CHAPTER 1

Temperament and Personality: Trait Structure and Persistency

As in the 1991 first edition of this book, I begin with a discussion of temperament and personality and their basic dimensions. This is a necessary first step in a top-down approach because one cannot begin a levels analysis of psychobiology without a classification of traits at the top level. It would be like a science of astronomy without distinctions between planetary bodies such as asteroids, planets, stars, and galaxies; geology as a science of "rocks" sorted by size; or biology that makes distinctions only between two-legged and four-legged creatures – putting humans and chickens in the same category. Classification of phenomena is basic to any science. Without it, all is chaos.

There is a difference, however, between the classification of behavioral traits and other types of scientific classification. We are not defining "types" in the sense of clear-cut assortment of individuals. The concept of continuous, normally distributed trait dimensions is not widely understood outside of psychology. I purposely use the labels "high" and "low" sensation seekers, rather than type terms, such as "Big-T" and "Little-t," to define persons falling near the extreme ends of the continuum on this trait. Types, however, may be defined from a combination of independent dimensions as particular combinations of high or low scores on these dimensions in the same way that syndromes of psychopathology are defined by particular combinations of symptoms.

In the earlier volume, I discussed certain issues about traits that preoccupied personality researchers in the 1970s. Among these issues were whether to use narrow or broad trait concepts, states versus traits, and whether there was any consistency of traits or states across situations (Mischel, 1968). These issues no longer fascinate personality psychologists, and I do not deal with them at all in this book. In the last volume, an entire chapter was devoted to the question of consistency. In this book, I

discuss consistency within systems of traits in every chapter rather than in a separate chapter. Readers who wish to revisit these issues can refer to the 1991 volume.

The current preoccupation of personality psychologists concerns arguments over which traits are the basic ones and which system best describes them (Costa & McCrae, 1992; Eysenck, 1992; Zuckerman, 1992). Costa and McCrae and other advocates of the Big-Five model claim that their five traits are the final answer and that all other systems should be reinterpreted within their dimensions. This preemptive assertion was questioned by several investigators, including Eysenck (1994), Zuckerman (1994), and Block (1995, 2001). As will be seen, there are some similarities across systems, particularly on four of the major factors, but there also are differences in which factors are considered major and which are merely subfactors in the hierarchy dominated by the major factors.

TEMPERAMENT

The distinctions between temperament and personality are not always clear. Strelau (1983, 1998) has made what are, perhaps, the clearest distinctions. Temperament is

a) distinguished by basic, relatively stable personality traits
b) expressed in the energetic and temporal (rather than the motivational or goal-directed) aspects of behavior
c) present from early childhood
d) known to have behavioral counterparts in other species of animals
e) primarily determined by inborn (genetic) biological mechanisms
f) but subject to changes caused by maturation and the interaction of the genotype with specific life experiences.

These distinctions do not completely distinguish temperament and personality and contain certain contradictions.

With distinction regard to (a): How stable must temperament traits be and over what time periods? There is little consistency of behavioral traits in the first year of life and prediction of behavior from 1 to 5 years is very low for most temperament traits (Thomas & Chess, 1986). Consistency does not appear until about age 3 and is still low until age 6 (Kagan & Moss, 1962). Consistency estimates for adult personality traits are higher than those for measures of temperament (Roberts & DelVecchio, 2000). Criterion (f) would explain the greater consistency of adult personality. If temperament is changeable by maturation, most of these changes will

occur in childhood. By late adolescence – after personality is shaped by genetic and maturational differences – life experiences may have less impact than those occuring when the personality is still malleable.

With regard to (b): This distinction in the type of measures used is the clearest of Strelau's distinctions. General activity and emotionality are expressive aspects of temperament. But, many temperament theorists include sociability or aggression as factors of temperament and these are goal-directed and motivated. In fact, expressive and goal-directed are not mutually exclusive. Extraversion has the goal of making and keeping friends and is expressed in positive emotions such as joy and elation. Neuroticism has the goal of being secure in relationships and avoiding rejection and is expressed in negative affects like anxiety and depression.

