

What Remains Invariant? *Finding Order within a Person's Thoughts, Feelings, and Behaviors across Situations*

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One long-standing goal of personality psychology is to identify the coherence and stability that underlie individuals' thoughts, feelings, and behaviors. Attempts to do so, however, inevitably require confronting the challenge of bringing together change and variation with endurance and stability. People's behaviors vary widely across situations in ways that are seemingly inconsistent, yet the core mission of personality psychology and our intuition compel us to seek an enduring set of characteristics that define the person across situations and over time. How does one reconcile behavioral variation with the notion that each individual is characterized by stable and distinctive qualities? What remains invariant through the changing stream of thoughts, feelings, and behaviors, and how might one capture what is constant? Addressing these questions is the basic challenge to any conception of personality.

To illustrate this challenge, imagine tracing any aspect of an individual's experience, mood, the salience of a particular type of thought, or a particular type of behavior, over time and across situations. The result is likely to resemble Figure 10.1, showing a wide variation in thoughts, feelings, and behaviors within the same individual.

Perhaps all this variation is random fluctuation, and we should remove it by averaging across these situations. But if we do so we may be

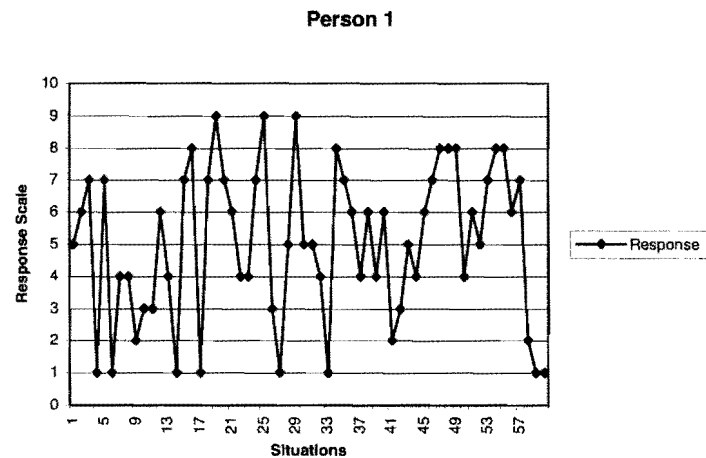


FIGURE 10.1. Example response pattern to 60 situations.

losing some important information. Besides, that may amount to accepting the possibility that personality accounts for only that small portion of behavioral variance represented by *average* behavioral tendencies and that the usefulness of the personality construct is limited to predicting the location of an individual as a point on a continuum. On the other hand, if one is not to give up on understanding intraindividual variation, one needs to ask: Are there any patterns and regularities here? Could important information about a person, and how that person's mind works, be discovered by looking for regularities in what may appear to be random fluctuations? That these "random fluctuations" *do* contain regularities that reflect personality is the fundamental assumption of our approach to the science of personality.

We propose that within the patterns of intraindividual variation, there may be a discernible order, a stable pattern that is unique to each individual. The thoughts, feelings, and behaviors of an individual may vary considerably, and on the surface, this may appear to go against the central tenet of the construct of personality—that personality is invariant or consistent over time and across situations. But when we look beyond the surface and focus on how it varies and on what external and internal situations it depends, we may find a regular pattern that is distinctive for each individual and that transcends the surface level variation.

To this end, this chapter has three goals. First, we summarize evidence that this intraindividual variation is indeed more than random fluctuation, that there is an order there that can be measured and even predicted.

Specifically, our first goal is to show that behavior variation across situations is systematic and that the patterns of variation are stable over time, reflecting the unique and stable characteristics of each individual. Our approach to finding order amid the variation is to adopt an information processing model of personality, to think of personality as a system operating in continual concert with the social environment. There are two components to this approach: defining the social environment as configurations of features that are psychologically meaningful and measuring and modeling the unique way individuals process those features in producing behaviors. Exploring these two components are our second and third goals for this chapter. Specifically, we present a method for finding these features and determining the degree to which they are present in social situations. We then illustrate two methods for modeling the unique way individuals process these features.

VARIATIONS IN BEHAVIOR ARE NOT ALWAYS RANDOM

Some evidence that not all intraindividual variation in behavior is random fluctuation comes from recent studies of the meaningful temporal patterning of behavior variation. Although still relatively few, the number of investigators focusing on and finding such stable intraindividual patterning is increasing (e.g., Eizenman, Nesselrode, Featherman, & Rowe, 1997; Fleeson, 2001; Rhodewalt & Morf, 1998; Zelenski & Larsen, 2000). Encouraging evidence is coming from studies using new tools such as spectral analysis (Larsen, 1987), which identifies discernible cyclic patterns embedded in what may first appear as random fluctuations. With these techniques, Larsen and Kasimatis (1990) found that some individuals' affective experiences clearly follow a 7-day weekly cycle, whereas others do not show such a pattern. Similarly, Brown and Moskowitz (1998) showed that some individuals have discernible daily cycles in their interpersonal behaviors, such as dominance–submissiveness and agreeableness–quarrelsomeness, whereas others do not, and Rusting and Larsen (1998) found that an "evening-worse" pattern was associated with neuroticism, depression, and anxiety, as well as with a cognitive style indicative of hopelessness. In the same vein, multilevel analyses (e.g., Bolger & Zuckerman, 1995) identify the functional situation–behavior relationships that characterize different individuals or types (e.g., Bolger & Zuckerman, 1995).

Other evidence comes from studies of systematic covariation patterns among behaviors and subjective experiences. Cote and Moskowitz (1998), for example, found that individuals who score high on a given interpersonal trait (e.g., agreeableness) exhibit a stronger pattern of covariation

(called "behavioral concordance" by Cote & Moskowitz) between the level of pleasant affect they feel in a given interpersonal interaction and the agreeableness of their behavior in that interaction. In contrast, those who score low on such a trait do not show such correspondence as strongly. Larsen and Cutler (1996) defined a measure of affect complexity as the number of intraindividual factors needed to account for a given amount of variance in daily mood. Carstensen, Pasupathi, Mayr, and Nesselroade (2000) examined age differences in the patterns of intraindividual variation in daily emotional experience and found that older adults' emotional experiences were more highly differentiated than those of younger adults. In addition, among older people periods of highly positive emotional experience were more likely to endure and periods of highly negative emotional experience were less stable. Feldman (1995) found that individual differences in attention to the hedonic versus arousal components of affective experience were related to intraindividual correlations between specific affective elements, such as anxious and depressed mood and negative and positive affects.

