

## Self-Esteem and Memory

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This article describes two potential bases for memory bias associated with global self-esteem. According to the mood-congruence model, activation of either dimension of self-esteem (self-competence or self-liking) produces an affective state that facilitates retrieval of traces that are consistent with that state while hindering retrieval of traces that are inconsistent. According to the relevance model, activation of either dimension results in superior encoding of matching negative content by individuals who are low on the dimension. Three studies were conducted to determine which model best accounts for the pattern of bias across distinct content categories. Results were generally consistent with the relevance model.

“The devil! . . . what beastly incidents our memories insist on cherishing! . . . the ugly and disgusting . . . the beautiful things we have to keep diaries to remember.”

So observes Charles Marsden in Eugene O’Neill’s *Strange Interlude* (1928), following the shameful recollection of his encounter with a prostitute. As with many bleak perceptions in O’Neill’s plays, the lines betray the author’s own frustration in trying to transcend the troubling elements of his past. A tortured soul, O’Neill was as ambivalent about himself as he was about the family and society he grew up in. Plagued by guilt and self-doubt until his death from illness in 1953, his literary success owed much to the “ugly and disgusting” ghosts that haunted him. Through the alchemy of his craft, dark memories were transformed into tragic and moving characterizations of conflict, betrayal, and moral frailty. Perhaps more than he wished, O’Neill saw himself in the unhappy past, and the past in his unhappy self. Had the playwright been more at peace with himself, would the shadows of his past have been so intrusive? More generally, do our generalized attitudes toward ourselves affect what we are able to remember of our experiences?

The interdependence of memory and personal identity has rarely been doubted. The reciprocal influences that account for this relation have received much attention in recent years (Bruner, 1994; Kihlstrom, 1997; Singer & Salovey, 1996). In this vein, we focus here on the role of self-esteem in producing selective mem-

ory of what is experienced. Two hypothetical models of selectivity as a function of self-esteem are presented and tested. Toward describing the key elements of these models, the duality of global self-esteem is first discussed.

### Self-Competence and Self-Liking

Self-esteem is essentially a valuative phenomenon. Value, as applied to a person, can be understood according to the axiological distinction between means and ends (Dewey, 1939). That is, individuals are seen as good for what they can do (instrumental and technical value) as well as who they are (character, appearance, social identity, and inherent worth as a person). Informally, this is often expressed as the distinction between “respect” and “liking.” The former is founded on observable abilities, skills, and talents; the latter on moral qualities, attractiveness, membership in valued groups, and other aspects of social worth. Admittedly, the two aspects are not independent, for a specific competency may be celebrated as a virtue that is inherently good, and, likewise, qualities that are judged inherently good can be used instrumentally to great effect. Despite this overlap, the distinction is worth maintaining for the purpose of discussing the duality of self-esteem. Namely, we assign two distinct types of value to ourselves just as we do to others. Consistent with this, the competence and social-worth aspects of self-esteem have been distinguished by a range of theorists over the past half-century (Bandura, 1986; Brissett, 1972; Brown, 1998; Diggory, 1966; Franks & Marolla, 1976; Gecas, 1971; Silverberg, 1952; White, 1963). The most explicit treatment was offered by Tafarodi and Swann (1995, 2001), who labeled the two aspects *self-competence* (SC) and *self-liking* (SL).

SC is defined as the valuative experience of oneself as a causal agent, an intentional being that can bring about desired outcomes. As a generalized trait, it refers to the overall positive or negative conception of oneself as a source of power and efficacy. The more successful one has been in fulfilling the countless intentions that constitute a lifetime of action, the stronger and more effective one feels. As an aspect of personal identity, this strength is experienced as positive value, irrespective of any secondary, moral-aesthetic significance that overlays it. SC is founded on self-efficacy, defined by Bandura (1989) as “people’s beliefs about their capabilities to exercise control over events that control their lives” (p.

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1175; Bandura, 1992). In its generalized form, self-efficacy refers to the overall assurance or faith that individuals have in their ability to achieve their goals (Sherer et al., 1982; Tipton & Worthington, 1984; Woodruff & Cashman, 1993). As Bandura (1990) has pointed out, however, self-efficacy is distinguishable from self-esteem. Specifically, whereas self-efficacy refers to beliefs and expectations about what one can do, SC refers to the direct *valuative* significance (both cognitive and affective) of those beliefs and expectations for one's self-identity. In other words, SC is the hedonic imprint that efficacy beliefs leave on the self-concept. It is how we experience *ourselves* as a result of believing we can do things.

The moral-aesthetic significance of one's characteristics and actions reflects the social side of value. This is represented in self-esteem as SL, defined as the *valuative* experience of oneself as a social object, a good or bad person. As a generalized trait, it reduces to one's chronic, overall sense of social worth. Social worth refers to our value as persons, where value is defined within the particular moral framework of the society in which we live. The use of "social" here is not intended to imply that SL is limited to our conception of how worthy we appear to those around us. It is certainly true that we often perceive that others judge us (or would judge us, if they knew enough) just as we judge ourselves. It is also true that self-judgment is often powerfully affected by the judgments of others. SL, however, refers to the social value we assign to ourselves, irrespective of how we think others see us. So, for example, a pillar of the community who is loved and admired by all may nonetheless suffer a crushing sense of inadequacy that rests on privately perceived shortcomings. Self-esteem is ultimately a personal valuation. Even when sitting alone in a dark and soundless room, we all exist as objects to ourselves, positioned in physical, temporal, and moral space (Harré, 1991). We require neither a real nor imagined audience to stand as audience to ourselves. Accordingly, we cannot help but judge ourselves according to the criteria for "goodness" that we have internalized, such as charm, beauty, integrity, humanity, divinity, group membership, and countless other sources of personal worth. SL, insofar as it refers to social worth, bears some resemblance to Leary's (1999a) conception of self-esteem as a "psychological meter, or gauge, that monitors the quality of people's relationships with others" (p. 33; Leary, 1999b) and "reflects the person's general sense that he or she is the sort of person who is valued and accepted by other people" (p. 34). It differs from Leary's "sociometer" account, however, by upholding the long-standing definition of self-regard as the individual's *own* sense of personal value, which need not be consistent with the individual's sense of being valued by others. Again, it is possible, albeit extraordinary, to scorn oneself in the face of universal adoration and to adore oneself in the face of universal scorn.

Whether SC and SL are collapsed into a unitary concept of global self-esteem or used as distinct and separate constructs ultimately depends on the practical aims of the researcher. A third approach is to posit a higher order self-esteem that represents the intercorrelation of the two dimensions. This approach, however, is open to question. Measures of general self-esteem such as Rosenberg's (1965) Self-Esteem Scale do not produce appreciable variance beyond that jointly accounted for by SC and SL (Tafarodi & Milne, 2002). Thus, measures of "general" self-esteem appear to be redundant with measures of generalized SC and SL, suggesting that the same pair of constructs is measured in both cases. More-

over, the overlap of the two dimensions requires no explanation beyond their developmental interdependence and method factors that affect measurement. Hence, the correlation of SC and SL does not require the introduction of an additional hypothetical construct. The sizeable correlation ( $r = .50-.70$  across studies) does, however, require formal evidence of discriminant validity to justify maintaining the conceptual separation. This has been consistently supported in confirmatory factor analyses, including one conducted within the multitrait-multimethod framework (Tafarodi & Milne, 2002; Tafarodi & Swann, 1995, 2001).

In summary, the common approach of collapsing SC and SL into a gross conception of global self-esteem may be appropriate in many contexts. This strategy, however, may prove self-limiting in other contexts. Specifically, explicit separation of the two dimensions is recommended when theory suggests that they diverge in their *unique* associations with the variables of interest. Such is the case, we suggest, for selective memory.

### Self-Esteem and Selective Memory

Memory bias or *selectivity* as a function of stable disposition or character is defined here as the tendency for those high on some personality trait to recall or recognize a particular type of previous experience better or worse than those low on the trait, controlling for general mnemonic ability. Compelling evidence for such selectivity as a function of self-esteem has been rare, as no studies have clearly addressed it. Of the relevant research, two recent articles deserve attention. Story (1998, Study 1) found no differences in accurate recall of positive and negative personality feedback for college students who were low versus high in global self-esteem. When feedback was not accurately recalled, however, those high in self-esteem provided more positive guesses than did those low in self-esteem. As less than 40% of the feedback items were accurately recalled, on average, the study is more revealing of the significance of self-esteem for forced reproduction of past events that are *not* remembered. Furthermore, SC was not distinguished from SL, leaving their unique associations unknown. In a recognition memory study that did adopt the two-dimensional distinction, Tafarodi (1998) found that those high in SC but low in SL remembered more negative than positive feedback, whereas those high in SL but low in SC remembered more positive than negative feedback. These findings are suggestive. However, they involve highly select groups and therefore do not reveal the more general associations of SC and SL with memory. Nor do they reveal anything about underlying processes.

In contrast to the paucity of research on self-esteem and memory, the significance of depression for memory has received much attention. Overall, depression appears to be associated with negative memory bias for emotionally toned information (see Blaney, 1986; MacLeod & Mathews, 1991; Mineka & Nugent, 1995, for reviews). Explanations of this association have focused on the dysphoric mood that is characteristic of depression (e.g., Bower, 1981) or on negative beliefs about the self (e.g., Beck, 1976) as operative factors. The latter implicates self-esteem (Bernet, Ingram, & Johnson, 1993; Metalsky, Joiner, Hardin, & Abramson, 1993; Roberts & Monroe, 1994, 1999), recommending direct examination of its associations with memory bias.

