Effects of Different Moral Domains on Source Memory for Faces

Authors: Yang Yuxiang, Liu Yuanyuan, Hu Chuanpeng, Peng Kaiping, Kaiping Peng

Date: 2018-09-15T00:00:00+00:00

Abstract

Understanding information regarding others' moral character facilitates individuals' search for potential collaborators and avoidance of potential losses in social contexts. Precisely due to the significance of moral character information, people may prioritize the processing of information related to others' moral traits. Based on Moral Foundations Theory, the present study investigated the influence of positive and negative information from harm and purity moral domains on face memory. Thirty-two participants initially learned 24 neutral male faces associated with different moral information, which comprised four dimensions: (moral domain: harm/care and sanctity/purity) × 2 (valence: positive and negative). Following a brief arithmetic distraction task, participants completed tests of face recognition memory and source memory. The results demonstrated that, in terms of source memory performance, faces paired with purity moral domain information may be superior to those paired with harm moral domain information. This finding may indicate that different moral behaviors exert differential effects on face memory, with purity domain information potentially yielding more profound face memory due to its stronger emotional salience. As an exploratory study, the conclusions of this experiment necessitate validation through further research.

Full Text

The Influence of Different Moral Domains on Source Memory for Faces

Yuxiang Yang
Department of Psychology, Hubei University, Wuhan 420062, China
Department of Psychology, Graduate School of Letters, Hokkaido University, Sapporo, Hokkaido 060-0810, Japan

Yuanyuan Liu
Department of Psychology, Hubei University, Wuhan 420062, China

Chuan-Peng Hu
Department of Psychology, Tsinghua University, Beijing 100086, China
Neuroimaging Center, Johannes Gutenberg University, 55131 Mainz, Germany

Kaiping Peng
Department of Psychology, Tsinghua University, Beijing 100086, China

The results reported here constitute part of Yuxiang Yang' s Bachelor' s thesis.

Yuxiang Yang and Chuan-Peng Hu developed the study concept and experimental design. Yuxiang Yang and Yuanyuan Liu collected the experimental data. Yuxiang Yang and Chuan-Peng Hu analyzed the data and drafted the manuscript. All authors reviewed and approved the final manuscript.

We embrace the values of openness and transparency in science [**?**]. Accordingly, we have submitted this manuscript (an unpublished paper) to a preprint platform (Chinaxiv.org) and made our data publicly available on OSF (https://osf.io/nnp9y/). The research reported in this paper remains preliminary (see discussion of limitations at the end of the article) and has not undergone peer review. Therefore, if you wish to cite this paper, have questions about the data, or hope to build upon this research, we would be happy to provide assistance with procedures and other support. Please contact Dr. Chuan-Peng Hu at hcp4715@hotmail.com.

Abstract

Information about others' moral character is crucial for successful social life, helping people avoid "bad guys" and identify potential cooperators. Given the importance of moral character information, people may tend to process such information more deeply than other types of information. To test this hypothesis, the current study examined how positive and negative moral information from harm and purity domains affects face memory. Thirty-two participants first learned 24 neutral male faces paired with different moral behaviors, representing a 2 (moral domain: harm/care vs. sacred/purity) $\times$ 2 (valence: positive vs. negative) design. After a brief arithmetic filler task, participants completed tests of old/new recognition and source memory. The results showed that source memory performance was better for faces paired with purity-domain behaviors than for faces paired with harm-domain behaviors, regardless of valence. These preliminary results suggest that different moral behaviors may have differential effects on face memory. However, these findings require confirmation through further experiments with more powerful designs.

Keywords: moral character, harm, purity, face, source memory

Introduction

In daily life, we constantly make moral judgments, evaluating actions as good or bad from an objective standpoint. In such evaluations, we typically use morality as our criterion, where "good" generally refers to moral actions and "bad" refers to immoral actions. Similarly, in interpersonal interactions, moral evaluation of a person represents a crucial standard by which we measure them.

