

Supplementary Materials

Table S1. LMEM summary tables for two models described in the Behavioral Data section of Results, for SPIN score and Intelligibility Rating. The respective models are given by:

SPIN score ~ 1 + noise cond. +(1|subject)

Intelligibility Rating ~ 1 + noise cond. +age + (1 + noise cond. |subject)

	SPIN score				Intelligibility Rating			
<i>Fixed Effects</i>	<i>Estimates</i>	<i>SE</i>	<i>t value</i>	<i>p value</i>	<i>Estimates</i>	<i>SE</i>	<i>t value</i>	<i>p value</i>
Intercept [Younger, Quiet]	93.59	1.92	48.6	<0.001	8.72	0.27	32.2	<0.001
noise cond. [0 dB]	-12.88	1.57	-8.2	<0.001	-2.60	0.27	-9.5	<0.001
noise cond. [-6 dB]	-53.83	1.57	-34.3	<0.001	-4.10	0.34	-12.0	<0.001
noise cond. [Bab]	-67.35	1.92	-35.1	<0.001	-4.63	0.43	-10.9	<0.001
age [Older]					0.76	0.36	2.1	0.035
<i>Random Effects</i>	<i>Variance</i>	<i>SD</i>			<i>Variance</i>	<i>SD</i>		
Intercept subject	76.6	8.76			0.88	0.94		
noise cond. [0 dB] subject					1.29	1.14		
noise cond. [-6 dB] subject					2.72	1.65		
noise cond. [Bab] subject					4.32	2.08		
Number of obs.: 217, Subjects: 31					Number of obs.: 238, Subjects: 34			

Table S2. LMEM summary table for SPIN score vs Intelligibility score in the Behavioral Data section of Results. The model is given by: SPIN score ~ Intelligibility rating + (1|subject)

SPIN score				
<i>Fixed Effects</i>	<i>Estimates</i>	<i>SE</i>	<i>t value</i>	<i>p value</i>
(Intercept)	12.08	4.22	2.9	0.005
Intelligibility rating	8.2	0.58	14.2	<0.001
Random Effects			Variance	SD
Intercept subject	71.98		8.49	
Number of obs.: 217, Subjects: 31				

Table S3. LMEM summary table for attended speech envelope reconstruction accuracies described in Stimulus Reconstruction Analysis section of Results. The model is given by:
Rec. accuracy ~ *age* × *noise cond.* + (*noise cond.* | *subject*)

Reconstruction accuracy				
<i>Fixed Effects</i>	<i>Estimates</i>	<i>SE</i>	<i>t value</i>	<i>p value</i>
Intercept [Younger, Quiet]	0.30	0.01	47.9	<0.001
age [Older]	0.05	0.01	5.4	<0.001
noise cond. [0 dB]	-0.02	0.01	-3.2	0.002
noise cond. [-6 dB]	-0.01	0.01	-2.7	0.007
noise cond. [Bab]	-0.04	0.01	-6.9	<0.001
age [Older] × noise cond. [0 dB]	-0.02	0.01	-2.4	0.018
age [Older] × noise cond. [-6 dB]	-0.02	0.01	-2.1	0.038
age [Older] × noise cond. [Bab]	-0.02	0.01	-2.5	0.014
Random Effects	Variance	SD		
Intercept subject	0.001	0.02		
Number of obs.: 782, Subjects: 34				

Table S4. LMEM summary table for attended vs unattended speech envelope reconstruction accuracies described in Stimulus Reconstruction Analysis section of Results. The model is given by: *Rec. accuracy* ~ *age* + *attention* + (1 + *attention* | *subject*)

Reconstruction accuracy				
<i>Fixed Effects</i>	<i>Estimates</i>	<i>SE</i>	<i>t value</i>	<i>p value</i>
Intercept [Attended, Younger]	0.29	0.01	49.9	<0.001
attention [Unattended]	-0.03	0.00	-6.9	<0.001
age [Older]	0.03	0.01	4.1	<0.001
Random Effects	Variance	SD		
Intercept subject	0.0007	0.03		
attention subject	0.0003	0.02		
Number of obs.: 816, Subjects: 34				

