Cognitive Bias in the Articulated Thoughts of Depressed and Nondepressed Psychiatric Patients

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Beck's cognitive theory of depression postulates several types of cognitive bias among depressed patients. Empirical studies supporting this hypothesis have usually used questionnaire "endorsement" measures of cognition, which may suggest responses to subjects. We used the articulated thoughts during simulated situations (ATSS) method of cognitive assessment in comparing cognitive processes of 15 outpatients with major depression with those of 15 nondepressed psychiatric outpatients in three simulated situations. Depressed patients exceeded nondepressed patients in cognitive bias only in the negative (not the neutral or positive) simulated situation. Discussion centered on the possible utility of ATSS for research on cognition in stressful situations.

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Cognitive theory (Beck, 1963, 1987) holds that depression is associated with negative thoughts about the self, the world, and the future. According to the theory, this negative thinking is sustained in part by cognitive biases, such as a tendency to overgeneralize the implications of one failure and conclude that one will never again succeed. Several studies have corroborated the hypothesis that depressed people exceed nondistressed people (Dobson and Shaw, 1986; Wilkinson and Blackburn, 1981) and mixed psychopathology control groups (Haley et al., 1985; Krantz and Hammen, 1979) on measures of cognitive bias (for a review, see Haaga et al., 1991). We aimed to extend this earlier research, focusing mainly on methodological issues in cognitive assessment.

First, most of the research suggesting higher levels of cognitive bias in depressed than in nondepressed samples has used questionnaire "endorsement" measures of cognitive bias, in which subjects choose from among preselected items the thoughts most typical of them (e.g., the Cognitive Bias Questionnaire; Krantz and Hammen, 1979). This approach to cognitive assessment may be limiting, because responses endorsed on such measures might not reflect naturalistic cognitive processes (Weiner, 1985). Indeed, Coyne (1989) claimed that "There is little evidence that such questionnaires tap the cognitive processes of depressed persons routinely occurring in the absence of such a structured inquiry" (p. 235). Accordingly, we assessed cognitive biases with a nonendorsement measure.

Second, we considered it important to compare cognitive biases among depressed and nondepressed patients in negative, neutral, and positive situations. Some of Beck's writings suggest that depressed patients engage in biased negative thinking even in the face of seemingly positive input from the environment: "A depressed businessman complains that he is on the verge of bankruptcy, yet examination of his accounts indicates that he is completely solvent and, in fact, is prospering" (Beck, 1976, p. 218). Other investigators, though, have found that depressed people exceed nondepressed people on measures of cognitive bias mainly in negative situations (e.g., Krantz & Gallagher-Thompson, 1990). To be sure, depressed people frequently face such negative, difficult circumstances (Coyne, 1989; Krantz, 1985). However, it is important to determine whether they exceed nondepressed people in cognitive bias only in negative situations or in a wider range of situations, as suggested by Beck.

Thus, empirical results are consistent with Beck's postulate of cognitive biases in depression, but it remains important to determine whether cognitive biases:
a) can be detected with methods that do not provide the subject with preselected thoughts to endorse, and b) can distinguish depressed from nondepressed groups primarily in negative situations, as suggested by some recent research. To evaluate these questions, we used the articulated thoughts during simulated situations (ATSS; Davison et al., 1983) method of cognitive assessment. The ATSS method involves the audiotaped presentation of complex hypothetical situations, which are interrupted at intervals to allow a subject time to think aloud. Because ATSS does not constrain responses, it is useful for evaluating whether subjects report hypothesized cognitions even if these are not suggested by the measuring instrument itself (Haaga, 1989). Furthermore, ATSS is particularly suitable for our purposes because it permits an examination of cognitions in a range of situations; prior research indicates that experimental manipulation of simulated situations reliably affects articulated thoughts (Davison and Zighelboim, 1987; Davison et al., 1984).

