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SELF-COMPLEXITY AND AFFECTIVE EXTREMITY: DON'T PUT ALL OF YOUR EGGS IN ONE COGNITIVE BASKET

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This research develops and tests a model relating complexity of self-representation to affective and evaluative responses. The basic hypothesis is that the less complex a person's cognitive representation of the self, the more extreme will be the person's swings in affect and self-appraisal. Experiment 1 showed that those lower in self-complexity experienced greater swings in affect and self-appraisal following a failure or success experience. Experiment 2 showed that those lower in self-complexity experienced greater variability in affect over a 2-week period. The results are discussed, first, in terms of self-complexity as a buffer against the negative effects of stressful life events, particularly depression; and, second, in terms of the thought patterns of depressed persons. The results reported here suggest that level of self-complexity may provide a promising cognitive marker for vulnerability to depression.

People differ substantially in how extremely they respond to happenings in their lives. Some people experience dramatic affective swings in response to the ups and downs of daily life, while others are relatively unaffected. The present argument is that such differences can be accounted for in part by the structure of the self-representation—more specifically, by the *complexity* of the self-representation. In the sections that follow, I first develop a general model relating complexity

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of self-representation to affective variability. After developing this general model, I turn to its implications concerning depression.

The basic hypothesis of the present model is as follows: The less complex a person's cognitive representation of the self, the more extreme will be the person's affect and self-appraisal. In other words, when the representation is simple, affect and self-appraisal will be relatively extreme. When the representation is more complex, affect and self-appraisal will be more moderate. For example, suppose a scientist gets a paper rejected and has a simple self-representation in which professional aspects are closely linked in memory to family aspects and social aspects of the self. Then the negative affect and self-appraisal associated with professional failure will be widespread, resulting in negative feelings about other areas of the self. With a more complex self-representation, other areas are not as closely linked in memory to one's professional self and thus are not as affected. By maintaining distinctions among various aspects of the self, one is more likely to maintain positive feelings about some aspects, which act as a buffer against negative happenings or negative thoughts about other specific aspects. Thus, as I argue later, high self-complexity can act as a buffer against depression, and low self-complexity can render one more prone to depression. First, however, I describe my model of the link between self-complexity and feelings about the self.

In this model, *greater complexity* of self-representation entails organizing self-knowledge in terms of a greater number of aspects that are relatively independent of one another. *Greater extremity* denotes a tendency to respond more extremely in both a positive and a negative direction, depending on the happening or thoughts—that is, more negative affect and self-appraisal following a negative self-relevant happening or thought, and more positive affect and self-appraisal following a positive self-relevant happening or thought. This basic prediction follows from a model consisting of four assumptions.

ASSUMPTIONS OF THE MODEL

Assumption 1: The self is cognitively represented in terms of multiple aspects.

The self is cognitively represented as a complex structure that develops to help organize vast amounts of self-relevant knowledge and is evoked to process information about the self. While the exact form of self-knowledge remains an open question, what does seem clear is that we think about ourselves in terms of multiple aspects (see Gergen,

1971; Gordon, 1968; James, 1892; Sullivan, 1953). For example, a woman might organize knowledge about herself in terms of an assortment of social roles (lawyer, tennis player, friend, mother) or kinds of interpersonal relationships (colleague, competitor, supporter, nurturer).

The self-representation may include information about specific events and behavior (e.g., "I worked 6 hours on a manuscript today") as well as generalizations developed from repeated observations (e.g., "I am a hard worker"). Such generalizations take the form of traits (extravert), roles (researcher, father), physical features (slim), category membership (male, black), behavior (jogger), abilities (analytical), preferences (vegetarian), goals (professional success), autobiographical recollections (summers at the lake), and relations with others (loyal friend) (see Gergen, 1971; Gordon, 1968; McGuire & Padawer-Singer, 1976; Robinson, 1976).

Several unique qualities of self-knowledge point to its richness and multifaceted nature. First, we probably possess a greater amount of information about the self than any other cognitive domain. This enormous data base demands more elaborate organization and a higher level of differentiation to function in a relatively efficient manner. Second, self-relevant information in the environment is relatively salient and gains our attention (e.g., Brenner, 1973; Markus & Smith, 1981; Moray, 1959; Ross & Sicoly, 1979), thus increasing processing demands. Third, self-observations vary across multiple situations and persons, thus increasing the differentiation of attributes and behaviors. For example, a person may observe that he or she is anxious as a parent but relaxed as a colleague. Self-differentiation across attributes and situations is compatible with the well-known tendency to make relatively more situational attributions about the self (Jones & Nisbett, 1971). Finally, much of our general information about persons, places, events, and social and natural categories is linked to the self, both because of the motivation to monitor possible consequences for the self and because of the constant presence of the self in experiences where such data is encoded. In short, the richness of self-knowledge demands not a unitary cognitive structure, but one housing many concepts and distinctions corresponding to various roles and aspects of the self.

The notion that the self is organized in terms of multiple aspects does not necessarily commit one to a particular form of self-representation. The present assumption that the self is organized in terms of multiple aspects is compatible with the following types of self-representations: a system of nodes in an associative network (Bower & Gilligan, 1979), schemas (Markus, 1977), prototypes (Kuiper & Derry, 1981; Rogers, 1981), or multidimensional trait space (Breckler & Greenwald, 1982).

Assumption 2: Self-aspects vary in the affect associated with them.

Affect and self-appraisal are, at least in part, linked to specific aspects of the self. People typically feel good about themselves in certain respects but not in others. Some aspects have positive associations, others have negative associations, but most are likely to have a mixture of both positive and negative associations. These positive and negative associations may be differentiated into specific emotions, such as embarrassment or pride. How people feel about themselves will vary over time and circumstance, depending partially on the specific aspect of self that is activated either through associations in memory or through a current self-relevant experience. For example, a person may feel good when thinking about himself or herself as an athlete but not as a student. Likewise, success in one aspect enhances positive feelings about the self, while failure diminishes these feelings.

