

Cell Reports, Volume 24

Supplemental Information

Successful Reorganization of Category-Selective

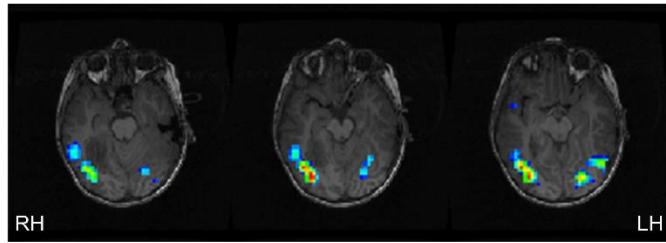
Visual Cortex following Occipito-temporal

Lobectomy in Childhood

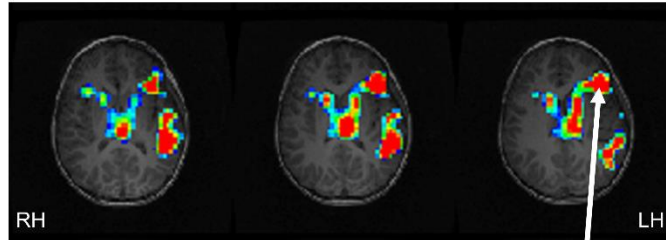
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A.

1. Visual task:
(spinning circle - crosshair)



2. Verb generation task:
(nouns – random noise)



B.

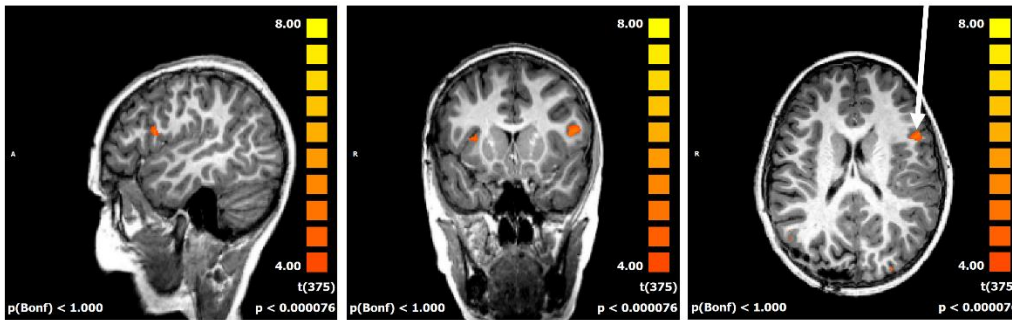


Figure S1. Pre- and post-surgical language mapping results. Related to Figure 1.
(A) Tasks and results from the pre-surgical clinical/functional localizer: (1) visual task and (2) language/verb generation task.
(B) Results from the post-surgical language localizer (Fedorenko et al., 2010).

