Mirror, Mirror on the Wall: Enhancement in Self-Recognition

Nicholas Epley
University of Chicago

Erin Whitchurch
University of Virginia

People's inferences about their own traits and abilities are often enhancing. A series of experiments suggests that this enhancement extends to more automatic and perceptual judgments as well, such that people recognize their own faces as being more physically attractive than they actually are. In each experiment, participants' faces were made more or less attractive using a morphing procedure. Participants were more likely to recognize an attractively enhanced version of their own face out of a lineup as their own, and they identified an attractively enhanced version of their face more quickly in a lineup of distracter faces. This enhancement bias occurred for both one's own face and a friend's face but not for a relative stranger's face. Such enhancement was correlated with implicit measures of self-worth but not with explicit measures, consistent with this variety of enhancement being a relatively automatic rather than deliberative process.

Keywords: *self-enhancement; recognition; implicit attitudes; automatic evaluation; self-esteem*

People tend to evaluate their own traits and abilities more favorably than is objectively warranted. Although debate exists about the magnitude and exact nature of such biases across both individuals and cultures (Heine, Lehman, Markus, & Kitayama, 1999; Kwan, John, Kenny, Bond, & Robins, 2004; Sedikides, Gaertner, & Toguchi, 2003), a large literature documents the variety of clever ways in which people can create flattering images of themselves (Dunning, 1999). Such self-enhancement effects are not simply mindless attempts for people to "see" what they want to see but rather represent a more thoughtful—albeit biased—processing of self-relevant information. Ambiguous traits are defined in ways that enable favorable self-evaluations (Dunning & Cohen, 1992). Negative stereotypes about others are selectively activated and applied to make oneself look better (Kunda & Sinclair, 1999). Flattering information about the self is accepted readily, whereas threatening information is evaluated more critically and ultimately derogated (Ditto & Lopez, 1992; Ditto, Munro, Apanovitch, Scepansky, & Lockhart, 2003; Ditto, Scepansky, Munro, Apanovich, & Lockhart, 1998). These and other deliberate reasoning strategies (Chambers & Windschitl, 2004) are the tools that frequently enable people to form a more desirable image of their traits and abilities than reality might allow.

We sought evidence in this research, however, for a more direct and potentially automatic version of enhancement, using a novel method to study biases in the evaluation of relatively objective self-relevant stimuli. In particular, we investigated whether people would show evidence of enhancement in the recognition of their own facial image. Do people recognize themselves—their very own faces—as being more desirable than they actually are? In addition, are people more calibrated evaluating the attractiveness of strangers about whom they know relatively nothing?

Authors' Note: We thank Julia Crowell, Nicholas Josephowitz, Megan Kolasinski, Julie Ragsdale, Aram Seo, and Audrey Tse for assisting with data collection; Justin Kruger, Jasmine Kwong, Allen McConnel, Gillian Rhodes, and Bernd Wittenbrink for helpful comments; and National Science Foundation Grant SES0241544, the University of Chicago Graduate School of Business, and the Templeton Foundation for financial support. Please address correspondence to Nicholas Epley, Graduate School of Business, University of Chicago, 5807 South Woodlawn Avenue, Chicago, IL 60637; e-mail: epley@chicagogsb.edu.

PSPB, Vol. 34 No. 9, September 2008 1159-1170
DOI: 10.1177/0146167208318601

We predicted that people would indeed show an enhancement bias in self-recognition based on the emerging consensus that people's automatic and intuitive associations to the self tend to be objectively positive (see Koole & DeHart, 2007, for a review). People, for instance, tend to like the letters in their own name more than letters that are not in their name (Koole, Dijksterhuis, & van Knippenberg, 2001; Nuttin, 1985) and are faster to identify positive words and slower to identify negative words following a self-relevant subliminal prime than a self-irrelevant prime (Spalding & Hardin, 1999). As a result of such positive associations, people tend to unknowingly prefer jobs, spouses, and even grades that bear some resemblance to the self (Nelson & Simmons, 2007; Pelham, Mirenberg, & Jones, 2002). Because liking tends to be used as a cue for familiarity, with liked others being recognized as more familiar than disliked others (Monin, 2003), we reasoned that such automatic liking for the self would likewise bias recognition of one's own facial image. The more positive one's intuitive and automatic assessment of the self, the more they should recognize positively enhanced images of their face as their actual face. Such a bias should not, however, extend to relative strangers that do not provoke intuitively positive assessments. People are therefore likely to be more calibrated when evaluating others' images than when evaluating their own image.

Such results—self-enhancement compared to both reality and evaluations of others—would share many hallmarks of existing self-enhancement results. We believe, however, that such a bias in self-recognition would not only be widely interesting but also scientifically important for at least three reasons. First, self-enhancement in the recognition of one's own image may represent a distinct form of self-enhancement, one produced by relatively implicit or automatic psychological mechanisms rather than by the existing list of deliberate information-processing mechanisms. Visual recognition, including facial recognition, is a textbook example of an automatic psychological process (Grill-Spector & Kanwisher, 2005), occurring rapidly and intuitively with little or no apparent conscious deliberation (e.g., Thorpe, Fize, & Marlot, 1996). As a result, enhancement biases in self-recognition should be correlated with automatic or implicit measures of self-worth that gauge such automatic associations to the self rather than with explicit and deliberate measures of self-worth. This relationship with implicit measures would contrast sharply with existing enhancement results that are related to explicit measures of self-worth (e.g., Brown, 1986; Gramzow & Willard, 2006; Kobayashi & Brown, 2003) and suggest there may be two relatively independent sources of self-enhancement. One source would be reflected in the automatic and implicit associations people possess about themselves, and another would be reflected in the more explicit and deliberate attitudes people hold about themselves that may distort the recruitment and evaluation of ambiguous evidence. This research would therefore suggest that both automatic and controlled mechanisms can underlie objective self-enhancement. In so doing, it would also advance the developing and expanding literature on the consequences and importance of implicit attitudes in general, and the consequences and importance of implicit self-esteem more specifically.

