

Self-Reference and the Encoding of Personal Information in Depression¹

Henry Davis²

The University of Calgary

This paper questions for the first time whether a negative self-schema is a regular symptom of depression. An alternative position derives from clinical evidence suggesting that many depressed persons describe themselves inconsistently. A distinction between schema- and non-schema-based responding is proposed and tested with the spread of processing model: Depressed and nondepressed subjects are compared for incidental recall of personal adjectives under a self-reference encoding task, a semantic task, and two other lower level encoding tasks. As expected, the groups differed significantly only on self-reference recall; depressives showed significantly weaker recall on this task. Duration of depression significantly predicted the strength of self-reference recall. The results are interpreted in a developmental framework, which suggests that a self-schema in depression develops, as does any schema, over time and repeated use.

INTRODUCTION

In Beck's model for adult depression (Beck, 1967; Beck & Rush, 1978), cognitive distortions are the basis for the negative statements that depressives make about themselves. Beck and Rush have suggested that negative self-references, observed clinically among depressives and measured on instruments such as the Beck Depression Inventory, derive from relatively stable negativistic patterns of interpreting life events. Re-

¹Appreciation is expressed to P. Eaton and T. B. Rogers for critical commentary and encouragement during the preparation of this research.

²Address all correspondence to Henry Davis, Division of Clinical Research, Calgary Family Service Bureau, 120-13th Avenue SE, Calgary, Alberta, Canada T2G 1B3.

cently, Beck has formally extended his earlier theory by invoking the concept of "schema" as a basis for such patterns (Beck & Rush, 1978): "Although different persons may conceptualize the same situation in different ways, a particular person tends to be consistent in his responses to similar types of events. Relatively stable cognitive patterns form the basis for the regularity of interpretations of a particular set of situations. The term 'schema' designates these stable patterns" (Beck, Rush, Shaw, & Emory, 1978, p. 7). It does not appear that Beck would distinguish between what he has called a "negative self-concept" (Beck, 1967) and what he might now label "negative self-schema"; in this paper the terms will be used synonymously.³

What is important for the present paper is that Beck has also suggested that some patients describe themselves inconsistently. For example, he has described a patient who in one instance would say, "I'm nobody . . . I'm not good enough," but, in another, would reflect more positively on himself (Beck, 1967, p. 236). Nevertheless, Beck and Rush (1978) have only indirectly taken account of inconsistency in self-reference; they have noted that as depression deepens the depressive's thought content is "increasingly" saturated with idiosyncratic ideas (p. 6). In other words, as depression continues its course, and as idiosyncratic ideas become more prevalent, the depressive's responding may gain in stability and may lose some of its inconsistency. The present paper suggests, therefore, that not all depressives have negative self-schema as a basis for their negative self-references; perhaps only those who have been depressed over a period of time have developed negative self-schema. Others may be responding to their observations of environmental changes.

Relevant to this possibility, Hammen (1978) has questioned whether all depressives show regular cognitive distortions. Her data suggested the possibility that some depressives have a tendency to distort despite low levels of life-stress. In their self-references, such persons may be using the stable self-schema or a negative self-concept, as Beck has proposed. On the other hand, depressives who perceive high life-stress show a lesser tendency for cognitive distortion.

Those depressives who are depressed independently of life-stress events may be using negative schema to distort environmental information. Consequently, they may invoke a negative self-schema as a means of giving a systematic negative bias to information about themselves. Negative self-references result. Other depressives, perhaps those who have only recently undergone life-stress, may not use such schema.

³In the present context, the term *self* refers to a composite of beliefs, attitudes, and labels, which, in this case, depressed persons may have stored in memory as a set of features about themselves.

It is proposed here that there are essentially two classes of depressives: those who show schema-based responding and those who are responding more veridically to environmental information.

This proposal receives some support from Hammen's work, as well as from earlier research by the author (Davis, Note 1). The data showed that clinical improvement in depressive 17-hydroxycorticosteroid elevations is best predicted by measures of conflict and variability in self-reference. Or, in the terms of the present paper, changes in physiological stress were related to inconsistent self-references and to non-schema-based responding. Patients rated 90 statements on a 5-point scale as to whether a given statement was a true self-description. The statements were arranged in thematically related blocks of six and included physical, moral-ethical, personal, social, and familial contexts. Within each set of six statements the sum of the ratings on three was compared for consistency with the sum for the other three. Where differences existed these were scored in terms of variability and conflict in self-reference; each was an algebraically defined construct. The principal finding that emerged from a multiple regression analysis was that conflict and variability in self-reference changed before the steroid levels and accounted for 54% of the variance in this change.

