Cerebral Cortex, 2016, 1–10

doi: 10.1093/cercor/bhw147 0 🖕 A 🗛

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Contour Integration over Time: Psychophysical and fMRI Evidence

 $\mathbf{X} = \mathbf{G} \cdot \mathbf{K} \cdot \mathbf{A}^{1}, \quad \mathbf{K} \in \mathbf{A}^{2}, \mathbf{C} \cdot \mathbf{V}^{3} \cdot \mathbf{A}^{4}$

¥ * A , A C ↓ CB2 3A , K

Are re respectively. D A, A Pr., Physical Addition (C), C_{1} , C_{2} , E_{1} ; E_{2} , C_{2} , E_{1} ; E_{2} , C_{2} , E_{2} ; E_{2} , E_{2} ,

Abstract

A MAIMME , A . , AA , & A , hA , A MA ST , T . A V fi 🔹 , A <u>ب</u> ۲ ۲ , A. A A, , AA , AA, A A , A A A . . A A 🗛 A G A A 🛛 , A & CI , A.

Key words: A A, MI, G A A, h r, + A hA, r. . hr

Introduction

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Materials and Methods

Observers

• • A-A • • • (12 • • • 10 •, **▶** = 24 r) hA, Ar-A, hh, Ah Ar r, h, r MI h, A. Pr : 1 h A A A

Stimuli

 $\begin{array}{c} \mathbf{A} & \mathbf{A} & \mathbf{A} & \mathbf{A} \\ \mathbf{A} & \mathbf{A} & \mathbf{A} \\ \mathbf{A} & \mathbf{A} & \mathbf{A} \\ \mathbf{G} & \mathbf{A} & \mathbf{A} \\ \mathbf{G} & \mathbf{A} & \mathbf{A} \\ \mathbf{A} \mathbf{A} \\ \mathbf{A} & \mathbf{A} \\ \mathbf$ hp 🗛 . 6.4//-JMI h , A, A , A, H fin, A A, h, -A, h A I , , , A, A, A, A, A, A, J, -A, h A I , , , , A(BOLD) - , - , - ,

* h-A-0.3 h, 85 H A, $47 \cdot 7^2$ s - 35 H h A - 54 H A - 87 H A **A ⊷, - A** 67 .

Psychophysical Procedure

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fMRI Experimental Procedure

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fMRI Data Acquisition

 $\mathbf{A} = 34$, $\mathbf{r}; \mathbf{r} \ge \mathbf{A}_{\mathbf{r}} = 1.5$ 1.5 2).

fMRI Data Analysis

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)	fl 🗛 👌 🎭	В 🦕	Q	(B 🆕 📕	Å, r,	М А А



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Regions of Interest

A 3B/A A , A (LO) - 2 - (1, 2, 3, F Afi 🗸 А, A A (KO) ካ ካ 🗛 A r 1 % 3 Į, 7) 2 ⊉ **X** h > Að 85 Ā

r rin A hr rr Ar Ar A.

Multivoxel Pattern Analysis

112-



 $f_{1,6} = 25.6, P = 0.002, \eta^2 = 0.81), LO t_{(6)} = 2.88, P = 0.028, f_{1,6} = 0.028, f_$ C '- d = 1.09, IP ($F_{1,6} = 21.51$, P = 0.004, $\eta^2 = 0.78$), F = 1.09, F = 1.09, F = 1.35, P = 0.29, $\eta^2 = 0.18$). F = 1.35, P = 0.29, $\eta^2 = 0.18$). F = 1.35, P = 0.29, $\eta^2 = 0.18$). F = 1.35, P = 0.29, $\eta^2 = 0.18$, F = 1.35, P = 0.29, $\eta^2 = 0.18$, F = 1.35, P = 0.29, $\eta^2 = 0.18$, F = 1.35, P = 0.29, $\eta^2 = 0.18$, F = 1.35, P = 0.29, $\eta^2 = 0.18$, F = 1.35, P = 0.29, $\eta^2 = 0.18$, F = 1.35, P = 0.29, $\eta^2 = 0.18$, F = 1.35, P = 0.29, $\eta^2 = 0.18$, F = 1.35, P = 0.29, $\eta^2 = 0.18$, F = 1.35, P = 0.29, $\eta^2 = 0.18$, F = 1.35, P = 0.29, $\eta^2 = 0.18$, F = 1.35, P = 0.29, $\eta^2 = 0.18$, F = 1.35, P = 0.29, $\eta^2 = 0.18$, P = 0.29, η^2 ۶ ph p $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20)$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20)$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20)$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20)$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20)$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20)$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20)$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20)$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20)$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20)$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20)$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20)$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20)$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20)$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20)$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20)$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20)$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20$, $\eta^2 = 0.15)$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20$, $\eta^2 = 0.15$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20$, $\eta^2 = 0.15$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20$, $\eta^2 = 0.15$, $f_{1,6} = 1.5, P = 0.267, \eta^2 = 0.20$, $\eta^2 = 0.20$,

