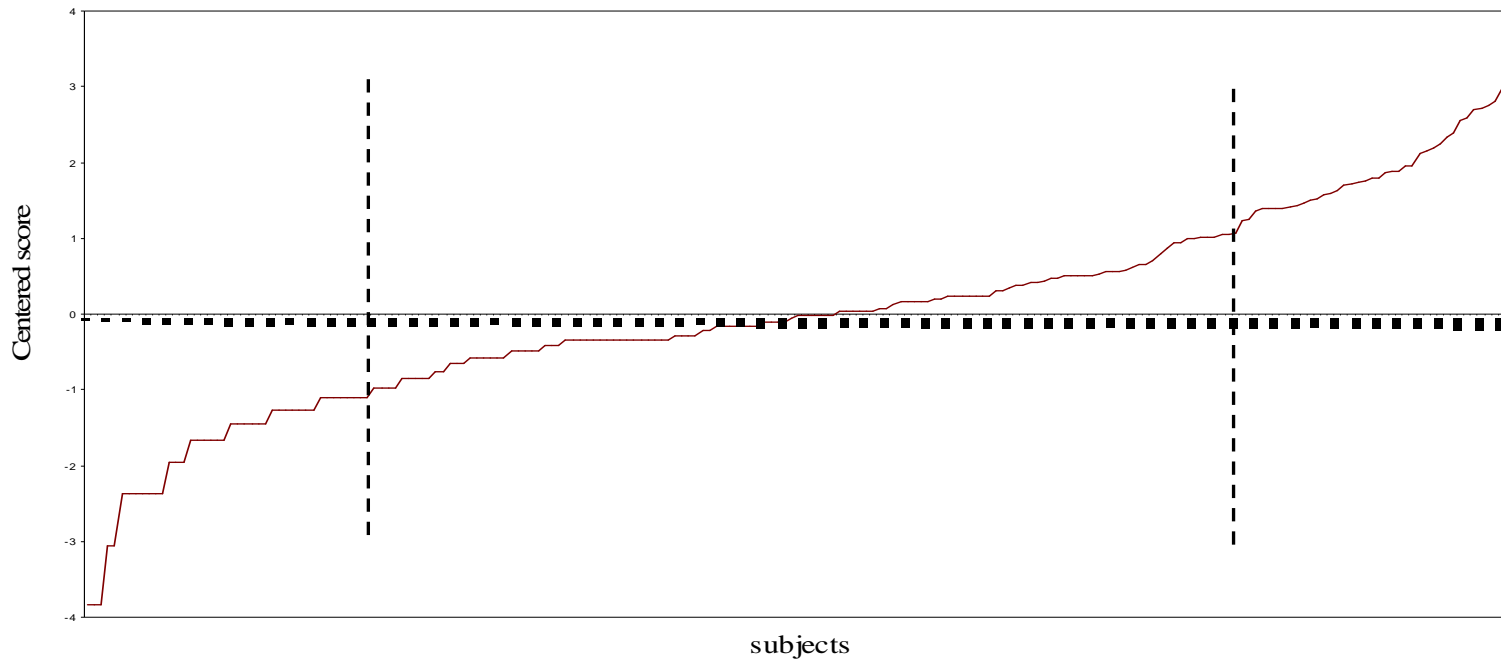
Consumers groups characterization



1

Consumers groups based on Rasch score