These findings suggested that high physiological stress reactivity relates to confusion and inconsistency in self-reference and not to schema-based responding (which would have been marked by low conflict and low variability in self-reference). Indirect support for this suggestion comes from Hammen's (1978) study. If systematic cognitive distortions are schema-mediated, as Beck and Rush (1978) suggest, then it is possible that Hammen's high- (life-) stress subjects, in showing lower levels of distortion, were offering non-schema-based responses.

It is further possible that some depressives have developed a negative self-schema as a simple function of the *duration* of their depression, where others, who still describe themselves inconsistently, show non-schema-based responding. This possibility is explored in the present paper.

One means of establishing the existence of a self-schema is to study the information processing of personal adjectives in an incidental recall paradigm (Rogers, Kuiper, & Kirker, 1977). These authors found that when a self-schema, rather than schemata possessing the structural, phonemic, or semantic qualities of words, was used to encode personal adjectives, the organization of these words in memory was, by inference, greater than when other methods of encoding were used. What this suggests is that self-reference encoding has been successfully added to Craik and Lockhart's (1972) depth-of-processing model at a level "deeper" than semantic encoding. That is, recall was highest under the self-reference encoding task. The incidental recall paradigm is used similarly in the present research to shed light on whether all depressives use self-schema in organizing environmental information.

The rationale for use of incidental recall to study self-schema derives from experimental literature on the depth-of-processing model (Craik & Lockhart, 1972; Craik & Tulving, 1975). This model asserts that word memory is a function of depth of processing where *depth* refers to greater degrees of semantic involvement. In this research, encoding at different depths is produced by having subjects answer various questions about words. Three different orienting tasks (structural, phonemic, and semantic) are used in this model to mediate different amounts of recall. For the *semantic* task a subject is asked about the meaning of a word; recall or recognition under this condition is best. For the *phonemic* task the subject is typically asked to decide whether a word rhymes with the target word. For the *structural* task the subject might be asked to inspect the word's structure (e.g., for word length or for the size of letters). Both recognition and recall are poorest under this task. In opposition to multistore theories of memory, this model predicts that the degree of involvement with words is the mediator in memory.

Available data have long illustrated that free recall of a word varies with the type of orienting task (e.g., Kirkpatrick, 1894). What distinguishes the depth-of-processing model is the prediction it makes regarding semantic encoding. For instance, Walsh and Jenkins (1973) found that encoding with a semantic strategy (which required Ss to rate whether the word was pleasant or unpleasant) was superior to the combined use of two nonsemantic strategies.

It is not known what property of semantic encoding produces a more durable memory trace. Belleza, Cheesman, and Reddy (1977) have suggested that it is not sufficient to consider, alone, the subject's encoding strategy. They have provided evidence that suggests that semantic processing is necessary but not sufficient for predicting recall performance. They factorially varied word organization and semantic elaboration, and from their results they suggest that it is not so much a semantic elaboration that produces better memory but, instead, word organization. In this context, organization reflected the degree to which a word was related to other words in a sentence or a story. In a similar vein, Postman and Kruesi (1977) have suggested that the critical element is the *spread* of semantic encoding. The degree to which a word can be compared with other words at the same level of processing, or the degree to which strong interitem associations are formed, is a determinant of subsequent recall.

It is possible that these results can be interpreted as an effect due to word fit with a structure or schema; if the word fits a preexisting structure in long-term store, it gains in probability of recall. In the Belleza study the structure was a story. In the Postman study the structure might have been a superordinate concept that two words have in common. Schulman (1974) has presented data that support this interpretation. His subjects answered

congruous or incongruous questions about target words. An example of an incongruous task was "Is a twingle sudden?" The congruous task words were remembered better, presumably because they fit with a preexisting structure in semantic memory and could more readily be organized within that structure. Thus, from the study by Rogers et al. (1977), it is reasonable to conclude that a schema of "self" aids in producing the stronger memory trace when adjectives fit with this schema.