What is needed is a theoretical and methodological framework capable of explaining the contextual and semantic specificity of any selectivity associated with self-esteem. Toward that end, we

describe two models for how individual differences in self-esteem may have consequences for what is remembered.

### Two Models of Selectivity: Mood-Congruence and Relevance

The self-concept, or self as represented in memory, is a complex cognitive representation consisting of both semantic and episodic elements (Kihlstrom & Cantor, 1984; Klein & Loftus, 1993). SC and SL are relevant here as generalized evaluative aspects of the semantic self-concept, situated within its hierarchical structure. The representation of one's own value is arguably the most consequential element within this structure, and therefore should be associated with considerable emotion. Whatever its level in an individual, self-esteem cannot be dispassionate. Thus, the representations of SL and SC are at once cognitive and affective. More than just cold beliefs, they are powerful attitudes with motivational implications.

The differences between SC and SL suggest that their activation within the self-concept is heightened by qualitatively different contextual and stimulus-based factors. SC should be responsive to performance contexts and external primes that connote success/failure in the pursuit of goals. SL should be responsive to contexts and primes that heighten awareness of one's significance as a moral-aesthetic social object. Many real-world contexts and conceptual stimuli are relevant to both dimensions of self-esteem, but this natural conjunction takes nothing away from their potential for differential activation.

How might heightened activation of either SC or SL give rise to memory bias? Two possibilities are outlined here.

#### *Mood-Congruence*

The first possibility is one form of *mood-congruence* effect (see Blaney, 1986; Bower, 1981; Sedikides, 1992; Segal, 1988; Singer & Salovey, 1988), whereby information that is consistent with the valence of one's emotional state tends to be more readily remembered than information that is inconsistent or unrelated. So, for example, recalling the past week's minor triumphs is easier when one is elated than depressed, independent of how one felt at the time of those events. Successes are inherently positive and therefore consistent with a happy state. According to Bower's (1981) associative network account of the mnemonic effects of mood, each specific emotion is represented as a node or unit in memory. When a particular emotion is experienced, the activation of the corresponding node increases. The excitation then spreads to associated memory nodes, including knowledge and episodic traces that are consistent with the valence of the emotion (J. R. Anderson, 1989). The increased subthreshold activation, or accessibility, of these associated nodes renders them easier to retrieve from memory while the emotion persists (Tulving & Pearlstone, 1966). During this time, the individual will be biased toward remembering evaluatively consistent information. Also, because excitation of one emotion node is assumed to inhibit activation of contrasting emotion nodes (e.g., sad vs. happy) and their associated memory traces, memory for evaluatively inconsistent information should suffer.

The application of this form of mood-congruence to self-esteem is straightforward. Both low SC and low SL feel bad, and both high SC and high SL feel good. Heightened activation of either

dimension will therefore affect mood in a manner that corresponds to the individual's standing on the dimension. According to the foregoing account, this should enhance memory for evaluative information that is consistent with the resulting affective state while impairing memory for information that is inconsistent. Those who are high on the activated dimension will enjoy enhanced memory for positive information and inhibited memory for negative information. The opposite holds for those who are low on the activated dimension. This translates into the prediction that those high in SC (independent of SL) should be better than those low in SC at remembering positive content but worse at remembering negative content. The same holds for SL (independent of SC).

#### *Relevance*

The second possibility for how self-esteem gives rise to selective memory relates to the personal *relevance* of evaluative information. Those who are low in SC tend to be preoccupied with their perceived inability and lack of success. They are therefore quicker than those high in SC at identifying information suggestive of failure or inefficacy (Tafarodi & Milne, 2002). Such information, we assume, is richly encoded because of its relevance to the abiding personal concerns of these individuals and elaborated on through connection with the dense network of semantic and episodic nodes surrounding the representation of low SC. Attempts to recall the information would be facilitated by the additional retrieval cues that this connection provides (Alba & Hasher, 1983). Thus, frustrated actions and threats to goal fulfillment should be keenly remembered by those who lack SC. More generally, this translates into the prediction that those low in SC (independent of SL) should be better than those high in SC at remembering content related to weak agency. The opposite, however, cannot be said of content related to strong agency. Those with negative self-views often hold stringent self-ideals and experience intense dissatisfaction when falling short of these ideals (Higgins, Klein, & Strauman, 1987; Kuiper, Olinger, & MacDonald, 1988). Preoccupation with one's failings entails a keen awareness with what one has failed to achieve, embody, or otherwise live up to. This suggests that conceptual nodes representing imperatives of success, achievement, and the realization of goals are at least as strongly associated in memory with the representation of low SC as with high SC. Consistent with this reasoning, those low in SC have been found to be as quick as those high in SC at identifying information related to strong agency (Tafarodi & Milne, 2002). Thus, there is little reason to expect richer encoding and greater elaboration of information related to strong agency by those high than by those low in SC. Such information is equally relevant for both groups and therefore should be equally memorable.

A parallel argument applies to SL. Those who are low on this dimension tend to be preoccupied with concerns about social worth. Dominant themes include guilt over perceived transgressions, concerns about physical appearance, dissatisfaction with social identity, and fears of rejection or disapproval by others. Those low in SL are therefore quicker than those high in SL at identifying information suggestive of "badness" or unworthiness (Tafarodi & Milne, 2002). As was the case for SC, the heightened personal relevance of this information should render it especially memorable for those who lack SL. This translates into the prediction that those low in SL (independent of SC) should be better than

Table 1  
*Comparison of Mood-Congruence and Relevance Models of Self-Esteem-Consistent Selectivity*

Model feature	Mood-congruence	Relevance
Locus of effect	Retrieval	Encoding
Symmetry	Symmetrical (applies to both negative and positive content)	Asymmetrical (applies only to negative content)
Specificity	Match defined by valence	Match defined by valence and semantic address
Predictions	Self-competence - → memory for negative content + → memory for positive content	Self-competence - → memory for content suggestive of weak agency
	Self-liking - → memory for negative content + → memory for positive content	Self-liking - → memory for content suggestive of low social worth

*Note.* Arrows represent independent associations, with direction indicated to the left.

those high in SL at remembering content related to low social worth. As before, however, content related to high social worth is expected to be as relevant to those low as those high in SL, resulting in similar memory for it.

The relevance model suggests a form of *schematicity* (Markus, 1977; Markus, Smith, & Moreland, 1985) for domain-specific negative content in those low on either dimension of self-esteem. It should be noted, however, that a parallel schematicity for positive content does not apply to those high on either dimension, as there is little basis for assuming a distinctive focus on ideals in this group. We suggest that fixation and preoccupation in the context of self-esteem is bred of perceived inadequacy, not fulfillment, and is limited to *negative* rumination. Furthermore, the consequences of relevance for those low on either dimension should not generalize to schema-inconsistent positive content (see Markus, 1977, Study 1). Relevance, as described here, is valence-specific.

The mood-congruence and relevance models describe distinct forms of selectivity. The mood-congruence model posits a retrieval-based process<sup>1</sup> by which the affective state aroused by activation of either dimension of self-esteem leads to subthreshold excitation of trace content that is consistent with that state and inhibition of trace content that is inconsistent. The resulting increased or decreased accessibility of this content directly affects the likelihood of retrieving it. The relevance model, however, posits an encoding-based process by which negative content reflecting on either activated dimension is represented with greater richness, and is therefore better remembered, by those who are low on that specific dimension. The two models differ in several important ways. First, selectivity based on the mood-congruence model is hypothesized to occur during retrieval, whereas selectivity based on relevance assumes differential encoding. Second, mood-congruence predicts selectivity for both positive and negative content, whereas relevance predicts selectivity only for negative content. Third, selectivity due to mood-congruence hinges solely on the valence of the content to be remembered, whereas selectivity due to relevance hinges on the substantive address of the content (agency vs. social worth). That is, according to the mood-congruence model, activation of either dimension of self-esteem biases memory for all emotionally toned content, as “congruence” here relates only to gross valence. In contrast, the relevance model holds that activation of either dimension of self-esteem produces selectivity only for negative content that is specifically related to that dimension. The differences between the

two models, including their divergent predictions, are summarized in Table 1.

The mood-congruence and relevance models do not represent strictly competing alternatives. The distinct processes they describe may coincide. Even so, appropriate tests of the association of self-esteem with selective memory should be capable of confirming or disconfirming both models, given that each generates distinctive predictions that are falsifiable, even in contexts where the alternative process is in effect. The three studies reported here provide such tests. Each assesses the unique or independent associations of SC and SL with memory for content representing distinct categories of valuative information.

## Study 1

### Overview

College students viewed a series of trait words, including some representing low and high agency and social worth. They were then asked to recall the words. Students’ SC and SL scores were used to predict the degree of recall within each semantic category. Selectivity uniquely attributable to each dimension of self-esteem

<sup>1</sup> A distinct form of mood-congruence effect, whereby matching affective states at encoding and retrieval facilitate memory, is not as relevant. The consistency of affect across the brief latency periods examined in the studies that follow is assumed to hold equally across individuals, regardless of their levels of self-esteem. An *encoding-based* mood-congruence effect, however, is a more plausible alternative. Evidence for this form of the effect is fairly consistent (see Singer & Salovey, 1988), but comes mainly from studies that did not use controlled presentation of content. This fits with Bower’s (1981) original casting of encoding-based mood-congruence effects as operating through selective attention, perceptual salience, lower recognition threshold, and selective learning. One implication of Bower’s (1981) claims is that mood-congruent content is subject to greater attention and thought because it is more *relevant* to the mood-dependent motivational state of the perceiver. This sounds much like our relevance model, substituting mood associated with self beliefs for the beliefs themselves. Such a “mood-based relevance” account, however, does not predict the asymmetry or specificity of our relevance model. In fact, it generates the same predictions in relation to self-esteem and memory as does its retrieval-based cousin. As such, we prefer to revisit the encoding versus retrieval issue in relation to mood only if the results obtained are at all consistent with a mood-congruence account.

was tested for correspondence with the mood-congruence and relevance models.