In brief, we hypothesized that indices of cognitive bias could be coded reliably in articulated thoughts and that depressed patients would exceed nondepressed psychiatric patients in cognitive bias in a negative simulated situation, but not in a positive or neutral situation.

**Methods**

**Subjects**

Subjects were 30 psychiatric outpatients at the Los Angeles County-University of Southern California Medical Center’s Adult Psychiatric Clinic. Diagnoses were determined by the attending psychiatrist at intake to the clinic and were confirmed by the first author (then an advanced graduate student in clinical psychology) prior to the subject’s participation in our study. Exclusionary criteria for the study as a whole were diagnoses of schizophrenia, bipolar affective disorder, organic mental disorder, or mental retardation. The depressed group (N = 15) was diagnosed with major depression according to DSM-III criteria (American Psychiatric Association, 1980). The nondepressed group (N = 15), selected for absence of affective disorder or psychosis, received the following principal diagnoses: dependent personality disorder (N = 2), antisocial personality disorder (N = 1), adjustment reactions (without depressed mood; N = 2), impulse control disorder (N = 1), generalized anxiety disorder (N = 1), agoraphobia with panic attacks (N = 3), sex offense (court referred; N = 1), and no mental disorder (interpersonal problems; N = 4).

Scores on the Beck Depression Inventory (BDI; Beck et al., 1979), a reliable and valid self-report measure of depressive symptom severity (Beck et al., 1988), provided convergent validity for the diagnostic distinction between groups. The depressed group obtained a mean BDI score of 27.8 (SD = 6.9; range, 17-38), significantly higher than that of the nondepressed group (6.0 ± 4.9; range, 0-14; t[28] = 9.9, p < .001). Indeed, the two distributions did not overlap.

The groups were demographically similar. The depressed group averaged 38.1 years old (+ 12.5), nonsignificantly older than the nondepressed group (31.8 ± 11.8; t[28] = 1.37, p > .1). Eleven of the 15 depressed subjects were men, compared with seven of 15 nondepressed subjects (χ²[1] = 2.22, p > .1).

**Materials**

Articulated thoughts were measured in three audiotaped, simulated situations, each consisting of five scripted segments of 15 to 30 seconds duration. Between segments was a 30-second interval, during which the subject thought aloud. The negative situation was a simulated conversation featuring an acquaintance expressing disappointment about an outdoor party the subject had planned, which had been disrupted by bad weather. The positive situation involved compliments, praise, and gratitude from an acquaintance whom the subject had helped with a plumbing emergency. The neutral situation found the acquaintance making polite conversational remarks and discussing innocuous topics.

**Procedure**

Subjects completed the BDI, then were instructed to listen to each ATSS situation (presented in counterbalanced order), imagine as clearly as possible being part of the event as it unfolded, and say their thoughts aloud between segments (indicated by tones on the audi-tape). Subjects’ articulated thoughts were audiotaped and transcribed later.

**Articulated thoughts coding.** Transcripts of articulated thoughts were coded by two undergraduate research assistants blind to the subjects’ group membership. Both coders rated all of the data, scoring each segment of articulated thoughts on a 1 (absent) to 5 (marked) basis for each cognitive category. Coding categories showed moderate to high intrarater reliability, estimated using an alpha model (Novick and Lewis, 1967). Reliabilities (in parentheses), definitions, and examples of the categories follow:

a) **Arbitrary inference (.64):** drawing specific conclusions in the absence of relevant evidence (e.g., “The weatherman was wrong because he was drunk that day” [which was not stated in the stimulus scenario]).

b) **Selective abstraction (.75):** drawing conclusions on the basis of isolated details of an event, even if this requires ignoring other contradictory evidence
(e.g., "I never see that friend myself—I feel so alone.").

c) Overgeneralization (.86): holding extreme beliefs based on specific events and inappropriately applying them to dissimilar occasions or settings (e.g., "The weatherman’s always wrong.").

d) Magnification (.57): overestimation of the significance of negative events (e.g., "Society is crumbling.").

e) Personalization (.88): relating events to oneself even when there is no connection (e.g., "It was my fault" [that it rained].).

f) Dichotomous thinking (.85): thinking in all-or-none terms, categorizing experiences only in one of two extremes rather than acknowledging grey areas (e.g., "That’s very bad.").