Ranked centered Rasch model's wine knowledge score by consumer

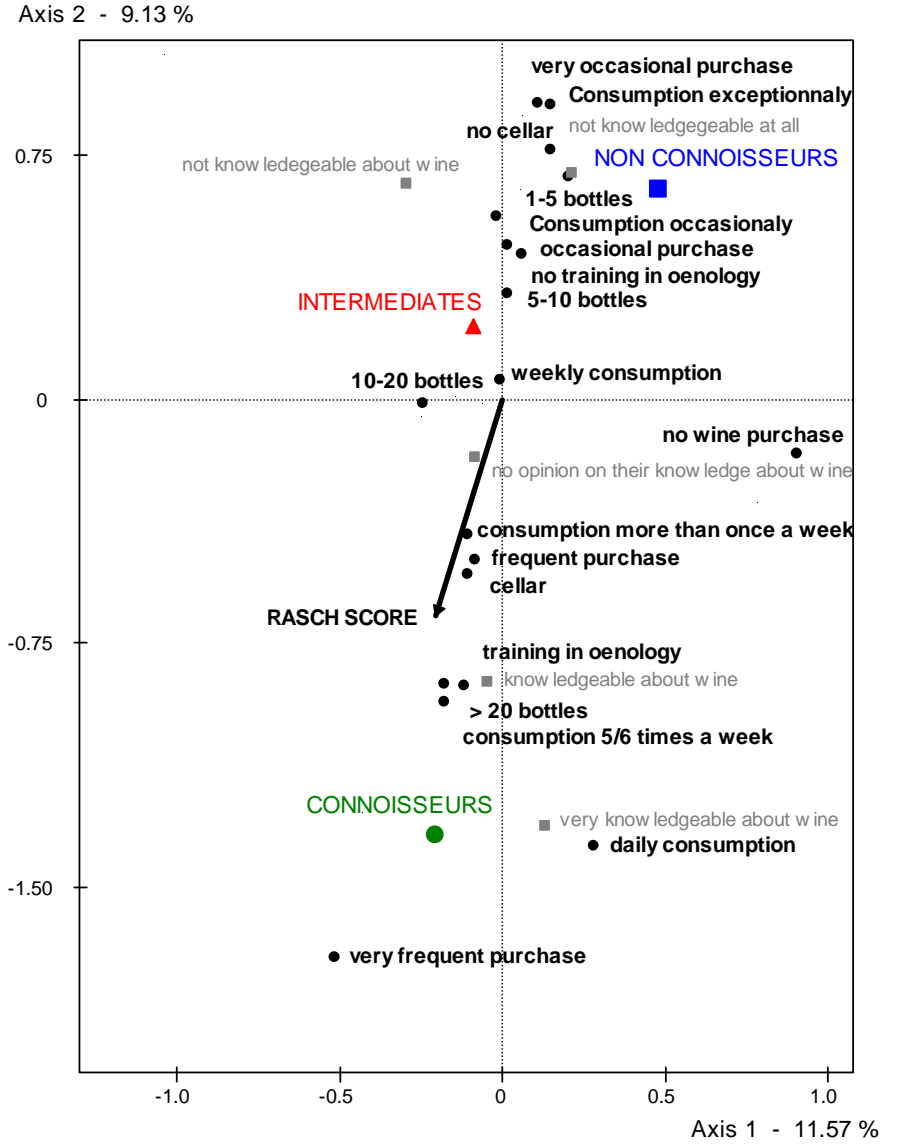
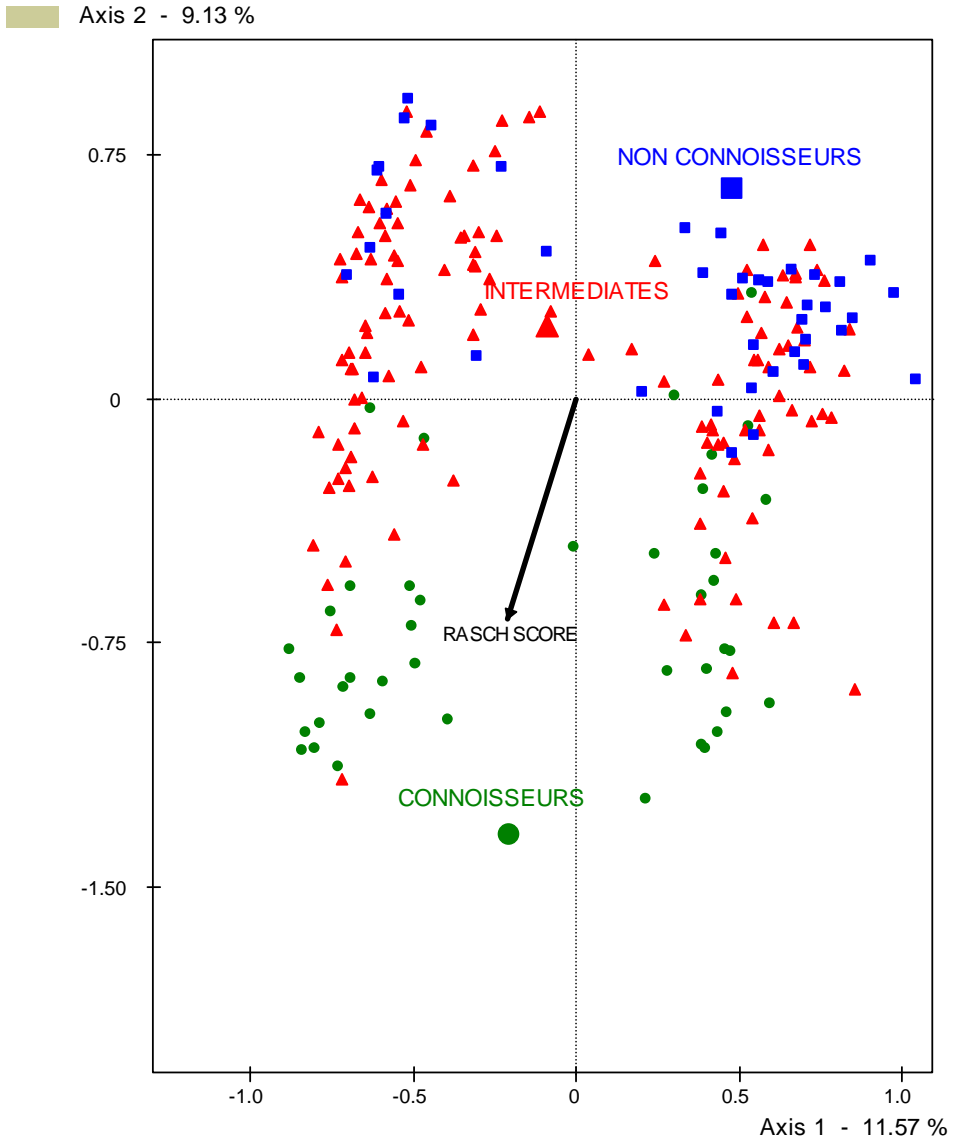


