

## **THE INHIBITION OF SOCIALLY REJECTING INFORMATION AMONG PEOPLE WITH HIGH VERSUS LOW SELF-ESTEEM: THE ROLE OF ATTENTIONAL BIAS AND THE EFFECTS OF BIAS REDUCTION TRAINING**

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In two studies, we examined the inhibition of rejection information. In Study 1, we developed a Rejection Stroop task with the purpose of measuring an attentional bias to rejection words hypothesized to characterize individuals with low self-esteem. Results indicated that people with low self-esteem experienced significantly more interference on rejection words than on acceptance words, whereas for people with high self-esteem there was no such difference. In Study 2, we developed a task to train the response of inhibiting rejection information by repeatedly identifying the smiling/accepting face in a 4 × 4 matrix of frowning faces. Results showed that after this inhibition training, people with chronic low self-esteem experienced significantly less interference on rejection words on the Rejection Stroop than their counterparts in the control condition. People with high self-esteem, on the other hand, did not exhibit different amounts of interference on rejection or acceptance words between conditions. The present findings suggest that it is possible to measure people's attentional bias to rejection and teach people skills that help them deal with negative social information.

Research into the cognitive processes characterizing people with low and high self-esteem has shown reliable differences in how they respond to

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certain types of information. This research has generally focused on the evaluative judgments people make of themselves and their own performances. After a failure, for example, individuals with low self-esteem tend to focus on the negative outcome, blame themselves for it, and draw uncharitable inferences about their abilities. Conversely, high self-esteem individuals engage in a variety of defensive processes. They engage in processing that is biased toward overestimation of their control over circumstances, overestimation of their performances, and a tendency to respond to any negative outcomes with external attributions and increased attention to alternative domains of strength. Such differences in handling outcome information help to explain why low self-esteem has been associated with negative affect, depression, anxiety, and maladjustment, while high self-esteem has been associated with greater confidence, expectations of success, self-enhancement, positive self-views, optimism, and low levels of anxiety (Campbell, Rudich, & Sedikides, 2002; Leary, Tambor, Terdal, & Downs, 1995; Taylor & Brown, 1988).

Rather than focusing on performance appraisals, we examined the domain of interpersonal relations, specifically, processing differences in the perception of rejection. According to research on the interpersonal roots of self-esteem, a critical aspect of self-esteem dynamics has to do with an individual's sense of his or her place in the social world. *Sociometer Theory* (Leary et al., 1995) holds that the self-esteem system is, at its core, a gauge that monitors the degree to which one is accepted and included by others versus rejected and excluded. One needs to constantly assess and monitor others' reactions in order to retrieve social information pertaining to one's inclusionary status. According to this theory, people who, over time, experience real or imagined rejection develop lower trait self-esteem than people who feel accepted and included in their social environment. Low trait self-esteem in turn predisposes the person to more readily perceive others as rejecting. In contrast, individuals with high self-esteem generally perceive others as accepting (Leary et al., 1995). Therefore, according to this perspective, a key cognitive process underlying self-esteem dynamics is the perception of rejection and acceptance. Related research on the construct of *rejection sensitivity* (Ayduk et al., 2000; Feldman & Downey, 1994) confirmed that individuals who have a strong tendency to anxiously expect, perceive, and overreact to rejection tend to also suffer from low self-esteem. Therefore it seems that individuals with low self-esteem monitor the environment with an attentional bias for rejection information, tending to monitor the environment for, focus attention on, and have difficulty disengaging attention from, any minimal indication of negative interpersonal feedback. Conversely, individuals with high self-esteem

exhibit an attentional bias toward acceptance and/or a corresponding inhibitory tendency for negative social feedback.

We sought to develop a task to measure this attentional bias regarding rejection and acceptance information. We drew on previous work that has employed the *emotional Stroop* task to study attentional processes in a variety of clinical and nonclinical populations. The task is most commonly used to investigate attentional biases in disorders such as anxiety disorders or depression. The most common use of the emotional Stroop task is to assess the extent to which certain stimuli hypothesized to be relevant to the disorder “capture attentional resources” (Williams, Mathews, & MacLeod, 1996). In a variant of the original Stroop task (Stroop, 1935), participants are asked to name the ink color of emotionally significant words (rather than color words as in the original). For anxious or distressed participants, performance on the color-naming task is hindered because the word presented on the screen—for example, *danger*, creates interference that delays the color-naming response. Participants automatically attend to two stimuli, the threatening word itself and the ink color, leading to longer response times. In general, interference findings are taken as an indicator of an inability to disengage attention from the threatening information. Nondistressed participants, who are able to inhibit the words or are not disturbed by the words, can name the ink color more quickly. Interference effects have been found in populations suffering from a variety of disorders, including depression, anxiety, social phobia, panic disorders, health worries, and spider phobias. Moreover, this seemingly sterile laboratory task has been found to predict people’s behaviors in social or phobia-related situations, and improvements on the Stroop task are found among people who successfully respond to psychotherapy (Williams et al., 1996).