Due to the importance of moral information, it may receive prioritized processing in human cognition. Information concerning others' moral character is directly relevant to individual interests. Knowing about others' moral behaviors before direct interaction helps individuals avoid potential losses (e.g., being deceived in cooperation) and identify potential collaborators (e.g., finding trustworthy and capable partners). Social psychological research demonstrates that information related to others' moral character indeed receives greater attention and is more easily remembered. For example, Anderson, Siegel, Bliss-Moreau, and Barrett (2011) used binocular rivalry to explore how long faces paired with different behaviors dominated conscious awareness, finding that faces paired with immoral behaviors remained in consciousness longer. Using face source memory paradigms, Bell and colleagues also found that while cheaters' faces showed no advantage in old/new recognition compared to neutral and trustworthy faces, they demonstrated a significant advantage in source memory [**?**, **?**, **?**]. This may occur because participants exhibit a stronger desire to avoid faces associated with negative moral character information [**?**].

To further explore how moral information beyond deception influences face source memory, we selected the harm and purity domains from Moral Foundations Theory for investigation. Moral Foundations Theory categorizes morality into five distinct domains based on evolutionary origins: harm/care, fairness/reciprocity, ingroup/loyalty, authority/respect, and purity/sanctity [**?**]. These different moral domains are associated with distinct moral emotions; for instance, the purity/sanctity domain is linked to disgust, while the harm/care domain is associated with anger [**?**]. Dehghani et al. (2016) found that people prefer greater spatial and social distance from those whose purity-domain moral beliefs differ from their own compared to other domains, suggesting that disgust may be activated when encountering individuals with incompatible purity-domain beliefs.

In this experiment, we selected the harm/care and purity/sanctity domains from Moral Foundations Theory as our independent variables. These domains correspond to two distinct emotions (anger for harm/care, disgust for purity/sanctity), and disgust serves as a human "protector" [**?**, **?**, **?**]. We hypothesized that source memory would be better for faces associated with purity-domain information, as this would be evolutionarily adaptive: recognizing a face while recalling its associated purity-domain behavior would help us decide whether to avoid the person or engage in further social interaction.

Method

Participants

We recruited 32 college students from Hubei University (23 female, mean age = 20.69 ± 1.36 years) with normal or corrected-to-normal vision. All participants provided informed consent before the experiment and received compensation upon completion.

Materials

Face stimuli. We selected faces from the CAS-PEAL-R1 face database, which includes 30,900 images of 1,040 Chinese individuals photographed from various angles [**?**]. From this database, we selected 150 neutral-expression male face images of individuals aged 18-30 years. We then removed hair and clothing from these images, retaining only the face area, and cropped them to 220$×$250 pixels. A separate group of participants who did not take part in the main experiment rated these images on seven dimensions: attractiveness, competence, aggressiveness, trustworthiness, maturity, dominance, and likability. Each image received at least 34 ratings (with at least 10 valid ratings per face). Based on previous research showing that face attractiveness [**?**, **?**] and trustworthiness [**?**, **?**, **?**] affect face memory, we selected 48 faces with similar trustworthiness and attractiveness scores (trustworthiness: 3.74 ± 0.196; attractiveness: 3.94 ± 0.454). Half of these faces were randomly assigned as study items paired with behavioral descriptions, while the other half served as new foils during the recognition test.

Description materials. Based on moral domain descriptions used in previous research [**?**, **?**] and definitions of each moral domain from Haidt and colleagues [**?**, **?**], we created 40 behavioral descriptions according to a 2 (moral domain: harm/care vs. sacred/purity) × 2 (moral valence: positive vs. negative) design, with 10 descriptions per condition. To validate these materials, we recruited an independent sample of undergraduate students to rate the 40 descriptions on two dimensions using a 7-point scale: moral valence (-3 = very immoral; 3 = very moral) and moral domain classification. We collected 39 questionnaires and excluded data from participants who failed attention checks, yielding 20 valid samples (11 female, mean age = 21.9 ± 1.774 years). The mean moral valence ratings were: harm-domain negative = -2.39 ± 0.28; harm-domain positive = 2.32 ± 0.12; purity-domain negative = -2.17 ± 0.43; purity-domain positive = 1.92 ± 0.25. The average proportion of domain classification in the intended category exceeded 80% for each dimension.

A 2 (moral domain: harm vs. purity) × 2 (moral valence: negative vs. positive) repeated-measures ANOVA on moral valence ratings revealed a significant main effect of valence, $F(1,10) = 3407.91$, $p < .001$, $p^2 = .997$. The main effect of moral domain was not significant, $F(1,10) = 0.330$, $p = .578$, $p^2 = .032$. The interaction was significant, $F(1,10) = 17.22$, $p = .002$, $p^2 = .633$. Simple effects analysis showed no significant difference between harm-domain

negative and purity-domain negative descriptions (F = 1.13, p = .312), but a significant difference between harm-domain positive and purity-domain positive descriptions (F = 12.26, p = .006).