41 non connoisseurs (20%)
17% of right answers

127 intermediates (60%)
42% of right answers

41 connoisseurs (20%)
75 % of right answers

Correspondance Multiple Analysis and Rasch score

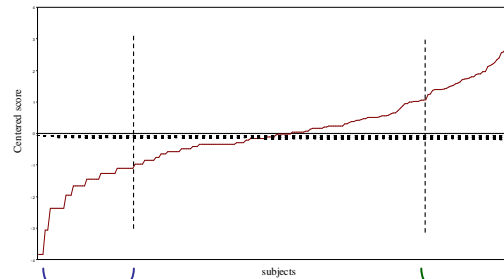


Consumers groups characterization

Non connoisseurs

- Students, workers or employees
- Occasional consumption of wine
- No trained to wine tasting,
- Purchases in supermarket
- Purchase criteria : Price
- Not confident in their wine expertise.

Ranked centered Rasch score



Intermediates

no particular characteristics

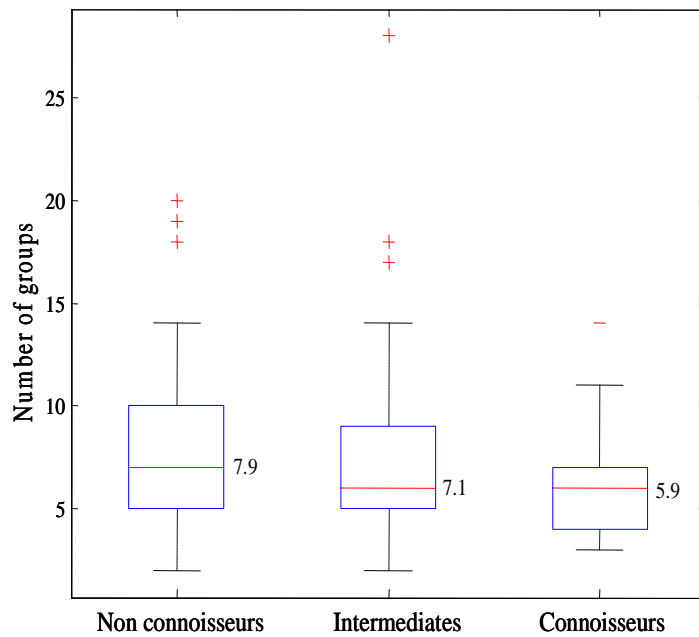
Connoisseurs

- Wine professionals (cellarmen and wine grower) and consumers trained in wine tasting,
- 30-50 years old
- Quite frequent wine consumption
- Wine cellar
- Purchase in specialized wine shops
- Purchase criteria : price, vintage, grape
- Quite confident in their knowledge on wine.

