



# Impairment of switching attention in patients with fluent aphasia and temporal lobe damage

Svetlana Kuptsova<sup>1,2</sup>, Anastasia Ulicheva<sup>3</sup>, Olga Dragoy<sup>2</sup>, Maria Ivanova<sup>2,4</sup>

<sup>1</sup>Center for Speech Pathology and Neurorehabilitation (Russia), <sup>2</sup>National Research University Higher School of Economics (Russia)

<sup>3</sup>Royal Holloway, University of London (United Kingdom), <sup>4</sup>University of California Berkeley (Berkeley, CA, USA)



## Background

- Aphasia co-occurs with different types of deficits in cognitive and executive functions, with attention being one of them (Heuer & Hallowell, 2015; Murray, 2000, 2012).
- Some studies have shown impairments in switching between two different tasks in patients with aphasia compared to aged matched healthy controls (Murray et al., 1998; Hula & McNeil, 2008).
- Switching attention can influence the ability to readily and efficiently adopt rehabilitation programs and to influence outcomes (Nicholasa & Connorb, 2016; Murray, 2017).

## Aims of the study

investigate characteristics of switching attention in one type of task in patients with fluent aphasia and temporal lobe damage.

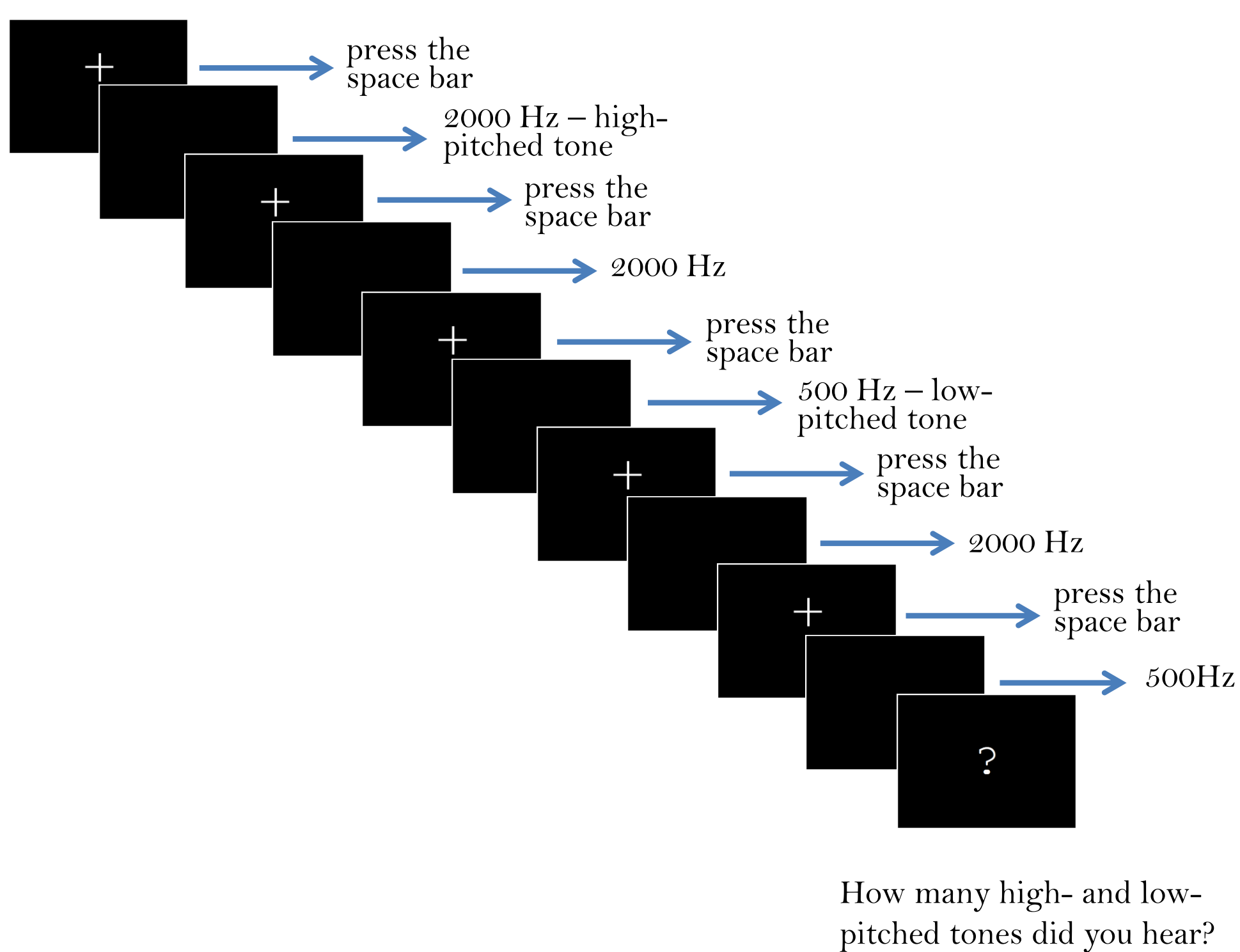
## Methods

### Participants

- Twenty healthy individuals (mean age:  $50.8 \pm 5.9$ ; 10 men).
- Sixteen patients with fluent aphasia and temporal lobe damage verified on an MRI (mean age:  $54.5 \pm 7.9$ ; 11 men; after left hemisphere CVA, with additional minor damage to the parietal lobe (11 individuals), the occipital lobe (3); aphasia severity ranging from mild to moderate).
- (All participants were right-handed native speakers of Russian).