Ratings in each category (1-5) by each rater were summed across the five segments of a taped situation, then averaged across the two raters, yielding a range of possible scores of 5 to 25 for each subject on each ATSS variable in a given situation. Scores on these six variables representing types of cognitive bias were summed to create a total cognitive bias score, ranging in each situation from 30 to 150.

Results

Descriptive statistics for the ATSS categories are presented in Table 1.

Because our hypotheses concerned sets of pairwise comparisons (depressed expected to exceed nondepressed in cognitive bias in the negative situation, not in the other situations), rather than the more global question of whether cognitive bias differs across groups or across situations, we adopted a multiple comparison analytic strategy instead of using a factorial analysis of variance. In particular, we used Dunnett’s T3 procedure (Dunnett, 1980), cited by Wilcox (1985) as optimal for the case of relatively small sample sizes and unequal variances. The T3 procedure involves calculating confidence intervals (C.I.) for the difference between two means; if the C.I. excludes zero, the null hypothesis is rejected. The family-wise type I error rate was held at .05 for the family of three comparisons (depressed versus nondepressed in each situation) on total cognitive bias.

Total Cognitive Bias

Depressed subjects significantly exceeded the nondepressed group on total cognitive bias in the negative situation (95% C.I. for the difference in means was 15.1 ± 14.3), but not in the neutral (-0.5 ± 7.4) or positive (5.4 ± 9.0) situation.

Specific Cognitive Biases

Given that the depressed group significantly exceeded the nondepressed group on total cognitive bias in the negative situation, we explored the subsidiary question of which specific cognitive bias categories significantly distinguished the groups. For this purpose, we again used Dunnett’s T3 procedure to conduct a family of six pairwise comparisons (depressed versus nondepressed in negative situation scores on the six specific cognitive bias categories), using a family-wise alpha level of .05.

The group difference in arbitrary inference was non-significant (95% C.I. for the difference in means was 0.5 ± 1.9), as were group differences in selective abstraction (2.2 ± 5.1), overgeneralization (3.1 ± 4.5), magnification (2.9 ± 4.1), personalization (2.6 ± 4.9), and dichotomous thinking (3.8 ± 4.7). Thus, the depressed group exceeded the nondepressed group in each category, and the difference in total scores was statistically significant, but none of the differences on specific categories attained significance. It is, therefore, not possible in this sample to differentiate the types of bias and draw conclusions as to whether some subset of them is particularly strongly associated with depression.

Discussion

Our major hypotheses were supported. Cognitive biases were detected in unstructured, unconstrained reports of depressed patients’ cognitions in the ATSS.

