Application of Napping® to the evaluation of digital camera zoom lens function

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Abstract

The use of rapid and intuitive sensory evaluation methods have become more and more widespread over the last couple of years. In working with non-food sensory evaluation, these methods posses the same appeal as they have in the food-domain – they are cheap, easy to setup, and deliver the main sensory dimensions of a given product range. The present study examined the application of the Napping method as described by Pagès (2002) and Perrin (2008), in a haptic/sound related domain. The study focused on the sensory evaluation of the zoom function on a variety of compact digital cameras. The evaluation of the zoom functions was divided into three separate Napping sessions, starting with a non-modality specific session (global) and continuing with two modality specific sessions focusing on sound and haptics. Each separate session was completed using Ultra Flash Profiling (UFP) (Reference). The assessors where recruited from the DELTA SenseLab expert panel, and had previous experience in evaluating different types on non-food stimuli. To give the assessors a brief introduction to the Napping method, a tutorial was setup using a selection of geometrical objects with different sizes and colours. The cameras used in the experiment where selected to represent a wide range of camera brands, types of zoom buttons (ergonomics), sound characteristics, and haptic feedbacks. The results from the experiment show that the Napping method can be used to evaluate stimuli in the sensory dimension of sound and haptics.

Keywords: Haptics; Napping; Non-food sensory evaluation; Sound.

Examining multimodal stimuli

This study was done in order to establish how well the Napping procedure **[4]** could be applied to examine multi-modal stimuli that included haptic and auditory features.

A selection of eight (8) digital cameras was tested with a focus on the zoom function. The type of button, sound feedback, and haptic feedback varied significantly within the stimulus set.

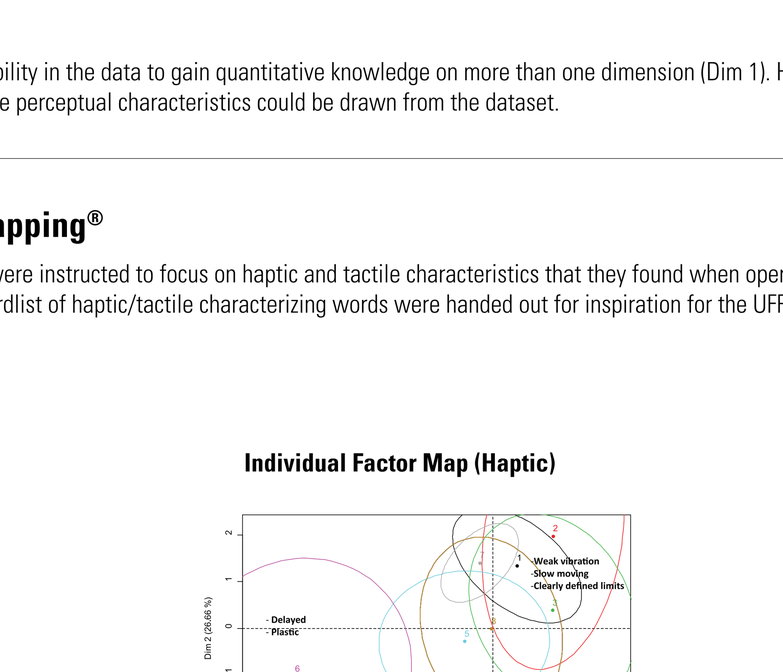
Before performing the three napping procedures, the test subjects were introduced to the procedure using a Napping tutorial. The tutorial consisted of sorting geometrical figures according to perceived similarities/differences. Each napping session was finished with an ultra-flash profiling (UFP) **[3]**, adding descriptive terms to the positioned stimuli.

Experimental details

- Eight (8) selected assessors **[1] [2]**, from SenseLab expert panel.
- Experimental sessions performed in quiet office room.
- Size of napping cloth (85x64.5 cm).
- One experimental session (1 hour 45 min., including brakes and instructions).
- Data analyzed using multiple-factorial analysis (MFA) **[3]**, to give same weight to all assessors. Used R-package FactorMineR **[5]**.
- Grid with the cameras (numbered).

Global (multi-modal) Napping®

The assessors were instructed to examine the zoom function and place the cameras on the paper according to the perceived similarities/differences. No instructions were given regarding what features of the zoom function the test subject should focus on.



Main perceptual characteristics relating to the multi modal operation of the zoom function:

Dim 1 (58.62%) - Noise level (noisy – silent).

Dim 2 (15.84%) - Delayed response between mechanical movement and zoom button / Slow mechanical movement speed of the lens while operating the zoom function.

Dim 3 (11.54%) - Type of button (rotating button/back-forth moving button).

Dim 4 (7.57%) - Sound quality related attribute (crackling sound).