In a recent study of social feedback, Martin and Cole (2000) studied the internalization of rejection in children using an emotional Stroop task. Socially popular and unpopular elementary schoolchildren were presented negative social words and control words. Results demonstrated that unpopular children, but not popular children, took significantly longer to name the ink color of rejection words versus control words. The authors suggest that unpopular children had internalized negative personally relevant social information, which in turn made them more sensitive to such social information. Drawing from this study, we adapted the emotional Stroop to test for the attentional bias of rejection in individuals with low and high self-esteem by presenting negative and positive interpersonal social words (e.g., rejected, welcomed).

In our second study, we asked whether it might be possible to train an inhibitory response to negative social information. In the stereotyping literature, recent research has demonstrated that people with negative atti-

tudes can be trained to inhibit the stereotypes they hold by repeatedly negating their typical view (Kawakami, Dion, & Dovidio, 1998; Kawakami, Dovidio, Moll, Hermsen, & Russin, 2000). On another front, Anderson and Green (2001) trained individuals to inhibit paired associates by deliberately suppressing target words on repeated trials. Results showed that mechanisms can be developed to prevent unwanted memories from entering awareness and that after having been trained, individuals find it more difficult to recall suppressed memories. We wondered if, through adequate practice, people with low self-esteem could be trained with inhibition skills so as to reduce their attentional bias to rejection information. Ayduk et al. (2000), building on their earlier rejection sensitivity research, found in a correlational study that the ability to strategically deploy attention reduced a link between low self-esteem and rejection sensitivity. We sought to train this ability in an experimental task.

## STUDY 1

The purpose of the first study was to see if people with chronic low self-esteem would experience more interference on interpersonal rejection words than on interpersonal acceptance words. We hypothesized that, based on the notion that the concept of rejection is highly accessible and impactful for people with low self-esteem, rejection words would create more Stroop interference than acceptance words. People with high self-esteem, on the other hand, would not experience different amounts of interference on rejection and acceptance words.

Previous research using the emotional Stroop has shown that the more one identifies with a word, the more Stroop interference this word creates. Furthermore, relatedness to words describing one's current concern is necessary for Stroop interference to occur in nonclinical groups (Mathews & Klug, 1993; Rienmann & McNally, 1995; Williams et al., 1996). Therefore, it seemed important to determine the degree to which participants identified with the rejection words and the acceptance words in order to assess the interference caused by targets highly relevant to interpersonal concerns. For this we added a word identification rating scale in our methodology.

## METHOD

### Participants

Participants were 33 undergraduate students, fluent in English, who participated voluntarily for extra course credit. Two participants were excluded for the following reasons: One participant was color-blind and one participant did not correctly follow the questionnaire instructions.

The final sample of 31 participants consisted of 22 women and 9 men, with a mean age of 19.95 years.

### **Materials and Apparatus**

*Rejection Stroop Task.* The Rejection Stroop task was designed and programmed using E-Prime software (2002). Color-naming response latencies were recorded using a voice-key connected to a headset microphone.

From previous studies on rejection and acceptance, 36 stimulus words were adapted (Baldwin & Sinclair, 1996). The 36 words were divided into three categories; 12 rejection words (unwanted, ignored, rejected, disliked, shunned, rebuffed, neglected, excluded, avoided, isolated, condemned, disapproved), 12 acceptance words (welcomed, wanted, liked, accepted, cherished, caring, supported, included, loved, affection, warmth, embraced), and 12 noninterpersonal words of mixed valence (spoon, chair, kitchen, table, pain, tragedy, death, poison, rainbow, paradise, happy, pleasure). On each trial, a target word was randomly presented in one of four colors (red, blue, green or yellow), and the same color was never presented on two consecutive trials. Each word was presented once in each of the four experimental blocks, which made for a total of 144 experimental trials. The 144 trials were presented in four blocks of 36 trials with breaks between blocks.