Table S5. LMEM summary tables for three models described in Temporal Response Function Peak Amplitudes section of Results, for $M50_{TRF}$, $M100_{TRF}$, and $M200_{TRF}$ attended TRF peak amplitudes. The respective models are given by:

$$M50_{TRF} \sim age \times noise\ cond. + (1|subject)$$

$$M100_{TRF} \sim age \times noise\ cond. + (1|subject)$$

$$M200_{TRF} \sim age \times noise\ cond. + (1|subject)$$

	M50 _{TRF} amplitude				M100 _{TRF} amplitude				M200 _{TRF} amplitude			
<i>Fixed Effects</i>	<i>Est.</i>	<i>SE</i>	<i>t value</i>	<i>p value</i>	<i>Est.</i>	<i>SE</i>	<i>t value</i>	<i>p value</i>	<i>Est.</i>	<i>SE</i>	<i>t value</i>	<i>p value</i>
Intercept [Younger, Quiet]	0.02	0.003	5.6	<0.001	0.02	0.004	5.2	<0.001	0.01	0.003	2.3	0.021
age [Older]	0.02	0.01	3.5	<0.001	0.01	0.01	0.9	0.369	0.03	0.004	6.8	<0.001
noise cond.[0 dB]	-0.01	0.003	-1.6	0.101	-0.00	0.003	-0.6	0.567	-0.00	0.003	-0.1	0.931
noise cond.[-6 dB]	-0.01	0.003	-2.1	0.038	-0.00	0.003	-0.3	0.745	-0.00	0.003	-0.5	0.612
noise cond.[Bab]	-0.02	0.003	-5.2	<0.001	-0.01	0.003	-2.6	0.008	-0.00	0.003	-1.1	0.289
age [Older] × noise cond.[0 dB]	-0.01	0.005	-2.1	0.034	0.01	0.005	2.9	0.004	-0.02	0.004	-4.8	<0.001
age [Older] × noise cond.[-6 dB]	-0.01	0.005	-2.9	0.004	0.01	0.005	2.6	0.009	-0.02	0.004	-4.9	<0.001
age [Older] × noise cond.[Bab]	-0.01	0.005	-2.2	0.029	0.01	0.005	2.1	0.036	-0.03	0.004	-5.8	<0.001
Random Effects	Variance	SD			Variance	SD			Variance	SD		
Intercept subject	0.0001	0.01			0.0002	0.01			0.0001	0.01		
Number of obs.: 136, Subjects: 34				Number of obs.: 136, Subjects: 34				Number of obs.: 136, Subjects: 34				

Table S6. LMEM summary tables for three models described in Temporal Response Function Peak Amplitudes section of Results, for $M50_{TRF}$, $M100_{TRF}$, and $M200_{TRF}$ attended vs unattended TRF peak amplitudes. The respective models are given by:

$$M50_{TRF} \sim \text{attention} + (1|\text{subject})$$

$$M100_{TRF} \sim \text{age} \times \text{attention} + (1|\text{subject})$$

$$M200_{TRF} \sim \text{age} \times \text{noise cond.} + (1|\text{subject})$$

	M50 _{TRF} amplitude				M100 _{TRF} amplitude				M200 _{TRF} amplitude			
<i>Fixed Effects</i>	<i>Est.</i>	<i>SE</i>	<i>t value</i>	<i>p value</i>	<i>Est.</i>	<i>SE</i>	<i>t value</i>	<i>p value</i>	<i>Est.</i>	<i>SE</i>	<i>t value</i>	<i>p value</i>
Intercept [Attended, Younger, 0 dB]	0.02	0.000	7.6	<0.001	0.02	0.000	6.1	<0.001	0.01	0.000	4.8	<0.001
attention [Unattended]	0.01	0.00	5.8	<0.001	-0.01	0.00	-5.9	<0.001	-0.01	0.00	-4.7	<0.001
age [Older]					0.02	0.00	3.8	<0.001	0.01	0.00	3.7	<0.001
attention [Unattended] × age [Older]					-0.01	0.00	-4.1	<0.001				
noise cond.[-6 dB]									-0.00	0.00	-1.0	0.310
attention [Unattended] × noise cond.[-6 dB]									0.00	0.00	1.2	0.237
Random Effects	Variance		SD		Variance		SD		Variance		SD	
Intercept subject	0.0001		0.01		0.0001		0.01		0.0001		0.00	
Number of obs.: 136, Subjects: 34 Number of obs.: 136, Subjects: 34 Number of obs.: 136, Subjects: 34												