### Method

#### Participants

Participants were 114 women enrolled in an introductory psychology course at the University of Toronto, Toronto, Ontario, Canada. All students participated in exchange for course credit. The modal age was 19 years.

#### Materials and Procedure

Participants were individually run through a computer-based task by a female experimenter. At the outset, they were informed that the task involved thinking about the meaning of a number of personality trait words. Care was taken to avoid any clue that memory for the trait words would be tested, while also emphasizing that each word was to be carefully attended to.

Mnemonic selectivity as a function of self-esteem requires activation of the self-concept during encoding (relevance model) or retrieval (mood-congruence model). As with other forms of self-related bias, selectivity due to SC and SL should not extend to contexts where the semantic network containing representations of these attitudes is not activated (e.g., Pitromonaco & Markus, 1985; Pyszczynski, Hamilton, Herring, & Greenberg, 1989; Schlenker & Britt, 1996). To confirm this contingency, encoding context (EC) was manipulated. One half of the participants were instructed to consider each trait word presented in relation to their own personality (*self-reference* condition), whereas the other half were instructed to consider each word in relation to the average female student (*other-reference* condition). No selectivity related to self-esteem was expected in the latter condition.

Sixty trait words were serially presented. Controlled presentation was used to fix inspection time (item strength). Each word appeared in lower-case font centered on an otherwise blank monitor screen for 3 s, followed by 1 s of blank screen, and then the next word. Participants were instructed to think carefully about each word for the full duration of its presentation. The first 6 and last 6 words were presented in the same order for all participants. The order of the remaining 48 words was random. Five categories were represented by these words (see the Appendix): High Competence (C+), Low Competence (C-), High Social Worth (W+), Low Social Worth (W-), and Neutral (N). The 16 words in the last category (N) were selected from the neutral range (neither positive nor negative in perceived meaning) in N. H. Anderson's (1968) normed list of trait adjectives and were not clearly indicative of either competence or social worth. The neutral words were included to permit estimation of general retrieval ability, an important individual-difference variable to control for in tests of selectivity (Bors & MacLeod, 1996). The remaining four categories were represented by 8 words each. These words had been confirmed through preliminary research to be highly indicative of their semantic category, as reflected in college students' judgments of their applicability to the experience of low and high SC and SL. There was no need to match categories on normative memorability (e.g., word frequency, imagability), as all model predictions are associative rather than cross-categorical. To reduce structural similarity of words across valence categories, negated versions of the positive words were avoided in representing the negative categories (e.g., "incompetent" was not used with "competent," nor "unlikable" with "likable").

Immediately following the presentation phase, participants were given 5 min to write down as many words as they could recall. The balance of competence- and social-worth-related words in the memory set was intended to produce similarly heightened activation of SC and SL within the self-concept during self-referential encoding, as required by the relevance model to produce selectivity in line with *both* dimensions at the same time. Furthermore, because recall was tested without delay, the increased acti-

vation of both dimensions would extend into retrieval, providing the context needed for selectivity due to mood-congruence.

Finally, participants completed the Self-Liking/Self-Competence Scale (SLCS; Tafari & Swann, 1995), followed by several other self-report measures that are not relevant here.<sup>2</sup> The SLCS consists of two 10-item subscales, one designed to measure trait SC and the other trait SL. Respondents indicate degree of agreement with global statements reflecting low or high SC (e.g., "I don't succeed at much"; "I am a capable person") or SL (e.g., "I feel worthless at times"; "I like myself"). The reliability and validity of the correlated subscales have been supported elsewhere across a range of applications (e.g., Aidman, 1999; Bosson & Swann, 1999; Tafari, 1998; Tafari, Lang, & Smith, 1999; Tafari & Milne, 2002; Tafari & Swann, 1995, 1996, 2001; Tafari & Walters, 1999). The duration of the entire procedure, including full debriefing, was approximately 45 min.

### Results

#### Preliminary

Two participants were eliminated as clear multivariate outliers, as reflected in their discontinuously high Mahalanobis  $D^2$  values for the variables analyzed below (see Khattree & Naik, 1995). This left a final sample size of 112 (57 self-reference and 55 other-reference). Total-sample means for SC and SL were 40.13 and 35.48, respectively, with no reliable difference across encoding conditions,  $t(110) = -0.95$ ,  $p = .34$  for SC and  $t(110) = 0.79$ ,  $p = .43$  for SL. The SL-SC correlation ( $r = .62$ ) was comparable with values found in past studies and similar across conditions,  $t(108) = 1.30$ ,  $p = .20$ .

#### Selectivity in Recall

The dependent variables were the correct recall proportions for the four categories of self-esteem-relevant words (C+, C-, W+, and W-). The proportion of N words correctly recalled served only as a covariate in the analyses that follow, to control for general retrieval ability. In calculating proportions, close reproductions that preserved the valence (e.g., "ignorable" for *ignored*; "liked" for *likable*) were counted as half a word to credit partial memory. Only .78% of the recalled words qualified as such.<sup>3</sup> Means and standard deviations appear in Table 2. Consistent with past research (see Symons & Johnson, 1997, for a review), better overall recall resulted from self-reference than from other-reference,  $F(1, 110) = 136.50$ ,  $p < .0001$ . This reflects the enhanced organization and semantic elaboration of explicitly self-relevant information.

Simultaneous multiple regression was used to examine selectivity uniquely attributable to each dimension of self-esteem. This

<sup>2</sup> Participants had completed the SLCS once before, during a mass testing session conducted at the beginning of the academic term. Analysis confirmed that change in SC and SL scores across the two administrations was unrelated to encoding condition, as would be expected for a trait measure. Furthermore, degree of change (holding resulting levels of SC and SL constant) was unrelated to memory performance. The same independence was confirmed in Studies 2 and 3. Thus, SLCS scores on the second administration did not appear to be influenced by the preceding memory task.

<sup>3</sup> Neither eliminating these partial memories from the recall counts nor assigning them full credit altered the pattern of results reported here. The same was true in Study 3.

required statistically controlling for each dimension of self-esteem when testing the association of the other. All noncategorical variables were standardized prior to model testing to facilitate interpretation of interactions. Dummy coding was used to represent EC. Recall for each of the four categories was regressed on N recall, EC, SC, SL, EC × SC, and EC × SL.<sup>4</sup> The interactions serve as slope shift coefficients, which, if significant, indicate unequal partial associations for SC or SL across encoding conditions. Thus, only SC, SL, EC × SC, and EC × SL are predictors relevant to the selectivity hypotheses.

The results for the self-esteem predictors appear in Table 3. The mood-congruence model but not the relevance model predicts selectivity for positive words in the self-reference condition. Consistent with the relevance model, none of the self-esteem predictors were significant in relation to recall of C+ or W+ words. Both models predict selectivity for W- words in the self-reference condition. They differ, however, in that the mood-congruence model predicts that both SL and SC will be independently associated with recall, whereas the relevance model predicts that only the semantically matching dimension, SL, will be independently associated. The results supported the relevance model, with only the EC × SL interaction emerging as significant,  $\beta = -.53$ ,  $t(105) = -2.53$ ,  $p = .01$  (see Figure 1). Given the dummy coding used, the nonsignificant partial association of SL with memory for W- words that appears in Table 3,  $\beta = .01$ ,  $t(105) = 0.05$ ,  $p = .96$ , represents the simple slope for the other-reference condition, indicating no selectivity in this EC. The same, however, was not true of the simple slope for SL in the self-reference condition,  $\beta = -.52$ ,  $t(105) = -3.62$ ,  $p = .0005$ . The direction of this significant slope reveals that more W- words were recalled by those lower in SL, as predicted by the relevance model. Additional testing revealed that the simple slope for SL was significantly more negative than that for SC in the self-reference condition,  $F(1, 105) = 7.89$ ,  $p = .006$ , but not in the other-reference condition,  $F(1, 105) = 0.02$ ,  $p = .88$ . Furthermore, multivariate comparisons using Wilks's lambda confirmed that the simple slope for SL in the self-reference condition was significantly more negative for W- recall than for C- ( $p = .03$ ), W+ ( $p = .01$ ), and C+ recall ( $p = .02$ ). Finally, both models predict selectivity for C- words in the self-reference condition. The mood-congruence model again predicts that both SL and SC will be independently associated with recall, whereas the relevance model predicts that only SC will be independently associated. Contrary to both models, no self-esteem predictors were significant.

Table 2  
*Proportion Recall as a Function of Semantic Category and Encoding Context*

Category	Encoding	
	Self-reference	Other-reference
High competence	.40 (.18)	.27 (.19)
Low competence	.28 (.12)	.17 (.14)
High social worth	.50 (.18)	.28 (.15)
Low social worth	.41 (.17)	.26 (.13)
Neutral	.53 (.15)	.17 (.09)

Note. Standard deviations appear in parentheses.

