ORIGINAL PAPER

Schematic Processing: A Comparison of Clinically Depressed, Dysphoric, and Nondepressed College Students

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Abstract Reformulations of Beck's theory (e.g., Dykman et al. *J Pers Social Psychol* 56:431–445, 1989) propose that depressed and nondepressed people are equally likely to use schematic processing to interpret information. The few studies to test this hypothesis have had methodological shortcomings. Past studies have not included a clinically depressed sample and have failed to assess a full range of potential biases (negative, neutral, and positive). To address these limitations, a recognition-of-information task was administered to clinically depressed, dysphoric, and nondepressed college students. Clinically depressed participants were significantly more likely than nondepressed participants to generate negative interpretations of a self-relevant ambiguous story. Clinically depressed participants also were more likely than both dysphoric and nondepressed participants to refute positive interpretations of the story. However, consistent with reformulations of Beck's theory, dysphoric participants and nondepressed participants also tended to ''go beyond'' the information given in the story. Indeed, all three participant groups were equally biased in their interpretations. The difference among the groups was in the direction (negative vs. positive) and the heterogeneity of the biases.

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According to the original statement of Beck's theory (1967), depressed and nondepressed people process information differently. People with depression use schemas to process information whereas nondepressed people are aschematic or "data-driven." Thus, depressed people make negatively biased interpretations of ambiguous situations because they rely on negative schemas to "fill-in" the informational gaps. Nondepressed people, on the other hand, make unbiased or neutral interpretations of ambiguous information because they only use the available data.

Over the years, the idea that schematic processing is restricted to people with depression has largely been refuted. Research on social cognition (e.g., Nisbett and Ross 1980) and optimistic biases (e.g., Alloy et al. 1990) has shown that nondepressed people also use top-down schematic processing. In light of this work, Beck's theory was reformulated (e.g., Dykman et al. 1989; Haack et al. 1996; Haaga and Beck 1995; Hollon and Garber 1988). These reformulations hypothesize that depressive and nondepressive cognition may differ more in terms of content than process. Depressed and nondepressed individuals should be equally likely to make biased interpretations of ambiguous information; however, the interpretations of the two groups should be different in content with the depressives' interpretations being more negative and nondepressed being more positive (e.g., exhibit a positivity bias).

Given the large body of research showing schema-related biases among nondepressed people, the more recent formulations of Beck's theory have gained wide acceptance. Indeed, it would be difficult to argue that schema-driven processing is unique to people with depression. However, it is interesting that very few studies have actually compared depressed and nondepressed participants on the *degree* to which they use schematic processing. Thus, it remains unclear whether depressed and nondepressed people are equally likely to use schemas when processing ambiguous information.

Studies investigating depression-related biases generally have found that depressed individuals are likely to generate negative interpretations of ambiguous information whereas nondepressed people are likely to make more neutral interpretations (e.g., Dykman et al. 1989; Haack et al. 1996; Lawson et al. 2002; see Lawson and MacLeod 1999 for exception). On the surface, these results support Beck's original hypothesis that depressed people are more likely to use schematic processing than nondepressed people. However, this conclusion is premature because most studies investigating schematic biases have only examined negative and neutral biases, but not positive biases (see Wang et al. 2006 for exception). Recent formulations of Beck's theory suggest that nondepressed people also should exhibit schematic biases, but in the positive direction. Thus, it is critical that studies testing schema-driven biases examine a full range of schema content—negative, neutral, and positive. By examining a full range of potential biases, researchers can clarify whether people with depression are more likely to process information with their schemas than nondepressed people. However, it is not enough to simply examine a full range of potential biases. It also is necessary to examine the degree to which these biases may be present. That is, do depressed and nondepressed people rely on schematic processing to the same extent; are depressives more negative than nondepressives are positive?

