

Supplemental Digital Content 1. Linear mixed model* results comparing CNC word scores for the SSD NH alone and NH binaural groups when measured in the sound field. The NH group was the reference. The comparison variable is in brackets. Age is centered on 7.0 years, the mean of the SSD group. Testing was completed at the 24-month post-activation interval.

<i>Predictors</i>	<i>Estimates</i>	<i>Conf. Int.</i>	<i>p</i>
(Intercept)	103.34	98.40 – 108.28	< .001
Age at test	4.44	0.72 – 8.16	.026
Group [SSD]	-15.62	-22.46 – -8.78	< .001
Age * Group [SSD]	-1.84	-7.62 – 3.94	.538
Observations	36		
Pseudo R ²	0.396		

Conf. Int., confidence interval; NH, normal hearing; SSD, single-sided-deafness

*Model equation: lme(RAU ~ Age at test * Group, random = ~1|Subject)

Supplemental Digital Content 2. Results of the linear mixed model investigating change over time in CNC word scores measured with the CI alone*. Interval was log-transformed prior to analysis. Age at activation is centered on 5.0 years. Testing was completed at the 3-, 6-, 9-, 12-, 18-, and 24-month post-activation intervals.

<i>Predictors</i>	<i>Estimates</i>	<i>Conf. Int.</i>	<i>p</i>
(Intercept)	-18.10	-28.50 - -7.69	.001
Age at activation	8.93	-0.76 - 18.62	.090
Interval	25.21	21.49 - 28.93	< .001
Age * Interval	-2.44	-5.91 - 1.03	.170
Observations	108		
Pseudo R ²	0.628		

Conf. Int., confidence interval

*lme(RAU ~ Age at activation * Interval, random = ~1|Subject)

Supplemental Digital Content 3. *Linear mixed model results comparing BKB-SIN SNR-50 scores for the three combinations of group and condition (Group&Cond: SSD CI+NH, SSD NH alone, and NH binaural) for each masker location (MaskerLoc) at the 24-month post-activation interval. The SSD CI+NH and S_0N_0 variables served as references. The comparison variable is in brackets, and age is centered on 7.0 years.

<i>Predictors</i>	<i>Estimates</i>	<i>Conf. Int.</i>	<i>p</i>
(Intercept)	2.79	1.75 – 3.83	< .001
Age at test	-0.85	-1.33 – -0.37	.002
Group&Cond [SSD NH alone]	1.61	0.52 – 2.69	.004
Group&Cond [NH binaural]	-0.14	-1.63 – 1.35	.854
MaskerLoc [$S_0N_{nh/R}$]	-1.25	-2.34 – -0.16	.026
MaskerLoc [$S_0N_{ci/L}$]	-3.22	-4.31 – -2.13	< .001
Group&Cond [SSD NH alone] * Masker location [$S_0N_{nh/R}$]	2.39	0.85 – 3.93	.003
Group&Cond [NH binaural] * MaskerLoc [$S_0N_{nh/R}$]	-4.83	-6.37 – -3.29	< .001
Group&Cond [SSD NH alone] * MaskerLoc [$S_0N_{ci/L}$]	-0.14	-1.68 – 1.40	.860
Group&Cond [NH binaural] * MaskerLoc [$S_0N_{ci/L}$]	-2.78	-4.32 – -1.24	.001
N_{SubjID}	36		
Observations	162		
Pseudo R^2	0.396		

CI, cochlear implant; Conf. Int., confidence interval; NH, normal hearing; SSD, single-sided-deafness; S_0N_0 , speech front masker front; $S_0N_{nh/R}$, speech front masker to the normal hearing or right ear; $S_0N_{ci/L}$, speech front masker to the CI or left ear

* $\text{lme}(\text{SNR-50} \sim \text{Age at test} + \text{Group\&Cond} * \text{MaskerLoc}, \text{random} = \sim 1 | \text{Subject})$

Supplemental Digital Content 4. Results of comparisons of estimated marginal means derived from the linear mixed model investigating the interaction between combinations of group and condition for each masker location. Bonferroni corrections were used for multiple comparisons.