Second, many existing self-enhancement biases emerge on relatively ambiguous stimuli that must be constructed or recalled at the time of judgment—from one's relative standing on ambiguous traits (Dunning & Cohen, 1992), to the quality of one's relationships (Murray, Holmes, & Griffin, 2004), to the liking of one's initials (Koole et al., 2001), to the validity of self-threatening information (Ditto et al., 2003). There is no easy method for objectively identifying one's true leadership ability, the true quality of one's romantic relationship, the actual attractiveness of the letter *E*, or the true implications of negative performance feedback for one's self-evaluation. Other research has demonstrated that people recall past behavior on objectively verifiable stimuli in a self-serving fashion (such as prior SAT or GPA scores; Gramzow & Willard, 2006), but such results appear to stem from the effortful reconstruction of memory or deliberately exaggerated self-reports rather than from a distorted perception of a stimulus that appears right before people's eyes. Self-enhanced recognition of one's own face, in contrast, would emerge on a concrete and verifiable feature of the self that most people see multiple times every day of their lives. Few aspects about the self are more readily observable and objectively verifiable than one's own facial image. Nevertheless, top-down processes based on motivations, goals, or expectations have been shown to influence perception of objective and readily observable stimuli. In one experiment, for instance, participants judged the slope of a hill to be steeper when they were encumbered by a heavy backpack than when they were not so encumbered (Bhalla & Proffitt, 1999). In another, participants' motivations to see a particular object on a screen led them to actually perceive an ambiguous stimulus in a manner consistent with their motivated desires (Balcetis & Dunning, 2006). These findings are consistent with the "new look" approach to perception that has emphasized the ways in which top-down processes can influence what people "see" when they look at the external world. This research would be the first within this tradition to look at how top-down processes can influence people's perceptions

of their very own image. It would therefore be the first to demonstrate that people, quite literally, see themselves as more desirable than they actually are.

Third, our experiments involve having people recognize themselves as well as a relative stranger and may therefore provide additional demonstrations that people's evaluations of others can be more calibrated than evaluations of themselves. For instance, people in one set of experiments tended to overestimate the likelihood that they would engage in a desirable behavior at some point in the future, from buying a flower to benefiting a charity to voting in a U.S. presidential election, but were remarkably well calibrated when predicting the behavior of a relative stranger (Epley & Dunning, 2000, 2006). The same results also emerged in predictions of relationship longevity, in which those in the midst of a relationship were more miscalibrated (in the predictable direction) than were observers (see also Gagne & Lydon, 2004). Similar miscalibration in this experiment would perhaps be even more interesting given that people so clearly have more exposure to, and experience with, their own image than they do to others. The miscalibration, however, does not come from the lack of information about the self compared to others but rather from the positively distorted nature of the information and associations people have about themselves that they do not have about relatively unknown others.

We tested our main hypotheses—that people would show enhancement in the recognition of their own facial image; that such enhancement would be correlated with implicit, but not explicit, measures of self-worth; and that people would not show such biases in the recognition of relative strangers—in three experiments using a morphing procedure to create more and less attractive versions of participants' own facial image. Participants were then asked to identify their actual face out of a lineup (Experiments 1 and 2) and that of a relative stranger and a close friend (Experiment 2), or to recognize their own image from a series of distracters as quickly as possible (Experiment 3). We predicted that participants would recognize their own image as being more desirable than it actually is, that this bias would also emerge for well-liked friends but not for relative strangers, and that people would also be faster to identify positively distorted images of themselves than to recognize their actual image.

EXPERIMENT 1: SELF-RECOGNITION

Method

Caucasian participants ($N = 27$, 18 female) posed for a photograph at the end of an unrelated experiment. The experimenter instructed participants to remove their glasses and facial piercings and to pull back their hair if it fell onto their faces. Participants were also instructed to form a neutral expression for the picture. These images were then cropped and subjected to a procedure designed to systematically alter their facial attractiveness, namely, by morphing their photograph with a highly attractive or unattractive face.

In this averaging procedure, participants' facial images were morphed in 10% increments (up to 50%) with a highly attractive or unattractive same-gender target face. The attractive targets (male and female) were composite images of several dozen faces (obtained at http://www.uni-regensburg.de/Fakultaeten/phil_Fak_II/Psychologie/Psy_II/beautycheck/english/durchschnittsgesichter/durchschnittsgesichter.htm), and the unattractive targets were individuals suffering from craniofacial syndrome (obtained at http://www.craniofacial.net/). This morphing was done by matching up points on the participants' face with the identical points on the target's face (corners of mouth, shape of eyes, etc.). A 50% morph with the attractive target would therefore represent a face that was halfway between their own and the target's on all of these critical points. This procedure produced 11 faces, 5 morphed with the attractive target (up to 50%), 5 morphed with the unattractive target, and the actual photograph (see Figure 1).[1]

Participants returned 2 to 4 weeks after taking their photograph, were seated at a computer, reminded of the photograph taken several weeks earlier, and told that they would be presented with a series of images modified from their original picture. Participants were then presented with a randomly ordered lineup containing all 11 faces and asked to identify their actual image by pointing to it on the computer screen. We defined actual image to participants as the image taken of them in the prior session. This served as our primary measure of self-recognition.

Participants then completed a second recognition measure in which they were shown each picture in isolation on the computer screen (in a random order) and asked to estimate the likelihood that each image was their actual image, on a scale ranging from 0% (*not at all likely*) to 100% (*certain*). Finally, participants were again shown each imagine in isolation (in the same random order) and asked to indicate how much they liked each image on a scale ranging from –5 (*bad*) to 5 (*good*).

Participants next completed an implicit measure of self-worth (Spalding & Hardin, 1999) in which they were asked to classify words as positive or negative following subliminal (15 ms) presentations of self-relevant (me, myself) or self-irrelevant (two, manner) primes (see also Hetts, Sakuma, & Pelham, 1999). The extent to which self-relevant primes, compared to irrelevant primes,

