Published in final edited form as:

Emotion. 2013 June ; 13(3): 462–467. doi:10.1037/a0030784.

Hemispheric Asymmetries in Motivation Neurally Dissociate Self-Description Processes

Chad J. Marsolek, Colin G. DeYoung, W. Scott Domansky, and Rebecca G. Deason

University of Minnesota

Abstract

When people describe themselves by responding to personality questionnaires, typically they endorse some items and reject others. Further, most people endorse likable traits and reject unlikeable traits. In one case, people use previously stored information about themselves to judge that a particular trait—usually likable—describes them well, and in the other, they use previously stored information to judge that a particular trait—usually unlikeable—does not describe them well. Here we report evidence that these processes are neurally dissociable, with the former benefiting from engaging left-hemisphere processes and the latter benefiting from engaging right-hemisphere processes. Hemispheric asymmetries in self-description are not unidirectional and do not differ across different personality traits, but do differ between endorsing likable items and rejecting unlikeable items. Thus, we are not dispassionate observers of ourselves. Dissociable, basic motivational processes are involved in the neural architecture underlying self-description.

Keywords

self-description; cerebral hemispheres; emotion

The experience of a coherent self is arguably central to human existence (e.g., Heatherton, Macrae, & Kelley, 2004). Many aspects of the self have been investigated experimentally, including own-body or own-face perception, self-awareness, self-regulation, autobiographical memory, and relevant aspects of theory of mind. Here we focus on self-description, the ability to retrieve previously stored information about ourselves and use that information to judge how well particular descriptors reflect ourselves. Clearly self-description processes are fundamental to the conscious representation of the self. A better understanding of self-description processes and their implementation in the brain is crucial for understanding the psychological and biological basis of the self as a coherent and knowable entity.

Neuroimaging studies have been aimed at examining the neural bases of self-description; however, results have been discrepant especially with respect to cerebral hemispheric

© 2012 American Psychological Association

Correspondence concerning this article should be addressed to Chad J. Marsolek, Department of Psychology, University of Minnesota, 75 East River Road, Minneapolis, MN 55455. chad.j.marsolek-1@umn.edu.

Chad J. Marsolek, Colin G. DeYoung, W. Scott Domansky, and Rebecca G. Deason, Department of Psychology, University of Minnesota.

differences. The results from some studies indicate that self-description involves greater processing in the left hemisphere than in the right (e.g., Zhu, Zhang, Fan, & Han, 2007), although others have more strongly implicated right-hemisphere processes in self-description (e.g., Fossati et al., 2004; Molnar-Szakacs, Uddin, & Iacoboni, 2005). In this study, we tested whether self-description processes exhibit important left/right hemispheric asymmetries in a manner that enables inferences supplementing those enabled by neuroimaging.

Relevant theories lead to different predictions about asymmetries in self-description processes. From one perspective, the processes needed for all kinds of self-description may exhibit a consistent hemispheric asymmetry (although there is disagreement about the direction of this asymmetry). Self-description may be enhanced generally when left-hemisphere processes are engaged more strongly than right-hemisphere processes (e.g., Faust, Kravetz, & Nativ-Safrai, 2004; Gazzaniga, 2000; Zhu et al., 2007) or when right-hemisphere processes are engaged more strongly than left-hemisphere processes (e.g., Fossati et al., 2004; Molnar-Szakacs et al., 2005; Platek, Myers, Critton, & Gallup, 2003). Regardless of which hemisphere is thought to be dominant, this perspective leads to the hypothesis that all forms of self-description are benefited by engaging one hemisphere more strongly than the other.

In contrast, another perspective involves the possibility that different asymmetries in self-description may exist, depending on the particular descriptors involved. This perspective is linked to the finding that the two hemispheres are biased toward different motivational processes. Processes involved in motivation to approach are associated with left-hemisphere activity, whereas processes related to motivation to withdraw are associated with right-hemisphere activity (Harmon-Jones, Gable, & Peterson, 2010), and this asymmetry can be observed when single words are presented as stimuli (e.g., Cunningham, Espinet, DeYoung, & Zelazo, 2005). This suggests that self-description processes may vary in hemispheric asymmetry depending on whether single-word descriptors are approach related or withdrawal related.

