Journal of E perimental Social Ps cholog 45 (2009) 1048 1051

Contents lists available at ScienceDirect

Journal of E perimental Social Ps cholog

journal homepage: www.elsevier.com/locate/jesp

FlashReport

Self-face ad antage is modulated b social threat Boss effect on self-face recognition

Yina Ma, Shihui Han *

Department of Ps cholog , Peking Universit , 5 Yihe uan Road, Beijing 100871, People's Republic of China

ARTICLE INFO

Article histor :
Reci ed 7 April 2009
Re ised 11 Ma 2009
A ailable online 19 Ma 2009

Ke words:
Face recognition
Self
Social threat
Implicit positi e association

ABSTRACT

Human adults usuall respond faster to self-face than to faces of others. The self-face ad antage has been associated ith an implicit positi e association ith the self. The current ork in estigated hether social threats modulate self-face recognition b asking graduate students to identif orientations of self-face in a high-threat conte t, in hich self-face and a facult ad isor's face ere presented in one block of trials, or in a lo -threat conte t, in hich self-face and a face of another facult member ere presented in one block of trials. We found a self-face ad antage in the lo -threat conte t but a self-face disad antage in the high-threat conte t (i.e., slo er responses to self-face compared to the ad isor's face). Moreo er, the self-face disad antage positi el correlated ith the degree of fear of negati e e aluations from ad isors. Our ndings suggest that self-face recognition is strongl modulated b social interactions ith in uential superiors ithin social hierarchies.

Introduction

> *A man has as man social selves as there are individuals who recogni e him and carr an image of him in their mind. William James, The principles of ps cholog* (1890/1950, *Vol. I, p.* 294)

The distincti eness of the self is re ected in multiple cogniti e processes, such as self-face recognition (Keenan et al., 1999) and self-referential memor (Klein, Cosmides, Toob , & Chance, 2002; Rogers, Kuiper, & Kirker, 1977), hich ha e been associated ith neural acti it in se eral brain regions (see Northoff et al., 2006; Zhu & Han, 2008). Ho e er, since the time of William James, it has been noted that self-concept depends greatl on social conte ts in hich the self interacts ith others. For e ample, hile one ma remember information about the self better than information about others (Con a , Wang, Han u, & Haque, 2005; Rogers et al., 1977), this self-ad antage in memor is eakened in a conte t that includes close others (e.g., mother/father/best friend, Zhu & Zhang, 2002).

Similarl , self-face recognition is also in uenced b conte tual information. Human adults manifest distinct self-face recognition, responding faster to their o n faces than to faces of unfamiliar or familiar others in isual search (Tong & Naka ama, 1999), face o ner identi cation (Keenan et al., 1999), or face orientation identi cation tasks (Ma & Han, in press; Sui & Han, 2007). Ho e er, our recent research sho ed that self-face recognition is strongl affected b e perimentall manipulated conte ts. While adults responded faster to orientations of self-face compared to familiar faces, the self-face ad antage as eliminated hen self-concept as threatened b a priming procedure that associated the self ith negati e traits (Ma & Han, in press). The results support an implicit positi e association (IPA) theor , hich posits that self-face recognition and the concomitant self-a areness acti ate positi e attributes in self-concept, hich in turn facilitate beha ioral responses to self-face and result in self-ad antage in face recognition (Ma & Han, in press).

The current ork assessed hether social threats confronted in naturalistic social situations to one's positi e associations also modulate self-face recognition. One social threat commonl e perienced is being negati el e aluated b in uential superiors ithin a social hierarch such as one's boss, hich usuall results in dif cult of promotion or e en loss of one's job. The ps chological consequences of such a social threat ma include a reduction of positi e self-associations, hich induces eakened self-ad antage during face recognition according to the IPA theor . Gi en that face perception induces both the processing of ph sical appearance and automatic access to information about familiar indi iduals such as personal traits and attitudes (Gobbini & Ha b , 2007), e h poth- esi ed that the appearance of in uential superiors ithin a social hierarch ma induce social threats and lead to elimination of self-face ad antage. To assess this, e asked graduate students to identif orientations of self-face that as sho n in one block of trials ith either their facult ad isor's face (high-threat condition) or ith the face of another facult member ho as not ithin

* Corresponding author. Fa : +86 10 6276 1081.
E-mail address: shan@pku.edu.cn (S. Han).

