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ORIGINAL ARTICLE

Dissociated Neural Representations of Pain Expressions of Different Races

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[1]D P , [2]PKU-IDG/M G I B R , [3]G S M , P U , B , C

A S H , D P , P U , 52 H R , B 100080, C . E : @ . .

[†]F.S. X.H.

Abstract

T - - C C . I (RS) . W 128–188 (P2) 200–300 (N2) / . M , RS P2/N2 C C . O fi .

Key words: EEG, , ,

Introduction

A . 2012). E - (ERP) . R - 100 - (. ., N1 - - (I B 2009; K , I U 2003; K I 2007), . 2012; M 2013). F 170 , (MRI) (. ., N170, S I 2013). , (. ., W A 200 (P200) F 2005) (. ., G . 2001), - - (I U 2003; K fi - , . T - I 2007; I B 2009). (. ., R . W 2003) fl - - - - , , fi

? A MRI

(L . 2008) (C . 2008)
. ERP

O MRI
ERP

. MRI

(X .
2009; A . 2013; S . 2014). ERP

128–188 (P2) 200–300 (N2)
(S H 2012; S . 2013;
H H 2014). F

(S . 2014) (A
. 2010).

(J . 2002;
D . 2011). H

. B (B Y 1986) (H
. 2002)

. T

(. .,)

H . (2002)
( )
). S

(I B 2009; K . 2012)

