Primitive Auditory Memory Is Correlated with Spatial Unmasking That Is Based on Direct-Reflection Integration

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1 D P , P U , B , C , **2** D M I , P U , B , C , **3** S H R C , P U , B , C , **4** K L M P (M E), P U , B , C , **5** PKU-IDG/M G I B R , P U , B , C

Abstract

I - , - - . I - . T (1) - - - (2) ; , (. ., , PAM). T - . I , PAM . M , PAM - . T , , - PAM - , , .

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Competing Interests: T .

* E- : @ .

Introduction

P I P U - E S S , - - . ?'' *cocktail-part problem*, 1 . / - - (2). , (1) - - ( ) - , (2) - - *echoes* (. ., -), (3) - . , ((. ., , 11,15 18). -

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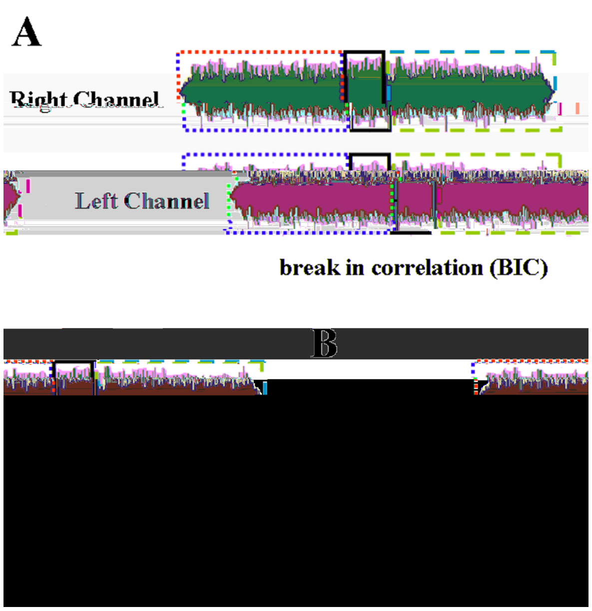

Figure 1. Illustration of the concept of *break in correlation* (BIC).
A: A (. ., BIC,) . - ( ). *B*: A (IAI) *A* (PAM).
:10.1371/ .0063106. 001

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

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Results and Discussion

1, - , - 30 . 31 , 0 , : . 16 , - ( ) . 64 , , , . - - 31 . 3, - - - 0 64 - : $F(4,116) = 158.935$, $p < 0.001$. 3 - , , :

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

- , , y_0 - , A , t_0 ( ). , t_0 . , t_0 , . t_0, 3 , y_0 A t_0 (t_0 t_0). , t_0 30 4. , t_0 . 4 ' A ( ), - - . A t_0.

Experiment 2: The Longest IAI for Detecting the BIC

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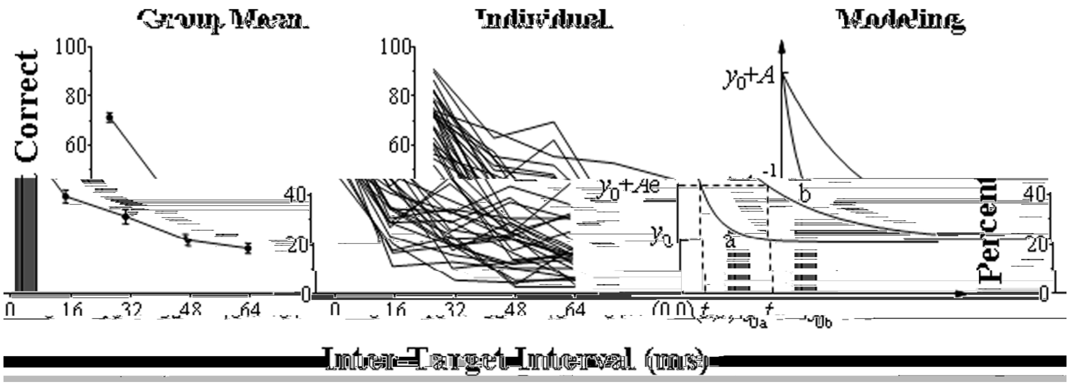

Figure 3. Percent-correct recognition of target speech as a function of the ITI (Experiment 1). T ITI left middle panels, . T . Right panel: T ITI. C (t_0), ITI .
doi:10.1371/ .0063106.g003

1. . , 47 : 0 , 5.1 15.4 30 (5). , , 200 3200 (16 , 0.5 5). 1 . 200 3200 (6) (: $F(4,116) = 256.1$, $p<0.001$). . 10 , ( ) , 6 . 3 . , 4 . , (5).

