

Background

Masked priming experiments show that **words can prime other words with related meanings** (cat-dog) even when the prime word is perceived unconsciously.

There are at least two possible explanations for the effect:

- **Semantic-based:** words are processed up to the semantic level, and priming reflects the activation of conceptual knowledge in semantic memory.
- **Wordform-based:** words are processed at the wordform level, and priming reflects predictive relationships between the words' forms.

Hypothesis

Unconscious “semantic” priming effects could be due to relationships between wordforms, mimicking conceptual relationships, as in Searle’s Chinese Room thought experiment.



Space-Time

Time is conceptualized along a **sagittal axis** (past behind / future ahead) and a **lateral axis** (past left / future right).

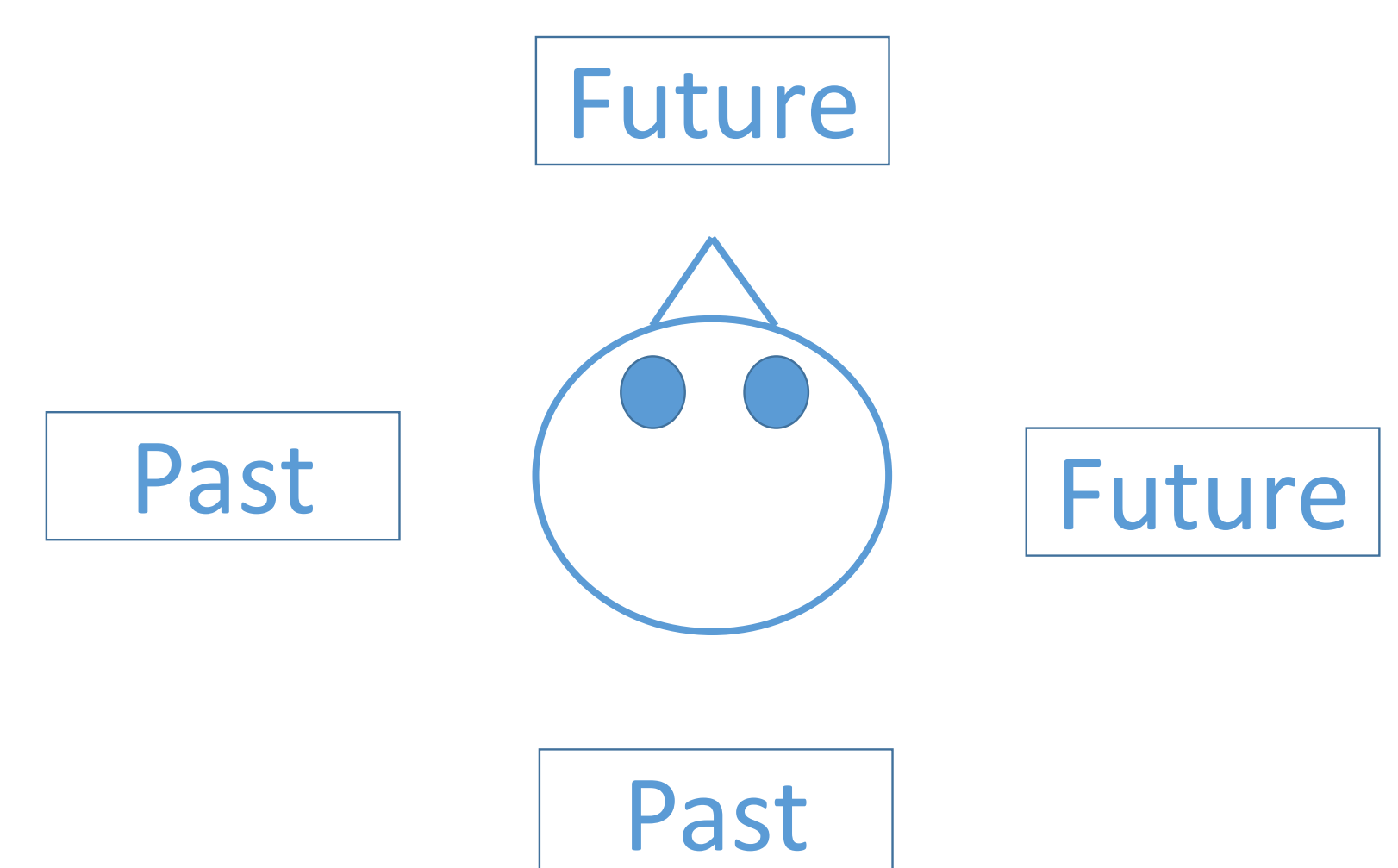
This association emerges in behavioral experiments [1,2] spontaneous gestures [3] and even in neglect patients [4].