The present study assessed two hypotheses. First, it was hypothesized that, for depressives, words encoded with the self-referencing task would not be recalled better than words that were encoded at the semantic, phonemic, and structural levels. Such a finding would cast doubt on whether depression is, in fact, characterized by a well-organized schema of self.

It is logical that unless one has had much experience in the misconstruing of reality to fit negative expectations, then the resultant self-references will be poorly organized and inconsistent. Beck's patient, cited earlier, might have shown such inconsistency. Poor organization would not result in superior encoding under the self-referencing task and a self-schema would not be seen as an active agent in the encoding of personal data.

Consistent with this developmental position, it has been shown in children that self-references become less concrete and more abstract over time (Montemayor & Eisen, 1977). This is the same course taken by concept development, in general, and suggests that it is accurate to compare the development of a concept of self with the development of other concepts. Relevant to the spread of processing within a given level, it has been shown that experience with semantic concepts facilitates subjective organization on a semantic encoding task and on subsequent recall (Bjorklund, Ornstein, & Haig, 1977).

This point has been made in the context of child development. The children were asked to sort words into semantic groupings on the basis of meaning. Subsequent recall revealed that, despite ability, young subjects do not spontaneously use word interrelationships to impose structure on their word lists. Like the children, it is possible that depressives have not interrelated, or elaborated on, the meanings of their references and that depressives' recall of adjectives will be a part function of an elaboration deficit. If recall is lower for depressives, a process similar to that in children is implied, but that implication will require its own exploration.⁴ It is reason-

⁴Research that assessed multitrial free recall for personal adjectives has demonstrated significantly lower subjective organization for adult depressives ($N = 20$) relative to nondepressives. Depressives have also shown lower organization on adjectives relative to nouns. Thus there is some initial basis for making the comparison between the semantic structures of words, in general, among children and the semantic structures of self-referent adjectives among depressed adults (Davis & Murphy, Note 2).

able to hypothesize, however, that the same experience-sophistication factor is important to self-reference encoding and that the length of time over which persons use particular self-reference schema will predict spread of processing at that level.

The second hypothesis, therefore, was that the duration of depression would be linearly related to strength of recall under the self-reference encoding task.

METHOD

Subjects

Depressed subjects were in- and outpatients of a general hospital psychiatric ward. Nondepressed subjects were university undergraduates and members of a clerical pool. There were 29 subjects in each group. For each group ages ranged between 18 and 60; the mean ages were 33 years for the depressed and 28 years for the nondepressed group. There were 21 females and 8 males in each group. All depressed subjects scored above 10 on the Beck Depression Inventory (Beck, 1967). The mean BDI score for the depressives was 28. The mean duration of current depressive episode was 10 months.

All depressed subjects received imiprimine, but this is not considered important because the design is a within-subjects design and because there are some data showing nonsignificant improvement in short-term memory and final free recall following imiprimine administration (Henry, Weingartner, & Murphy, 1973). No subject had received ECT.

Procedure

In the depressive group, subjects who had been given an admitting diagnosis of depression were first given the BDI in order to screen for the presence of depression in each subject. This subject pool consisted of all consecutive admissions over a 2-week period. Next, subjects were asked to participate in research on how depressed persons respond to certain words. Nondepressives were given a similar orientation. Subjects were tested on the adjectives both individually and in groups since the results of Craik and Tulving (1975) had indicated that there were no differences between the results of the two methods.

All subjects rated 48 adjectives on one of four orienting tasks outlined in Table I. Subjects were given a rating sheet that indicated which of the four tasks they were to perform on a given word. After the adjective was

Table I. Rating Tasks and Mean Adjusted Recall

Rating task	Cue question	Definition	Mean adjusted recall ^a			
			Depressives			Non-depressives
			Yes ratings	No ratings	Mean	Mean
Structural	Long?	Rate whether you feel the word is long or short	.09	.05	.07	.10
Phonemic	Rhythmic?	Rate whether you feel the word has a rhythmic sound	.08	.07	.07	.06
Semantic	Meaningful?	Rate whether you feel the word is meaningful to you	.13	.14	.13	.13
Self-reference	Describes you?	Rate whether you feel the word describes you	.14	.12	.13	.27
		<i>Mean</i>			.10	.14

^aAll data were transformed to proportion scores that adjusted for differential numbers of yes and no responses. The mean adjusted recall scores were, therefore, derived from the subject's recall of words under a specific Rating Task divided by the number of ratings the subject made while doing the task.

read aloud by the experimenter, subjects read the task question to themselves and made a yes or no response on the sheet as it applied to the adjective. Initial instructions did not indicate that recall was expected. Immediately after the adjectives were rated, subjects were given 3 minutes to recall, in any order, as many adjectives as they could. Spelling was specifically de-emphasized.