<i>Masker location</i>	<i>Comparison</i>	<i>Mean Difference (dB)</i>	<i>df</i>	<i>t-ratio</i>	<i>p</i>
S ₀ N ₀	SSD CI+NH – SSD NH alone	-1.61	119	-2.903	.013
	SSD CI+NH – NH binaural	-0.25	33	0.186	1.000
	SSD NH alone – NH binaural	1.36	33	2.306	.083
S ₀ N _{nh/R}	SSD CI+NH – SSD NH alone	-4.00	119	-7.208	< .001
	SSD CI+NH – NH binaural	4.58	33	6.548	< .001
	SSD NH alone – NH binaural	8.58	33	-11.813	< .001
S ₀ N _{ci/L}	SSD CI+NH – SSD NH alone	0.47	119	-2.653	.027
	SSD CI+NH – NH binaural	-3.53	33	3.842	.002
	SSD NH alone – NH binaural	-2.06	33	5.780	< .001

dB, decibel; CI, cochlear implant; NH, normal hearing; SSD, single-sided-deafness; S₀N₀, speech front masker front; S₀N_{nh/R}, speech front masker to the normal hearing or right ear; S₀N_{ci/L}, speech front masker to the CI or left ear

Supplemental Digital Content 5. *Linear mixed model results comparing BKB-SIN SNR-50 scores over time for the SSD group in CI+NH and NH alone conditions (Device) in each masker location (MaskerLoc). The NH alone - S₀N₀ condition was the reference. The comparison variable is in brackets, and age at activation is centered on 5.0 years. Testing was completed at the 6-, 12-, and 24-month post-activation intervals.

<i>Predictors</i>	<i>Estimates</i>	<i>Conf Int</i>	<i>p</i>
(Intercept)	5.49	4.57 – 6.41	< .001
Age at activation	-0.94	-1.41 – -0.47	.001
Interval	-0.04	-0.08 – 0.001	.176
Device[CI+NH]	-1.72	-2.62 – -0.82	< .001
MaskerLoc [S ₀ N _{ci}]	-3.02	-3.92 – -2.12	< .001
MaskerLoc [S ₀ N _{nh}]	0.02	-0.88 – 0.92	.958
Device [CI+NH] * MaskerLoc [S ₀ N _{ci}]	0.29	-0.98 – 1.547	.657
Device [CI+NH] * MaskerLoc [S ₀ N _{nh}]	-1.47	-2.74 – -0.20	.024
N _{SubjID}	18		
Observations	324		
Pseudo R ²	0.396		

CI, cochlear implant; Conf. Int., confidence interval; NH, normal hearing; SSD, single-sided-deafness; S₀N_{nh}, speech front masker to the normal hearing ear; S₀N_{ci}, speech front masker to the CI ear

* lme(SNR-50 ~ Age at activation + Interval + Device * MaskerLoc, random = ~1 | Subject).

Supplemental Digital Content 6. Results of the comparisons of estimated marginal means derived from the mixed model investigating the significant interaction between spatial configuration and CI+NH vs NH alone. Bonferroni corrections were used for multiple comparisons.

	<i>Comparison</i>	<i>Mean Difference (dB)</i>	<i>df</i>	<i>t-ratio</i>	<i>p</i>
CI+NH	S ₀ N ₀ - S ₀ N _{nh}	1.44	300	3.162	.005
	S ₀ N ₀ - S ₀ N _{ci}	2.73	300	5.980	< .001
NH alone	S ₀ N ₀ - S ₀ N _{nh}	-0.02	300	-0.053	1.000
	S ₀ N ₀ - S ₀ N _{ci}	3.02	300	6.608	< .001

CI, cochlear implant; dB, decibel; NH, normal hearing; S₀N₀, speech front masker front; S₀N_{nh/R}, speech front masker to the normal hearing or right ear; S₀N_{ci/L}, speech front masker to the CI or left ear

Supplemental Digital Content 7. *Linear mixed model results comparing the log transformed RMS_{err} for the three combinations of group and condition (Group&Cond: SSD CI+NH, SSD NH alone, and NH binaural). The NH binaural group and condition was the reference. The comparison variable is in brackets and age is centered on 7.0 years. Testing was completed at the 24-month post-activation interval.