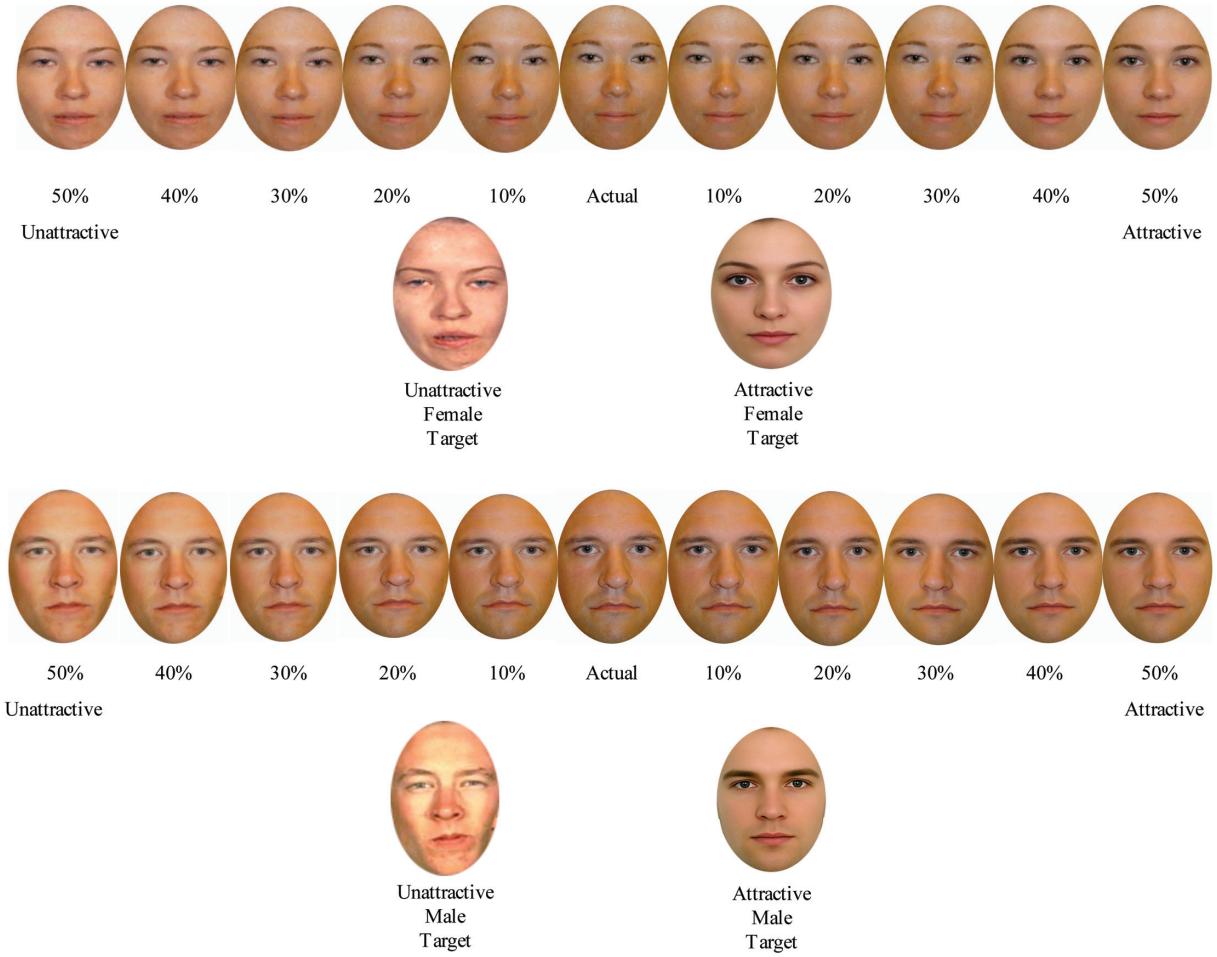

Figure 1 Example of the averaging procedure.

speeds the identification of positive words and slows identification of negative words is taken as an index of implicit self-worth. Participants then completed the standard measure of explicit self-esteem—the Rosenberg (1965) Self-Esteem scale—and a second measure of implicit self-esteem—the name-letter effect (Nuttin, 1985). Liking one's own initials more than different initials, compared to others with different initials, is taken as a measure of implicit self-esteem (see Baccus, Baldwin, & Packer, 2004, for a description of the scoring procedure). We collected two measures of implicit self-esteem, because of a lack of an accepted standard, to collapse them into a more reliable composite measure of the underlying latent variable (Cunningham, Preacher, & Banaji, 2001).

Results

All relevant means and correlations for this experiment are presented in Table 1.

Face recognition and self-esteem. As predicted, participants tended to select one of the faces morphed with an attractive target as their own out of the lineup more often than faces morphed with an unattractive target, $t(26) = 2.63$, $p = .02$, $d = 1.01$. A frequency distribution for this measure is presented in Figure 2.

To help identify the source of this bias in self-recognition, we correlated the image participants recognized as their own with the implicit and explicit measures of self-worth. Because the two measures of implicit self-esteem were significantly correlated with each other, $r(25) = .52$, $p = .01$, we standardized each measure and then averaged them into a single composite measure. As predicted, participants' self-recognition was significantly correlated with the composite measure of implicit self-esteem, $r(25) = .47$, $p = .01$, but neither positively nor significantly correlated with explicit self-esteem, $r(25) = -.26$, $p = .19$. The stronger participants' automatic

TABLE 1: Average Enhancement in Self-Recognition and Its Relation to Implicit and Explicit Self-Esteem Across Experiments

	Experiment 1 M (SD)	*Experiment 1 Follow-Up* M (SD)	*Experiment 2* M (SD)
Enhancement in recognition			
Averaging procedure			
Self	6.30% (12.45)*	12.00% (19.71)*	13.33% (16.33)*
Friend			10.09% (19.00)*
Stranger (experimenters)			
Female			1.3% (18.72)
Male			3.3% (29.44)
Correlation with self-recognition			
Implicit self-esteem			
Name-letter preference	0.44*	0.15	0.44*
Automatic evaluation	0.30	0.52*	0.25
Composite average	0.47*	0.40	0.53*
Explicit self-esteem			
Rosenberg Self-Esteem scale	–0.26	0.11	–0.03

NOTE: Enhancement in recognition (the top half of the table) is reported as the mean morph level selected by participants in the experiments, with positive percentages indicating a mean selection morphed in the direction of the positive target (e.g., 10% indicates that participants, on average, selected the 10% morph with the attractive target). Negative numbers indicate a mean selection morphed in the direction of a negative target. Standard deviations are reported in parentheses.
*$p < .05$.