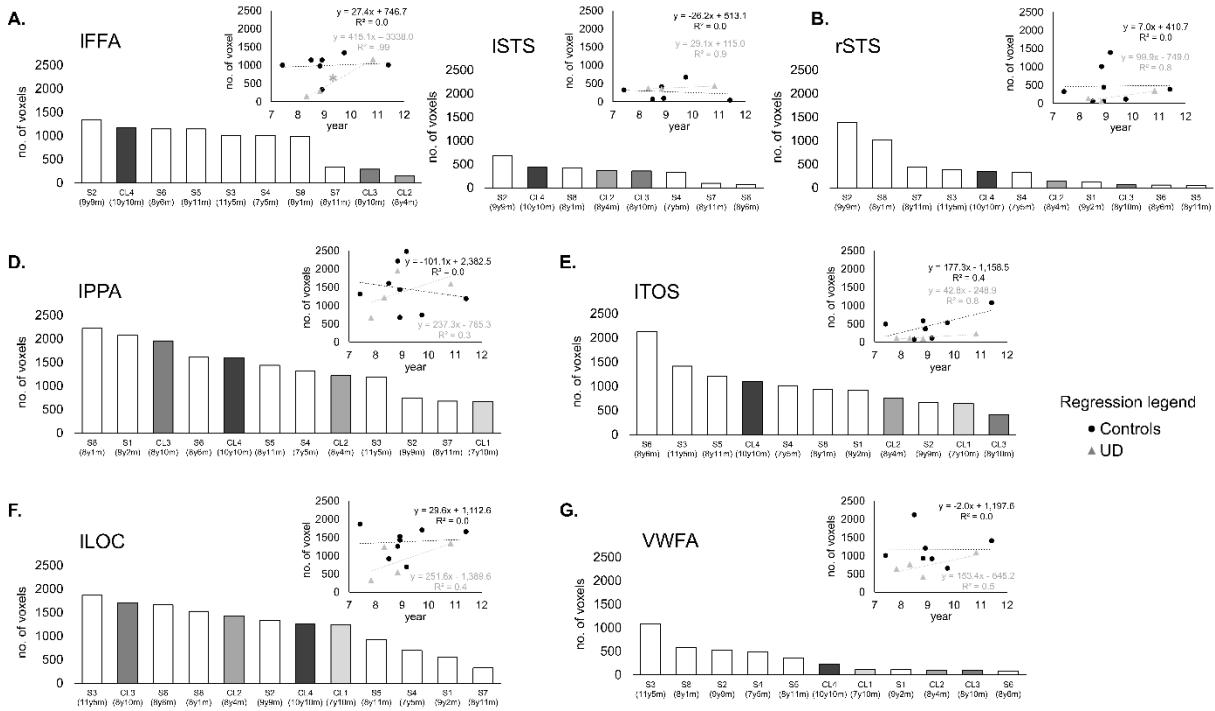


Figure S2. Extent of activation in controls and UD in A) IFFA, B) ISTS, C) rSTS, D) IPPA, E) ITOS, F) ILOC, and G) VWFA. Related to Figures 2 and 3.

Bar chart (main figure): Number of voxels in individual controls (white) and UD (different shades of grey for different sessions). Each white bar reflects data from a single control participant. The X-axis is ranked in descending order of age to indicate where UD falls in the control distribution. Scatter plot (secondary figure, top right corner): Linear regression showing the relationship between age (X-axis) and the extent of activation (Y-axis: number of voxels) in the controls (black dots, regression lines, equations and R-squared values) and in UD (grey triangles, regression lines, equations and R-squared values). An asterisk (dark grey) is above the slope when there is a significant linear relationship (IFFA).

The number of regions defined in controls¹: IFFA (n=7), ISTS (n=5), rSTS (n=8), IPPA (n=8), ITOS (n=7), ILOC (n=8), and VWFA (n=7).

¹ Note that here the regions were defined using all available runs, whereas the ROIs used to quantify the magnitude of selectivity were defined from the first run in each subject.

