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ABSTRACT

Recent models of depression have shown differences in information processing to be important concomitants of depressed affect. To determine whether the cognitive distortion found in depressed individuals extends beyond self-evaluation and interpersonal evaluation into abstract decision making, 288 college students completed the Beck Depression Inventory and a variety of experimental materials, including a risky decision task in which they circled their preference in each of 30 pairs of monetary risk. An analysis of the results showed significantly different risk preference patterns for depressed and non-depressed subjects. Non-depressed subjects were considered "good riskers" in choosing maximum expected value gains and minimum expected value losses. Non-depressed subjects also exhibited the reflection effect and reversed their preferences when prospects became negative. Depressed subjects failed to show either the pattern of prospect selection shown by the non-depressed subjects, or a significant reflection effect within their own pattern of prospect selection. The poor planning ability and risk taking strategy of predepressive children may have implications for later depression and learned helplessness. (BL)

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RISKY DECISION IN DEPRESSION:
SAD SCHEMAS PRODUCE UNEXPECTED UTILITY VALUES[1,2]

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Risky Decision in Depression:

Sad Schemas Produce Unexpected Utility Values

ABSTRACT

The purpose of the present study was to determine whether cognitive distortion found in depressives extends beyond self-evaluation and interpersonal evaluation into abstract decision-making.

Subjects were given a task of deciding preference among pairs of monetary risks; the experimental stimuli were modeled after those employed by Kahneman and Tversky (1979).

Contrary to assertions by Tversky, Depressed and Non-Depressed subjects showed significantly different risk preference patterns. Non-Depressed subjects were considered "good riskers" in choosing maximum expected value gains and minimum expected value losses. Depressed subjects did not show this pattern.

Results are discussed with implications for depressive development. A reformulated view of learned helplessness is proposed.

Risky Decision in Depression:

Sad Schemas Produce Unexpected Utility Values

Recent theoretical models of depression (Seligman, 1975; Beck, 1967) have shown differences in information processing to be important concomitants of depressed affect. Of critical interest in refining these models is the delineation of cognitive patterns (or "schemas") in depression. This necessarily implies the extension of information processing principles into the clinical realm.

Studies employing this information processing approach indicate that depressive schemas are activated in self-evaluation (Beck, 1967) and in the evaluation of others (Hartman, 1982).

Additional insights into the nature and extent of depressive schemas may be revealed by the study of risk preference patterns.

For example, a subject who prefers gaining 50 dollars with a 70% probability may not be as good a risker as someone who chooses the alternative of 200 dollars at 40% likelihood, since the expected value (dollars multiplied by probability) of the former (35) is considerably less than that of the latter (80).

Tversky (personal communication) has stated that psychopathology should not alter basic axioms of risk preference (Kahneman and Tversky, 1979). However, other researchers (e.g., Sheridan & Schack, 1970; Plax & Rosenfeld, 1976) have shown results suggesting personality differences do effect risky-decision schemas.

Thus, the purpose of the present study is to determine whether patterns of cognitive distortion found among depressives extend into impersonal, abstract decision-making, contrary to the assertion of Tversky.

Subjects and Materials

Subjects were 88 University of Illinois undergraduates screened from a larger group on the basis of their scores on the Beck Depression Inventory (Beck, 1967). Subjects with a BDI score of 4 or less were assigned to the Non-Depressed group while subjects who scored 13 or more on the BDI were placed in the Depressed group. After finishing the BDI, all subjects completed a variety of experimental materials, including a risky decision task where subjects circled their preference in each of 30 pairs of monetary risk preference pairs (called "prospects" by Kahneman and Tversky, 1979).

The stimuli were divided into 15 pairs of risks where the choice was between two positive gains (positive prospects) and 15 pairs of losses (negative prospects). The amount of money involved in the risks ranged from several dollars to several thousands of dollars. A typical pair of positive prospects follows:

(A)		(B)	
$522,	.39	$413,	.47

The expected value of the smaller prospect was always .94 of the larger prospect.

Method of Analysis

Multiple regression analysis was performed where Affect, Prospect Discrepancy, and Prospect Valence were regressed onto Prospect Preference.

Prospect Preference, the dependent variable and measure of subjective utility, was the percentage of subjects choosing the larger expected value member of the prospect pair. The different prospects were treated as replicates ("subjects") in the design.

Affect was determined by subjects' score on the Beck Depression Inventory as previously described.

Prospect Discrepancy was a measure of the relative magnitude of each prospect pair and was computed by subtracting the expected value of the smaller prospect from the larger expected value member of each pair; this variable was added to determine whether the monetary size of the risk influenced Prospect Preference.

