



THE MODALITY-SWITCH EFFECT: NEW INSIGHTS FROM LANGUAGE PROCESSING

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INTRODUCTION

- The relation between perceptual and conceptual information is complex [1].
- Several studies on perception showed that there is a cognitive cost in shifting attention between events in different modalities [2].
- This effect, known as Modality-Shifting Effect or Modality-Switch Effect (MSE), has also been found in studies on concepts and in studies where perceptual detection influenced conceptual processing [3, 4, 5].
- The interaction between the MSE and language processing has not been fully explored.

AIMS

The present study aims at investigating the MSE:

- by priming conceptual processing with a perceptual, linguistically described stimulus (e.g., "the light is dazzling");
- by introducing amodal prime stimuli (e.g. # ° ^ ? *), thus creating a neutral baseline compared to visual and auditory prime items.

METHOD

Participants: 32 students (18 females, mean age: 20.37, SD: 1,97).

Task: participants were required to perform a property-verification task on 96 concept-property target pairs (e.g., a walnut is brown). Each concept-property target pair was preceded by a prime sentence (e.g., the light is dazzling) that could be: 1) in the same modality as target (visual-visual; auditory-auditory, **same condition**); 2) in a different modality than target (visual-auditory, auditory-visual, **different condition**) or 3) amodal (amodal-visual, amodal-auditory, **neutral condition**). Only in the different condition participants experienced a modality-switch, see Figure 1 for an example.

Dependent variables: RTs and ERs for experimental target pairs.



Figure 1: Example of the experimental procedure

RESULTS

A Repeated-measures ANOVA, with Condition (**same** vs. **different** vs. **neutral**) as the only within-subjects factor revealed:

MSE significant for RTs, $[F(2,54) = 23.07, MS_e = 5622.94, p < .001, \eta_p^2 = .461]$, but not for ERs, $[F < 1, \eta_p^2 = .014]$, see Table 1 and Figure 2 for details. Paired-sample t tests confirmed that the **different** condition was slower compared to the **same** condition, as expected. Moreover, the **neutral** condition resulted to be the slowest overall.

Table 1: Mean Response Times (RTs; in ms) and Error Rate (Ers; in %)

Condition	RTs	ERs
	ms	%
Same	1534	16,2
Different	1588	17,1
Neutral	1670	15,1

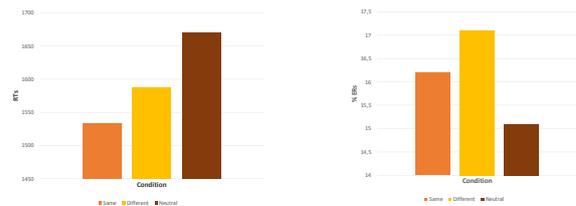


Figure 2: Mean Response Times (RTs; in Milliseconds) (left panel) and Percentages of Errors (right panel) as a Function of Condition (**same**, **different**, **neutral**)

In order to control for items variability, we run an Univariate Analysis of Variance with *Target* (i.e., concept-property target pairs) as a fixed factor and *Condition* (**same** vs. **different** vs. **neutral**) as a random factor. The *Target* x *Condition* interaction was not significant $[F(63,1033) = 1.26, MS_e = 128599.9, p = .090, \eta_p^2 = .071]$, ruling out the possibility that the effect was due to some particular target among the others.

DISCUSSION

- o Results show a facilitation for the processing of those concept-property target pairs whose modality was formerly primed. These results are in line with recent behavioral findings showing the MSE during conceptual processing and across perceptual and conceptual tasks [see 3, 4, 5].
- o Our findings extend those of van Dantzig et al., (2008) showing that the MSE emerges within a priming paradigm, even when perceptual information is linguistically conveyed.
- o The slowest RTs in the neutral condition could be due to the fact that neutral primes were amodal, hence they didn't activate any modality at all, slowing down the processing of those targets they preceded.
- o These findings support the embodied and grounded cognition view, which claims that perceptual information and conceptual organization are closely related.

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