Feeling what you see:

The effect of congruent-incongruent visual stimuli on Haptic Aesthetic, Sensory perception

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INTRODUCTION

Haptic perception is a fundamental part of human life: not only for meaningful interpersonal connections, object recognition, texture differentiation, and spatial awareness. Recent studies have focused on:

- The basic principles of haptic perception (Kappers et al., 2013)
- How we visually perceive different material properties (Fleming, 2014)
- How vision (e.g., emotionally valenced pictures) shapes haptic perception (Etzi et al., 2018)

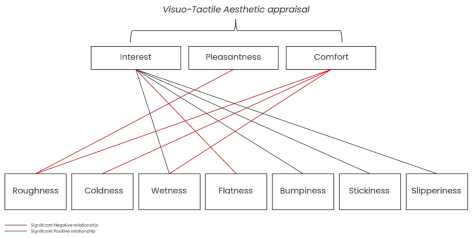
However, we identified a gap in research concerning the influence of non-emotional, material-related visual stimuli on haptic perception, which led us to our research question.

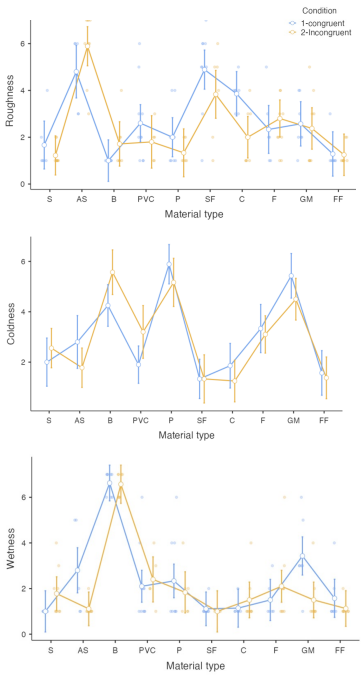
RQ: Does the simultaneous presentation of congruent vs incongruent Visual stimuli affect Haptic Aesthetic and Sensory perception of materials?

Picture A : Experimental setup

ANALYSES

- Correlation analyses to explore linear relationship between Haptic Aesthetic Appraisal and materials' Sensory properties
- Principal component analysis (PCA) to create composite DV of Haptic Aesthetic appraisal, i.e., "Haptic Pleasure" (for data reduction)
- Two-ways within-subjects ANOVAs to investigate the effects of Congruent/Incongruent visual stimuli, and materials type on Haptic Pleasure, Sensory perception





METHODOLOGY

- Within-subject Design
- 15 participants (ranging from 19 to 36, M= 22.3, SD= 4.22)
- 10 randomized (congruent/incongruent pairs) of everyday materials
- 7-point Likert scales with Sensory, Aesthetic adjectives

Congruent pair of stimuli *Incongruent pair of stimuli*

1b 2b 1c 2c

PROCEDURE

- Exploratory phase (picture A): Visual stimulus(1) presentation for 10s. Then haptic exploration of congruent/incongruent stimulus (2b/2c) for 20s.
- Rating phase: Aesthetic/sensory judgments with 7-point Likert scales

RESULTS

- Haptic Interest positively related to Wetness, Bumpiness, Stickiness, Slipperiness;
- Haptic Pleasantness, Comfort negatively related to Roughness;
- Haptic Comfort negatively related to Coldness, Wetness;
- No significant main effect of Congruent/Incongruent condition on Haptic Pleasure;
- Significant main effect of material type on Haptic pleasure, and Sensory perception;
- Significant interactions between Congruent/Incongruent condition and material type on Sensory perception;

KEY FINDINGS

✓ The present study findings align with existing literature: Rougher textures tend to be perceived as less pleasant, comfortable.

✓ Materials perceived as wet, bumpy, sticky, slippery were found haptically interesting: These tactile qualities can engage users, potentially increasing the perception of novelty

✓ An increase in perception of coldness, wetness may lead to a reduced sense of haptic overall comfort: This can be relevant in design/ergonomics, where the choice of materials can impact user's haptic hedonics, needs (can also be context dependant).

✓ The hypothesised effect of congruent/incongruent stimuli on haptic aesthetic appraisal was not confirmed. However, material type accounted for variations in haptic hedonics. PVC, Faux Fur were considered the most pleasant, as opposed to Styrofoam.

✓ The interaction between congruent/incongruent stimuli and material type appeared to affect perception of Roughness, coldness, wetness only, thereby indicating a visual modulatory effect on haptic sensory evaluations (especially for certain materials).

➢ *Future studies: Bigger sample, stricter experimental setting, test fewer materials in depths*

Etzi, R., Zampini, M., Juravle, G. *et al.* Emotional visual stimuli affect the evaluation of tactile stimuli presented on the arms but not the related electrodermal responses. *Exp Brain Res* **236**, 3391–3403 (2018). https://doi.org/10.1007/s00221-018-5386-0. Fleming, R. W. (2014). Visual perception of materials and their properties. Vision Research, Volume 94, 2014, Pages 62-75. ISSN 0042-6989. https://doi.org/10.1016/j.visres.2013.11.004. Kappers, A.M.L. and Bergmann Tiest, W.M. (2013), Haptic perception. WIREs Cogn Sci, 4: 357-374. https://doi.org/10.1002/wcs.1238