LOOKING FOR REGULARITIES (AND PERSONALITY) IN SITUATION-BEHAVIOR RELATIONS

Sometimes, however, regularities in the stream of behaviors contain more information than just the periodicity or patterns of covariation among behaviors. Behaviors do not occur in a vacuum; they occur in specific situations. Therefore, it may be possible to identify the regularities that characterize the stream of an individual's behavior in relation to the characteristics of the situations. When the situation changes, so do the behaviors, but the relationship between the situations and behaviors may be stable and may express an individual's distinctive cognitive, behavioral, and affective response characteristics. Identifying the situation features that covary with behaviors is important because it can lead to making predictions of an individual's behavior in response to novel situations. It may lead to answers to questions such as: What kind of advising style would help a particular graduate student flourish? Which school should a child attend? Which of multiple job offers should a person accept? Or whom should one marry?

Some situation-behavior relations are obvious. After all, most people are happier at weddings than at funerals. But are there regularities at an individual level, so that it is possible to identify for each individual a distinctive and stable pattern of situation-behavior relationships? Many years of systematic observation of social behavior, ranging from honesty, conscientiousness, friendliness, and aggressiveness, seem to support such a

possibility. For example, Shoda, Mischel, and Wright (1994) followed aggressive behaviors of children at a summer camp over an entire summer, some of which had serious consequences (e.g., a camper hitting a counselor on the head with a flashlight). Children's aggressiveness varied across situations, such as when warned by an adult or when teased by a peer, and such variations remained even after the differences among situations in the average aggressiveness of children in general were statistically removed. One child was substantially more aggressive than other children when warned by an adult. But the same child may be substantially less aggressive than other children when teased by a peer.

Of course, such variations may be due to chance. Therefore, more than 150 hours of observations per individual were averaged to form a reliable measure of how each camper responded to each type of situation. Most campers still showed substantial variability across situations. That is, reliable intraindividual variations across situations remained even after the normative levels of behavior in each situation were controlled for. Most important, when the pattern of intraindividual variation for each child observed during one half of the summer was compared with the pattern during the other half of the summer, the patterns resembled each other. If the pattern of variation reflected chance fluctuations, one would not expect it to be repeated. But for a sizable and statistically highly significant majority of the campers, the pattern from one time sample predicted that from the other. Thus, for example, if in one half of the summer a child was distinctively more aggressive than other children in response to adult warning but less aggressive than others in response to peer teasing, in the other half of the summer the child would show a similar pattern.

Data from this and other studies (e.g., Vansteelandt & Van Mechelen, 1998) have begun to establish that it is a rule, rather than an exception, that such reliable patterns of behavior variability distinctively characterize each individual. We have been referring to these patterns as an individual's *behavioral signature* to emphasize the fact that they distinctively and stably characterize each individual. Stability and distinctiveness in an individual's behaviors were found in an unexpected place: the pattern of variation itself.

IDENTIFYING PSYCHOLOGICAL FEATURES OF SOCIAL SITUATIONS

Like their handwritten counterparts, these behavioral signatures can be seen as identifying the individual, as an expression of individuality. Do behavioral signatures have a meaning that can be understood and that

can help us generalize and predict behaviors in a different context? Can they also be used to predict future behaviors in new situations? We believe answering these questions requires going beyond the “nominal” definition of situations to identifying their psychological features. A nominal definition identifies situations by name, such as “canoeing at Camp Caribou,” or “being teased by Joey.” These are valid and reliable definitions and are perfectly suitable for assessing cross-situational consistency of behaviors. But they do not tell us just what about each situation is responsible for the observed pattern of behavior variation, therefore limiting our ability to make predictions in new situations. For example, if a child is repeatedly observed as being unkind to friends while canoeing but not while horseback riding, can one predict what she will be like when she goes for a swim with friends or when she goes to an amusement park? The challenge at hand is analogous to one faced by an allergy specialist. Suppose a patient has reliably identified that he has an allergic reaction every time he eats breakfast cereal brands *A* and *E* but that he can eat brands *B*, *C*, and *D* without any problems. Note that the “situations,” the brands of cereal, are defined *nominally*. The pattern of variation in the patient’s reactions across the situations (brands of cereal) is reliable and reflects some stable characteristics of his immune system—it is his “allergy signature.” But to go beyond it and to predict whether or not he can safely eat brand *X*, a new brand he has not tried before, it would be necessary to identify just what it is about brands *A* and *E* that cause the allergic reaction. How, then, might one identify the critical ingredient(s) of social situations?

The approach we have been pursuing draws on George Kelly’s personal construct theory (Kelly, 1955), with some key variations. Like Kelly’s, our general strategy starts with identifying the nominal units of situations; then we seek to identify their psychological ingredients by comparing and contrasting functionally similar and dissimilar sets of situations. For Kelly, whose primary goal was clinical intervention, the “situations” were specific individuals who played significant roles in a particular client’s life. In his “role repertory test” procedure, he had clients identify ways in which two of these people in their lives were more similar to each other than to a third person. The result of this procedure was a set of personal constructs, which constituted the most salient dimensions in which the significant individuals were perceived, constituting the structure of the client’s subjective social world.

Kelly’s procedure was highly effective for understanding a particular individual’s subjective world. However, it was not intended to provide results that could be readily applicable to other individuals. There were two aspects of this procedure that contributed to this idiographic focus. First, the “situations” presented to his clients were the specific

individuals in the client’s life, and therefore it was unlikely that they were a part of any other client’s life. Second, the personal constructs an individual identifies may be idiosyncratic and may differ qualitatively from those employed by another individual.

The goal of our approach, in contrast, was to find a set of situation features that allows generalization across situations and individuals. For that purpose, we first select a representative set of situations that *all* individuals in a sample are asked to consider. We then seek to identify the psychological features that seem to be salient, not for just one but for at least a nontrivial portion of the population. The goal is to identify a set of situation features, a subset of which are expected to be salient for any given individual. For example, for one individual, features *a*, *c*, and *d* may be salient characteristics differentiating the set of situations, whereas for another individual, features *b*, *c*, and *e* may be salient. The union of these sets, *a*, *b*, *c*, *d*, and *e*, will provide a set of finite (and hopefully small number of) features that are likely to be salient to at least some of the individuals. This set provides a nomothetic *language* with which to characterize situations. Individual differences can then be captured by identifying the subset of the common situation features that are salient for a given individual.

The logic of our procedure for identifying the critical features, however, is the same as Kelly’s. We seek those features that distinguish functionally equivalent sets of situations. More concretely, we first have individuals “experience” each situation, while asking them to indicate how they might respond to each situation. They are then asked to report the features that seemed to distinguish those situations to which they responded in one way from those to which they responded in another way. Again, we do *not* expect that any given participant is necessarily able to provide a complete account of the features that underlie the psychological meaning of these situations. Instead, our procedure seeks to identify *some* of the features used by each individual, with the hope that, collectively, the total set of features will cover most of the aspects of these situations that are psychologically significant to at least some of the individuals.