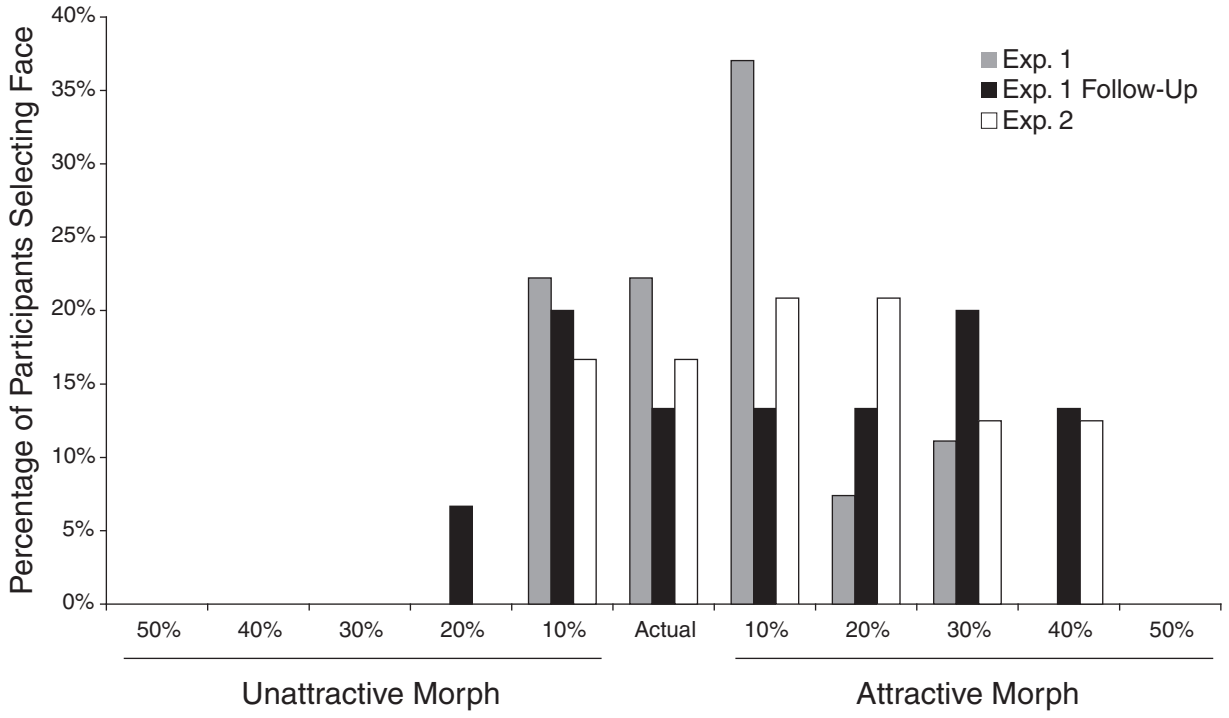

Figure 2 Percentage of participants selecting each face as their own image in the averaging procedure from Experiment 1, Experiment 1 follow-up, and Experiment 2.

positive associations to the self (indexed by implicit self-esteem) was, the more enhanced an image participants recognized as their own.

Likelihood and liking. Participants' ratings of the likelihood that each face, rated in isolation, was their own showed the same conceptual pattern as the self-recognition measure already reported, with participants indicating that the more desirable morphs were more likely to be their own. As can be seen in the top panel of Figure 3, the average likelihood judgments across the 11 faces showed a roughly bell-shaped curve, with the peak

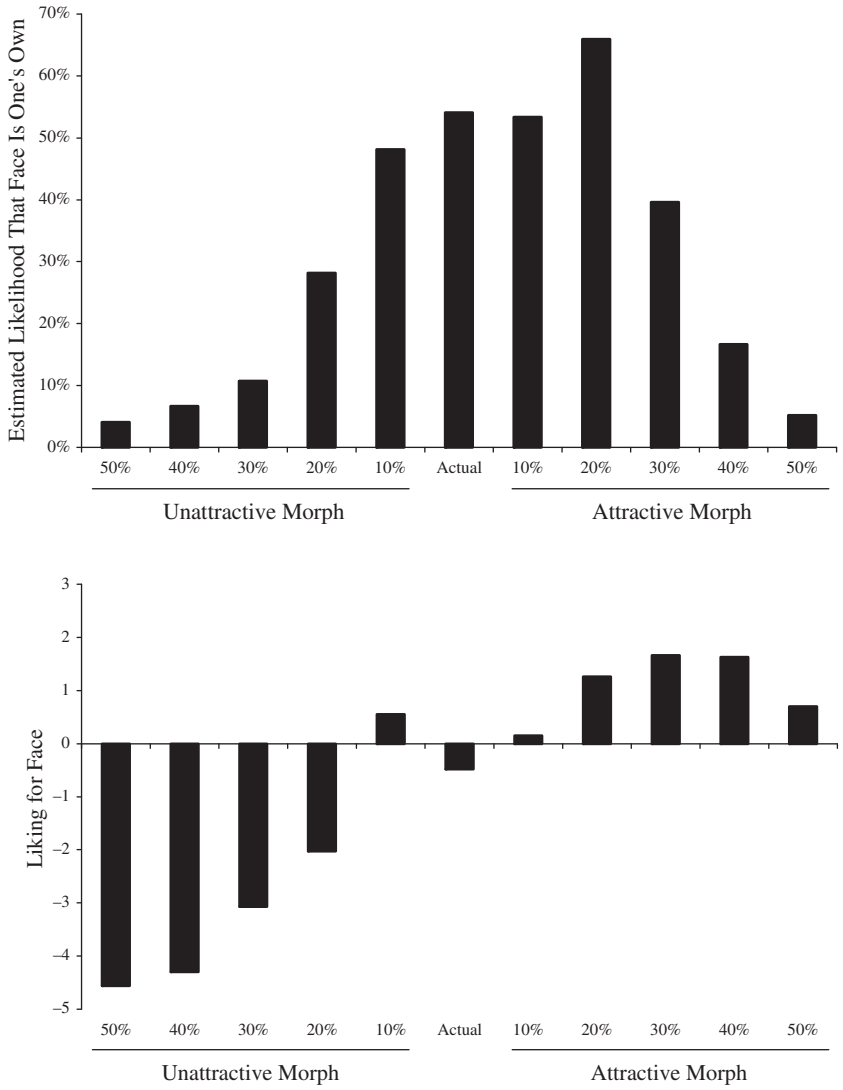

Figure 3 Average estimated likelihood and liking for each image presented in isolation (Experiment 1).
NOTE: Likelihood estimates were made on a scale ranging from 0% to 100%. Liking estimates were made on a scale ranging from –5 (*bad*) to 5 (*good*).

shifted toward the attractive morphs. Participants indicated that the 20% attractive morph, for instance, was most likely to be their own ($M = 65.93\%$, $SD = 20.24$), a figure significantly higher than the likelihood ratings for their actual image ($M = 54.07\%$, $SD = 26.93$), paired $t(26) = 2.17$, $p = .04$, $d = .85$. The average estimated likelihood assigned to the five attractive morphs was significantly higher ($M = 36.15$, $SD = 15.23$) than that assigned to the five unattractive morphs ($M = 19.56$, $SD = 12.48$), paired $t(26) = 6.06$, $p < .001$, $d = 2.38$.

In addition to making these likelihood estimates, participants also saw each image in isolation and indicated how much they liked each image. As can be seen in the bottom panel of Figure 3, participants tended to like the images morphed with the attractive faces more than those morphed with the unattractive faces. More important, the average correlation for each participant between these likelihood and liking ratings was significantly positive ($M = .42$, $SD = .30$), $t(26) = 7.38$, $p < .001$, $d = 2.89$, as was the overall correlation across participants between the average likelihood estimate assigned to each of the 11 images and the average liking of those images, $r(26) = .58$, $p < .001$. These results are consistent with our proposed mechanism that automatic liking of one's image is used as a guide for self-recognition and are consistent with the significant

implicit self-esteem correlation observed on the direct self-recognition measure.

Discussion

As predicted, participants tended to recognize their own facial image as being more desirable than it actually was. What is more, this bias was correlated with implicit measures of self-worth in two procedures, but it was not correlated with explicit measures of self-worth. This suggests that automatic positive associations to the self guide the enhancement observed in this experiment rather than more deliberate and controlled assessments of the self, a finding further corroborated by the significant relationship between assessed likelihood that an image is one's own and liking for that image.