Materials

The Beck Depression Inventory was used as the depression screening instrument.⁵

⁵A distinction between endogenous and reactive depressions was not made in this study because endogenous and reactive depressions appear qualitatively similar on a continuum of severity (Costello, Christensen, & Rogers, 1974), and because self-concept is one factor in the estimate of severity of depression (Weckowicz, Muir, & Cropley, 1967; Beck & Beamesderfer, 1974). It was assumed, therefore, that on a continuum of self-concepts the endogenous and reactive depressions would be qualitatively similar.

The 48-adjective instrument used in this study was the same as that used by Rogers et al. (1977). Each adjective was appropriate for a self-description task. Only 40 were used in data analysis with the 4 at the beginning and end of the list serving as buffer items. Four different randomized task orders were generated, such that each adjective was rated under each task considered across the four orders. Eight *Ss* were assigned to list order number four while seven were assigned to the other three orders. ANOVA revealed no significant effect due to word order ($F < 1.0$).

There were four different task questions presented in four random orders. One task question was answered after each adjective was read in order to elicit different levels of encoding: structural, phonemic, semantic, and self-reference. On the structural task a word was read to the subject who then answered whether the word was a long word (yes or no). For the phonemic question the subject decided whether the word that was read to him had a rhythmic sound. For the semantic task the subject decided whether the cue word was a meaningful one. For the self-referencing task the subject answered according to whether the word described him (yes or no) (see Table I).

RESULTS

Both hypotheses received support.

A two-way repeated-measures analysis of variance (Depression-Non-depression X Rating Task: four levels) produced significant main effects for the Rating Task by Depression interaction [$F(3,168) = 4.71, p < .01$], for the main effect of Depression [$F(1,56) = 4.54, p < .05$], and for Task [$F(3,168) = 12.92, p < .0001$]. The most important aspect of these results is revealed in Newman-Keuls post hoc tests of the Depression X Task interaction. These showed meaningful self-reference task differences ($p < .01$); no other differences due to depression reached significance. Figure 1 illustrates this interaction.

Table II. Analysis of Variance Summary Table for Recall Scores

Source		<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Depression	(A)	1	.099	4.54	< .05
Subjects within groups	(S)	56	.021		
Rating task 4 levels	(B)	3	.186	12.92	< .0001
A X B		3	.067	4.71	< .01
Error	(ABS)	168	.014		