A second limitation of prior research on schematic processing is the lack of a clinically depressed sample. The majority of studies (e.g., Dykman et al. 1989; Haack

et al. 1996; Lawson and MacLeod, 1999; Lawson et al. 2002; see Ingram et al. 1995 for exception) examining schema-driven biases have used mildly depressed samples that were identified with self-report measures such as the Beck Depression Inventory. Thus, it is unclear whether the pattern of findings in these studies can be generalized to clinically depressed populations. To provide a more thorough test of Beck's theory, it is important to also include a group of participants with clinically significant depression, as determined by clinical interview. This point is particularly relevant to testing Beck's theory because his schema hypothesis was developed from his clinical experiences treating severely depressed individuals.

The inclusion of both mildly depressed and clinically depressed participants can also help shed light on the issue of depressive continuity. Much controversy exists in the literature about whether mild to moderate symptoms of depression differ in quantity or in quality when compared with clinically significant forms of depression (e.g., Flett et al. 1997; Ruscio and Ruscio 2000; Santor and Coyne 2001). That is, should the syndrome of major depression be viewed as a qualitatively discrete form of psychopathology or rather as an endpoint on a severity continuum of depression? Resolution of this long-running controversy may be aided by researchers' inclusion of both clinically depressed and mildly depressed groups when theory testing. The ability to detect differences within the depressive spectrum in terms of etiology and vulnerability factors would be useful in resolving the continuity controversy.

The goal of the current study is to address the limitations of prior research and to test the widely accepted (but rarely tested) hypothesis that depressed and nondepressed people are equally likely to use schemas to fill-in informational gaps when presented with ambiguous information. Prior research has focused on determining whether schematic biases are present in depressed and nondepressed participants, but have not examined whether these biases are present to the same extent. To test this hypothesis, we used a modification of a prototypic method from cognitive psychology (Owens et al. 1979) to investigate schematic processing in comprehension and memory among depressed and nondepressed students. If people have schemas that guide the processing of information, we predicted that these schemas should bias the way they comprehend and remember ambiguous passages pertaining to self-evaluation, causal attributions, and expectations of future success and failure in a text. More specifically, in a recognition-of-information task (RIT; see Harris and Monaco 1978), students should *go beyond the information given* and judge that sentences containing material not directly stated in the passage but consistent with their schemas follow either logically or pragmatically from the information presented in the passage. Also, students should judge sentences containing material not directly refuted in the passage but inconsistent with their schemas as either necessarily or likely to be false.

In summary, recent formulations of Beck's theory predict that depressed and nondepressed people are equally likely to use schematic processing. Interestingly, few studies have actually tested this assertion. To test this hypothesis, a recognition-of-information task (RIT) was administered to clinically depressed, dysphoric, and nondepressed students. This procedure allowed us to compare schema-related bias in students displaying full-blown syndromes of depression (major, minor, and intermittent depressive disorders) versus "dysphoric" (Kendall et al. 1987) students exhibiting only a subsyndromal smattering of depressive symptoms. Consistent with recent formulations of Beck's theory, we predicted that depressed, dysphoric, and nondepressed participants would be equally likely to use schema-driven processing to interpret ambiguous information. The difference between the three groups would be the direction of the bias.

Depressed individuals should exhibit a negative interpretive bias and nondepressed individuals should exhibit a positive interpretive bias. Consistent with the view that depression is on a continuum, we hypothesize that the direction of the bias in the dysphoric group will fall in between the depressed and nondepressed groups.

Method

Overview

All participants completed two experimental sessions. At session one, participants were read a story about taking an exam. The next day, at session two, participants were administered a recognition-of-information task (RIT) regarding the details of the story they heard at session one. They also completed a measure of depressive symptoms. Participants who scored above the cut point for mild depression were individually scheduled for a third session. At session three, participants were administered a clinical diagnostic interview. Session three occurred within one week of session two.