Table S7. LMEM summary tables for three models described in Temporal Response Function Peak Latencies section of Results, for $M50_{TRF}$, $M100_{TRF}$, and $M200_{TRF}$ attended TRF peak latencies. The respective models are given by:

$$M50_{TRF} \sim age \times noise\ cond. + (1|subject)$$

$$M100_{TRF} \sim age \times noise\ cond. + (1|subject)$$

$$M200_{TRF} \sim age \times noise\ cond. + (1|subject)$$

	M50 _{TRF} Latency				M100 _{TRF} Latency				M200 _{TRF} Latency			
<i>Fixed Effects</i>	<i>Est.</i>	<i>SE</i>	<i>t value</i>	<i>p value</i>	<i>Est.</i>	<i>SE</i>	<i>t value</i>	<i>p value</i>	<i>Est.</i>	<i>SE</i>	<i>t value</i>	<i>p value</i>
Intercept [Younger, Quiet]	42.44	2.85	14.9	<0.001	120.57	3.32	36.3	<0.001	178.70	5.20	34.4	<0.001
age [Older]	-2.27	4.11	-0.6	0.581	-9.44	4.84	-1.9	0.051	11.05	7.22	1.5	0.126
noise cond.[0 dB]	18.48	3.02	6.1	<0.001	14.59	2.75	5.3	<0.001	21.80	4.64	4.7	<0.001
noise cond.[-6 dB]	13.07	2.99	4.4	<0.001	17.65	2.75	6.4	<0.001	29.97	4.91	6.1	<0.001
noise cond.[Bab]	25.63	3.12	8.2	<0.001	16.99	2.73	6.2	<0.001	30.82	5.12	6.0	<0.001
noise cond.[0 dB] × age [Older]	-7.66	4.32	-1.8	0.076	8.05	3.98	2.0	0.043	17.08	6.68	2.6	0.011
noise cond.[-6 dB] × age [Older]	-0.49	4.30	-0.1	0.909	11.23	3.97	2.8	0.004	11.16	6.97	1.6	0.109
noise cond.[Bab] × age [Older]	-16.39	4.54	-3.6	<0.001	8.64	3.95	2.2	0.023	-6.92	7.11	-0.9	0.330
Random Effects	Variance		SD		Variance		SD		Variance		SD	
Intercept subject	60.9		7.8		128.2		11.32		270.8.		16.46	
Number of obs.: 125, Subjects: 34				Number of obs.: 131, Subjects: 34				Number of obs.: 109, Subjects: 32				

Table S8. LMEM summary tables for three models described in Temporal Response Function Peak Latencies section of Results, for $M50_{TRF}$, $M100_{TRF}$, and $M200_{TRF}$ attended vs unattended TRF peak latencies. The respective models are given by:

$$M50_{TRF} \sim age \times attention \times noise\ cond. + (1 + attention | Subject)$$

$$M100_{TRF} \sim age \times attention + noise\ cond. + (1 + attention + noise\ level | subject)$$

$$M200_{TRF} \sim age \times attention + attention \times noise\ cond. + (1 + attention | subject)$$