Assumption 3: People differ in the degree of complexity of their self-representation.

Self-complexity as defined here is a function of two things: the number of aspects that one uses to cognitively organize knowledge about the self, and the degree of relatedness of these aspects. Without getting formal at this point, the greatest degrees of complexity occur with a large number of aspects that are totally independent. The lowest degrees of complexity occur with a small number of aspects that are totally interdependent.[1] More specific operationalizations of complexity depend, of course, on the theoretical representational model being used (e.g., spatial model, similarity tree, semantic network).

Number of Aspects

In general, self-complexity reflects a greater number of aspects used in thinking about the self. A "self-aspect" may be considered a self-relevant cognitive category, concept, or schema. The number of aspects is likely to be a function in part of the number of actual roles one has in his or her life (e.g., teacher, researcher, parent, spouse, tennis player,

1. The term "cognitive complexity" has been used to refer to a number of conceptually distinct, and possibly independent, properties: for example, dimensionality, attribute articulation, integration across attributes (see Bieri, 1966; Crockett, 1965; Kelly, 1955; Schroder, Driver, & Streufert, 1967; Scott, Osgood, & Peterson, 1979). The present research defines and measures complexity in terms of the number of nonredundant or distinctive attributes underlying a person's thinking about a domain. The hypothesis derived here follows from this specific definition of complexity. Other notions of complexity may have a different relationship to mood and self-appraisal.

friend). People learn to conceptualize themselves in varying ways through increased experiences in different roles, relationships, behaviors, or situations.

Degree of Relatedness among Aspects

Greater self-complexity in the present model also reflects a greater degree of independence among self-aspects. In other words, feelings and self-relevant cognitions about one aspect vary independently from those about another aspect. For example, a person's "professional" and "personal" aspects are independent to the extent to which the ups and downs of feelings about professional life are relatively uncorrelated with the ups and downs of feelings about personal life. Success or failure in one self-aspect has minimal implications for feelings or self-evaluation in other aspects.

What might lead feelings about different self-aspects to be correlated? First, actual events in the real world regarding different aspects may be correlated. Consider a woman whose life is comprised mainly of two aspects—her profession and her relationship with her husband. If her husband's admiration depends heavily on her professional success, then a professional failure may lead to a loss in her husband's admiration, resulting in unpleasant feelings about herself both as a professional and as a wife.

Second, feelings about different aspects of the self may be cognitively correlated. The assumption here is that self-aspects vary in their degree of *perceived* relatedness to one another. Some aspects are perceived to be highly related to one another. Others are perceived to be relatively unrelated, having little relationship to one another. Still others are relatively contradictory. To continue our same example, this woman's feelings about herself as a professional may be conceptually linked with her feelings about herself as a wife. In this case, her unpleasant feelings about her professional failure will conceptually spread to and color her feelings about herself as a wife.

It is likely that both the *actual covariation* of events and the *perceived covariation* of feelings about different aspects of the self influence the degree of emotional spill-over between different aspects. While it is reasonable to assume a partial overlap between the actual and the perceived covariation of aspects, the intuition is that there is not a total overlap. Two persons with similar actual roles may differ in the way they cognitively organize the relationship among roles, thus processing the same self-relevant information in different ways. The present work focuses on the *cognitive* relationship among different aspects of the self.

This perceived covariation or relatedness of different aspects reflects the degree of spill-over between different aspects. The actual mechanism of spill-over remains an open question at this point. It might involve a spreading activation process through a network involving self-aspects as semantic nodes and their associated affect nodes (see Bower, 1981; Clark & Isen, 1982), or an inferential spreading process.

Whatever the actual process, the central issue concerns the degree to which an experience that activates one aspect of the self also activates other aspects. To what extent do unpleasant feelings about one part of the self result in unpleasant feelings about other parts? However one might characterize the spreading process, the assumption made here is that the impact of an experience with respect to one aspect spreads to other aspects according to the strength of their relatedness. For example, suppose a student gets the highest score on her calculus final. This may have a substantial impact on her feelings about her math ability. It may produce a moderate improvement in her feelings about her general analytical skills, and a smaller improvement still in her feelings about her general intelligence. It perhaps has a very slight impact on her feelings about her interpersonal insightfulness, and absolutely no impact on her feelings about her troublesome backhand.

One interpretation of being simple, then, is to experience a greater degree of spill-over from one aspect to another. To be complex is to experience a lesser degree of spill-over. Thus, with a simple structure, negative feelings regarding one aspect are more likely to spill over and color many more aspects; with a complex structure, negative feelings about one aspect are more likely to be localized and contained.

To reiterate, self-complexity is defined here as a joint function of the number of aspects and their degree of independence. How does self-complexity develop? Just as other knowledge structures develop through processes of generalization and discrimination (see Anderson, 1976; Linville, Salovey, & Fischer, in press), so too the self-representation tends to develop over time with increasing use and information into a more differentiated structure. Increased experience in varied roles, relationships, and situations leads to increased differentiation of self-aspects. With an increase in the range of experience relevant to the self (e.g., social, family, professional, aesthetic, physical), one not only has the opportunity to generalize or to differentiate more nonredundant self-aspects, but has a functional incentive for doing so. Increased differentiation may allow one to process self-relevant information more efficiently in a variety of areas of one's life, to discriminate more efficiently among the varied demands of an increasing number of roles and interpersonal situations, and so to respond more quickly and appro-

priately to varied demands. Thus greater self-complexity is likely to be linked with greater and more varied experiences and demands. Several lines of research are consistent with these speculations. The suggestion that increased experience leads to increased differentiation is consistent with the theories of Lewin (1951), Piaget (1960), and Werner (1957). With increasing age, one's self-concept and self-evaluations become more differentiated and more abstract (Montemayor & Eisen, 1977; Mullener & Laird, 1971). In the area of social categorization, people develop a more complex knowledge structure for more familiar social groups. Specifically, they show greater complexity in their thinking about their own age, race, or sex, compared to other groups (Linville, 1982; Linville & Jones, 1980; Linville *et al.*, in press). And with increasing contact with a given group, they develop over time a more differentiated view of group members (Linville *et al.*, in press). Similarly, people are more complex in thinking about themselves than about a best friend, presumably because they are more familiar with or knowledgeable about themselves (Linville, Clayton, & Salovey, 1984).