Although consistent with our hypotheses, readers might be concerned that this experiment used participants' actual photograph rather than their mirror image, and they may entertain alternative interpretations of our results based on this feature (Mita, Dermer, & Knight, 1977). We see no theoretical reason to expect this to be an important boundary condition for self-enhanced recognition. To examine this generalizability directly, we simply conducted a small follow-up with 15 participants from the University of Chicago using their mirror image in the same morphing procedure described in Experiment 1. As before (see Table 1), participants tended to select an enhanced image as their own actual image, $t(14) = 2.36$, $p = .03$, $d = 1.26$, with an effect size very similar to that observed in Experiment 1 on this procedure. This image selection was again positively correlated (with similar effect size, but nonsignificantly given the smaller sample size) with the composite measure of implicit self-esteem, $r(12) = .40$, $p = .15$, but not with explicit self-esteem, $r(12) = .11$, $p = .71$ (see Table 1 for all relevant means and correlations for this experiment). Using participants' actual photograph rather than their mirror image does not seem to explain the results of Experiment 1.

EXPERIMENT 2: FRIENDS AND STRANGERS

One hallmark of enhancement biases is that one's close friends and relatives get caught up in the act as well. People in satisfying relationships, for instance, rate their romantic partners more favorably than those very partners rate themselves (Murray et al., 2004) and sometimes even rate their friends more desirably than people rate themselves (Kenny & Kashy, 1994). Given such findings for liked others, we expected that the patterns of enhancement in recognition we observed in Experiment 1 would not be restricted just to one's own image, but would extend to close friends as well. It should not, however, extend to relative strangers. We tested this prediction directly in Experiment 2.

Method

Harvard University undergraduates ($N = 24$, 17 female) participated in exchange for course credit. As part of an unrelated study, participants were asked to bring along a close friend. This two-part experiment was conducted by three experimenters, one male and one female in the first session and a new female experimenter for the second session. Participants completed this experiment individually (each participant completed the first part with either the male or female experimenter and then finished the study with the remaining experimenter). At the end of this unrelated experiment, participants posed for a photograph against a white wall. Photographs of both participants as well as both experimenters were then morphed using the averaging procedure described for Experiment 1.

Participants were invited to return to the lab alone 3 to 4 weeks later by a new experimenter. In this second session, participants completed the same recognition procedure used in Experiment 1 for their own image, for their friend's image, and for both of the experimenters' images' (in random order). Finally, participants completed the three self-esteem measures from Experiment 1.

Results

Because of computer malfunctions, the composite self-esteem scores for 2 participants are based only on the name-letter measure.

As can be seen in Table 1, participants showed evidence of enhancement when identifying their own image, $t(23) = 4.12$, $p < .001$, $d = 1.72$, as well as their friend's image, $ts(23) = 2.69$, $p = .01$, $d = 1.12$, but not when identifying either of the experimenters' images, both $ts < 1$. Averaging across the two experimenters' images, this difference across targets was reliable, $F(2, 20) = 3.65$, $p = .04$, $\eta^2 = .27$. Follow-up contrasts revealed that the observed recognition bias did not differ between self and friend, $F < 1$; was significantly different between self and the average of the experimenters' images, $F(1, 21) = 5.47$, $p = .03$, $\eta^2 = .21$; and was marginally significant between the friend's image and the average of the experimenters' images, $F(1, 21) = 3.95$, $p = .06$, $\eta^2 = .16$.

As in Experiment 1, self-enhancement was significantly correlated with the composite measure of implicit self-esteem, $r(19) = .53$, $p < .01$, but not with explicit self-esteem, $r(19) = -.03$, *ns*. Given that the self was the target of these measures (rather than the friend or the

experimenters), it is not surprising that neither implicit nor explicit measures of self-esteem correlated systematically with enhancement of one's friend or the experimenters ($ps > .4$).

Discussion

Experiment 2 again provides support for our main prediction that people would show evidence of an enhancement bias in self-recognition, a bias that was related to implicit or automatic measures of self-worth rather than to explicit or deliberate measures. Experiment 2 also demonstrates that such enhancement bias extends to familiar and liked others as well, in this case to one's close friends, but does not extend to unfamiliar strangers. Consistent with other existing research, participants tended to show evidence of enhancement when evaluating their close friends to the same extent as when evaluating themselves (Kenny & Kashy, 1994).

There is one lower level ambiguity that this experiment does not completely address, namely, whether the enhancement in recognition observed in this experiment was due to liking or familiarity. People tend to like both themselves and their friends, but they are also more familiar with both themselves and their friends (compared to strangers). These two variables are close traveling companions in daily life, as people tend to feel they are familiar with liked others (Monin, 2003) and simple exposure to others tends to increase liking (Moreland & Zajonc, 1982). Although the simple comparison between friends and strangers in this experiment cannot distinguish between these two mechanistic accounts, the relationship between implicit self-esteem and self-recognition clearly suggests that liking is playing a larger role in the effects observed in these experiments than simple familiarity (see also Note 1).

Existing research demonstrates that the positive associations indexed by these implicit self-esteem measures are more than simple measures of exposure or familiarity, and instead index favorable conditioned associations toward a target (in this case, toward the self; Baccus et al., 2004; Dijksterhuis, 2004; Jones, Pelham, Mirenberg, & Hetts, 2002). Distinguishing the impact of familiarity versus liking in enhanced recognition for others would require measuring automatic evaluative associations to these others or identifying targets that are equivalent in terms of liking but vary in familiarity or who vary in liking but are equal in familiarity. The self-recognition results from these experiments, and their relation to implicit measures of self-worth, suggest that implicitly disliked targets, for instance, should show evidence of derogation in recognition. Indeed, one recent experiment using a procedure nearly identical to Experiment 2 showed that people who tend to dislike *themselves*—namely, those with body dysmorphic disorder—tend to recognize themselves as being *less* attractive than they actually are (Clerkin & Teachman, in press). Whether implicitly disliked targets show evidence for negative distortion is an interesting avenue for further research and may shed light on likely sources of variability and boundary conditions for recognition biases in judgment.

EXPERIMENT 3: SPEED OF RECOGNITION

Although we find the influence of familiarity on recognition biases to be interesting, we felt it more prudent in the scope of the present research to provide stronger evidence for the phenomenon of enhanced self-recognition itself. In particular, all of the results presented thus far have relied on self-reported recognition as an index of actual recognition. People are willing to report that an attractively enhanced image is truly their own, but we sought more evidence in Experiment 3 that people truly *believe* what they report. Although such self-report biases would not explain the pattern of correlations with implicit and explicit self-esteem, they might serve as an alternative account for the overall enhancement bias observed in self-recognition. In particular, we sought evidence for self-enhancement from a less reactive measure that uses the speed with which people can identify an image as an indication of their recognition. In this experiment we asked participants to identify, as quickly as possible, their own, an attractively enhanced, or an unattractively enhanced photo of themselves out of a series of lineups composed of distracter faces. We reasoned that people would recognize a face that they truly *believed* to be their own more quickly than a face that they did not truly believe was their own. Given the results of Experiments 1 and 2, we predicted a linear trend—that participants would identify the attractively enhanced version the fastest, their actual image more slowly, and their unattractively altered version the slowest.