This perspective leads to two very different hypotheses, which may be described as *trait* and *likability* hypotheses. Under the trait hypothesis, self-description processes may differ depending on whether the traits that are judged are approach related or withdrawal related, with left-hemisphere advantages in judging approach-related traits and right-hemisphere advantages in judging withdrawal-related traits. In the Big Five personality trait taxonomy (Goldberg, 1992), specific predictions can be made about two traits. Judgments of descriptors reflecting Extraversion may be enhanced when left-hemisphere processes are engaged more strongly than right-hemisphere processes, because Extraversion involves talkativeness and other forms of approach behavior. In contrast, judgments of descriptors reflecting Neuroticism may be enhanced when right-hemisphere processes are engaged more strongly than left-hemisphere processes, because Neuroticism is associated with anxiety, depression, and other states associated with withdrawal.¹ Thus, in a sense, this hypothesis implies that the left hemisphere is more extraverted than the right, whereas the right hemisphere is more neurotic than the left, and that each hemisphere will describe itself accordingly. Hemispheric asymmetries for the other Big Five traits, Agreeableness,

Conscientiousness, and Openness/Intellect, are uncertain because they are less directly linked to approach and withdrawal.

In contrast, the likability hypothesis is that the motivational biases of the two hemispheres may lead to different asymmetries for judging descriptors with different levels of likability, independently of the traits associated with the descriptors. Judging that highly likable descriptors (e.g., “helpful” and “generous” for Agreeableness) describe ourselves well may be more likely when left-hemisphere processes are engaged more strongly than right-hemisphere processes, because endorsement of the descriptor constitutes approach to a reward. In contrast, judging that low likability items (e.g., “rude” and “distrustful” for Agreeableness) describe ourselves poorly may be more likely when right-hemisphere processes are engaged more strongly than left-hemisphere processes, because rejection of the descriptor constitutes withdrawal from a threat.

Such motivational effects on self-evaluation are plausible, even at the level of automatic processing most relevant to hemispheric asymmetries; electrophysiological evidence indicates that effects of positive versus negative trait words take place very early (by 300 ms) when making self-evaluation judgments of trait words (Tucker et al., 2003). Further, the fact that people often self-enhance by overendorsing likable traits and overrejecting unlikeable traits is well established (Paulhus & Trapnell, 2008). Our likability hypothesis implies that the two hemispheres self-enhance differently, the left hemisphere by overendorsing likable traits and the right hemisphere by overrejecting unlikeable traits. Previous neuroscientific findings on self-enhancement have implicated mid-line brain structures and thus do not provide evidence relevant to the question of hemispheric asymmetries in self-enhancement (Beer & Hughes, 2011). Finally, it is worth noting that a combination of the likability and trait hypotheses is possible; different asymmetries may exist depending on combinations of personality traits and levels of likability of items, and we tested this possibility as well.

In the following study, we tested all hypotheses described above by administering a Big Five self-assessment personality inventory using trait-descriptive adjectives (Goldberg, 1992), with each item presented directly to one hemisphere (briefly in the contralateral/opposite visual field). In this situation, processes in the first hemisphere received timing and representational quality advantages over processes in the other hemisphere (interhemispheric communication is required following ipsilateral/same-side presentations). For example, neuronal firing rates (e.g., Gross, Rocha-Miranda, & Bender, 1972) and amplitudes of functional magnetic resonance signals (Tootell, Mendola, Hadjikhani, Liu, & Dale, 1998) are greater when visual stimuli are presented in the contralateral than the ipsilateral visual field.