	M50 _{TRF} Latency				M100 _{TRF} Latency				M200 _{TRF} Latency				
<i>Fixed Effects</i>	<i>Estimates</i>	<i>SE</i>	<i>t value</i>	<i>p value</i>	<i>Estimates</i>	<i>SE</i>	<i>t value</i>	<i>p value</i>	<i>Estimates</i>	<i>SE</i>	<i>t value</i>	<i>p value</i>	
Intercept [Younger, Attended]	60.76	2.79	21.8	<0.001	136.62	2.73	50.1	<0.001	202.15	4.90	41.3	<0.001	
age [Older]	-9.76	4.03	-2.4	0.015	-1.97	3.93	-0.5	0.616	27.84	7.09	3.9	<0.001	
attention [Unattended]	0.50	3.11	0.2	0.873	8.03	3.21	2.5	0.012	-12.02	6.28	-1.9	0.056	
noise cond.[-6 dB]	-5.40	2.17	-2.5	0.013	2.95	1.46	2.0	0.043	7.15	2.38	3.0	0.003	
age [Older] × attention [Unattended]	-2.25	4.48	-0.5	0.616	-12.01	4.56	-2.6	0.008	-28.54	8.26	-3.5	0.001	
attention [Unattended] × noise cond.[-6 dB]	6.80	3.03	2.3	0.025					-12.04	3.96	-3.0	0.002	
age [Older] × noise cond.[-6 dB]	7.15	3.08	2.3	0.020									
age [Older] × attention [Unattended] × noise cond.[-6 dB]	-9.05	4.33	-2.1	0.037									
Random Effects	Variance	SD			Variance	SD			Variance	SD			
Intercept subject	97.58	9.88			101.24	10.06			330.42	18.18			
attention [Unattended] subject	89.56	9.43			117.18	10.82			313.69	17.71			
noise cond.[-6 dB] subject					31.28	5.59							
Number of obs.: 133, Subjects: 34					Number of obs.: 116, Subjects: 34					Number of obs.: 94, Subjects: 32			

Table S9. LM summary table for $M200_{TRF}$ amplitudes vs latency described in Temporal response Function Amplitude vs Latency Analysis section of Results. The model is given by:

$M200_{TRF}amplitude \sim age \times M200_{TRF}latency$

M200_{TRF} amplitude				
<i>Effects</i>	<i>Estimates</i>	<i>SE</i>	<i>t value</i>	<i>p value</i>
Intercept [Younger]	-0.04	0.03	-1.4	0.17
age [Older]	0.08	0.03	2.8	<0.001
latency	0.0002	0.0001	1.7	0.10
age [Older] $\times$ latency	-0.0004	0.0001	-2.4	0.025
Number of obs.: 30, Subjects: 30				

Table S10. GAMM summary table described in Integration Window Analysis section of Results.

Parametric Coefficients	Reconstruction Accuracy			
	<i>Estimates</i>	<i>SE</i>	<i>t value</i>	<i>p value</i>
Intercept [Younger, Quiet]	0.25	0.00	55.42	<0.001
Older $\times$ Quiet	0.04	0.01	6.43	<0.001
Younger $\times$ 0 dB $\times$ Attended	-0.02	0.001	-4.56	<0.001
Older $\times$ 0 dB $\times$ Attended	0.01	0.01	1.45	0.146
Younger $\times$ 0 dB $\times$ Unattended	-0.03	0.001	-8.21	<0.001
Older $\times$ 0 dB $\times$ Unattended	-0.01	0.01	-1.78	0.075
Younger $\times$ -6 dB $\times$ Attended	-0.01	0.001	-3.50	<0.001
Older $\times$ -6 dB $\times$ Attended	0.02	0.01	2.29	0.022
Younger $\times$ -6 dB $\times$ Unattended	-0.03	0.001	-8.19	<0.001
Older $\times$ -6 dB $\times$ Unattended	-0.00	0.01	-0.11	0.914
Smooth Terms	edf		Ref.df	<i>p</i>
s(Wind) :Younger $\times$ Quiet	5.93		370.86	<0.001
s(Wind) :Older $\times$ Quiet	5.94		520.27	<0.001
s(Wind) :Younger $\times$ 0 dB $\times$ Attended	5.80		243.32	<0.001
s(Wind) :Older $\times$ 0 dB $\times$ Attended	5.90		336.61	<0.001
s(Wind) :Younger $\times$ 0 dB $\times$ Unattended	5.89		231.45	<0.001
s(Wind) :Older $\times$ 0 dB $\times$ Unattended	5.94		298.78	<0.001
s(Wind) :Younger $\times$ -6 dB $\times$ Attended	5.82		249.48	<0.001
s(Wind) :Older $\times$ -6 dB $\times$ Attended	5.86		330.57	<0.001
s(Wind) :Younger $\times$ -6 dB $\times$ Unattended	5.91		227.02	<0.001
s(Wind) :Older $\times$ -6 dB $\times$ Unattended	5.94		302.23	<0.001
s (Wind,Subject)	107.49		5.68	<0.001

Number of obs.: 14144, Subjects: 34