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2, (200, 400, 800, 1600, 3200) 30

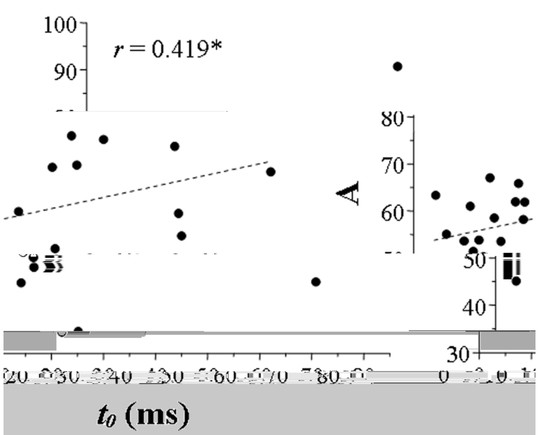

Figure 4. Correlation between the parameter *A* (the dynamic range of the performance change affected by ITI, the value along the ordinate) and the time constant t_0 (the value along the abscissa) across participants (Experiment 1). T , *r* P . *' 0.05.
doi:10.1371/ .0063106.g004

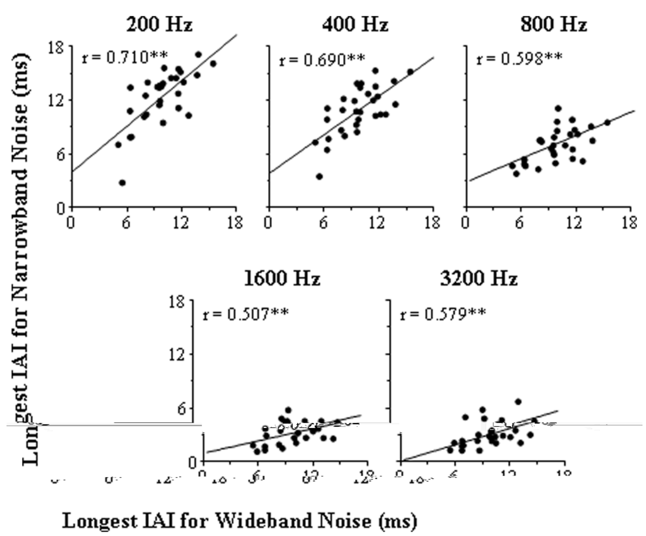

Figure 5. Correlation between the longest interaural interval (IAI) at which a 200-ms break in correlation (BIC) could be detected for each of the five types of narrowband noises and that for wideband noise (Experiment 2). T (CF) 200, 400, 800, 1600, 3200 H . T , *r* P . **' 0.01.
doi:10.1371/ .0063106.g005

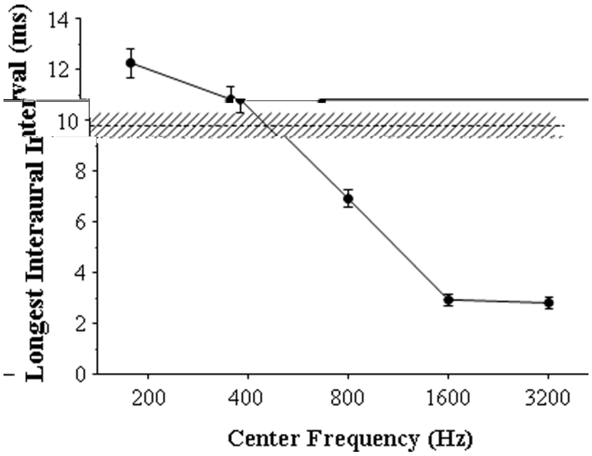

Figure 6. The group mean of the longest IAI for detecting the BIC in the wideband noise and that in each of the narrowband noises (Experiment 2). T

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Experiment 3: Comparison of the Longest IAI for Detecting the BIC and the Longest IAI for Perceptually Fusing the Noises

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$t\,(12) = 6.41,\ p < 0.001$.

Experiment 4: The BIC-Duration Threshold as the IAI Varied between 0 and 10 Ms

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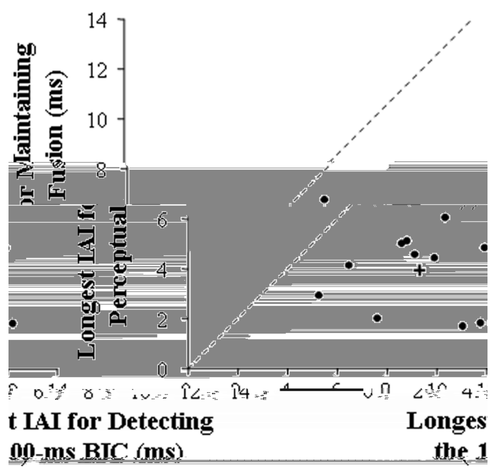