. T
2

. T 2

. T

T -1.3 20.6( )-13289( )-218( )-17 ( )-58 TJT 19.3 .6(0.4(941( )--251.3 ( )22.95( )-)-29775.9)-27

4214( )10 - - (41.1( ))233-603.( ) -T ()11245.8(41.9((19.30.4).984TD ( )22.9(T)2343( ))1. 42184.2(44( )1

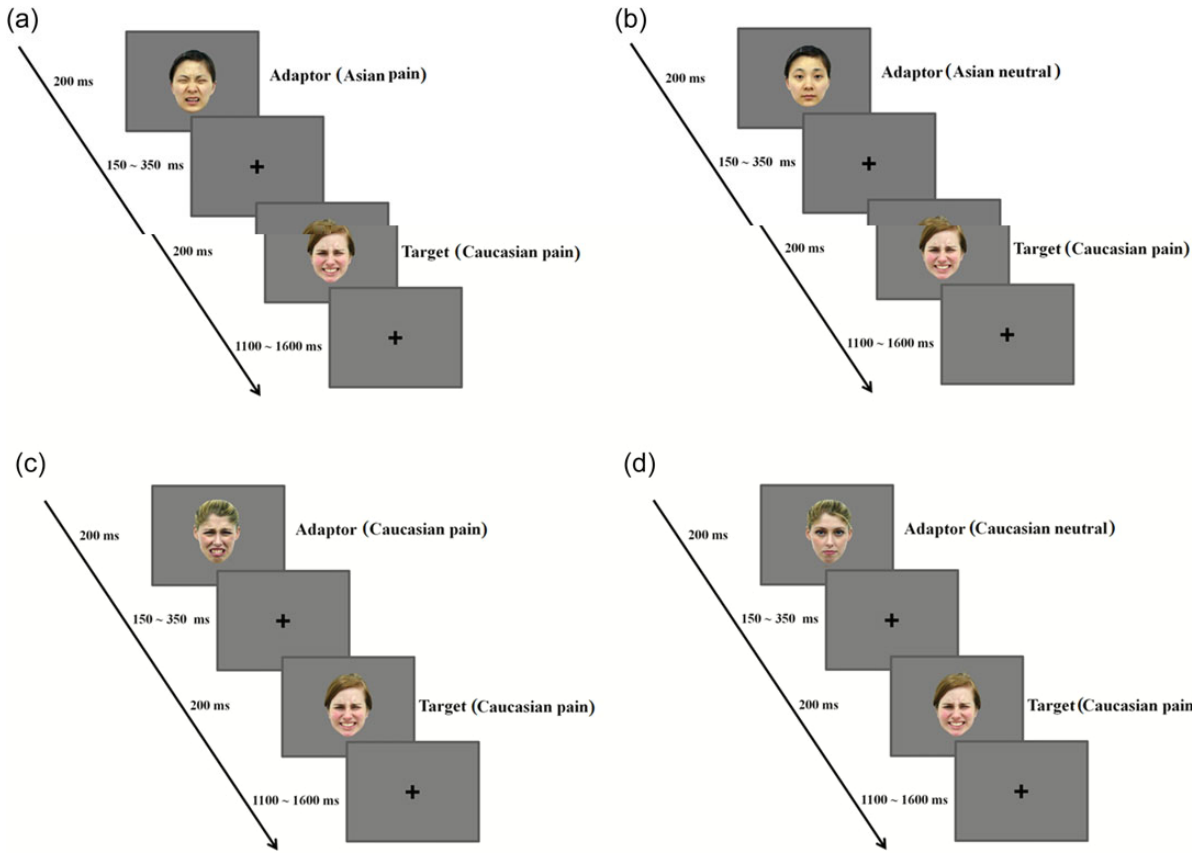


Figure 1. I EEG . T fi . A A C . T . O ,

- .

T - RS

. C , - RS

. W ERP C C - - , .

Materials and Methods

Participants

S C (8 , 19 27 , M = 21.56 , SD = 2.50) 16 C (8 , 17 27 , M = 21.06 , SD = 2.62) B , C , . A C C . C 7 G , 4 A - , 2 I , 2 F , 1 S , - C 1 1 (= 6) . P , M - E I M (P 1992), fi 2 (C : 2.73 0.45; C : 2.85 0.46, $t_{30} = 0.72$, $P = 0.479$). A - , - fi E H I (O fi 1971), - - , . T , .

Stimuli and Procedure

S (S H 2012) 32 16 A (8) 32 16 C (8). T 2 , . R / , , - , A C (S H 2012).

E 200 fi 150 350 . A 200 fi 1100 1600 (F . 1). E 3.8 4.7 120 . A - , - - . A

. O ,
1 2 . T 8 128 . A
. T
( )
( ) . T
P .
T ,
9- L (1 =
, 9 =)
(EEG) . P ,
I R I
(IRI, D 1983) 5- (0 =
, 4 =). W
I A T (IAT, G . 1998)
, A C
. A 10 A 10 C (
) IAT. I
20 40 , -
A /
C /
. I 20 40 -
, A /
C /
. T IAT I . A -
(G . 2003),
2
, D
. A D 0 ,
- , -
, D 0 -
-
- . A -
,
9- L (1 = 9 =
) A
C .

EEG Recording and Analysis

A N S EEG .
T EEG
62 .
E
. T
- 1.5
. T EEG fi
(0.1–100 H) 250 H .
T ERP fl
200
1000 . T
50 μV
. T
91 14 -
- 91 15 -
- . T
ERP 200- -
.
W fi RS -
ERP

. S fi ,
ERP F -
1a b, ERP F -
1c d. T , (. ., -
) 2 RS
-
2 . S -
F 1
C
RS -
fi . A - , RS
“ ”
ERP F 1a b -
ERP F 1c d. H ,
- , RS
ERP
F 1c d “ ” ERP
F 1a b.
M N1, P2, N2
(F , F3, F4) (C , C3,
C4) . M P3 N170
/ (C , C3, C4, P , P3, P4) -
(P7 P8) , . R -
(ANOVA) ERP ,
(RT), A R (-
-), A E (.), T R
(- . -) - , E -
. ANOVA ERP (C . C)
(. ., C3 C4) -
- , , H (
). H ,
H fi ,
R . W
ERP ,
fi fi (F < 1). O - (
-) (
) .

