

Attitude Formation in Depression: Evidence for Deficits in Forming Positive Attitudes

Laren R. Conklin\*, Daniel R. Strunk, & Russell H. Fazio

Ohio State University

Department of Psychology

1835 Neil Avenue

Columbus, OH 43210

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\* Corresponding author

E-mail: conklin.52@osu.edu

Phone: 614-688-4965

Fax: 614-688-8261

## Abstract

While a wealth of research has found that depressive symptoms are related to current attitudes, new evidence suggests depressive symptoms may be related to a fundamental deficit in forming new attitudes. Researchers investigating individual differences in attitude formation have found that depressive symptoms are strongly correlated with poorer learning of positive stimuli. This study extended these findings to a sample including clinically depressed participants. Results show that, as compared to nondepressed individuals, depressed individuals are characterized by a large deficit in their learning of positive stimuli. Implications of this fundamental deficit are discussed.

Keywords: Attitude formation, depression, cognitive bias, positive and negative

## Attitude Formation in Depression: Evidence for Deficits in Forming Positive Attitudes

Cognitive models of depression have emphasized the importance of negative beliefs and information-processing biases in the development and maintenance of depression.

Depressed people have long been thought to have pervasive negative views of themselves, their world, and their futures (Beck, 1967). A wealth of research shows that depressed people do endorse more negative beliefs than people who are not depressed (Beck, Riskind, Brown, & Steer, 1988; Hill, Oei, & Hill, 1989; Hollon, Kendall, & Lumry, 1986).

Depressed people also show a host of information-processing biases that include biases in attention and memory (Mineka, Rafaeli, & Yovel, 2003). Taken together, these pervasive biases likely serve to maintain (and perhaps strengthen) the negative attitudes of people who are depressed.

However, research has been lacking in how attitudes in depressed individuals, or in the general population for that matter, are formed. There is consistent evidence that people with depression experience more negative life events than those who have not been depressed (Brown, & Harris, 1989; Hammen, 2005). The negative attitudes of people with depression may be partly based on their history of greater negative experiences. However, Shook, Fazio, and Vasey (2007) recently provided evidence suggesting the negative attitudes associated with depressive symptoms extend to stimuli with which participants have no prior learning experience. Thus, depressive symptoms appear to be associated with a fundamental deficit in learning about novel positive stimuli.

In their examination of this issue, Shook and colleagues (2007) used a recently developed assessment of attitude formation—a computer game called “Beanfest” (Fazio, Eiser, & Shook, 2004). The use of novel stimuli in this game allows investigators to assess

individual differences in attitude formation involving objects with which participants have no prior learning history.

The Beanfest game can be implemented in different ways to assess multiple aspects of attitude formation [see Fazio et al. (2004) for a full description of these implementation options]. The implementations are similar in that participants are asked whether they will accept or reject each of a series of bean-like stimuli knowing that accepting a bean can lead to either gaining or losing game points. One important difference among the different implementations of the game is whether participants are provided with feedback only on trials on which they selected a bean (i.e., contingent feedback) or whether they are provided feedback regardless of whether they selected a bean (i.e., full feedback). Using contingent feedback, researchers can assess individual differences in willingness to sample the stimuli (and risk losing points). With full feedback, researchers can assess individual differences in participants' tendencies to form attitudes toward positive and negative stimuli. The individual differences that emerge reflect fundamental tendencies to learn positive and negative stimuli, which are neither a function of prior learning history (as the stimuli are truly novel) nor participants' willingness to take the risk of sampling the stimuli (as feedback is not contingent on sampling).

Using full feedback in an unselected sample, Shook and colleagues (2007) found depressive symptoms were associated with less learning of positive stimuli, but these symptoms were unrelated to the learning of negative stimuli. On the basis of these findings, Shook et al. (2007) suggested that "a lack of appreciation for positives, rather than increased rehearsal of negatives," was responsible for the learning bias seen in those with more depressive symptoms (p. 153). If future research found that this failure to learn the

positive was characteristic of Major Depressive Disorder, this would be an important advancement with potential implications for the development of models of the etiology and maintenance of depression.

