A en ion mod la es ne ronal correla es of in erhemispheric in egra ion and global mo ion percep ion

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In earl   re ino opic areas of he h man   is al s s em, informa ion from he lef and righ   is al hemifields (VHFs) is processed con rala erall   in   o hemispheres. Despi e his segrega ion,   e ha e he percep   al e perience of a   nified, coheren , and   nin err p ed single   is al field. Ho   e ac l   he   is al s s em in egra es informa ion from he   o VHFs and achie es his percep   al e perience s ill remains largel   nkno   n. In his s   d   sing fMRI,   e e plored candida e areas ha are in ol ed in in erhemispheric in egra ion and he percep   al e perience of a   nified, global mo ion across VHFs. S im li   ere   o-dimensional, comp   er-genera ed objec s   i h par s in bo h VHFs. The re inal image in he lef VHF al   a s remained s a ionar , b   in he e perimen al condi ion, i   appeared   o ha e local mo ion beca se of he percei ed global mo ion of he objec . This percep   al effec co ld be   eakened b direc ing he a   en ion a   a   from he global mo ion hro gh a demanding fi a ion ask. Res l s sho   ha la eral occipi al areas, incl ding he medial emporal comple , pla   an impor an role in he process of percep   al e perience of a   nified global mo ion across VHFs. In earl   areas, incl ding he la eral genic la e n cle s and V1,   e obser ed correla es of his percep   al e perience onl   hen a   en ion is no direc ed a   a   from he objec . These findings re eal effec s of a   en ion on in erhemispheric in egra ion in mo ion percep ion and impl   ha bo h he bila eral ac i i   of higher- ier   is al areas and feedback mechanisms leading   o bila eral ac i i   of earl   areas

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pla roles in he percep al e perience of a nified is al field.

In rod c ion

E , (G , 2000; T , S , S , & H , 1988). . H . O . P , (HF) (A. T. S , & S , 2004; T , M , H - , L , & D , 1998; L & , 2004). H , . I 1 - (L & R , 2000; & F , 1998). T , , - (G & M - , 1990).

D , - . L , C , H (2009), MRI EEG , . T - (1) - (LOT) , MT+. I - , MT+ 1 . T - MT+ LOT , , 1. . (2004) EEG MRI . T LOT , MT+, . B . H , HF , . T , L . . B . (2006) MRI . T 1, 2, 3, . T . T , 1, 2 , 3 , , . B . , , . H , B . , 1, 2 , 3 .

A . A MRI (G , H , & B , 1999), - MT+ (B , B , M , & , 2009; C ., 2011; S , B , & B , 2002; H , K , & G , 2007; , A -E , P , & T , 2006). F , (L & R - , 2000). T , - , . ., .

T HF , MRI . I , P " , (F 1,). T P

. N

P . I

P

(F 1,). B

P

HF

P .

. I ” -

M). I ”

. T

×).

Me hods

Par icipan s

B

DTK, SE, CO,

. I

H E

C B . P

. A

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DTK, SE, CO. A

20

HB KD.

MR da a acq isi ion

M 3

T (M T , S AG, E

G) 12- . A

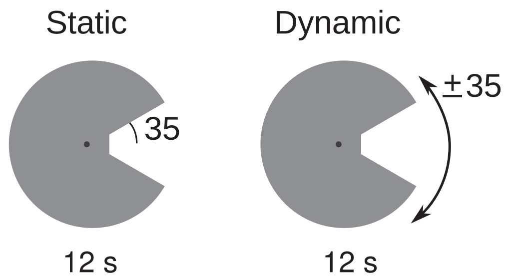
T1-

(

= 1 × 1 × 1 3;

TR = 2600 ; TE = 3.02 ; = 8°;

FO = 256 × 224 2



30° × 22° . T 1832 /m^2 CIE $x = 0.357$, $y = 0.351$.

S im li

A J (:// . . /~ /P J / .). A - . T (G 377.25 /m^2, 6 × 6 F 1). I - P ” ” . B 503 /m^2. T P - . B . I , ” , P . T F 2. A . T . D , 480 . F , . T . I P ,

; (F 1).

E perimen al proced re and fi a ion ask

C MRI . E 12 , 12 . T 10 (F 2). E 250 , 10 . I , . I ” , - . T 200 1750 2250 , (: 665 /m^2; : 747 /m^2; : 585 /m^2), MR (ORP 904 MRI , C D , P , PA, SA). I ” - , . D , .