There are a few critical requirements for this approach. One is that there be enough situations through which to see a *systematic* pattern of variation in a person’s responses. Just as one cannot reliably diagnose what one is allergic to by just a few instances of allergic reactions, separating the factors with which an individual’s behavior systematically varies from chance associations requires a large enough number of observations. In short, the number of *situations* is the relevant *N*. We are used to thinking of the *N* as the number of participants. Very few psychologists would consider a sample of only 5 individuals to be sufficient to draw a reliable conclusion. Similarly, when the goal of a study is to discover reliable

patterns of covariation between an individual's behavior and the features of the situations, the number of situations sampled, the N , must be large enough.

Second, in order for the findings to be relevant beyond the specific sample of situations chosen for the study, the situations must reflect types of social situations people encounter regularly. Finally, in order to study responses to enough situations in a reasonable amount of time, we needed a mechanism for collecting many responses from each participant quickly. For this purpose, we created a laboratory-based paradigm that would allow us to collect responses to systematically chosen sets of situations in an hour or so, as we describe next.

THE "SIMULATED SITUATIONS" PARADIGM

In this paradigm participants experience and respond to a set of simulated situations presented on a computer. Each simulated situation consists of an audio clip of another person speaking to the participant, and, when relevant, the audio clip is accompanied by a photograph of the person "talking to" the participant. Typically, participants respond to 60 simulated situations per session and complete either one or two experimental sessions, yielding a behavioral signature for intraindividual response variation across the set of situations as measured at either one or two points in time.

Our simulated situations were implemented in two ways. One is the "guided imagination" format, in which participants listen to audio clips told in the second person, and the participant is instructed to imagine being in the situation. We used the "guided imagination" format to collect responses to situations previously identified as stressful to college student populations (e.g., "It is finals week. You have two exams on the same day and a paper due. . .").

The second type of implementation simulates interpersonal interactions. In each situation, participants see a photograph of a person and hear an audio clip of the person speaking to the participants (e.g., "Would you loan me your class notes? I had to miss class because . . ."). Participants respond by indicating what they would do or how the situation would make them feel. Participants respond to 60 different versions of the same general "scenario" (e.g., 60 different people asking in their own words to borrow class notes). Thus the situations differed in the characteristics associated with the person enacting the scenario (e.g., the tone of voice, facial expression, level of confidence). It should be noted that our choice to hold the general scenario (e.g., asking to lend class notes) constant across 60 situations is deliberate and crucial for the interpreta-

tion of the results. Imagine that a biologist is interested in testing the effect of various soil conditions on the rate of plant growth by planting in soil from a variety of areas. It is easy to appreciate the importance of holding other factors, such as the amount of water, temperature, and sunlight, constant, not to mention making sure to plant the same plant. Otherwise, the experiment does not have a hope of reaching any reliable conclusion about the effect of soil type, unconfounded by other factors. Similarly, if we did not hold the scenario constant, and if the situations varied in any unconstrained way, with only 60 situations we would not be able to identify any situation feature reliably. For example, we generally would not know whether the observed variation reflects differences among the scenarios or variations in the stimulus persons in the scenarios. By holding the scenario constant but varying the stimulus persons drawn from the population of students, therefore, this study seeks to find those psychological features of situations that make up important ways in which social situations differ as a function of the individuals who are in them. (Of course, one could hold the stimulus person constant, while varying the scenario. In that case, the analysis would be seeking to find psychological features important in differentiating among the sample of scenarios. We have explored this possibility in a study of scenarios sampled from a set of situations that have been nominated as the most stressful by college students, as described later).

In summary, in order to identify the person factors important in our interpersonal situations, we presented sets of situations in which the scenario was held constant (e.g., "Would you loan me your class notes?"), and the differences across the 60 situations were due entirely to the person in the situation. In this way, the "stimulus" person—his or her looks, voice, friendliness, word choice, and so forth—is what differentiates one situation from another.

Stability and Uniqueness of Behavioral Signatures in the Simulated Situations Paradigm

A first research question we asked using this approach is whether the pattern of intraindividual variation observed across the simulated situations, the behavioral signature, was stable over time. If a person experienced the same set of situations on multiple occasions, would their behavioral signature look similar? To test for stability over time, we collected responses using the "simulated situations" paradigm from the same participants on two occasions, separated by either 1 or 2 weeks. Each participant responded to the same set of situations presented in different sequences at both experimental sessions. The level of stability in the behavioral signature was defined by the correlation between response pat-

terns—or signatures—at the two experimental sessions, computed within each person.

From the perspective of a participant in one of these experiments, he or she came into our lab, was seated in front of a computer, and responded to 60 instances of the same scenario. For example, in one of the experiments, a participant responded to 60 different people asking in their own words to borrow a dollar to make photocopies (e.g., one phrased the question “Um, excuse me, I totally forgot my wallet. Could I borrow a dollar? I promise I’ll pay you right back,” while another phrased it “I hate to bother you, but I forgot my wallet at home. Could I possibly borrow a dollar and pay you back somehow?”). Each of these is a “situation,” defined by the person doing the asking, his or her appearance, tone of voice, and the words chosen. Participants were students and were instructed to imagine being approached by another student they had “seen around in one of their classes” at the photocopy center in the library. They responded on a 9-point Likert scale with the likelihood that they would loan the person the dollar. This procedure was completed on two occasions separated by 1 week so that the response patterns to the 60 situations from each experimental session could be correlated to assess the stability of the response profile over time.

In an initial study, 7 participants completed this procedure, responding on two occasions to the “dollar loaning” set of 60 situations, presented in random order on each occasion. For each person, responses to the situations were quite varied, with most people using close to or the entire response scale. Each person’s response signatures (see Figure 10.2a for an example response signature) from the two experimental sessions were then correlated. Across the 7 participants, the median correlation was .62, indicating relative stability in the response pattern from 1 week to the next.

Correlations between response patterns, however, do not necessarily reflect the stability of the *unique* way a person responds to the situations. It is possible that the stability over time is due simply to situational factors to which all individuals would respond similarly and consistently. Therefore, in order to address individual differences, we also tested the stability in the unique way each person responded to the situations. First, we created unique response signatures (see Figure 10.2b) for each person by subtracting the normative response to each situation (i.e., average of all participants’ responses to a given situation) from that person’s response. Note that, as a result, the scale on the y-axis is now centered on 0, indicating whether this person’s response was above or below the typical, or normative, response to each situation. Unique response signatures were computed for each participant.