Why, then, will people differ in their degree of self-complexity? Individual differences in self-complexity result from the interactions of a person's life experiences and the kinds of cognitive processes discussed above. Because greater variety of experience breeds differentiation, differences in personal history will result in differences in self-complexity. For instance, people who are involved in multiple personal and professional roles are likely to exhibit greater self-complexity than people whose lives are centered on only a few roles. In addition, holding actual experience constant, people may well differ in their tendency to differentiate their self-representations. For instance, highly intelligent or introspective people may form a more complex self-representation.

Assumption 4: Overall affect and self-appraisal are a function of the affect and self-appraisal associated with different aspects of the self.

Whatever the actual process that results in overall affect and self-appraisal, I assume that it can be approximated by a model in which overall affect and self-appraisal are a weighted average of the affect and self-appraisal associated with individual aspects. In this averaging process, important or salient self-aspects will receive more weight than other aspects. I do not mean to imply that people consciously weight and average affects associated with different aspects. Rather, I simply assume that whatever the exact nature of the underlying process, it can be well approximated by an averaging model. This might be the case, for example, if overall affect resulted from a process in which consideration of different self-aspects triggered affects associated with different aspects, and in which these affects were somehow mentally accumulated to form an overall mood. The component processes of "triggering associated affects" and "mental accumulation" might well be totally unconscious (Lopes, 1983).

THE SELF-COMPLEXITY AND AFFECTIVE EXTREMITY HYPOTHESIS

The four assumptions described above lead to the following basic hypothesis: *Those lower in self-complexity will experience greater swings in affect and self-appraisal.*

Greater self-complexity acts to moderate swings in mood and self-appraisal. Why might complexity, defined in terms of number and degree of relatedness or independence of aspects, result in affective consequences? First, consider the extreme case involving *a large number of completely independent aspects* and an event that has an impact on a single relevant aspect. Since aspects are completely independent, the effect is entirely limited to this one aspect. Since this single aspect is a very small proportion of the total number of aspects, the total impact on overall affect is likely to be relatively small. Next consider the case involving a *small number of completely independent aspects*. Here, too, the impact is localized to the single relevant aspect. But since the relevant aspect is a larger proportion of the self-representation, the total impact will be greater. To illustrate these first two cases, consider a man who has four conceptually independent self-aspects—school, athletics, male friendships, and relationships with women. If an unpleasant experience happens in one—his girlfriend breaks up with him—then the unpleasant feelings will have an impact on only one-quarter of his self-concept. In comparison, consider a man who fails to make a sharp distinction between his male and female relationships. So, in effect, he has three distinct aspects—school, athletics, and relationships. Here the unpleasant feelings will have an impact on one-third of his self-concept, a higher proportion of his total self.

Finally, consider the case involving a *large number of aspects that are highly interdependent*. Here the impact occurs on the relevant aspect but also spills over to other related aspects. So, in effect, a larger proportion of the self is affected here, in comparison to the first case involving a large number of independent aspects. For example, suppose that a student gets cut from his high-school basketball team. If being a good basketball player is perceived to be quite separate from being a good baseball player or football player, or more generally from being an athlete, a leader, a friend to other males, or a good student, then the impact will be relatively local. If, however, all of these aspects are con-

ceptually linked for him—say, as components of general male competence—then the impact will be more widespread.

So whether simplicity results from a smaller number of aspects or a higher degree of interdependence between aspects, the result is the same: greater affective reaction. By maintaining more distinct aspects, a person high in self-complexity is more likely to maintain positive feelings about some aspects of the self, despite negative feelings relating to other aspects. Maintaining such distinctions acts to *buffer* the impact of negative feelings and events.

Two experiments were designed to test the basic hypothesis that those lower in self-complexity experience more extreme affect and self-appraisal. The first examined the impact of a success or failure experience on mood and self-appraisal. The second examined changes in mood over a period of time in a natural setting. Self-complexity was operationalized in terms of traits in the first study and in terms of roles in the second study.

EXPERIMENT 1

Experiment 1 was designed to test the moderating effects of self-complexity on affective reactions to experimentally induced success or failure. First, self-complexity was measured as an individual difference variable; then a success or failure experience was experimentally induced. The prediction was that following a failure experience, those lower in self-complexity would experience more negative affect and self-evaluation. Following success, those lower in self-complexity would experience more positive affect and self-evaluation.

METHOD

Subjects

Fifty-nine male undergraduates participated as part of their research participation requirement. Each subject was tested individually.

Self-Complexity Measure

A measure of self-differentiation, reflecting the number and distinctiveness of attributes an individual uses to think about himself or herself, was developed. To the extent that self-aspects overlap in their conceptual meaning or use for the individual, differentiation will be less than

the number of attributes used. To measure self-complexity defined in this way, I adapted the trait-sort method used previously to study an individual's complexity regarding various social groups (Linville, 1982; Linville & Jones, 1980). (The measure is patterned after one developed by Scott, 1969, and Scott *et al.*, 1979.)

The method proceeded as follows. Subjects received a packet of 33 randomly ordered index cards, each containing the name of one trait (e.g., "outgoing," "rebellious," "lazy"). The traits were chosen from a pretest, open-ended self-description task. They were chosen to represent a wide range of dimensions that students use to think about themselves, and included both positive and negative traits. The experimenter explained that the subject's task involved using these traits to describe himself. Subjects were asked to think about themselves and "to sort those traits that are descriptive of you into groups according to which traits you think belong together." Traits could be sorted on any meaningful basis. Each pile might represent a different aspect of the self. Subjects could form as few or many groups as they wished, and the experimenter instructed subjects "to form groups until you feel that you have formed the important ones." The same trait could be placed in multiple piles, and blank cards were provided for this purpose. Subjects did not have to use every trait. The experimenter emphasized that there were no right or wrong answers, only the subjects' opinions. To insure anonymity, subjects did not put their names on the recording sheet.