Pre-planned comparisions were computed using multiple regression. Bonferroni's method was employed to correct for experiment-wise error in these comparisions.

RESULTS

Subjects' mean BDI scores were clearly within the ranges appropriate to categorization as Depressed or Non-Depressed (see table 1). Male and Female BDI scores did not differ significantly from each other within Affect groups.

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insert table 1 about here

Affect interacted significantly with Prospect Discrepancy in determining the percentage of subjects choosing the larger member of the prospect pair ($F(1,96)=4.338$, $p < .040$) Thus, Depressed and Non-Depressed subjects showed significantly different risk preference responses to the prospect stimuli as a function of the relative magnitude of those prospects.

These data are best portrayed pictorially (see figure 1): Non-depressed subjects show an increasing preference for the higher expected value prospect where depressed subjects do not appear

responsive to these variables.

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insert figure 1 about here

No other main effects or interactions were significant. The preplanned individual comparisions showed Non-Depressed subjects to have responded differently to Negative versus Positively valenced prospects. This difference approached significance ($F(1,96) = 3.446$, $p < .067$). This latter effect was predicted by Kahneman and Tversky (1979) to occur in their subjects who were unselected for affect.

DISCUSSION

The results of this experiment allow us to extend the realm of depressogenic cognition into "rational" decision-making processes. Depressed and Non-Depressed subjects were found to show significantly different patterns of risky decision-making. Non-depressed subjects' risk preference in our set of moderate risk prospects was similar to that predicted by Kahneman and Tversky (1979); subjects selected the higher expected value risk among the positive prospect pairs. Normal subjects also exhibited the reflection effect and reversed their risk preferences when prospects became negative. Depressed subjects failed to show either the pattern of prospect selection shown by normals, or a significant reflection effect within their own pattern of prospect selection.

It cannot be determined from these data whether individual risk preference was determined by expected value, risk probability or potential gain/loss, since these factors were not orthogonal in this

experiment. However, our results suggest that non-depressed subjects are more sensitive to the risk value of alternative prospects, choosing the positive prospect with the greatest expected value and the negative prospect with the least expected value. Thus, these normal subjects could be considered "risk optimizers"; they effectively discriminated prospects expected value and were able to change their strategy as a function of prospect valence. These results suggest to us that non-depressive risk strategy is both conservative and flexible.

By contrast, depressed subjects did not show either conservatism or flexibility in their risky decision-making. There is even a suggestion in our data that depressives might respond to risk in a manner opposite from normals; choosing the smaller gain and the larger loss in their prospect selection. The finding of such a "masochistic" schema would be consonent with the theories of Beck (1967) but since this particular pattern did not achieve significance in our data, further exploration is necessary.

It cannot, of course, be determined from these data whether observed differences in decision-making are a cause or a result of depressive symptomatology. Nonetheless, the efficacy of decision-making strategies in maintaining current affect state is clear. Subjects who utilize an active, flexible, optimizing risk strategy would show a larger ratio of real-world rewards to punishments than would depressives. This higher ratio would allow them to maintain the sense of control postulated by Kelley (1971) as well as a belief in a "just world" because these non-depressed

individuals might actually have more control and live in a more just world than their depressive counterparts.

Depressed subjects do not fare as well; they appear unable to effectively select optimal risks. If depressive risk-taking is haphazard, than rewards or punishments stemming from such risk-taking would also be perceived as haphazard. Thus, the weakened response of depressed individuals to contingencies postulated by learned helplessness theory could actually be caused by their own inadequate decision-making strategies rather than by their learned response of helplessness when confronted with an unpredictable environment.

Thus, an important implication of our data is to remove random environmental influence as primary to chronic learned helplessnes in humans. Instead, we propose that inadequate risk-taking schema development is the crucial factor in chronic helplessness because undeveloped schemas in this area can cause the most consistent environment to be perceived as a place of random occurences. Thus, the effect of inadequate risk-taking strategies is to produce haphazard and unsystematized risk-taking. If risky decision-making is unsystematized, so too must be any understanding of consequences stemming from those risky decisions.

Such a process may begin in childhood. The "pre-depressive" child may be the one who does not develop adequate planning ability or risk-taking strategy. This may occur either because feedback concerning its actions on the world is inaccurate, random, or inadequate, or because the efficacy of such actions is somehow lost. Similarly, the child who is allowed to roam unfettered by adult rules

may be become the adult depressive unable to perceive the efficacy of rule-governed decision-making behavior.