Results

Behavioral Performances

T 1 RT
. ANOVA RT (-
- -
ANOVA) fi (P > 0.1). P -
-
(6.39 1.15 . 1.78 0.94, $F_{1,30} = 422.92$,
P < 0.001)
(4.44 1.96
. 1.77 0.97, $F_{1,30} = 79.23$, P < 0.001). R
A C
(P > 0.1). O - t- IAT D
D fi 0 C -
(0.51 0.28, $t_{15} = 7.29$, P < 0.001)
C (0.18 0.41, $t_{15} = 1.79$, P = 0.094). I -
t- fi D C -
C ($t_{30} = 2.65$, P < 0.05).
T , C
- ,
C . I t- -
IRI C C
(T 2, P > 0.2).

ERPs to Adaptor Faces

ERP
84–124 (N1) fl 128–188 (P2)
–
200–300 (N2)
420–

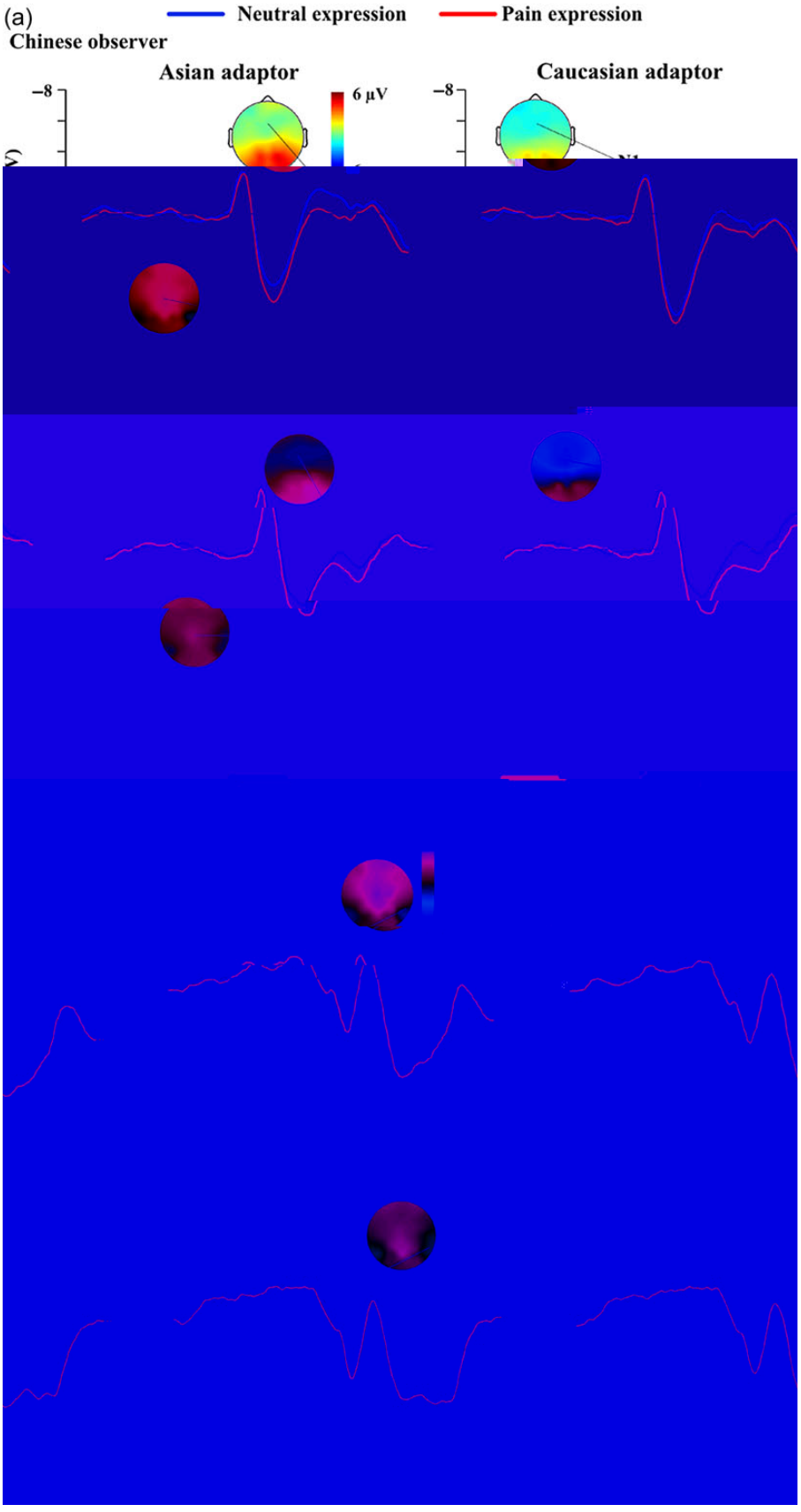


Figure 2. (*a*) I ERP (C). M P2/N2 - . (*b*) I ERP (P8). T N170 . ERP C C , .