Participants

Participants were a subset of a larger data set used by Halberstadt et al. (2005). Participants were undergraduate student volunteers from Introductory Psychology classes who received extra credit points for their participation. Specific ethnic and racial information was not collected from participants; however, the sample likely reflected the ethnic and racial diversity of the large Midwestern university from which it was recruited (~90% Caucasian). All participants were administered the RIT and the Beck Depression Inventory. Participants who scored 10 or above on the BDI, the cut point for mild depression (Bumberry et al. 1978), were administered the Schedule for Affective Disorders and Schizophrenia (SADS; Endicott and Spitzer 1978). To be certain that cases of RDC major, minor, and intermittent were not being overlooked among participants who scored less than 10 on the BDI, a randomly selected subset of these participants also was administered the diagnostic interview. Consistent with Lewinsohn and Teri (1982), none of the participants with BDI scores of less than 10 who were interviewed met RDC criteria for major, minor, or intermittent depression. A total of 396 participants were interviewed.

Because of the nonselective participant recruitment procedure (i.e., all participants who volunteered for the study were examined) used to gather the original data set (Halberstadt et al. 2005), we were able to form the three participant groups used in the present study: (1) Clinically depressed (depression diagnosis); (2) Dysphoric (no depression diagnosis + BDI = 10–15; and (3) Nondepressed (no depression diagnosis + BDI = 0–9). Assignment to the two depression groups was based on Research Diagnostic Criteria (RDC; Spitzer & Endicott 1978) and BDI scores. The Clinically Depressed group consisted of 62 students who (a) met RDC criteria for current major, minor, or intermittent depressive disorder, and (b) did not meet RDC criteria for current or past bipolar disorder, cyclothymic personality disorder, or schizophrenia/unspecified functional psychosis. The Dysphoric group consisted of 167 students who (a) did not meet RDC criteria for current major, minor, or intermittent depressive disorder, (b) did not meet RDC criteria for current or past bipolar disorder, cyclothymic personality disorder, or schizophrenia/unspecified functional psychosis, and (c) had a

BDI score of 10–15. The nondepressed group consisted of 944 students who (a) scored 0–9 on the BDI and (b) reported no history of treatment for psychiatric or psychological problems. Thus, the final sample used in this study consisted of 1,173 students.[1]

Materials

Beck Depression Inventory (BDI; Beck et al. 1979). The BDI was administered to assess levels of depressive symptoms. Total scores on the BDI can range from 0 to 63, with higher scores reflecting greater levels of depressive symptoms. The BDI has high internal consistency, test–retest reliability, and validity with both psychiatric and normal samples (Beck et al. 1988).

Recognition of Information Task (RIT). Work in psycholinguistics has direct implications for more adequately conceptualizing and, in turn, testing Beck's theory about the depressive inference process. In psycholinguistic theory, a statement's meaning is composed of what is directly asserted in the statement *and* the sum total of inferences that can be derived from the statement (Harris and Monaco 1978). A *logical inference* follows as a logical or necessary consequence of a statement. In contrast, a *pragmatic inference* is very plausible given people's knowledge of the world but does not follow logically (i.e., of necessity) from a statement. In this view, the meaning of a bundle of information is not invariant; people with different schemas will make different pragmatic inferences when confronted with the same information, and thereby, derive different meanings from it (Owens et al. 1979; Van den Broek 1994).

The RIT was designed to assess schema-based biases in recognition-of-information memory judgments pertaining to self-evaluation, expectations of future success and failure, causal inferences, and other hypothesized negative and positive schema-relevant cognitions featured in the cognitive theories of depression. A modification of the experimental method of Owens et al. (1979) was used. A relatively complex event sequence of presumed high personal meaning to the average college student was constructed in which a typical college examination situation is described. The passage includes events occurring during the morning before the exam, including getting out of bed, studying, and meeting a friend; taking the exam; discussing the exam with classmates immediately after the exam; engaging in activities taking place the evening after the exam; and receiving feedback about performance on the exam. The story is ambiguous to central character's performance, expectations, moods, self-evaluation, social comparison, and other hypothesized negative and positive schema-relevant information.

