

... (...) ...

... 4 ...
... 4,19 23 ...

... (...) ...

... (... 19) ...

... (...) ...
... 4,25 29 ...

... (...) ... 30 ...

R ... (... 22 ... 0° ... 60° ...) ...
... -64 +64 ...

... 32 ...
... -64 ...
... +64 ...
... 4 ...
... 4 ...

... 32 ...

... 0 ... 32 ... (...) ...

... (... / ...) ...

... 23,31 ...
... (...) ...

... 0 ... 64 ...
... 64 ... 0 ...

... (...) ...

... 23,31 ...

... 23 ...
... (...) ...

... 32 ...
... (...) ...

... 23,24 ...
... (...) ...

... 33 37 ...
... 38,39 ...
... 0, ...
... 0.25, 0.50, ... 0.75, ...
... 38 ...

P r i m i t i v e A u d i t o r M e m o r

... primitive auditor memor (...) ...

0, 16, 32, 48, 64, 80, 96, 112, 128, 144, 160, 176, 192, 208, 224, 240, 256, 272, 288, 304, 320, 336, 352, 368, 384, 400, 416, 432, 448, 464, 480, 496, 512, 528, 544, 560, 576, 592, 608, 624, 640, 656, 672, 688, 704, 720, 736, 752, 768, 784, 800, 816, 832, 848, 864, 880, 896, 912, 928, 944, 960, 976, 992, 1008, 1024, 1040, 1056, 1072, 1088, 1104, 1120, 1136, 1152, 1168, 1184, 1200, 1216, 1232, 1248, 1264, 1280, 1296, 1312, 1328, 1344, 1360, 1376, 1392, 1408, 1424, 1440, 1456, 1472, 1488, 1504, 1520, 1536, 1552, 1568, 1584, 1600, 1616, 1632, 1648, 1664, 1680, 1696, 1712, 1728, 1744, 1760, 1776, 1792, 1808, 1824, 1840, 1856, 1872, 1888, 1904, 1920, 1936, 1952, 1968, 1984, 2000, 2016, 2032, 2048, 2064, 2080, 2096, 2112, 2128, 2144, 2160, 2176, 2192, 2208, 2224, 2240, 2256, 2272, 2288, 2304, 2320, 2336, 2352, 2368, 2384, 2400, 2416, 2432, 2448, 2464, 2480, 2496, 2512, 2528, 2544, 2560, 2576, 2592, 2608, 2624, 2640, 2656, 2672, 2688, 2704, 2720, 2736, 2752, 2768, 2784, 2800, 2816, 2832, 2848, 2864, 2880, 2896, 2912, 2928, 2944, 2960, 2976, 2992, 3008, 3024, 3040, 3056, 3072, 3088, 3104, 3120, 3136, 3152, 3168, 3184, 3200, 3216, 3232, 3248, 3264, 3280, 3296, 3312, 3328, 3344, 3360, 3376, 3392, 3408, 3424, 3440, 3456, 3472, 3488, 3504, 3520, 3536, 3552, 3568, 3584, 3600, 3616, 3632, 3648, 3664, 3680, 3696, 3712, 3728, 3744, 3760, 3776, 3792, 3808, 3824, 3840, 3856, 3872, 3888, 3904, 3920, 3936, 3952, 3968, 3984, 4000, 4016, 4032, 4048, 4064, 4080, 4096, 4112, 4128, 4144, 4160, 4176, 4192, 4208, 4224, 4240, 