We applied the following logic to enable causal inferences about the neural implementation of dissociable processes involved in self-description. If participants score more highly on one kind of item when stimulus presentations benefit left hemisphere processes, whereas

¹Neuroticism also includes items related to anger, an approach-oriented emotion (Harmon-Jones et al., 2010), but our results remained the same when the one anger-related descriptor in our analysis—“irritable”—was not included (judgments for that particular item did not differ depending on hemisphere of presentation, $p > .90$).

they score more highly on another kind of item when stimulus presentations benefit right hemisphere processes, then one can conclude that the stimulus presentation manipulation (left or right visual field) causes different self descriptions attributable to at least weakly dissociable neural processes involved in the assessments (e.g., Marsolek & Burgund, 1997, 2008; Marsolek, Nicholas, & Andresen, 2002). This kind of inference importantly supplements those typically made in neuroimaging experiments.

We analyzed participant scores as a function of (a) the Big Five factor (trait) to which each item belonged, (b) high and low likability of items, and (c) left and right hemisphere of direct item presentations. The predictions were as follows: If the processing needed for all kinds of self-description exhibit a consistent hemispheric asymmetry, then a main effect of hemisphere should be observed but no interactions involving hemisphere should be observed. If there are different hemispheric asymmetries for assessing different personality traits, then an interaction between Big Five factor and hemisphere should be observed. Finally, if there are different hemispheric asymmetries for endorsing likable items and rejecting unlikeable items, then an interaction between high and low likability of items and hemisphere should be observed.

One additional component of our method was designed to rule out an alternative explanation for results consistent with the likability hypothesis. If the likability hypothesis were supported, this might simply be attributable to differences in acquiescence bias between the two hemispheres. Acquiescence bias refers to the tendency to agree with self-descriptions, regardless of their likability or accuracy (Soto, John, Gosling, & Potter, 2008). It is possible that an artifact of the use of Likert scales in conjunction with lateralized stimulus presentation could create greater acquiescence when words are presented directly to the left hemisphere: Words presented to the right of fixation (i.e., directly to the left hemisphere) might be given higher responses because the larger numbers of the 1-to-9 response scale appeared on the right. This would lead to the appearance that the right hemisphere was over-rejecting unlikeable items relative to the left, as well as that the left hemisphere was overendorsing likable items relative to the right, when in fact the left hemisphere was simply overendorsing all items. However, this alternative explanation leads to one strikingly different prediction from the likability hypothesis, namely that neutral items that are neither high nor low in likability should also be endorsed more strongly when presented directly to the left hemisphere than when presented directly to the right. The likability hypothesis predicts no such effect for neutral words (e.g., “reserved”) because they are neither likable nor unlikeable. To contrast these two explanations, we limited our primary test to high and low likability items, but then we subsequently tested the neutral items after observing evidence for the likability hypothesis.

Method

Participants

Participants were 104 University of Minnesota undergraduates (half female, half male) who volunteered for course credit. All were right-handed as measured with the Edinburgh Handedness Inventory (mean laterality quotient = .88; Oldfield, 1971). Right-handed

participants were tested because they generally exhibit more reliable hemispheric asymmetries than do left-handed people (e.g., Hellige, 1993).

Materials

The 100 unipolar trait-descriptive adjectives in Goldberg (1992; Table 3) were used as word stimuli. Twenty items were used to represent each of the Big Five factors: Extraversion, Agreeableness, Conscientiousness, Emotional Stability (Neuroticism reversed), and Openness/Intellect.

The 20 terms for each factor were divided into two sublists of 10 adjectives each. The two sublists per factor were balanced on factor-loading direction (positive/negative), factor loading values (both from Goldberg, 1992), number of high versus low likability items, word length (number of letters per word), and word frequency in written English (Francis & Kucera, 1982). For each participant, the words in one sublist for each factor were presented in the right visual field and the words in the other sublist were presented in the left visual field. In this way, the 10 words per factor that were presented directly to the left or right hemispheres for each participant were balanced on those variables. Counterbalancing across participants assured that each sublist was used to represent each visual-field condition an equal number of times across participants.