To conclude, we hypothesize that depression may be the result of never having learned the effectiveness of strategic planning for risk-taking. This understanding of depression could account for anecdotal accounts that "good riskers" engaged in a high risk occupation (e.g. jet fighter pilots) are methodical planners and strategists who do not suffer from depression. The depressive "bad risker" would be more likely to be a poor planner, e.g. someone who plunges into the stock market with no prior experience.

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Table 1

Mean Beck Depression Inventory Score by Sex

Sex	Affect	
	Non-Depressed	Depressed
Male	1.6	18.6
Female	2.2	19.4

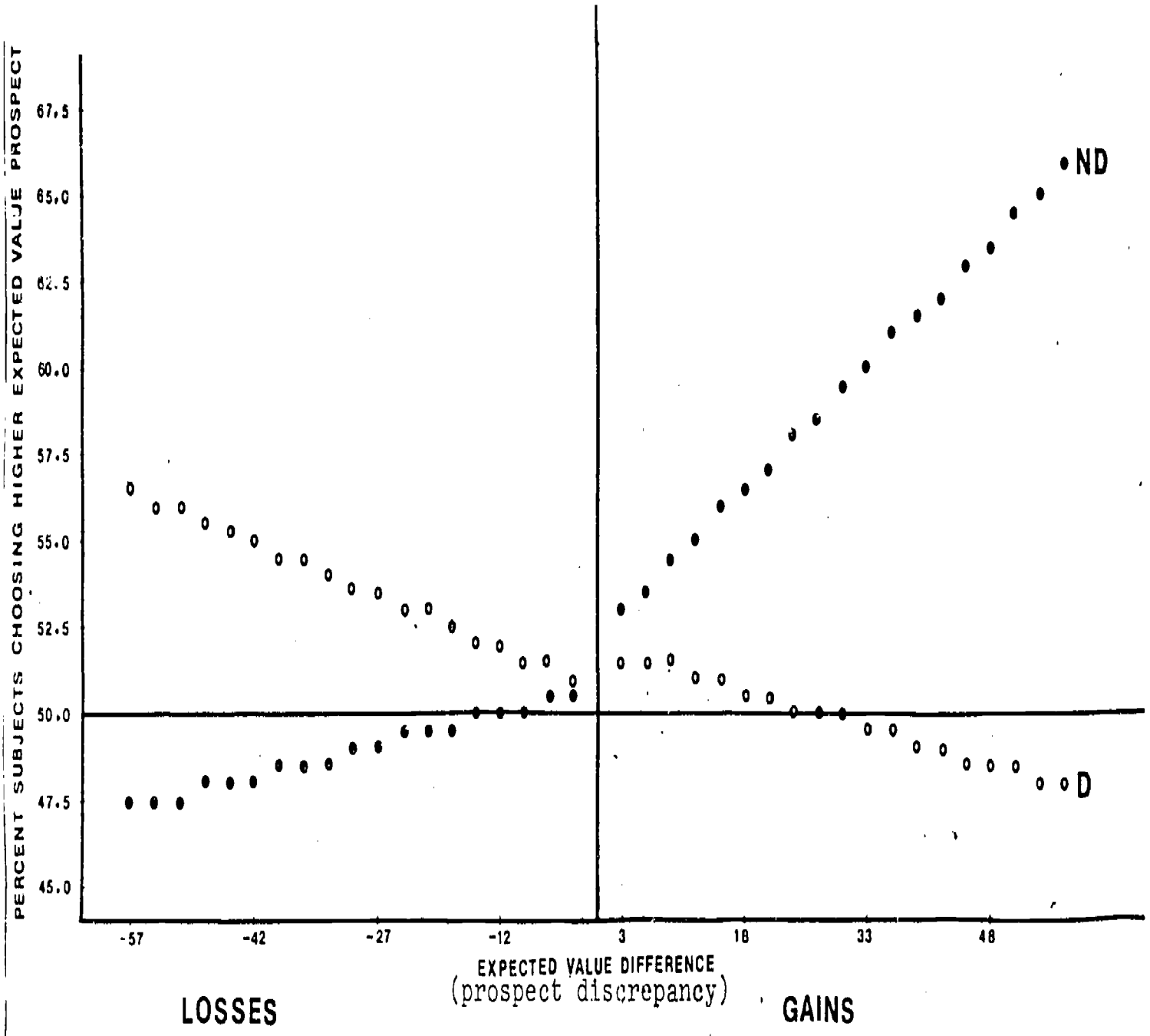

FIG. 1 Regression plots through experiment data. Plots depict percentage of subjects choosing the higher expected value member of a prospect pair for a range of gains and losses. Solid dots show non-depressed subjects; hollow dots show depressed subjects.