A self-complexity score was calculated for each subject, based on his trait sort.[2] The statistical measure H can be interpreted as the minimal number of independent binary attributes needed to reproduce the trait sort. The measure does not assume that people think in terms of independent binary attributes; it is simply a useful statistical measure of the richness or complexity of a trait sort. In general, subjects found the task meaningful and interesting. All formed at least several groups, often reusing the same trait in several different groups. Table 1 illu-

2. H was calculated for each subject as follows:

$$H = \log_2 n - (\Sigma\, n_i \log_2 n_i)/n$$

where n is the total number of traits (here 33); and n_i is the number of traits that appear in a particular group combination, $n = \Sigma n_i$. To define a *group combination*, consider a trait that is sorted in Group 1 and Group 2 but no others. This trait is said to fall into the group combination 1–2. More generally, if a person forms two groups, a given trait may fall into one of four possible group combinations: 1, 2, 1–2, or no group. The n_i in the formula above would be interpreted as follows in this example: n_1 = number of traits sorted only into Group 1; n_2 = number of traits sorted only into Group 2; n_3 = number of traits sorted only into both Group 1 and Group 2; and n_4 = number of traits not sorted into any group (see Scott *et al.*, 1979, p. 105, for a detailed numerical example).

TABLE 1
An Example of One Subject's Trait Sort

CREATIVE	ALONE	WITH FRIENDS	REAL-WORLD SURVIVAL	BAD TRAITS
Industrious	Relaxed	Relaxed	Outgoing	Lazy
Reflective	Reflective	Playful	Rebellious	Impulsive
Imaginative	Quiet	Soft-hearted	Assertive	Unorganized
Individualistic		Affectionate	Mature	Not studious
Humorous		Humorous	Competitive	
Unconventional				

strates an actual trait sort created by one subject. In this particular case, the subject later provided the labels that appear above the trait groupings. This prototypic sort supports several present speculations concerning the self. The self is multifaceted, including categories related to superordinate traits (e.g., creative), roles (e.g., with friends, alone), and evaluatively organized aspects (e.g., bad traits). Also, the self includes aspects that are seemingly contradictory (e.g., both lazy and industrious, quiet and outgoing), and the same trait may vary in connotation depending on the particular self-aspect (e.g., relaxed and quiet vs. relaxed and playful).

Procedure

The experimenter described the study as a research project on how the college experience influences the way people feel and think about themselves. She explained that the project would look for any systematic differences in the way freshmen, sophomores, juniors, and seniors viewed themselves. The subject thus expected to complete several self-descriptive tasks. The experimenter emphasized that there were no right or wrong answers, only the subjects' own opinions. She also stressed the anonymity of the subjects' responses, instructing them not to put their names on any of the materials. First, each subject completed the trait-sorting task, putting traits together that belonged together in terms of himself. From this task, a self-complexity score was obtained for each subject. The subject then completed a series of items presented on a terminal screen. These included affect and self-evaluation items, counterbalanced for order. The 14 affect items included the Happiness, Sadness, Activeness, and Anxiety subscales of the Nowlis Mood Adjective Check List (Nowlis, 1968) plus a depression item. The experimenter emphasized that it was important to answer items on these types of questionnaires in terms of how the subject felt right at the moment

(e.g., "At this moment, to what degree do you feel depressed?"). The 12 self-evaluation items included the following attributes chosen to cover a range of dimensions relevant to undergraduates: motivated, logical thinker, indecisive, intelligent, verbally skillful, pessimistic, socially skillful, unorganized, passive, touchy, intellectually sharp, and creative (e.g., "At this moment, to what degree do you feel that you are creative?"). (None of these items were included in the 33 traits used in the sorting task.) On both the affect and self-evaluation items, subjects responded on a scale with endpoints labeled "not at all" to "extremely." The subject responded to each item by typing his answer into the computer.

After the subject responded to the last item, a bogus error message appeared on the screen. While the experimenter left the room (supposedly to check out the error message), the subject completed the final task, described to him as an analytical task related to certain aspects of intelligence. The purpose of this task was described as a control task to see if analytical abilities, in addition to self-description, changed from one year in college to the next. After the 5-minute timed period allowed for the task, the experimenter returned. Explaining that she would need to put his analytical score into the computer before the arrival of the next subject, she graded the task in front of the subject. Since the subject supposedly had completed the final task of the study, he was handed a bogus debriefing sheet, reiterating the original cover story, to read while the experimenter graded his analytical test. Explaining that she had norms on the task, she offered to tell the subject how he did on the task. All subjects accepted her offer. She then provided bogus feedback to half the subjects that their performance was in the bottom 10% of those taking the test, and bogus feedback to the other half that their performance was in the top 10%. Then after leaving the room briefly (supposedly to complete the check on the error message), she returned with the news that the computer had temporarily gone down, losing his initial mood and self-evaluation data. Subjects believed the breakdown glitch explanation and agreed to repeat the items as a favor to the experimenter. She emphasized again that the items should be completed in terms of how each subject felt right at the moment. After completing the items, the subject was thoroughly debriefed.

RESULTS

As a first step in the analysis, each subject received a score for self-complexity based on his trait sort (see footnote 2). A higher score indicates higher dimensional complexity. The score may range between 1

and $\log_2 n$ (n = number of traits; here, n = 33). Thus, in this study, the self-complexity score could range between 1 and $\log_2 33 = 5.04$. The actual range of scores was between 1.422 and 4.923 ($M = 2.857$, $SD = .756$). The range of number of actual groups created was between 3 and 21 ($M = 6.83$, $SD = 3.587$).

Recall that we expect those with lower self-complexity scores to change the most after feedback—that is, to change the most in a negative direction after failure feedback and the most in a positive direction after success feedback.