Given these considerations, the purpose of this study was to compare nondepressed participants and participants diagnosed with clinical depression with respect to their formation of attitudes toward positively and negatively valenced stimuli. We utilized a formal evaluation of Major Depressive Disorder and an interview-based measure of depressive symptom severity. We expected that learning of positive stimuli would differentiate between depressed and nondepressed groups.

## 1. Method

### *1.1 Participants*

A total of 34 undergraduate participants from Ohio State University were included in this study. These participants were selected from a sample of 87 students who had participated in a larger study for research credit (see Strunk & Adler, 2008 for additional information on the sample of 87 participants). To be eligible for inclusion into this study, participants had to either meet criteria for current Major Depressive Disorder according to the Structured Clinical Interview for the DSM-IV (First, Spitzer, Miriam, & Williams, 2002), or they had to be nondepressed with low levels of depressive symptoms. Cutoff scores to identify the low depressive symptom group were chosen to reflect the lowest 30 percent of scores on each of two measures of depressive symptoms. These cutoffs were a Beck Depression Inventory-II (Beck, Steer, & Brown, 1996) score of five or fewer and a Hamilton Rating Scale for Depression (Hamilton, 1960; Williams, 1988) score of four or fewer. To be included in the low depressive symptoms group, participants had to meet

cutoff criteria for both measures. The 34 participants in this study were primarily Caucasian (30 of 34) and female (21 of 34) with a mean age of 18.8 years ( $SD = 1.8$ ). Seventeen were currently depressed and seventeen were currently nondepressed with low depressive symptoms.

## *1.2 Measures*

*1.2.1 The Beck Depression Inventory—2<sup>nd</sup> edition (BDI-II).* The BDI-II (Beck, et al., 1996) is a 21-item self-report measure used to assess the severity of depressive symptoms over the past week. Items are summed to yield a total depressive symptom severity score ranging from 0 to 63.

*1.2.2 The Hamilton Rating Scale for Depression (HRSD).* The modified 17-item HRSD (Hamilton, 1960; Williams, 1988) is an interviewer-rated questionnaire of depression symptom severity during the past week. Trained evaluators administer the measure and code responses and behaviors based on formal criteria. Items are summed to yield a measure of depressive symptom severity ranging from 0 to 48.

*1.2.3 Structured Clinical Interview for the DSM-IV (SCID; Non-patient, Research version).* The SCID (First, et. al 2002) is a structured interview used to assess whether participants meet formal criteria for Major Depressive Disorder and other Axis I conditions. The SCID is a widely used and well-validated instrument for making Axis I diagnoses, including assessments of major depression (Nezu, Ronan, Meadows, & McClure, 2000). In addition to providing a diagnosis of Major Depression, evaluators also rate the current severity of the episode as mild, moderate, or severe. This rating of episode severity takes into account participants' functional impairment as well as the number and severity of symptoms.

### *1.3 Beanfest: Design and Procedures*

For this study, Beanfest was implemented with full feedback to assess individual differences in learning positive and negative stimuli. The game was employed as described by Shook et al. (2007) with modifications to allow the creation of a second configuration of the game in which the particular beans assigned positive versus negative values differed from the original. The additional configuration allowed us to check that any results obtained were not a result of a particular instantiation of the game. For each configuration, participants progressed through three phases: practice, game, and test. To begin, participants were seated at a computer and given instructions regarding the stimuli (and the dimensions on which the stimuli would vary), the point system, the response keys (“yes” and “no” keyboard keys), and the practice and game phases. In the practice phase, participants completed a six-trial sequence to become familiar with the procedure.

Next, participants began the game phase. To do well in this phase, participants needed to learn the valence of novel bean-shaped stimuli that varied systematically along two dimensions: the shape of the “bean” (from oval to circular) and the number of speckles (from one to ten). Each bean was either associated with a positive (+10) or negative (-10) point value. Participants gained points by accepting the positive beans and avoided losing points by rejecting the negative beans. The participants’ goal was to maximize points earned. If participants accepted a bean, points were awarded or subtracted from their current point total—otherwise their point total remained unchanged. Throughout the practice and game phases, participants had a maximum of five seconds to respond on each trial. Regardless of whether a bean was accepted or rejected, participants received feedback about the valence of the bean. As mentioned earlier, this non-contingent feedback

allowed for learning of the stimuli to be separated from participants' individual sampling tendencies (i.e., whether the participant was more or less willing to accept the beans).