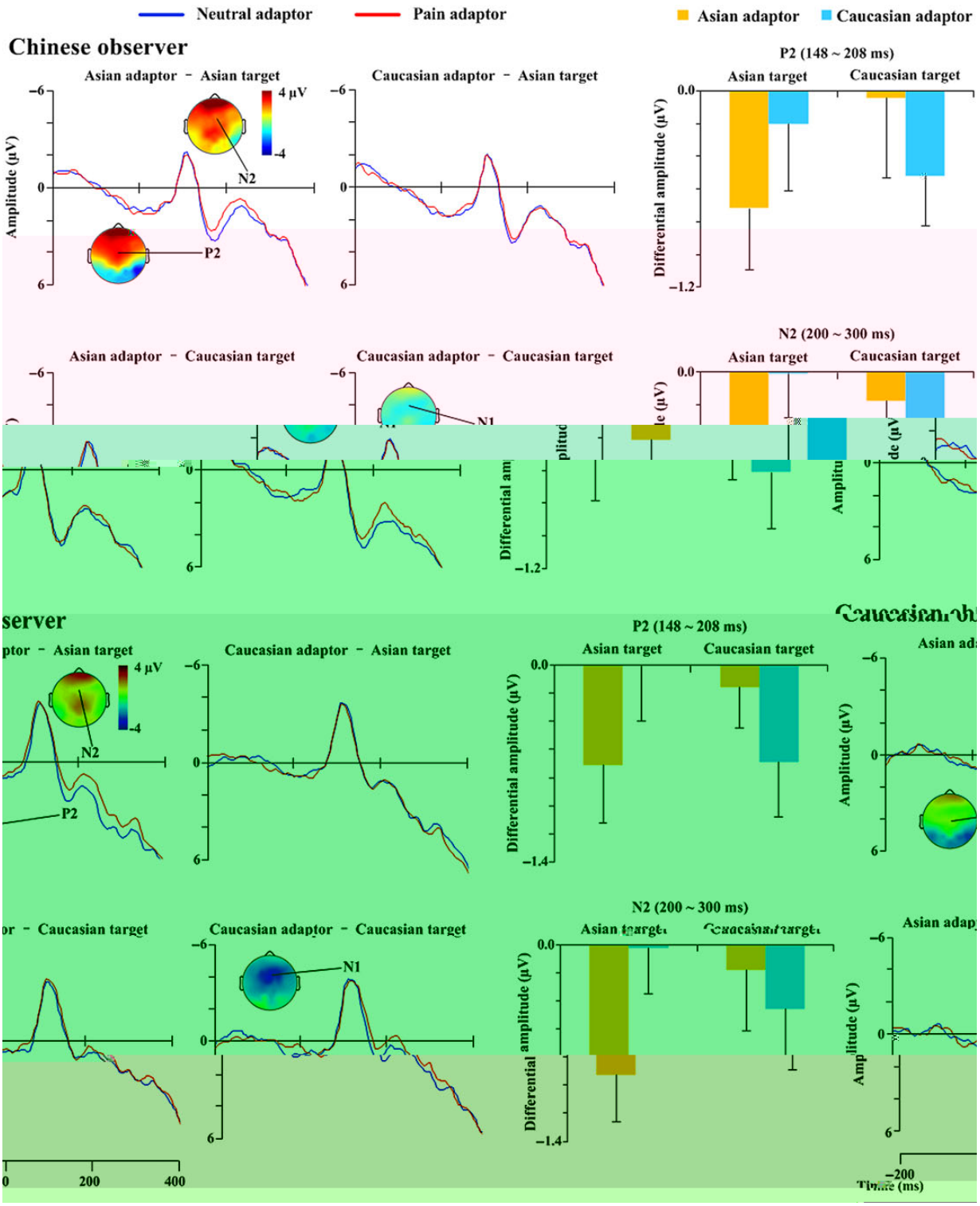
