Supplementary Table 1. Comparisons of amplitudes and latencies among groups based on ERPs.

Amplitude / Latency		VD children vs. TD children			TD children vs. Healthy adults		
		P1	N170	P2	P1	N170	P2
Character	Significance	*/_	_/_	_/_	**/***	***/***	***/**
	Peak ROI	O1	O2	O2			
	Peak time	105 ms	210 ms	350 ms			
Face	Significance	*/_	_/_	_/_	***/***	***/**	***/_
	Peak ROI	O1	O2	O2			
	Peak time	105 ms	200 ms	360 ms			
Object	Significance	*/_	*/_	_/*	***/***	***/***	***/***
	Peak ROI	O1	O2	O2			
	Peak time	115 ms	205 ms	370 ms			

Footnotes: The asterisk (*) and hash (#) both indicate significant differences between two groups; the lack of a significant difference is represented as an underscore (_). The t-test results of the amplitude and latency of three ERP components are shown according to components and conditions. For the ERP amplitude, asterisks indicate differences of VD < TD and TD > healthy adults, while hashes show differences of TD < healthy adults. For the ERP latency, all asterisks indicate differences of VD > TD and TD > healthy adults.

ERP, event-related potential; VD, visually deprived; TD, typically developing.

*$P<0.05$; **$P<0.01$; ***$P<0.001$.

#$P<0.05$; ##$P<0.01$; ###$P<0.001$.

Supplementary Table 2. The highest task-activated regions for three groups.

	Character	Human face	Object
VD	**[Ventral]**	**[Ventral]**	**[Ventral]**
	Fusiform_L	Lingual_R	Lingual_L
	Fusiform_R	Fusiform_L	Lingual_R
	[Dorsal]	Fusiform_R	Fusiform_L
	Temporal_Mid_L	Temporal_Inf_L	Fusiform_R
	[Beyond]	Temporal_Inf_R	Temporal_Inf_L
	Temporal_Pole_Sup_L	ParaHippocampal_L	Temporal_Inf_R
	Frontal_Sup_Orb_L	**[Dorsal]**	ParaHippocampal_L
	Frontal_Mid_Orb_L	Temporal_Mid_L	**[Dorsal]**
	Frontal_Inf_Orb_L	**[Beyond]**	Temporal_Mid_L
	Frontal_Inf_Orb_R	Frontal_Inf_Orb_L	**[Beyond]**
		Temporal_Pole_Sup_L	Temporal_Pole_Sup_L
TD	**[Visual cortex]**	**[Visual cortex]**	**[Visual cortex]**
	Calcarine_L	Calcarine_L	Calcarine_L
	[Ventral]	**[Ventral]**	Occipital_Mid_L
	Lingual_L	Lingual_L	**[Ventral]**
	Lingual_R	Lingual_R	Lingual_L
	Fusiform_L	Fusiform_L	Lingual_R
	Fusiform_R	Fusiform_R	Fusiform_L
	Temporal_Inf_L	Temporal_Inf_L	Fusiform_R
	Temporal_Inf_R	Temporal_Inf_R	Temporal_Inf_L
	[Dorsal]	**[Dorsal]**	Temporal_Inf_R
	Temporal_Mid_L	Temporal_Mid_L	**[Dorsal]**
		[Beyond]	Temporal_Mid_L
		Frontal_Mid_R	
Healthy adults	**[Ventral]**	**[Ventral]**	**[Ventral]**
	Lingual_L	Lingual_L	Lingual_L

Lingual_R	Lingual_R	Lingual_R
Fusiform_L	Fusiform_L	Fusiform_L
Fusiform_R	Fusiform_R	Fusiform_R
Temporal_Inf_L	Temporal_Inf_L	Temporal_Inf_L
Temporal_Inf_R	Temporal_Inf_R	Temporal_Inf_R
ParaHippocampal_R	ParaHippocampal_L	ParaHippocampal_R
[Dorsal]	ParaHippocampal_R	**[Dorsal]**
Precuneus_L	**[Dorsal]**	Precuneus_L
Temporal_Mid_R	Temporal_Mid_R	Temporal_Mid_R

Footnotes: The activated AAL regions are classified according to the visual processing networks.

VD, visually deprived; TD, typically developing; AAL, automated anatomical labeling.