Words were presented in Courier font on a black background and were 1 centimeter tall on the computer screen. Participants were taken through a series of 12 practice trials before moving on to the experimental trials. Participants were instructed to look directly at the word presented on the screen and to name the ink color of the word as quickly as possible. The experimental trials proceeded as follows: a fixation point "+" appeared in the middle of the screen for 1 second, replaced by a stimulus word that remained on the screen for 1,200 ms, followed by a blank screen for 500 ms. The experimenter entered the participant's response on every trial in order to later check for errors.

*Questionnaire.* The questionnaire included the Rosenberg Self-Esteem scale (Rosenberg, 1965) along with other measures included for exploratory purposes. On the last page of the questionnaire, participants were asked to indicate what they thought the purpose of the experiment was and also to rate, using a 0 to 4 scale, the extent to which they felt they could identify with each of the rejection and acceptance words.

### **Procedure**

Participants were run individually and every participant completed the Stroop task followed by the questionnaire. Before completing the Rejection Stroop task, three Ishihara color-blindness schemes (Ishihara, 1939) were administered to make sure that the participants could correctly identify

each color. Once the Stroop task and the questionnaires were completed, participants were fully debriefed and thanked for their participation.

## RESULTS AND DISCUSSION

No subject accurately guessed the nature of the experimental hypothesis. Participants were designated as low or high self-esteem on the basis of a median split using scores on the Rosenberg Self-Esteem Scale. Because the computer relied on a voice-activated timer, trials on which the participant hesitated, emitted a sound before saying the color, responded in less than 300 ms, or on which they committed an error were not included in the analyses. The mean percentage of excluded trials was 6%. A score to represent interference caused by rejection words was calculated by subtracting the mean reaction time (RT) of noninterpersonal words from the mean RT of rejection words. The same was done to calculate acceptance interference. For both interference scores, higher numbers reflect an attentional bias toward the construct when compared to baseline.

A 2 (target: rejection vs. acceptance)  $\times$  2 (self-esteem: low vs. high self-esteem) mixed model ANOVA with target as a within-subject factor was conducted to test our hypothesis. The target main effect was significant,  $F(1, 29) = 4.54, p < .05$ , showing that, overall, rejection words produced more interference than acceptance words. Although this result might reflect a general tendency toward monitoring one's environment for negative information (Pratto & John, 1991; Wentura, Rothermund, & Bak, 2000) and is consistent with earlier research (e.g., Segerstrom, 2001), we are reluctant to interpret the finding because the words were not carefully matched for length, frequency, and so on because baseline differences were not central to our theoretical question. Rather, our important questions involve differences between individuals as a function of their level of self-esteem. However, the predicted two-way interaction, between self-esteem and target type, was not significant,  $F(1, 29) = 1.92, ns$ , indicating that there was no significant difference in this analysis between rejection interference and acceptance interference for low and high self-esteem participants.

The nonsignificant two-way interaction could be explained by the possibility that only some of the target words effectively captured the interpersonal experiences of rejection and acceptance. To determine the most representative rejection and acceptance words, a principal components analysis (PCA) was conducted on the word identification ratings to determine which words from each category loaded most highly on their respective factor. The resulting PCA using VARIMAX rotation yielded two factors, the first consisting of rejection words and the second of acceptance words. On the basis of the factor loadings, two new mean

TABLE 1. Mean (and SDs) Interference on Rejection and Acceptance Words for People with Low and High Self-Esteem

	Low Self-Esteem	High Self-Esteem
Rejection interference	9.04 (28.54)	13.82 (24.95)
Acceptance interference	-18.35 (29.87)	14.39 (32.63)

rejection RTs were calculated, one for the six rejection words with the highest factor loadings and a second for the bottom six rejection word loadings. The same was done with the acceptance words.

The  $2 \times 2$  ANOVA of the *bottom* loading target words again revealed a nonsignificant target by self-esteem interaction,  $F(1, 29) = .078$ , *ns*. Both low and high self-esteem participants experienced the same amount of interference on words that did not load highly on their relevant factors.