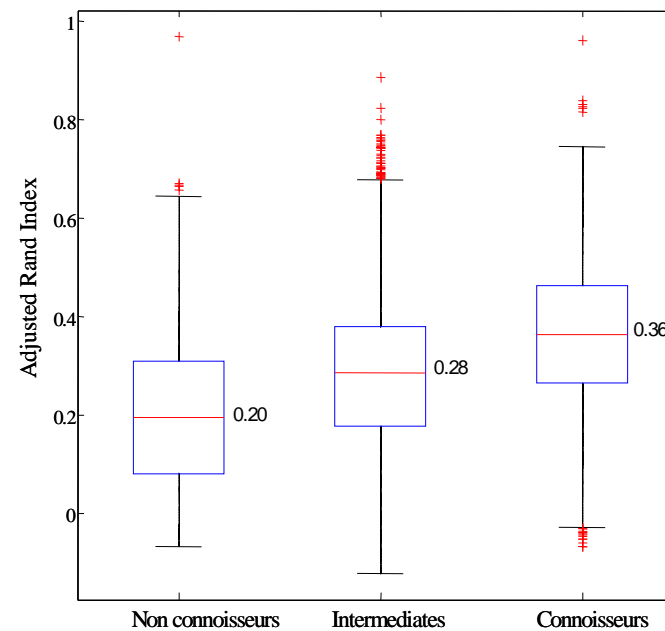
- 3 groups of consumer with different knowledge level
 - Differently characterized in terms of practices and habits
 - Comparison of non connoisseurs and connoisseurs' perception
- Correlation between Rasch's score and the second axis of MCA ($R=-0.65$)
 - Link between practices, consumption habits and knowledge on wine
 - Validation of the groups based on knowledge

Consumer sorts' variability

Number of categories



Within groups agreement



- Connoisseurs : less categories, more consensual
- Non connoisseurs : more categories, less consensual

Consumer groups perceptions

Free sorting task

N partitions of P glasses



Non connoisseurs



Σ

N consumers



Σ

Connoisseurs



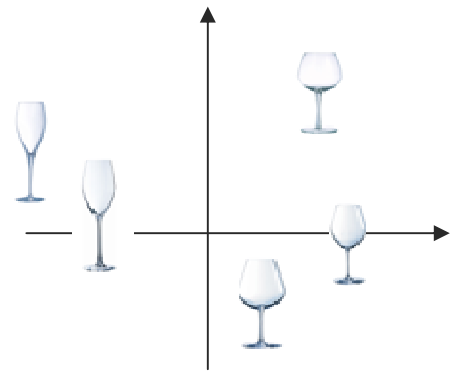
By couple of product (i,j)
0 : same group
1 : different group

INDSCAL non metric (Borg I. and Groenen P., 1997)

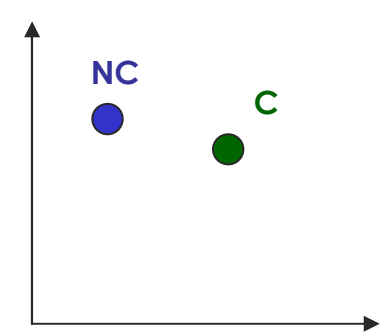
$$Stress = \left[\frac{\sum_h \sum_{ij} (f^{(h)}(\delta_{ij}^{(h)}) - d_{ij}^{(h)}(X))^2}{\sum_h \sum_{ij} d_{ij}^{(h)}(X)^2} \right]^{1/2}$$

with $d_{ij}^{(h)}(X) = \sqrt{\sum_a w_a^{(h)} (X_{ia} - X_{ja})^2}$

Glass configuration (X)



Group configuration (w)