This new methodology also allows us to test the plausibility of an alternative interpretation of the results of Experiments 1 and 2 based on the similarity between the extreme targets used in the morphing procedure and participants' actual faces. In particular, it is possible that participants' actual faces resemble the highly attractive target more than they resemble the highly unattractive target. If one's actual image is more similar to the attractive morph than it is to the unattractive morph, the range of morphs produced with the attractive target may simply be smaller than the range produced with the unattractive target. Any error in recognition is therefore likely to lead to biased responses in the direction of the attractive target. This alternative interpretation would

presumably apply to all faces rather than simply one's own, and the difference in recognition for self versus the relative stranger in Study 2 therefore seems inconsistent with this alternative. So too are the likelihood estimates reported in Figure 2 inconsistent with this interpretation, as the range of likelihood estimates is directionally larger across the attractive faces than it is across the unattractive faces, showing a clear ability to differentiate between the images. Nevertheless, the new procedure in Experiment 3 allows us to test this alternative directly by measuring, through reaction times, participants' ability to distinguish among the morphed images. If the range of attractive morphs is small and is therefore hard to distinguish among them, participants should show a smaller difference in recognition speed between the attractive morph and their actual face (or perhaps no difference at all) than between their unattractive morph and their actual face.

Method

University of Chicago undergraduates (N = 20, 17 female) participated in exchange for $6. As in the previous experiments, participants arrived in the laboratory for an unrelated experiment and had their photograph taken before leaving. Participants' facial images were then morphed using the averaging procedure from Experiments 1 and 2. After returning to the lab, participants were seated in front of a blank computer screen, told that they would be shown an array of 12 photographs (1 of which was their own), that they were to identify their own image as quickly as possible, and that they would see a total of 12 such arrays. Each array included 1 image of the actual participant (in a random location)—either their actual image, the 20% attractive morph, or the 20% unattractive morph—and 11 same-gender distracter faces (taken from 33 participants in previous experiments). Each of the three target images (attractive, actual, unattractive) was therefore presented four times in a predetermined random order. Participants were told to press the space bar as soon as they spotted their own image, and to then point to their image on the screen that they recognized to be their own. We used the speed with which participants pressed the space bar as an indication of their recognition speed. When finished with all 12 arrays, participants were thanked, paid, and dismissed.

Results and Discussion

Reaction times more than 3 *SD* from the mean of a particular trial were removed on an item-by-item basis (3.5% of observations in total). Participants saw each of the target images four times, and we calculated the average speed with which they recognized each of the target images.

A repeated measures ANOVA on participants' average reaction times to recognize the three target faces revealed a significant effect consistent with our predicted linear trend, $F(2, 18) = 4.43$, $p = .03$, $\eta^2 = .33$. Participants recognized their attractive morph most quickly (M = 1,892.09 ms, SD = 442.53), their actual image more slowly (M = 2,068.44 ms, SD = 559.47), and their unattractive morph the most slowly (M = 2,133.12 ms, SD = 460.11). Follow-up contrasts revealed that participants were marginally faster to recognize the attractive morph than their actual image, $F(1, 19) = 3.35$, $p = .08$, $\eta^2 = .15$, and were significantly faster to recognize the attractive morph than the unattractive morph, $F(1, 19) = 6.47$, $p = .02$, $\eta^2 = .25$. The difference in reaction times for participants to recognize their actual image and the unattractive morph was nonsignificant, $F < 1$. Notice that this result is not only inconsistent with what an alternative interpretation based on range restrictions between participants' actual image and the morphed targets would predict, it is precisely the opposite of what such an alternative would predict. People recognize objects more quickly when those objects match their mental representations, and these results clearly suggest that people's mental representations of their own facial image are, on average, more desirable than their image actually appears in reality.

GENERAL DISCUSSION

These experiments demonstrate that people tend to show evidence of self-enhancement in self-recognition, that such self-enhancement extends to close friends but not relative strangers, and that it is related to automatic and implicit measures of self-worth rather than deliberate and explicit measures. These experiments demonstrate that self-enhancement can emerge during the relatively automatic and perceptual process of face recognition, and the pattern of correlations with implicit measures of self-worth suggest a version of self-enhancement potentially distinct from existing demonstrations of positive illusions that are consistently correlated with explicit measures.

The methodology used to derive these conclusions is novel and immediately seems to raise at least two interesting issues. First, the methodology in these experiments bears some relation to measures of implicit self-esteem and raises questions about whether these results reflect another measure of implicit self-esteem or a consequence of implicit self-esteem. We believe it is a consequence,

rather than another measure, of implicit self-esteem. Psychological measures of latent constructs are designed to tap the central and defining features of the construct itself. Implicit self-esteem is theoretically defined as the positivity of automatic or intuitive associations to the self (Koole & DeHart, 2007) and is therefore indexed by measures of liking for things associated with the self (such as liking for the initials of one's name; Dijksterhuis, 2004; Koole et al., 2001) or by the valence of associations automatically activated when primed with the self-concept (e.g., Hetts et al., 1999; Spalding & Hardin, 1999). Because liking is used as a cue for recognition (Monin, 2003), we believe that enhancement bias in self-recognition is one causal step removed from the more basic underlying measure of implicit self-regard and therefore is better conceptualized as a psychological phenomenon rather than as a psychological measure.

Second, novel methodologies such as the one used here raise concerns about procedural artifacts that may provide alternative interpretations of an experiment's results. Although we took great care to avoid obvious confounds, readers may be concerned that the images may have somehow differed in luminance, blurriness, or some other aspect systematically across the experiments. We have no evidence to suggest such procedural artifacts but notice that any such procedural concerns would need to account for the breadth of findings across the entire set of experiments—not simply the mean-level bias in recognitions observed for self and friends (Experiments 1 and 2), for one's actual image and one's mirror image (follow-up to Experiment 1), or in the speed of recognition (Experiment 3), but also for the consistent pattern of correlations with implicit versus explicit measures of self-worth (and the symmetry procedure mentioned in Note 1).

One alternative interpretation that might systematically be able to explain this entire pattern, and one we therefore believed required additional empirical investigation, involves people's actual attractiveness. People who are actually more attractive may have more difficulty distinguishing between images morphed with the attractive target simply because the objective difference between an attractive person and the attractive target used in these experiments would be smaller. Attractive participants might therefore false alarm to the attractively enhanced images more often. If attractive people also have higher implicit self-worth, such an alternative could account for the pattern we obtained. Although we mentioned that a similar alternative interpretation does not seem to account for the pattern of results observed in Experiment 3 across all participants, our concern here has more to do with the individual-level correlations between participants.

