



Seeing the Bees Buzz and Hearing the Diamonds Glisten: The Effect of the Mode of Presentation of Stimuli on the Modality-Switch Effect

Elisa Scerrati¹, Luisa Lugli¹, Anna Maria Borghi^{2,3}, Roberto Nicoletti¹
¹ Department of Philosophy and Communication, University of Bologna
² Department of Psychology, University of Bologna
³ Institute of Cognitive Sciences and Technologies, Italian National Research Council
elisa.scerrati@unibo.it



INTRODUCTION

- Switching from the sentence “BEE BUZZES” to the sentence “DIAMOND GLISTENS” incurs a modality switching cost much like switching from an auditory tone to a light flash [1, 2].
- Modality switching costs during conceptual processing have been taken as evidence supporting the assumption that perceptual information is engaged in conceptual processing [3].
- Such costs have been shown with both visual and aural presentation of stimuli [4].
- However, it has not been fully explored whether such semantic costs are independent of the mode of presentation of the stimulus.

METHOD

Participants: 60 students (31 females; mean age: 20.586, SD: 2.45).
Task: property-verification task on concept-property target pairs presented either visually or aurally (see figure 1 for an example of the experimental conditions).

RESULTS

A Repeated Analysis of Variance (ANOVA) on RTs with *Mode of Presentation* (**same** vs. **different**), *Content Modality* (**same** vs. **different**) and *Target Congruency* (**congruent** vs. **incongruent**) as within-subject factors was performed. There was a main effect of *Mode of Presentation*, $F(1, 59) = 4.582$, $MS_e = 75789.90$, $p < .05$, $\eta_p^2 = .072$, and a main effect of *Target Congruency*, $F(1, 59) = 18.63$, $MSE = 65906.25$, $p < .001$, $\eta_p^2 = .240$.

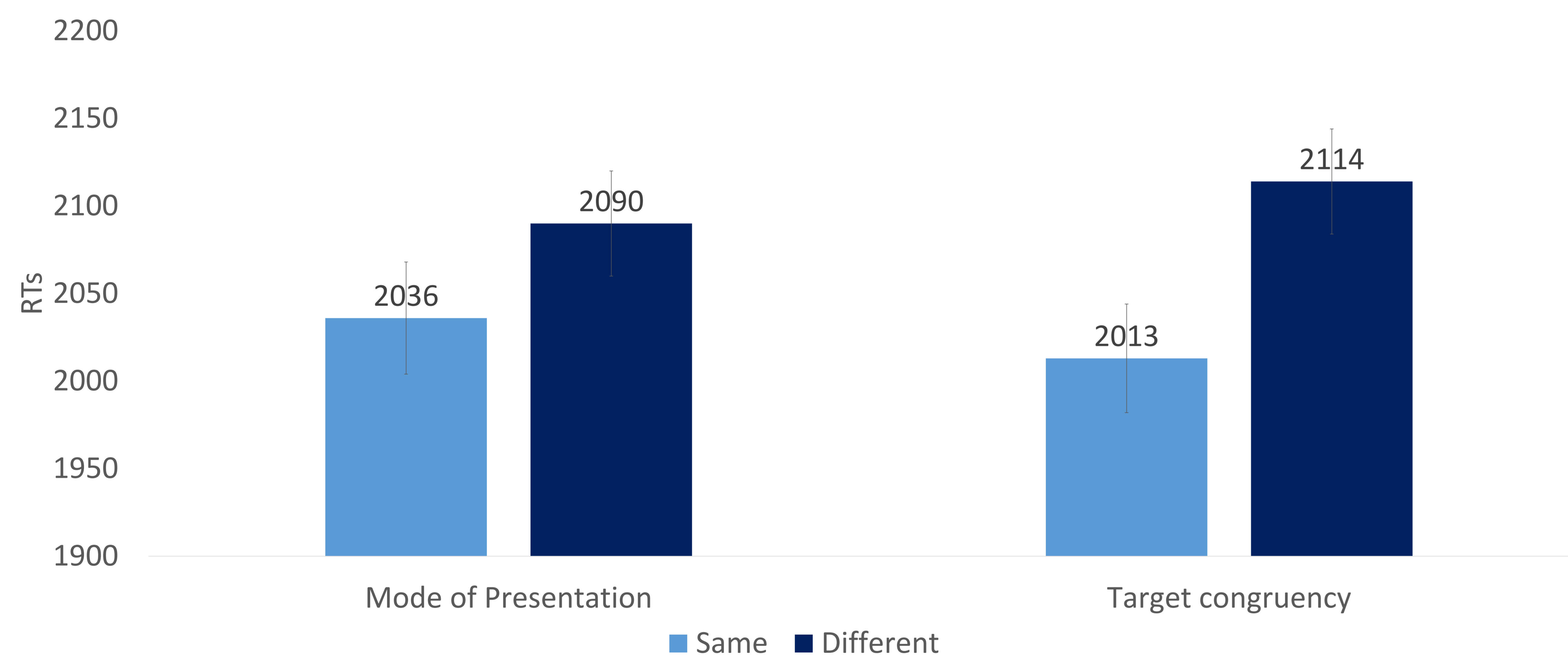


Figure 2: Mean Response Times (in Milliseconds) as a Function of *Mode of Presentation* (**same** vs. **different**), *Content Modality* (**same** vs. **different**) and *Target Congruency* (**congruent** vs. **incongruent**). Bars are standard Errors.

