

■ A P D C : B E P E

M₁¹, ¹, C_{1,2,*} ¹, J ¹,

¹Department of Psychology, Peking University, China
²The Research Center of Psychology and Behavior, Tianjin Normal University, China

B (E P) C E 1, 102 C 32% (MMN) MMN C B MMN

*C : D P P B : 100871, C . F : +86-10-6276-1081; - : 104@ . ; C / : C N P ; / : 95- -09; C / : N N ; F C ; / : 30200078, 30070260, 30470569, 60435010; C / : M E ; / : 01002, 02170, 01JA L 015

Journal of Experimental Psychology: Applied
Copyright 2005 by Lawrence Erlbaum Associates, Inc.
© 2005 J. E. P. & L. .

Keywords: ; (MMN)

IN TRODUCTION

P (. . . , , & , 1994). L & B , 1985; L , F , & P , 1988). P . D . F , (B & B , 1978, 1983; B & B , 1978; M , C , & , 1993; & , 1995; & , 1994), (, 1981), (K , 1986), (& , 1988; , 1985), (B & , 1993; D & , 1976), (& , 1997; B , 1997). I . . .

C (. . .)
 C ')
 & F , 2001; M+B -C (, C , A , , & , 2003;
 & H , 2000; H & B , 1997). B
 C

I ,
 E 1 C
 102 C
 . E 2, E P ,
 C

E PE IMEN 1

. F ,
 ? F ,
 ? I

Method

Participants

O - = 129) C - (52 50 ,
 . A M C B
 - - ,

Design and procedure

. I C
 P M (& , 1985)
 , , , ,

50 (109/50) (20/)

Auditory and temporal tests

I *tone frequency discrimination task*, 300
 (700 H), I I 500 . O

C 5 120 H, 7
 50 , 5 . E 10 10 . 75%

I *tone temporal order judgment*, 800 H
 2000 H . E 50
 C I I 5

I *temporal interval discrimination*,
 (1000 H) 15 . I I
 500 .

100 , 50 100
 10 (5) . C

75% *composite tone pattern discrimination task*
 2000 H 800 H

150 50 150 ;
 50 . C ;

75% . I , 25% . C ,

Results

I ,

	1	2	3	4	5	6	7	8	9	10
1.										
2.	0.24*									
3.	0.16	0.33**								
4. P	0.35**	0.50**	0.22*							
5. O	0.10	-0.18	-0.27**	-0.20*						
6. C	0.02	-0.34**	-0.37**	-0.18	0.38**					
7. C	-0.20*	-0.35**	-0.14	-0.30**	0.01	0.06				
8.	-0.28**	-0.25**	-0.26**	-0.30**	0.18	0.10	0.06			
9.	-0.01	-0.22*	-0.31**	-0.26**	0.18	0.25**	0.02	0.34**		
10.	-0.27**	-0.23*	-0.28**	-0.46**	0.07	-0.01	0.14	0.21*	0.55**	
11. C	-0.17	-0.43**	-0.22*	-0.56**	0.08	0.31**	0.22*	0.26**	0.26**	0.35**

N : * <0.05; ** <0.01, *** <0.001.

Multiple regressions

I, 2, I', I, I, 21%, (19%), 7%, 14%, 5%, 7%, A, N, 2. I

D	P	R ²	R ²	t
1.	1.	0.05	0.05*	2.29*
	2. C	0.24	0.19***	-3.55***
	3. P	0.31	0.07**	2.86**
2.	1.	0.05	0.05*	2.29*
	2.	0.10	0.05*	-2.22*
	3. C	0.24	0.14**	-3.55***
	4. P	0.31	0.07**	2.86**
3.	1.	0.05	0.05*	2.29*
	2. P	0.26	0.21***	5.02***
	3. A	0.31	0.05	

N : * <0.05; ** <0.01; *** <0.001.

(3).
 ,
 ,
 4
 32%
 I . A
 5
 16% 13%
 4%
 . P
 3.
 I

D	P	R ²	R ²	t
F	1.	0.03	0.03	
	2.	0.17	0.14*	-2.01*
	3. P	0.172	0.002	
	1.	0.03	0.03	
	2.	0.09	0.06*	-2.30*
	3.	0.17	0.08*	-2.01*
	4. P	0.172	0.002	
	1.	0.03	0.03	
	2. P	0.06	0.03	
	3. A	0.172	0.11*	

N : * <0.05.