Table 3  
*Proportion Recall Predicted by Self-Esteem as a Function of Semantic Category*

Category	Predictor	$\beta$	$t(105)$	$p$
High competence	SC	-.08	-0.53	.60
	SL	.01	0.08	.94
	EC×SC	-.06	-0.24	.81
	EC×SL	-.13	-0.57	.57
Low competence	SC	-.05	-0.32	.75
	SL	.03	0.16	.87
	EC×SC	.04	0.18	.86
	EC×SL	-.17	-0.77	.44
High social worth	SC	-.10	-0.68	.50
	SL	.14	0.94	.35
	EC×SC	.02	0.07	.94
	EC×SL	-.21	-0.99	.32
Low social worth	SC	-.03	-0.23	.82
	SL	.01	0.05	.96
	EC×SC	.23	1.07	.29
	EC×SL	-.53	-2.53	.01

Note. SC = self-competence; SL = self-liking; EC = encoding context (self-reference vs. other-reference).

### Discussion

The results provide partial support for the relevance model of selectivity. The mood-congruence model, however, received no support. With regard to the latter, null result, it may be that variability in mood as a function of self-esteem is quite modest in a random sample of college students. The sample distributions are telling here. For both subscales, the absolute attitudinal midpoint is 30. Someone with this score would, in the aggregate, be perfectly ambivalent or neutral, similarly endorsing items reflecting low and high self-esteem. The percentage of the sample below this midpoint was 2% for SC and 23% for SL. This implies only a modest number of participants with sharply negative feelings about themselves on SL and virtually none on SC. In contrast, much of the previous evidence for mood-congruence in memory comes from studies where intensive mood induction was used to examine the effects of acutely elated or depressed states, or where

<sup>4</sup> Initial models included the SC × SL interaction, all quadratic terms, and their related slope shift terms. As none of these higher order terms were close to significance, they were eliminated from the model to preserve degrees of freedom and focus testing, as is appropriate (Darlington, 1990). The same was true for all other regressions conducted in the three studies reported in this article. Furthermore, for all regressions conducted, sample size was sufficient to ensure power > .80 for squared partial coefficients representing small-medium effect sizes, according to the detailed recommendations of Green (1991). Effects any smaller than this would be of negligible substantive significance. Examination of variance inflation factors and eigenvalues (see Freund & Littell, 1992) confirmed that the SC-SL correlation did not result in problems of multicollinearity for any of the regressions reported. Neither was there evidence of suppression, as reflected in comparison of direct versus partial SC and SL associations (see Tzelgov & Henik, 1991). Finally, preliminary analyses confirmed homogeneity of covariance across encoding conditions for all covariates used in the regressions.

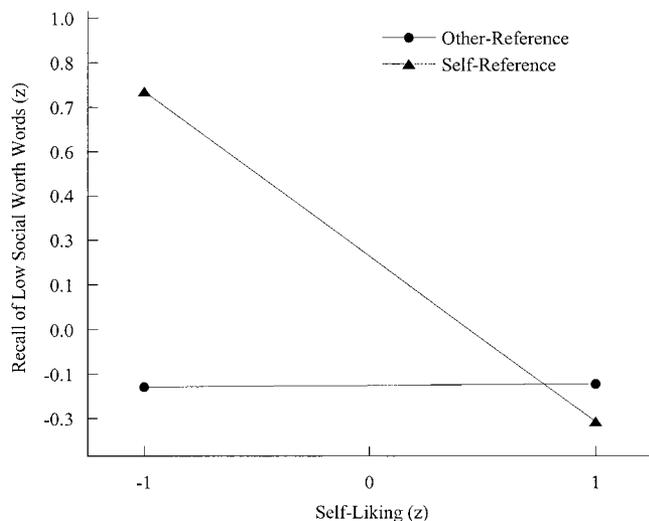


Figure 1. Free recall of low social worth words as a function of self-liking and encoding context.

chronically depressed and nondepressed participants were compared. The affective range of the present study does not parallel the power of such discrete, manufactured contrasts. The variability in self-esteem within a nonselect sample of students is likely to correspond to subtle differences in gross emotional state. The same variability, however, may correspond to more pronounced differences in what individuals are differentially concerned with. This is consistent with the form of selectivity found in relation to SL.

As predicted by the relevance model, SL, independent of SC, was inversely related to recall of words conveying lack of social worth. This supports the hypothesis that the greater relevance of such material for those with doubts about their social value results in richer and more accessible memory traces. Also as predicted, there was no association of SL with words conveying high social worth, which are held to be similarly relevant at all levels of SL. Support for the relevance model, however, was only partial, as a parallel associative pattern was not found for SC. This requires explanation. Nearly 30% of the words in the low SC category were recalled in the self-reference condition, discounting the possibility of ceiling or floor effects. The limited sampling of participants with low SC, mentioned above, is one possible cause of the failure to detect an association. Before examining other possibilities, the findings need to be replicated in extension to other forms of memory. Accordingly, we looked at recognition memory for the same material in Study 2.<sup>5</sup>

## Study 2

### Method

#### Participants

Participants were 126 women enrolled in an introductory psychology course at the University of Toronto. All students participated in exchange for course credit. The modal age was 19 years.

#### Materials and Procedure

The materials and procedure were identical to that of Study 1 through to the end of the presentation of the series of trait words. EC was manipulated

as before. Immediately following the last word, instructions for a digit-detection task appeared on the monitor screen. This task was a distraction, aimed at producing enough memory decay to allow for a sufficiently discriminating recognition test. Pilot testing had revealed that without such decay, recognition accuracy was generally too high. For the task, participants viewed strings of digits presented for 500 ms each with a 1-s interstimulus interval. They were required to press a bar whenever they saw the digit 5 in a string. The task lasted 3 min.

Recognition memory was then tested by combining the 48 trait words that had been presented (8 C+, 8 C-, 8 W+, 8 W-, and 16 N) with 48 new trait words. One third (16) of the new words were drawn from the neutral range of N. H. Anderson's (1968) list to provide a matched set of foils for the 16 old N words. Another third was taken from the positive range of the list (e.g., *realistic*, *enthusiastic*) to provide foils for the old C+ and W+ words. The final third was taken from the negative range of the list (e.g., *shallow*, *hostile*) to provide foils for the C- and W- words. None of the new positive and negative words were highly indicative of competence or social worth. This avoided close synonymy with their old counterparts, a feature that would have caused significant mnemonic confusion (Roediger, McDermott, & Robinson, 1998). The 96 words were presented in random order and participants made forced old-new judgments about each of them. Afterward, participants completed the SLCS and several unrelated measures before being fully debriefed. The entire session lasted approximately 45 min.

## Results

### Preliminary

Two participants were eliminated, 1 due to confessing that she had expected a memory test and rehearsed accordingly, and the other as a clear multivariate outlier on the variables analyzed below. This left a final sample size of 124 (61 self-reference

<sup>5</sup> Both recognition and free recall reflect explicit memory, which is primarily sensitive to conceptual processing of sensory content (Jacoby, 1983). Recall, however, is somewhat more effortful, requiring self-generation of cues and candidates for retrieval from episodic memory (Raaijmakers & Shiffrin, 1981). Recognition, as most often tested, requires discriminative judgments of whether old and new presented items have been encountered before in a specific context. Such judgments may be guided as much by the familiarity of the item as by its retrieval from episodic memory (Gardiner & Java, 1993; Mandler, 1980). The mood-congruence and relevance models of selectivity apply to retrieval-based recognition or true "remembering" (Tulving, 1985) just as they do to free recall. Their relation to familiarity-based recognition is less straightforward. The mood-congruence model assumes greater accessibility of content that is consistent with the gross valence of the emotion node activated in memory at the time of recognition judgments. This should similarly increase the familiarity of old and new valence-congruent items in the recognition test and therefore have little net effect on measures of discriminative sensitivity (see Bower, 1998). The relevance model implies that those with lower standing on a dimension of self-esteem will tend toward higher chronic or *base* familiarity of negative content that is conceptually consistent with that dimension. Recognition, however, is affected by *situational* familiarity, or the proportional increment in base familiarity produced by its prior occurrence in a specific context (Engelkamp & Zimmer, 1994; Mandler, 1980). This proportional increment will be lower with increasing base familiarity, suggesting that "relevant" content may actually be less contextually familiar to those low in self-esteem and therefore more difficult to discriminate on this basis alone in a recognition memory test. The upshot of this analysis is that recognition evidence for either selectivity model could only be attributed to enhanced episodic retrieval of consistent content, not the greater subthreshold familiarity of its features.

and 63 other-reference). Total-sample means for SC and SL were 39.26 and 33.69, respectively. The SC–SL correlation was  $r = .66$ . Both means and the correlation were similar for the two encoding conditions ( $ps > .25$ ).

### Selectivity in Recognition

A major advantage of recognition tests is that they allow for the estimation of subjective decision factors that affect the measurement of memory. A standard index of recognition strength or sensitivity is  $d'$ , which is independent of response criterion, the subjective threshold for concluding that a test item was seen before on the basis of its familiarity. Because criterion oppositely affects the proportion of old information correctly recognized (hits) and the proportion of new information incorrectly recognized (false alarms), neither proportion represents a satisfactory measure of retention.  $d'$ , computed as  $z(\text{hit rate}) - z(\text{false-alarm rate})$  (Macmillan & Creelman, 1990), takes both proportions into account so as to effectively remove the influence of criterion (Banks, 1970; Murdock, 1982; Zuroff, Colussy, & Wielgus, 1986).