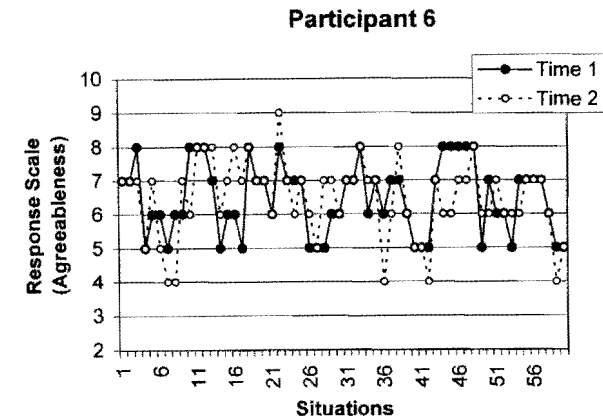


FIGURE 10.2a. Response signatures of Participant 6 at time 1 and time 2. In each of the 60 situations, a different person asked to borrow money for photocopies. The correlation between the two signatures was .62.

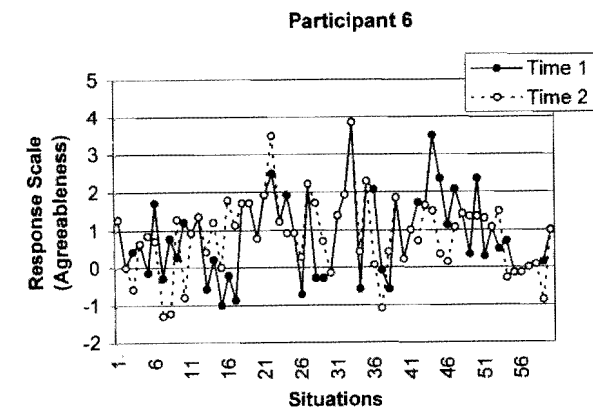


FIGURE 10.2b. Unique response signatures of Participant 6 at time 1 and time 2. In each of the 60 situations, a different person asked to borrow money for photocopies. The correlation between the two signatures was .57.

Correlations between unique responses reflected the degree of stability in the unique response pattern over time. As expected, removing systematic variance due to responses normative for each situation reduced the degree of stability over time, and the correlations were lower than their nonunique counterparts. Nonetheless, the median correlation between each person's unique response signatures at time 1 and time 2 was .55, indicating stability in the unique way each person responded to the situations.

Replication

In a second study, we repeated the procedure with 53 more participants. In addition, to assess the generality of the findings, the same procedure was repeated with different scenarios. For example, instead of encountering 60 different people asking to borrow a dollar in a library to make photocopies, one group of participants encountered 60 people asking, in their own words and voice, if they would like to come to a free swing dancing lesson. Table 10.1 shows these scenarios (first and second columns), the number of participants (third column) and the median stability of their behavioral signatures (fourth and fifth columns). The scenarios were chosen to represent a variety of social behaviors widely regarded as relevant to personality in the field, namely, agreeableness and openness to experience, as well as situations that are relevant for eliciting positive or negative emotional reactions. For the latter, participants indicated the degree to which each situation made them feel good or bad, whereas for the other situation sets they indicated the likelihood that they would engage in the relevant behavior (e.g., the likelihood of trying the dance lessons in the "swing dance" situation set). All participants returned after 1 week to respond again to the same situation set presented in a new sequence. After completing the procedure a second time, participants listed the "aspects of the situations" they felt were instrumental in determining their responses.

Like our first group of 7 participants, all response signatures contained considerable variation across the situations, with many participants' responses ranging from the lowest to the highest point on the scale. The two response patterns were then correlated to produce a stability coefficient for each participant. The results in Table 10.1, column 4, show median correlation coefficients. With median correlation coefficients ranging from .47 to .83, participants responding to the interpersonal situation sets were highly stable over time in their behavioral response signatures. Unique response signatures were computed for each person, again by subtracting a person's responses from the average over all participants. Correlating unique response signatures at times 1 and 2 reveals that across

all the situation domains participants' unique response patterns were stable over time, with correlation coefficients ranging from .37 to .58 (Table 10.1, column 5).

To further test the generality of these findings, in a third study, a new group of participants responded to a set of situations identified as highly stressful to college students. These were 22 stressful situations that were selected from a set of 123 situations listed by a different group of participants as one of the two most stressful situations they had experienced in the previous 3 months. Participants provided 16 responses to each situation: the degree to which they would experience each of eight emotions and the degree to which they would react with each of eight coping behaviors (Folkman & Lazarus, 1985). Participants returned after 2 weeks to provide all 16 responses to each of the 22 stressful situations, presented in a new, randomly chosen sequence. On both occasions, participants' responses varied considerably across the situations, again with many participants' responses ranging from the lowest to the highest points on the scales. For each participant, responses with regard to each emotion and coping behavior were separately plotted against the 22 situations, yielding 16 situation-response profiles for each participant. The same procedure was applied to the time 2 data, and the stability of the profiles was assessed by computing a correlation coefficient between corresponding situation-response profiles from time 1 and time 2, yielding 16 stability coefficients for each participant. Table 10.2 presents median stability coefficients for each of the response categories, with a "grand" median stability correlation coefficient of .44.

The percentage of participants with positive correlations (Table 10.2) gives a sense of the likelihood of positively correlated stability coefficients. For the majority of response categories, close to 90% or more of participants' stability coefficients were positive. A typical participant showed a positive stability coefficient for 14 or 15 out of their 16 response signatures.

Similar to the analysis of responses to the interpersonal interactions, for each participant, 16 unique response signatures were calculated by subtracting from each individual's responses the average of the responses given by the entire sample of participants. For the unique response signatures, correlation coefficients for the stressful situations ranged from .12 to .41. The percentages of participants with positive stability coefficients for each of the 16 responses to the stressful situations dropped only slightly in comparison with percentages for nonunique responses. The slight drop is expected if we assume that the shared variance (i.e., common pattern of variability across the situations) removed in the conversion to unique scores is stable over time.

TABLE 10.1. Median Correlations between Response Patterns to the Agreeableness, Openness, and Affective Response Situations from the First and Second Experimental Sessions

Situation set	Scenarios used to create the 60 situations in each situation set	Number of participants	Stability of behavioral signatures	
			Raw response pattern	Unique response pattern
<u>Agreeableness</u>				
Photocopies	You are at the library and someone you have seen around approaches you and asks to borrow a dollar to make photocopies.	7	.62	.55
Class notes	After class one day, another student approaches you and asks to borrow your notes because he or she had to miss a week of class.	7	.47	.43
Bookstore	After class one day another student asks you to pick up a book from the bookstore for him or her because he or she does not have time.	5	.59	.47
<u>Openness to experience</u>				
Swing dance	Another student whom you have seen around approaches you one day and asks if you would like to try free swing dancing lessons going on in the H.U.B. [the student union building].	6	.56	.45
Movie extra	Another student whom you have seen around approaches you one day and asks if you would like to try out to be an extra in a movie being filmed here on campus.	7	.61	.37
Drum demo	Another student whom you have seen around approaches you one day and asks if you would like to try a free demo of African drumming that's being offered in Red Square [on campus].	7	.60	.48
<u>Affect inducing</u>				
Psych class	Another student you have seen around in your psych class approaches you one day and says how tough the class is but that you seem to know your stuff.	7	.62	.58
Save seat	You are in a crowded movie theater waiting for the film to start. Another person, someone you recognize from campus, says that you look nice enough to hold his or her seat while he or she goes for popcorn.	6	.83	.52
Tailgating	You are driving and when stopped at a light someone in the car next to you, whom you have seen around campus, yells at you that you were tailgating him or her, which is dangerous, and that you really shouldn't do it.	7	.70	.51