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**) A. "A " - - A 8 - 1 - 8 A 4.4 r



4 •. , A · hA , A L 6000 E -A) (A) L 🖡 🔥 🛌, B 📲 🗸 , MA, A). E -A 🦕 - A A . ✓ . F , · A A WARA ANA - A . A . A . 🔹 🖌 F 🗛0 . P 🗸 🔹 A, $t_{(3)} < 1$, P = 0.47, C, ir d = 0.41, A, $t_{(3)} < 1$, P = 0.57, C, ir d = 0.32, $t_{(3)} < 1, P = 0.61, C , ' = d = 0.29, A = t_{(3)} < 1, P = 0.27, C , ' = d = 0.68, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C , ' = d = 0.04, A = t_{(3)} < 1, P = 0.95, C =$ <u>∖</u>≱∙ ່ 1 -: ^ A A fi A , Aካችታ ተ - A.

 $(F_{1,3} < 1, P = 0.41, \eta^2 = 0.23), \qquad (F_{1,3} = 1.7, P = 0.29, \eta^2 = 0.36), \qquad (F_{1,3} = 3.8, P = 0.15, \eta^2 = 0.56), \qquad (F_{1,3} = 3.5, P = 0.16, \eta^2 = 0.54), \qquad (F_{1,3} = 3.5, P = 0.54), \qquad (F_{1$

Discussion

•••• A (F••• 2001; G••• A . 2001). O:••• A 1 5 25 - - - A A , A, A ۶ 1 A A GAR A. 2001). J -• •, > MI here here are a rah , **, , , , ,** , n A north of Athen in the rorth A net of a Athen **ማ**ት ነሥ * > Α, r 🦕 🦕 CI A 0. MI – A – -AA AA -Ab b A A **,** -The second secon



• A • • A • A • • . (c) M PA • **A** • • **A** • 45 Figure 4. M I 🖂 🏞 🛛 CI · , A, , 5 ··· A MI μα αα μα φα A A 7 mfi 🗛 - A 🐴 ነካ. D ካ ተኑ ማ ማ A A 🔹 h h 🗛 🗛 95% , fr , ٩ AA , h.r.

2004; M hr, I, 2005; 👌 🖕 🗣 🦕 2006), 🌬 🗛 🗭 A (C 🎙 🛣 🔉 . 1998). H 4 A, ,**≁**∖ r tip POIP , A , A A) Α, А, AA ٨ CI A - AA POIP , A 5.14 A Α, **A A** Ā (M 🔥 - h-A A h A -A-∽ስቆካ A 2010). 1993; N 🛌 2004; Α 🔹 C 🛣 r - 1 A-fi A 4 ٦ Ă. h, (C 🍾 **A** . 2012; r ٦ A-A) : A . 2013).

0 A APOIP A A А, Α, A A ٣ 1 • 🗛 A A AA, , r (F, . 3d), (2008), A A 🔹 K 🚜 ٦æ ΙP 7-A A h A K * AA, A - 🗛 🕹 . A-A J **ካ**ቃ A r **4**1) A CI ri r 🐴 5-3 ۶Ļ A NW ***** fl 🖪 POIP CI r ph p APOIP AA 5 11 A CI rr AAN A A APOIP AA A A A A ĀĀ ĸ A: - A ۶ AhA <u>ካ∛⊭⊭⊉</u>∰ **A** r 7 ۲: ۳**%** A A -, IP A A-> A, **A**, -٦ - h # ĸ, Ç y 2006; B 🏔 1 A, 2016). () Ŧ * , CI A Η , , A ۶ MI he 🔎 A - A rr r. O. Ά, A LO `≁ rh) • A, CI A (F₁ . 2d), • A A A • * 4 P (F. . 3b) 🦛 CI . **₹**'} A >

🔉 . 2002, 2004; A 🗛 😱 -A- - (M Α. わち > 2003; K & 🔥 🗛 . 2003; 🔥 . 2013). M ,3D r A - 🏲 А, А, A: 🖕 A `≽ **(** r r) 🖪 🗼 🔉 . 2005). I🗛 - 🦙 🗛 . 1997; K A A Ŧ rr

A -A CI m m h h A A A LO, A A Α A 1 h., ٣ A CI A r -A. 1 BOLD ļ, A -A 2 h (F . 2d). B 2 r Ă, A A A۱ -A M I, A A : A, 5 , 5 -AA A A, ,1 A A A, ≽ ፦ እ (**G** A . 2007), A A 1 -A • rr A A • A AA ٦ -**∽≩**∖

Funding

Notes

Conflict of Interest: N , \bullet .

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- $\label{eq:main_second} \textbf{MI}, \textbf{D} \quad \textbf{AM}, \qquad \textbf{F} J\textbf{B}, \textbf{K} \quad \textbf{F} \quad \textbf{KK}, \textbf{B} \quad \textbf{KK}, \textbf{B} \quad \textbf{KK}, \textbf{B} \quad \textbf{KK}, \textbf{KK}$ B A B. 1995. B A A A . 268:889–893.
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