Using the five hit and three false-alarm rates,  $d'$  was computed separately for the different categories of trait words. False-alarm rate for positive foils was used in computing  $d'$  for high C+ and W+ words, whereas false-alarm rate for negative foils was used in conjunction with C– and W– words. False-alarm rate for neutral foils was used for N words. Hits and false alarms were not analyzed separately, given their confounding with criterion and the demonstrated symmetry in their susceptibility to factors affecting memory strength (Glanzer & Adams, 1985, 1990; Glanzer, Adams, & Iverson, 1991). Means and standard deviations for category-specific  $d'$  are given in Table 4. Higher values of  $d'$  reflect greater recognition accuracy. Mirroring the recall findings, self-reference produced greater overall accuracy than did other-reference,  $F(1, 122) = 11.83, p = .0008$ .

As in Study 1, simultaneous multiple regression was used to examine selectivity uniquely attributable to each dimension of self-esteem. Recognition ( $d'$ ) for each of the four self-esteem-relevant categories was regressed on N recognition (covariate), SC, SL, EC, EC  $\times$  SC, and EC  $\times$  SL. As can be seen in Table 5, the results for the self-esteem predictors paralleled those of Study 1. No selectivity was evident for C+, W+, or C– words, and only the EC  $\times$  SL was significant for W– words,  $\beta = -.48, t(117) = -2.25, p = .03$  (see Figure 2). Given the dummy coding used, the nonsignificant partial association of SL with memory for W– words that appears in Table 5,  $\beta = .00, t(117) = -0.03, p = .98$ , represents the simple slope for the other-reference condition, indicating no selectivity there. In contrast, the corresponding simple slope for SL in the self-reference condition,  $\beta = -.48, t(117) = -3.08, p = .003$ , reveals that W– words were better recognized by those lower in SL in this EC, as predicted by the relevance model. Additional testing revealed that the simple slope for SL was significantly more negative than that for SC in the self-reference condition,  $F(1, 117) = 5.93, p = .02$ , but not in the other-reference condition,  $F(1, 117) = 0.15, p = .70$ . Furthermore, multivariate comparisons confirmed that the simple slope for SL in the self-reference condition was significantly more negative for W– recognition than for C– ( $p = .04$ ), W+ ( $p = .003$ ), and C+ recognition ( $p = .001$ ).<sup>6</sup>

Table 4  
Recognition Accuracy ( $d'$ ) as a Function of Semantic Category and Encoding Context

Category	Encoding	
	Self-reference	Other-reference
High competence	2.31 (1.15)	1.88 (0.89)
Low competence	2.78 (1.13)	2.15 (0.90)
High social worth	2.37 (1.05)	1.90 (0.81)
Low social worth	3.15 (1.01)	2.68 (0.94)
Neutral	2.30 (0.83)	2.01 (0.83)

Note. Standard deviations appear in parentheses.

### Discussion

The recognition results converge with the recall results of Study 1 in revealing SL-consistent selectivity for content conveying low social worth. No selectivity was evident, however, for content conveying high social worth. This asymmetry fits with the relevance model but not the mood-congruence model. Furthermore, selectivity was evident only in the context of self-reference, confirming its dependence on activation of the self-concept, and specifically SL, during encoding.

The results, however, were also asymmetric in a manner that does not fit with the relevance model. Namely, there was no evidence for SC-consistent selectivity in memory for content conveying weak agency. This returns us to the puzzle of why personal relevance should be consequential for memory in relation to SL but not SC.

As noted earlier, one possibility pertains to the narrow sampling of SC. Recall that only 2% of the participants in Study 1 could be assumed to see themselves as incompetent in the absolute sense. The figure was 4% here. The high SC of the participants reflects their status as first-year students at a nationally top-ranked university. The lack of acutely negative attitudes on this dimension, however, would not preclude detecting a uniform *linear* association such as that found for SL, as long as there was sufficient variation in the sample, irrespective of range. In fact, the SC : SL ratio of sample standard deviations was .69 in Study 1 and .66 in Study 2. Thus, SC was no less than two thirds as variable as SL, indicating an appreciable amount of variation in the former. This suggests that the *clearly* disconfirmatory results for SC were not primarily due to the characteristics of the sampling distribution. Furthermore, there was no indication that the weak agency words were insensitive as an index of memory bias. There was nearly as much variance in memory for this category as for low social worth words in Study 1, and more in Study 2.

<sup>6</sup> Neither the mood-congruence nor the selectivity model proposes differences in response criterion as a function of self-esteem. Although the mood-congruence model suggests greater subjective familiarity of both old and new valence-congruent content during the recognition test, this implies nothing about the location of the subjective criterion for judging an item familiar enough to be judged old. Consistent with this, exploratory analyses revealed that neither dimension of self-esteem was associated with criterion, or  $c$ —computed as  $-.5[z(\text{hit rate}) + z(\text{false-alarm rate})]$  (see Ingham, 1970; Macmillan & Creelman, 1990)—for any of the self-esteem-relevant word categories.

Table 5  
Recognition Accuracy ( $d'$ ) Predicted by Self-Esteem as a Function of Semantic Category

Category	Predictor	$\beta$	$t(117)$	$p$
High competence	SC	-.14	-1.12	.26
	SL	.16	1.12	.27
	EC×SC	.32	1.38	.17
	EC×SL	-.10	-0.45	.66
Low competence	SC	-.12	-1.09	.28
	SL	.07	0.55	.58
	EC×SC	-.02	-0.11	.91
	EC×SL	-.29	-1.47	.14
High social worth	SC	-.04	-0.21	.83
	SL	-.12	-0.81	.42
	EC×SC	-.28	-1.17	.25
	EC×SL	.22	0.95	.34
Low social worth	SC	.09	0.75	.45
	SL	.00	-0.03	.98
	EC×SC	.21	0.94	.35
	EC×SL	-.48	-2.25	.03

Note. SC = self-competence; SL = self-liking; EC = encoding context (self-reference vs. other-reference).

A second possibility is that, despite the design of the study, SC and SL were not similarly activated by the EC and the equal number of relevant words in the memory set. Related findings (Tafarodi, Tam, & Milne, 2001) suggest that traits words indicative of low social worth, when subject to explicit self-reference of the sort used here, produce targeted activation of SL. Therefore, one might reasonably expect explicit self-reference of words representing weak agency to produce targeted activation of SC, the matching dimension. A potential problem, however, is that the self-reference manipulation used here may *itself* activate SL, irrespective of the particular word being self-referenced. That is, deliberately focusing on the extent to which *any* trait word—even one that relates to agency—applies to one’s personality (“Am I the kind of person who can be seen as \_\_\_\_?”) appears to require consideration of oneself as a *social object*. Such consideration would activate the social dimension of self-esteem, SL, thereby preventing clean, asymmetric activation of SC by an agency-related word. The results of Studies 1 and 2 are consistent with this possibility. Unintended joint activation of SC and SL by weak agency words may have obscured the independent associations of both dimensions with memory for these words. A better strategy for targeted activation of SC would defend against this possibility.

One should recall that SC is rooted in agency, or goal-directed action. As such, it should be maximally activated by settings that feature individual ability and success/failure outcomes. We created such an EC in Study 3, using an explicit performance task that allowed memory for successes and failures to be examined. Moreover, we manipulated the context to create two distinct encoding conditions, one intended to heighten activation of SC, and the other, SL.

### Study 3

#### Overview

Participants solved anagrams that had been selected to produce an equal number of successes and failures. EC was manipulated such that some participants saw the task for what it was, a test of puzzle-solving ability (highlighting SC). Other participants were led to believe that the task would reveal “good” and “bad” aspects of their personality (highlighting SL). Free recall of the original words was tested later. SC and SL were used to predict recall for success and failure trials. Selectivity uniquely attributable to each dimension of self-esteem was tested in relation to the mood-congruence and relevance models.

#### Method

##### Participants

Participants were 152 women enrolled in an introductory psychology course at the University of Toronto. All students participated in exchange for course credit. The modal age was 19 years.

##### Materials and Procedure

Participants were individually run through a computer-based task by a female experimenter. At the outset, they were informed that the task involved anagrams. As in the previous studies, care was taken to avoid any clue that memory of the material would be tested.

Individual performance is inherently self-relevant for ability-based tasks where success is desired. Strong manipulation of self-reference was therefore not feasible here. Recall that selective memory as a function of self-esteem requires activation of the self-concept during encoding (relevance model) or retrieval (mood-congruence model). The motivational engagement of participants with the task was apparent from the high level of performance (and implied effort) and from comments made during debriefing. Activation of the self-concept in this context therefore can be assumed (Alper, 1946, 1957; Coopersmith, 1960).