Supplementary Table 3. Between-group comparisons of pre-stimulus alpha PSD at the source level

| Subnetwork	Conditions	Frequency	TD_mean	VD_mean	p-value
Beyond Network Areas-Left	Character	8 ± 1 Hz	4.898	10.008	0.035
Beyond Network Areas-Left	Character	10 ± 1 Hz	3.658	6.843	0.037
Beyond Network Areas-Left	Character	12 ± 1 Hz	2.961	5.486	0.034
Beyond Network Areas-Left	Human face	8 ± 1 Hz	4.775	8.607	0.025
Beyond Network Areas-Left	Human face	10 ± 1 Hz	3.685	6.379	0.032
Beyond Network Areas-Left	Human face	12 ± 1 Hz	3.130	5.233	0.050
Beyond Network Areas-Right	Character	8 ± 1 Hz	5.335	14.197	0.030
Beyond Network Areas-Right	Human face	8 ± 1 Hz	4.662	9.487	0.021
Beyond Network Areas-Right	Human face	10 ± 1 Hz	3.683	6.468	0.045
Beyond Network Areas-Right	Object	8 ± 1 Hz	4.163	9.233	0.020
Beyond Network Areas-Right	Object	10 ± 1 Hz	3.306	7.423	0.016
Beyond Network Areas-Right	Object	12 ± 1 Hz	2.977	5.534	0.037

PSD, power spectrum density; AAL, automated anatomical labeling; VD, visually deprived; TD,

typically developing.

Supplementary Table 4. Between-group comparisons of post-stimulus alpha PSD at the source level

| Subnetwork	Conditions	Frequency	TD_mean	VD_mean	p-value
Beyond Network Areas-Left	Human face	12±1 Hz	3.814	8.622	0.032
Beyond Network Areas-Right	Object	12±1 Hz	3.397	6.417	0.047
Visual Cortex-Left	Object	10±1 Hz	7.760	4.617	0.046
Visual Cortex-Right	Object	8±1 Hz	6.852	4.405	0.044
Visual Cortex-Right	Object	10±1 Hz	5.498	3.114	0.017
Visual Cortex-Right	Object	12±1 Hz	3.080	2.002	0.022

Footnotes：The activated AAL regions are classified according to conditions.

PSD, power spectrum density; AAL, automated anatomical labeling; VD, visually deprived; TD,

typically developing.
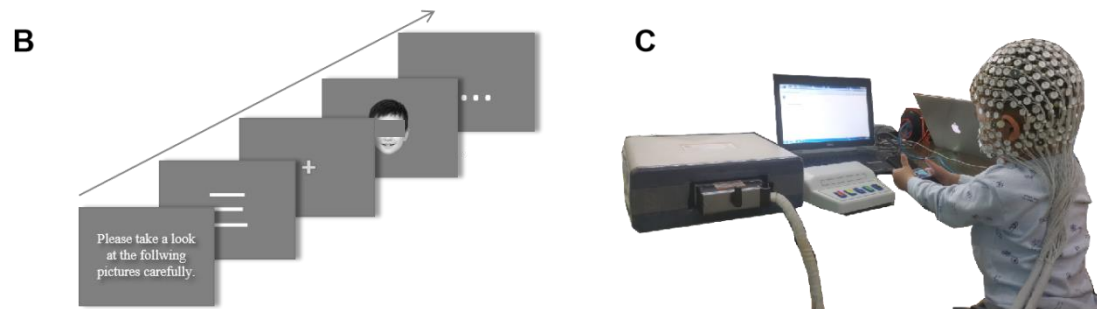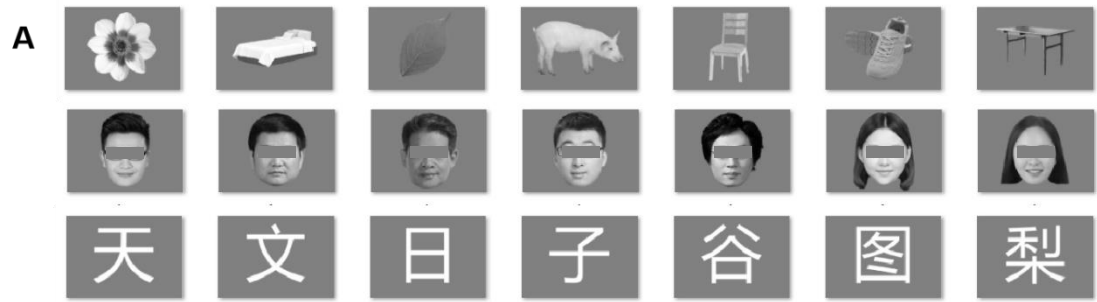
Supplementary Figure 1. Stimuli examples and test procedure.