P	P	R ²	R ²	t
P	1.	0.12	0.12**	2.46**
	2.			-2.63**
	C	0.44	0.32**	-4.9***
	1.	0.12	0.12**	2.46**
	2.	0.16	0.04*	-2.14*
	3.			-2.63**
	C	0.44	0.28**	-4.9***

N : * <0.05; ** <0.01; *** <0.001.

C

. B

. H

C

E PE IMEN O

E 1 C

E 2 ? M

Method

Participants

P 23 : 11 (2
 9) 12 (2 10).
 I , C
 P M (& , 1985).
 8 13 (11 1 , S.D.=1.34).

. A -
 - - . N
 . A

H K L -D
 (HK - LD) (H , C , & L , 2000)

:C
 P : 7
 (6).

Stimuli

. P
 C M

6.	A	I	C	D
	(.D.)	(.D.)		
C	10.91 (0.34)	75.84 (4.24)	9.56	9.97
D	11.18 (0.48)	81.81 (2.36)	5.7	7

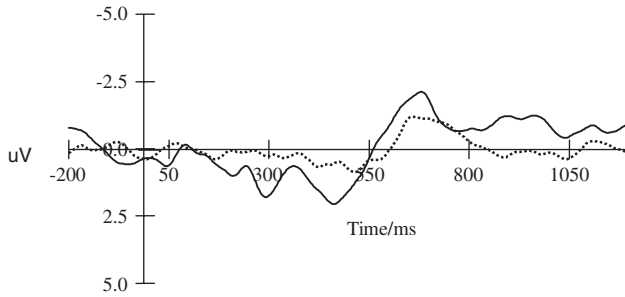
(p < 0.01).

110 Hz, 20%, 1250 Hz, 50 Hz, 700 Hz, 1400 Hz, 50 Hz, 150 Hz, 350 Hz, 150 Hz, 1000 Hz, 21- Hz, 80%, 2000 Hz, 800 Hz, 350 Hz, 1000 Hz, C, I, 1/, 2/, 40, 700.

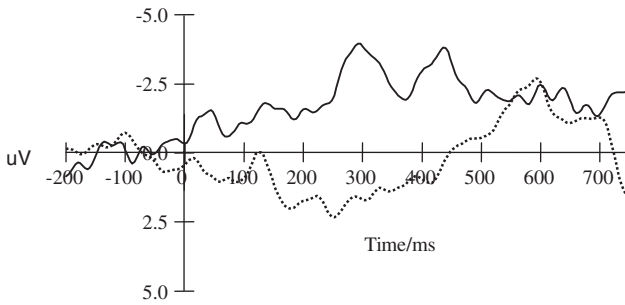
Procedure

P, C, M, P, EEG, 30, F, F, C, P, C, O.

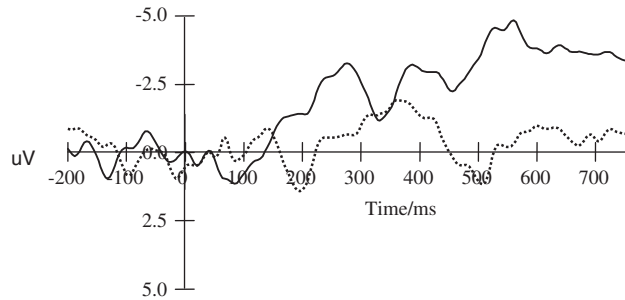
($0.05 < p < 0.1$, F 2). C MMN 150 500 .
 D MMN I F 3 (p < 0.05).
 C MMN 380 700
 (0.05 < p < 0.1, F 4). F MMN (F 5).



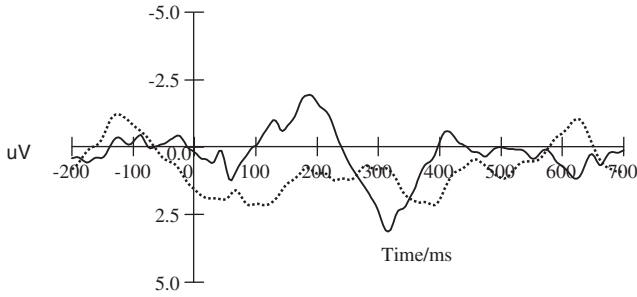
F 2. G MMN () F () .