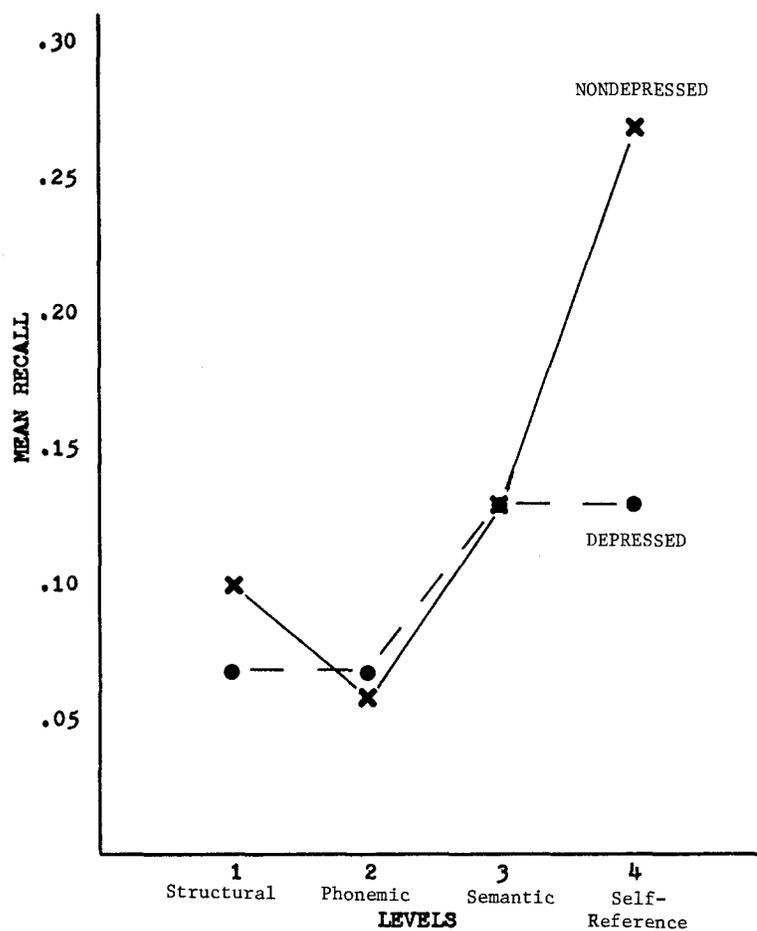


Fig. 1. Mean recall differences due to depression.

Depressives and nondepressives had equal recall on the semantic task while on the self-reference task depressives recalled significantly fewer words than the nondepressives (means were .13 and .27, respectively). Mean recall scores are shown in Table I. Table II presents the ANOVA results.

The ratio of total words recalled on the self-reference task to the total recall on the semantic task (SRT/SEM) reflects the relationship between the memory traces developed on self-reference and semantic encoding. As the SRT recall increases relative to SEM, the SRT/SEM value increases.

SRT/SEM was used as the dependent variable in a multiple-regression analysis on the depressed group with the duration of the depressive episode

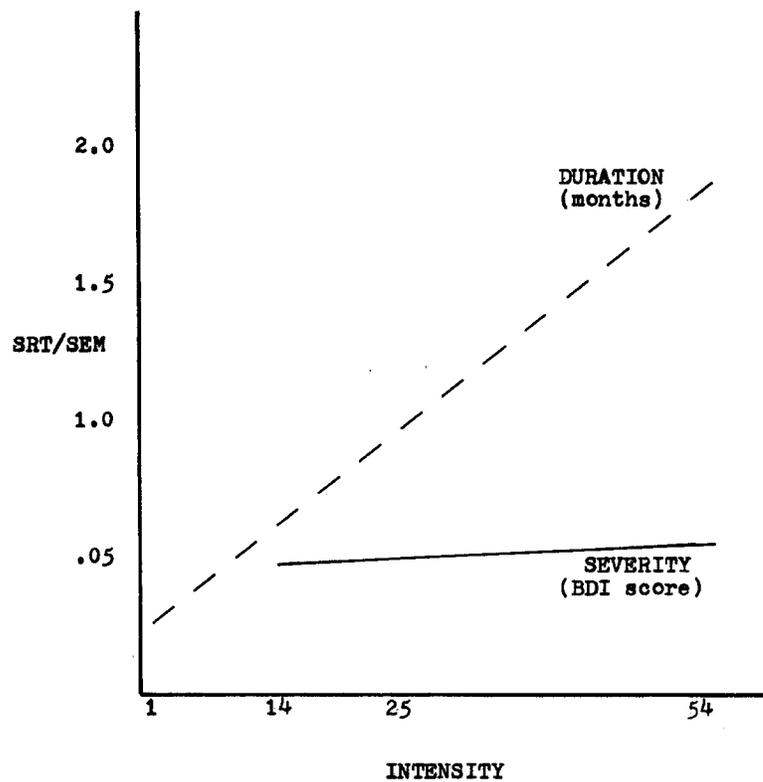


Fig. 2. The regressions of duration and severity of depression on the ratio of self-reference/semantic recall (SRT/SEM).

and the severity of depression as predictors according to the rationale given earlier: If a negative self-schema develops in depression as a function of the duration of idiosyncratic negative responding, then SRT/SEM should be higher for long-term than for short-term depressives. Further, if the severity of depression is unrelated to this course, then it should not be a significant predictor of SRT/SEM.