Participants worked on solving a series of “subanagrams.” For each trial, a common five-letter, CVCVC word (C = consonant, V = vowel; e.g.,

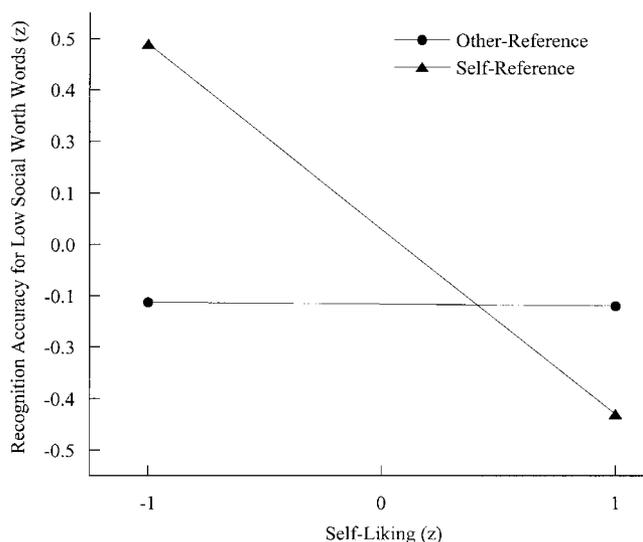


Figure 2. Recognition accuracy ( $d'$ ) for low social worth words as a function of self-liking and encoding context.

*PAPER, WIDOW, TOTAL*) was presented in uppercase at the center of the monitor screen for 10 s. The words, taken from Locascio and Ley (1972) and Kučera and Francis (1967), were not indicative of agency or social worth. Participants were instructed to focus on each word throughout its presentation while rearranging its letters to derive from it as many common four-letter words as possible. The instructions made clear that only one solution was required to successfully solve the puzzle, but multiple solutions were to be sought if the first solution was found with time remaining. This provision kept inspection time constant. Once the word disappeared, a response box appeared in its place, asking participants to type in their solutions. After typing these, participants clicked on a button labeled *done* to advance to the next trial. For trials where no solution was found, participants clicked on a button labeled *none found* to advance to the next trial.

There were 55 trials, of three types. For the 15 *success* trials, only CVCVC words known to have at least one common solution, and usually more, were used (e.g., *METAL*). If the participant came up with at least one valid solution, as nearly all did, the trial was taken to represent a fulfilled goal and, therefore, a subjective success. For the 15 *failure* trials, only words that had no solution were used (e.g., *VISIT*). If the participant clicked the “none found” key in response to these words, as nearly all did, the trial was taken to represent an unfulfilled goal, and, therefore, a subjective failure. Of importance, participants were misled to believe that *both* success and failure trials had common solutions. This was accomplished by emphasizing at the outset that all the words had common solutions unless otherwise marked. Neither success nor failure trials were marked. Participants therefore had every reason to believe that they could succeed on each of these trials. Finally, the 15 *neutral* trials involved words that had no solution and were marked at presentation as “probably no solution available” because no one had found one yet. If the participant clicked the “none found” key in response to these words, as nearly all did, the trial was taken to represent neither subjective success nor failure, as a solution could not be reasonably expected. The 45 critical trials, presented in random order, were preceded and followed by 5 success trials to familiarize participants with the task and guard against primacy and recency effects in memory. These buffer trials were not used in assessing memory.

Our aim was to avoid the spontaneous priming of SL that we suspected had rendered explicit self-reference of agency-related trait words problematic in the first two studies. As such, the logic of this study was a deliberate departure from that of the first two. The details of the success trials were considered positive content. Similarly, the details of the failure trials were considered negative content. The focal detail of each trial is the CVCVC word itself. According to the theory presented at the outset, memory for this detail should be associated with self-esteem. Specifically, insofar as the task is experienced as a clear performance situation reflecting ability and agency, SC should be selectively activated. Each CVCVC word is encoded during the 10 s it remains on the screen. If, during that time, a solution is not found where one was expected, the relevance model predicts that the word will be more deeply encoded, and therefore better remembered, by those lower in SC. In contrast, the relevance model predicts no association with SC for positive details, words for which solutions *are* found. As before, the mood-congruence model predicts both better memory for negative details (failure trial words) and worse memory for positive details (success trial words) by those lower in SC.

The predictions for SC, however, are conditional. Specifically, EC was manipulated as a factor in the study such that participants were assigned to one of two conditions. The procedure as described so far represents the *performance* condition, designed as an EC that activates SC over SL. To ensure that any SC-consistent selectivity could be attributed to this new EC, a second, *character* condition was designed to activate SL over SC. Here, the implicit focus on ability and performance was overridden by adding the following paragraph to the initial task instructions:

Please be aware that the words that have valid, common-word solutions are *not* designed to assess your ability to solve word puzzles. Nor

are they designed to assess some other specific or general ability. Rather, the particular words for which you manage to find solutions will give us insight into the GOOD or LIKABLE aspects of your character, whereas the particular words for which you are unable to find solutions will give us insight into the BAD or DISLIKABLE aspects of your character. In other words, you can think of this task as an indirect personality test, the validity of which has been demonstrated in past research. Keep this in mind as you work through the task.

By shifting the emphasis to qualities of character in this second condition, we sought to highlight the relevance of the trials for social worth. This, we expected, would increase the activation of SL much more than SC, allowing the former to drive selectivity. The manipulation of EC to highlight one or the other dimension of self-esteem allowed the prediction of memory bias in line with SC when the focus was on ability but memory bias in line with SL when the focus was on character.<sup>7</sup>

Following the task, participants were given 5 min to recall as many of the CVCVC words as possible. Free recall rather than recognition was tested because of its more modest procedural demands. The parallel findings of Studies 1 and 2, and their interpretation, suggest that a recognition test would have yielded similar results. Afterward, participants completed the SLCS, the Positive and Negative Affect Schedule–Expanded Form (PANAS-X; Watson & Clark, 1994), the Beck Depression Inventory–II (BDI-II; Beck, Steer, & Brown, 1996). The PANAS-X and BDI-II were included to directly examine the association of self-reported affective differences with selectivity. We suggested earlier that the extent of affective variation in nonselect samples of students might have been too modest to produce discernible selectivity due to mood-congruence in the first two studies. If so, then the belief content of self-esteem, rather than the gross mood associated with it, is what accounts for the selectivity observed. To provide support for this interpretation, positive affect (PA), negative affect (NA), and depressive dysphoria were examined here as alternative predictors of selectivity. Evidence that these dimensions are unrelated to memory in a context where self-esteem is related would confirm that affect is not the basis of the phenomenon. The entire session lasted approximately 50 min.

## Results

### Preliminary

Two participants were eliminated as clear multivariate outliers. This left a final sample size of 150 (76 in the performance condition and 74 in the character condition). Total-sample means for SC and SL were 39.75 and 34.90, respectively. The SC–SL correlation was  $r = .63$ . Both means and the correlation were similar for the two encoding conditions (all  $ps > .38$ ).

### Selectivity in Recall

Failure and neutral trials resulted in the expected “none found” response 95% and 93% of the time, respectively. Success trials

<sup>7</sup> We thank one of the editors, Debbie Prentice, for suggesting this general strategy. We should also note that our predictions contrast with the possibility that those high in self-esteem will be more inclined to remember failure because it is inconsistent with their high performance expectations. This possibility, although intuitive, has received little support in the literature. Rather, in contexts where failures or incompleting tasks are remembered better than successes or completed tasks, those who can be assumed to be lower in self-esteem show this tendency to a *greater* degree than do their high self-esteem counterparts (Alper, 1946, 1957; Coopersmith, 1960; Moot, Teevan, & Greenfield, 1988).

resulted in at least one ( $M = 1.70$ ) valid solution 92% of the time. Only trials that result in the expected response (valid solution vs. “none found”) can be safely assumed to produce the intended subjective state (success, failure, or neutral). As such, proportion recall was computed as the number of reproduced words of each trial type divided by the number of trials of that type for which the participant had given the expected response. (Reproduced words representing trials for which participants had not given the expected response were not included in the number of words reproduced.) As in Study 1, close reproductions counted as half a word. Such cases accounted for only .40% of the recalled words. Mean proportion recall was .18 ( $SD = .08$ ) for success trials, .19 ( $SD = .07$ ) for failure trials, and .18 ( $SD = .09$ ) for neutral trials. These proportions did not differ significantly across encoding conditions (all  $ps > .17$ ). The modest amount of recall in general is consistent with the high degree of mnemonic interference from the self-generated solution words.

*Predicting selectivity from self-esteem.* As in the first two studies, simultaneous multiple regression was used to examine selectivity uniquely attributable to each dimension of self-esteem. Recall proportions for success and failure trials were separately regressed on recall proportion for neutral trials (covariate), SC, SL, EC (encoding condition: performance, character),  $EC \times SC$ , and  $EC \times SL$ .<sup>8</sup> The relevant results appear in Table 6. Consistent with the relevance but not the mood-congruence model, no selectivity was evident for success trial words. For failure trial words, however, both interactions were clearly significant:  $EC \times SC$ ,  $\beta = .98$ ,  $t(143) = 3.55$ ,  $p = .0005$ ;  $EC \times SL$ ,  $\beta = -.71$ ,  $t(143) = -2.70$ ,  $p = .008$ . Given the dummy coding used, the significant partial association of SC with memory for failure trial words that appears in Table 6,  $\beta = -.78$ ,  $t(143) = -3.29$ ,  $p = .001$ , represents the simple slope for the performance condition, indicating that failure trial words were recalled better by those lower in SC, as predicted by the relevance model. In contrast, the corresponding simple slope for SC in the character condition was nonsignificant,  $\beta = .20$ ,  $t(143) = 1.43$ ,  $p = .15$ , confirming the absence of selectivity when social worth was emphasized (see Figure 3). The form of the  $EC \times SL$  for failure trials was also consistent with predictions. Given the dummy coding used, the nonsignificant partial association of SL with memory for failure trial words that appears in Table 6,  $\beta = .33$ ,  $t(143) = 1.51$ ,  $p = .13$ , represents the simple slope for the performance condition, indicating no selectivity in