After the game phase, participants were read the instructions for the test phase. During the test phase, participants were presented with the game stimuli (along with some distractor beans which had not been presented previously) and asked to indicate whether the valence of the bean was positive or negative. They were given a maximum of ten seconds to specify the valence of each bean. During this test phase, participants were not informed about whether their responses were correct.

Participants completed one configuration of the Beanfest game. Half of the participants were randomly assigned to play Set A of the Beanfest game, while the other half were assigned to play Set B. Each configuration of Beanfest used a different set of beans within a 10 x 10 matrix which varied along two dimensions: number of speckles (1-10) and sphericity (from oblong to circular). Both sets were constructed so that a simple linear relationship would not aid participants in classifying the beans. Neither the sphericity of the beans nor the number of speckles was correlated with valence ( $r_s < |.1|$ ). A more comprehensive description of the specific stimuli used in each configuration of the game is available upon request.

In both configurations, the game phase consisted of three blocks, which gave a total of three opportunities for participants to learn each bean. Each set was intended to have 17 positive and 17 negative beans for a total of 34 different beans. These beans, along with 16 distractor beans, were presented during the test phase.<sup>1</sup>



### *1.4 Overall Procedure*

Trained evaluators administered the SCID and HRSD to participants. Evaluators were graduate students and advanced undergraduate students trained by the second author. Training included guided readings, reviewing instructional videotapes, and a series of role plays and interactive training exercises. Participants also completed the BDI-II and played the Beanfest game as part of a larger assessment battery.

Each session was video-recorded. A subset of the interviews conducted (77% of the SCID interviews and 71% of the HRSD interviews) was re-rated by another evaluator blind to any previous ratings. The intraclass correlation coefficient estimating reliability for a single HRSD rater was .76 (Fleiss & Shrout, 1978). Kappa for current diagnoses of depression as assessed by the SCID was .61. For SCID assessments, in each case in which there was disagreement about the diagnosis, a third evaluator coded the tapes to resolve the disagreement so that a majority decision could be reached in each case.

## 2. Results

Prior to testing study hypotheses, we first examined the equivalence of the two configurations of Beanfest used. Overall learning of the stimuli was assessed for each participant using a phi coefficient to assess the correlation between the valence of the bean (positive or negative) and the participants' labeling of that bean during the test phase (positive or negative). Using the phi coefficient for each participant as an index of overall learning, this learning did not differ between the two configurations of Beanfest (A or B;  $t(32) = .20, p = .84, d = .07$ ), suggesting that the game configurations were comparable in difficulty.

Because the hypothesized differences in learning of positive stimuli might be accounted for by differences in the ability of depressed and nondepressed participants to learn stimuli regardless of valence, we examined potential differences in overall learning. On the basis of the phi coefficients, participants diagnosed with depression did not differ from those who were nondepressed in their overall learning of the stimuli ( $M = .16$ ,  $SD = .23$  and  $M = .20$ ,  $SD = .18$ , respectively;  $t(32) = .82$ ,  $p = .42$ ,  $d = .19$ ). Thus, any significant association of depression and learning positive stimuli would not merely reflect differences in overall learning.

### *2.1 Attitude Formation in Depressed and Nondepressed Participants*

We expected depressed participants would show less learning of positive stimuli than nondepressed participants, but that there would be no such difference for learning of negative stimuli. The learning of positive and negative stimuli was assessed by separately calculating the proportion of positive and negative beans that were classified correctly during the test phase. To assess our primary hypothesis, we examined an ANOVA in which valence (as a repeated measure), group (depressed and nondepressed), and their interaction served as predictors of proportion correct. The interaction term in this model was significant ( $F(1,32) = 5.71$ ,  $p = .02$ ), indicating depressed and nondepressed participants differed in learning as a function of stimuli valence.

The overall pattern of results is illustrated in Figure 1. As expected, depressed participants did not learn the positive stimuli as well as the nondepressed participants ( $M = .49$ ,  $SD = .14$  and  $M = .60$ ,  $SD = .12$ , respectively;  $t(32) = 2.54$ ,  $p = .02$ ,  $d = .84$ ). Whereas the nondepressed participants performed better than chance when identifying the positive stimuli ( $t(16) = 3.49$ ,  $p = .003$ ), the depressed participants did not ( $t(16) = -.35$ ,  $p = .73$ ).