Apparatus

The experiment was presented on a PC using E-Prime 2.0.

Procedure

The procedure consisted of five main steps:

(1) Participants completed a personal information form and signed the informed consent document.

(2) Before the formal experiment began, the experimenter provided participants with the following instructions: "Welcome to this experiment. The experiment consists of two phases. Before starting, you need to read some materials (see Appendix II). You may begin the formal experiment only after confirming that you fully understand the content. If anything is unclear, please ask the experimenter at any time. After completing both experimental phases, you will also complete a brief questionnaire. If you have no questions, please follow the on-screen instructions to begin."

(3) The formal experiment comprised a study phase and a recognition phase. In the study phase, each trial began with a 500 ms fixation cross, followed by simultaneous presentation of a face and behavioral description for 5 seconds (face image: 14.63° × 16.59° visual angle; distance from fixation to face center: 4.01°; description text: 38.58° visual angle; distance from fixation: 11.99°). The description then disappeared, and a likability rating scale from 1 (dislike very much) to 7 (like very much) appeared below the face. Participants responded via keypress, after which the face and scale disappeared and the next trial began.

During the study phase, participants rated 30 faces, including 24 experimental faces and 6 filler faces. The filler faces were paired with neutral descriptions and presented at the beginning (3 faces) and end (3 faces) of the study phase to eliminate primacy and recency effects.

After the study phase, participants completed a simple arithmetic task unrelated to the experimental purpose, serving solely as a distractor.

[Figure 1: see original paper]

(4) Following the arithmetic task, participants completed the recognition phase. The 24 old faces from the encoding phase were mixed with 24 new faces and presented in random order. Participants first judged whether they had seen each face before (options: "seen" or "not seen"). If they responded "seen," they were further asked: "What kind of action did this person do?" (options: "moral" or "immoral"), followed by: "Which

moral domain did the action belong to?" (options: "harm/care domain" or "sacred/purity domain"). If they responded "not seen," the trial advanced directly to the next face. After all 48 faces were presented, the E-Prime program ended. The complete experimental procedure is illustrated in Figure 1.

(5) Finally, participants completed the Disgust Sensitivity Questionnaire and Socioeconomic Status Scale. They also rated the trustworthiness and attractiveness of the 48 faces they had learned.

Data Analysis

All data were analyzed using JASP [**?**, **?**]. We established the following exclusion criteria prior to data collection: (a) participants who did not complete the experiment or had incomplete data records; (b) participants who did not maintain full concentration (since participants were informed this was a memory experiment and chance performance on old/new recognition is 50%, with previous studies using similar paradigms reporting average recognition accuracy around 80% [**?**, **?**, **?**, **?**, **?**], we considered participants with old/new recognition accuracy below 60% as not having concentrated on the task); and (c) participants with extreme data values (defined as values more than three standard deviations from the mean).

Results

Based on these exclusion criteria, data from 8 participants were excluded, leaving 24 participants for the final analysis. In this study, we analyzed only the behavioral experimental results; questionnaire data and post-experiment face ratings were not analyzed.

To examine whether the face descriptions influenced participants' impressions, we conducted a 2 (moral domain: harm vs. purity) × 2 (valence: negative vs. positive) repeated-measures ANOVA on likability ratings. The interaction was not significant, $F(1,23) = 1.435$, $p = .243$, $\omega^2 = .017$. The main effect of moral domain was significant, with harm-domain faces receiving higher likability ratings than purity-domain faces, $F(1,23) = 14.991$, $p < .001$, $\omega^2 = .359$. The main effect of valence was also significant, with positive faces receiving higher ratings than negative faces, $F(1,23) = 170.017$, $p < .001$, $\omega^2 = .871$.

Old/New Recognition

A 2 (moral domain: harm vs. purity) × 2 (valence: negative vs. positive) repeated-measures ANOVA on old/new recognition accuracy (see Table 1) revealed no significant main effect of valence, $F(1,23) = 0.087$, $p = .770$, $\omega^2 = .000$; no significant main effect of moral domain, $F(1,23) = 0.042$, $p = .840$, $\omega^2 = .000$; and no significant interaction, $F(1,23) = 0.215$, $p = .647$, $\omega^2 = .000$.