Two versions of the 48-item recognition-of-information task (RIT; see Harris and Monaco 1978) were constructed. Approximately one-half of the participants received

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[1] Participants from the original data set were excluded from the current data analyses if they failed to meet criteria for any of the three study groups or if they scored below a predetermined cutoff score for objectively true or false items on the RIT: ≤1 for logically true items and ≥ 1 for logically false items. The logically true and logically false subscales on the RIT provide objective indices of participants' performance on this measure, with scores below or above the respective cutoffs indicating very poor comprehension and/or memory for the experimental text. We took a conservative approach and eliminated these participants ($N = 117$) from the data analyses because it would be no surprise if participants who had little memory for the objective facts of the RIT story, and therefore little relevant current situational information available to them, relied on their schemas more so than did other participants. These 117 participants consisted of 8% of participants with BDI scores of 10 or above and 9% of those with BDI scores less than 10.

one version and the rest of the participants received the other version. Each version contains: (a) nine *logically true statements* (forming the logically true subscale) taken directly from the story text or following necessarily from directly asserted statements (e.g., I saw Chris in the cafeteria), (b) nine *logically false statements* (forming the logically false subscale) that mention out-of-place or impossible actions or occurrences (e.g., At 11 a.m. my alarm clock rang), and (c) 30 reasonable or *pragmatic inferences* that do not follow logically, or of necessity, given the events of the story. Eighteen of the pragmatic inferences are plausible but neutral with respect to the hypothesized negative and positive schemas. Nine of these 18 are pragmatically true statements (forming the pragmatically true subscale), which are strongly invited test inferences (e.g., I had coffee and breakfast in the cafeteria) and the other nine are pragmatically false statements (forming the pragmatically false subscale), which are implausible inferences given the stated action sequence (e.g., I didn't take a shower the morning of the exam).

The remaining 12 pragmatic items, dubbed the mood-relevant items, form the mood-relevant subscale and differ on the two versions of the RIT. On one version these items are appropriate to negative content and the other version are appropriate to positive content. Two versions of the RIT were created so that participants would not be exposed to both a positive and negative description of the same story event. By using RIT version as a between subject variable we could avoid an alternate choice methodology (i.e., participants comparing negative and positive story event descriptions). The mood-relevant items were selected in accordance with Beck's (1987) descriptions of negative attributions, expectations, self-evaluations and other related cognitions. An example of a mood-relevant inference, negative content, on the RIT is ''I felt that I would do poorly on the exam in my other course.'' In the experimental text, the pertinent content has the central character simply wondering how he or she will do on the exam, without actually presenting information regarding his or her expectations or information upon which to base such expectations.

Participants are asked to read each test sentence and rate on a 7-point scale how likely each sentence is to be true or false, given the information in the story (Harris and Monaco 1978). The instructions stress that it is the participant's memory of the content or idea of the story, not the exact wording of the sentences that is to be tested. The endpoints of the 7-point scale (+3 equals ''definitely true'' and –3 equals ''definitely false'') are the most accurate responses for the items forming the logically true and logically false subscales, respectively. The midpoint of the scale (0 equals ''not clear whether sentence was true or false'') is the unbiased or neutral response for items forming the pragmatically true, pragmatically false, and mood-relevant subscales. The average ratings on each of the four mood-irrelevant subscales (logically true, logically false, pragmatically true, and pragmatically false) and the mood-relevant subscale were computed for each participant. Positive values on the mood-relevant subscale, negative version, indicate endorsement of negative inference statements whereas negative values on this version indicate denial of negative inferences. On the mood-relevant subscale, positive version, positive values indicate endorsement of positive inferences whereas negative values indicate denial of positive inferences.

The internal consistency of the mood relevant subscale of each of the two RIT versions (negative content and positive content) was estimated using Cronbach's alpha (Cronbach 1951). Alpha coefficients of .88 and .83 were obtained for the negative and positive versions, respectively.

Schedule for Affective Disorders and Schizophrenia (SADS). A SADS interview (Endicott and Spitzer 1978) was administered to a subset of subjects as described earlier.

RDC diagnoses (Spitzer and Endicott 1978) were made on the basis of information obtained from the interview. Each interview was conducted by one of two female clinicians, one an advanced graduate student in clinical psychology and the other a faculty member in clinical psychology, both of whom had previous experience in conducting interviews with the type of sample used in this study. A reliability check on diagnoses was conducted on 37 (9%) of the interviews yielding a kappa coefficient (Spitzer et al. 1967) of .91 for schizotypal personality disorder and kappa coefficients of 1.00 for all other diagnostic categories.