TABLE 10.2. Median Correlations between Response Patterns to the Stressful Situations from the First and Second Experimental Sessions

	Response patterns		Unique response patterns	
	Median correlation	Percentage of participants with positive correlations	Median correlation	Percentage of participants with positive correlations
<u>Emotional responses</u>				
Angry	.50	94	.31	75
Confident/hopeful/eager	.23	88	.12	75
Disappointed	.43	94	.24	94
Disgusted	.31	88	.25	88
Guilty	.62	94	.33	81
Sad	.57	94	.36	100
Stressed	.58	100	.39	100
Worried/fearful/anxious	.49	94	.34	94
<u>Behavioral responses</u>				
Avoid people	.41	81	.36	81
Blame self	.51	100	.27	75
Blame others	.48	94	.20	81
Daydream	.20	75	.21	63
Focus on good things	.43	100	.32	81
Keep mind off problem	.39	75	.31	69
Think of solution	.42	88	.41	81
Seek support	.28	94	.15	81

IDENTIFYING THE PSYCHOLOGICAL FEATURES OF SITUATIONS

The stability in the unique response signatures indicates that there is regularity in each person's responses. We wanted to understand this regularity in such a way as to go beyond any given situation and predict responses to novel situations. In order to do so, it was necessary to understand what it was about the situations that made each person respond in his or her characteristic manner. As discussed earlier, features of situations may be conceptualized at two different levels (Shoda et al., 1994). At one level are the nominal features, units of situations that are dictated by the particular logistics and ecology of research setting. In the dollar-loaning situation, for example, the nominal units of situations would be each of the

60 simulated situations, consisting of a unique configuration of the appearance and voice of a particular person asking for a dollar and the way the request was phrased. Nominal situations have limited generalizability because individual differences in relation to a specific nominal situation, even if highly stable, cannot help predict responses to other nominal situations. For example, if we observe that a given participant was reliably reluctant to loan a dollar to John but reliably more willing to do so to David, would we expect the same participant to be more willing to agree to the same request from a third person, Michael, than to a request from Paul? Because David and John are nominal situations, we are unable to generalize to the situations with Michael or Paul. To make predictions beyond the original set of nominal situations in which the behaviors were already observed (i.e., "John" and "David") to new nominal situations (e.g., "Michael" and "Paul"), one needs to understand the psychological meaning of John, David, Michael, and Paul. This requires analyzing situations at a deeper level, at which situations may be defined to capture basic *psychological features* or ingredients that occur in many different nominal situations. Just as individuals' responses to particular medications can be understood more fundamentally by considering the specific active ingredients rather than brand names, our analysis of situations focuses on the psychologically active features of situations.

Nominal situations are highly complex and contain a wide array of different psychological features. The challenge, therefore, is to capture those features that are encoded distinctively by perceivers and that activate other relevant cognitive-social person variables (e.g., expectancies, values) in the mediating process. Because in our situation sets the general scenario (e.g., someone asking to borrow a dollar to make photocopies) was held constant, variations in responses to the different situations were due almost entirely to reactions to different combinations of features regarding the stimulus person's appearance, tone of voice, and the words spoken. For example, in the study of agreeing to a request for money, we hypothesized that psychological features would include features such as how forceful a requester's voice was, the confidence in his or her manner, and how "cool" the requester appeared.

In short, one way to understand the regularity in a person's response pattern—and to predict responses to novel situations—is to characterize situations in terms of configurations of psychologically meaningful features of situations and to analyze the pattern of variation in the individual's behavior as a function of responses to those features. If a person responds in a particular way to a certain configuration of psychological situation features, then we should be able to predict that person's response to a new situation containing a similar configuration of features.

Recall that after participants completed the experimental procedure for the second time, they listed as many aspects of the situations as they felt influenced their responses. Combining responses from all participants, this procedure produced a relatively comprehensive list of features relevant to the situation sets. This list was content analyzed to eliminate duplicates, and to combine features that were highly similar in order to produce a final set of relevant features. To date we have focused most of our efforts on the interpersonal interaction situations, in particular the "would you lend me a dollar?" scenario. For those situations we identified 17 situation features (see Table 10.3 for a complete list), including, for example, "the person seemed sincere," "the person seems to lack confidence," "the person seems intelligent," and "the person is well dressed."

We asked an independent group of judges to rate each situation for the degree to which it contained each of the features, in order to characterize each situation in terms of its "feature makeup" with reasonable certainty. For each of the 17 features, six to nine raters rated the degree to which the feature was present in each of the "dollar loaning" situation 3. For each feature, interrater reliability was assessed with Cronbach's alpha (Table 10.3); 16 of the 17 features received reliability scores of $\alpha > .70$ and were considered reliably rated. For the 16 reliably rated features, we took average ratings to derive final situation feature ratings for each

TABLE 10.3. List of Situation Features for Agreeableness Situations

Situation feature	α
Attractiveness of other person	.76
Confidence of other person	.81
How considerate was the other person?	.79
How "cool" was the other person?	.70
How well dressed was the other person?	.85
Eloquence of the other person	.82
How excited to talk to you was the person?	.74
Did the person make you feel comfortable?	.75
Friendliness of the other person	.80
Genuineness of the other person	.59
Intelligence of the other person	.78
Pleasantness of the other person	.72
Politeness of the other person	.73
Rudeness of the other person	.83
Sincerity of the other person	.72
Did the person have a nice tone of voice?	.77
Did the person have a warm face?	.93

of the 60 situations in the set. Using these ratings, each situation could then be described in terms of the degree to which it possessed each situation feature.

FROM SITUATION FEATURES TO BEHAVIORAL SIGNATURES

Ultimately the goal is to characterize a given person by the "if . . . then . . ." regularities in which the "if" refers to psychological features of situations (e.g., if approached by a friendly and confident person, then person X responds agreeably). We hypothesized that the response signatures would reflect the unique social information processing system each person employs to determine responses to social situations. If each person processes the different situation features uniquely and stably, the characteristics of the processing system should be reflected in the response signatures.