0022-1031/$ - see front matter © 2009 Else ier Inc. All rights reser ed.
doi:10.1016/j.jesp.2009.05.008

their o n lab (lo threat condition)[1]. As negati e e aluations from ad isors constitute higher threats to self-esteem compare to those from other facult members, as indicated b subjecti e reports of greater fear of being negati el e aluated b ad isors (see "Results"), e e pected that the self-face ad antage ould be reduced in the high than lo threat conditions. To further quantif the relation bet een subjecti e e aluations of social threats and beha ioral performances associated ith face recognition, e e amined hether differential responses to self-face and ad isor's face co- aried ith indi iduals' subjecti e ratings of fear of negati e e aluations from the ad isor. We ould e pect stronger in uences on self-face recognition for those ho reported greater fear of being negati el e aluated b their ad isors.

Method

Participants

T ent health Chinese graduate students (10 females, mean age = 24.8, SD = 1.94) participated in this stud . All had orked ith their ad isors more than a ear (14 48 months). All ere right-handed and had normal or corrected-to-normal ision.

Questionnaire measurement

The Brief Fear of Negati e E aluation (Brief-FNE) scale (Lear , 1983) as modi ed to assess participants' fear of being negati el e aluated b others. All items ere the same as the original Brief-FNE scale, e cept that participants had to rate each statement t ice, once for the ad isor and once for another facult member ho orked at the same department but not ithin one's o n lab (e.g., I am frequentl afraid of Prof. XXX noticing m shortcomings). Participants had to indicate ho properl each statement applied to themsel es using a 5-point scale (1 = not at all and 5 = e tremel right). An independent question as used to e aluate subjecti e ratings of social status (de ned as an indi idual's o erall abilit to control or in uence other people and institutions) of the ad isor and another facult member using an 11-point scale (0 = not all dominant and 10 = e tremel dominant).

Stimuli and procedure

Ten digital face images ere taEnt

ra s using MatLab and reorgani ed randoml to form scrambled faces that did not contain an facial features but contained a gra bar on the left or right (Fig. 1a). All images ere calibrated in luminance and contrast. Each stimulus subtended a isual angle of 2.13° × 2.17° at a ie ing distance of 70 cm and as presented for 200 ms at the center of the screen follo ed b a ation cross ith a duration ar ing bet een 800 and 1200 ms. Participants had to judge hether each face oriented to the left or right or to judge locations of a gra bar in scrambled faces (left or right) b pressing t o ke s using the inde and middle ngers. Instructions emphasi ed both response speed and accurac .

There ere 40 faces and 20 scrambled faces in each block of trials. Self-face as presented in a high-threat conte t in t o blocks of trials (20 trials of self-face and 20 trials of ad isor's face in each block) and in a lo -threat conte t in t o blocks of trials (20 trials of self-face and 20 trials of another facult member's face in each block). A labmate's face and the ad isor's faces ere presented in t o blocks of trials to e amine hether participants responded generall faster to ad isors' faces e en hen sho n in one block ith other non-self faces. For each stimulus condition, participants responded ith the left hand in one block but ith the right hand in another block. The orders of responding hands and conditions ere counterbalanced across participants.

Results

Subjective ratings

Subjecti e report indicated comparable social status of ad isors and facult members (8.30 ± 1.45 s. 7.85 ± 1.57, $t(1, 19) = 1.690$, $p = 0.107$). The results of the Brief-FNE Scale suggested that participants ere more afraid of negati e e aluation from ad isors than from facult members (3.38 ± 0.73 s. 2.41 ± 0.66, $t(1, 19) = 5.265$, $p < 0.001$).

RT results

Response accurac as high in face orientation judgment tasks (mean = 94.96% ± 2.43%). Reaction times (RTs) ith correct responses and ithin three standard de iations ere anal ed. Similar to our pre ious stud (Ma & Han, in press), RTs ere normali ed b di iding RTs to self/other faces b RTs to scrambled faces to rule out the i uence of difference in response selection and e ecution bet een different blocks of trials. Response accuracies and normali ed RTs ere subjected to repeated measure anal ses of ariance (ANOVAs) ith Hand (left s. right hand), Face (self s. other faces), and Threat (high- s. lo -threat) as independent ithin-subjects ariables.