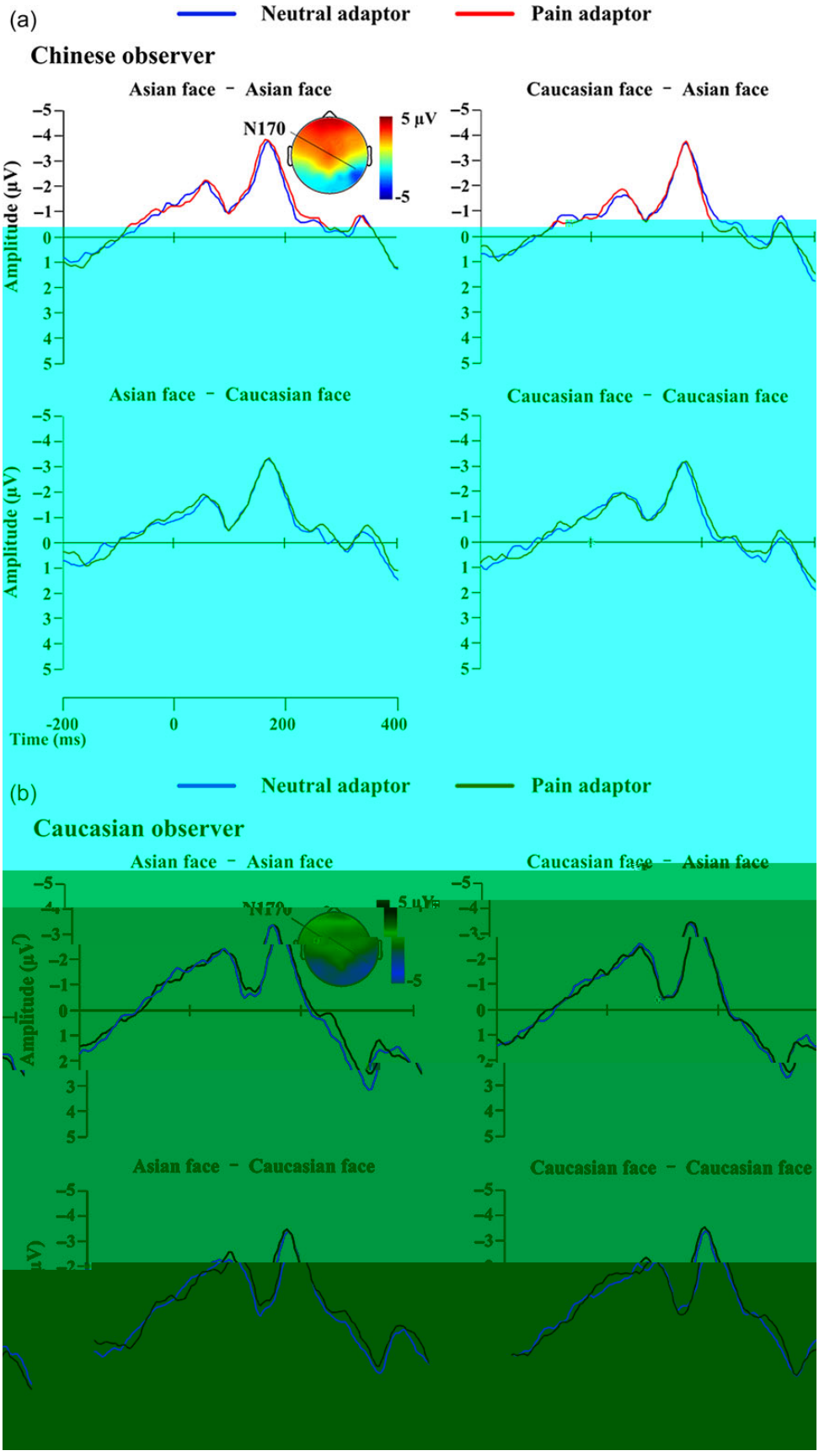


