Is the color of "Culture" visual or auditory? A study on abstract concepts with the Extrinsic Simon task

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INTRODUCTION

- Abstract concepts such as *FREEDOM* or *JUSTICE* have no clearly identifiable referent that we can experience.
- The Words As Social Tools theory (WAT) has suggested that, while both concrete and abstract concepts are grounded in the sensorimotor system, abstract concepts activate the linguistic network more than concrete concepts given that their mode of acquisition relies more on language [1, 2].
- Recent behavioral evidence supports this hypothesis showing that concrete words (e.g. *BOTTLE*) are mainly acquired through sensorimotor experience, whereas abstract words (e.g. *PHILOSOPHY*) are mainly acquired through linguistic inputs [3, 4]. In addition, fMRI research showed that concrete concepts are more associated with visual experience whereas abstract concepts are more associated with acoustic experience [5].
- The present study addresses the question of whether the acoustic modality is actually relevant for abstract concepts by means of implicit measures.

METHOD

Participants: 60 students (32 females; mean age: 22.45, SD: 2.43).

Task: Extrinsic Simon Task [6].

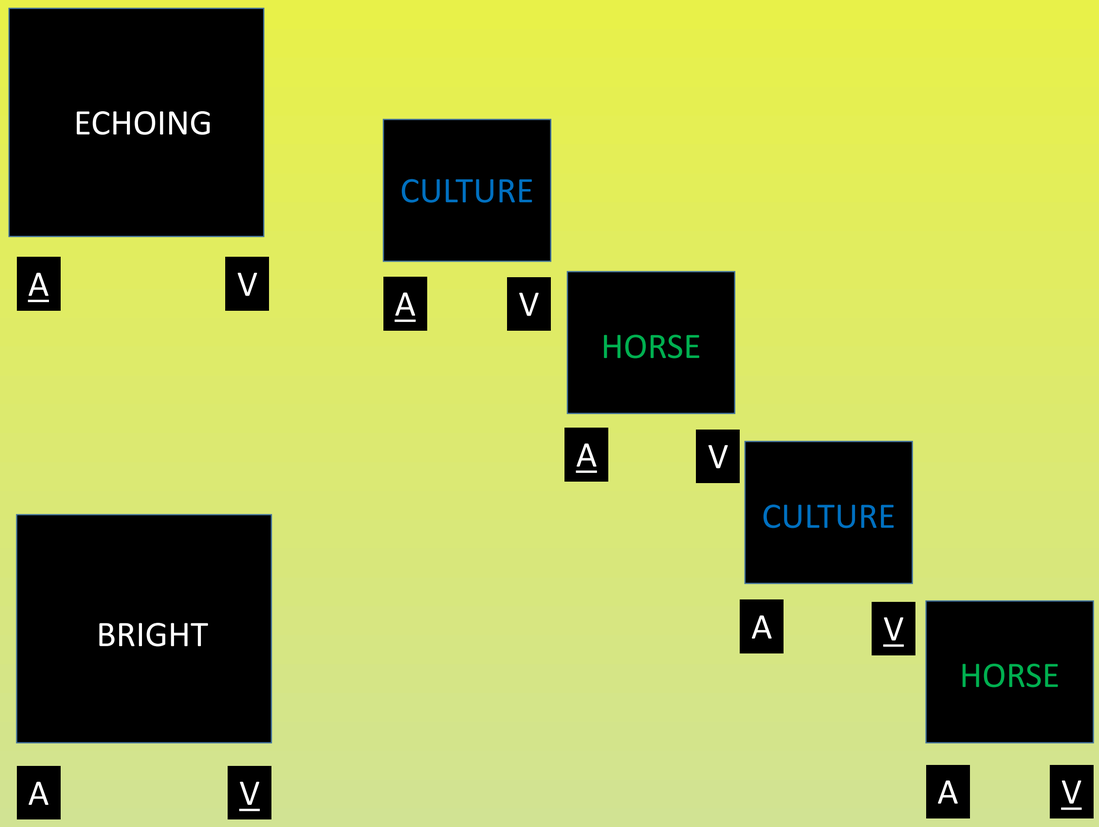

Figure 1: Example of white VISUAL and AUDITORY content words (on the left) and colored words in the Auditory-Abstract (AA), Auditory-Concrete (AC), Visual-Abstract (VA) and Visual-Concrete (VC) conditions (on the right).