ANOVAs of response accuracies did not sho an signi cant effect ($ps > 0.05$). ANOVAs of normali ed RTs sho ed a signi cant interaction of Face and Threat ($F(1, 19) = 58.469$, $p < 0.001$, $\eta^2 = 0.755$, Fig. 1b and c) as normali ed RTs to one's o n and others' faces sho ed a re erse pattern in the high-threat and lo -threat conte t conditions. Post-hoc anal sis con rmed that normali ed RTs ere signi cantl shorter to self-face than facult members' faces ($F(1, 19) = 15.531$, $p < 0.001$, $\eta^2 = 0.450$) but signi cantl longer to self-face than ad isors' faces ($F(1, 19) = 38.452$, $p = 0.001$, $\eta^2 = 0.669$). This "boss effect" as more salient ith the left-hand responses, resulting in a marginall signi cant triple interaction of Face × Threat × Hand ($F(1, 19) = 3.757$, $p = 0.068$, $\eta^2 = 0.165$). Moreo er, left-hand responses to self-face ere faster in the lo -threat than high-threat conte tual conditions ($F(1, 19) = 4.785$, $p = 0.041$, $\eta^2 = 0.201$) hereas left-hand responses did not differ signi cantl to faces of ad isors and facult members ($F(1, 19) = 1.116$, $p = 0.304$, $\eta^2 = 0.055$), suggesting that responses to self-face ere inhibited b the presence of ad isors' faces.

Normali ed RTs to faces of labmates and ad isors ere also subjected to ANOVAs ith Hand (left s. right hand) and Face (labmate s. ad isor) as independent ithin-subjects ariables. Ho e er neither the main effects nor the interaction reached signi cance ($ps > 0.05$, Fig. 1b and c), suggesting that social threat from superiors ithin a social hierarch does not necessaril result in slo ed responses to inferiors.

Correlation anal sis

To further quantif the relation bet een subjecti e e aluation of social threat from others and beha ioral performances associated ith self-face recognition, e calculated the correlation bet een the mean rating scores of the Brief-FNE Scale related to ad isors and the differential RTs (normali ed RTs to self-face minus normali ed RTs to ad isors' faces). We found a signi cant positi e correlation bet een subjecti e rating scores of the Brief-FNE Scale and left-hand responses ($r = 0.500$, $p = 0.025$, Fig. 1d) but not bet een subjecti e rating scores and right-hand responses ($r = -0.146$, $p = 0.538$). The higher the Brief-FNE scores, the stronger the self-face disad antage in left-hand responses. Similar anal sis of differential RTs in the lo -threat conte t failed to sho signi cant correlation ($p > 0.1$). The rating scores of social status did not sho signi cant correlation ith the differential RTs to self-face and ad isors' faces ($r = -0.205$, $p = 0.385$).

Discussion

The results of questionnaire measurements suggest that, although subjecti e feelings of social status ere comparable to one's o n ad isor and to another facult member, participants sho ed greater fear of being negati el e aluated b one's o n ad isor than b the facult member. This indicates that ad isors constitute a higher social threat to one's self-esteem compared to other facult members. More interestingl , e sho ed e idence that self-face processing as strongl modulated b social conte ts that carr information of threats to the self. Participants responded faster to self-face than to a facult member's face. This is consistent ith pre ious obser ations (Tong & Naka ama, 1999; Keenan et al., 1999; Ma & Han, in press) and indicates a self-face ad antage o er faces of others ho implicate lo threats to the self. Ho e er, the self-face ad antage as eliminated hen self-face as presented ith ad isors' faces that implicated a high social threat to the self so much so that RT results e en illustrated a self-face disad antage under this circumstance. The distinct patterns of self-face processing, i.e., self-ad antage in the lo -threat conte t and self-disad antage in the high-threat conte t, arose from dela ed responses to self-face in the high-than lo -threat conte ts since responses to others' (ad isors and other facult members) faces did not differ bet een high and lo -threat conte ts.

Our results suggest that perce ing faces ith high social status alone cannot modulate self-face processing because comparable subjecti e ratings of social status bet een ad isors and facult members did not necessaril result in comparable RTs to self-face sho n together ith ad isors' or facult members' faces. The boss effect on self-face recognition could not be interpreted as the effect of general fear or attentional capture because RTs did not differentiate ad isor's faces from labmates' faces. The boss effect could not simpl re ect i uence of a positi e and respected person because, although subjecti e reports on social status indicated comparable social status of the ad isor and the facult member, the facult member did not induce faster responses compared to self-face.