As an example, consider the responses from a participant in an additional study in which 53 people responded to the "dollar loaning" situation set, shown in Figure 10.3. The dark circles in this graph are the situations in which the person asking to make a copy was rated as looking very sincere. Note that in all situations involving a sincere-sounding per-

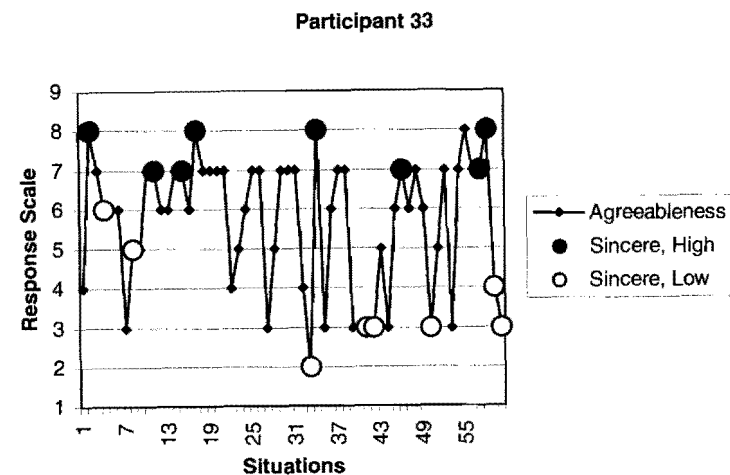


FIGURE 10.3. Responses by Participant 33, with the situations rated high or low in sincerity indicated. Note that sincerity in the person asking was a critical situation feature to this participant.

son asking for a favor, this participant was agreeable, accounting for some of the peaks of the agreeable responses. We also found that situations in which the person asking for a favor was independently judged to be low in sincerity, indicated by open circles, invariably led to less-than-average agreeableness and accounted for the valleys in the zigzag graph.

But does this reflect what is unique about Participant 33, or does it reflect a pattern that is common to all individuals? To test this, we repeated a similar analysis with other participants. Figure 10.4a shows the response pattern for a different participant—Participant 38—whose agreeableness also varied widely across situations but whose pattern of variation is quite different from that of Participant 33. The dark circles show the same situations involving a sincere-sounding person, and yet Participant 38's agreeableness in such situations is somewhere in the middle. The open circles indicate the situations involving an insincere-sounding person. Again, there is no correspondence between sincerity in the person asking for money and Participant 38's responses. So sincerity of the requester does not help account for Participant 38's pattern.

Instead, we found that a different feature explains person 38's response pattern. When looking at situations involving how well dressed the requester was (Figure 10.4b), Person 38's behavior variation begins to make a lot of sense. Like "sincerity" for Person 33, how well dressed a person is, as reliably rated by an independent group of people, can account for some of the peaks and valleys of Person 38's response signature.

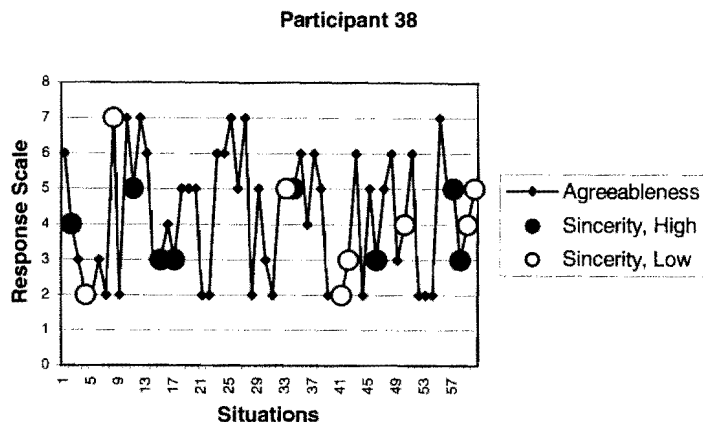


FIGURE 10.4a. Responses by Participant 38, with the situations rated high or low in sincerity indicated. Note that sincerity of the person asking for money does not account for this person's response pattern.

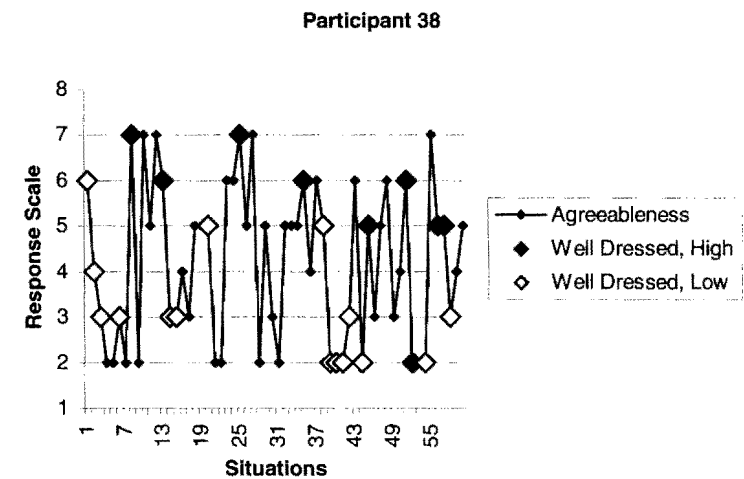


FIGURE 10.4b. Responses by Participant 38, with the situations rated high or low in how well dressed the person in each situation was. Note that the feature "well dressed" accounted for Participant 38's response pattern reasonably well.

CHARACTERIZING EACH PERSON BY A SET OF WEIGHTS REFLECTING SENSITIVITY TO EACH SITUATION FEATURE

We needed a systematic method for determining the weightings each person gives the situation features. To obtain such weights, we returned to the 7 participants in the original study and regressed the participant's responses to the situations from each time sample on the situation feature ratings. This yielded two sets of weights given to each feature for each participant. To test for stability, for each person the weight sets from each session were correlated. A median correlation across the 7 people of .75 indicated the weight sets were reliable. Table 10.4 shows three individuals. Importantly, the feature weightings were unique to each individual. Notice the differences in the weightings these three people gave to the attractiveness of the person asking to borrow money. Persons 2 and 4 actually weight attractiveness negatively, whereas Person 6 weights attractiveness positively. Politeness is also weighted negatively for Person 2 but positively for persons 4 and 6.