Words were presented in 24-point bold Arial font, and a small dot (subtending 0.69° of visual angle) was used as a central fixation point. In each lateralized word presentation, the word was centered on a point 4.18° left or right from the center of the display, and the inner edge of a word never appeared closer than 1.15° from the center of the display. A 1–9 response scale (Goldberg, 1992, Appendix A) was presented after each lateralized word presentation, and it was centered 7.31° above the center of the display. Participants placed their heads in a chin rest that kept their eyes 50 cm from the monitor throughout the experiment.

Procedure

Participants were tested individually. They were instructed to respond as accurately as possible on a 1–9 scale how well each trait described them (1 = *extremely inaccurate*, 9 = *extremely accurate*) as they generally are, as compared with other persons they know of the same sex and roughly the same age.

For each trial, participants first focused their eyes on the fixation point that appeared in the center of the display for 500 ms. Immediately after the disappearance of the fixation point, a word appeared briefly in the left or right visual field for 183 ms. Immediately after the disappearance of the word, the 1–9 rating scale appeared at the top of the display and remained on the screen until a response was registered by pressing one of the number keys (1–9) on the computer keyboard. A blank display appeared during each 1-s intertrial interval.

Words were presented in a pseudorandom order. The order was random but with the constraints that no more than three consecutive trials were used to represent the same factor, the same factor loading direction, or the same visual field of word presentation. Ten

additional trials were presented (using 10 additional/nonexperimental trait-descriptive adjectives) at the beginning of the session purely for practice and warm-up.

Analysis

A repeated-measures analysis of variance was conducted, with self-description score as the dependent variable after reverse-scoring the negative loading items (so that all scores indicated higher scores on the Big Five trait in question). Likability of an item was included as an independent variable. Because our hypotheses most strongly concerned the relative extremes of high and low likability of items within traits, and not moderate levels, likability ratings from other studies (Dumas, Johnson, & Lynch, 2002; Goldberg, 1975) were used to quartile split the 20 items per factor so that the five highest rated terms were used as high likability items (e.g., “active”) and the five lowest rated terms were used as low likability items (e.g., “unadventurous”). (Note that these likability ratings were not self-descriptions but explicit ratings of the likability, in general, of the characteristic described by each item.) The terms in the middle quartiles (e.g., “reserved”) were not included in the main analysis, although they were used in the secondary analysis of possible acquiescence effects.² It is worth noting that all high likability items loaded positively on their factors, and all low likability items loaded negatively on their factors, with one exception. The Emotional Stability (Neuroticism reversed) factor is different from the other factors in the Goldberg (1992; Table 3) inventory, in that it contains only five items that load positively and 15 items that load negatively (for the other factors, 10 items load positively and 10 items load negatively). In part for that reason, one of the five positively loading items (“unexcitable”) did not rank in the top quartile of likability, and instead one negatively loading item (“emotional”) did rank in the top quartile of likability. The analyses were done using “emotional” as a high likability item and not using “unexcitable” as a high likability item because “emotional” ranked much higher than “unexcitable” in likability (4.16 vs. 2.93, respectively on a 1–6 scale). Results did not change substantively if we excluded “emotional” from the analysis. Thus, the (within-participant *s*) independent variables were likability of an item (high vs. low), Big Five factor for an item (Factors 1–5), and hemisphere of direct presentation of an item (left vs. right), in a $5 \times 2 \times 2$ design.

Results

The main results are displayed in Figure 1 and support the likability hypothesis. Most importantly, the interaction between likability of items and hemisphere of direct presentation was significant, $F(1, 103) = 14.20, p < .001, MSe = 1.379$. For high likability items, scores were significantly greater when items were presented directly to the left hemisphere (6.43) than to the right hemisphere (6.25), $F(1, 103) < 8.26, p < .01, MSe = 1.379$, for the simple effect contrast. Thus, endorsing high likability items was benefited by strongly engaging left-hemisphere processes. In contrast, for low likability items, scores were significantly