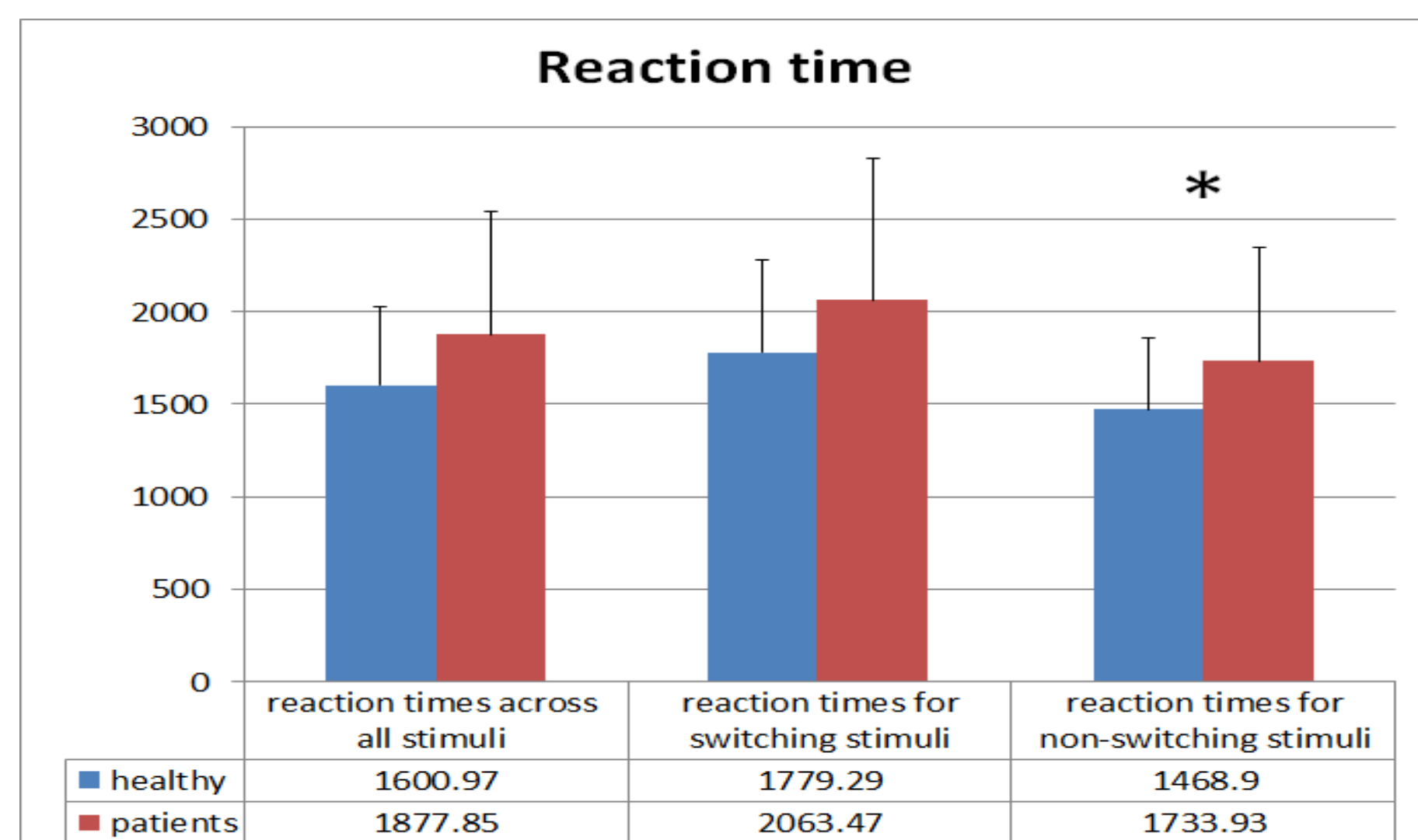
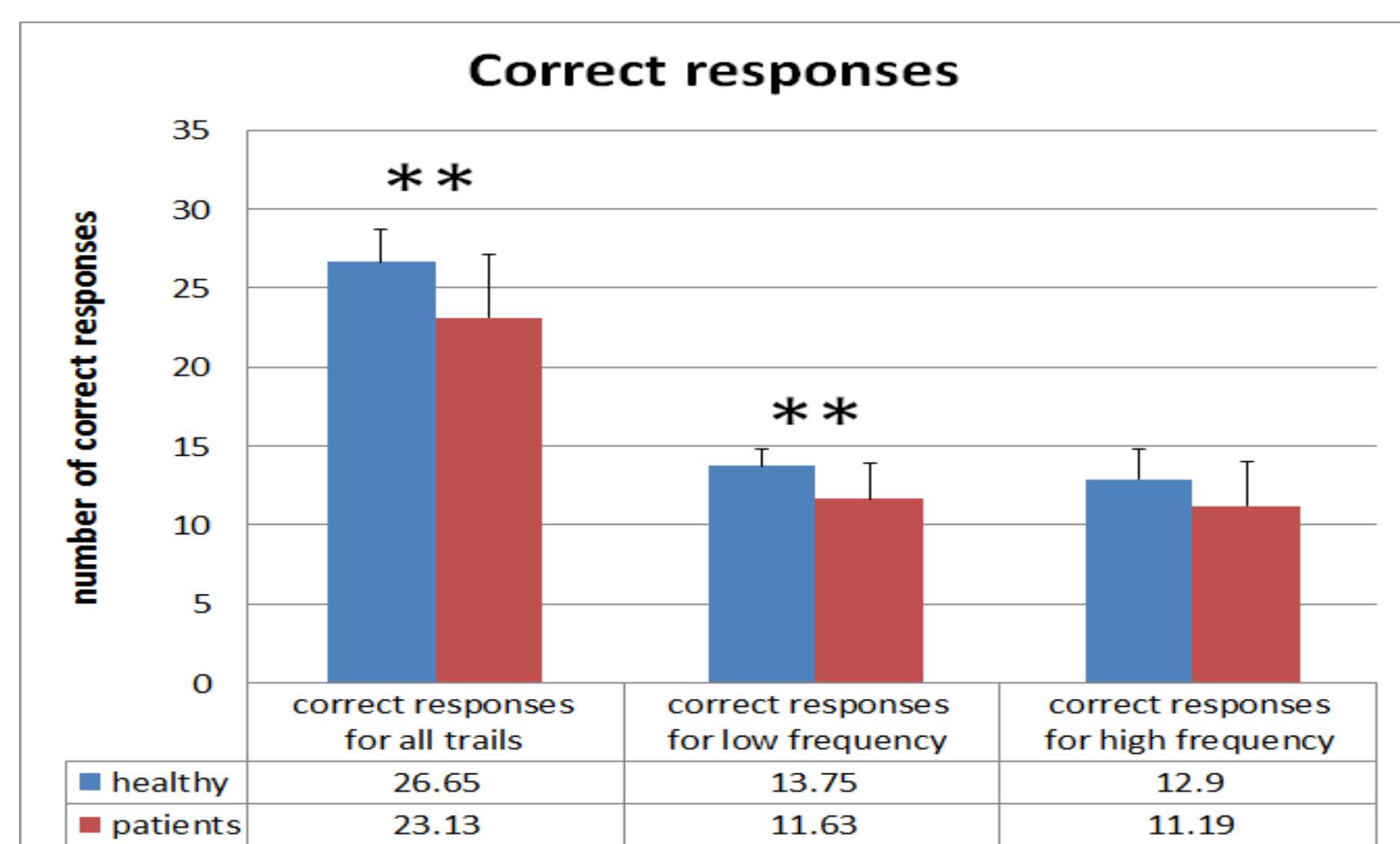
### Experimental task