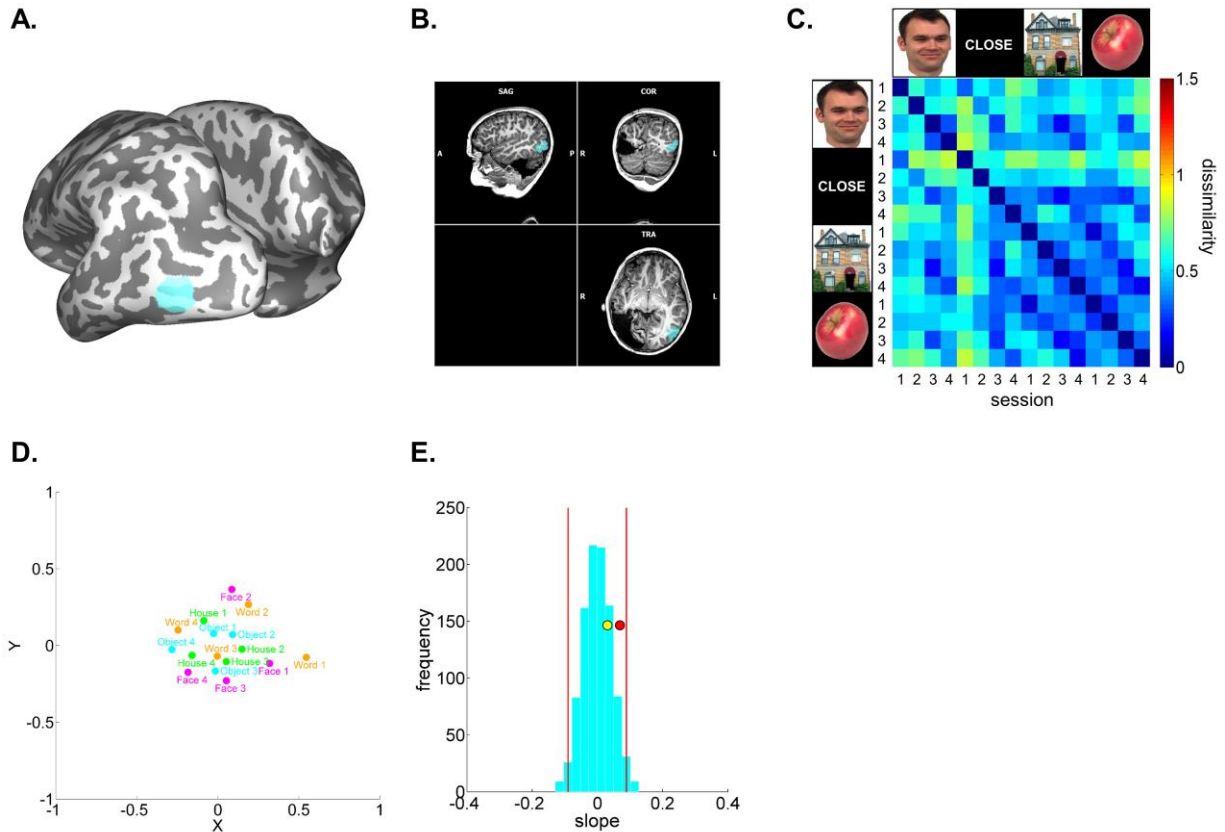


Figure S3. Results from the control anatomical ROI (LO2) analysis. Related to Figure 4.
 (A) LO2 (cyan) in the surface space (based on LO2 in Wang et al. 2015).
 (B) LO2 (cyan) in the corresponding volume space.
 (C) Representational dissimilarity of category representations across sessions in the LO2 region.
 (D) MDS plot of category representations across sessions in the LO2 region. Orange: words, Pink: faces, Green: houses, Blue: objects.
 (E) A distribution of bootstrapped dissimilarity slopes (cyan histogram), face and word dissimilarity slope (red dot), and house and object dissimilarity slope (yellow dot) as a function of session. Red vertical lines represent 95% CI.