The fact that the self-face disad antage in the high-threat conte t positi el correlated ith subjecti e feelings of fear of being negati el e aluated b ad isors supports the proposal that social threat modulates self-face processing through changing one's IPA and pro ides further e idence for the role of IPA in self-face ad antage (Ma & Han, in press). The effect of social threats on self-face ad antage indicates that positi e self-associations depend on social interactions ith in uential superiors in real life situations since negati e e aluations from the in uential superiors alert individuals to the possibilit of social e clusion (Lear , Tambor, Terdal, & Do ns, 1995). The presence of in uential superiors modulates self-face recognition b shaping self-concept and gi es rise to multiple social self-identities.

Although the correlation anal sis suggests a relation bet een the self-face disad antage in the high-threat conte t and subjecti e feelings of fear of being negati el e aluated b ad isors, such correlation as more salient ith left-hand than right-hand responses. Similarl , the effect of self-concept threat on self-face recognition as more salient on left-hand than on right-hand responses (Ma & Han, in press). Prior brain lesion and neuroimaging studies suggest right-hemisphere dominance in self-face recognition (Breen, Caine, & Coltheart, 2001; Keenan, Nelson, O'Connor, & Pascual-Leone, 2001; Sui & Han, 2007; Uddin, Iacoboni, Lange, & Keenan, 2007; but see Turk et al., 2002 for opposite obser ations). There is also e idence that the right hemisphere dominates the processing of negati e emotion such as fear (Adolphs, Damasio, Tranel, & Damasio, 1996; Da idson, 1992) and the processing of negati e concepts (Cunningham, Espinet, DeYoung, & Zela o, 2005). Thus the correlation results possibl re ected the interaction bet een self-face recognition and an iet about negati e attitudes on the self from in uential superiors that are represented mainl in the right hemisphere.

It should be noted that, as onl 20 subjects ere recruited, our stud pro ided a preliminar test of the effect of social threat on self-face recognition. Moreo er, self-concept is strongl in uenced b cultures such that Western cultures encourage the independent self that is autonomous and insusceptible hereas East Asian cultures foster the interdependent self that emphasi es the interconnectedness of human beings and is ulnerable to conte tual in uences (Markus & Kita ama, 1991). Recentl , Sui, Liu, and Han (in press) sho ed that self-face ad antage as stronger in Westerners than in Chinese and that such cultural difference in self-face ad antage as associated ith frontal acti it as earl as 300 ms after sensor stimulation. Cultural attitudes to ards peoples' status ithin social hierarchies also e ist bet een Western and East Asian cultures. An indi idual's dominant beha ior is positi el reinforced and people are generall encouraged to dominate and climb the hierarch in the United States (Triandis & Gelfand, 1998). In contrast, a collecti ist societ (e.g., Japanese societ) encourages subordination (Triandis & Gelfand, 1998) and praises being agreeable rather than being dominant (Mosko it , Suh, & Desaulniers, 1994; Realo, Allik, & Vadi, 1997). The fact that ad isors constitute a high threat to positi e self-association ma be speci c to East Asian cultures that foster both interdependent sel es and subordination. In Western cultures, ho e er, one ma e pect less effects of social an iet of threat from in uential superiors on self-face recognition. This can be assessed in future cross-culture studies. Future research ma also e amine the interaction of emotion and social rele ance using ad isors' faces ith positi e or negati e e pressions.

Acknowledgment

This ork as supported b National Natural Science Foundation of China (Project 30630025, 30828012). We thank Sook-Lei Lie for helpful comments on an earl draft of this paper.

References

Adolphs, R., Damasio, H., Tranel, D., & Damasio, A. R. (1996). Cortical s stems for the recognition of emotion in facial e pressions. *Journal of Neuroscience, 16*, 7678 7687.

Breen, N., Caine, D., & Coltheart, M. (2001). Mirrored-self misidenti cation: T o case of focal onset dementia. *Neurocase, 7*, 239 254.

Con a , M. A., Wang, Q., Han u, K., & Haque, S. (2005). A cross-cultural in estigation of autobiographical memor : On the uni ersalit and cultural ariation of the reminiscence bump. *Journal of Cross-cultural Ps cholog , 36*, 739 749.