4256, 4272, 4288, 4304, 4320, 4336, 4352, 4368, 4384, 4400, 4416, 4432, 4448, 4464, 4480, 4496, 4512, 4528, 4544, 4560, 4576, 4592, 4608, 4624, 4640, 4656, 4672, 4688, 4704, 4720, 4736, 4752, 4768, 4784, 4800, 4816, 4832, 4848, 4864, 4880, 4896, 4912, 4928, 4944, 4960, 4976, 4992, 5008, 5024, 5040, 5056, 5072, 5088, 5104, 5120, 5136, 5152, 5168, 5184, 5200, 5216, 5232, 5248, 5264, 5280, 5296, 5312, 5328, 5344, 5360, 5376, 5392, 5408, 5424, 5440, 5456, 5472, 5488, 5504, 5520, 5536, 5552, 5568, 5584, 5600, 5616, 5632, 5648, 5664, 5680, 5696, 5712, 5728, 5744, 5760, 5776, 5792, 5808, 5824, 5840, 5856, 5872, 5888, 5904, 5920, 5936, 5952, 5968, 5984, 6000, 6016, 6032, 6048, 6064, 6080, 6096, 6112, 6128, 6144, 6160, 6176, 6192, 6208, 6224, 6240, 6256, 6272, 6288, 6304, 6320, 6336, 6352, 6368, 6384, 6400, 6416, 6432, 6448, 6464, 6480, 6496, 6512, 6528, 6544, 6560, 6576, 6592, 6608, 6624, 6640, 6656, 6672, 6688, 6704, 6720, 6736, 6752, 6768, 6784, 6800, 6816, 6832, 6848, 6864, 6880, 6896, 6912, 6928, 6944, 6960, 6976, 6992, 7008, 7024, 7040, 7056, 7072, 7088, 7104, 7120, 7136, 7152, 7168, 7184, 7200, 7216, 7232, 7248, 7264, 7280, 7296, 7312, 7328, 7344, 7360, 7376, 7392, 7408, 7424, 7440, 7456, 7472, 7488, 7504, 7520, 7536, 7552, 7568, 7584, 7600, 7616, 7632, 7648, 7664, 7680, 7696, 7712, 7728, 7744, 7760, 7776, 7792, 7808, 7824, 7840, 7856, 7872, 7888, 7904, 7920, 7936, 7952, 7968, 7984, 8000, 8016, 8032, 8048, 8064, 8080, 8096, 8112, 8128, 8144, 8160, 8176, 8192, 8208, 8224, 8240, 8256, 8272, 8288, 8304, 8320, 8336, 8352, 8368, 8384, 8400, 8416, 8432, 8448, 8464, 8480, 8496, 8512, 8528, 8544, 8560, 8576, 8592, 8608, 8624, 8640, 8656, 8672, 8688, 8704, 8720, 8736, 8752, 8768, 8784, 8800, 8816, 8832, 8848, 8864, 8880, 8896, 8912, 8928, 8944, 8960, 8976, 8992, 9008, 9024, 9040, 9056, 9072, 9088, 9104, 9120, 9136, 9152, 9168, 9184, 9200, 9216, 9232, 9248, 9264, 9280, 9296, 9312, 9328, 9344, 9360, 9376, 9392, 9408, 9424, 9440, 9456, 9472, 9488, 9504, 9520, 9536, 9552, 9568, 9584, 9600, 9616, 9632, 9648, 9664, 9680, 9696, 9712, 9728, 9744, 9760, 9776, 9792, 9808, 9824, 9840, 9856, 9872, 9888, 9904, 9920, 9936, 9952, 9968, 9984, 10000.