Table III. Results of Regression Equation of Duration and Severity on Proportion SRT/SEM

Independent variable	Dependent variable: SRT/SEM			
	β	R^2	F	p
Step				
1. Duration	.61	.32	12.9	= .001
2. Severity	.25	.06	3.27	> .05

Table IV. Correlation Matrix of Duration, Severity, Self-Reference Recall, Semantic Recall, SRT/SEM^a

Variable		X ₂	X ₃	X ₄	X ₅
Duration	X ₁	-.17	.35 ^b	.08	.57 ^b
Severity	X ₂		.06	.25	.15
Self-reference recall	X ₃			.01	.46 ^b
Semantic recall	X ₄				.28
SRT/SEM	X ₅				

^a*N* = 29 depressives.^b*p* < .05.

As expected, duration accounted for a significant proportion of the variance in SRT/SEM ($R^2 = .32$, $p = .001$). Severity of depression did not account for a significant proportion of variance in SRT/SEM over and above duration [$R^2 = .06$, $F(.27) = 3.27$, $p > .05$]. The correlation between duration and SRT was significant ($r = .35$, $p < .05$). Figure 2 illustrates the relationship of the predictors to the SRT/SEM variable. It can be seen that duration was related to increases in SRT relative to SEM. Severity, on the other hand, appears not related to SRT/SEM. Tables III and IV summarize the regression and correlation data.

DISCUSSION

The results suggest that a self-schema is not an active agent in the encoding of personal information in depression as it is with normals. This conclusion received direct support by the Task X Depression interaction, which revealed equivalent recall for the two groups at all levels of processing except self-reference. The normals used in the present study as well as in studies by the Rogers group (Rogers et al., 1977; Kuiper & Rogers, Note 3; Rogers & Rogers, Note 4) showed highest recall on the self-reference task. These findings are not easily attributable to motivational, attentional, or concentration deficits on the incidental recall task because the two groups were not significantly differentiable at the lower levels of processing.

The duration of depressive episode accounted for a large proportion of variance in the multiple-regression analysis, suggesting that the negative self-schema does not exist for all depressives but that it develops over time. It is possible, therefore, that when idiosyncratic cognitive distortions are employed over time their semantic interrelatedness increases; this increase generates a self-schema that assists on the self-reference encoding task. This formation of a schema to represent the relations among self-referent words is essentially the same process that facilitates recall of nouns presented for multitrial free recall. Sternberg & Tulving (1977) note the well-established

finding that order of recall of randomly ordered word lists increases over trials as a function of "subjective organization." That is, the more familiar persons are with the words, the more they are likely to interrelate them, to develop a schema of this relationship, and, ultimately, to impose consistent orderings on the word list as a function of this schema. Recall improves as a result. It is highly possible that depressives must use their idiosyncratic self-referents for some time before a schema of how these referents relate to each other can develop. Such a schema becomes a self-schema.

This interpretation is consistent with the results of a recent study by Rogers and Rogers (Note 4). They demonstrated stronger SRT recall for middle-aged than for younger subjects. Presumably, because they had been using their particular self-referents longer and had developed more stable self-schema, SRT referents had formed a more integrated schema among the middle-aged. It is possible that the younger subjects in the Rogers study, as well as the depressed subjects in the present study, are only moderately successful in responding to a self-reference instruction because they have only a moderately/poorly integrated memory unit for what does and does not describe self.

A severity effect was not predicted and it accounted for only 6% of the variance in SRT/SEM; it appears that severity of depression has no systematic relationship to SRT recall. Thus it is possible that in order for cognitive distortions to become consistent and well organized all that is required is their presence. More distortions and greater severity do not appear to favor the organization of self-referents. The implication is that a mildly depressed patient can have as embedded a negative self-schema as the severely depressed patient.

Overall, in the light of these data it appears that the specific nature of belief systems in depression deserves closer attention. For some, it is probably quite accurate to refer to a negative self-schema as a basis for cognitive distortions but, for others, it is perhaps more accurate to refer to inconsistency and uncertainty about self (after Davis, Note 1). Because SRT recall was relatively weak, it is suggested that, for most depressives in this sample, depression involved non-schema-based responding. This is defined by the propensity to perceive one's capabilities, feelings, and environmental circumstances in inconsistent and poorly organized terms.

It is suggested, finally, that negative responses in self-description under a variety of circumstances facilitates the eventual development of a self-schema.