Table 1 Old/new recognition accuracy across four conditions: 64.6%, 67.4%, 65.3%, 65.3%

Source Memory

We first analyzed the number of hits for the four conditions (harm-negative, harm-positive, purity-negative, purity-positive). Here, hits refer to trials where participants correctly remembered both dimensions of source information (see Table 2). A 2 (moral domain: harm vs. purity) × 2 (valence: negative vs. positive) repeated-measures ANOVA on these hit counts showed no significant main effect of moral domain, $F(1,23) = 0.324$, $p = .575$, $\omega^2 = .000$; no significant main effect of valence, $F(1,23) = 0.039$, $p = .866$, $\omega^2 = .000$; and no significant interaction, $F(1,23) = 0.857$, $p = .364$, $\omega^2 = .000$.

Table 2 Number of correct source memory responses and d' scores across conditions

We then calculated d' scores for each condition (hit rate = hits/6; false alarm rate = probability of incorrectly attributing a face from a different domain to the target domain; d' scores shown in Table 2) [**?**]. A 2 (moral domain: harm vs. purity) × 2 (valence: negative vs. positive) repeated-measures ANOVA on d' scores revealed a significant main effect of moral domain, with higher d' scores for purity-domain than harm-domain faces, $F(1,23) = 6.040$, $p = .022$, $\omega^2 = .081$, $BF_{10} = 2.33$. The main effect of valence was not significant, $F(1,23) = 0.489$, $p = .492$, $\omega^2 = .000$, $BF_{10} = 0.286$, nor was the interaction, $F(1,23) = 0.726$, $p = .403$, $\omega^2 = .000$, $BF_{10} = 0.397$ (see Figure 2 [Figure 2: see original paper]).

Discussion

By associating faces with different moral behaviors and subsequently testing memory, this study found that source memory performance may be better for faces paired with purity-domain behaviors than those paired with harm-domain behaviors. However, this effect emerged only when using d' as the dependent variable, not in recognition accuracy measures. Bayesian factor analysis using default priors indicated that the current data provide only weak evidence [**?**, **?**]. Therefore, the existence of this effect requires further verification.

Our findings diverge from previous research in that we did not observe a main effect of valence. Past studies have demonstrated a cognitive "preference" for immoral information [**?**] and source memory advantages for cheaters [**?**]. Several factors may explain this null valence effect. One possibility is that the source memory advantage for cheaters may arise because cheaters threaten our personal interests: to prevent harm to ourselves, we develop enhanced source memory for cheaters. For instance, Bell et al. (2014) found that source memory for faces paired with self-harming immoral events was significantly better than for other events, whereas source memory for faces paired with self-benefiting immoral events not only showed no advantage but was significantly worse than other

events [?]. Thus, the absence of a memory bias for immoral information in the harm or purity domains in our study may be due to the lack of manipulation of participants' motivational states, thereby failing to elicit the motivation to avoid potential harm.

Limitations

First, this study had an insufficient sample size. We collected data from 32 participants, but 8 were excluded based on our predetermined criteria, leaving only 24 participants for final analysis. Using G*Power 3.2 and the observed effect for source memory d' across moral domains from these 24 participants ($F(1,23) = 6.040$, $p = .022$, $\omega^2 = .081$, $p^2 = .208$) as a priori estimates, we calculated that 53 participants would be needed to achieve 95% statistical power.

Second, the experimental design has room for improvement. Because we needed to select neutral male faces as stimuli and face materials were relatively limited, we included only positive and negative valence sentences from different moral domains without a neutral condition. This prevented us from examining valence effects. Future studies should include a neutral condition to further test valence effects.

Third, the processing of face stimuli may have been inadequate. In this study, we adjusted selected face images to upright orientation, converted them to grayscale, and cropped them. However, the CAS-PEAL-R1 face database does not have standardized clothing, making it difficult to completely remove all clothing portions during cropping. Additionally, hairstyles varied across face stimuli, which could have served as memory cues rather than allowing for pure face memory.

References

[?] Anderson, E., Siegel, E. H., Bliss-Moreau, E., & Barrett, L. F. (2011). The visual impact of gossip. Science, 332(6036), 1446-1448.

[?] Bell, R., & Buchner, A. (2010). Valence modulates source memory for faces. Mem Cognit, 38(1), 29-41.