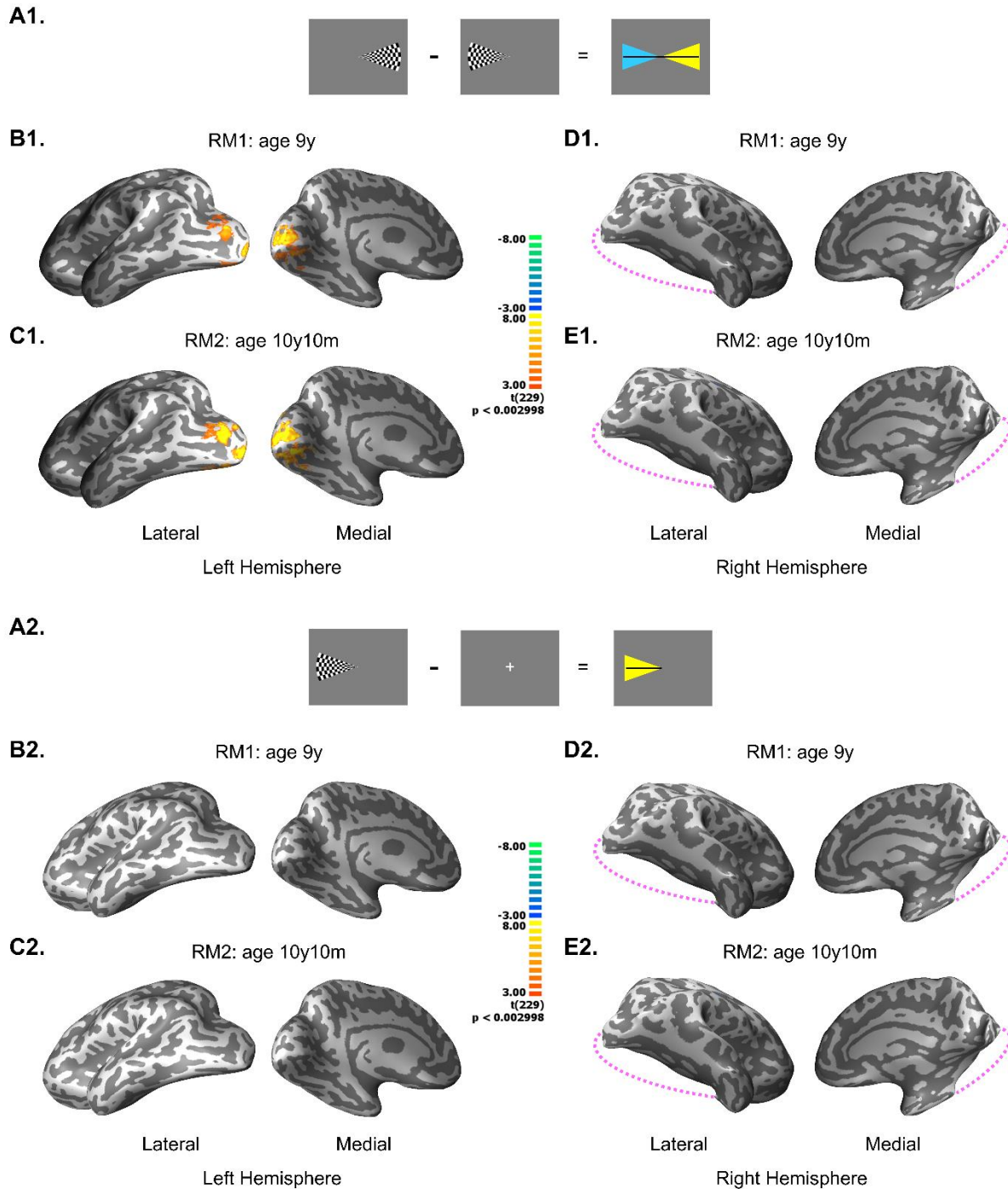


Figure S4. Early visual cortex activation under the RVF-LVF contrast (A1-E1) and the LVF-fixation contrast (A2-E2) in the left and right hemispheres of UD in RM1 (age 9y) and RM2 (age 10y10m). Related to Figure 5.

(A1) Stimuli and contrasts used in the retinotopic mapping experiment. This image shows a contrast between RVF and LVF (RVF-LVF).

(B2) Retinotopic response in the LH in RM1 (age 9y).

(C2) Retinotopic response in the LH in RM2 (age 10y10m).

(D2) Retinotopic response in the RH in RM1 (age 9y).

(E2) Retinotopic response in the RH in RM2 (age 10y10m).

Stronger responses to stimulation in the RVF are shown in yellow and orange, stronger responses to stimulation in the LVF are shown in blue and green. Color scale bars represent t scores. Note that no activation was found in the RH as reflected by a lack of retinotopic response under the RVF-LVF contrast.

(A2) Stimuli and contrasts used in the retinotopic mapping experiment. This image shows a contrast between LVF and fixation (LVF-fixation).

(B2) Retinotopic response in the LH in RM1 (age 9y).

(C2) Retinotopic response in the LH in RM2 (age 10y10m).

(D2) Retinotopic response in the RH in RM1 (age 9y).

(E2) Retinotopic response in the RH in RM2 (age 10y10m).

Stronger responses to stimulation in the LVF are shown in yellow and orange, stronger responses to stimulation in the fixation are shown in blue and green. Color scale bars represent t scores. Note that no activation was found in either hemisphere reflecting a lack of retinotopic response under the LVF-fixation contrast.