Figure 3. M - RS P2 N2 . ERP C A C . ERP - - . T P2/N2 . O , fi P2/N2 C C .

ANOVA N2 fi . M , T R ($F_{1,30} > 29.31$, $P < 0.001$), - ($F_{1,30} > 4.99$, $P < 0.05$), - N2 - - RS N2 . T RS


(a)
Neutral adaptor
Pain adaptor
Chinese observer
Asian face – Asian face
Caucasian face – Asian face
Asian face – Caucasian face
Caucasian face – Caucasian face
N170
5 μV
-5
Amplitude (μV)
Time (ms)
-200
0
200
400
(b)
Neutral adaptor
Pain adaptor
Caucasian observer
Asian face – Asian face
Caucasian face – Asian face
Asian face – Caucasian face
Caucasian face – Caucasian face
Amplitude (μV)

fi fi A
E A R T R ($F_{1,30} > 4.43$, $P < 0.05$).
S , RS N2 -
fi - ($F_{1,30} = 2.53$–
3.49, $P = 0.071$–0.122) - ($F_{1,30} < 1$,
$P > 0.6$). I , RS N2 -
fi - ($F_{1,30} > 4.65$,
$P < 0.05$) - ($F_{1,30} < 1$, $P > 0.4$, F . 2).
T , P2 N2
- RS

. S S T 4 .
O - P3
- ($F_{1,30} > 15.14$, $P < 0.001$). ANOVA N170 -
fi T R ($F_{1,30} =$
10.50, $P < 0.005$), - N170 -
- (F . 4). N fi
N170 P3 ($P > 0.05$).
ANOVA P2/N2/P3/N170
fi E -
($P > 0.05$), -
,
, RS ERP C -
C . W
P2/N2 RS -
' 4.1( )-14( )-301. 20
7).> -211 .3(9)-26( )221