The participants had to switch their attention between counting high-pitched (2000Hz) and low-pitched (500Hz) tones that lasted 500ms and were presented to them one by one in pseudorandom order. To switch to the next tone the participant had to press the space bar.



- Each sequence consisted of 7 to 9 tones.
- Thirty sequences (fifteen – high switching frequency (four switches within a sequence), fifteen – low switching frequency (two switches)).
- The participants had to listen to these tones and count them separately.
- The task had to be done as quickly and as accurately as possible.
- The task was presented on a laptop in an automated mode using the E-Prime 2.0 computer program.
- The data analysis was performed in SPSS 22.

## Results



\* -  $p < 0.05$

\*\* -  $p < 0.01$

- No correlations between correct responses and severity of aphasia and also time post-onset of stroke were observed.
- No correlations between reaction time and severity of aphasia and also time post-onset of stroke were found.
- No correlations between accuracy and reaction times were detected.

## Discussion

- Patients made significantly more errors than the healthy control group in low frequency trials but not in high frequency ones.
  - Possibly patients with temporal damage have impaired sustained attention (required for performance on the non-switching trials) relative to attention switching (required for performance on the switching trials), that is thought to be more dependent on the frontal regions that are intact in this group. Consequently, they are failing more in low frequency sequences, where performance is more dependent on sustained attention.
- Patients showed longer reaction times than the control group. However, this effect was significant only for non-switching stimuli.
  - This result is difficult to interpret since there was great variability within the patient group in the reaction times while healthy individuals were more stable. This might be due to differences in lesion location or severity of aphasia between patients or/and that they do not evaluate task demands properly.