

Supplementary Material: neuro-imaging data collection

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1 fMRI Data-set

1.1 Design & Methods

1.1.1 The Little Prince

The analyzed text was the transcribed version of the English audio-book of Antoine de Saint-Exupéry *The Little Prince*, translated by David Wilkinson and read by Nadine Eckert-Boulet. This text comprises 19,171 tokens and 15,388 words, grouped in 1388 sentences.

1.1.2 Participants

56 participants were scanned and 5 of them were excluded since they had incomplete scanning sessions. Participants included in this study were 50 volunteers (31 women, 18-37 years old, mean age = 21.3) with no history of psychiatric, neurological, medical illness or history of drug or alcohol abuse that might compromise cognitive functions. All strictly qualified as right-handed (Edinburgh handedness inventory Oldfield, 1971), self-identified as native English speakers, and gave their written informed consent prior to participation (Cornell University IRB guidelines).

1.1.3 fMRI Design

Participants were familiarised with the MRI facility. Auditory stimuli were delivered through MRI-safe, high-fidelity headphones (Confon HP-VS01, MR Confon, Magdeburg, Germany) inside the head coil. The volume was adjusted until participants reported that they could hear clearly, using a spoken recitation of the US Constitution. Passive listening of the audio-book lasted 1 hour 38 minutes, divided into nine sections. To confirm participants' comprehension, the whole session (2.5 h) included a multiple-choice questionnaire with four questions (36 in total), concerning events and situations at the end of each section.

1.1.4 fMRI-recording

Imaging was performed in a 3 Tesla MRI scanner (Discovery MR750 GE, Milwaukee, WI) with a 32-channel head coil at the Cornell MRI Facility. Blood Oxygen Level Dependent (BOLD) signal was collected using a T2-weighted echo planar imaging (EPI) sequence (repetition time: 2000 ms, echo time: 27 ms, flip angle: 77deg, image acceleration: 2X, field of view: 216x216 mm, matrix size 72x72, and 44 oblique slices, yielding 3 mm isotropic voxels). Anatomical images were collected at a high resolution (T1-weighted, 1x1x1 mm³ voxel) with a Magnetization-Prepared RAPid Gradient-Echo (MP-RAGE) pulse sequence.

1.2 fMRI Analysis

1.2.1 Preprocessing

First steps of preprocessing were carried out using AFNI (v.16 (Cox, 1996)) and FSL's Brain Extraction Tool (Jenkinson et al., 2012) for skull-stripping (0.5 fractional intensity). As fMRI data is acquired with physical, biological constraints, preprocessing allows to improve the signal-to-noise ratio. Specifically, Multi-echo independent components analysis (ME-ICA; (Kundu et al., 2013)) helped denoise data. Images were spatially normalized to the standard space of the Montreal Neurological Institute (MNI template), yielding volumetric time-series resampled at 2 mm isotropic voxels.

References

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