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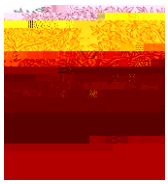

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Oxytocin modulates the racial bias in neural responses to others' suffering

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may up-regulate empathic concern for others. However, the effects of OT on social cognition and prosocial behavior are influenced by the social context (Bartz et al., 2011). OT promoted trust or cooperation with in-group members but not with out-group members (De Dreu et al., 2010, 2011). Thus it is likely that OT may improve empathic neural responses specifically to racial in-group members rather than function as a general facilitator of empathy.

The current study tested this hypothesis using a randomized double-blind within-subjects placebo-controlled design. From male adult subjects, we recorded ERPs to racial in-group and out-group faces expressing pain or

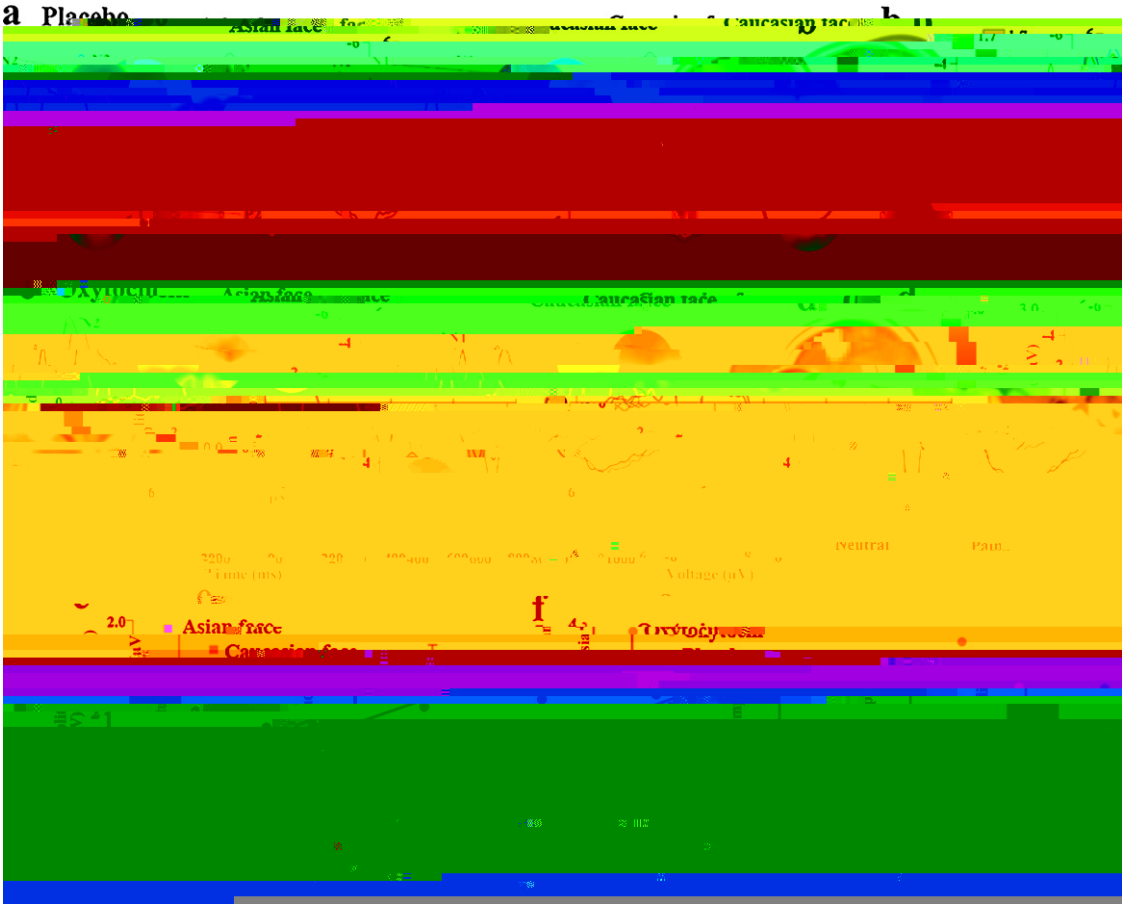

Fig. 2. Illustration of the OT effects on empathic neural responses. (a) ERPs recorded at FCz to pain and neutral expressions after placebo treatment. (b) Source estimation of the neural activity in the P2 time window that differentiated between pain and neutral expressions of Asian faces in the placebo condition. The scale

Table 1
Behavioral performances and subjective rating scores (mean ± SD).