$$I = -\log\left(\frac{1}{f}\right).$$

f is the frequency of the word in the text. The word frequency in the *People's Daily* (1994–2002) is used as an example.

The word frequency in the *People's Daily* (1994–2002) is used as an example. The word frequency in the *People's Daily* (1994–2002) is used as an example.

Results and Discussion

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

$$y = y_0 + Ae^{-(x/t_0)}$$

1000, 2000, 3000, 4000, 5000, 6000, 7000, 8000, 9000, 10000.

1000, 2000, 3000, 4000, 5000, 6000, 7000, 8000, 9000, 10000.

Experiment 2: The Longest IAI for Detecting the BIC

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

1000, 2000, 3000, 4000, 5000, 6000, 7000, 8000, 9000, 10000.

1000, 2000, 3000, 4000, 5000, 6000, 7000, 8000, 9000, 10000.

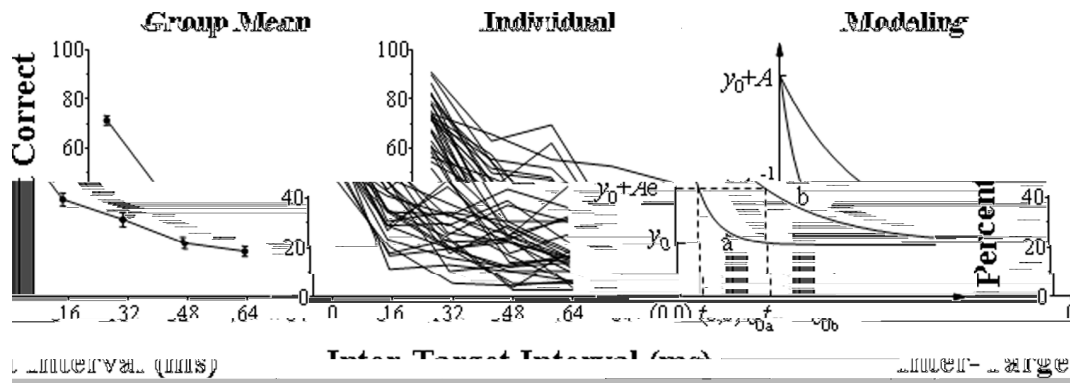


Figure 3. Percent-correct recognition of target speech as a function of the ITI (Experiment 1). T (CF) = 0.0063106, $P = 0.003$. Right panel: T (CF) = 0.0063106, $P = 0.003$. DOI:10.1371/journal.pone.0163106.g003

... 47: ... 0. ... 5.1 ... 15.4 ... 30 ... (... 5). ... 200 ... 3200 ... (... 5). ... 200 ... 3200 ... (... 6) ... (4,116) = 256.1, $p < 0.001$ (... 5).

R ... D ... 2, ... 200, 400, 800, 1600, 3200 ... 30

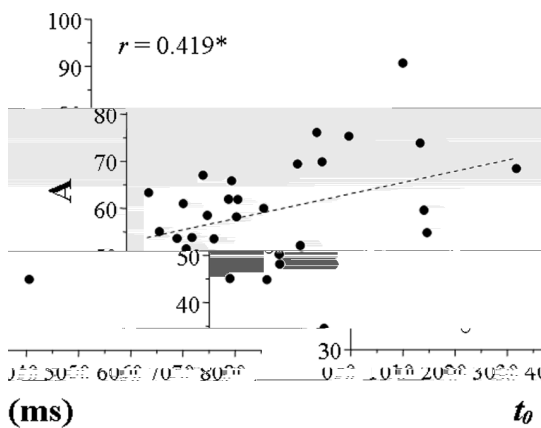


Figure 4. Correlation between the parameter A (the dynamic range affected by ITI, the value along the ordinate) and the time constant t_0 (the value along the abscissa) across participants (Experiment 1). T (CF) = 0.0063106, $P = 0.003$. DOI:10.1371/journal.pone.0163106.g004

1. ... 5.1 ... 15.4 ... 30 ... (... 5). ... 200 ... 3200 ... (... 5). ... 200 ... 3200 ... (... 6) ... (4,116) = 256.1, $p < 0.001$ (... 5).

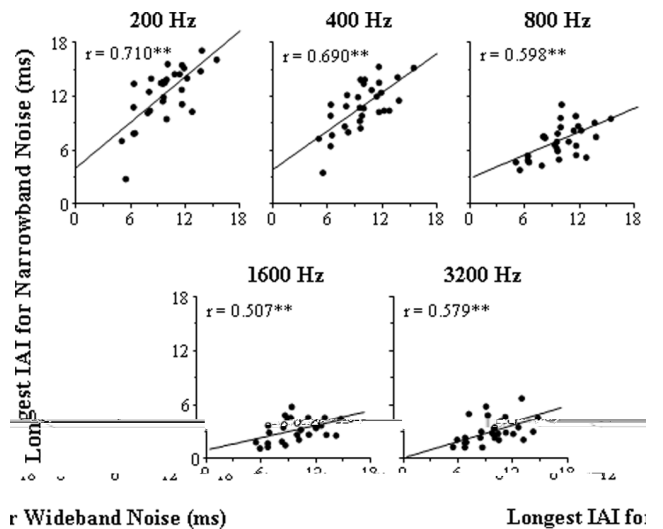


Figure 5. Correlation between the longest interaural interval (IAI) at which a 200-ms break in correlation (BIC) could be detected for each of the five types of narrowband noises and that for wideband noise (Experiment 2). T (CF) = 0.0063106, $P = 0.003$. DOI:10.1371/journal.pone.0163106.g005