To test this prediction, two indexes were formed. The "affect index" was formed by averaging the 14 affect items, and the "self-evaluation index" was formed by averaging the 12 self-evaluation items. In forming these indexes, all items were scaled so that higher scores reflected a more positive affect or self-evaluation.

Each of these indexes was subjected to an analysis of covariance, in which the value of the index at Time 2 (after succes or failure feedback) was the dependent variable, and in which self-complexity (high or low, based on median split), feedback (success or failure), and the self-complexity × feedback interaction were independent variables, with the value of the dependent variable at Time 1 (before feedback) serving as the covariate. The present model makes no prediction as to whether self-complexity is generally associated with high or low affect or self-evaluation. In fact, the self-complexity main effect was insignificant for both dependent variables.

As predicted, the self-complexity × feedback interaction was significant for both the affect index, $F(1, 54) = 6.62$, $p = .01$, and the self-evaluation index, $F(1, 54) = 8.06$, $p = .006$. The adjusted means for this analysis are presented in Table 2. As predicted, following failure feedback, those low in self-complexity experienced lower affect and self-evaluation than those high in self-complexity; following success feedback, those low in self-complexity experienced higher affect and self-evaluation. Preplanned contrasts for this predicted pattern of effects revealed that, following failure feedback, the difference between those high and low in self-complexity was highly significant for both affect ($p = .006$) and self-evaluation ($p < .003$).[3] Following success feedback, the difference between those high and low in self-complexity was in the predicted direction, but was nonsignificant for both affect ($p = .16$) and self-evaluation ($p = .15$).

TABLE 2
Adjusted Means for Mood and Self-Evaluation as a Function of a Failure or Success Experience and Self-Complexity

	FAILURE		SUCCESS 1		SUCCESS 2	
INDEX	SIMPLE	COMPLEX	SIMPLE	COMPLEX	SIMPLE	COMPLEX
Mood	51.2	57.7	62.3	59.8	69.2	63.3
Self-evaluation	61.3	67.3	66.5	64.5		

Note. Higher scores indicate more positive mood and self-evaluation. Scores are adjusted for mood and self-evaluation at Time 1. Success 1 denotes the success condition in the original study; Success 2 denotes the replication of the success condition with the stronger success manipulation, looking only at mood changes. All scores have been converted to a 0 to 100 scale to facilitate comparison between the two studies.

In the analysis reported above, a median split was used to classify subjects as being high or low in self-complexity. In addition, correlation and multiple-regression analyses were performed, in which self-complexity scores were treated as a continuous variable. In the correlation analyses, the hypothesized relationship between self-complexity and affective extremity was tested by correlating self-complexity scores with change scores (defined as the difference between the index scores before and after feedback). Following failure, those with lower self-complexity experienced a greater drop in affect ($r = .40$, $p < .02$) and in self-evaluation ($r = .60$, $p = .0005$). Following success, those with lower self-complexity experienced a greater but only marginally significant increase in affect ($r = -.27$, $p < .08$) and a nonsignificant increase in self-evaluation ($r = -.14$, $p = .2$).

Finally, the same pattern of results was obtained in a multiple-regression analysis in which mood and self-evaluation scores at Time 2 were modeled as a function of self-complexity and Time 1 scores for the dependent variables. For the subjects in the failure condition, the standardized regression equations were as follows:

$$\text{AII} = .892\ \text{AI} + .163\ \text{SC}\ (n = 29,\ R^2 = .872)$$

$$\text{EII} = .857\ \text{EI} + .295\ \text{SC}\ (n = 29,\ R^2 = .844)$$

Here AI and AII denote the affect scores at Times 1 and 2, respectively; EI and EII denote self-evaluation scores at Times 1 and 2; and SC denotes the self-complexity score. As predicted, self-complexity had a positive (moderating) and significant association with both affect ($p < .02$) and self-evaluation ($p = .0005$) for subjects in the failure condition.

For subjects in the success condition, the standardized regression equations were as follows:

3. Because all of the tests of the complexity–extremity hypothesis involved a clear *a priori* directional prediction, one-tailed tests were most appropriate and so were used in analyses testing a directional complexity–extremity prediction (Winer, 1971, p. 20).

$$AII = .943\ AI - .048\ SC\ (n = 30,\ R^2 = .851)$$

$$EII = .923\ EI - .079\ SC\ (n = 30,\ R^2 = .835)$$

As predicted, self-complexity had a negative (moderating) relationship with Time 2 mood and self-evaluation scores in the success condition, but the observed associations were weak and nonsignificant.

Thus, lower self-complexity was definitely linked with greater negative reaction after failure, and more weakly linked, but in the expected direction, with greater positive reaction after success.[4] Examination of means before and after receiving feedback suggests that the weaker pattern of results in the success feedback condition may be due to the fact that success feedback had little impact on the subjects' affect or self-evaluation. Many subjects indicated in debriefing that the success feedback on analytical tasks was expected and so meant little to them. Failure feedback, on the other hand, was unexpected and so had greater impact.

REPLICATION OF THE SUCCESS CONDITION

To test the speculation that the weaker pattern of results in the success feedback condition was due to the weakness of the success manipulation, an additional 31 male and female subjects were run in a stronger version of this success condition. The procedure was identical to the original study, with one change—a more powerful success manipulation. First, the experimenter stressed that the task measured analytical ability and correlated highly with intelligence. Second, the experimenter showed the subject a graph depicting the scores of 400 Yale undergraduates, explaining that the subject scored in the top 5% of Yale undergraduates who had taken the test, one of the highest scores she had seen on the test.

In this replication of the success condition, self-complexity scores ranged from 2.426 to 4.802 ($M = 3.555$, $SD = .680$). The range of numbers of actual groups created was from 4 to 14 ($M = 8.87$, $SD = 3.008$).

Recall that the prediction was that those lower in self-complexity would experience a greater rise in affect following success feedback.