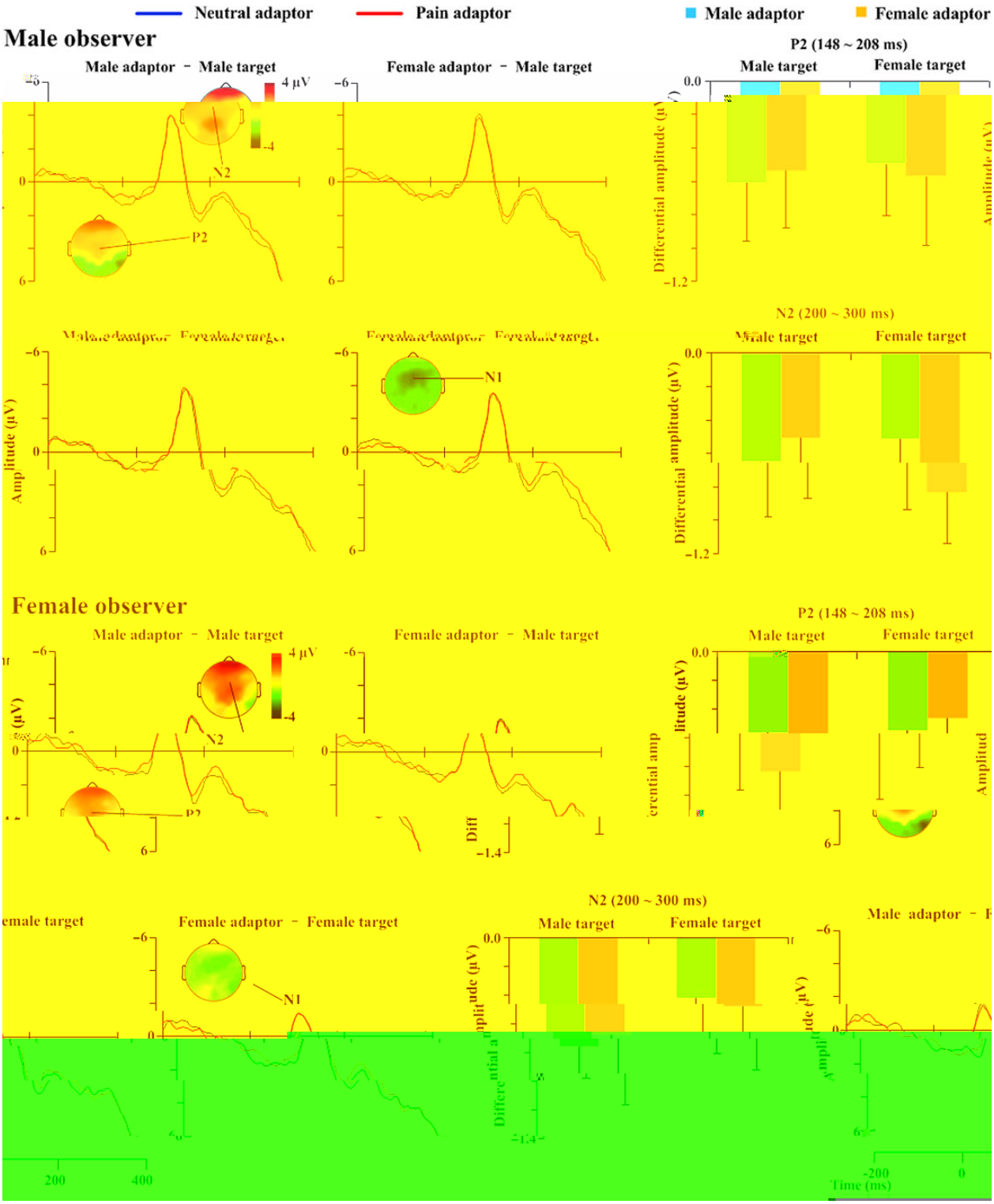


Figure 5. P2/N2 . ERP C ( ) . ERP - - . T P2/N2 . O , P2/N2 , .

S P2 2012). T MRI fi - - (S H (S . 2007;

S . 2014)

(X . 2009; A . 2013; S . 2014). S P2

P2 . H , / P2 . S P2 . F MRI P . I (V E 1992; V . 2010) (S H 2012). R P2 (S . 2013). T fi . T fi M ERP / N1, P2, N2, P3 , B W (I B 2009; K . 2012). M P2/N2 (I B 2009). S , (S H 2012) P2 C . H , RS / P2 N2 . T N1 (. ., I U 2003; D B 2007) fl , P300 (I U 2005; W -J I 2006) fl (I B 2009). T N170 (V . 2010). O fi RS P2/N2 H ? F , B C 3 (K . 2005). B 6 (K . 2007). A K E C 3 9 C A (S . 2005). T fi

. D . A , , T fi , N170 (R . 2013). T , F , . A fl fl (O W 2003) (R 2000), fl , fi , . T , fi

O fi RS 2 . A (V . 2008; M S 2008). MRI 2 . F , E . (2011) fi RS (EBA) (FBA) . M , EBA FBA. T fi 2 . H , 2 2 2 ( ), . A , 2 , . H , ( ) 2 . O , 2 2 . I , 2

Supplementary Material

S : :// . . . /.

Funding

T N N S F - C (P 31470986, 31421003, 91332125 81161120539) M E C (P 20130001110049).

Notes

Conflict of Interest: N .

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