Using the means of the *top* loading six words (rejection words: shunned, ignored, unwanted, disliked, neglected, rejected; and acceptance words: embraced, wanted, welcomed, included, caring, liked), however, the  $2 \times 2$  ANOVA revealed the predicted two-way interaction,  $F(1, 29) = 6.08$ ,  $p < .05$ . Table 1 shows the means and standard deviations of rejection and acceptance interference for low and high self-esteem participants. Simple main effects tests revealed that for people with low self-esteem, rejection interference was significantly greater than acceptance interference,  $F(1, 29) = 11.31$ ,  $p < 0.01$ , whereas for people with high self-esteem the difference was not significant,  $F(1, 29) = 0.005$ , *ns*.<sup>1</sup>

1. A plausible alternative explanation of our findings might be that low self-esteem individuals show a general bias toward all types of negative information, not just rejection as we hypothesize. In an effort to examine this possibility, we included in the category of 12 non-interpersonal words three subcategories: four noninterpersonal negative words, four noninterpersonal positive words, and four noninterpersonal kitchen words. We included the negative and positive noninterpersonal targets in a  $2$  (social context: interpersonal vs. non-interpersonal)  $\times 2$  (valence: negative vs. positive)  $\times 2$  (self-esteem: low vs. high) ANOVA to test whether participants' responses were indicative of an attentional bias toward rejection or acceptance per se and not a general orientation toward negative stimuli. The three-way interaction was significant,  $F(1, 29) = 5.73$ ,  $p < 0.05$ , indicating that people with low and high self-esteem responded differently to negative and positive stimuli, depending on whether they were interpersonal. Also, analyzing negative and positive, but non-interpersonal, words in a  $2$  (valence)  $\times 2$  (self-esteem) ANOVA revealed a nonsignificant two-way interaction, indicating that the difference between negative and positive words is similar for both low and high self-esteem participants, and self-esteem effects appear only on the interpersonal targets. Considering these findings, the negative and positive words were then considered as neutral words and included in calculating the mean neutral RT's.



As anticipated and based on interpersonal theories of self-esteem, people with low self-esteem exhibited significantly more Stroop interference on rejection words than on acceptance words, whereas people with high self-esteem did not. The rejection Stroop task developed here thus appears to measure the different attentional biases people with low and high self-esteem have toward interpersonal feedback information. This result fits well with previous findings that low self-esteem individuals are particularly sensitive to negative social information.

Examination of the means in Table 1 reveals that high self-esteem individuals actually showed relatively slower reaction times to both rejection and acceptance words when compared to neutral control words, which could be interpreted as activation of both kinds of social content. Low self-esteem individuals, in comparison, were distinguished by their particularly quick responses to acceptance words, which might be seen as the successful inhibition of acceptance information. We see these as intriguing possibilities but suggest that the interpretation of these means needs to take into account the ambiguity inevitably introduced by the use of ostensibly neutral targets to generate baseline scores (e.g., Neely, 1991), especially when the neutral targets are drawn from a different (in this case, noninterpersonal) domain. Baseline scores are useful to account for differences between individuals' response times. However, it is difficult if not impossible to generate words that have absolutely no affective or self-esteem relevance, and therefore baseline reaction times and deviations from them should always be considered imperfect approximations used primarily for statistical purposes. In that light, it is most appropriate to compare the interference caused by rejection targets with that caused by acceptance targets, because both are recorded from the same subject and both are adjusted by the same baseline score. In the current data, then, low self-esteem individuals showed relatively more interference for rejection than for acceptance targets, which we are interpreting as a relative bias toward rejection information (in line with other research in this area). Whether this involves primarily an orientation toward negative information or whether it may involve in part an orientation away from positive information remains to be seen.

The results confirm (as in some previous research, e.g., Dozois & Backs-Dermott, 2000) that it is important to assess the degree to which participants identify each target as representing the dimension in question. The predicted Stroop effects were evident only on targets that loaded highly on their relevant factor. It is important to note that the high-loading targets were not determined by analysis of the Stroop data, which could have introduced a statistical artifact of some kind. Rather, the selection was based on the self-report measure of how participants felt they could identify with each word. Thus, the target words that



emerged from analysis of participants' subjective ratings also showed the interference effects on the Stroop test.

## STUDY 2

The second study was designed to examine the possibility of training an inhibitory response to rejection information. In stereotyping research by Kawakami et al. (2000), participants were trained to say "NO" when shown a picture of a skinhead paired with a stereotypic trait (e.g., "aggressive") and "YES" when paired with a nonstereotypic trait (e.g., "gentle"). Participants were given a Stroop task before and after the training in order to measure change in automatic stereotype activation. Results showed that participants receiving extensive training in negating their stereotypes demonstrated reduced stereotype activation. If such automatic stereotyping processes have been shown to be modifiable under extensive training conditions, it might also be possible to train people on other automatic processes involving responses to negative evaluations in one's environment. More specifically, we hypothesized that people with low self-esteem could be trained to inhibit rejection information and, as a result, experience less interference on rejection words than those in the control condition.