F 3. G MMN () F () .



F 4. G MMN C



F 5. G () MMN () F ()

Discussion

O C MMN C F .

C .

(M et al., 1996; -K et al., 1999).

M C

(M+B -C , 1995; , A , & , 2000). F C

et al., 2001). (A et al., 2000; K et al., 2001).

C B et al. (1999). C -K et al. (1998)

P

GENERAL DISCUSSION

- Kan, R., Kuo, J., Cui, B., & P. (2001). P. . *Proceedings of the National Academy of Sciences*, 98, 10509-10514.
- L., I., F., J., & P., O. P. (1988). E. . *Reading Research Quarterly*, 23, 263-284.
- M., F., C., & P. A. (1993). D. . *Journal of Experimental Child Psychology*, 56, 64-86.
- M. B., C., C. (1995). P. . *Educational Psychologist*, 30, 109-121.
- M. B., C., & H., C. (2000). D. . *Journal of Educational Psychology*, 92, 50-55.
- M. C., L., & K., H. C. (1980). A. . *Journal of Learning Disabilities*, 13, 18-25.
- M., P., M. A., K. I., & J. F. (1999). P. . *Journal of Speech and Hearing Research*, 42, 797-803.
- M., M. M., J., M., J., P., C., M., L., & P. (1996). . *Science*, 271, 77-81.
- J. (1985). O. . *British Journal of Psychology*, 76, 325-340.
- F. (2003). D. . *Current Opinion in Neurobiology*, 13, 212-218.
- K., G., D., B., J., & H. (1998). A. . *NeuroReport*, 9, 337-340.
- K., G., D., B., J., & H. (1999). P. . *Neuroscience Letters*, 276, 41-44.
- K., G., D., B., J., & H. (2001). (MMN). *International Journal of Psychophysiology*, 40, 77-87.
- D. L., J., A. F., M., & M. (2002). . *Reading and Writing*, 15, 151-178.
- D. L., & K. E. (1995). C. . *Issues in Education: Contributions from Educational Psychology*, 1, 1-57.
- H., A., C., & N. (2000). P. . *Journal of Educational Psychology*, 92, 56-62.
- H., C., A., C., N., & (2003). P. . *Child Development*, 74, 27-48.
- I., L., & E. B. (1988). D. . *Developmental Psychology*, 24, 28-37.
- , & F., P. (2001). . *Developmental Psychology*, 37, 886-899.
- M. J. (1981). P. . *Psychological Research*, 43, 219-234.
- K. E., & L. (1994). . *Journal of Educational Psychology*, 86, 24-53.

-K , M. (1997). D . Paper presented at the international symposium on basic neural mechanisms in cognition and language with special reference to phonological problems in dyslexia, .

-K , M., & M , M. (1995). A . *Psychonomic Bulletin and Review*, 2, 508-514.

, D., & G , . (1997). P . *Journal of Experimental Child Psychology*, 66, 18-41.

, B., , C., M L , M. F., H , P. C., , A., G , G. G. , & , J. F. (2000). D . *Proceedings of the National Academy of Sciences*, 97, 2952-2957.

, P. (1980). A . *Brain and Language*, 9, 182-198.

, P., M , M. M., M , ., & J , . (1998). L : I . *Experimental Brain Research*, 123, 210-219.

, E., D , G. K., P , . A., M , . L., , P. M , M. M., & G , J. D. E. (2003). N : E M I. *Proceedings of the National Academy of Sciences*, 100, 2860-2865.

, . K., , J. K., & , C. A. (1994). D : N . *Developmental Psychology*, 30, 73-87.

, . L., & , B. P. (1996). *Chinese character recognition test battery and assessment scale for primary school children*. : E P .

, C., , J. B., H , P. C., , A. J., G , . D., , A., , J. F., & G , G. G. (1998). . *Current Biology*, 8, 791-797.

, H. C., & , P. (1985). *Raven standard progressive matrices: Chinese city revision*. B : N C G .

, ., & M - , . (1999). . *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 25, 819-837.