Cunningham, W. A., Espinet, S. D., DeYoung, C. G., & Zela o, P. D. (2005). Attitudes to the right- and left: Frontal ERP as mmetries associated ith stimulus alence and processing goals. *NeuroImage, 28*, 827 834.

Da idson, R. J. (1992). Anterior cerebral as mmetr and the nature of emotion. Special issue: The role of frontal lobe maturation in cogniti e and social de elopment. *Brain and Cognition, 20*, 125 151.

Gobbini, M. I., & Ha b , J. V. (2007). Neural s stems for recognition of familiar faces. *Neurops chologia, 45*, 32 41.

James, W. (1890/1950). *The principles of ps cholog* . Ne York: Do er.

Keenan, J. P., McCutcheon, B., Freund, S., Gallup, G. G., Sanders, G., & Pascal-Leone, A. (1999). Left hand ad antage in a self-face recognition task. *Neurops chologia, 37*, 1421 1425.

Keenan, J. P., Nelson, A. M., O'Connor, M., & Pascual-Leone, A. (2001). Self-recognition and the right hemisphere. *Nature, 409*, 305.

Klein, S. B., Cosmides, L., Toob , J., & Chance, S. (2002). Decisions and the e olution memor : Multiple s stems, multiple functions. *Ps chological Revie , 109*, 306 329.

Lear , M. R. (1983). A brief ersion of the fear of negati e e aluation scale. *Personalit and Social Ps cholog Bulletin, 9*, 371 375.

Lear , M. R., Tambor, E. S., Terdal, S. K., & Do ns, D. L. (1995). Self-esteem as an interpersonal monitor: The sociometer h pothesis. *Journal of Personalit and Social Ps cholog , 68*, 518 530.

Ma, Y., & Han, S. (in press). Wh respond faster to the self than others? An implicit positi e association theor of self ad antage during implicit face recognition. *Journal of E perimental Ps cholog : Human Perception and Performance*.

Markus, H. R., & Kita ama, S. (1991). Culture and the self: Implications for cognition, emotion, and moti ation. *Ps chological Revie , 98*, 224 253.

Mosko it , D. S., Suh, E. J., & Desaulniers, J. (1994). Situational in uences on gender differences in agenc and communion. *Journal of Personalit and Social Ps cholog , 66*, 753 761.

Northoff, G., Hein el, A., de Greck, M. D., Bermpohl, F., Dobro oln , H., & Panksepp, J. (2006). Self-referential processing in our brain A meta-anal sis of imaging studies on the self. *NeuroImage, 31*, 440 457.

Realo, A., Allik, J., & Vadi, M. (1997). The hierarchical structure of collecti ism. *Journal of Research on Personalit , 31*, 93 116.

Rogers, T. B., Kuiper, N. A., & Kirker, W. S. (1977). Self-reference and the encoding of personal information. *Journal of Personalit and Social Ps cholog , 35*, 677 688.

Sui, J., Liu, C. H., & Han, S. (in press). Cultural difference in neural mechanisms of self-recognition. Social Neuroscience.

Sui, J., & Han, S. (2007). Self-construal priming modulates neural substrates of self-a areness. *Ps chological Science, 18*, 861 866.

Tong, F., & Naka ama, K. (1999). Robust representations for faces: E idence from isual search. *Journal of E periment Ps cholog : Human Perception and Performance, 25*, 1016 1035.

Triandis, H. C., & Gelfand, M. J. (1998). Con erging measurement of hori ontal and ertical indi idualism and collecti ism. *Journal of Personalit and Social Ps cholog , 74*, 118 128.

Turk, D. J., Heartherton, T. F., Kelle , W. M., Funnell, M. G., Ga aniga, M. S., & Macrae, C. N. (2002). Mike or me? Self-recognition in a split-brain patient. *Nature Neuroscience, 5*, 841 842.

Uddin, L. Q., Iacoboni, M., Lange, C., & Keenan, J. P. (2007). The self and social cognition: The role of cortical midline structures and mirror neurons. *Trends in Cognitive Sciences, 11*, 153 157.

Zhu, Y., & Han, S. (2008). Cultural differences in the self: From philosoph to ps cholog and neuroscience. *Social and Personalit Ps cholog Compass, 2*, 1799 1811.

Zhu, Y., & Zhang, L. (2002). An e perimental stud on the self-reference effect. *Sciences in China, Series C, 45*, 120 128.