As briefly mentioned earlier, Ayduk et al. (2000) found significant correlations between rejection sensitivity, as measured by questionnaire, and numerous negative outcomes, including low self-esteem. The correlation was weakened, however, for individuals who scored high on the ability to manage their attentional focus (as measured years earlier in a delay of gratification paradigm). These authors reason that the ability to deploy attention strategically allows such individuals to "dampen the activation of vigilance, better attend to situational information and others' perspectives, and generate alternative explanations to that of purposeful rejection" (pp. 788-789). They acknowledge that one limitation of their work was its correlational nature, in that all variables were measured and so it was unknown if, for example, a low level of distress might have allowed people to better control their attention. Our purpose was to extend this work in an experimental design in which the attentional response was manipulated rather than measured as an individual difference variable.

Our procedure was inspired by the "face-in-the-crowd" research by Hansen and Hansen (1988), who examined face-processing. In a  $3 \times 3$  matrix, they presented pictures of happy, angry, and neutral faces embedded in a crowd of happy, angry, or neutral pictures to examine the extent to which threatening faces visually pop out of crowds and capture attention. We essentially reversed the task to instead train individuals to find

the smiling/accepting face in a matrix of negative expressions. The purpose was to see if participants would learn to inhibit their attention to negative expressions by repeatedly having to locate a smiling/accepting face, and thereby would be better able to inhibit attention to rejection information.

## METHOD

### Participants

Fifty-six participants, fluent in English, participated either for course credit or for \$8 CDN. Data from three participants were eliminated because of technical difficulties, and from four others because they did not properly follow the instructions in the training task. The final sample size consisted of 49 participants (8 men and 41 women, mean age = 19.9 years).

### Materials and Apparatus

*Training Task.* A smiling/accepting pose and a frowning pose of 16 different people were used as stimuli for the experimental training task. Pretesting confirmed that the smiling pictures were perceived as significantly more accepting and the frowning pictures were perceived as significantly more rejecting than a neutral point on a 7-point scale. The stimuli were presented on a 15-inch computer screen in the following manner: a 4 square  $\times$  4 square matrix, measuring 17 cm by 17 cm on the computer screen, appeared in the middle of the screen wherein there was 1 smiling/approving face and 15 frowning faces (Figure 1). Using a touch-screen panel, participants were instructed to tap on the smiling/approving face as quickly as possible. Each of the 16 smiling/approving face were randomly presented seven times, each time in a different square of the 4  $\times$  4 matrix, making for a total of 112 training trials. The 112 trials were divided into 4 blocks of 28 trials.

In the control condition, the stimuli consisted of drawings of five-petaled flowers and seven-petaled flowers. The procedure was identical to that in the experimental condition except for the instructions that asked participants to identify the five-petaled flower as quickly as possible in the matrix of seven-petaled flowers (Figure 2). In both conditions, the participants were not given feedback as to whether or not they had made a mistake on the trial. No positive or negative feedback was given at any time during the training task.

*Rejection Stroop Task.* The same procedure and equipment used in Study 1 were used in Study 2 except for the following changes. The stimuli were presented in Arial font but were still 1 centimeter tall on the screen. A fixation point was presented at the beginning of every block



FIGURE 1. Matrix presented to participants in the experimental training condition.

rather than at the beginning of every trial. The experimenter was present in the room only to set up the microphone and administer the practice trials and then left the participants to complete the experimental trials alone. The participants' voice responses were recorded and later checked for errors.

*Questionnaire.* The questionnaire was the same as in Study 1.