	Expression	Placebo		Oxytocin	
		Asian	Caucasian	Asian	Caucasian
Reaction					

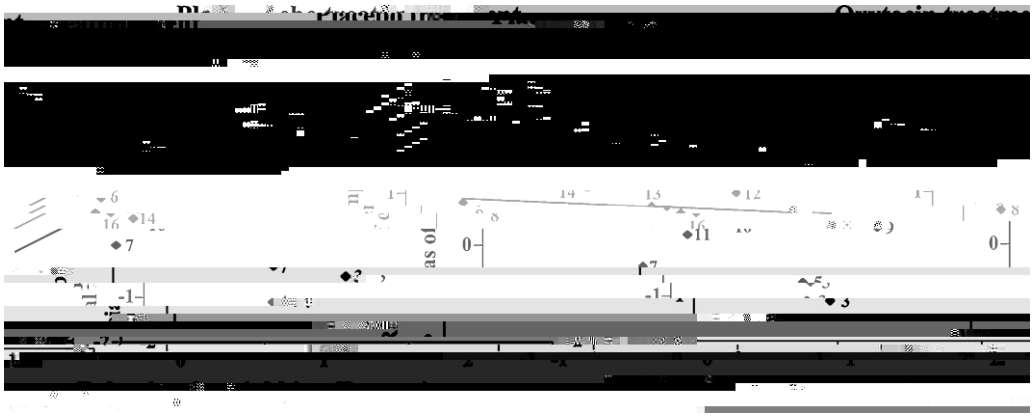

Fig. 3. Illustration of the correlation between the racial bias in empathic neural responses and the D score in the placebo and OT conditions, respectively. Each individual participant was indicated with a number.

in-group members and the racial bias in empathic neural responses in the P2 time window, after the OT treatment.

The ANOVAs of the N2 amplitudes showed significant main effects of race (Fz: $F(1,15) = 49.35$, $p < 0.001$; FCz: $F(1,15) = 47.61$, $p < 0.001$; Cz: $F(1,15) = 49.65$, $p < 0.001$; F3–F4: $F(1,15) = 36.28$, $p < 0.001$; FC3–FC4: $F(1,15) = 46.24$, $p < 0.001$; C3–C4: $F(1,15) = 53.36$, $p < 0.001$) and expression (Fz: $F(1,15) = 3.49$, $p = 0.081$; FCz: $F(1,15) = 7.87$, $p = 0.013$; Cz: $F(1,15) = 6.74$, $p = 0.020$; FC3–FC4: $F(1,15) = 5.56$, $p = 0.032$; C3–C4: $F(1,15) = 3.91$, $p = 0.067$), due to that the N2 was of larger amplitude to Asian than Caucasian faces and to neutral than pain expressions (Fig. 2a and c). There were also significant main effects of race on P3 amplitude (Pz: $F(1,15) = 8.38$, $p = 0.011$; P3–P4: $F(1,15) = 6.29$, $p = 0.023$) and N170 amplitudes (P7–P8: $F(1,15) = 38.13$, $p < 0.001$;

sustained variation of implicit attitudes might have modified the neural activity to perceived pain in racial in-group members in a top-down manner. This possibility should be investigated in future research.

Empathic neural responses are associated with altruistic behavior. Neural activity to perceived pain predicts how much money participants donate (

De Dreu, C.K.W., Greer, L.L., Van Kleef, G.A., Shalvi, S., Handgraaf, M.J.J., 2011. Oxytocin promotes human ethnocentrism. Proceedings of the National Academy of Sciences of the United States of America 108, 1262–2126.
De Dreu, C.K.W., 2012. Oxytocin modulates cooperation within and competition between groups: an integrative review and research agenda. Hormones and Behavior 61, 419–428.
Decety, J., Yang, C., Cheng, Y., 2010. Physicians down-regulate their pain empathy response: an event-related brain potential study. NeuroImage 50, 1676–1682.
de Waal, F.B., 2008. Putting the altruism back into altruism: the evolution of empathy. Annual Review of