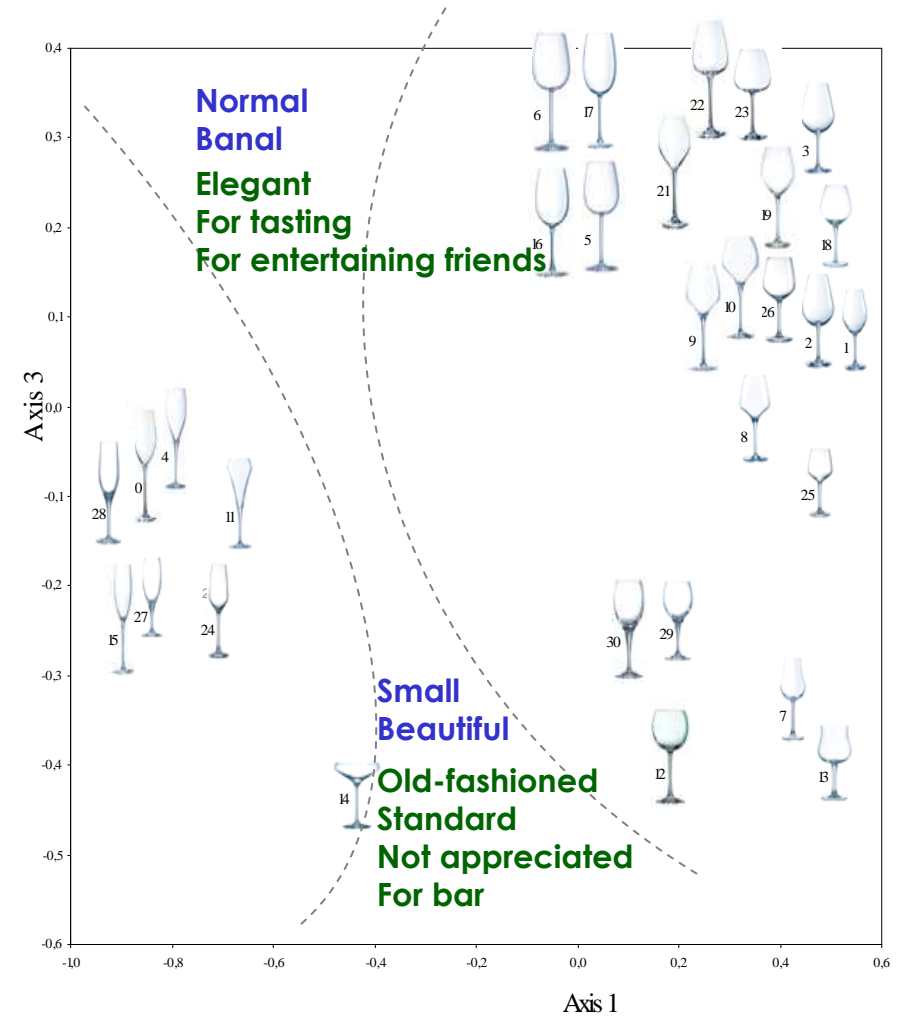
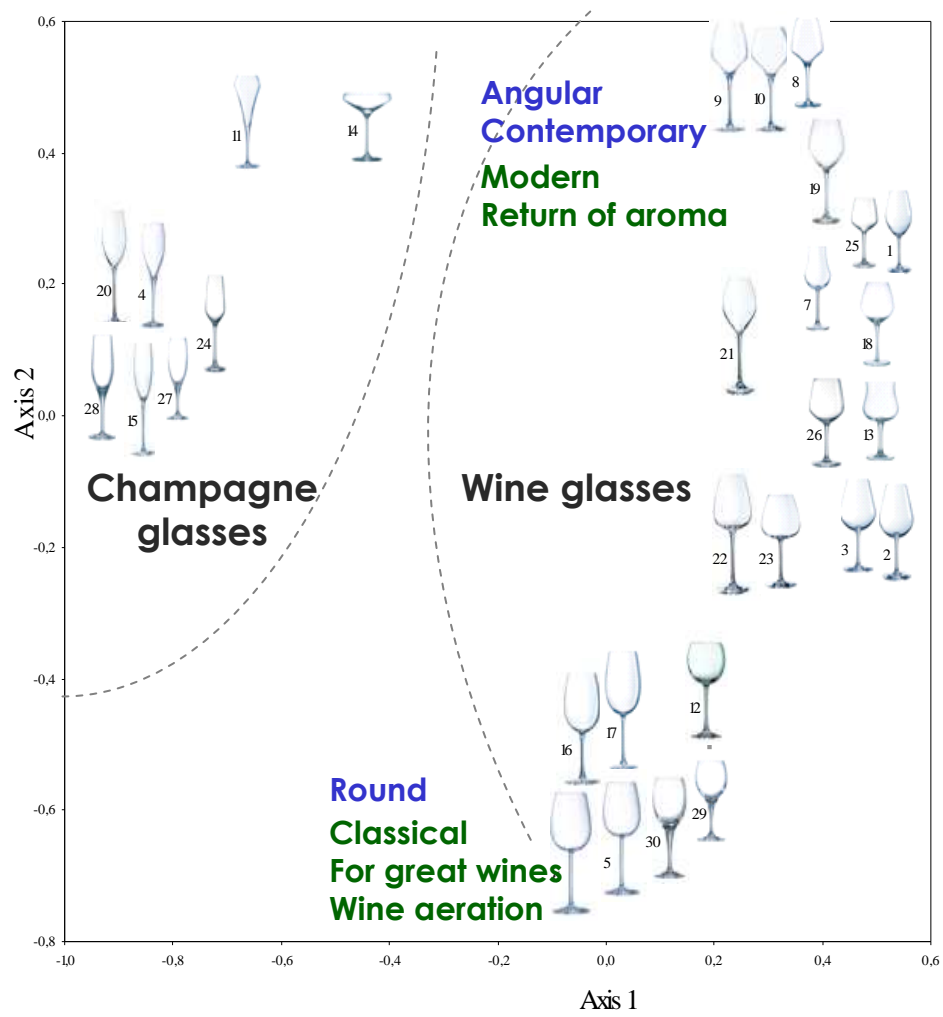


