

Supplemental Materials

Supplementary Experiment

To identify ROIs in the main experiment we used the data from another experiment performed by the same group of subjects. The details of this experiment are given below.

Materials and Methods

Stimuli The stimuli were 5-letter strings varying in sublexical orthographic familiarity, following Vinckier (et al., 2007). Letter strings were created using the SUBTLEX database of Polish word frequencies based on 101 million words from film and television subtitles (Mandera, et. al., 2014). Following Vinckier (et al., 2007) we created five categories of 5-letter strings with increasing similarity to real words; from (1) infrequent letter strings “lxlve”, (2) frequent letter strings “łuvęz”, (3) middle frequency bigrams “arsmm”, (4) rare quadrigrams “drwaw” to (5) pseudowords “wstam”. Seventy-two stimuli of each category were used. The stimuli were either presented in the tactile modality in all five conditions (see above) and in the auditory modality in only two conditions ((1) infrequent letter strings and (5) pseudowords). The stimuli were presented in blocks of four letter strings in each block. As a result, subjects were presented with 18 blocks of each condition in the tactile modality and 6 blocks of each condition in the auditory modality. Half of the blocks always contained one letter string with a two-dot letter (in Polish Braille this includes the letters ą b c e i k) in its 4th or 5th position. First, we exposed the participants to blocks of tactile letter-strings and then to auditory letter-strings.

Experimental Task Participants performed the same discrimination task as in the priming (main) experiment.

Experimental Design All stimuli were presented using Presentation software (<https://www.neurobs.com/>). Tactile stimuli were displayed on the BraillePen 12 Touch (<http://www.harpo.com.pl>) in the behavioral experiment and on an fMRI-compatible Braille Display (Neurodevice, Warsaw, Poland, see: Debowska, Wolak, Soluch, Orzechowski, & Kossut, 2013) during the fMRI experiment. As described in the main text this Braille display operates similarly to commercial Braille devices, has pneumatically driven Braille pins, and can display up to 5 Braille characters that can be read in a manner identical to regular Braille

text, i.e. by swiping ones' finger across them. The Braille display was placed on subjects' thighs (on the reading hand side). Auditory stimuli were recorded by a female and a male speaker using IVONA (<https://www.ivona.com/pl>) text-to-speech online converter and presented on a pair of headphones (in the fMRI: EarPlug, NordicNeuroLab, Bergen, Norway).

We used a block design. The experiment had three runs. In each fMRI run, auditory and tactile stimuli were presented separately in blocks in a pseudorandom order. In each run 38 blocks in total were presented at a rate of one block every 14000 ms. In each block we displayed stimuli for 2000 ms with 1500 ms breaks between stimuli. Breaks between the blocks were either 3000 ms, 4500 ms, or 6000 ms. Each subject was presented with a letter string only once during the whole experiment to control for long-lag repetition effect. In each run, first we presented participants with the 30 tactile blocks (6 blocks of 5-letter strings from of the 5 conditions *see Stimuli*) and 2 tactile blocks of nonsense Braille (a string constructed of 5 six-dot Braille signs). Then we presented participants with 4 auditory blocks [2 blocks of 5-letter strings of (1) infrequent letter strings and 2 blocks of 5-letter strings of (5) pseudowords *see Stimuli*]. Before each task subjects were cued with an auditory instruction.

MRI acquisition All MRI data were acquired at Małopolskie Centrum Biotechnologii in Kraków. Functional MR scans were collected using an EPI sequence on a 3 Tesla Siemens Skyra scanner. A 20-channel head coil was used (flip angle = 90°; TR = 3000 ms; TE = 27 ms, FOV = 208 mm, 20 x 20 matrix). Forty interleaved axial slices (thickness 2.5 mm; in-plane resolution = 2.3 x 2.3 mm²) were acquired. After 3 experimental runs, 3D T1-weighted MPRAGE images (resolution 1x1x1mm³) were acquired for each subject.