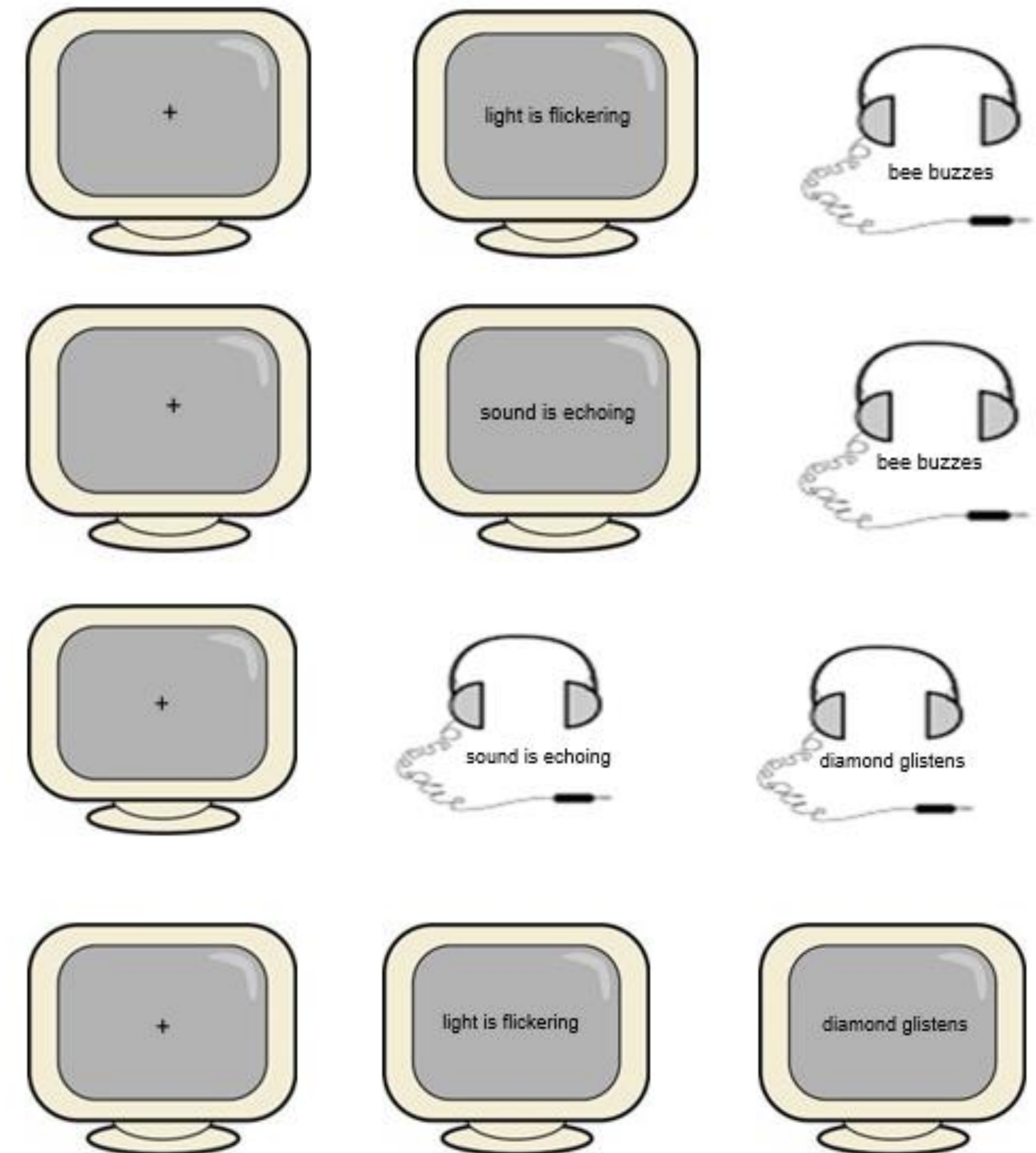


Figure 1: Example of written and spoken same and different-modality prime and target sentences in the Different-Different (DD) Different-Same (DS), Same-Different (SD), and Same-Same (SS) conditions.

DISCUSSION

- In line with the hypothesis, we found evidence for the involvement of the mode of presentation of stimuli in the property verification task.
- The effect of the *Target Congruency* is in line with the results of van Dantzig et al. (2008) [5] that showed that when a perceptual stimulus and a subsequent target sentence were in a different sensory modality, RT were slower compared to when they were in the same modality. Our results broaden their finding showing such an interference effect within the same stimulus, that is, when the processing of perceptual and conceptual information overlap in time.
- We conclude that the MSE is a multilevel effect which can occur on two different levels of information processing, i.e., perceptual and semantic.

REFERENCES

- [1] Pecher, D., Zeelenberg, R., & Barsalou, L.W. (2003). Verifying the properties of object concepts across different modalities produces switching costs. *Psychological Science*, 14, 119-124.
- [2] Spence, C., Nicholls, M.E.R., & Driver, J. (2001). The cost of expecting events in the wrong sensory modality. *Perception & Psychophysics*, 63, 330-336.
- [3] Barsalou, L. W. (2008). Grounded cognition. *The Annual Review of Psychology*, 59, 617-645.
- [4] Scerrati, E., Baroni, G., Borghi, A.M., Galatolo, R., Lugli, L., Nicoletti, R. (2015). The modality-switch effect: Visually and aurally presented prime sentences activate our senses. *Front. Psychol.* 6:1668. doi: 10.3389/fpsyg.2015.01668
- [5] van Dantzig, S., Pecher, D., Zeelenberg, R., Barsalou, L. W. (2008). Perceptual processing affects conceptual processing. *Cognitive Science*, 32, 579-590.