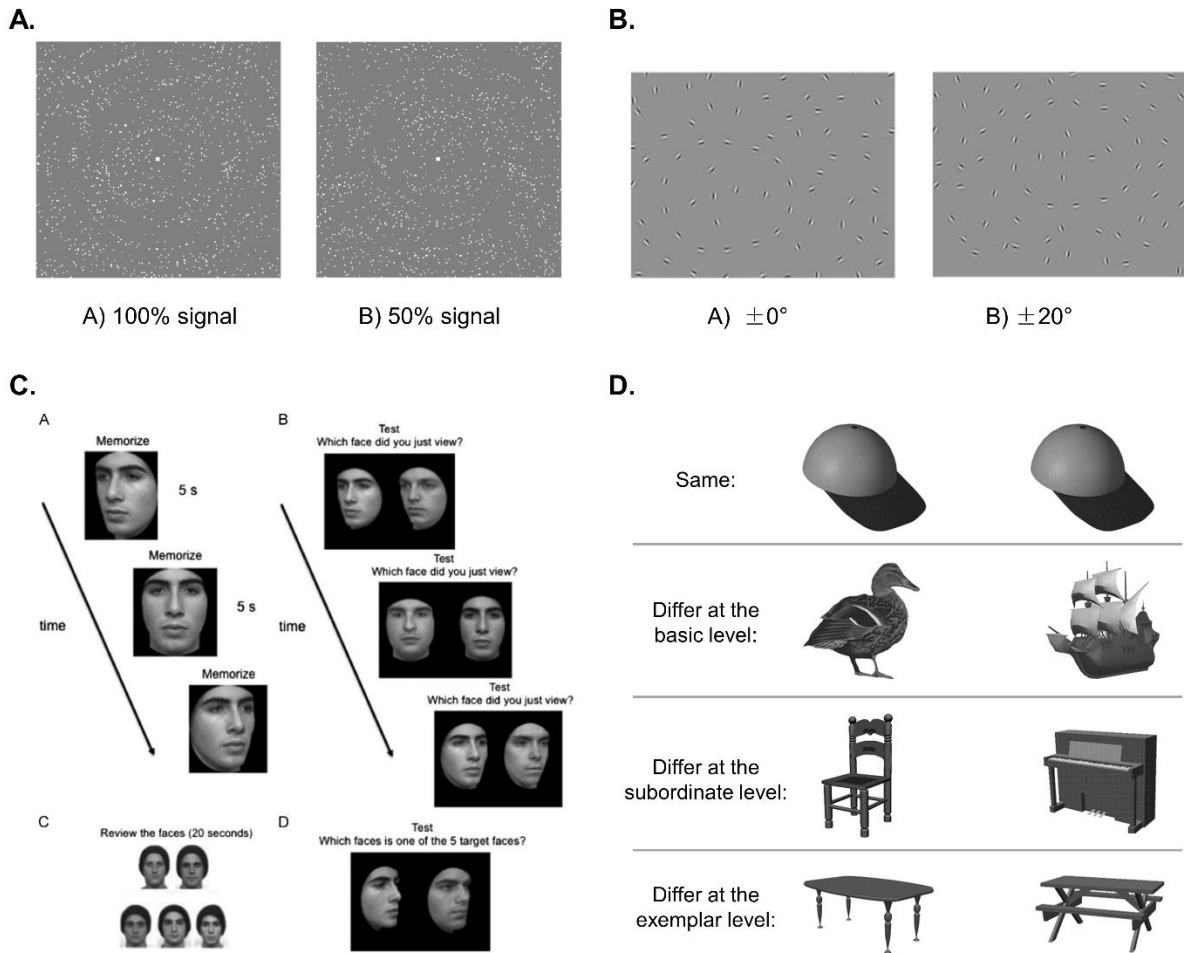


Figure S5. Examples of stimuli in the behavioral experiments. Related to Figure 1.

(A) Glass pattern (Lewis et al., 2002). Participants viewed two sequentially displayed patterns and pressed a button to indicate which display had more concentric swirl.

(B) Contour integration (Hadad et al., 2010). Participants viewed a brief presentation and indicated the leftward or rightward pointing of the embedded “egg-like” shape.

(C) CFMT-C (Croydon et al., 2014). Participants were instructed to remember a set of target faces and identify them amongst distractor faces.