Yet, **only the sagittal metaphor is encoded in language** [5]:

Several languages have expressions like: “you have a bright future *in front* of you”

No known language has expressions like: “you have a bright future *on your right*”

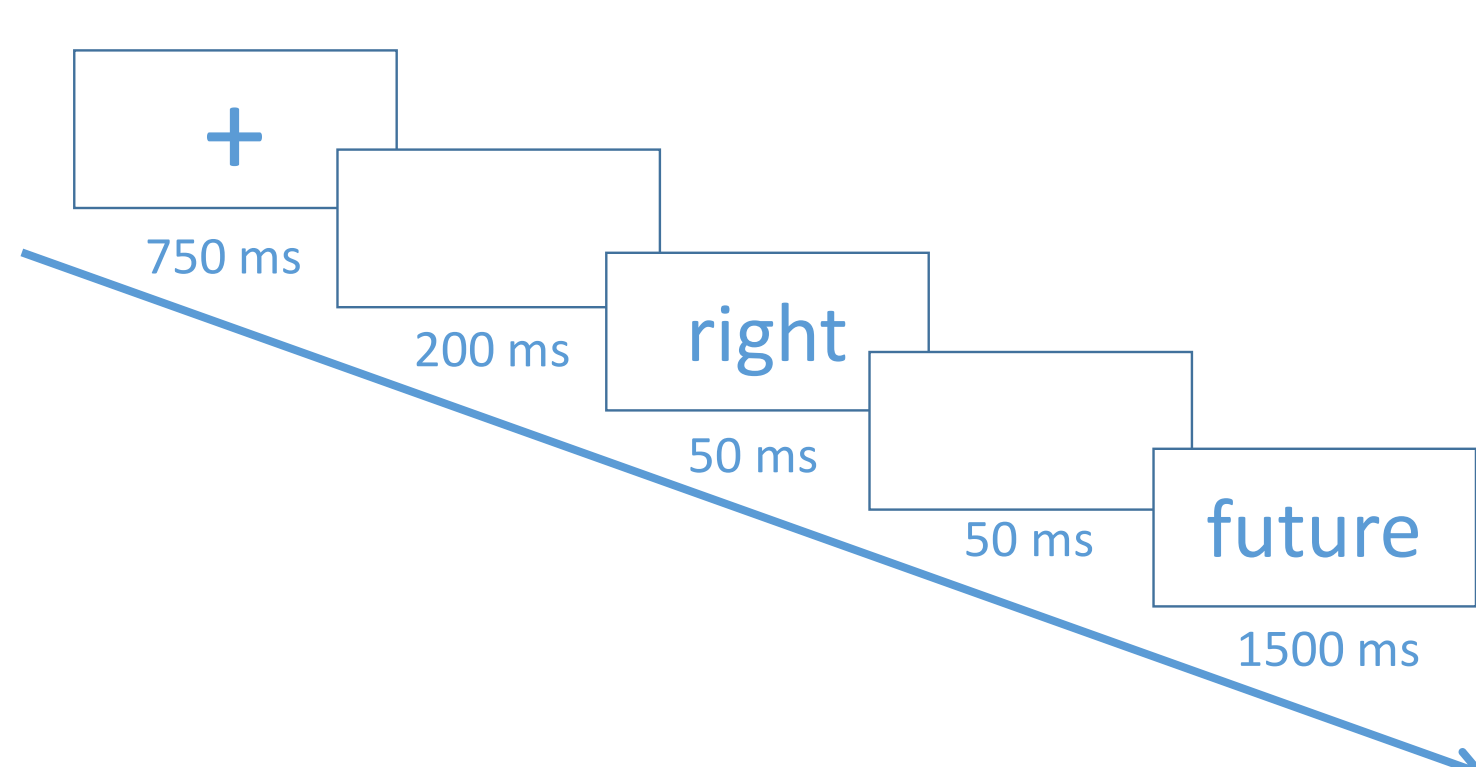
The conceptual relationship between lateral axis and time cannot be mimicked by wordform-wordform links.