ROI locali a ion

ROI (LGN), 1, 2, 3, 3A/B, 4, LO-1 , - (8 H), - - F 3. T 12- , 10 . T 250 , 10 . M H , D , H (2002) , MT+. MT+ 6.75° , 9° . E 12 , 12- . D 12 , , 12- . I , MST, -

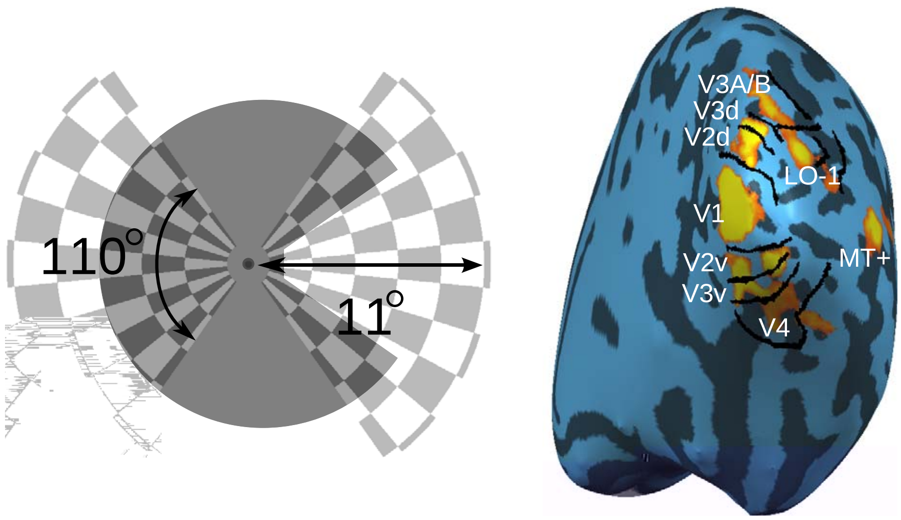


Figure 3. ROIs were identified using wedges texture-mapped with counter-phase contrast reversing checkerboard patterns in early visual areas (the Pac-man figure in the background is shown here for visualization purposes; it was not present in the actual experiment). For MT+, moving random dots were used as a localizer. Boundaries between early visual areas were drawn using the results of a separate retinotopic mapping session for each participant. The image on the right shows ROIs and visual area boundaries on an inflated brain of one participant.

, MT (H ., 2002; M ., 2000). H , . T , MT+.

Re ino opic mapping s im li

A . R . T 30° 30° 10 , 360° 12 . T . T 2° 1° 14°. E 10 . T 10 . F 3A/B, LO-1, LO-2 , L H (2006) (T ., 1997). T 3-D . B MR (E , G , & , 1997; S ., 1995).

MR da a processing and anal sis

F B - Q (B I , M , T N). P , 3-D , , - (0.015 H) (A. M. S ., 1999). N MRI . A , - , . F ROI - B Q . ($p <$ 10^{-4},) . F - , , J . T - . A , - (F 5), - (12) . A ,

P - : ( ) D
(F 6). *not* ? ( ) I , ,(
F ,
t (. .,
P
).

Beha ioral e perimen

(P)
. S MRI -
( ). O -
12 . F ,
. A ,

64 . T . T . E (250 ,) . T . S . (P), (MANO A) (ANO A).