The primary goal of identifying an individual's behavioral signature in terms of active ingredients of situations is to go beyond the situations in which the person's behavior was observed to predict behavior in new situations. The true test of this approach, therefore, is to see whether the weightings can predict a person's responses in an entirely new set of situations. We tested this by first creating a reliable response profile for each

TABLE 10.4. Regression Weights for Predicting Response Variations from Situation Features

Feature	Person 2		Person 4		Person 6	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
Attractiveness	-0.76	-0.25	-0.50	-0.19	0.33	0.37
Make comfortable	1.36	1.15	-0.03	-0.50	0.62	0.31
Confidence	-0.08	0.07	-0.22	-0.48	-0.96	-0.71
Considerate	-0.44	-0.80	0.28	0.51	-0.86	-0.86
Cool	0.76	0.87	0.30	-0.01	-0.20	-0.27
Eloquent	0.20	0.12	-0.26	-0.15	0.17	0.6
Excited to talk	0.27	-0.02	0.32	0.57	-0.20	-0.05
Friendly	0.47	0.51	-0.14	-0.54	0.40	0.51
Intelligent	0.55	0.18	0.82	0.39	0.30	-0.19
Pleasant	0.02	-0.43	0.20	0.62	0.44	-0.05
Pleasant voice	-0.13	0.15	0.65	0.34	0.12	0.20
Polite	-1.96	-0.93	0.21	0.28	0.72	0.41
Rude	0.02	0.54	-0.89	-1.05	0.60	0.65
Sincere	0.19	0.50	-0.29	-0.25	-0.08	0.52
Warm face	0.00	-0.03	0.03	0.00	-0.04	-0.03
Well dressed	-0.36	-0.30	-0.34	-0.05	0.03	0.14
Stability (correlation between time 1 and time 2)	.84		.79		.79	

of the 7 participants by simply averaging each participant's responses at time 1 and time 2. From each person's average response profile, we then regressed responses to the first 30 of the 60 situations on the feature ratings for those situations to generate a set of feature weights for each person. This yielded a set of weights that each person gave to the 16 situation features. The fact that the regression weights were based on only the first 30 (of 60) situations is critical. This allowed the second set of 30 situations to effectively serve as a new set of situations to which we could predict responses using our models. The goal is to predict not just how agreeable on average a given participant is likely to be in a new set of situations, but also, and importantly, how their behavior will *vary* across the new set of situations. For each of the remaining 30 situations we generated predicted responses for each participant by applying the regression equation based on each person's responses to the first 30 situations (i.e., situation feature rating of each of the second 30 situations were multiplied by each person's feature weight obtained in the first 30 situations and then summing each term and the intercept). The resulting 30 predicted responses were then correlated with the person's actual responses as an index of the degree to which the weight set captured that person's behavioral signature. At the median, the correlation across these 7 people was .53.

As mentioned earlier in a separate study, 53 additional participants responded to the "dollar loaning" situation set. Again we generated feature weights for each participant based on responses to 30 of the 60 situations, and then predicted responses to the remaining 30 by applying each person's weight set. On average, across the 53 participants, the predicted responses correlated .42 with the actual responses.

How much of the predictability is due to the weight sets' ability to capture each person's unique processing system? To address this question, we computed the correlations between each person's actual responses and every other person's predicted responses. With 52 other individuals to compare with, this is similar to asking how much the average or typical feature weighting can predict any one person's responses. Across all participants, the average correlation between any one person's actual responses and all other people's predicted responses was .31. Thus the typical weight set explained about 9% of the variance in the second set of 30 situations, and the unique weight sets explained an *additional* 7% of the variance. This more than 75% gain in variance explained represents information that uniquely defines the way each individual translates the situation features into responses.

In addition to regression, we also tried a second approach to modeling and predicting responses to our simulated situations: back-propagation neural networks (for more on neural networks and social and personality psychology, see Smith, 1996, and Read & Miller, 1998). A back-propagation neural network was created for each person using the situation feature ratings as inputs and that person's responses to 30 of the situations as outputs. In addition to the 16-unit input and single unit output layers, our back-prop networks also had a 7-unit hidden layer. Thus in the neural network model, a weight set is assigned to an initial processing of the situation features and also to a secondary processing, mapping the nodes in the hidden layer to the output layer.

Similar to the regression analysis, we used each person's back-propagation network that had been trained on the first 30 responses to predict responses to the remaining 30 situations. In this case, on average across all participants, the predicted responses correlated .50 with the actual responses, explaining 25% of the response variance. Like the regression analysis, each person's network was used to predict every other person's responses. Each person's actual responses were then correlated with the responses predicted by every other person's network, with an average correlation of .39, explaining about 15% of the variance in responses to the second set of 30 situations. Thus with the back-propagation models, we were able to capture enough information about idiosyncratic processing of situation features to add 10% of the total variance for predicting responses to new situations.

In summary, in the studies described herein, we first established that responses to the simulated social situations we observed in the laboratory followed a pattern of cross-situational variation that was unique to each individual and stable over time, constituting a *behavioral signature* (Shoda et al., 1994). We then identified a representative set of possible situation features. It was possible to reliably rate the degree to which each situation contains each feature and then to model the pattern of variability in the participants' responses across the situations that were psychologically "active," or meaningful, to participants.

An effort to model individuals' behavioral signatures requires a mechanism for describing a situation. Characterizing situations in terms of their psychologically meaningful features is one way to achieve that goal. The weights we computed to describe the sensitivity of a person's behavior as a function of each situation feature may in turn provide a glimpse into how the relevant social situational information was uniquely translated into subjective meaning by each person, leading to his or her response signature.

DIRECTIONS

A number of next steps are apparent, and undoubtedly many more have yet to be discovered. One direction is generalizing to new types of situations. As we move into different situational domains, we will start to get a sense of whether the psychological situation features reported here as relevant to the "agreeableness" scenario generalize to different situations. Currently we are working on finding features and modeling responses to the situations involving openness to experience, as well as those eliciting both positive and negative affective responses. As the feature sets for each additional situation domain become available, we move closer to a set of comprehensive features from which a subset can be used to describe any situation type.

Systematic expansion of this approach to personality research into new situational domains would benefit greatly from a situation typology. For example, interdependence theory (Thibaut & Kelley, 1959; Kelley & Thibaut, 1978) provides a typology of dyadic interpersonal situations, such as *chicken* and *prisoner's dilemma*, that might provide a situational structure in which to grow this situation feature processing approach to personality. Kelley (2000) has made a call to extend the interdependence theory situation typology to include all situations of interdependence, and indeed a set of prototypical interdependence situations may soon be available (Kelley, 2000).

We see another future direction for laboratory-based studies that should help measure more precisely the variations in situation features that result in changes in response behavior or affect. The features of simulated situations such as those we used can be systematically manipulated via software (Pelachaud, Badler, & Steedman, 1996; Mendoza-Denton, 1999). For example, if a visual feature such as skin color is heavily weighted by a given person, changing the skin color should induce a corresponding behavioral or affective response change. Because the rest of the features are held constant (e.g., facial expression, clothing, tone of voice remain the same) we can measure the effect of skin color on the respondent's behavior or affect.