²Using a quartile split to separate high likeability, neutral, and low likeability items is somewhat arbitrary, but we know of no established criterion for how distant from the midpoint of a Likert scale an item must be before one considers it high or low on that scale as opposed to intermediate or neutral. Using a quartile split was relatively conservative because it left twice as many words in the neutral condition as in either of the two valenced conditions, and this was useful for the follow-up analysis performed on neutral words because it helped ensure that the demonstration of no hemispheric effect on neutral words was unlikely to be simply a result of less reliable assessment of that class of stimuli.

greater when items were presented directly to the right hemisphere (6.55) than to the left hemisphere (6.35), $F(1, 103) = 6.03$, $p < .05$, $MSe = 1.379$, for the simple effect contrast. Note that low likability items were reverse scored because they were negatively loading items. Thus, rejecting low likability items was benefited by strongly engaging right-hemisphere processes. This pattern of results did not differ as a function of Big Five factors; the three-way interaction between Big Five factor, likability, and hemisphere did not approach significance, $F(4, 412) = 1.51$, $p > .15$, $MSe = 1.427$.

Only two other significant effects were observed. The main effect of Big Five factor was significant, $F(4, 412) = 120.14$, $p < .0001$, $MSe = 2.618$. Scores were ordered as follows: Agreeableness (7.26), Openness/Intellect (6.80), Conscientiousness (6.69), Extraversion (6.23), and Emotional Stability (4.98). Finally, the interaction between Big Five factor and likability of items was significant, $F(4, 412) = 13.37$, $p < .0001$, $MSe = 1.078$. Scores were higher for high likability items than for low likability items in Extraversion (6.40 vs. 6.07, respectively) and Agreeableness (7.30 vs. 7.22, respectively), whereas scores were higher for low likability items than for high likability items in Conscientiousness (6.77 vs. 6.62, respectively), Emotional Stability (5.32 vs. 4.64, respectively), and Openness/Intellect (6.87 vs. 6.74, respectively). No other effects achieved significance (all other $ps > .20$).

Because the likability hypothesis was supported in the main analysis, we conducted a secondary analysis to test the acquiescence hypothesis. Under this hypothesis, a general bias toward left-hemisphere endorsement should operate on all items, including neutral items. Therefore, to rule out this alternative explanation for the results, we conducted an analysis on responses made to the items with likability ratings in the middle quartiles. To provide the strongest possible test of the alternative explanation, the same number of middle-quartile items were analyzed in this analysis (50) as high and low likability items in the main analysis (50), the middle-quartile items were presented in the same manner as the high and low likability items, and the middle-quartile items were randomly intermixed with the high and low likability items. The responses to middle quartile items (with no reverse scoring of any items) did not differ as a function of left-hemisphere presentation (4.94) versus right-hemisphere presentation (4.92), $t(103) = 0.33$, $p > .70$. This indicates that the main results with high and low likability items (see Figure 1) should not be interpreted as indicating a general acquiescence bias such that stronger endorsements of all items, on the 1–9 scale, are made when they are presented directly to the left hemisphere rather than to the right. Instead, hemispheric asymmetries exist specifically for endorsing high likability items versus rejecting low likability items.

Discussion

The results of this study uncover the differential roles of the brain's left and right hemispheres in the process of self-description. The hypothesis that one hemisphere is generally more responsible for self-description than the other was not supported. In addition, the trait hypothesis that the two hemispheres "have different personalities," or are asymmetric in different ways when judging different personality traits, was not supported. Instead we found support for the likability hypothesis that the two hemispheres make different contributions to self-description that cut across personality traits. Specifically,

dissociable processes exhibit opposite hemispheric asymmetries depending on the likability of individual items. Independently of traits, endorsing likable descriptors is enhanced by presenting items directly to the left hemisphere, whereas rejecting unlikeable descriptors is enhanced by presenting items directly to the right hemisphere. This supports the hypothesis that self-description processes are neurally dissociable, with hemispheric asymmetries depending on whether items are rewarding and hence approach-related or threatening and hence withdrawal-related.