4. An additional measure was calculated—a count of the number of groups formed by each subject. This is an inferior measure of self-complexity, because, unlike the H measure, it fails to adjust for the redundancy of the categories formed. For all three types of analyses reported above, the number of groups formed showed a similar but weaker pattern of relationships with affect and self-appraisal. While the number of groups formed showed weaker results than the H measure, it was positively correlated with H ($r = .69$, $p < .0001$).

To test this hypothesis, an analysis of covariance was performed, with affect at Time 2 as a dependent variable, affect at Time 1 as a covariate, and self-complexity as the independent variable. (Here self-complexity was dichotomized using a median split.) The adjusted means for affect at Time 2 support the complexity–extremity hypothesis. Subjects low in self-complexity had a higher adjusted post-feedback mean than subjects high in self-complexity;[5] the difference was significant, $F(1, 28) = 5.22$, $p < .02$. (See Table 2.)

Treating self-complexity as a continuous variable, the hypothesized negative relationship between self-complexity and post-feedback affect was supported by both a simple correlation and a multiple-regression analysis. Following success, those lower in self-complexity experienced a greater increase in affect ($r = -.31$, $p = .04$). The standardized multiple-regression equation for this relationship was as follows:

$$AII = .857\ AI - .190\ SC\ (n = 31,\ R^2 = .835)$$

As predicted, the adjusted self-complexity effect was negative and significant, $t(28) = -2.42$, $p = .01$. Thus, with a more powerful success manipulation, lower self-complexity was linked with a greater rise in positive affect.

EXPERIMENT 2

If those with lower self-complexity (i.e., simpler self-structure) do experience more extreme affective swings, in both a positive and a negative direction, then one would expect those with lower self-complexity to experience greater affective variability over a period of time. This assumes that even over a relatively brief period of time, people tend to experience both positive and negative self-relevant events. The following experiment was designed to test this hypothesis in a natural field setting.

A group of college women first completed a self-complexity task. Then subjects completed an affect scale each day in their own rooms for the following 14 days. The prediction was that those lower in self-complexity would experience greater *variance* in their affect over time.

5. In this replication, each affect scale consisted of a line on the computer screen labeled "not at all" to "extremely." Subjects used a joystick to place an "X" anywhere along the line that best reflected their feeling at that moment. The line was later divided into 100 segments for the purpose of coding.

METHOD

Subjects

Thirty-one women undergraduates participated in an experiment on "daily moods."

Procedure

The study involved two phases. Each woman first completed the self-complexity task used in the previous experiment, with one change: Here, subjects sorted 25 *roles* (rather than traits) into groups according to which ones belonged together. Roles were chosen from the self-descriptions of a pretest sample of subjects to represent a wide range of roles that students use to think about themselves (e.g., student, romantic partner, daughter, friend to men, friend to women, in future career, nonacademic activities, future wife, leader, at play). Table 3 illustrates actual role sorts created by two subjects. These data were used to calculate a self-complexity score for each subject.

Then, for the next 14 days, each subject filled out an affect scale. The 14 affect items included the same items used in Experiment 1: the Happiness, Sadness, Activeness, and Anxiety subscales of the Nowlis Mood Adjective Check List (Nowlis, 1968), plus a depression item. Subjects were instructed, "Please use this list to describe your feelings at the moment you read each word. Place an 'X' anywhere along the line that best reflects your feelings at this moment." Each item was followed by a 5-inch line labeled "not at all" to "extremely." This line was later divided into 41 segments for coding purposes.

Each subject chose one time of day and filled out the affect scale at that same time each day in her room. She returned her affect scale each day, keeping no record of her previous ratings. The experimenter described an interest in possible affective differences among those entering and those finishing college, making no mention of an interest in affective variability. The experimenter emphasized the subject's anonymity, asking her not to put her name on any materials. At the end of the 14 days, all subjects were thoroughly debriefed.

RESULTS

As a first step in the analysis, each subject received a self-complexity score based on her role sort (see footnote 2). In this study, the self-complexity score could range between 1 and $\log_2 25 = 4.644$. The actual range of scores was between 3.183 and 4.563 ($M = 4.017$, $SD = .362$). The range of number of groups created was between 5 and 23 ($M = 10.16$, $SD = 4.18$). Second, an affective variability score was calculated for each subject by first combining the affective items for one day into an index, with higher numbers indicating more positive affect, and then by calculating the variance of the daily affect index across the 14 days.

To test the prediction that those lower in self-complexity would experience more affective variability, a correlational analysis between self-complexity and affective variability scores was performed. As predicted, self-complexity was negatively correlated with affective variability ($r = -.36$, $p = .02$).[6]

The affect scale, as noted, was comprised of five subscales. The correlations between self-complexity and the variability of each of these subscales revealed the same predicted association for four subscales. Those lower in self-complexity demonstrated more variability in happiness ($r = -.30$, $p < .05$), sadness ($r = -.32$, $p < .04$), depression ($r = -.32$, $p = .04$), and anxiety ($r = -.32$, $p = .04$), but not in activeness ($r = -.005$).

There was no significant relationship between self-complexity and the overall mean of the affect index ($r = .22$, n.s.). Thus simple persons were not more positive or more negative in their moods; they were just more variable.

The mean of the affect index was quite stable over the 14-day period. The mean affect scores ranged from a low of 25.2 on Day 5 to a high of 27.3 on Day 6 (on a 41-point scale). There was no trend toward becoming either more positive or more negative over time.

GENERAL DISCUSSION

The present research suggests that the structure of self-cognitions is an important determinant of both affect and self-appraisal. More specifically, the present research supports the hypothesis that self-complexity is a moderator of human affective response. Experiment 1 showed that those lower in self-complexity experienced greater swings in affect and self-appraisal following a failure or success experience. Experiment 2 showed that those lower in self-complexity experienced greater variability in affect over a 2-week period.