Responses to situations using the simulated situations paradigm may predict or be predicted by other measures or constructs. For example, individuals' weights for skin color and other features associated with race may be predicted by measures of automatic associations among concepts, such as the Implicit Association Test (Greenwald, McGhee, & Schwartz, 1998) and the sequential priming paradigm (SPP; e.g., Bargh, Chaiken, Govender, & Pratto, 1992; Fazio, Sanbonmatsu, Powell, & Kardes, 1986). Another possibility is that the situation characteristics to which a person is sensitive may be related to that person's schematicity with regard to the characteristics. For example, sincerity of others may be a salient feature of social situations for those people who are themselves schematic for sincerity. If so, reaction time-based measures of schematicity (e.g., Fazio et al., 1986) may allow one to predict the situation features salient for a given individual. Finally, the paradigm can also be used in conjunction with psychophysiological responses, such as heart rate, skin conductance, and more advanced physiological measures, such as cardiac pre-ejection period, to situations as a function of the configuration of psychologically meaningful situation features. For example, a person might show a strong autonomic response to certain situation features of stressful situations, although his or her behavioral profile based on self-reports reveals little if any behavioral response to the same situation.

CONCLUSION

Intraindividual variations in behavior over time and across situations have long been considered antithetical to the construct of personality, imperfections in an otherwise neat and orderly world, and a "noise" that needs to be removed in order to obtain a clear signal about the true nature of persons. The central thesis of this chapter is to question this implicit assumption and to suggest changing or at least broadening how we approach

personality science. From the beginning of modern psychology, when William James likened the ever-changing contents of consciousness to a stream and when Sigmund Freud focused on the mysterious vicissitudes of mental life, theorists of personality have acknowledged, at least tacitly, that understanding a person requires understanding the dynamics of that person's mental, behavioral, and emotional life, as great novels and plays attest. Doing so systematically and quantitatively, however, was difficult before the development of modern methodologies and information technology. Thus it is understandable that much of personality psychology has captured persons as a single point on a continuum. However, we believe that given the methodological sophistication the field has witnessed lately, it is time to revisit the study of people as they live their lives. Perhaps the dynamics of intraindividual variation in thoughts, feelings, and actions now can, and should, be a central subject matter of our field (e.g., Nowak, Vallacher, & Zochowski, Chapter 12, this volume).

Of course, the field's core mission is identifying the enduring and distinctive characteristics of each person that reflect a coherent intraindividual organization (Cervone & Shoda, 1999). But we suggest that constancy may be sought not only at the surface level in the form of stability and central tendencies but also in the regularities that are present in the pattern of intraindividual variation. Larsen (1990) used the term "second order consistency" to refer to the characteristic frequency with which an individual's experience varies over time. Inspired by this idea but broadening the concept to include not just distinctive frequencies of change but also other types of regularities, such as the behavioral signature in relation to active situation features just discussed, we propose the term *higher order consistency* to include the consistent way each person varies his or her behavior across situations.

The focus on intraindividual variability and the search for stable and distinctive patterns within it will in turn lead to a question about the cognitive-affective dynamics that produce them. What creates a pattern of higher order consistency in the changing stream of thoughts, feelings, and behaviors? We believe that such an understanding requires conceptualizing personality as a complex information processing system. The system of psychological processes that can account for such higher order regularity needs to take situations into account to explain why a particular person responds differently to different situations (Mischel & Shoda, 1995; Shoda & Mischel, 1998, 2000). The system needs to be dynamic in order to account for the way its states change. It also needs to be responsive to *internal* situations, such as what one is thinking, feeling, and doing at any given moment, as well as to external situations, so that the system is responsive to both internal and external situations in determin-

ing what the person will think, feel, and do next. Our hope is that identification of the regularity in the seemingly paradoxical variations of thoughts, emotions, and behaviors within each individual will facilitate explorations of personality as a dynamic social-cognitive-affective processing system.

Most research in personality and social psychology involves examining the relationship between one variable and another, which essentially amounts to making a scatterplot, as shown in Figure 10.5, in which each individual is represented by a single point. But if we unpack the point, there is, within it, intraindividual variability of experience and behavior. Two people who may be similar in terms of their average or overall characteristics may have quite different patterns of intraindividual variation, representing their characteristic social-cognitive-affective dynamics. By examining and understanding such dynamics, we may be one step closer to understanding the uniqueness in how each individual functions, not as a static object, but as a dynamic, thinking, feeling, behaving, and *living* system.

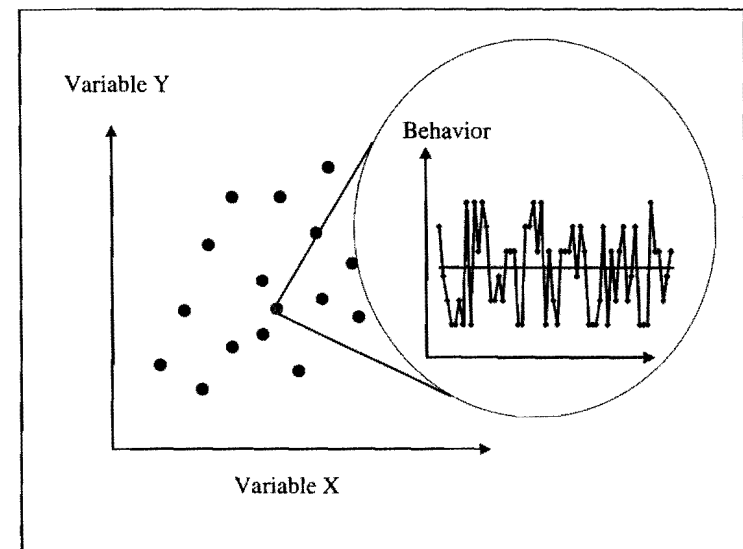


FIGURE 10.5. In a typical scatterplot, each person is represented by a point. When the point is "unpacked," there is, within it, intraindividual variability of experience and behavior, or "behavioral signature," potentially reflecting the individual's characteristic social-cognitive-affective dynamics.

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CHAPTER 11

Integration and Compartmentalization

A Model of Self-Structure and Self-Change

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Traditional approaches to personality have focused on the higher order consistency in human behavior, rather than on intraindividual variability across situations (Cervone & Shoda, 1999a; 1999b). In this chapter, self-structure is viewed as a feature of personality that may speak to both the consistency and variability in behavior, broadly defined. On one hand, individuals may display relatively stable differences in the way they structure beliefs about the self. On the other hand, an understanding of self-structure may shed light on the *process* of how individuals change to fit the situation (Cantor & Kihlstrom, 1987; Showers & Ziegler-Hill, in press). When a person's behavior changes with the situation, what is changing is (at least in part) the *self*. Such change can be described in two ways: Either a particular domain or subset of the entire self-structure is activated, facilitating behaviors that may be specific to that context, or the self is actually restructured to fit that situation. In either case, the self-structure is an important element of people's discriminative facility in responding to specific contexts (cf. Mischel, 1973).

A fundamental feature of self-structure is evaluative organization. Whether we turn to psychodynamic theory or a trait approach for inspiration, the evaluative dimension is recognized as a basic way of categorizing beliefs about the self and others. From the psychodynamic perspective, the compartmentalization of positive and negative self-beliefs