

Language lateralization in right- and left-handed individuals: an fMRI study

Grigory Ignatyev¹ /gaignatev@edu.hse.ru/, Rosa Vlasova^{1,2}, Yulia Akinina^{1,3}, Maria Ivanova¹, Olga Dragoy¹

¹Neurolinguistics Laboratory, National Research University Higher School of Economics, Russia, ²Federal Center of Medicine and Rehabilitation, Russia, ³University of Groningen, the Netherlands

PROBLEM

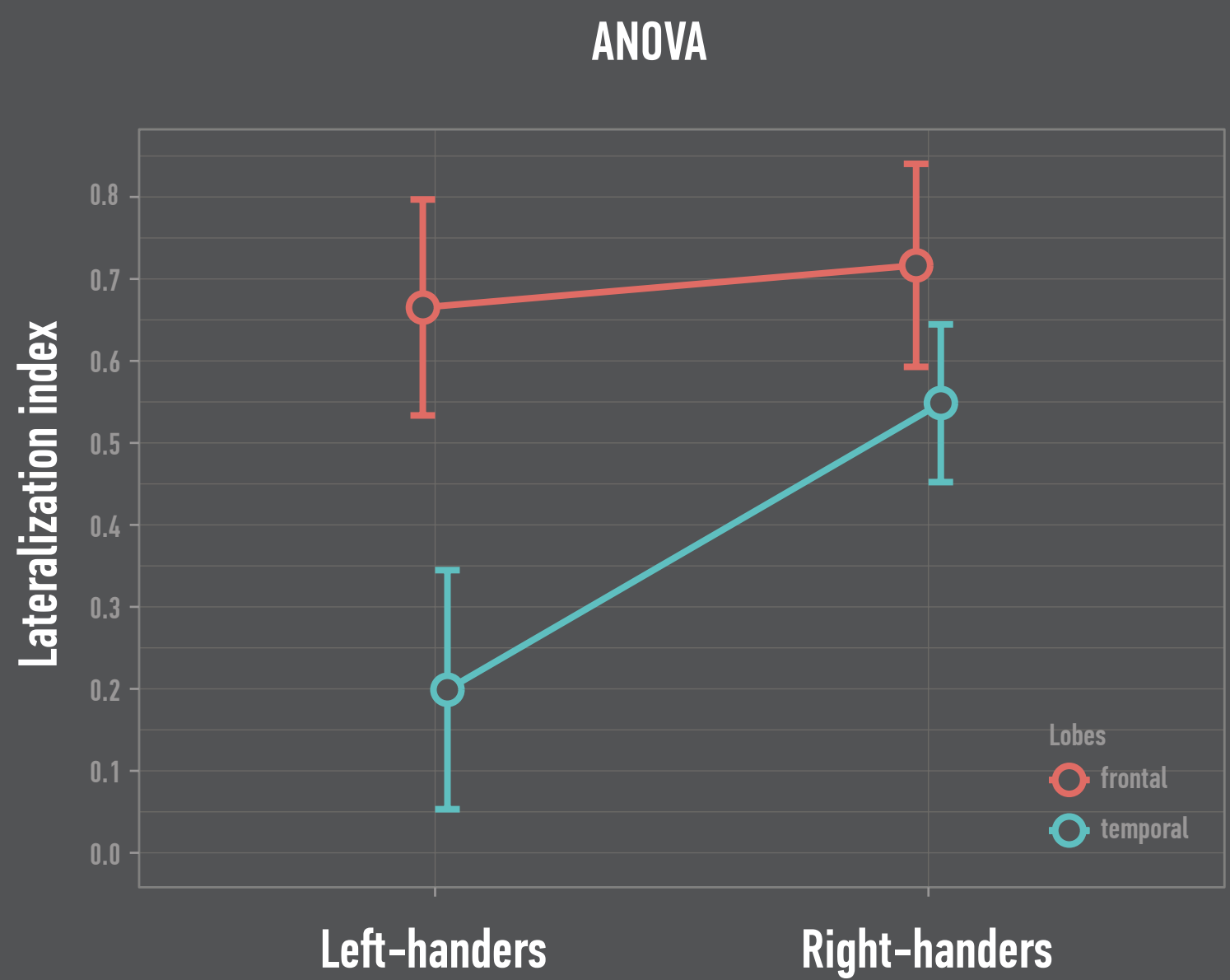
Previous studies of handedness & language lateralization:

- compare mean lateralization indices (LI) between groups [1]
- present a correlation between LI and handedness quotients (HQ) [2]
- assess variability of hemisphere dominance within different groups [3]

The goal of the present study – to measure functional language lateralization in healthy right- and left-handers and to test the following hypotheses:

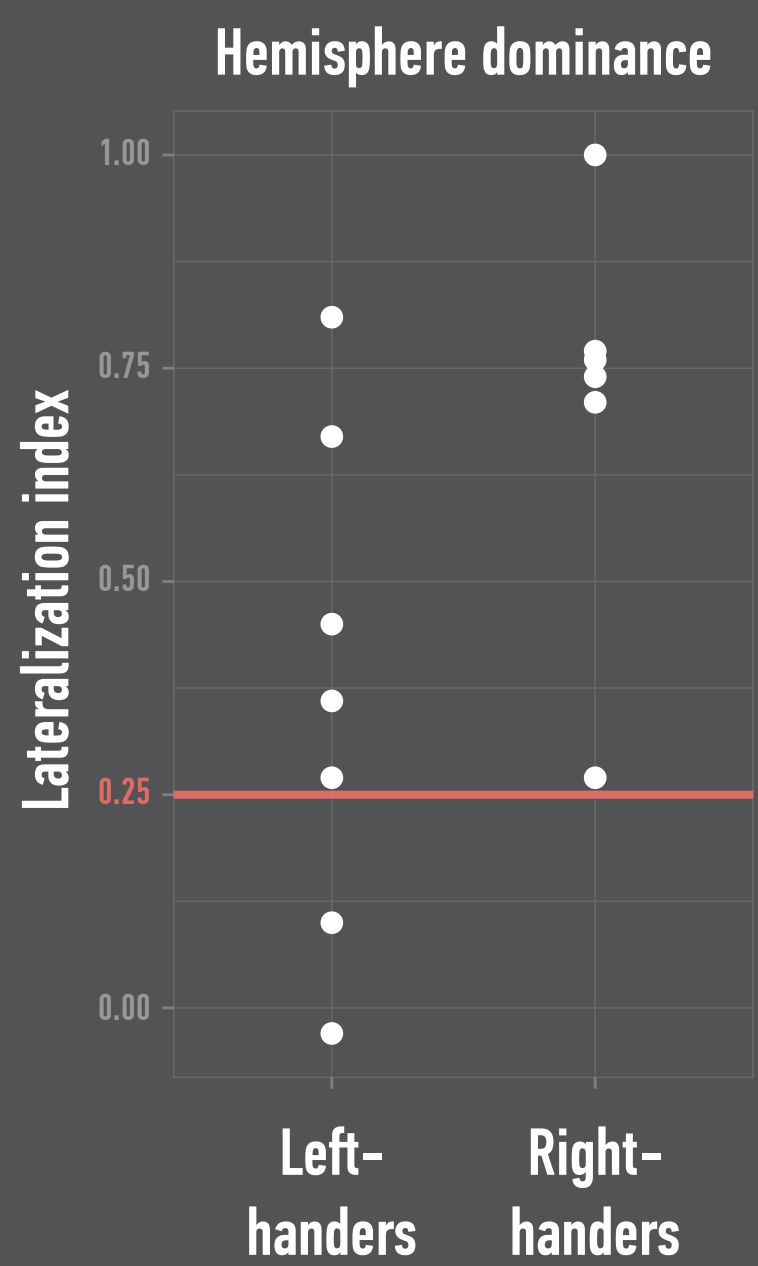
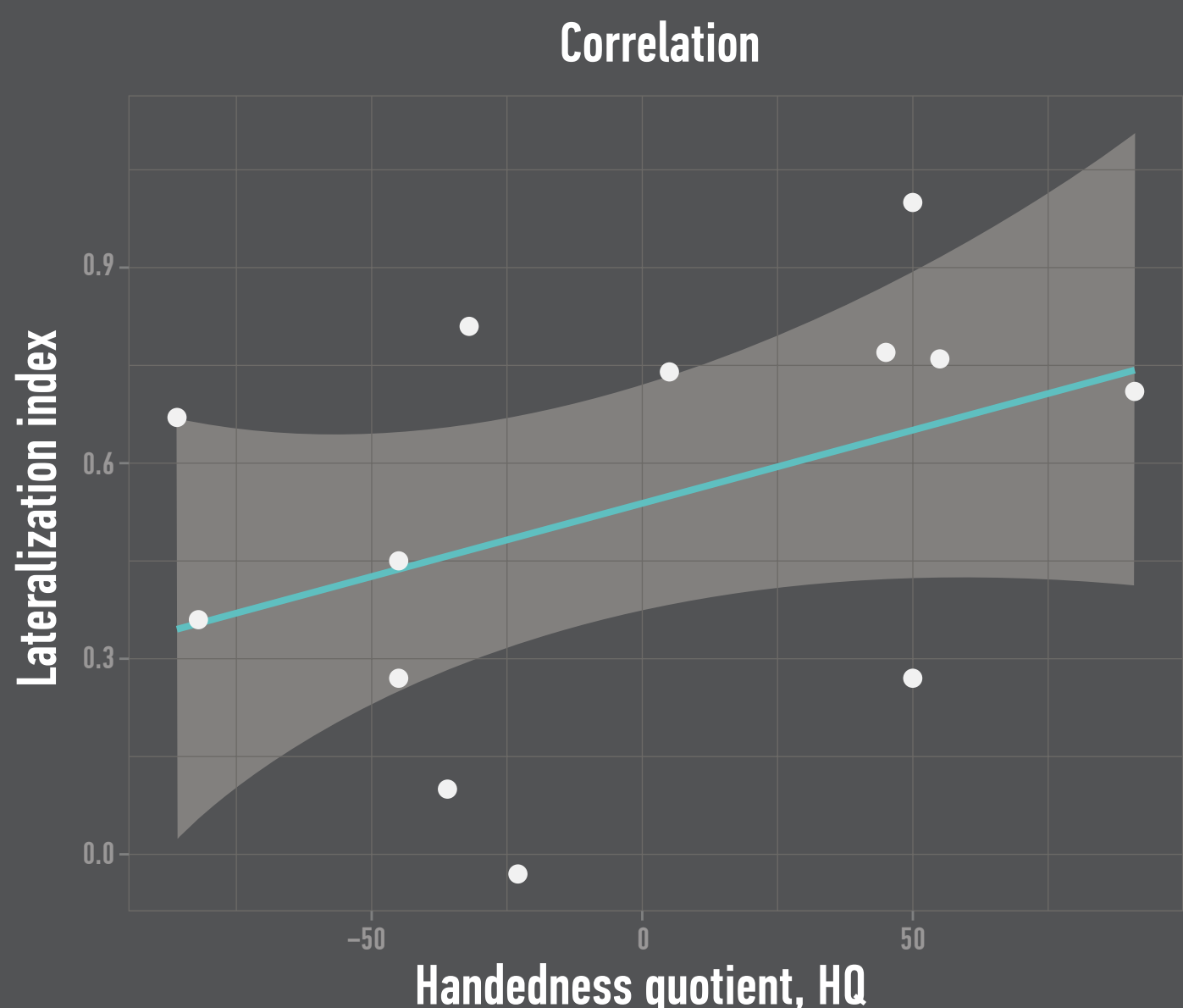
- whether mean LIs between these groups are different
- whether there is a correlation between LI and HQ
- whether there is a higher variability of hemisphere dominance within the group of left-handers