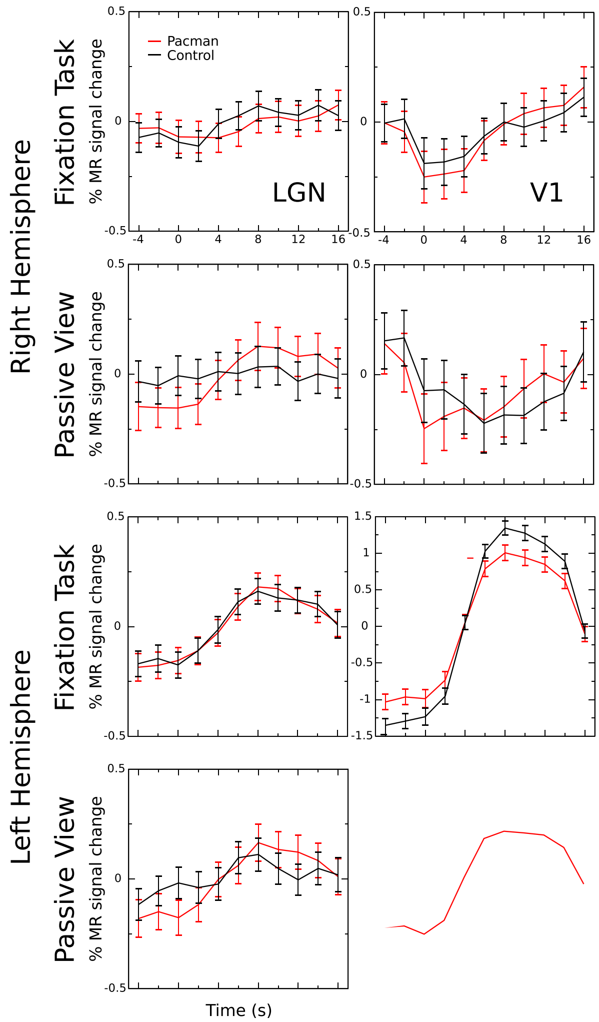
Res l s

? I P HF HF . T (RF) HF . O , RF HF, . C A HF , P . I HF . F 4 F 5 P . T ; . T : 85% P , 76% ($\alpha = 0.05$

RT = 653 665 , $\alpha = 0.05$). T . N MR (A. T. S ., 2004; T ., 1998). I , (12) P . I ROI, MRI P . R F 6. F , 3A/B, LO-1, MT+, P . I , , . T LGN. T . I P (F 5), 1, P LO-1 3A/B ($\alpha = 0.05$). T , .

Beha ioral e perimen

T , 12- P ( ) *not* ? ( ) (/). P ” (. ., N , *not* ”); .” P , ,” ,” .” A



.” T

. I

P

E e- racking e perimen

$= 0.947$, $F(2, 964) = 27.18$, $p < 0.0001$. N

$\alpha = 0.01$. T

ANO A

(

) $F(1, 965) = 22.41$, $p < 0.0001$,

$F(1, 965) = 28.36$, $p < 0.001$, . N

$\alpha = 0.01$. T

$-0.46°$

(0°) ($SE = 0.03$)

$-0.66°$ ($SE = 0.032$)

. T

$0.77°$ ($SE = 0.042$) (0°

( )) $0.45°$

( ), ($SE = 0.044$) .

Passive View

Average % MR signal difference

Disc ssion

3A/B, LO-1, MT+ P LGN, P . I . T HF . T (T ., 1997). M L MT+, L (A. T. S ., 2004; T ., 1998) . L . (2009) 1 LOT MT+, LOT 1 (., 2004). T MRI, . MT+ (B & B , 2005; G & M , 1990) 1 (B & B , 2005; L & R , 2000). T MT+ M LGN (L & R , 2000; S , P , & H , 2004). G 1 (B & B , 2005), MT+ (., 2004) 1. S LGN . T . T

LGN MT+ K (B & B , 2005; S ., 2004), . I LGN (SC), SC MT (B , 2004). M SC MT (B , 2004; C , 2004). I MT+ SC LGN . T 1, 2, 3 MT C (G , 2000; N & C , 1996). I , G ç, B , S , K (2011), MRI DTI, MT 1 . T MT S MT (G & M , 1990; G ç ., 2011) 3 3A/B (G & M , 1990) 1, 2, 3 (G & M - , 1990). T HF . MT 1, 2 3 (B & B , 2005; B , 2004). H 1, 2, 3, MT . T , MT+

E MT+ (B & B , 2005; C ., 2011; C , H , D , & , 2001; O'C , R , K , T , & S , 1997; S ., 2002). M (G ., 1999) LGN (O'C , F , P , & K , 2002).

. T ,
HF . T
(L & R , , 2000; & F , 1998).
P RF MT 70°
(B , 2013; B , M , & , 1998; M , B , & , 1995). M , MT RF RF
, (B ., 2009; C ., 2011; ., 2006; H ., 2007). M , -
(O'C , D , & K , 1999; R , L , & S , 1998),
(M M & S , 2004, 2005) - (S ., 2002; T & T , 1999)
HF MT.
O B . (2006), -
, 2 3 . T
.
R , P
. I MRI
. O
- , P
MRI
P .
P ,
. H ,
. T
RF , 1/2,
B . (2006) . N
P (85% -
, 76%) . T
P
- (P -
LOT 3A/B, MT+, LO1). H ,
LOT
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Conclusions

T ,
. O
3A/B, LO-1, MT+
(
),
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Keywords: global motion perception, interhemispheric integration, fMRI, visual brain, perceptual experience of unified visual field

Acknowledgments

S S T
R C , T 1001" (108K398),
E C M C I
R " (PIRG-GA-2008-239467),
T A S D
I " . A
M ,
C M R R
NIH N B I C
C G (P30 NS057091). HB KD
F
C , S D
.

C :
C : H B .
E : @ . .
A : D P & N ,
M R R C , B -
, A , T .

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