### **Procedure**

Participants were randomly assigned to either the experimental or control training task and were taken through a series of on-screen instructions and six practice trials before completing the 112 training task trials. After completing the training task, all participants completed the Rejection Stroop followed by the questionnaire. The participants were thor-

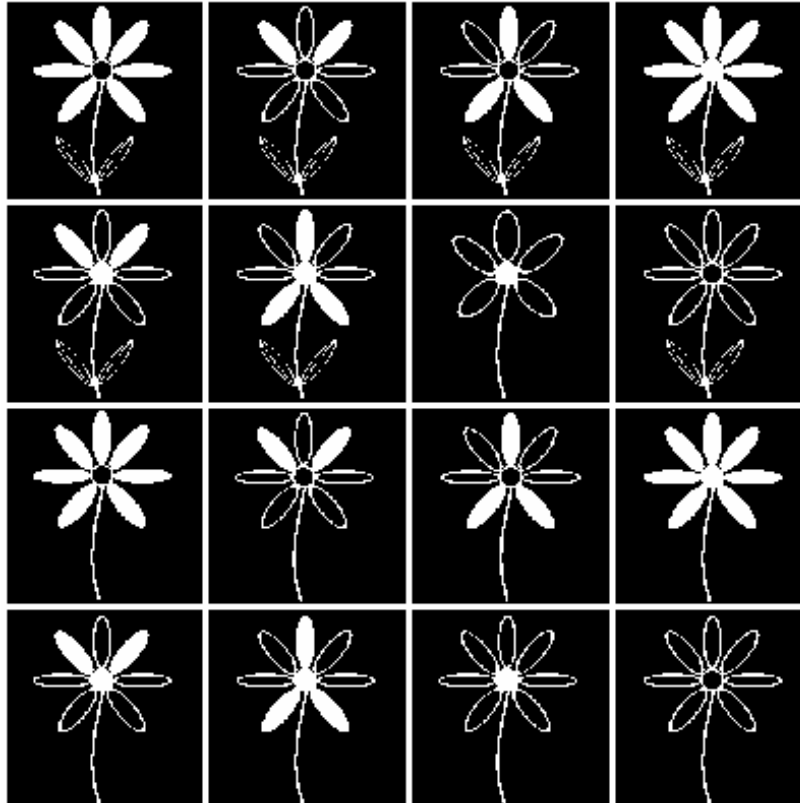


FIGURE 2. Matrix presented to participants in the control training condition.

oughly debriefed and thanked for their participation after completing the questionnaire.

## RESULTS AND DISCUSSION

No subject accurately guessed the nature of the experimental hypothesis. Participants were designated as high or low self-esteem on the basis of a median split using the score on the Rosenberg Self-Esteem Scale. The same criteria as in Study 1 were used to exclude trials. The mean percentage of excluded trials was 3.6%. Rejection interference and acceptance interference scores were calculated in the same manner as was done in Study 1.

TABLE 2. Mean (and SDs) Interference on Rejection and Acceptance Words for People with Low and High Self-Esteem in Both Conditions

	Low Self-Esteem		High Self-Esteem	
	Control	Experimental	Control	Experimental
Rejection interference	15.28 (19.87)	-12.98 (38.12)	-14.70 (23.29)	-2.51 (45.02)
Acceptance interference	10.76 (18.82)	10.67 (59.43)	-0.52 (57.66)	-19.37 (25.10)

A 2 (target: rejection vs. acceptance)  $\times$  2 (self-esteem: low vs. high)  $\times$  2 (condition: control vs. experimental) mixed model ANOVA with target as a within-subjects factor revealed the same, but marginal, target main effect as in Study 1,  $F(1, 45) = 3.54, p = .067$ , indicating that rejection targets produced more interference than acceptance targets.

The predicted three-way interaction was marginally significant,  $F(1, 45) = 3.25, p = .078$ . As in Study 1, a PCA was performed on the identification ratings to determine the top six and bottom six words from both category that load on the rejection and acceptance factors.

Using the *bottom* six word loadings to calculate rejection interference and acceptance interference, the two- and three-way interactions were not significant, suggesting that, as in Study 1, there was no difference between interference on rejection and acceptance words for people with low and high self-esteem on words that did not load highly on their relevant factors.

The same ANOVA was performed using the *top* six word loadings (rejection words: unwanted, ignored, disliked, rejected, avoided, shunned; acceptance words: warmth, affection, wanted, welcomed, cherished, liked) to calculate rejection and acceptance interference and revealed a significant target by self-esteem by condition interaction,  $F(1, 45) = 4.88, p < .05$ . Simple main effects analyses indicated that people with low self-esteem in the experimental condition experienced significantly less interference on rejection words than people with low self-esteem in the control condition,  $F(1, 45) = 4.14, p < .05$  (see Table 2 for means and standard deviations). Participants with low self-esteem in both conditions experienced virtually an identical amount of acceptance interference,  $F(1, 45) = .000, ns$ , (see Figure 3). People with high self-esteem, on the other hand, did not exhibit different amounts of interference on different targets, specifically on rejection or acceptance words between conditions,  $F_s < 1.17, p_s > .28$ .