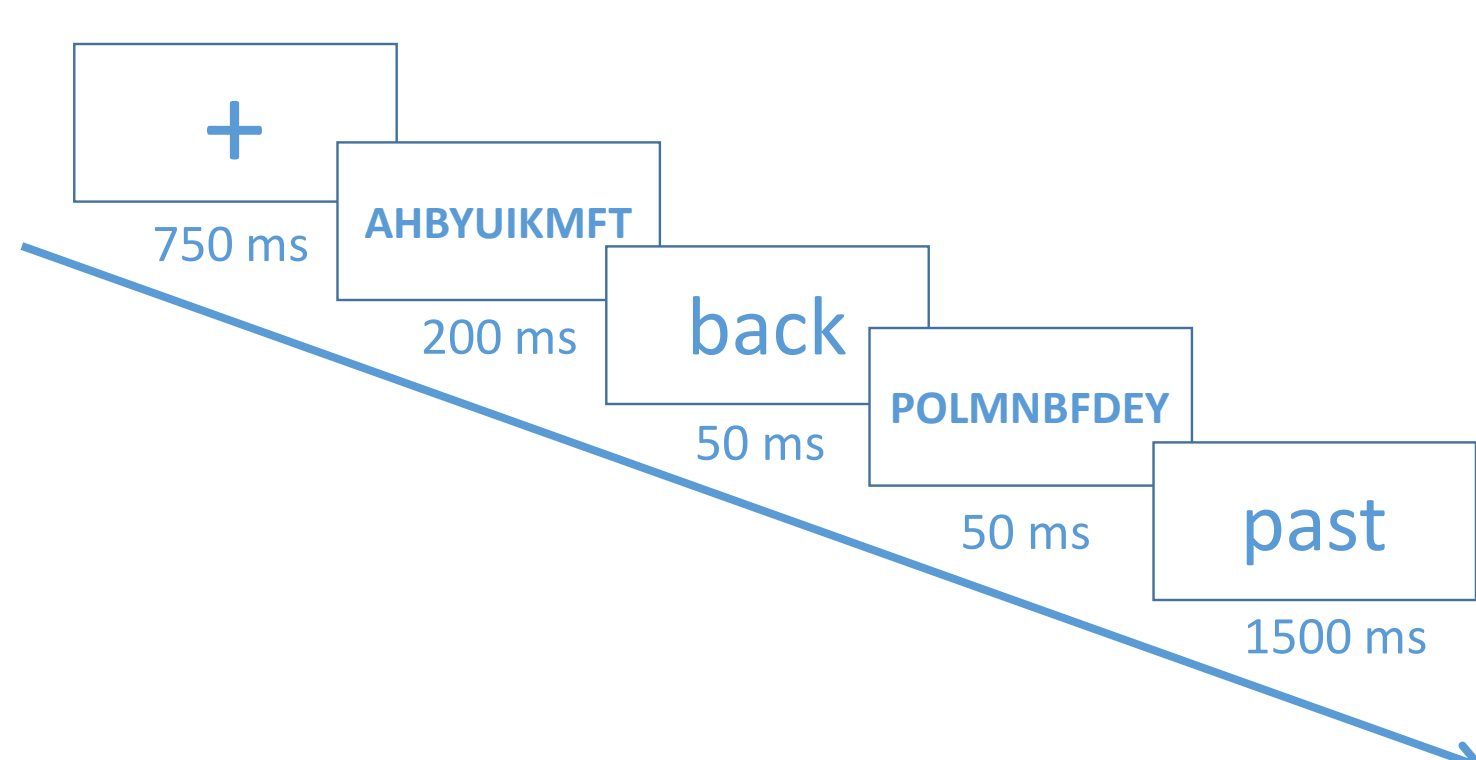
Experiments

- We tested space-time associations using a priming paradigm
- Two spatial words related to the lateral axis (left, right) and two spatial words related to the sagittal axis (back, front) were used as primes.
- Target stimuli were 8 temporal words: four of them referred to the past, and four referred to the future.
- All participants performed a GO\NO-GO task responding only to either the past-related or the future-related target words, counterbalanced across participants.
- Prime-Target pairs were either congruent (left-past; back-past) or incongruent (left-future; back-future) with the Mental Time Lines

