

Free sorting experiments for sound quality applications

Etienne Parizet

Laboratoire Vibrations Acoustique

INSA-Lyon, Villeurbanne

Motivation

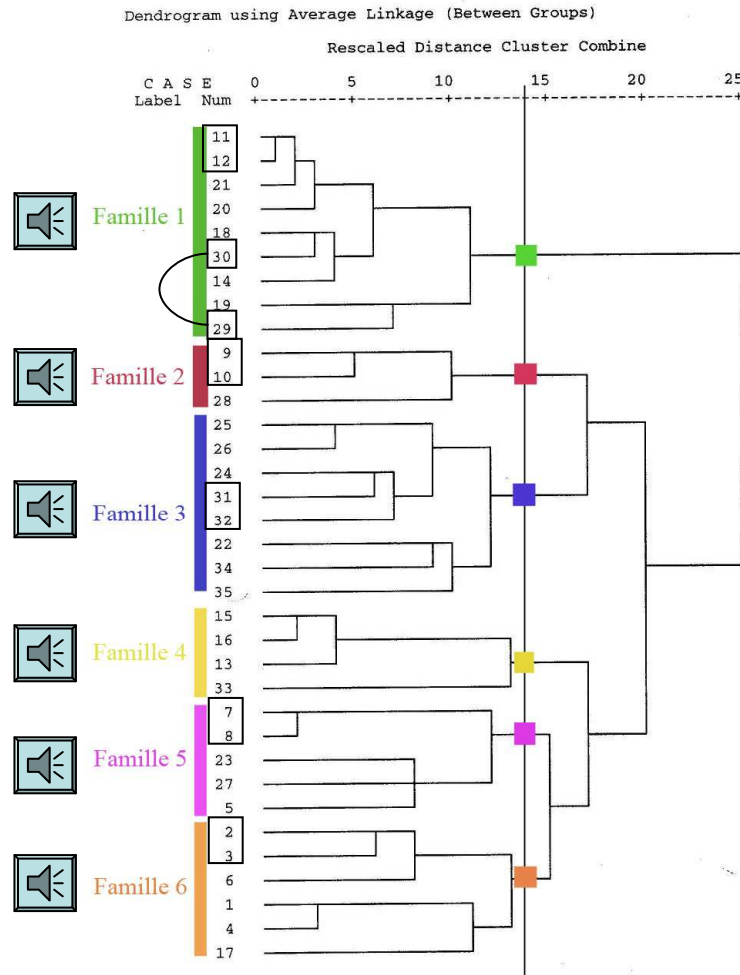
- In sound quality applications, paired-comparison experiments are widely used :
 - Dissimilarity ratings (perceptual space);
 - Preference.
- Drawback : the number of pairs can be very high.
- Free-sorting experiments can be used to reduce the number of stimuli.

Example : car door closure sounds.

- 16 cars;
- Modification of seals : 27 stimuli;
- 351 pairs : too many.
- Experiment :
 - 35 stimuli (incl. 8 replications);
 - Free sorting (similar sounds);
 - 31 listeners.