The finding that the trait hypothesis was not supported and the likability hypothesis was supported helps to pinpoint the nature of the hemispheric asymmetries in motivation to approach and motivation to withdraw. The asymmetries were restricted to processing of the individual items themselves; they did not involve processing of the relevant larger personality traits. Self-description processes did not differ depending on whether the larger *traits* that were involved were approach related (e.g., left-hemisphere influences on judgments of all items that reflect Extraversion) or withdrawal related (e.g., right-hemisphere influences on judgments of all items that reflect Neuroticism). Instead, within each of the Big Five personality traits, self-description processes differed depending on whether a particular item was positive and therefore likely to induce approach (e.g., “active” for Extraversion) or negative and therefore likely to induce withdrawal (e.g., “unadventurous” for Extraversion). This indicates that the hemispheric differences were attributable to motivation-based differences that applied only to the individual items themselves, and that people did not process the larger personality traits when making item judgments. In other words, despite the possibility that Extraversion as a whole trait is approach related, there are items that reflect Extraversion that induce withdrawal (low likability items), and it was the processing of the items at the individual item level, not processing of the relevant larger trait, that mattered with respect to the hemispheric asymmetries. For this reason, we suspect that the hemispheric differences in judging high and low likability words were a result of quick motivational processes, rather than slower semantic processes. If semantic processes had been involved, greater activation of the relevant larger personality traits might have been expected.

Likability of items was determined according to previously published norms. Thus within the participants in our experiment, likability of some items may have varied somewhat between individuals. However, previous studies have typically found inter-rater agreement to be very high for ratings of the likability of trait adjectives ($r_s > .8$; Krueger, 1996; Pettersson, Turkheimer, Horn, & Menatti, 2012), meaning that such variability is minimal. Thus, the degree of variation present between individuals is extremely unlikely to have shifted an adjective all the way from the high likability category (top quartile) to the low likability category (bottom quartile), or vice versa. Even a shift from high or low likability to neutral will be rare. Further, note that even if an occasional adjective were “mis-categorized” for any particular participant, this would merely add noise to our analysis, rendering it more unlikely that we would find the positive results that we did. That we did find positive results indicates that our likability assessments were robust to such noise.

Our finding of a neural dissociation between endorsing high likability items and rejecting low likability items is relevant to understanding self-enhancement (Paulhus & Trapnell,

2008; Beer & Hughes, 2011), but in a novel way. Self-enhancement occurs when people view themselves in an exaggeratedly positive light. To our knowledge self-enhancement research has never made a substantive distinction between endorsing positively keyed items and rejecting negatively keyed items; either would constitute self-enhancement. (Note that the distinction between “Self-Deceptive Enhancement” and “Self-Deceptive Denial” refers to what type of content is enhanced, rather than to endorsing or rejecting individual items; Paulhus & Trapnell, 2008.) However, making this distinction appears to be uniquely important for hemispheric differences.

The degree to which the present results may extend to other forms of description (e.g., descriptions of other people) may be useful to investigate in future research. If hemispheric asymmetries in endorsing high likability items and rejecting low likability items extend beyond self-description, this would provide evidence that fundamental motivational asymmetries have effects on multiple kinds of description. Alternatively, if the hemispheric asymmetries do not extend beyond self-description, this would provide evidence that the relevant self representations are qualitatively different from representations of other people (e.g., Heatherton et al., 2004). In addition, the closeness of the other people that are rated may be important; neural activity differs when describing close versus distant others (Hughes & Beer, in press). Either possibility would be interesting. In either case, however, it is important to note that a potential lack of specificity of our pattern of results to self-description would not invalidate the hypothesis that our results supported, which is that the motivational differences of the two hemispheres are likely to influence responses to individual stimuli used in self-descriptions.