1. In the **first** experiment, all stimuli were clearly visible.

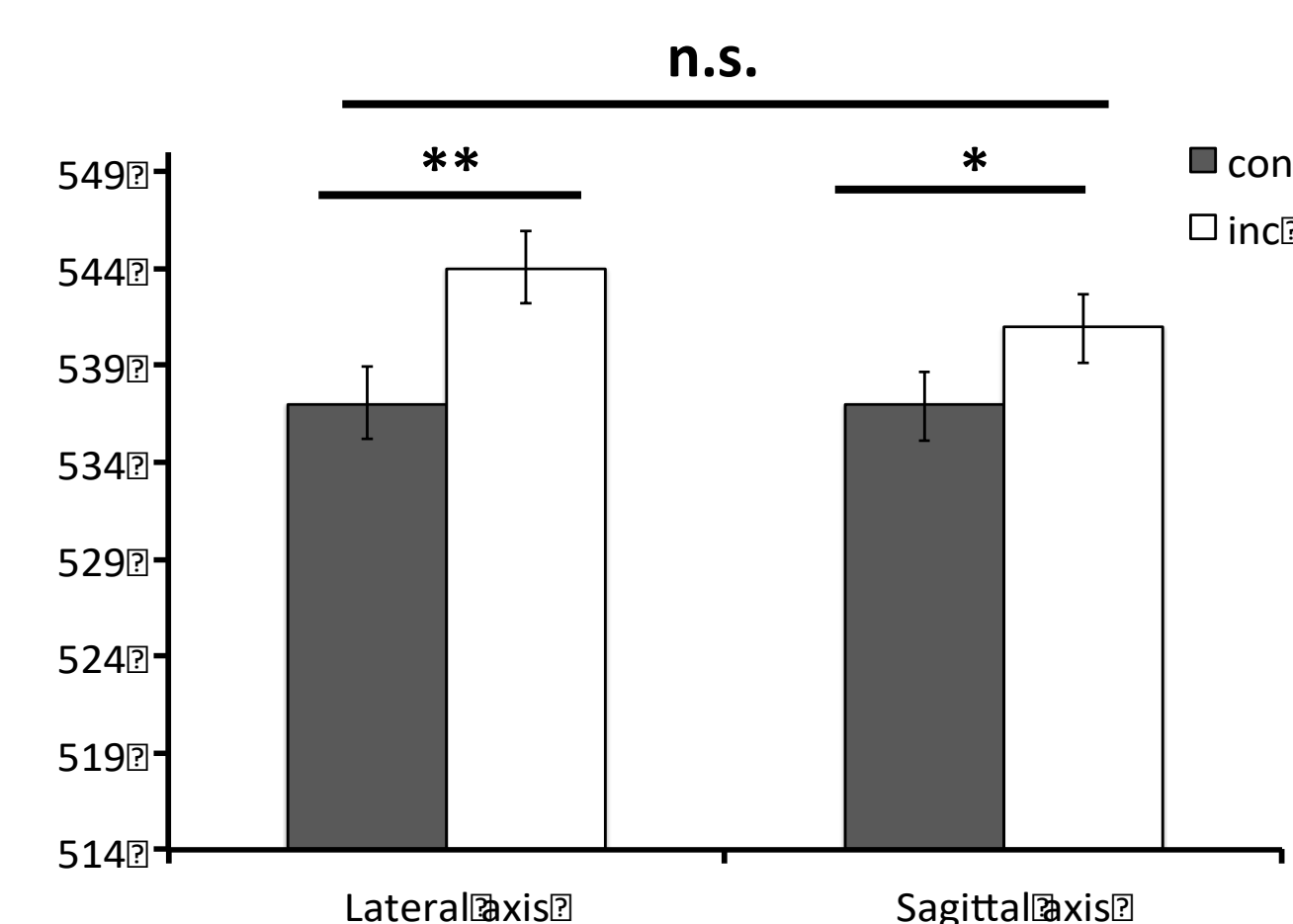


2. In the **second** experiment prime words were presented out of awareness, through a masking procedure. Prime visibility was assessed by a d-prime analysis.