These results suggest several conclusions regarding the present measure of self-complexity. First, in both of these studies, the H statistical measure of self-complexity was more strongly related to affec-

6. A count of the number of groups formed by each subject showed that sheer number of groups formed was not significantly correlated with affective variability ($r = -.24$). Recall that this is an inferior measure of self-complexity, because, unlike the H measure, it fails to adjust for the redundancy of the categories formed. While the number of groups formed showed weaker results than the H measure, it was positively correlated with H ($r = .65$, $p < .0001$).

TABLE 3
An Example of Two Subjects' Role Sorts

SUBJECT 1				
Leader	At play	Friend to women	At a large social gathering	Helping someone
Worker	Involved in nonacademic activity (hobby, interest, sport, talent)	When I have a personal problem	Conversationalist	Intimate friend
Relating to someone in authority	When I succeed	Receiving advice	Woman	Friend to men
Standing up for my rights				
In my future career				
Wife	Wife	Student	Student	Leader
Romantic partner	Helping someone	Alone	Leader	At a large social gathering
Woman	Intimate friend	When I fail	Worker	Conversationalist
	Friend to men			

SUBJECT 2				
Alone	Physically sick	Conversationalist	Involved in nonacademic activity (hobby, interest, sport, talent)	Leader
Woman	When I fail	At a large social gathering		Helping someone
In my future career	When I have a personal problem	Friend to women	At play	Standing up for my rights
Student		At play	When I succeed	
		When I succeed		
Wife	Relating to someone in authority	Daughter	Worker	Friend to men
Helping someone	In my future career	Receiving advice	Student	Involved in nonacademic activity (hobby, interest, sport, talent)
Romantic partner	Casual acquaintance	Helping someone	Casual acquaintance	
When I have a personal problem				
Intimate friend				

tive reactions than was a simple count of self-aspects. This finding supports the present theoretical interpretation of complexity: namely, that it depends not only on the number of self-aspects, but also on the extent to which these aspects are independent of one another. Second, the link between self-complexity and affective extremity was obtained using both trait- and role-based measures of self-complexity, thus demonstrating the generalizability of the link across various conceptualizations of the self.

The present work has implications for several areas of research. Here I consider three—the complexity–extremity model, theories of the self, and cognitive approaches to depression.

RELATIONSHIP TO THE GENERAL COMPLEXITY–EXTREMITY MODEL

The model developed here grows out of a more general model of social judgment that involves two key hypotheses: (1) Greater familiarity with a social domain leads to a more complex knowledge structure for thinking about that domain; and (2) the more complex one's knowledge structure concerning a given domain, the less extreme will be one's evaluations based on that knowledge structure (see Linville, 1982, for details concerning the theory and empirical results). Both hypotheses have been strongly supported in a program of research focusing on judgments about members of different age, sex, and racial groups. For example, having shown that people have more complex representations of their own age and racial groups, we found that people are less extreme in their evaluations of members of their own age or race than in their evaluations of those from other ages or races (see Linville, 1982; Linville & Jones, 1980; Linville & Salovey, 1984). Evidence on complexity as an individual-difference variable is most relevant to the present results. Those more simple in their thinking about the category of older males were more extreme in their evaluations of individual older males (Linville, 1982). These results on intergroup evaluations parallel those obtained for affect and self-appraisal in the research described here, thus lending additional support to the general complexity–extremity model.

RELATIONSHIP TO OTHER RESEARCH ON THE SELF

The present view of multiple aspects of the self is in contrast to the conception of the self as a singular, global entity. Some research assumes a single, fixed self, measured in such terms as self-esteem or self-concept. Some clinical theorists assume that a unitary self is a mentally healthy self. The distinction is often drawn between a self that is fragmented, disconnected, and inconsistent and a self that is unified into a coherent, consistent, and constant whole. In contrast, the present research suggests that a self comprised of many distinct aspects may actually have positive mental health consequences.

RELATIONSHIP TO DEPRESSION

At a general level, the assumption is that self-aspects or self-schemas play a key role in depression. Various theoretical approaches recognize the importance of self-relevant cognitions in depression (e.g., Beck, 1976; Higgins, Klein, & Strauman, 1984; Kuiper, Olinger, & MacDonald, in press). The present model of cognitive processes underlying affective variability may contribute to our understanding of clinical depression in two ways. The first involves a causal link between self-complexity and reactions to stressful life events. The second involves the thought patterns of depressed persons.

Self-Complexity as a Buffer against Stressful Life Events

Physical and mental health outcomes including depression are affected by major stressful life events (e.g., divorce, death of a spouse, retirement), as well as by the accumulation of recent minor stressful events (see Dohrenwend & Dohrenwend, 1978; Kanner, Coyne, Shaefer, & Lazarus, 1980; Silver & Wortman, 1980). The relationship between life events and physical or mental health outcomes is, however, often only low to moderate, suggesting the existence of moderating variables that result in substantial individual differences in vulnerability to stressful life events. Previous research suggests that social support is an important moderating variable (see Caplan, 1974; Cassel, 1976; Cobb, 1976; Cohen & Hoberman, 1983; Dean & Lin, 1977; Henderson, Byrne, Duncan-Jones, Adcock, Scott, & Steel, 1978; Kaplan, Cassel, & Gore, 1977; LaRocco, House, & French, 1980; Schaefer, Coyne, & Lazarus, 1981; Thoits, 1982; Turner, 1981). The present results suggest that self-complexity may be another important moderating variable.

Most research on the role of cognition in depression contrasts the thinking processes of depressed and nondepressed persons, leaving open the question of causality. The present paper develops a causal theory that successfully accounts for changes in affect and self-appraisal as a function of experience and level of self-complexity. Self-complexity appeared to buffer subjects against affective consequences of a failure experience, including depression, sadness, anxiety, and lower self-

appraisal. The validity of the generalization from affect and self-appraisal changes following a failure experience to clinical depression remains an open question at this point.