In conclusion, although this sample of depressives described themselves in negative terms, the present data suggested that the self-references were insufficiently organized and developed to assist in the encoding and recall of personal adjectives. For this reason, and because the duration of

depression predicted the relative strength of self-reference recall, it is proposed that a negative self-schema does not develop until one has been depressed over a period of time.

REFERENCE NOTES

1. Davis, H. *Self-reference as related to 17-hydroxycorticosteroid secretion in adult depression*. Manuscript submitted for publication, 1978.
2. Davis, H., & Murphy, R. *The organization of memory for personal adjectives in depression*. Manuscript in preparation.
3. Kuiper, N. A., & Rogers, T. B. *The encoding of personal information: Self-other differences*. Manuscript submitted for publication, 1978.
4. Rogers, P. J., & Rogers, T. B. *Self-referent encoding in a middle aged group*. Manuscript in preparation.

REFERENCES

- Beck, A. T. *Depression: Causes and treatment*. Philadelphia: University of Pennsylvania Press, 1967.
- Beck, A. T., & Beamesderfer, A. Assessment of depression: The depression inventory. *Modern Problems in Pharmacopsychiatry*, 1974, 7, 151-169.
- Beck, A. T., & Rush, A. J. Cognitive approaches to depression and suicide. In G. Serben (Ed.), *Cognitive deficits in the development of mental illness*. New York: Brunner/Mazel, 1978.
- Beck, A. T., Rush, A. J., Shaw, B. F., & Emory, G. *Cognitive therapy of depression: A treatment manual*. Philadelphia: A. T. Beck, 1978.
- Belleza, F. S., Cheesman, F. L., & Reddy, G. Organization and semantic elaboration in free recall. *Journal of Experimental Psychology: Human Learning + Memory*, 1977, 3, 539-550.
- Bjorklund, D. F., Ornstein, P. A., & Haig, J. R. Developmental differences in organization and recall: Training in the use of organizational techniques. *Developmental Psychology*, 1977, 13, 175-183.
- Costello, C. G., Christensen, S. J., & Rogers, T. B. The relationships between measures of general depression and the endogenous versus reactive classification. *Canadian Psychiatric Association Journal*, 1974, 19, 259-265.
- Craik, F. I. M., & Lockhart, R. S. Levels of processing: A framework for memory research. *Journal of Verbal Learning and Verbal Behavior*, 1972, 11, 671-684.
- Craik, F. I. M., & Tulving, E. Depth of processing and the retention of words in episodic memory. *Journal of Experimental Psychology, General*, 1975, 104, 268-294.
- Hammen, C. L. Depression, distortion, and life stress in college students. *Cognitive Therapy and Research*, 1978, 2, 189-192.
- Henry, G. M., Weingartner, H., & Murphy, D. L. Influence of affective states and psychoactive drugs on verbal learning and memory. *American Journal of Psychiatry*, 1973, 130, 966-971.
- Kirkpatrick, E. A. An experimental study of memory. *Psychological Review*, 1894, 1, 602-609.
- Montemayor, R., & Eisen, M. The development of self conceptions from childhood to adolescence. *Developmental Psychology*, 1977, 13, 314-319.
- Postman, L., & Kruesi, E. The influence of orienting tasks on the encoding and recall of words. *Journal of Verbal Learning and Verbal Behavior*, 1977, 16, 353-359.

- Rogers, T. B., Kuiper, N. A., & Kirker, W. S. Self-reference and the encoding of personal information. *Journal of Personality and Social Psychology*, 1977, 35, 677-688.
- Schulman, A. S. Memory for words recently classified. *Memory and Cognition*, 1974, 2, 47-52.
- Sternberg, R. J., & Tulving, E. The measurement of subjective organization in free recall. *Psychological Bulletin*, 1977, 84, 539-557.
- Walsh, D. A., & Jenkins, J. J. Effects of orienting tasks on free recall in incidental learning: "Difficulty," "effort," and "process" explanations. *Journal of Verbal Learning and Behavior*, 1973, 12, 481-488.
- Weckowicz, T. E., Muir, W., & Cropley, A. O. A factor analysis of the Beck Inventory of Depression. *Journal of Consulting Psychology*, 1967, 31, 23-28.