Results



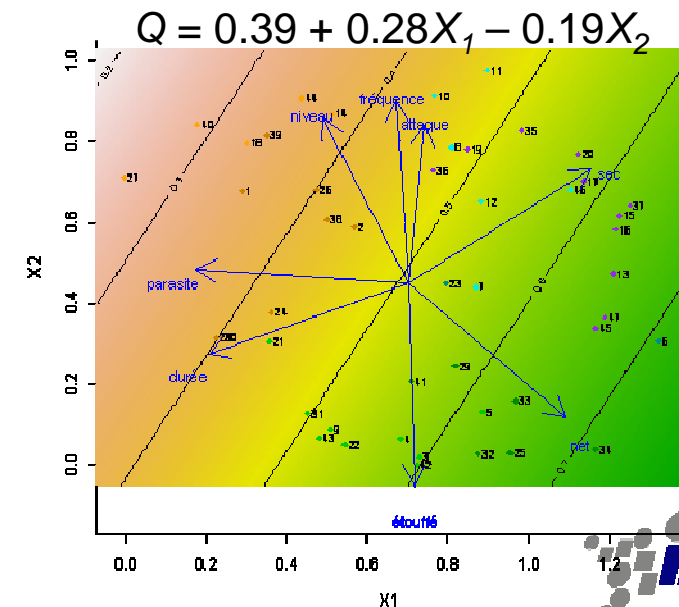
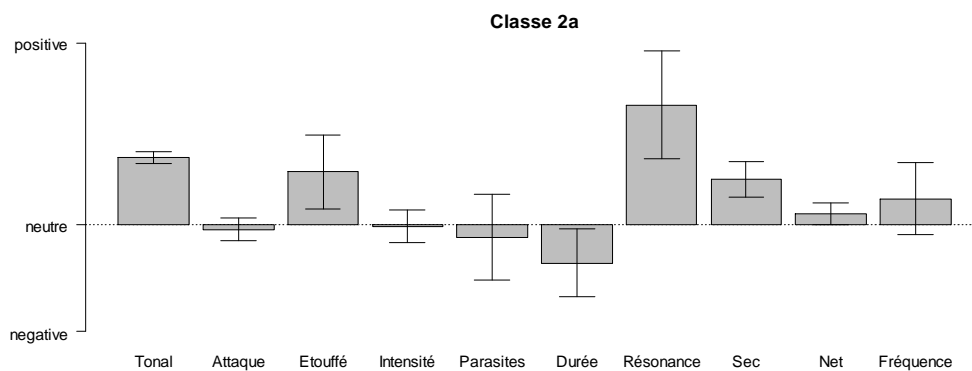
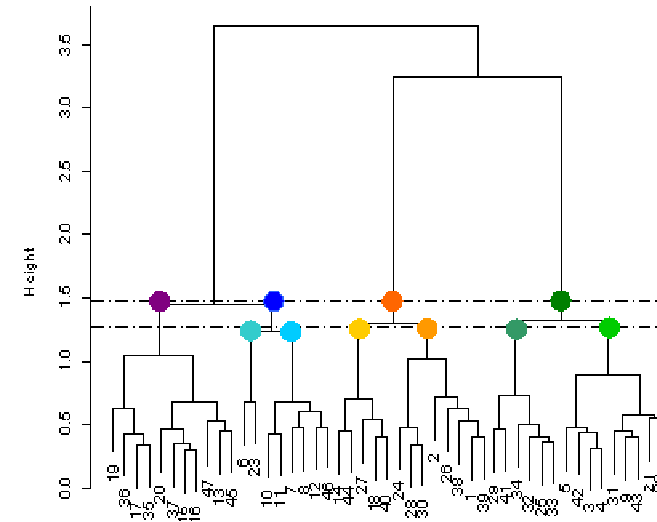
- 6 groups of sounds.
- Each couple of replicated sounds belonged to the same group.
- Next experiment :
 - selection of 2 sounds in each group (12 sounds);
 - dissimilarity and preference ratings (paired compar.).

2nd example : dashboard sounds

- 47 sounds
 - "All in one" experiment : a subject had to realize 4 tasks :
 - (1) Free sorting of stimuli according to similarity
 - (2) Verbal description of each group of stimuli;
 - (3) Selection of a typical sound from each group;
 - (4) Evaluation of the selected typical sounds according to the quality of the dashboard material.
- } *No information about sources*
- 58 subjects
 - Duration of the whole experiment : less than 1 hour.