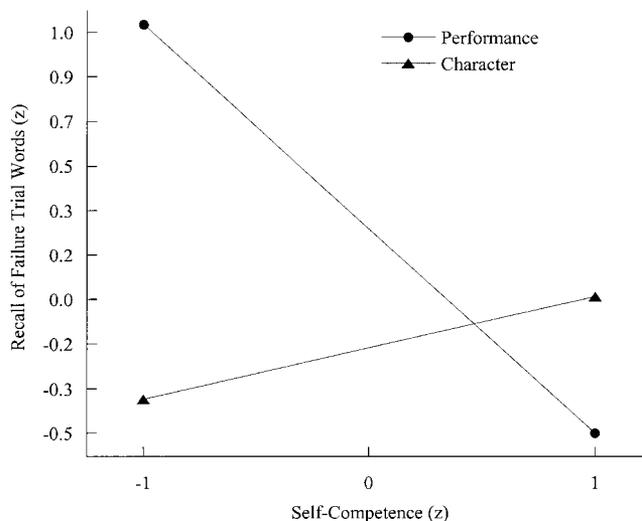


Figure 3. Free recall of failure trial words as a function of self-competence and encoding context.

line with this dimension when the focus was on ability. Although this slope is clearly positive (see Figure 4), the high standard error and resulting probability indicates no reliable association. In contrast, the corresponding simple slope for SL in the character condition,  $\beta = -.39$ ,  $t(143) = -2.63$ ,  $p = .009$ , confirms that failure trial words were recalled better by those lower in SL when social worth was emphasized.

Additional testing revealed that the simple slope for SC was significantly more negative than that of SL in the performance condition,  $F(1, 143) = 6.55$ ,  $p = .01$ , but significantly less negative than that of SL in the character condition,  $F(1, 143) = 4.96$ ,  $p = .02$ . Furthermore, multivariate comparisons using Wilks’s lambda confirmed that the simple slope for SC in the performance condition was significantly more negative for failure trial words than for success trial words ( $p = .03$ ). Similarly, the simple slope for SL in the character condition was significantly more negative for failure trial words than for success trial words ( $p = .02$ ).

*Predicting selectivity from affective measures.* Were the affective measures similarly effective in predicting recall of the success and failure trial words? To answer this question, we adopted the recommendation of MacLachlan (1985) to avoid content redundancy by eliminating any items from these alternative measures that appeared to be indicators of self-esteem. Accordingly, the items *strong* and *proud* were removed from the PANAS-X 10-item PA scale, and *ashamed* was removed from the 10-item NA scale. Similarly, 4 items were removed from the 21-item BDI-II (*failure*, *self-dislike*, *self-criticalness*, and *worthlessness*). The resulting means were 20.70 ( $SD = 5.28$ ) for PA, 12.83 ( $SD = 4.42$ ) for NA, and 9.23 ( $SD = 6.74$ ) for the BDI-II. The means did not differ significantly across encoding conditions (all  $ps > .31$ ).

As applied to normal college populations, the BDI-II measures “diffuse maladaptive functioning” (Beck, Steer, & Garbin, 1988)

Table 6  
Proportion Recall Predicted by Self-Esteem as a Function of Trial Type

Trial type	Predictor	$\beta$	$t(143)$	$p$
Success	SC	-.12	-0.48	.63
	SL	.06	0.23	.81
	$EC \times SC$	.28	0.93	.35
	$EC \times SL$	-.02	-0.08	.94
Failure	SC	-.78	-3.29	.001
	SL	.33	1.51	.13
	$EC \times SC$	.98	3.55	.0005
	$EC \times SL$	-.71	-2.70	.008

Note. SC = self-competence; SL = self-liking; EC = encoding context (performance vs. character).

<sup>8</sup> Participants who generated many rather than few solutions on success trials might be expected to experience greater interference in memory. To control for this, we conducted supplementary regressions where the average number of solutions generated per success trial was included as a covariate. This addition did not change the pattern of results reported.

or “self-reported distress” (Coyne, 1994) rather than depression per se. In the present study, BDI-II score was correlated with PA and NA at  $-.37$  and  $.66$ , respectively. The PA–NA correlation was  $-.18$ . Regression models parallel to those estimated using the SLCS predictors were estimated for the two alternative measures. First, recall proportions for success and failure trials were regressed on recall proportion for neutral trials, PA, NA, EC, EC  $\times$  PA, and EC  $\times$  NA. The relevant results appear in Table 7. As before, no significant selectivity was evident for success trial words. Of more importance, however, no selectivity was evident for failure trial words either. Next, to examine the possibility of distress-consistent selectivity, recall proportions for success and failure trials were regressed on recall proportion for neutral trials, BDI-II, EC, and EC  $\times$  BDI-II. Mirroring the results for PA and NA, neither success nor failure trial words showed significant selectivity (see Table 7).<sup>9</sup>

### Discussion

The results confirm that EC is critical for determining which dimension of self-esteem biases memory.<sup>10</sup> When the task focused on performance and ability, only SC was independently related to recall of negative (failure-linked) content. However, when the task drew attention to participants’ personality or character, only SL was independently related to recall. This contextual specificity, together with the absence of selectivity for positive (success-linked) content, provides support for the relevance model.

The pattern of selectivity was again inconsistent with the mood-congruence model. Moreover, individual differences in mood, as indexed by the PANAS-X and the BDI-II, did not predict recall of negative or positive content. This null finding does not gainsay the broader importance of mood-congruence effects for memory, of which there is ample evidence in the literature. It does, however, support our claim that the association of self-esteem with selective memory is due primarily to the differential relevance of content rather than differences in mood. That is, typical variation in self-esteem may correspond more clearly to differences in what

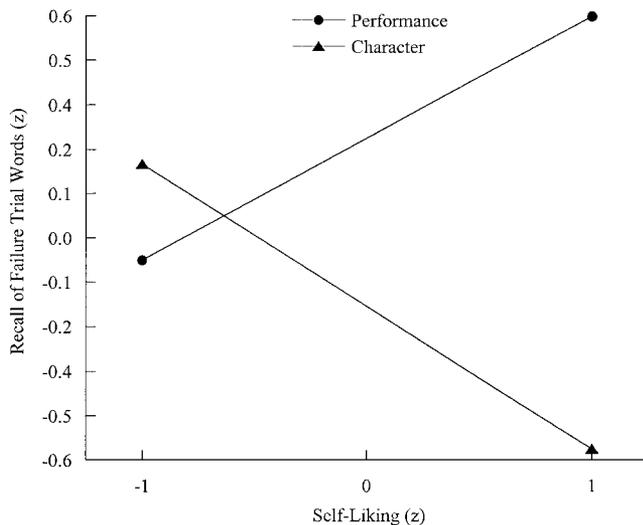


Figure 4. Free recall of failure trial words as a function of self-liking and encoding context.

Table 7  
*Proportion Recall Predicted by Affective Measures as a Function of Trial Type*

Predictor	$\beta$	$t$	$p$
Success trials			
PA	-.08	-0.75	.46
NA	-.15	-1.30	.20
EC $\times$ PA	.30	1.86	.07
EC $\times$ NA	.11	0.65	.52
BDI-II	-.10	-0.88	.38
EC $\times$ BDI-II	-.20	-1.16	.25
Failure trials			
PA	-.04	-0.33	.74
NA	.19	1.70	.10
EC $\times$ PA	-.03	-0.18	.86
EC $\times$ NA	.01	0.09	.93
BDI-II	.14	1.22	.22
EC $\times$ BDI-II	.07	0.39	.70

Note. The first four and last two predictors listed under both types of trials are contained in different regression models, with error  $df = 143$  and  $145$ , respectively. PA = positive affect; NA = negative affect; EC = encoding context (performance vs. character); BDI-II = Beck Depression Inventory-II.

individuals are specifically concerned with when experiencing their own value than it does to how they feel overall.

The emergence of SC as a source of selectivity in a true performance context lends credence to our suspicion that self-referential encoding did not selectively activate this dimension of self-esteem in the first two studies. This invites the generalization

<sup>9</sup> Our reliance on reduced affective scales raises the question of comparability with the original measures. Cronbach’s alpha was negligibly affected by item exclusion: BDI-II = .88 for 17 items versus .90 for 21 items; PA = .81 for 8 items versus .84 for 10 items; and NA = .80 for 9 items versus .82 for 10 items. Moreover, using the full scales in place of the reduced scales did not change the pattern of regression results: PA, NA, and BDI-II scores remained nonsignificantly associated with memory for both success and failure trial words. Finally, entering the three reduced affective scales alongside SC and SL in the regressions did not change the pattern of results for success or failure trial words. Critically, both the SC and SL interactions remained significant in the case of failure trial words ( $p = .0004$  and  $p = .01$ , respectively), with the pattern of simple slopes as before. The same was true when the full scales were used ( $p = .0006$  and  $p = .02$ , respectively).