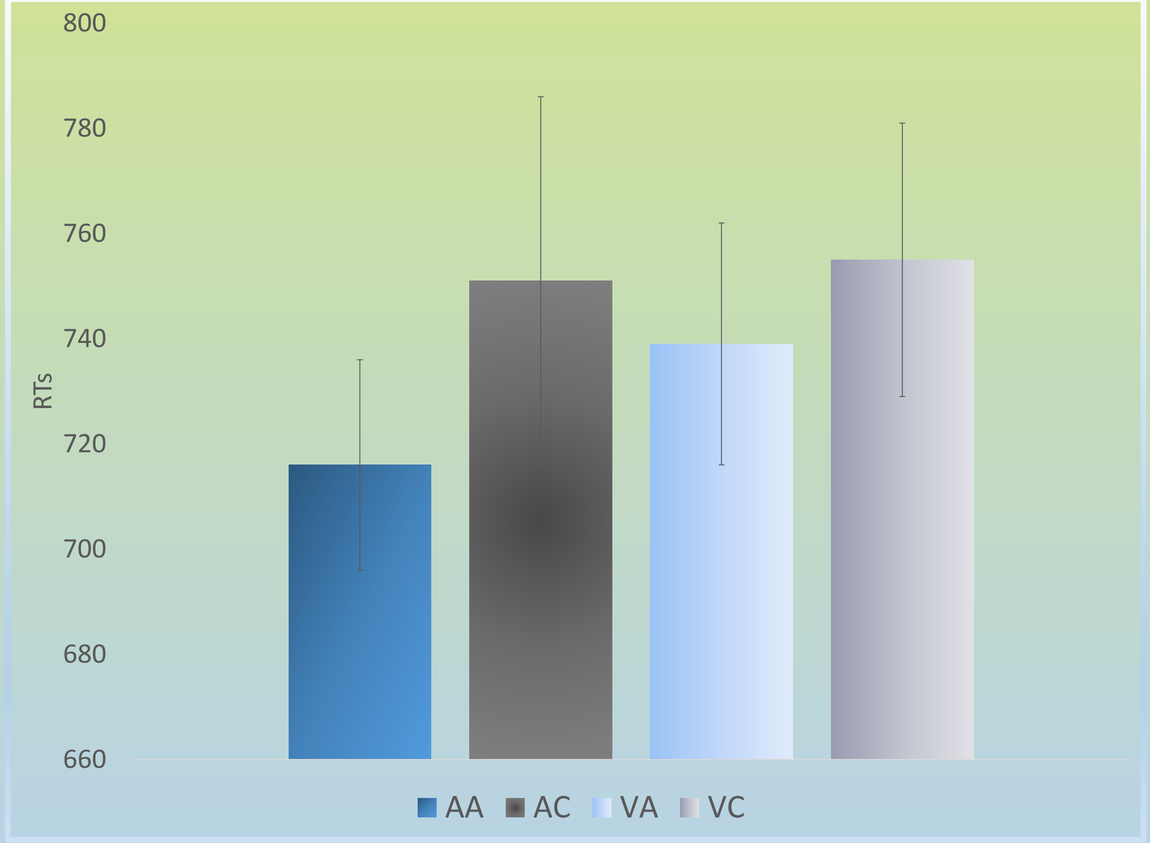

Figure 2: Mean Response Times (in Milliseconds) as a Function of *Condition* (*AA, AC, VA, VC*). Bars are standard Errors.

RESULTS

A Repeated Analysis of Variance (ANOVA) on RTs with *Condition* (**AA, AC, VA, VC**) as a *within-subject* factor was performed. Although the main effect of *Condition* was not significant, $F(3, 177) = 1.237$, $MS_e = 14905.54$, $p > .05$, $\eta_p^2 = .021$, Helmert contrasts showed that decision latencies in the Auditoy-Abstract (AA) condition were significantly faster than decision latencies in the other three conditions, $F(1, 59) = 4.258$, $MS_e = 14700.088$, $p < .05$, $\eta_p^2 = .067$. No other contrast turned out to be significant, $F_s < .960$ $p_s > .3$. See Figure 2.

DISCUSSION

- As predicted by the WAT theory [1, 2] the contribution of language to conceptual processing has proven to be particularly crucial for abstract concepts and the corresponding words, given their lack of identifiable referents.
- In line with the hypotheses, our findings showed that discriminating the color of abstract words (e.g., *CULTURE*) was faster when the correct response was the response that was also assigned to auditory white words (e.g. *ECHOING*).
- Our results boost and broaden previous fMRI research showing that abstract concepts are mainly associated with acoustic experience.
- In sum, this preliminary finding constitutes an implicit evidence that abstract concepts are grounded in sensory modalities and that they especially activate the acoustic modality, as predicted by the WAT theory.

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