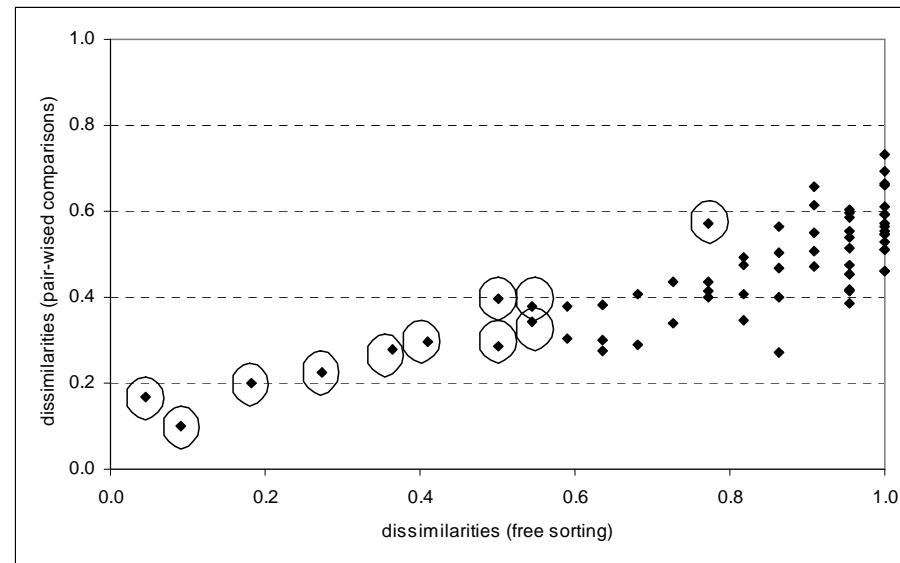
Results

- Clustering of sounds;
- Verbal description of groups;
- Perceptual space;
- Identification of its axes;
- Model of preference.



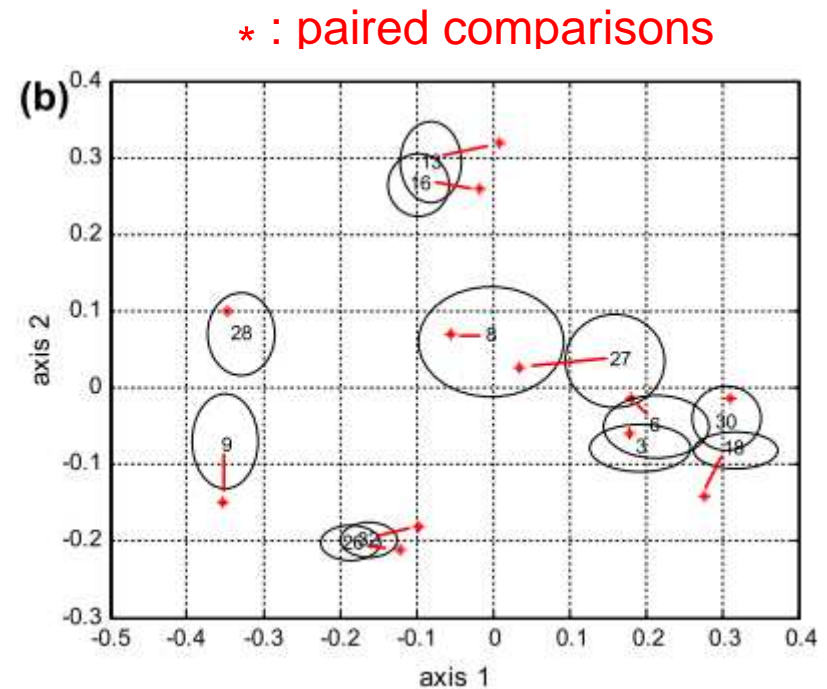
Can we use a free sorting exp. to derive a perceptual space ?

- Some differences between perceptual spaces obtained from a free sorting experiment and a dissimilarity rating one can be seen.
- Example : 12 door-closure sounds.
- Some differences between the two sets of dissimilarities can be seen (a circle indicates a pair for which dissimilarities are not significantly different).



Comparison of the perceptual spaces

- Reference space : computed from pair comparisons;
- Free-sorting exp. : perceptual space computed using bootstrap, fitted to the reference space (procrustean transformation).
- Some differences can be seen.



Thank you for your attention !

- Parizet E., Guyader G., Nosulenko V. "Analysis of car door closure sound quality", Applied Acoustics 69 (2008), 12 - 22.
- Parizet E., Koehl V., "Application of free sorting tasks in sound quality experiments", Applied Acoustics 73 (2012), 61-65.
- "Evaluation of dashboard quality through sounds produced by tapping", F. Montignies, E. Parizet, D. Nesa, Proc. Euronoise 2009, Edimburg (UK).
- Koehl V., Parizet E., "Listening test methods for perceptual assessment of structural uncertainty", Noise Control Eng. Journ. 55 (1) (2007), 55-66