(D) Object Matching Experiment (Gauthier et al., 1999). Participants made same/different discrimination on pairs of objects.

Table S1. Behavioral results of visual perceptual performance in UD and age-matched controls. Related to Figure 1.

		Participant	Age	Version	Threshold	
Intermediate-level vision	Contour integration ¹	Patient	9y	±0 collinearity	57.51	
			9y	±20 collinearity	76.97	
		Control ¹	10y10m	±0 collinearity	51.96	
			10y10m	±20 collinearity	76.88	
	Glass pattern ¹	Patient	7-11y (n=14)	±0 collinearity	60.12 (9.09)	
			7-11y (n=14)	±20 collinearity	74.95 (4.69)	
		Participant	Age	Threshold (1st time)	Threshold (2nd time)	Average Threshold
High-level vision	CFMT-C ²	Patient	9y	33.33	34.17	33.75 (0.59)
			10y10m	25.83	27.5	26.67 (1.18)
		Control ¹	7-11y (n=14)	49.52 (8.58)	41.31 (7.13)	45.42 (6.53)
					Participant	Age
	High-level vision	Object Matching ¹	Patient	9y	upright	76.67
				9y	inverted	58.33
Control ²			10y10m	upright	83.33	
			10y10m	inverted	68.33	
CFMT-C ²		Patient	9y (n=33)	upright	81.6 (9.0)	
			9y (n=33)	inverted	67.9 (6.1)	
		Control ²	11y (n=29)	upright	83.2 (9.2)	
			11y (n=29)	inverted	74.2 (9.1)	
		Participant	Age	Accuracy (% correct)	RT (ms)	Inverse efficiency
Object Matching ¹	Patient	9y	89	993.99	1116.84	
		10y10m	91	1366.96	1502.15	
	Control ¹	7-11y (n=14)	88.57 (5.9)	1218.29 (338.17)	1366.42 (320.95)	

¹ Each age-matched control participated in all of the three following tests: Object Matching, Contour Integration, and Glass Pattern.

² CFMT-C control scores per age group were based on those from the typical developing children reported in (Croydon et al., 2014).

Table S2. Summary of UD's scholastic performance and neuropsychological evaluation test performance before and after the surgery. Related to Figure 1.

Scholastic performance							
Woodcock-Johnson – III Test of Achievement (Pre-surgery)				Pennsylvania Systems of School Assessment (Post-surgery)			
Subject	Reading	Letter-Word	Passage	Calculation	Subject	English Language Arts	Mathematics
Percentile	63rd	67th	56th	91st	Standard score ¹	1028/1586	1094/1594
					Evaluation	Proficient	Proficient
General Intellectual Function Wechsler Abbreviated Scales of Intelligence (WASI-2)							
	Pre-surgery			Post-surgery			
Indices	Full Scale	Verbal	Performance	Full Scale	Verbal	Performance	
Standard score ¹	116	135	97	118	123	108	
Descriptive	High average	Very superior	Average	Superior	Superior	Average	
Language							
	WASI-2 (Pre-surgery)			NEPSY-II (Post-surgery)			
Subtest	Vocabulary			Subtest	Comprehension	Semantic	Phonemic
Scaled score ²	15			Scaled score ²	11	17	17
Descriptive	High average			Percentile	63rd	99th	99th
Fine Motor/ Visual-Motor Integration Grooved Pegboard							
	Pre-surgery			Post-surgery			
Hand	Dominant Hand (RH)		Nondominant Hand (LH)	Dominant Hand (RH)		Nondominant hand (LH)	
Time	97"		51"	38"		50"	
Percentile	7th		53rd	50th		26th	
Executive Control Processes Wechsler Intelligence Scale for Children (WISC-V)							
	Pre-surgery			Post-surgery			
Indices	Working Memory		Processing Speed	Working Memory		Processing Speed	
Standard score ¹	80		106	94		95	
Percentile	9th		66th	34th		37th	
Descriptive	Weak		Average	Average		Average	
¹ Standard score: Mean =100, Standard Deviation = 15 ² Scaled score: Mean = 10, Standard Deviation = 3							