MRI data analysis All fMRI data were analyzed using the SPM12 software package. (<http://www.fil.ion.ucl.ac.uk/spm/software/spm12/>). Using Fourier phase shift interpolation, all the acquired functional volumes were corrected to the first slice for EPI distortion and slice acquisition time; they were subsequently realigned using rigid body transformations to correct for head movements and normalized to the standard adult template (MNI space). Functional data were finally smoothed with a 8 mm (FWHM) Gaussian kernel. The hemodynamic activity for each condition (tactile: *infrequent letter strings, frequent letter strings, middle frequency bigrams, rare quadrigrams, pseudowords, nonsense Braille*; auditory: *infrequent letter strings, pseudowords*) and six estimated movement parameters as regressors were first modeled within a general linear model for each subject. In the second level analysis, we carried out a random-effects ANOVA analysis for the group, we applied an uncorrected voxel

wise threshold of $p < 0.001$.

For the localizer in the main experiment, we compared activation of all tactile 5 letter-strings in the tactile modality (see *Stimuli*) with nonsense Braille by creating All Tactile Strings (all 5 tactile conditions) vs. Nonsense Braille contrast.

Supplementary Tables

Subject	Median xyz	Range x	SD x	Range y	SD y	Range z	SD z
1	-43 -52 -20	[-48 -41]	2,40	[-61 -40]	6,00	[-22 -15]	2,20
2	-52 -49 -23	[-55 -46]	2,60	[-66 -43]	7,90	[-23 -20]	1,20
3	-32 -61 -18	[-53 -32]	7,40	[-66 -48]	5,90	[-23 -13]	2,90
4	-50 -52 -18	[-53 -46]	1,80	[-57 -41]	5,90	[-20 -13]	1,60
5	-33 -59 -20	[-39 -32]	2,00	[-64 -57]	2,30	[-23 -15]	2,60
6	-50 -66 -13	[-60 -43]	4,70	[-68 -64]	1,60	[-15 -13]	1,20
7	-46 -66 -15	[-50 -41]	2,60	[-68 -64]	1,60	[-20 -13]	2,20
8	-34 -64 -23	[-43 -32]	4,40	[-68 -59]	2,80	[-23 -15]	1,90
9	-48 -66 -15	[-53 -43]	2,60	[-68 -48]	6,70	[-20 -13]	3,00
10	-43 -48 -15	[-48 -39]	2,70	[-50 -45]	1,70	[-23 -13]	2,30
11	-57 -52 -18	[-59 -34]	8,90	[-68 -45]	6,60	[-22 -12]	3,60
12	-34 -57 -22	[-38 -32]	2,10	[-68 -49]	5,30	[-22 -20]	0,70
13	-34 -47 -15	[-38 -32]	2,60	[-68 -40]	9,70	[-22 -12]	3,20

Table 2. Location of the individually defined vOT ROI. Xyz coordinates are given in the MNI space.

Subject	Median xyz	Range x	SD x	Range y	SD y	Range z	SD z
1	-59 -41 5	[-62 -57]	1,80	[-43 -32]	3,60	[3 13]	4,30
2	-67 -33 5	[-71 -62]	2,90	[-36 -32]	1,70	[3 10]	2,60
3	-70 -37 13	[-78 -57]	8,00	[-43 -32]	4,50	[3 13]	4,00
4	-61 -36 10	[-67 -57]	3,50	[-43 -32]	3,90	[5 13]	2,50
5	-72 -36 13	[-78 -57]	6,70	[-40 -32]	3,10	[8 13]	1,60
6	-60 -41 5	[-62 -57]	1,90	[-43 -36]	2,20	[3 10]	2,30
7	-62 -36 5	[-64 -57]	1,80	[-43 -32]	3,60	[3 10]	2,30
8	-60 -41 5	[-64 -57]	2,20	[-43 -32]	3,30	[3 10]	2,10
9	-67 -38 8	[-69 -62]	1,90	[-43 -32]	2,90	[3 13]	2,80
10	-63 -34 5	[-67 -57]	3,00	[-43 -32]	3,90	[3 13]	2,90
11	-67 -36 5	[-69 -64]	1,80	[-41 -32]	2,70	[3 10]	2,20
12	-60 -42 5	[-67 -57]	2,80	[-43 -36]	2,20	[3 10]	2,30
13	-60 -36 5	[-62 -57]	2,90	[-41 -32]	2,50	[3 8]	2,10

Table 3. Location of the individually defined STS ROI. Xyz coordinates are given in the MNI space.