<sup>10</sup> We claimed at the outset that our two-dimensional approach to self-esteem affords predictive advantages over the unidimensional alternative. To confirm this, we combined SC and SL into a single score representing what is commonly measured using Rosenberg’s (1965) Self-Esteem Scale (see Tafarodi & Milne, 2002, on this redundancy). This new predictor was substituted in for SC and SL in the regressions reported in Study 1. Results revealed that the combined score was not significantly associated with recall of C+, C-, W+, or W- words. The same strategy was applied to Study 2. Here, the combined score was associated with recognition memory for W- words in the same manner as SL had been, but model prediction was weakened ( $R^2$  reduced from .36 to .32). Finally, in Study 3, the combined score was not significantly associated with recall of success or failure trial words. Taken as a whole, this pattern illustrates the benefits of maintaining the conceptual separation of SC and SL in relation to memory bias.

that contexts that focus self-awareness on personality rather than goal-directed action are more relevant for SL than for SC. Discovering the full import of this distinction for the relative influence of the two dimensions on thought and behavior will require extended investigation. Nonetheless, some speculation is appropriate here.

Consideration of the concrete consequences of one's actions in relation to intended or desired outcomes should asymmetrically engage the SC dimension of self-esteem. In contrast, consideration of the social or moral implications of these same consequences for one's character and social identity should asymmetrically engage SL. Individuals caught up in the flow of physically or mentally taxing activity, especially solitary activity, often lack the capacity or inclination to reflect on the latter, secondary significance of their actions and outcomes. Take, for example, the experience of rushing by car to an important out-of-town meeting. The demands of fighting with traffic and finding the unfamiliar location may leave you unable to reflect on your social worth in the situation. This blindness, however, will not prevent you from experiencing a profound, even visceral, awareness of your own agency (or lack thereof) and its direct valuative significance as you discover yourself either late and lost or approaching the destination with time to spare. In contexts such as this, SC should dominate as the source of memory bias. Many other activities tend to place the focus of reflexive attention on one's character and social significance—one's personhood. Mindful social interaction does so necessarily because of the reciprocal "mirroring" it affords (Kohut, 1977). Even solitary activities, however, can promote such a focus, insofar as individuals are both disposed and able to consider the broader implications of what they are doing or have done for *who* they are. Here, SL should dominate as the source of memory bias.

Returning to the studies, we should note that the laboratory setting does not, in general, give rise to a typical level of self-consciousness. Rather, research participants in the laboratory are acutely aware of their social significance, wondering how they are being perceived, interpreted, compared, evaluated, and measured by the researchers. This "bug-in-a-jar" mindset, coupled with consideration of the self-relevance of *both* social worth and agency words, may have contributed to our failure to achieve targeted activation of SC in the first two studies. In contrast, participants in Study 3 worked at a brisk pace on a demanding task that, in the performance condition, did not draw attention to social worth. Presumably, the task was engaging enough to limit their capacity to reflect on the laboratory scrutiny they were under.

In everyday life, most of what we do holds implications for our social significance, suggesting that SL may be subject to greater activation than SC in general. However, as we rush through our typical day, we are frequently so taken up with the mechanics of getting things done that we become oblivious to how we appear to ourselves and others as social objects. At these times, our reflexive experience is limited largely to that of the "self-as-agent." For those of us whose lives are replete with nonsocial, goal-directed activities that are at least moderately demanding, SC may receive at least as much activation as SL. It is therefore difficult to draw any firm conclusions about which dimension of self-esteem is likely to be the greater source of memory bias on the whole and the implications of this for the architecture of the self-concept. The answers may depend in large part on the individual.

## General Discussion

In this article, we explored the association of self-esteem with selective memory. In Studies 1 and 2, SL, independent of SC, was negatively associated with memory for traits words conveying lack of social worth. The association held only when these words were encoded in relation to the self, suggesting selective activation of SL. In Study 3, SL, independent of SC, was negatively associated with memory for failure-related content. However, the association held only when performance outcomes were described as diagnostic of social worth rather than ability, again suggesting selective activation of SL. In contrast, when performance outcomes were perceived to reflect ability, SC, independent of SL, was negatively associated with memory for failure-related content, suggesting selective activation of SC.

Taken together, these findings are consistent with our claim that information and experiences related to low social worth or weak agency are most relevant to those who see themselves as embodying these deficits. Greater personal relevance appears to enhance the strength and efficiency of encoding such that the resulting memory traces are more easily retrieved in the future. Though not examined here, heightened spontaneous memory or intrusions might also be expected, suggesting, in the extreme case, a predisposition to obsessive ideation (James & Kendell, 1997). Of importance, there appear to be two planes of relevance, corresponding to the two dimensions of self-esteem and their associated cognitive structures. The functional relevance of sensory content for either dimension appears to require activation of the corresponding structure. This activation is determined by both the wider EC and the semantic or thematic nature of the content.

The findings also support our claim that valuative content related to high social worth or strong agency is equally relevant to those low and high on the corresponding dimension of self-esteem. The ideals against which we measure ourselves may be similarly represented and associated with self-esteem across individuals, such that positive content is neither more accessible nor subject to superior encoding by those who see themselves as satisfying rather than falling short of these ideals. Several findings in the literature are consistent with this conclusion. McGuire and McGuire (1996, Study 1) found that those low vs. high in self-esteem did not differ in their ability to generate desirable self-relevant characteristics, although lows were more inclined to see themselves as lacking rather than possessing these characteristics. Epstein (1992) found that those low vs. high in "constructive thinking" (a dimension that is highly correlated with self-esteem) did not differ in the extent to which they elaborated on, in an overgeneralizing manner, instances of personal success and approval. Using a Stroop color-naming task with positive and negative trait adjectives, Segal, Gemar, Truchon, Guirguis, and Horowitz (1995) produced results indicating that negative self-descriptive content is more integrated within the depressive than the nondepressive self-concept (depression is highly correlated, inversely, with self-esteem). Their results also suggested, however, that positive self-descriptive content is no more integrated in the nondepressive than the depressive self-concept. Finally, Teasdale, Taylor, Cooper, Hayhurst, and Paykel (1995) found that depressives were no less (in fact, more) likely than nondepressives to provide sentence completions suggestive of success and approval when those completions reflected their contingencies of self-acceptance (ideals).

The absence in the present studies of any evidence for selectivity due to mood-congruence suggests that the acute dysphoria associated with clinical depression or produced by mood induction procedures is not characteristic of those who are merely lower than average in SC or SL. As mentioned, the SLCS score distributions revealed that few participants held strongly negative attitudes toward themselves. The affective range of the student samples therefore can be assumed to be quite limited, precluding a pronounced mood-congruence effect. In contrast, one does not have to feel acutely despondent to be selectively concerned with negative information. Selective memory as a general function of self-esteem, then, appears to be due more to the content of self-conception than to mood. A more detailed understanding of how this content comes to bias recollection of the past requires further investigation. For one thing, our claim that the memory bias observed across studies was due to differential *encoding* as a function of self-esteem needs to be directly tested. Furthermore, the distinct cognitive and motivational consequences of heightened relevance need to be clearly identified and their separate and interactive effects on memory processes better understood.

Finally, the broader significance of the link between trait self-esteem and memory may be more complex, and tragic, than is apparent in a single-session study. Implicit in the relevance interpretation of the findings is the assumption that self-esteem influences memory rather than being influenced by it. This assumption was supported by the lack of any immediate effects of the memory tasks on the trait measure of self-esteem. More broadly, however, the remembered past may have profound consequences for the persistence of self-esteem. Across time, self-esteem has been shown to fluctuate as a function of negative life events, with greater frequency of negative events predicting lower self-esteem (e.g., Lakey, Tardiff, & Drew, 1994; Miller, Kreitman, Ingham, & Sashidharan, 1989; Mullis, Youngs, Mullis, & Rathge, 1993; Pearlman, Menaghan, Lieberman, & Mullan, 1981; Tafarodi & Milne, 2002; Tafarodi & Walters, 1999). Assuming the impact of negative events to be distributed over time, greater memory for these events may exacerbate their injury to self-esteem. This implies a vicious circle. First, low SC and SL promote memories of deficit-relevant events. These memories then serve as reminders of inadequacy, confirming the validity of self-doubts and sustaining the negative preoccupation they produce. Therapeutic interventions aimed at breaking this circle might include intensive training in deliberate encoding, rehearsal, and retrieval strategies. Insofar as we are what we remember of our lives, willful control of memory may help create the conditions needed to improve self-esteem.

In summary, we have presented evidence that self-esteem is associated with selective memory for negative information. The form of bias is consistent with our claim that those who are low in SC or SL are especially concerned with perceived inadequacy on the corresponding evaluative dimension (agency or social worth). This heightened concern appears to render deficit-related experiences especially memorable. That self-doubts can weave themselves into the fabric of memory in this way suggests that an unflinching focus on the pains and failures of the past may be more tragic than heroic. For Eugene O'Neill, the playwright we mentioned at the outset, preoccupation with the past was fueled by his contempt for the illusions of his parents, and a desire to avoid a world where "truth is untrue and life can hide from itself." He relentlessly sought to confront the ghosts that haunted him. In

doing so, however, he may have created a past that was more a reflection of his tortured soul than of his actual experiences.

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## Appendix

## Memory Set Used in Studies 1 and 2

High Competence (C+)	Low Social Worth (W-)
competent	ugly
effective	rejected
strong	isolated
successful	neglected
capable	inferior
powerful	ignored
energetic	despised
talented	criticized
Low Competence (C-)	Neutral (N)
weak	sentimental
afraid	talkative
dependent	thrifty
passive	religious
failure	curious
helpless	excited
lacking	systematic
defeated	serious
High Social Worth (W+)	definite
likable	deliberate
popular	meticulous
attractive	meditative
appreciated	quick
worthy	idealistic
accepted	precise
interesting	subtle
important	

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