Procedure

All session 1 and 2 testing was done in groups of approximately 20 participants. The experimenter read a statement explaining the ostensible rationale of a visual imagery study which was designed to distract participants from the true purpose of the study. First, the experimenter informed participants that their ability to form images of isolated objects and events would be assessed. Participants were then given a 16-item visual imagery filler task, adapted from Betts (1909), for which they rated the vividness of their visual images on a 5-point scale. The experimenter then explained that in the next task participants would be hearing a sequence of connected events, specifically, a story about taking an exam (RIT story). Participants were instructed to place themselves in the events described and imagine themselves vividly within those scenes, calling up similar events that they may have experienced in order to help them to form images. After listening to the RIT story, participants were given a bogus questionnaire, on which they rated the vividness of various visual images formed while listening to the story. None of the items on the bogus questionnaire was related to the RIT recognition-of-information test items and no mention of the upcoming recognition task was made.

Participants returned the next day for session 2. A 24 h delay between session 1 and 2 was used because schema related distortions should increase over time (Bergman and Roediger 1999; Read and Rosson 1982). Participants first were administered the RIT recognition-of-information task. Following the RIT, participants completed the BDI. All participants scoring greater than or equal to 10 were individually scheduled for session 3. They were not told the basis of their selection for session 3. At session 3 (within 1 week of session 2), participants were interviewed on an individual basis. The interviewers were blind to participants' responses on all session 1 and 2 measures.

Results

The mean BDI score and standard deviation for the three participant groups were as follows: (a) the clinically depressed group ($n = 62$) had an average BDI score of 21.87 ($SD = 6.19$), (b) the dysphoric group ($n = 167$) had an average BDI score of 12.14 ($SD = 1.70$); and (c) the nondepressed group ($n = 944$) had an average BDI score of 3.77 ($SD = 2.80$). There was a significant difference between the three groups on gender, $\chi^2(2, N = 1173) = 9.75$, $p = .008$, with a greater proportion of females in the clinically depressed (68%) and dysphoric (61%) groups than in the nondepressed group (52%). Thus, gender was used as a covariate in all subsequent analyses. Other demographic information such as ethnicity and socioeconomic status was not collected, and thus, could not be compared across groups.

Mood-irrelevant Subscales

To determine whether the three groups differed in terms of memory for the RIT story or on general mood-irrelevant inference tendencies, a 3 (Group: clinically depressed, dysphoric, and nondepressed) × 4 (Mood-irrelevant Subscale: logically true, logically false, pragmatically true, and pragmatically false) analysis of variance (ANOVA) was performed on mean inference scores, with repeated measures on the Mood-irrelevant Subscale. Gender served as a covariate. Mauchly's Test of Sphericity indicated that sphericity could not be assumed. Consequently, for all tests of the repeated measures factors, we multiplied the numerator and denominator degrees of freedom by the relevant Greenhouse-Geisser estimate of epsilon, and for all follow-up comparisons we do not assume homogeneity of variance and use a separate error term for each effect under consideration.

Results revealed a significant main effect for Subscale, $F(2.19, 2559.10) = 7194.07$, $p < .001$. This was followed by a series of Tukey post hoc tests (Tukey 1953), which revealed that each subscale mean differed significantly ($p < .05$) from all other subscale means. Participants rated logically true items highest ($M = 2.55$, $SD = .45$) and logically false items lowest ($M = -2.34$, $SD = .53$), indicating accurate memory across groups for the RIT story. Also, as expected, participants endorsed pragmatically true inferences ($M = 2.07$, $SD = .58$) and refuted pragmatically false inferences ($M = -1.97$, $SD = .57$), but with less certainty than the logical items. Neither the main effect of subscale nor the subscale by group interaction was significant (all $ps > .30$)