The cerebral hemispheres exhibit asymmetric activity in situations involving approach and withdrawal (Harmon-Jones et al., 2010). Our research demonstrates that this pattern extends to self-description, in which likable descriptors can be viewed as rewarding, triggering approach, and unlikeable descriptors can be viewed as threatening, triggering withdrawal. That dissociable processes are involved in self-description implies that this aspect of self-representation is not completely unified (see also Moran, Macrae, Heatherton, Wyland, & Kelley, 2006). That basic motivational processes are involved affirms that we are not dispassionate observers when we explicitly assess ourselves (Paulhus & Trapnell, 2008; Taylor & Brown, 1988). This research thus contributes to understanding both the biological and the psychological dynamics of self-representation.

References

- Beer, JS.; Hughes, BL. Self-enhancement: A social neuroscience perspective. In: Alicke, M.; Sedikides, C., editors. *The handbook of self-enhancement and self-protection*. New York, NY: Guilford Press; 2011.
- Cunningham WA, Espinet SD, DeYoung CG, Zelazo PD. Attitudes to the right- and left: Frontal ERP asymmetries associated with stimulus valence and processing goals. *NeuroImage*. 2005; 28:827–834.10.1016/j.neuroimage.2005.04.044 [PubMed: 16039143]
- Dumas JE, Johnson M, Lynch AM. Likableness, familiarity, and frequency of 844 person-descriptive words. *Personality and Individual Differences*. 2002; 32:523–531.10.1016/S0191-8869(01)00054-X
- Faust M, Kravetz S, Nativ-Safrai O. The representation of aspects of the self in the two cerebral hemispheres. *Personality and Individual Differences*. 2004; 37:607–619.10.1016/j.paid.2003.09.030

- Fossati P, Hevenor SJ, Lepage M, Graham SJ, Grady C, Keightley ML, Mayberg H. Distributed self in episodic memory: Neural correlates of successful retrieval of self-encoded positive and negative personality traits. *NeuroImage*. 2004; 22:1596–1604.10.1016/j.neuroimage.2004.03.034 [PubMed: 15275916]
- Francis, WN.; Kucera, H. Frequency analysis of English usage: Lexicon and grammar. Boston, Ma: Houghton Mifflin; 1982.
- Gazzaniga MS. Cerebral specialization and interhemispheric communication: Does the corpus callosum enable the human condition? *Brain: A Journal of Neurology*. 2000; 123:1293–1326.10.1093/brain/123.7.1293 [PubMed: 10869045]
- Goldberg, LR. Unpublished Technical Report. Eugene, OR: University of Oregon and Oregon Research Institute; 1975. Some normative characteristics of the 1710 trait descriptive adjectives.
- Goldberg LR. The development of markers for the big-five factor structure. *Psychological Assessment*. 1992; 4:26–42.10.1037/1040-3590.4.1.26
- Gross CG, Rocha-Miranda CE, Bender DB. Visual properties of neurons in inferotemporal cortex of the macaque. *Journal of Neurophysiology*. 1972; 35:96–111. [PubMed: 4621506]
- Harmon-Jones E, Gable PA, Peterson CK. The role of asymmetric frontal cortical activity in emotion-related phenomena: A review and update. *Biological Psychology*. 2010; 84:451–462.10.1016/j.biopsycho.2009.08.010 [PubMed: 19733618]
- Heatherton TF, Macrae CN, Kelley WM. What the social brain sciences can tell us about the self. *Current Directions in Psychological Science*. 2004; 13:190–193.10.1111/j.0963-7214.2004.00305.x
- Hellige, JB. Hemispheric asymmetry: What's right and what's left. Cambridge, MA: Harvard University Press; 1993.
- Hughes BL, Beer JS. Orbitofrontal cortex and anterior cingulate cortex are modulated by motivated social cognition. *Cerebral Cortex*. in press.
- Krueger J. Personal beliefs and cultural stereotypes about racial characteristics. *Journal of Personality and Social Psychology*. 1996; 71:536–548.10.1037/0022-3514.71.3.536
- Marsolek, CJ.; Burgund, ED. Computational analyses and hemispheric asymmetries in visual-form recognition. In: Christman, S., editor. *Cerebral asymmetries in sensory and perceptual processing*. Amsterdam: Elsevier; 1997. p. 125-158.
- Marsolek CJ, Burgund ED. Dissociable neural subsystems underlie visual working memory for abstract categories and specific exemplars. *Cognitive, Affective, & Behavioral Neuroscience*. 2008; 8:17–24.10.3758/CABN.8.1.17
- Marsolek CJ, Nicholas CD, Andresen DR. Interhemispheric communication of abstract and specific visual-form information. *Neuropsychologia*. 2002; 40:1983–1999.10.1016/S0028-3932(02)00065-9 [PubMed: 12207996]
- Molnar-Szakacs I, Uddin LQ, Iacoboni M. Right-hemisphere motor facilitation by self-descriptive personality trait words. *European Journal of Neuroscience*. 2005; 21:2000–2006.10.1111/j.1460-9568.2005.04019.x [PubMed: 15869493]
- Moran JM, Macrae CN, Heatherton TF, Wyland CL, Kelley WM. Neuroanatomical evidence for distinct cognitive and affective components of self. *Journal of Cognitive Neuroscience*. 2006; 18:1586–1594.10.1162/jocn.2006.18.9.1586 [PubMed: 16989558]
- Oldfield RC. The assessment and analysis of handedness: The Edinburgh Inventory. *Neuropsychologia*. 1971; 9:97–113.10.1016/0028-3932(71)90067-4 [PubMed: 5146491]
- Paulhus, DL.; Trapnell, PD. Self-presentation of personality: An agency-communion framework. In: John, OP.; Robins, RW.; Pervin, LA., editors. *Handbook of personality: Theory and research*. New York, NY: Guilford Press; 2008. p. 492-517.
- Pettersson E, Turkheimer E, Horn EE, Menatti AR. The general factor of personality and evaluation. *European Journal of Personality*. 2012; 26:292–302.10.1002/per.839
- Platek SM, Myers TE, Critton SR, Gallup GG. A left-hand advantage for self-description: The impact of schizotypal personality traits. *Schizophrenia Research*. 2003; 65:147–151.10.1016/S0920-9964(02)00494-2 [PubMed: 14630307]
- Soto CJ, John OP, Gosling SD, Potter J. The developmental psychometrics of Big Five self-reports: Acquiescence, factor structure, coherence, and differentiation from ages 10 to 20. *Journal of*