**TABLE 1**

**Articulated Thoughts of Depressed and Nondepressed Patients**

<table>
<thead>
<tr>
<th>ATSS Category</th>
<th>Depressed</th>
<th>Nondepressed</th>
<th>Depressed</th>
<th>Nondepressed</th>
<th>Depressed</th>
<th>Nondepressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arbitrary Inference</td>
<td>11.6 ± 2.1</td>
<td>11.1 ± 1.6</td>
<td>11.0 ± 2.1</td>
<td>10.9 ± 1.3</td>
<td>12.4 ± 4.4</td>
<td>10.9 ± 1.6</td>
</tr>
<tr>
<td>Selective Abstraction</td>
<td>17.1 ± 5.9</td>
<td>14.9 ± 3.5</td>
<td>13.9 ± 4.3</td>
<td>14.6 ± 3.4</td>
<td>18.9 ± 9.3</td>
<td>17.1 ± 5.1</td>
</tr>
<tr>
<td>Overgeneralization</td>
<td>14.6 ± 5.5</td>
<td>11.5 ± 2.1</td>
<td>12.5 ± 3.2</td>
<td>12.4 ± 2.1</td>
<td>12.3 ± 2.6</td>
<td>10.9 ± 1.4</td>
</tr>
<tr>
<td>Magnification</td>
<td>15.7 ± 4.8</td>
<td>12.8 ± 2.7</td>
<td>12.4 ± 2.4</td>
<td>12.5 ± 2.6</td>
<td>14.4 ± 3.4</td>
<td>15.1 ± 2.9</td>
</tr>
<tr>
<td>Personalization</td>
<td>16.2 ± 5.9</td>
<td>13.6 ± 2.7</td>
<td>11.1 ± 1.1</td>
<td>11.9 ± 3.3</td>
<td>12.8 ± 4.4</td>
<td>11.5 ± 1.8</td>
</tr>
<tr>
<td>Dichotomous Thinking</td>
<td>14.7 ± 6.0</td>
<td>10.9 ± .9</td>
<td>12.1 ± 2.3</td>
<td>11.0 ± 1.2</td>
<td>10.9 ± 1.5</td>
<td>10.7 ± 1.4</td>
</tr>
<tr>
<td>Total Bias*</td>
<td>89.9 ± 20.1</td>
<td>74.8 ± 5.9</td>
<td>72.9 ± 8.5</td>
<td>73.4 ± 7.3</td>
<td>81.7 ± 10.5</td>
<td>76.3 ± 8.8</td>
</tr>
</tbody>
</table>

Total bias indicates the sum of six previous categories.
procedure. This result conceptually replicates the findings of Blackburn and Eunson (1989), who devised reliable procedures for measuring cognitive bias in the self-monitored thoughts of depressed patients in cognitive therapy (CT; Beck et al., 1979). The ATSS may be more flexible than self-monitoring methods for some purposes, though, since it allows experimental control over stimulus situations. Self-monitored cognitions, of necessity, involve subjects’ responses to idiosyncratic, unstandardized situations.

Experimental control over stimulus situations was useful in this study, since it allowed us to corroborate the view advanced by Krantz (1985; Krantz and Gallagher-Thompson, 1990) that depression is associated with increased cognitive bias particularly in negative situations, not in neutral or positive ones. The Krantz and Gallagher-Thompson (1990) study differed from ours in type of sample (all subjects were at least 50 years old), type of control group (nonclinical), and type of cognitive bias measure (a modified Cognitive Bias Questionnaire). The similarity of results in spite of methodological variation suggests that situational specificity of depressed-nondepressed differences in cognitive bias may be a robust finding.

Several methodological limitations to our study should be noted. First, our depressed sample included 11 men and four women, whereas a truly representative sample of depressed patients would include a majority of women (Nolen-Hoeksema, 1987). Replication is needed to ensure the generalizability of our results, but it is instructive to note the parallel findings of Krantz and Gallagher-Thompson (1990), two-thirds of whose subjects were women. Second, our sample size was relatively small, which limits statistical power; this issue is particularly salient in considering our inability to satisfactorily resolve the secondary question of which specific cognitive biases differentiated the groups in the negative situation. Third, the specificity of our results to depression could have been more definitively evaluated if we had included a pure anxiety-disorder control group, rather than a heterogeneous psychiatric control group, given the high comorbidity of depression and anxiety disorders (e.g., Sanderson et al., 1990). Finally, we did not conduct a formal manipulation check on the perceived valence of simulated situations used in the ATSS procedure. The specificity of group differences in cognitive bias to the negative situation provides prima facie evidence that the situations differed as intended, but the identification of each situation as “negative,” “neutral,” or “positive” remains largely based on face validity.