Mood-relevant Subscales

To test whether participant groups differed in their tendency to endorse negative and positive inferences, a 3 (Group: clinically depressed, dysphoric, and nondepressed) × 2 (Version: negative and positive) ANOVA was conducted on mood-relevant subscale scores. Gender served as a covariate. Results revealed a main effect for Version, $F(1, 1166) = 14.96$, $p < .001$, which was qualified by a significant Group × Version interaction, $F(2, 1166) = 10.38$, $p < .001$. No other main effects or interactions were significant (all $ps > .3$). Simple main effect tests for Group revealed that mean scores of the three groups differed on the negative mood-relevant subscale, $F(2, 1166) = 4.32$, $p < .05$, and on the positive mood-relevant subscale, $F(2, 1166) = 4.53$, $p < .01$ (see Fig. 1). Tukey post hoc tests (alpha set at .05) found that on the negative version, the clinically depressed participants ($M = .65$, $SD = 1.20$) made more negative inferences than the nondepressed participants ($M = .10$, $SD = 1.10$). The dysphoric participants ($M = .25$, $SD = 1.06$) tended to slightly endorse negative inferences, but did not differ significantly from the depressed or nondepressed participants. On the positive version, clinically depressed participants differed from both dysphoric and nondepressed participants in their tendency to infer positive inferences (Tukey tests, all $ps < .05$). The clinically depressed group ($M = -.51$, $SD = .98$) tended to refute positive inferences whereas the nondepressed group ($M = .18$, $SD = 1.0$) slightly endorsed positive inferences. The dysphoric group ($M = .09$, $SD = 1.0$) neither endorsed nor refuted positive inferences.

In summary, analyses of the mood-irrelevant subscale scores revealed only a significant main effect of Version. All groups were equally likely to make mood-irrelevant pragmatically true inferences and refute mood-irrelevant pragmatically false inferences. Also, groups were equally accurate in their comprehension and/or memory for the story as measured by logically true and logically false item subscales. In contrast,
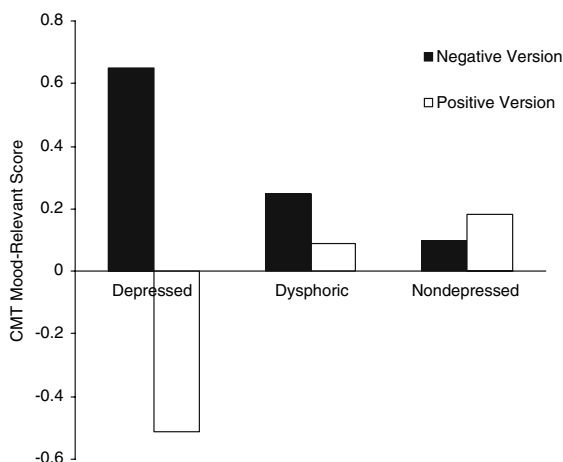
Fig. 1 Mood relevant subscale score as a function of RIT version (negative vs. positive) and group (depressed, dysphoric, and nondepressed)

analyses of the mood-relevant subscales scores revealed a significant Group × Version interaction. Follow-up tests of this interaction showed that clinically depressed participants were more likely to endorse negative inferences than nondepressed participants. Clinically depressed participants also were more likely to refute positive inferences than both dysphoric and nondepressed participants.

On the face of it, these results appear to support Beck's original formulation that clinically depressed and nondepressed people process information differently. The results suggest that clinically depressed participants are schema driven and "fill-in" informational gaps with negative content (i.e., have a negative interpretive bias that leads them to endorse negative inferences and refute positive inferences). In contrast, dysphoric and nondepressed participants appear to be more accurate and less likely to "fill-in" informational gaps from the story with self-schema content. Prior to drawing such conclusions, however, it is necessary to disambiguate the current results. An alternative explanation for our findings is that the nondepressed and dysphoric groups also are schema driven, but have greater within group variability than the depressed group. That is, participants within these groups may be just as biased as depressed participants, but some may be biased in the positive direction whereas others may be biased in the negative direction. This heterogeneity would lead to an overall group mean of zero (making the group appear aschematic). Thus, it is necessary to determine the proportion of participants within each group who are positively biased and negatively biased and not simply rely on the group mean.