These results support our second hypothesis and demonstrate that people with low self-esteem in the experimental condition learned to inhibit

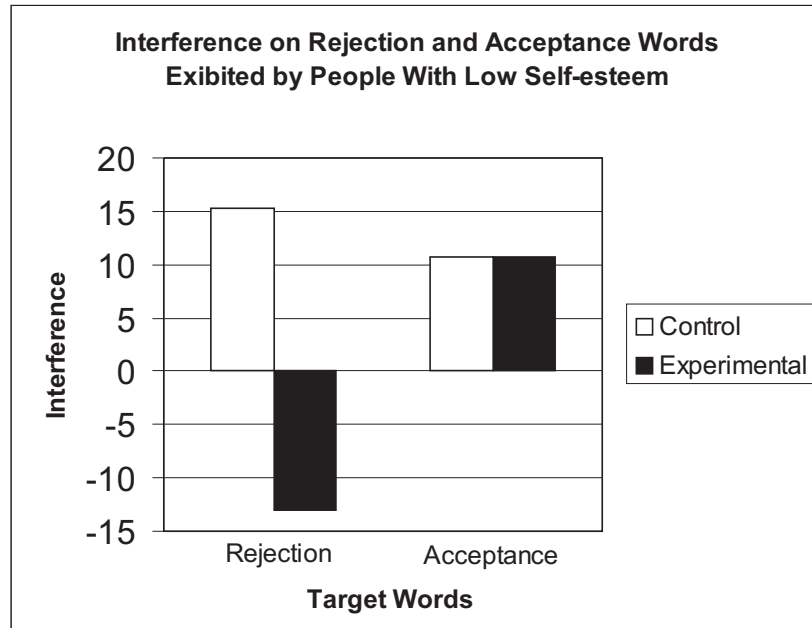


FIGURE 3. Interference on rejection and acceptance words exhibited by people with low self-esteem.

rejection or disengage their attention from negative social information, as indicated by less interference on rejection words.<sup>2</sup> As in Study 1, the most robust effects were observed on targets selected on the basis of the self-report measure of the extent to which participants can identify to each word.

2. As in Study 1, analyses were conducted on the negative and positive noninterpersonal words in order to test for social context and valence, and the analyses led to the same conclusions. In this study, we also examined the possibility that any effects of our manipulation might be due to a momentary increase in mood or state self-esteem. Among the scales that we administered after the manipulation were the Profile of Mood States (including composed/anxious, elated/depressed, and confident/unsure subscales; McNair, Lorr & Droppleman, 1971) and the State Self-Esteem Scale (including performance, appearance, and social subscales; Heatherton & Polivy, 1991). When we analyzed these scales as well as their subscales in two-way ANOVAs, neither the main effect for the manipulation nor the interaction with self-esteem was significant, indicating that mood and state self-esteem were not affected by condition. Also, the critical interaction result on the Stroop interference scores remained significant when we entered the mood and state self-esteem total and subscale scores as covariates. Thus, there is no evidence that the Stroop effect was due to a momentary boost to mood and/or state self-esteem.

This confirms again the importance of determining the words that relate most to participants' current concern of rejection and acceptance.

## GENERAL DISCUSSION

The purpose of this research was twofold: First, we sought to develop a Rejection Stroop task to measure the attentional bias and inhibitory reactions to rejection information exhibited by people with low self-esteem. Second, we sought to develop a training task to teach people with low self-esteem to inhibit negative social information in order to decrease their attentional bias to rejection versus acceptance.

Findings of Study 1 were consistent with the notion that low and high self-esteem individuals differ in their attentional bias regarding social feedback. People with low self-esteem seem to have a tendency to monitor the environment for rejection rather than acceptance, indicated by more interference on rejection words than on acceptance words. This is consistent with Williams et al.'s (1996) suggestion that a common feature shared by many different emotional disorders is a "sensitivity to and preoccupation with stimuli in their environment that represent their concern" (p. 3).