We examined this alternative by having separate groups of participants (between 20 and 24 for each experiment) rate the actual attractiveness of each original image used in the experiments. Raters evaluated the participants from only one of the experiments included in this article, with images of the original participants appearing in a random order. No consistent relationship emerged between average ratings of actual attractiveness and the photo participants originally selected as their own (rs = –.37, –.15, and .29, for Experiment 1, Experiment 1 follow-up, and Experiment 2, respectively, all ps > .05) or in the speed with which they identified any of the images in Experiment 3 (ps > .3). Average ratings of attractiveness were also not consistently related to the composite measure of implicit self-esteem across the three experiments (ps > .2). Differences in actual attractiveness do not seem to account for the results we observed.

Although these results are generally consistent with the general picture of self-enhancement that emerges from the social psychological literature, they appear at odds with empirical results regarding body satisfaction more generally. In particular, both men and women tend to show consistent dissatisfaction with their body image (Powell, Matacin, & Stuart, 2001) and may even hold negatively distorted perceptions of their own bodies. Women (especially those with eating disorders) asked to represent their waist circumference with a rope, for instance, tend to create a circle that may be as little as half the size of their actual waist (for a review, see Cash & Deagle, 1997). The resolution, we suspect, may come in the automatic and implicit versus relatively controlled and deliberate nature of the measures used in these differing experiments. The self-enhancing results we report here emerge on recognition measures that are prototypic examples of automatic psychological processes, whereas body dissatisfaction results emerge in more deliberate and explicit measures. Similar dissociations between implicit and explicit self-views have emerged in cross-cultural studies of self-enhancement between Asian and Western Europeans. Although explicit measures show consistent evidence of self-criticism and deprecation among East Asians compared to Western Europeans (Heine et al., 1999), their implicit self-assessments are predictably favorable (Hetts et al., 1999; Kitayama & Karasawa, 1997; Yamaguchi et al., 2007). Whether a similar dissociation would emerge in perceptions of body image more generally is an interesting avenue for further research.

More generally, the relation between self-enhancement and implicit self-worth in these experiments suggests a potentially distinct version of self-enhancement from existing demonstrations of positive illusions that are consistently correlated with explicit measures. Implicit attitude measures tend to reflect consistent and repeated associations in the environment, producing

automatic associations through classical conditioning that can then extend to related but unconditioned stimuli. People structure their lives in ways that tend to increase the likelihood of positive associations to the self (or close friends and loved ones), and stimuli associated with the self are therefore automatically evaluated positively (Beggan, 1992; Pelham, Carvallo, & Jones, 2005). The experiments here suggest that such associations can create positive *distortions* of the self as well, a top-down influence that not only influences how people think about themselves but also what people see when they look directly at themselves. It is perhaps of little wonder, then, that people so rarely seem to like the photographs taken of themselves. The image captured by the camera lens just does not match up to the image captured in the mind's eye.

NOTE

1. Participants also completed a second procedure originally intended to allow a conceptual replication of the correlation with implicit versus explicit self-esteem. In particular, we created a series of morphed images increasing in symmetry. Existing research demonstrates that people tend to like symmetrical images of themselves (Little & Jones, 2003), and symmetry is generally perceived as being attractive (Rhodes, 2006). In this symmetry procedure, participants' facial images were split in half vertically, the right side flipped to create a perfectly symmetrical face, and participants' actual image was morphed with this symmetrical image in 10% increments up to 90%, resulting in 11 total images. Because this procedure only increases symmetry rather than decreases it, mean biases in the recognized image cannot be taken as clear evidence of self-enhancement, as any random error in the selection of faces can only lead to a selection of an enhanced face. We included this procedure only to serve as a possible conceptual replication for the relation between recognition and implicit versus explicit self-esteem.

Recent evidence, however, suggests that this chimeric procedure can slightly *decrease* the apparent attractiveness of the face due to anomalies introduced by asymmetrical facial features (for a review, see Rhodes, 2006). We tried to eliminate these concerns by removing three people who had obvious facial marks that would appear bizarre with this procedure, but we cannot rule out artifacts altogether. This procedure, unbeknown to us at the time, therefore contains some ambiguities that may make it less than ideal for our purposes.

That said, results from this symmetry procedure were at least consistent with our predictions. As with the averaging procedure, participants' tendency to select the more symmetrical self-images was significantly correlated with the composite measure of implicit self-esteem, $r(22) = .40$, $p = .05$, but not with explicit self-esteem, $r = .18$, $p = .40$. Participants tended to select a face that was significantly more enhanced than their own ($M = 26.25\%$ morph with perfectly symmetrical image), $t(23) = 4.68$, $p < .001$, $d = 1.95$.

REFERENCES

Baccus, J. R., Baldwin, M. W., & Packer, D. J. (2004). Increasing implicit self-esteem through classical conditioning. *Psychological Science, 15,* 498-502.

Balcetis, E., & Dunning, D. (2006). See what you want to see: Motivational influences on visual perception. *Journal of Personality and Social Psychology, 91*, 612-625.

Beggan, J. K. (1992). On the social nature of nonsocial perception: The mere ownership effect. *Journal of Personality and Social Psychology, 62*, 229-237.

Bhalla, M., & Proffitt, D. R. (1999). Visual-motor recalibration in geographical slant perception. *Journal of Experimental Psychology: Human Perception and Performance, 25,* 1076-1096.

Brown, J. D. (1986). Evaluations of self and others: Self-enhancement biases in social judgments. *Social Cognition, 4,* 353-376.

Cash, T. F., & Deagle, E. A., III (1997). The nature and extent of body image disturbances in anorexia nervosa and bulimia nervosa. *International Journal of Eating Disorders, 22,* 107-125.

Chambers, J. R., & Windschitl, P. D. (2004). Biases in social comparative judgments: The role of nonmotivated factors in above-average and comparative optimism effects. *Psychological Bulletin, 130,* 813-838.

Clerkin, E. M., & Teachman, B. A. (in press). Perceptual and cognitive biases in individuals with body dysmorphic disorder symptoms. *Cognition and Emotion.*

Cunningham, W. A., Preacher, K. J., & Banaji, M. R. (2001). Implicit attitude measures: Consistency, stability, and convergent validity. *Psychological Science*, *12*, 163-170.

Dijksterhuis, A. (2004). I like myself but I don't know why: Enhancing implicit self-esteem by subliminal evaluative conditioning. *Journal of Personality and Social Psychology, 86,* 345-355.

Ditto, P. H., & Lopez, D. F. (1992). Motivated skepticism: The use of differential decision criteria for preferred and nonpreferred conclusions. *Journal of Personality and Social Psychology, 63,*568-584.