The results of Experiment 1 suggest that the present model is a promising causal theory, one indicating a potential cognitive contribution to the onset and maintenance of depression. The results of this first study are most relevant to depression following a life crisis such as divorce, death of a spouse, or occupational failure, negative events that will have an emotional impact on almost anyone. According to the present model, though, a person high in self-complexity is more likely to be able to contain the impact of such a crisis, and to maintain positive affect regarding other aspects of his or her life. Thus high self-complexity may reduce the likelihood of serious depression, or reduce the depth or duration of a depressive episode. With a simple self-structure, one does not have the buffer of other aspects, and this makes one more prone to depression in the wake of negative events. Thus, level of self-complexity provides a promising cognitive marker for vulnerability to depression.

Additional indirect evidence for the applicability of the self-complexity model to depression is provided by the sociological literature on the protective function of multiple roles. Persons holding fewer social roles—the unmarried, the unemployed, the retired, housewives, those who live alone—experience more psychological distress (including depression) than their counterparts holding more roles (Gove, 1972; Gove & Hughes, 1980; Gove & Tudor, 1973; Gurin, Veroff, & Feld, 1960; Radloff, 1975). More directly relevant are the results of a recent study showing that the greater the number of actual social identities possessed, the lower the reported level of psychological distress (Thoits, 1983).

Whether the present model accounts for cyclical depression that is not precipitated in part by some event is unclear at this point. However, the next section suggests one possible mechanism by which a person could initiate and maintain a cycle of negative thoughts in the absence of a major life stress.

Self-Complexity and the Thought Patterns of Depressed Persons

The literature on depression suggests that depressed persons tend to get locked into cycles of negative thoughts in which everything tends to be interpreted in a negative fashion (Beck, 1976). In the context of the present model, this pattern can be interpreted in terms of simplicity of self-representation and processes of spill-over. We would expect such

thought patterns to be especially likely among those individuals low in self-complexity. The basis of this assumption lies in the definition of self-complexity per se.

Recall that low self-complexity is associated with a failure to maintain distinctions among different self-aspects. Thus individuals low in self-complexity are those for whom feelings about some aspects of the self spill over to color linked aspects of the self. The lower the self-complexity, the more feelings will spread from aspect to aspect. So once a person low in self-complexity becomes engaged in negative thought patterns, whatever the initial cause, this pattern is likely to persist, and the negative affect will spill over to color many aspects of the self. Such "affective spill-over" might result from a spreading activation process (Anderson, 1976), in which the activation of one negative thought easily activates other negative thoughts. Consistent with this speculation, Bower (1981) and Clark and Isen (1982) have found that cognitions that are associated with negative affect tend to be closely linked in memory. Thus, one negative thought easily evokes another. The spreading activation process suggests that a depressive thought pattern may begin even in the absence of a major life stress. Thus, various causes, including a relatively minor event, might initiate a cycle in which one negative thought triggers other associated negative thoughts. Whatever the exact process, persons low in self-complexity are then more likely to get locked into negative thought patterns, a tendency characteristic of depressed persons.

According to the model, the same processes should also occur in the positive realm. That is, persons low in self-complexity may also get locked into positive thought cycles, in which a positive event relevant to one self-aspect spills over to create positive feelings about many self-aspects. In its extreme form, this might be associated with the experience of mania. This conjecture about mania is clearly highly speculative.

While the model and results of Experiment 1 indicate that level of self-complexity influences level of subsequent emotional change, the model does not rule out a different causal sequence. A depressive episode could conceivably reduce a person's level of self-complexity, leading to a failure to distinguish between various aspects of one's life.

In conclusion, at a theoretical level, this work is an initial step toward explicating the relationship between the processes involved in self-complexity and emotional and mental health reactions. If the present model is correct, it should have several significant clinical implications. First, it provides insight into stress reactions and the mechanisms involved in mental health problems, particularly depression. Second, this work suggests a potential diagnostic tool for identifying individuals vulnerable to stress and prone to depression. Third, inspection of the

actual trait and role sorts indicates great individual differences in the traits or roles placed together in a grouping. The present measure of self-complexity is an abstract and quantitative indicator of structure and organization. From a clinical perspective, however, the actual semantic *content* of role and trait groupings provides a rich source of data concerning how individuals structure their thinking about their lives. Fourth, to the degree that cognitive representations are therapeutically manipulable, this work suggests therapeutic intervention emphasizing self-complexity. Such an intervention with depression might attempt to emphasize or develop a more differentiated view of the self, in which feelings about various self-aspects are relatively distinct.

Current work in progress is designed, first, to test the spill-over processes more precisely; second, to study a clinically depressed population; and third, to study the physical and mental health of a population undergoing a particular stressful life event. This new work will extend both the theory and application of the present work.

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THE INFLUENCE OF AFFECT ON SELF-PERCEPTION IN DEPRESSION

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This study examined the role of affect in the organization of self-relevant thoughts in depression. Depressed and nondepressed college students described themselves by selecting adjectives and organizing these adjectives into categories that represented different aspects of themselves. Individuals also supplied a label to describe the general content or meaning of each category. Each label was coded for whether it expressed predominantly an affective, good–bad theme *or* themes that reflected more than a simple affective distinction (e.g., social themes). As predicted, the depressed were more likely than the nondepressed to use category labels in which the salient feature was negative or positive affect (e.g., "my bad traits" or "my good traits") and less likely to use category labels that incorporated additional information (e.g., "how I act with others," "myself as a student"). These results suggest that the depressed are particularly sensitive to the affective nature of their thoughts and behavior, and that they may develop a self-structure in which affect is a central organizing factor. It is also proposed that the affect associated with self-relevant stimuli acquires special significance in depression because it can give the depressed critical information for resolving or understanding the marked discrepancy between their actual feelings about themselves and how they would like to feel. Several alternative ways in which affect may influence cognition in depression are discussed.

Depressed individuals are overcome by negative thoughts and feelings about themselves. Clinicians have struggled to understand and to alter the depressive's excessive self-directed negativity, but this problem only recently has received widespread empirical attention. Research in the last decade has followed the approach suggested by Beck's (1967, 1976) cognitive theory of depression and, more generally, by current

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