These authors also describe a type of vicious cycle, in which the attentional bias fuels a preoccupation which in turn perpetuates the disorder. Given that most social situations contain a full range of social responses, a negative bias might lead people with low self-esteem to preferentially notice and dwell on rejection instead of acceptance and therefore to feel socially excluded, or at least to feel that any acceptance is tenuous and might be shattered by the slightest gaffe or failure (Baldwin & Sinclair, 1996). Sadly, this expectation can become a self-fulfilling prophecy, as people expecting to be rejected often produce the very outcome they fear (Downey, Freitas, Michaelis, & Khouri, 1998) or even withdraw from potentially supportive situations to avoid the possibility of future rejection (Murray & Holmes, 2000).

High self-esteem individuals, on the other hand, do not exhibit the same attentional bias to rejection; they instead tend to be at least equally attentive to positive social feedback and to perceive others and social situations in a more accepting light (Leary et al., 1995). Therefore, the lack of attentional bias to rejection enables people with high self-esteem to be less disturbed by rejection feedback and to feel accepted and included. Additional research is needed to link the attentional bias measured by the Rejection Stroop with other kinds of biased processing, such as responding to failures by making situational rather than internal attributions.



The results of Study 2 suggest that the attentional bias shown by low self-esteem individuals is not immutably set in stone by temperament or a lifelong learning history. Through repetitive practice, cognitive responses to rejection seem to be modifiable to the point where people with low self-esteem exhibit less attentional bias toward rejection words after being trained to do so. Furthermore, the fact that the training task, which involved identifying *faces*, resulted in increased inhibition of rejection *words* suggests that participants learned not only a specific procedural ability of looking for smiling/accepting faces but also the *conceptual* ability of looking for acceptance information while inhibiting rejection information. This degree of transfer indicates that the skills learned may generalize well beyond the simple cognitive tasks studied here. If such a response could be applied in day-to-day life, this might ultimately buffer individuals against several negative consequences of rejection expectations, such as chronic self-esteem, peer rejection, and interpersonal aggression (Ayduk et al., 2000).

These results add to a growing body of research showing that automatic processes can be modified through repetitive training (Anderson & Green, 2001; Dijksterhuis, 2004; Kawakami et al., 2000). They also fit with other research in our lab, in which we have applied basic learning principles to the social cognition of interpersonal information, leading to cognitive, emotional, and behavioral effects. For example, Baldwin and Main (2001) conditioned neutral auditory tones to thoughts of social rejection and acceptance, and later played these tones in the background while participants interacted with an aloof confederate. Chronically high self-conscious participants tended to be socially anxious with the confederate unless a tone, reinstating acceptance, was played in the background, in which case they were no more anxious than their chronically low self-conscious counterparts.

In another study examining classical conditioning (Baccus, Baldwin, & Packer, in press), this time using a game-like computer task, participants' implicit self-esteem was increased after self-relevant information (e.g., the participant's name) was paired with positive/accepting feedback. Moreover, a tendency for low self-esteem individuals to report feeling aggressive in an adversarial situation was no longer evident among participants who underwent the conditioning training. Studies such as these demonstrate the possibilities available for applying basic learning principles in the context of interpersonal relations and self-esteem. The particular response studied in the current research, involving the inhibition of rejection information, might not seem to be an ideal response to train because it implies a defensive and arguably avoidant response. We suspect, however, that high self-esteem involves a range of cognitive responses, and the processing of in-

terpersonal information clearly seems to be involved. The training developed here suggests that adaptive responses to rejection information might be considered skills that can be taught to those lacking them. These skills could then be combined with other types of response, such as the increased activation of acceptance schemas (e.g., Baldwin & Main, 2001).

We acknowledge certain limitations that should be addressed in future research. The training task in the control condition was designed to hold constant the response of seeking one image in a matrix of slightly different images, but it is unknown whether other characteristics of the task (e.g., viewing flowers rather than faces) might have had an impact on the results. Future research might use a variety of control conditions wherein people would have to identify the male in the matrix of females or the neutral face in the matrix of smiles and frowns. Also, a more thorough examination of participants' identification with individual words would be useful to determine the critical factors underlying the Stroop effect. Past research has used open-ended questions to determine words with which participants most relate; similar open-ended questions could be given to determine rejection words that best describe each participant's current concern. Finally, future research could also look at the behavioral consequences of the task in order to see if the inhibition training affects, for example, participants' responses to failure or interpersonal rejection.

In conclusion, the present findings have shown the possibility of developing computer tasks to measure cognitive responses to rejection and acceptance and to help people with low self-esteem reduce their attentional bias to rejection. These encouraging results now put us one step closer to understanding how the cognitive biases that maintain low self-esteem might be modified.

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