

# Language improves goal-directed behaviour

Alessandro Buttinelli (Master student, Scienze Cognitive, Università degli studi Roma Tre)  
 Giovanni Granato (Research Fellow, ISTC-CNR)  
 Gianluca Baldassarre (Researcher, ISTC-CNR)

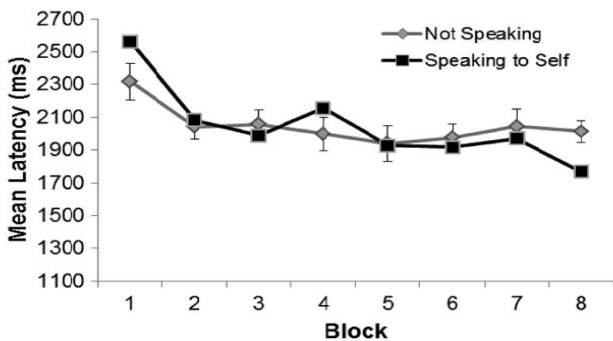


Figure 3. Response times in Experiment 2: Error bars show  $\pm 1$  standard error of the within-subject difference between the means. Accuracy was significantly higher for the speaking condition throughout the task; see text.

From Lupyan, Swingley, *Self-directed speech affects visual search performance*, 2012

## Background and topics

- The relation between language and thought is one of the most debated issues in linguistics and philosophy
- Strong theories on the role of language in thought are highly debated and have only partial empirical support
- All theories agree that language plays a key role in the development and functioning of human behaviour; but its specific functions are still poorly understood
- Computational models can greatly help to operationalise and integrate theories, test their soundness, and better understand the functions of language for thought

## Objectives

Use computational models to investigate the role of language in complex problem-solving tasks such as the Wisconsin Card Sorting Test. In particular study:

- The effects of language (social/inner speech) on cognition: possible category learning improvement
- The effects of language on motivation: possible strengthening of rewards
- The effects of language of working memory: possible memory strengthening

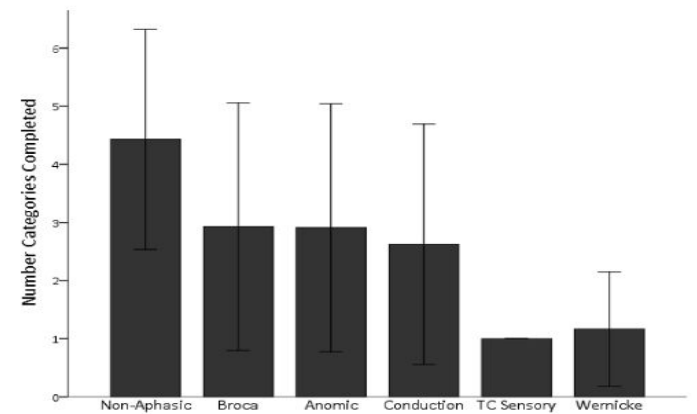


FIGURE 3 | Wisconsin Card Sorting Task (WCST) performance is shown for the number of categories completed, based on aphasia subtype. Individuals with severe comprehension deficits (Wernicke's and TC Sensory aphasia) sorted the fewest number of categories on the WCST. Performance in individuals with milder deficits overlapped with that of non-aphasic individuals. TC Sensory, transcortical sensory aphasia. Standard deviation bars are shown.

From Baldo et al., *Impaired reasoning and problem-solving in individuals with language impairment due to aphasia or language delay*, 2015

## What we have done, what we have to do

- Identify which aspects of language are more importantly involved in complex problem solving tasks and goal directed behaviour
- Formulate specific computational models of language functions for thought
- Contribute to formulate an integrated theory of language functions for cognition