- Personality and Social Psychology. 2008; 94:718–737.10.1037/0022-3514.94.4.718 [PubMed: 18361680]
- Taylor SE, Brown JD. Illusion and well-being: A social psychological perspective on mental health. Psychological Bulletin. 1988; 103:193–210.10.1037/0033-2909.103.2.193 [PubMed: 3283814]
- Tootell RBH, Mendola JD, Hadjikhani NK, Liu AK, Dale AM. The representation of the ipsilateral visual field in human cerebral cortex. Proceedings of the National Academy of Sciences USA. 1998; 95:818–824.10.1073/pnas.95.3.818
- Tucker DM, Luu P, Hartry-Speiser A, Davey C, Desmond RE Jr, Flaisch T. Corticolimbic mechanisms in emotional decisions. Emotion. 2003; 3:127–149.10.1037/1528-3542.3.2.127 [PubMed: 12899415]
- Zhu Y, Zhang L, Fan J, Han S. Neural basis of cultural influence on self-representation. NeuroImage. 2007; 34:1310–1316.10.1016/j.neuroimage.2006.08.047 [PubMed: 17134915]

Figure 1.

Main results depicting hemispheric asymmetries in self-description processes; accepting high likeability items benefits from direct left-hemisphere item presentations, and rejecting low likeability items benefits from direct right-hemisphere item presentations. Self-description score (after reverse-scoring the negative loading items) is displayed as a function of the likeability of an item (high vs. low) and hemisphere of direct presentation of an item (left vs. right). Error bars indicate standard errors of the mean. ** $p < .01$; * $p < .05$.