Ditto, P. H., Munro, G. D., Apanovitch, A. M., Scepansky, J. A., & Lockhart, L. K. (2003). Spontaneous skepticism: The interplay of motivation and expectation in responses to favorable and unfavorable medical diagnoses. *Personality and Social Psychology Bulletin*, *29*, 1120-1132.

Ditto, P. H., Scepansky, J. A., Munro, G. D., Apanovich, A. M., & Lockhart, L. K. (1998). Motivated sensitivity to preference-inconsistent information. *Journal of Personality and Social Psychology, 75,* 53-69.

Dunning, D. (1999). A newer look: Motivated social cognition and the schematic representation of social concepts. *Psychological Inquiry, 10,* 1-11.

Dunning, D., & Cohen, G. L. (1992). Egocentric definitions of traits and abilities in social judgment. *Journal of Personality and Social Psychology, 63,* 341-355.

Epley, N., & Dunning, D. (2000). Feeling "holier than thou": Are self-serving assessments produced by errors in self or social prediction? *Journal of Personality and Social Psychology*, *79*, 861-875.

Epley, N., & Dunning, D. (2006). The mixed blessings of self-knowledge in behavioral prediction: Enhanced discrimination but exacerbated bias. *Personality and Social Psychology Bulletin, 32,* 641-655.

Gagne, F. M., & Lydon, J. E. (2004). Bias and accuracy in close relationships: An integrative review. *Personality and Social Psychology Review, 8,* 322-338.

Gramzow, R. H., & Willard, G. (2006). Exaggerating current and past performance: Motivated self-enhancement versus reconstructive memory. *Personality and Social Psychology Bulletin, 32,* 1114-1125.

Grill-Spector, K., & Kanwisher, N. (2005). Visual recognition: As soon as you know it is there, you know what it is. *Psychological Science, 16,* 152-160.

Heine, S. J., Lehman, D. R., Markus, H. R., & Kitayama, S. (1999). Is there a universal need for positive self-regard? *Psychological Review, 106,* 766-794.

Hetts, J. J., Sakuma, M., & Pelham, B.W. (1999). Two roads to positive regard: Implicit and explicit self-evaluation and culture. *Journal of Experimental Social Psychology, 35*, 512-559.

Jones, J. T., Pelham, B. W., Mirenberg, M. C., & Hetts, J. J. (2002). Name letter preferences are not merely mere exposure: Implicit egotism as self-regulation. *Journal of Experimental Social Psychology, 38*, 170-177.

Kenny, D. A., & Kashy, D. A. (1994). Enhanced coorientation in the perception of friends: A social relations analysis. *Journal of Personality and Social Psychology, 67*, 1024-1033.

Kitayama, S., & Karasawa, M. (1997). Implicit self-esteem in Japan: Name letters and birthday numbers. *Personality and Social Psychology Bulletin, 23,* 736-742.

Kobayashi, C., & Brown, J. D. (2003). Self-esteem and self-enhancement in Japan and America. *Journal of Cross-Cultural Psychology, 34*, 567-580.

Koole, S. L., & DeHart, T. (2007). Self-affection without self-reflection: Origins, models, and consequences of implicit self-esteem. In C. Sedikides & S. Spencer (Eds.), *The self in social psychology* (pp. 36-86). New York: Psychology Press.

Koole, S. L., Dijksterhuis, A., & van Knippenberg, A. (2001). What's in a name: Implicit self-esteem. *Journal of Personality and Social Psychology, 80,* 614-627.

Kunda, Z., & Sinclair, L. (1999). Motivated reasoning with stereotypes: Activation, application, and inhibition. *Psychological Inquiry, 10*, 12-22.

Kwan, V. S. Y, John, O. P., Kenny, D. A., Bond, M. H., & Robins, R. W. (2004). Reconceptualizing individual differences in self-enhancement bias: An interpersonal approach. *Psychological Review, 111,* 94-110.

Little, A. C., & Jones, B. C. (2003). Evidence against perceptual bias views for symmetry preferences in human faces. *Proceedings of the Royal Society of London Series B–Biological Sciences, 270,* 1759-1763.

Mita, T. H., Dermer, M., & Knight, J. (1977). Reversed facial images and the mere-exposure hypothesis. *Journal of Personality and Social Psychology, 35,* 597-601.

Monin, B. (2003). The warm glow heuristic: When liking leads to familiarity. *Journal of Personality and Social Psychology, 85,* 1035-1048.

Moreland, R. L., & Zajonc, R. B. (1982). Exposure effects in person perception: Familiarity, similarity, and attraction. *Journal of Experimental Social Psychology, 18,* 395-415.

Murray, S. L., Holmes, J. G., & Griffin, D. W. (2004). The benefits of positive illusions: Idealization and the construction of satisfaction in close relationships. In H. T. Reis & C. E. Rusbult (Eds.), *Close relationships: Key readings* (pp. 317-338). Philadelphia: Taylor & Francis.

Nelson, L. D., & Simmons, J. P. (2007). Moniker maladies: When names sabotage success. *Psychological Science, 18,* 1106-1112.

Nuttin, J. M. (1985). Narcissism beyond Gestalt and awareness: The name letter effect. *European Journal of Social Psychology, 15,* 353-361.

Pelham, B. W., Carvallo, M., & Jones, J. T. (2005). Implicit egotism. *Current Directions in Psychological Science, 14*, 106-110.

Pelham, B. W., Mirenberg, M. C., & Jones, J. K. (2002). Why Susie sells seashells by the seashore: Implicit egotism and major life decisions. *Journal of Personality and Social Psychology, 82,* 469-487.

Powell, J. L., Matacin, M. L., & Stuart, A. E. (2001). Body esteem: An exception to self-enhancing illusions? *Journal of Applied Social Psychology, 31,* 1951-1978.

Rhodes, G. (2006). The evolutionary psychology of facial beauty. *Annual Review of Psychology, 57,* 199-226.

Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.

Sedikides, C., Gaertner, L., & Toguchi, Y. (2003). Pancultural self-enhancement. *Journal of Personality and Social Psychology*, *84*, 60-79.

Spalding, L. R., & Hardin, C. D. (1999). Unconscious unease and self-handicapping: Behavioral consequences of individual differences in implicit and explicit self-esteem. *Psychological Science, 10,* 535-539.

Thorpe, S., Fize, D., & Marlot, C. (1996). Speed of processing in the human visual system. *Nature, 381*, 520-522.

Yamaguchi, S., Greenwald, A. G., Banaji, M. R., Murakami, F., Chen, D., Shiomura, K, et al. (2007). Apparent universality of positive implicit self-esteem. *Psychological Science, 18,* 498-500.

Received July 7, 2007
Revision accepted February 1, 2008