Figure 7. Comparison of the longest IAI when the 100-ms BIC was detectable (the abscissa) and the longest IAI when perceptual fusion of the identical noises at the two ears (the ordinate) for individual participants (dots) and group mean (the cross). T 1

.:10.1371/ . .0063106. 007

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Correlation between Recognition of Target Speech and the Temporal Extent of Pam

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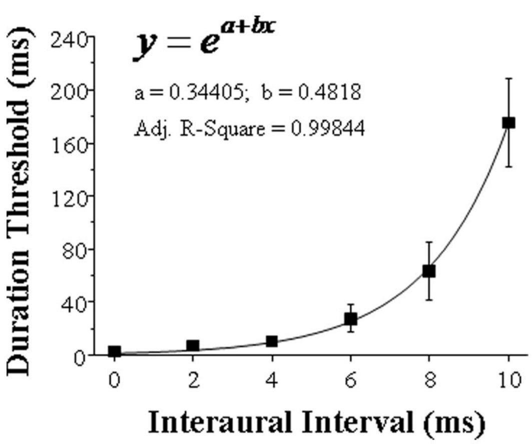

Figure 8. The group-mean BIC-duration threshold and the best fitting curve of mean duration threshold against IAI. Error bars represent standard errors of the mean.
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General Discussion

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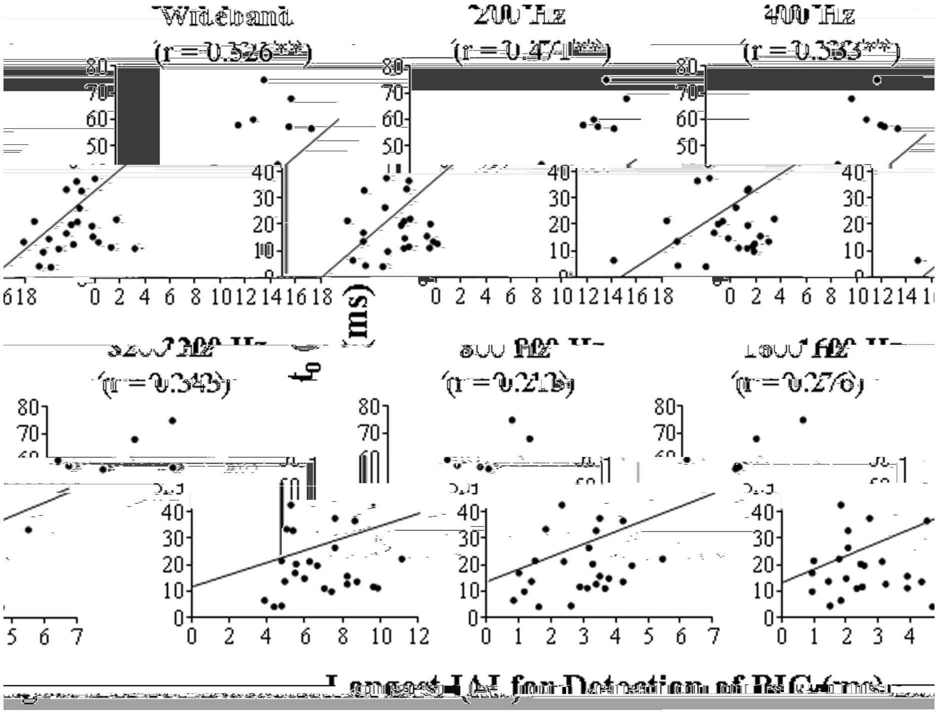

Figure 9. Correlation between t_0 (obtained from Experiment 1) and the longest IAI for detecting the BIC in each noise type (obtained from Experiment 2) across 30 participants. , r P . N t_0 IAI BIC CF 200 400 H . **' 0.01.
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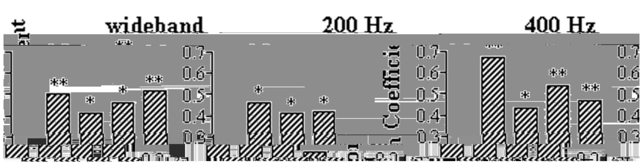

Figure 10. Correlations between percent-correct target-speech recognition (obtained from Experiment 1) and the longest IAI for detecting the BIC in either the wideband or the narrow-band noise with the low CF of 200 or 400 Hz (obtained from Experiment 2) across 30 participants. *' 0.05; **' 0.01.
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Acknowledgments

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Author Contributions

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