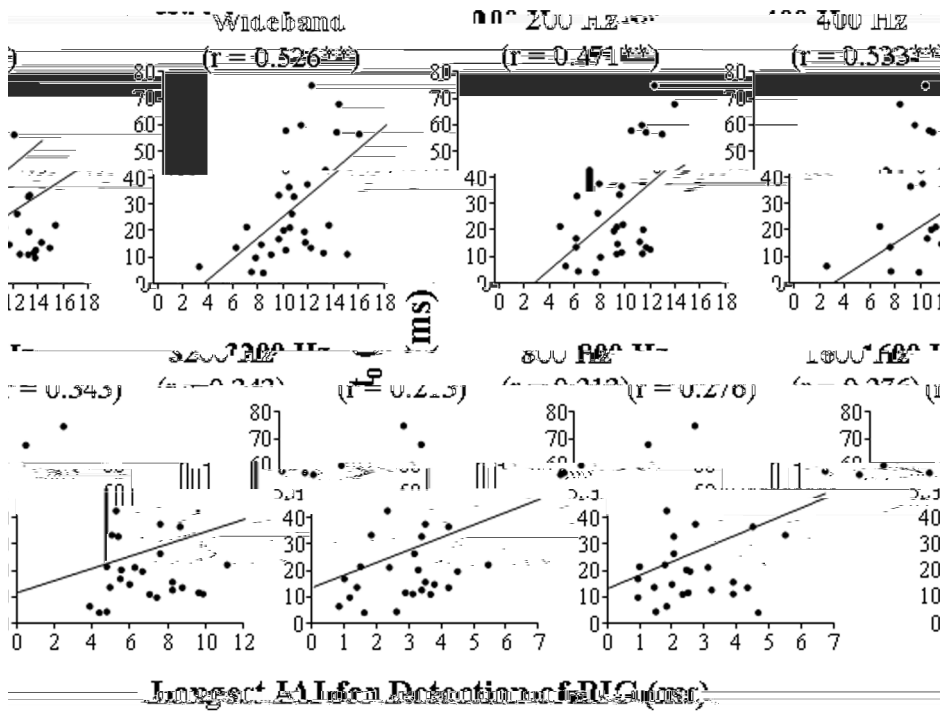


Figure 9. Correlation between t_0 (obtained from Experiment 1) and the longest IAI for detecting the BIC in each noise type (obtained from Experiment 2) across 30 participants.

doi:10.1371/journal.pone.0163106.g009

Table 1. Correlation between t_0 and the longest IAI for detecting the BIC in each noise type across 30 participants.

| Noise Type | CF | r | Significance |
|------------|------|-------|--------------|
| Wideband | - | 0.526 | *** |
| 200 Hz | 200 | 0.471 | ** |
| 400 Hz | 400 | 0.533 | *** |
| 200 Hz | 200 | 0.343 | |
| 400 Hz | 400 | 0.213 | |
| 1000 Hz | 1000 | 0.276 | |

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; + $p < 0.1$.

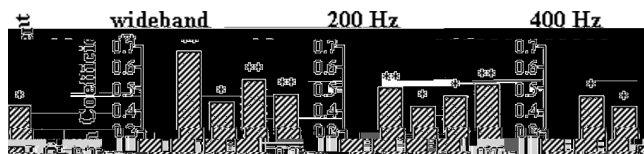


Figure 10. Correlations between percent-correct target-speech recognition (obtained from Experiment 1) and the longest IAI for detecting the BIC in either the wideband or the narrow-band noise with the low CF of 200 or 400 Hz (obtained from Experiment 2) across 30 participants.

doi:10.1371/journal.pone.0163106.g010

... (2) ... (3) ... (4) ... (5)

... (200, 400) ...

... (23) ...

... (37) ...

... (53, 55) ...

... (56) ...

... (54, 57, 58) ...

... (59, 63) ...

... (60, 62) ...

... (1) ... (2) ...

T B -U S U R :T C -P T

... Chain-Processing Theor

... (1)

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7. ... (2003) ... 114: 2871-2876.

... (2)

... (3)

... (4)

... (5)

... (53, 55)

... (56)

... (54, 57, 58)

... (59, 63)

... (60, 62)

... (1)

... (2)

... (3)

... (4)

... (5)

Acknowledgments

...

Author Contributions

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