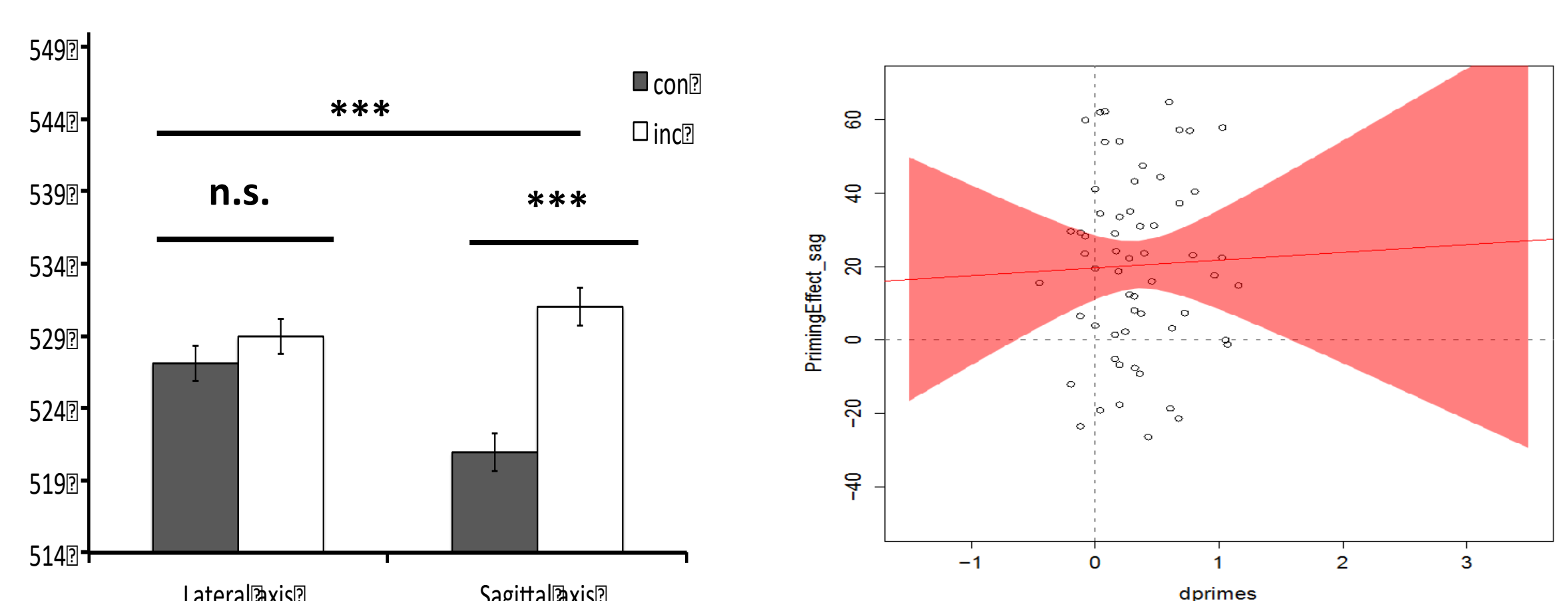


Results

Experiment 1: visible primes led to a significant effect of Congruency. No sign of Congruency-by-Axis interaction was found.



Experiment 2: the analysis showed a significant effect of Congruency, as well as a Congruency-by-Axis interaction, being the priming effect significant only on the sagittal axis. Through the Greenwald regression method [6], we guaranteed the truly subliminal nature of the priming effect.



Finally, we run additional analyses merging the data from the two experiment. The 3-way interaction between Congruity, Axis, and Prime Visibility (subliminal vs supraliminal) was significant.

Discussion

This result suggests that **unconscious semantic processing may be limited to word-to-word relationships encoded in language use** and that **conscious access is important to integrate linguistic and nonlinguistic information in the construction of meaning.**

References

- [1] Casasanto & Bottini (2014), JEP:G
- [2] Ulrich et al. (2012), Mem Cogn
- [3] Casasanto & Jasmyn. (2012), Cog Ling
- [4] Saj et al. (2014), Psych Sci
- [5] Haspelmath (1997), Limcom Europa
- [6] Greenwald et al. (1995), JEP:G