To clarify our results, we examined the proportion of participants in each group that showed a propensity to rely on schemas to "fill in" informational gaps or infer information from the RIT story. On the negative version of the RIT, participants were classified as going beyond the information given if they rated negative inferences as more likely true than false (i.e., had a mean item rating ≥1). There was a significant difference at the level of a trend in the proportion of participants from each group endorsing negative inferences, $\chi^2(2, N = 546) = 4.87$, $p = .08$. Thirty-four percent of clinically depressed participants, 28% of dysphoric participants, and 20% of nondepressed participants endorsed negative inferences. Participants also were considered to

go beyond the information given, if they rated negative inferences as more likely false than true (i.e., had a mean item rating < –1) on the negative version of the RIT. There was not a significant difference in the proportion of participants from each group refuting negative inferences, $\chi^2(2, N = 546) = 2.78$, $p = .25$. Nine percent of clinically depressed participants, 13% of dysphoric participants, and 20% of nondepressed participants refuted negative inferences.

On the positive version of the RIT, participants were classified as going beyond the information given if they rated positive inferences as more likely true than false (i.e., had a mean item rating ≥1). There was a significant difference in the proportion of participants from each group endorsing positive inferences, $\chi^2(2, N = 627) = 8.81$, $p = .01$ None of the clinically depressed participants, 25% of dysphoric participants, and 21% of nondepressed participants endorsed positive inferences. Participants also were considered to go beyond the information given, if they rated positive inferences as more likely false than true (i.e., had a mean item rating < –1) on the positive version of the RIT. There was a significant difference in the proportion of participants from each group refuting positive inferences, $\chi^2(2, N = 627) = 9.28$, $p < .01$. Thirty-three percent of clinically depressed participants, 17% of dysphoric participants, and 13% of nondepressed participants refuted positive inferences.

To determine if one group was more likely to go beyond the information given, in either direction, we combined participants within each group who endorsed (mean rating ≥ 1) or refuted (mean rating < –1) pragmatic inferences in the negative and positive RIT versions, respectively. Chi square analyses revealed that on the negative version the three groups did not differ in their tendency to go beyond the information provided by the RIT story, $\chi^2(2, N = 546) = .31$, $p = .86$. On the positive version, the three groups also did not differ in their tendency to go beyond the information provided by the RIT story, $\chi^2(2, N = 627) = 1.60$, $p = .45$.

In summary, these results support recent formulations of Beck's theory that all people (depressed, dysphoric, and nondepressed) are likely to make inferences about themselves, their worlds, and their futures when current situational information, by itself, is not sufficient to justify such inferences. Indeed, the proportion of individuals who went beyond the information given in the story was the same for the three groups. The difference among the three groups was in the direction of the biases and the degree of heterogeneity within each group. Clinically depressed participants were relatively consistent in making negative interpretations and refuting positive interpretations of the story; the other two groups showed greater within-group heterogeneity in their biases (i.e., some dysphoric and nondepressed participants made positive interpretations of the ambiguous information while others made negative interpretations).

Discussion

Results provide support for recent formulations of Beck's (1967, 1987) theory. Participants with clinically significant depression were more likely than nondepressed participants to endorse negative interpretations of a self-relevant ambiguous story (i.e., exhibit a negativity bias). Clinically depressed participants also were more likely than nondepressed and dysphoric participants to refute positive interpretations (i.e., exhibit a reduced positivity bias). Thus, it appears that people with clinically significant depression infer information that is consistent with the negative content of the schemas, but not actually included in the external configuration of information. However,

nondepressed and dysphoric participants also generated biased interpretations of the RIT story. In fact, all three participants group were equally biased in their interpretations of the story.