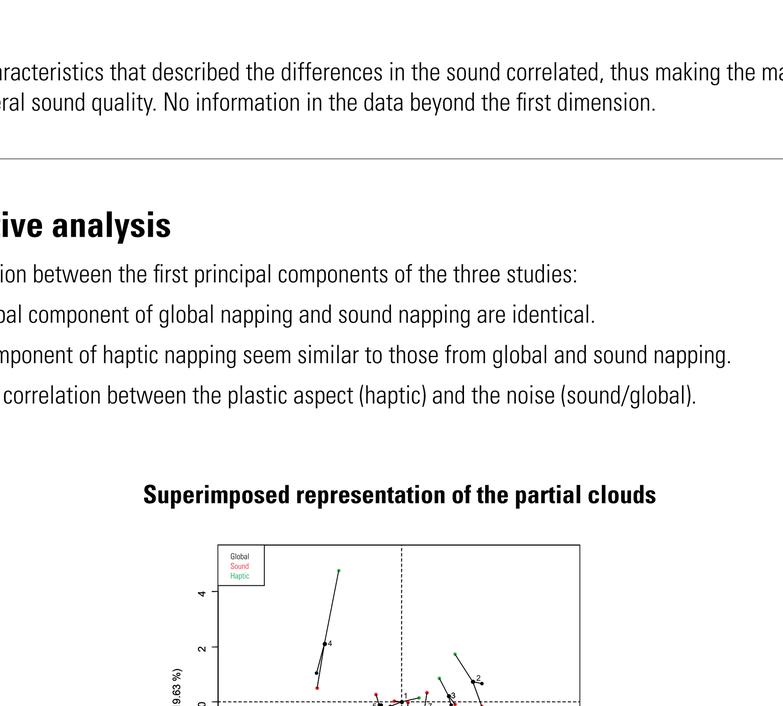
Conclusions

Too little variability in the data to gain quantitative knowledge on more than one dimension (Dim 1). However some main qualitative perceptual characteristics could be drawn from the dataset.

Sound Napping®

Test subjects were instructed to focus on sound feedback that occurred when operating the zoom-function. A wordlist of sound characterizing words were handed out for inspiration for the UFP (≈300 words).

Very high percentage of the variability on the first dimension. A relative good qualitative level of distinction the cameras in between on the first dimension.



Main perceptual characteristics relating to the sound:

Dim 1 (72.73%) - A range of sound describing attributes correlate on the first principal component; "mechanical" sounding, noise level, smoothness, weak sounding etc.

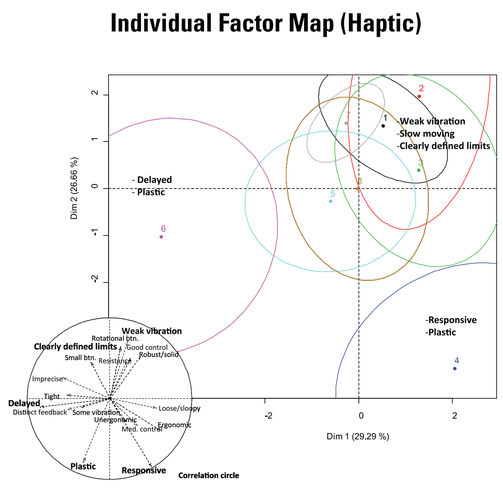
Dim 2 (13.18%) - Click or abrupt ending sound (when max/min of zoom range was reached) / squeakiness also correlated with this dimension.

Conclusions

A lot of the characteristics that described the differences in the sound correlated, thus making the main dimension related to general sound quality. No information in the data beyond the first dimension.

Haptic Napping®

Test subjects were instructed to focus on haptic and tactile characteristics that they found when operating the zoom-function. A wordlist of haptic/tactile characterizing words were handed out for inspiration for the UFP (57 words).



The study provided relative high level of qualitative information regarding haptic and tactile features of the zoom functions. The main perceptual characteristics relating to the haptic aspects:

Dim 1 (29.29%) - Delayed response between mechanical movement and zoom button.

Dim 2 (26.66%) - Responsiveness relationship between button and zoom and material characteristics of the button (plastic) opposed weakly vibrating and clearly defined endpoints.

Dim 3 (20.45%) - Type of button (rotating button/back-forth moving button).

Dim 4 (13.62%) - Resistance level of button.

Conclusions

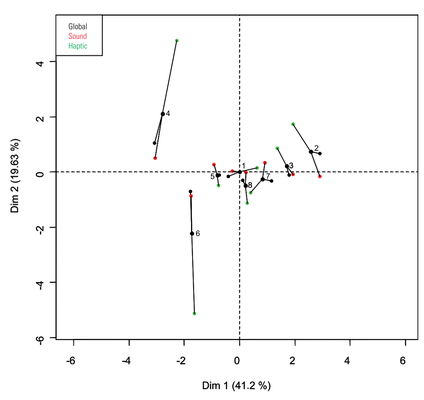
The study showed that a lot of characteristics contributed to the perceived differences of the stimulus set, and that some groupings of the stimuli could be identified along the identified dimensions.

Comparative analysis

Strong correlation between the first principal components of the three studies:

- First principal component of global napping and sound napping are identical.
- Second component of haptic napping seem similar to those from global and sound napping.

There is a high correlation between the plastic aspect (haptic) and the noise (sound/global).



	Dim.1	Dim.2	Dim.3	Dim.4
Global	0.989	0.187	0.227	0.193
Sound	0.996	0.116	0.124	0.058
Haptic	0.729	0.990	0.637	0.505

The sound napping was almost one-dimensional (close to the first axis). The results from the global napping were more multidimensional, though still not rich from a factorial analysis point of view. The haptic napping provided a real multidimensional view of the stimulus.

Conclusion

This study illustrates that the napping method can be successfully employed for complex multimodal hi-tech applications. Some good insight into the dominant perceptual characteristics relating to the sound and haptic feedback of digital camera zooms was gained, though the global napping provide to be of finite and limited value in this study.

It is apparent that for such perceptual and technically complex cases, the global napping is inferior and yields limited results. The modal napping is a more focused task for assessors and is clearly more amenable, yielding a far great level of information. It is observed that ideally more and 8 assessors should be employed in such studies to be able to yield more statistically significant results. Our estimate is that 16-20 assessors would have been needed. Additionally, it is clear the ultra-flash profiling is vital to the interpretation of the results, which would have otherwise have been close to impossible.

References

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