Also consistent with our expectations, depressed and nondepressed participants did not significantly differ in the extent to which they learned the negative stimuli, ( $M = .66$ ,  $SD = .16$  and  $M = .61$ ,  $SD = .15$ , respectively;  $t(32) = -1.01$ ,  $p = .32$ ,  $d = -.32$ ). Both depressed and nondepressed participants evidenced learning of the negative stimuli, as both groups correctly identified these stimuli as negative more than would be expected by chance ( $t(16) = 4.28$ ,  $p = .0006$  and  $t(16) = 3.08$ ,  $p = .007$ , respectively).

We then examined potential differences between depressed and nondepressed participants on the learning asymmetry. This asymmetry was calculated by subtracting the proportion positive correct from the proportion negative correct. The extent of the learning asymmetry significantly differed between depressed and nondepressed participants ( $t(32) = 2.39$ ,  $p = .02$ ,  $d = .90$ ). Depressed participants showed a learning asymmetry favoring learning of the negative stimuli ( $M = .18$ ,  $SD = .21$ ;  $t(16) = 3.51$ ,  $p = .003$ ,  $d = 1.13$ ). There was no evidence of this pattern among the nondepressed participants ( $t(16) = .18$ ,  $p = .86$ ,  $d = -.07$ ).

## 2.2 Attitude Formation and Depressive Episode Severity

As noted previously, ratings of the current severity of depressed participants' depressive episodes were made using the SCID. These ratings allowed for an exploratory analysis examining whether episode severity was related to learning positive stimuli among participants with depression. Even in this small sample, current episode severity was significantly and strongly correlated with the learning of positive stimuli ( $r(15) = -.52$ ,  $p = .03$ ). Participants with a more severe current episode tended not to learn the positive stimuli as well as participants whose current severity was less severe. There was no

relationship between the learning of negative stimuli and current episode severity ( $r(15) = -.08, p = .75$ ).

### 3. Discussion

Our results showed that depressed participants learned negative stimuli as well as nondepressed participants, but depressed participants showed significantly poorer learning of positive stimuli than nondepressed participants. Consistent with these findings, depressed participants with greater episode severity exhibited poorer learning of positive stimuli. Taken together, results support the hypothesis that Major Depressive Disorder is associated with a failure to appreciate positive stimuli, even when participants have had no prior learning experience with these stimuli.

A major limitation of any research examining pre-existing groups is that it remains somewhat unclear whether a third variable might explain any differences observed. In considering our study, one might be concerned that depressed and nondepressed participants differ in their level of cognitive impairment or motivation. These differences might impede participants' ability to learn new information. However, differences in either of these variables would likely have resulted in corresponding differences in overall levels of learning. In fact, the depressed and nondepressed groups showed no differences in overall learning as assessed by the phi coefficient. Thus, rather than showing that depression is associated with poorer learning overall, our results suggest that depression is associated with a specific deficit in learning about positive stimuli.

Another potential difference between our groups was the distribution of men and women. Although our groups were not matched on gender, they did not differ significantly on gender ( $\chi^2(1, N = 34) = 1.12, p = .29$ ). While this non-significant gender difference may

have contributed to the group differences we observed, results of additional analyses were not consistent with this possibility. First, consistent with the findings of Fazio et al. (2004), men and women in our sample did not differ in their learning of positive stimuli ( $t(32) = .66, p = .51$ ). In addition, a logistic regression failed to find an interaction between gender and learning the positive stimuli as predictors of depression group ( $\chi^2(1, N = 34) = 1.58, p = .21$ ). Thus, gender is not likely to explain our findings regarding the learning of positive stimuli.

Our study raises several important questions which could be addressed in future research. Though we identified differences in learning of novel positive stimuli between depressed and nondepressed participants, investigations of the mechanism by which these differences emerge warrants future study. Furthermore, a prospective study is needed to examine whether the differences we observed in learning about novel stimuli reflect risk factors in the development of depression.