<i>Predictors</i>	<i>Estimates</i>	<i>Conf Int</i>	<i>p</i>
(Intercept)	2.11	1.95 – 2.27	<0.001
Age at test	0.02	-0.10 – 0.14	0.766
Group&Cond [SSD NH alone]	1.82	1.30 – 2.04	<0.001
Group&Cond [SSD CI+NH]	0.89	0.67 – 1.11	<0.001
Age at test * Group&Cond [SSD NH alone]	-0.23	-0.43 - -0.03	0.030
Age at test * Group&Cond [SSD CI+NH]	-0.18	-0.38 – 0.02	0.087
N _{SubjID}	36		
Observations	54		
Pseudo R ²	0.860		

CI, cochlear implant; Conf. Int., confidence interval; NH, normal hearing; SSD, single-sided-deafness

* lme(RMS Error ~ Age at test + Group&Cond , random = ~1 | Subject)

Supplemental Digital Content 8. *Results of linear mixed models investigating change in log-transformed RMS_{err} over time for the SSD group measured in the CI+NH and NH alone conditions (Device). The NH alone condition was the reference. The comparison variable is in brackets, and age at activation is centered on 5.0 years. Testing was completed at the 3-, 9-, 18-, and 24-month post-activation intervals.

<i>Predictors</i>	All Test Intervals		
	<i>Estimates</i>	<i>Conf. Int.</i>	<i>p</i>
(Intercept)	4.28	4.12 – 4.34	<0.001
Age at activation	0.03	-0.1 – 0.17	0.696
Device[CI+NH]	-0.25	-0.42 - -0.07	0.005
Interval	-0.01	-0.02 - -0.01	0.001
Age at activation * Device[CI+NH]	-0.03	-0.18 – 0.13	0.738
Age at activation * Interval	-0.01	-0.02 - -0.002	0.006
Device[CI+NH] * Interval	-0.32	-0.33 - -0.31	<0.001
Age at activation * Device[CI+NH] * Interval	< 0.001	-0.009 – 0.01	0.852
N	18 _{SubjID}		
Observations	144		
Pseudo R ²	0.781		

CI, cochlear implant; Conf. Int., confidence interval; NH, normal hearing; SSD, single-sided-deafness

* $lme(\log\text{-transformed RMS error} \sim \text{Age at activation} * \text{Device} * \text{Interval}, \text{random} = \sim 1 | \text{Subject})$.

Supplemental Digital Content 9. *Linear mixed model results investigating changes in variable error over time measured in the SSD group CI+NH and NH alone conditions (Device). The NH alone condition was the reference. The comparison variable is in brackets, and age at activation is centered on 5.0 years. Testing was completed at the 3-, 9-, 18-, and 24-month post-activation intervals.

<i>Predictors</i>	<i>Estimates</i>	<i>Conf. Int.</i>	<i>p</i>
(Intercept)	41.09	36.15 – 46.03	<0.001
Age at activation	-3.39	-8.00 – 1.22	0.169
Device[CI+NH]	-1.25	-7.05 – 4.55	0.675
Interval	-0.18	-0.43 – 0.75	0.178
Age * Device[CI+NH]	2.89	-2.52 – 8.30	0.297
Age at activation * Interval	0.05	-0.29 – 0.19	0.711
Device[CI+NH] * Interval	-0.88	-1.25 -0.51	<0.001
Age at activation * Device [CI+NH] * Interval	-0.18	-0.53 – 0.17	0.297
N _{SubjID}	18		
Observations	144		
Pseudo R ²	0.576		

CI, cochlear implant; Conf. Int., confidence interval; NH, normal hearing; SSD, single-sided-deafness

*lme(Variable error ~ Age at activation * Device* Interval, random = ~1|Subject)

Supplemental Digital Content 10. *Linear mixed model results investigating changes in constant error over time measured in the SSD group CI+NH and NH alone (Group). The NH alone condition was the reference. The comparison variable is in brackets, and age at activation is centered on 5.0 years. Testing was completed at the 3-, 9-, 18-, and 24-month post-activation intervals.

<i>Predictors</i>	<i>Estimates</i>	<i>Conf. Int.</i>	<i>p</i>
(Intercept)	58.40	51.93 – 64.87	<0.001
Age at activation	3.43	-2.59 – 9.44	0.281
Group [CI+NH]	-20.45	-28.43 - -12.47	<0.001
Interval	-0.65	-1.03 - -0.33	<0.001
Age at activation * Group [CI+NH]	-4.04	-11.49 – 3.41	0.289
Age at activation * Interval	-0.67	-1.00 - -0.34	<0.001
Group [CI+NH] * Interval	-0.37	-0.88 – 0.14	0.157
Age at activation * Group [CI+NH] * Interval	0.53	0.04 – 1.00	0.029
N _{SubjID}	18		
Observations	144		
Pseudo R ²	0.674		

CI, cochlear implant; Conf. Int., confidence interval; NH, normal hearing; SSD, single-sided-deafness

*lme(Constant error ~ Age at activation * Group * Interval, random = ~1|Subject)