These results provide some of the first direct evidence supporting more recent formulations of Beck's theory, which contend that depressive and nondepressive cognition differs more in terms of content than process. The difference among the three groups was not in the tendency to make biased interpretations, but the within-group variability and direction of the interpretive bias. Participants in the clinically depressed group were more homogeneous in their interpretations than were participants in the dysphoric and nondepressed groups. Participants with clinical depression were consistently more negative than nondepressed and dysphoric participants; they tended to endorse negative interpretations and refute positive interpretations of the RIT story. Nondepressed participants were more heterogeneous than the clinically depressed group, but, as a group, tended to have a slightly positive interpretive bias. The dysphoric group fell in between the clinically depressed and nondepressed groups with some dysphoric participants making positive interpretations of the story material and others making negative interpretations. This linear relationship among the three groups is consistent with a continuum model of depression. This linear relationship is also consistent with recent theorizing (e.g., Dozois and Dobson 2001) about the organization of schemas in depressed and nondepressed individuals. For example, recent research suggests that the schemas of depressed participants tend to have a strong interconnectedness and cohesion for negative self-views. In contrast, nondepressed participants appear to have a wider range of self-view representations. Nondepressed participants are not devoid of negative schemas, but also have strong positive self-representations. It may be surprising that nondepressed participants have negative self-views, but as Ingram and colleagues (1995) suggest, virtually all people experience mild dysphoria in their livers and thus, have cognitive representations of these mood states. The current results suggest that dyshphoric participants may have the most diverse set of schemas containing relatively equal parts of negative and positive self-representations.

Although the three participant groups exhibited interpretive biases, it is important to underscore that these biases were not extreme. Indeed, participants in the three groups went beyond the information explicitly presented in the experimental story only to a small degree. These results are consistent with a meta-analytic review (Matt et al. 1992) examining mood-congruent recall of affectively toned adjectives. Results of the meta-analyses found that depressed participants only recall about 10% more negative stimuli than positive stimuli; similarly, nondepressed participants tend to recall only about 7% more positive than negative stimuli. It is important to note, however, that the meta-analysis examined differences in the recall of actual stimuli. In contrast, the current study examined participants tendency to go beyond the information given and infer the presence of stimuli that were not actually present in the RIT story. However, taken together, it appears that schematic biases among these groups can be reliably detected, but are not large in magnitude.

It also is important to emphasize that the directional differences in clinically depressed participants', dysphoric participants', and nondepressed participants' inferential biases cannot be explained by differences in their overall schematic processing or accuracy of comprehension and/or memory for the RIT story (see also Ingram et al. 1994). The three participant groups were equally likely to make mood-irrelevant pragmatically true inferences and refute mood-irrelevant pragmatically false inferences.

Similarly, groups were equally accurate in their comprehension and/or memory for the story as measured by logically true and logically false item subscales.

There are cautions that need to be acknowledged when interpreting these results. First, it is not possible to determine with our experiment whether participants' biases in interpreting text occurred at the time of initial comprehension of the text, at recall of the text, or both. Second, although the results for the RIT indicate that participants were biased in comprehending and remembering the information presented in the experimental text, it would be inappropriate to conclude that either depressed and nondepressed participants' cognitions are distorted or erroneous. Participants' judgments may seem irrational to observers because their inferences are not made solely on the basis of current available situational information, yet their generalized beliefs or schemas may make such inferences very plausible, albeit biased. Third, the current study cannot determine the causal relationship between cognitive biases and depression. It is unclear if the observed negative cognitive biases caused depression or if depression resulted in greater levels of negative biases. Finally, it will be important for future research to replicate the current findings in a non-college sample (e.g., community or clinical population).

The goal of the current study was to test whether depressed and nondepressed people are equally like to use schematic processing when interpreting ambiguous information. This study extended prior research by including a clinically depressed sample and by assessing a full range of interpretive biases. The results support Beck's original hypothesis that people with depression rely on their negative schemas to infer information that is consistent with the negative content of the schemas, but not actually included in the external environment. However, the results also provide some of the first empirical support for more recent formulations of Beck's theory (e.g., Dykman et al. 1989) that predict that nondepressed people are just as likely as depressed people to use schematic processing when interpreting ambiguous information. Finally, our results support the construct validity of the RIT and suggest that this new instrument warrants further empirical examination.

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