(A) The stimuli included 90 grayscale pictures of three conditions: (1) objects, (2) human faces, and (3) Chinese characters. The stimuli were framed within an area of 420×300 pixels (14.8 cm×10.6 cm) on a 1920×1080-pixel background of screen size, with gray as the background color. (B) Picture stimuli were randomly presented on the screen for 500 ms. Among each stimulus, there was an interval of 400-600 ms randomly. (C) The children were instructed to stare at the fixation point on the screen.
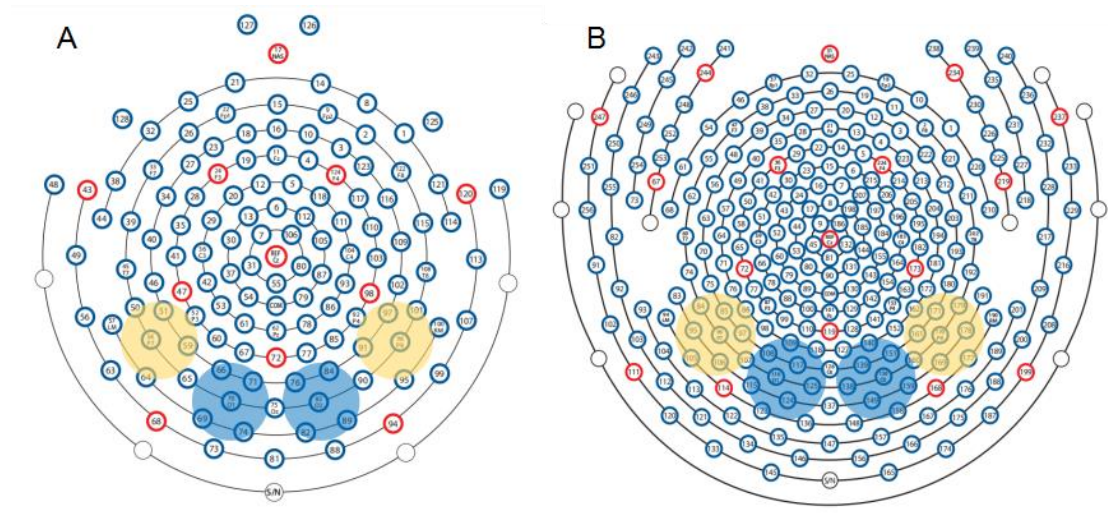
Supplementary Figure 2. Electrode points and corresponding brain regions.

(A) A 128-channel Geodesic Sensor Net. (B) A 256-channel Geodesic Sensor Net. The yellow and blue regions represent four ROIs. The left and right blue regions represent O1 and O2, respectively; the left and right yellow regions represent P7 and P8, respectively.

ROI, region of interest.
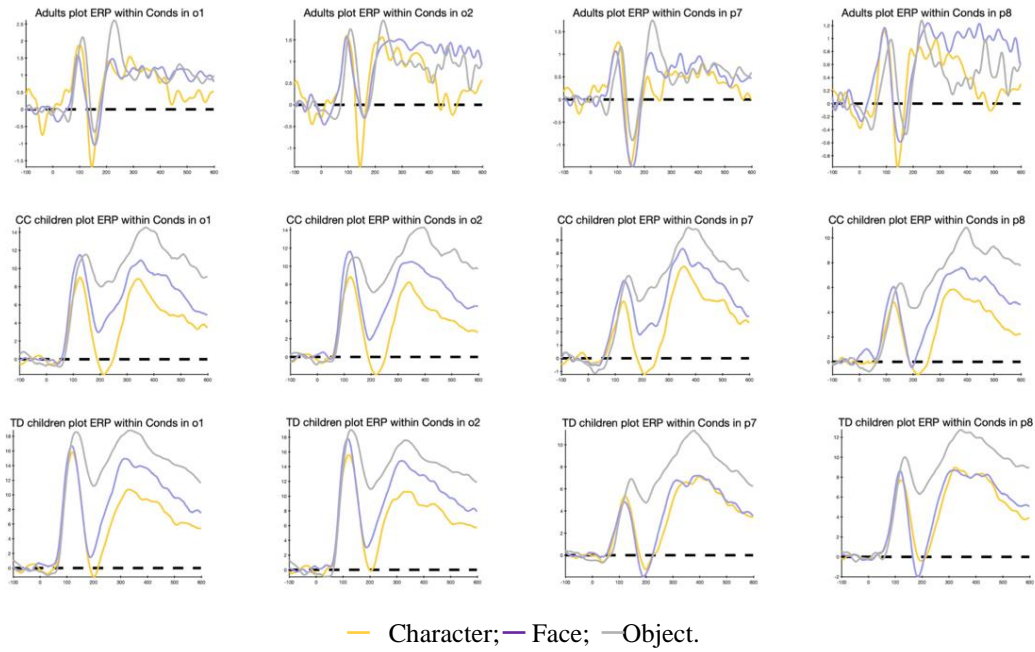
Supplementary Figure 3. Full view of the averaged waveforms for three groups.