Our findings lead us to wonder whether cognitive behavioral therapy for depression may achieve their effects at least in part by correcting the deficit in learning about positive stimuli. Perhaps cognitive behavioral therapies encourage clients to increase their exposure to information about positive stimuli. With sufficient practice, they may be able to remedy their deficit in learning about positive stimuli. While clearly speculative at this point, we think this would be a productive avenue for future research. The evidence we obtained for a deficit in learning positive stimuli in depression provides an important first step in this line of inquiry.

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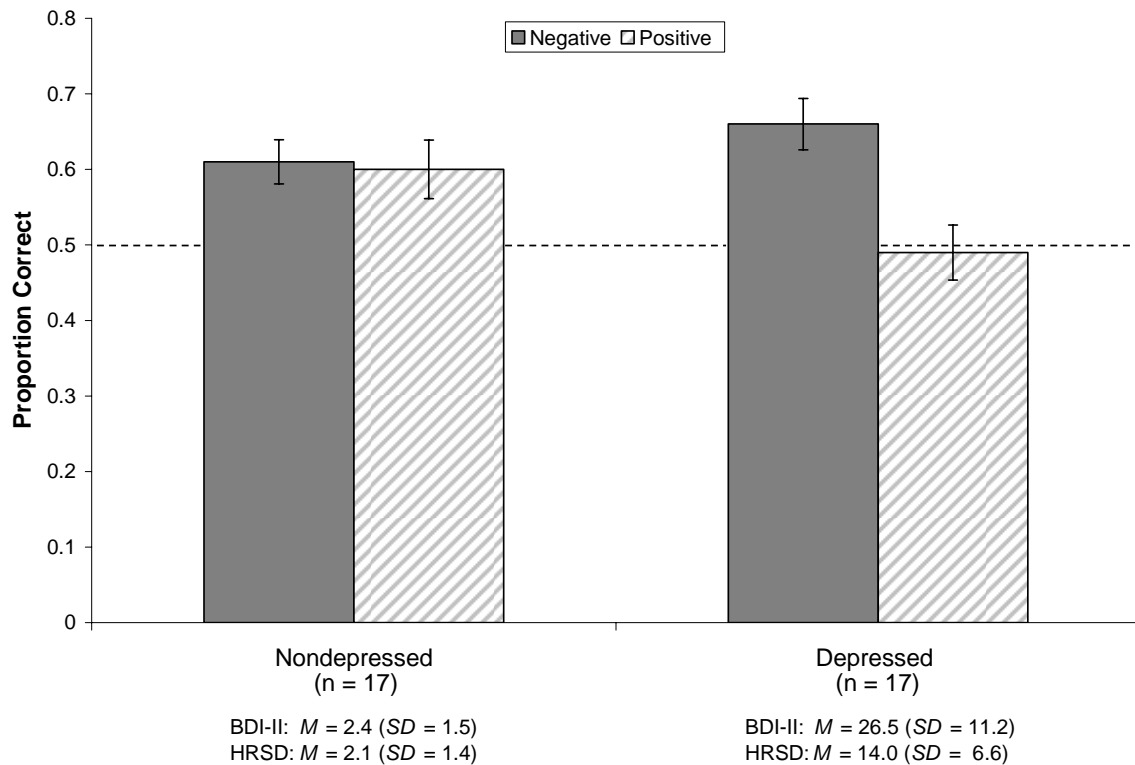
## Footnote

<sup>1</sup> Due to a programming error for Set B, one bean replaced another bean such that one positive bean was presented three times more than intended and one negative bean was not presented. However, taking into account the error in the programming of Set B, the correlations between valence and each dimension were still low (all  $r_s < |.1|$ ).



Figure 1.

Differences Between Depressed and Nondepressed participants in Learning of Positive and Negative Beanfest Stimuli



*Note.* Error bars indicate plus and minus one standard error. Dotted line indicates expected proportion correct given chance responding (i.e., .50).

Depressed participants learned the negative stimuli significantly better than the positive stimuli ( $p = .003$ ), whereas there was no difference in the learning of positive and negative stimuli for the nondepressed participants ( $p = .86$ ). Depressed participants learned the positive stimuli significantly less well than the nondepressed participants ( $p = .02$ ). There was no difference between depressed and nondepressed groups in learning of the negative stimuli ( $p = .32$ ).