→ Correlation between the axes and the terms generated by each group of consumers

Indscal glass' configuration

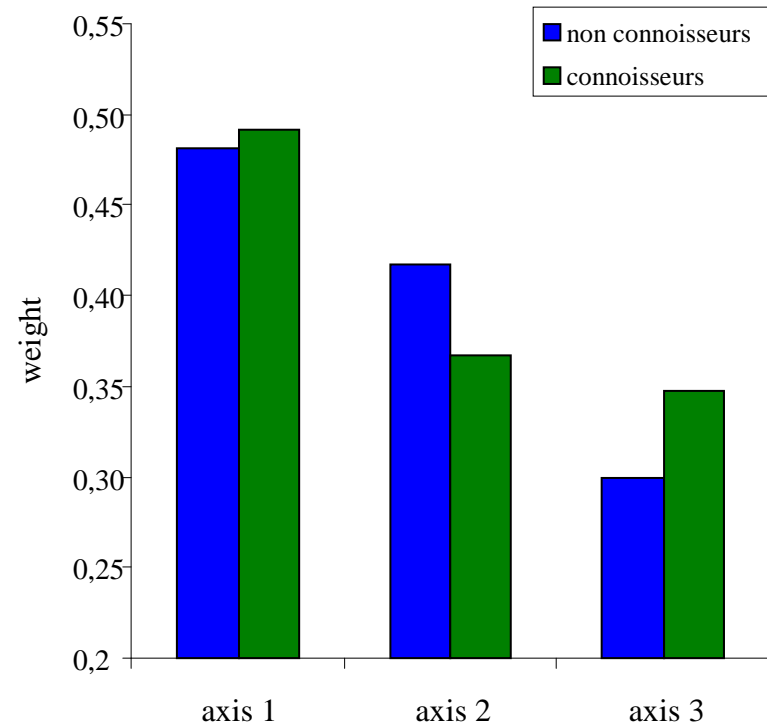
stress = 0.013 (3 dimension)

Legend
 Connoisseurs
 Non connoisseurs
 Common terms



Weight of the axes

- Non connoisseurs weight less the axis 3
→ 2 underlying dimensions
- Connoisseurs weight the axes 2 and 3 at the same level
→ 3 underlying dimensions



Synthesis

■ Glasses description

- Non connoisseurs : descriptive properties (shape and design) and qualifying
- Connoisseurs : usage properties → inference of usage based on physical characteristics of the glasses

■ Glasses configuration

- Axis 1 : usage properties for both groups (Champagne / Wine)
- Axis 2 : usage properties for connoisseurs, physical properties for non connoisseurs
- Axis 3
 - Poor description by non connoisseurs (few terms)
 - Difference of weights between the both groups of consumers : small weight for non connoisseurs
 - More specific to connoisseurs as principally based on « usage » properties

Conclusions

- Validation of the hypothesis
 - Impact of previous experience onto consumers perception
 - Different type of properties depending of the consumers
- Statistical treatments
 - Complementarity of the statistical treatments
 - Rasch model
 - Good index to synthetize the score knowledge taking into account the difficulty of the questions
 - Multiple Correspondance Analysis
 - Characterization of the groups
 - Link with the external variables (score)
 - Individual Scaling (Indscal)
 - Integration of the subjects' variability in a product oriented analysis
 - Comparison of groups/subjects' perception based on the same product configuration
- Integration of subjects' previous experience in the consumer studies

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