[?] Bell, R., & Buchner, A. (2011). Source memory for faces is determined by their emotional evaluation. Emotion, 11(2), 249-261.

[?] Bell, R., Buchner, A., Erdfelder, E., Giang, T., Schain, C., & Riether, N. (2012). How specific is source memory for faces of cheaters? Evidence for categorical emotional tagging. J Exp Psychol Learn Mem Cogn, 38(2), 457-472.

[?] Bell, R., Schain, C., & Echterhoff, G. (2014). How selfish is memory for cheaters? Evidence for moral and egoistic biases. Cognition, 132(3), 437-442.

[?] Buchner, A., Bell, R., Mehl, B., & Musch, J. (2009). No enhanced recognition memory, but better source memory for faces of cheaters. Evolution and Human

Behavior, 30(3), 212-224.

[?] Chakroff, A., & Young, L. (2015). Harmful situations, impure people: an attribution asymmetry across moral domains. Cognition, 136, 30-37.

[?] Dehghani, M., Johnson, K., Hoover, J., Sagi, E., Garten, J., Parmar, N., J., . . . Graham, J. (2016). Purity Homophily in Social Networks. Journal of Experimental Psychology: General, 145, 366-376.

[?] Gao, W., Cao, B., Shan, S., Chen, X., Zhou, D., Zhang, X., & Zhao, D. (2008). The CAS-PEAL Large-Scale Chinese Face Database and Baseline Evaluations. IEEE Transactions on Systems, Man, and Cybernetics - Part A: Systems and Humans, 38, 149-161.

[?] Graham, J., Haidt, J., & Nosek, B. A. (2009). Liberals and conservatives rely on different sets of moral foundations. J Pers Soc Psychol, 96(5), 1029-1046.

[?] Graham, J., Nosek, B. A., Haidt, J., Iyer, R., Koleva, S., & Ditto, P. H. (2011). Mapping the moral domain. J Pers Soc Psychol, 101(2), 366-385.

[?] Haidt, J. (2007). The new synthesis in moral psychology. Science, 316(5827), 998-1002.

[?] Haidt, J., & Joseph, C. (2004). Intuitive ethics: How innately prepared intuitions generate culturally variable virtues. Daedalus, 133(4), 55-66.

[?] Love, J., Selker, R., Marsman, M., Jamil, T., Dropmann, D., Verhagen, A. J., . . . Wagenmakers, E.-J. (2015). JASP. Retrieved from https://jasp-stats.org/download/

[?] Marzi, T., & Viggiano, M. P. (2010). When memory meets beauty: Insights from event-related potentials. Biol Psychol, 84(2), 192-205.

[?] Schönbrodt, F. D., Maier, M., Heene, M., & Zehetleitner, M. (2015). Voluntary commitment to research transparency. Retrieved from http://www.researchtransparency.org/

[?] Snodgrass, J. G., & Corwin, J. (1988). Pragmatics of measuring recognition memory: applications to dementia and amnesia. J Exp Psychol Gen, 117(1), 34-50.

[?] Tsukiura, T., & Cabeza, R. (2011). Remembering beauty: roles of orbitofrontal and hippocampal regions in successful memory encoding of attractive faces. Neuroimage, 54(1), 653-660.

[?] Wagenmakers, E.-J., Love, J., Marsman, M., Jamil, T., Ly, A., Verhagen, J., . . . Morey, R. D. (2018). Bayesian Inference for Psychology. Part II: Example Applications with JASP. Psychonomic Bulletin & Review, 25(1), 58-76.

[?] Hu, C.-P. (2012). The role of emotion and cognition in moral judgments across different moral domains: Evidence from harm and purity domains. Master' s thesis, Hubei University.

[?] Hu, C.-P., Kong, X.-Z., Wagenmakers, E.-J., Ly, A., & Peng, K.-P. (2018). Bayesian factors and their implementation in JASP. Advances in Psychological Science, 26(6), 951-965.

[?] Ye, Y.-H., Xu, Y., Zhu, Y.-J., Liang, J.-Q., Lan, T., & Yu, M. (2016). Characteristics of netizens' moral emotions toward "man-made" disasters: A big data study based on Weibo. Acta Psychologica Sinica, 48(3), 290-304. doi:10.3724/sp.j.1041.2016.00290

Note: Figure translations are in progress. See original paper for figures.