Cognitive Assessment

These limitations notwithstanding, our findings were encouraging from an assessment perspective. The ATSS method appeared to be sensitive to the hypothesized situational specificity of depressed-nondepressed differences in cognitive bias. These results are supported by subsequent research, ATSS methods could prove very useful for testing additional hypotheses regarding cognitive theory and therapy of depression. Consider one example. Treatment research has suggested that depression relapse is lower after CT than after pharmacotherapy (e.g., Simons et al., 1986), yet there is little evidence of a specific cognitive effect of CT to account for this differential relapse prevention (e.g., Simons et al., 1984). A recent review (Barber and DeRubeis, 1989) concluded that the most plausible model of the long-term effects of CT is that depressed patients learn compensatory skills for coping with negative automatic thoughts. Barber and DeRubeis identified several deficiencies in current measures of these coping skills, including possibly biased retrospective reporting, demand characteristics of endorsement measures, and the nonstandard nature of stressors when subjects are allowed to respond to their own idiosyncratic situations.

Taking these two considerations together, we believe that our interpretation (the depressed group showed more cognitive bias in the negative simulated situation than did the nondepressed group; this effect is, by conventional standards, statistically reliable at our small sample size if a composite measure is taken, but not if each coding category is considered separately) is more plausible than the alternative suggested by the reviewer.

A reviewer of this manuscrypt argued that obtaining a significant difference for total cognitive bias, but not for any of the specific codes, suggests that the groups differed merely in general “negativity,” rather than cognitive bias, as depicted by Beck. The construct validity of our measures is not conclusively established by one study, but we differ with the critique for two main reasons. First, total cognitive bias is a sum of the specific bias scores—all of them, and nothing but them. Therefore, we see no reason to ascribe to total cognitive bias the property of measuring something (e.g., negativity) contrasting with what the specific categories measure (e.g., bias).

Second, it is important to bear in mind the distinction between “nonsignificant difference” and “no difference” (Hunter and Schmidt, 1990; Rosnow and Rosenthal, 1989). We did not find that the groups were equal on specific bias variables, only that group differences were not statistically significant. Indeed, all six categories showed nonsignificant differences in the predicted direction. Under a null hypothesis of no group differences on specific bias variables, this consistency of directional effect would itself be unlikely. If the six comparisons are considered (roughly) independent, then by the binomial formula, the p-value for six out of six “successful” outcomes, each with a probability of .5, would be \( .5^6 \) or < .02.

Taking these two considerations together, we believe that our interpretation (the depressed group showed more cognitive bias in the negative simulated situation than did the nondepressed group; this effect is, by conventional standards, statistically reliable at our small sample size if a composite measure is taken, but not if each coding category is considered separately) is more plausible than the alternative suggested by the reviewer.

A reviewer of this manuscript argued that obtaining a significant difference in the positive simulated situation than did the nondepressed group; this effect is, by conventional standards, statistically reliable at our small sample size if a composite measure is taken, but not if each coding category is considered separately) is more plausible than the alternative suggested by the reviewer.
thing that requires compensation” (Barber and De-Rubeis, 1989, p. 452); b) “approximate an on-line assessment of responses to situations and thoughts rather than rely on the subject’s retrospective account of coping efforts” (p. 453); c) “ask the subjects to indicate which strategies they have been using, but rather sample the thinking and planning of the respondent in the context of (hypothetical) stressful events, enabling the researcher to classify the subject’s responses” (p. 453); and d) allow the researcher to “have some control over the variety of stressors assessed by the measure” (p. 453). We submit that these desiderata are matched closely by the ATSS paradigm, which may, therefore, merit attention from CT process-outcome researchers.

Conclusions

We found that depressed patients exceeded nondepressed psychiatric patients in an articulated thoughts index of cognitive bias in a negative simulated situation. Thus, our results confirmed that situation-specific cognitive biases may be detected in relatively unstructured samples of depressives’ cognitions and do not reflect merely their willingness to endorse preselected negative responses. Finally, this research provided further evidence for the utility of the ATSS paradigm and extended its applicability to the measurement of depressive thinking, an area in which advances in cognitive assessment are needed.

References