RESULTS



No significant difference between the groups ($F = 1.8, p = .21$); the main effect of the lobe (frontal vs. temporal) ($F = 7.2, p = .02$)

frontal lobe ($M = .69, SD = .31$)
temporal lobe ($M = .34, SD = .36$)



problem



stimuli



design



sample



parameters



results



implications

STIMULI

experimental condition:

five-word incomplete sentences with a direct object omitted:

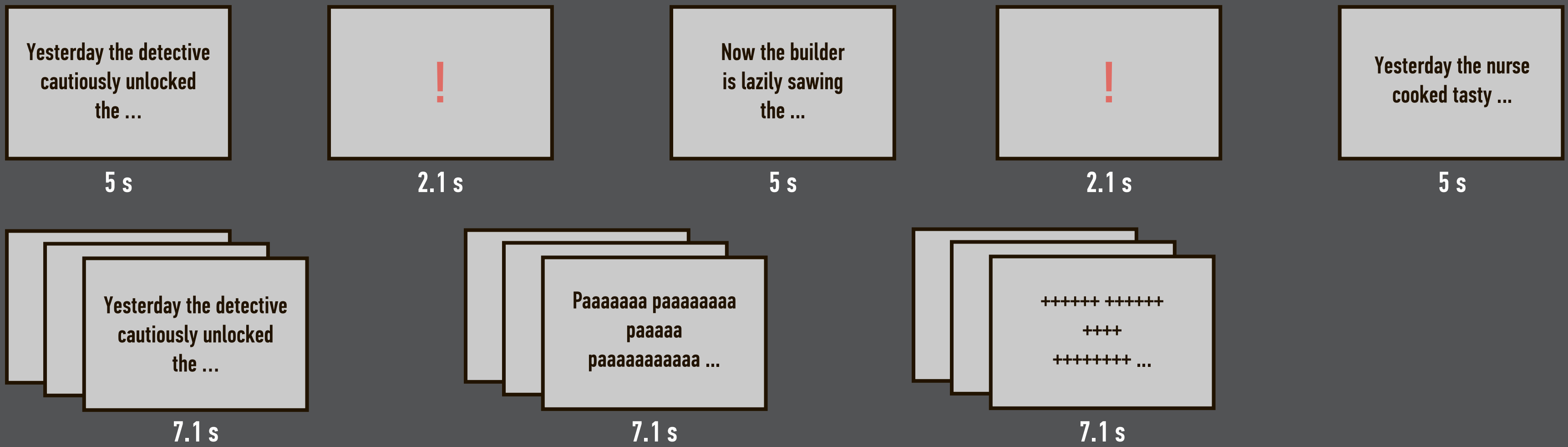
«Yesterday the detective cautiously unlocked the ...»

control condition:

sequences of meaningless syllables of equal length:

«Paaaaaaa paaaaaaa paaaaa paaaaaaaaa ...»

DESIGN



SAMPLE

- 13 healthy subjects (7 female)
- 6 right- and 7 left-handed
- mean age 24 years

PARAMETERS & DATA PROCESSING

- 1.5T Siemens Avanto scanner
- a sparse-sampling paradigm
- SPM12 software
- LI were calculated in the LI toolbox [4] using t-weighting of voxels and frontal and temporal lobes masks
- HQ was calculated using the Edinburgh Handedness Inventory [5]

IMPLICATIONS

- the present study failed to find difference between mean LIs in the groups of left- and right-handers
- no correlation between HQ and LI was revealed (likely due to the small sample)
- a significant difference in the variability of hemisphere dominance was found, the group of right-handers having more uniformly left-lateralized activation
- overall higher LIs in the frontal lobe suggest that language lateralization within anterior language regions is universally stronger than in the temporal lobe.

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