With regard to (c): It is true that some traits are more easily observed and defined in infancy than in adulthood. However, this may be more a function of maturation than a way of defining temperament. Sociability, for instance, becomes more observable when the child enters school, simply because it offers the first opportunities to interact with peers for any length of time. Sexual interest and desire may depend on inborn characteristics, but it cannot be reliably determined until early pubescence. Many genes are not expressed at birth, but they are activated by a maturational timetable and even by environmental stimulation.

With regard to (d): I agree that temperament traits in humans should show analogues in other species (Zuckerman, 1984). Ideally, this should be in species that are closer to us genetically, like the other primates. However, over 90% of the experimental research is done with rodents, and we must rely mostly on nonexperimental observational research on primates living in natural colonies for analogues of personality. Even so, sociability, aggression, fearfulness, and sensation seeking (approach, exploration, play) can be observed in many species. Their equivalence to human analogues, however, cannot be assumed. The discovery of common biological markers for behavior in animals and humans provides some confidence in the animal models.

With regard to (e): With few exceptions, no temperament or personality traits are completely determined by heredity. Few are "primarily determined" unless one defines "primarily" as any trait with a heritability above .50. Heritability is not a static statistic, but it may show changes with age. Intelligence, for example, shows higher heritabilities in adolescents and adults than in young children. Heritabilities for temperament may be high in early childhood, but they decrease in adult life as environmental influences

become more potent. Angleitner et al. (1995) and Strelau (1998) found little difference in heritabilities of classical types of temperment scales and personality scales in adults, and they even found low heritabilities for some of the temperament scales. It is clear that temperament cannot be distinguished from personality in terms of higher genetic influences in the former.

In the final analysis, the main way we can distinguish temperament from personality is that temperament is defined by the type of variables, such as behavioral observations or parental ratings, used to study individual differences in infants and young children, whereas personality is assessed by methods typically used with older children and adults suggest as questionnaires. Some of these traits are similar at all ages, whereas others are unique to a specific stage of development.

SYSTEMS OF TEMPERAMENT

Thomas and Chess

The first longitudinal study of temperament in infancy was conducted by Thomas and Chess (1977; Chess & Thomas, 1984). Like Strelau, Thomas and Chess distinguished temperament from personality, abilities, and motivation in terms of style or expression of response ("how") as opposed to its content ("what") or goals ("why"). The study, which was initiated in 1956, began with infants between 2 and 3 months of age who were reassessed at various intervals into adulthood. Parental ratings were used at the earlier stages and other methods were used at later ages.

Nine categories of behavior initially were established based on a rational classification of parent interview protocols. The categories are listed below in order of the rater reliabilities (in parentheses). The lower reliabilities indicate variables that were difficult for raters to define.

1. *Approach-Withdrawal*: Reactions to novel stimuli such as new foods, toys, and strangers (.84).
2. *Activity Level*: Activity in various situations, such as bathing, eating, playing, crawling, and walking (.71).
3. *Rhythmicity (regularity)*: Regularity in functions such as feeding, elimination, and sleep (.62).
4. *Distractibility*: The ease of changing the direction of attention from one activity to another (.61).
5. *Adaptability*: Long-term responses to new or altered situations; modifiability of behavior (.58).

6. *Attention Span and Persistence*: The length of time a particular activity is pursued and the continuation in an activity in spite of attempts at interference (.43).
7. *Quality of Mood*: The amount of pleasant, joyful, and friendly behavior contrasted with the amount of unpleasant, crying, and unfriendly behavior (.37).
8. *Threshold of Responsiveness*: The intensity of stimulation in any sensory modality that is necessary to evoke a response (.15).
9. *Intensity of Reaction*: The energy level of responses regardless of their quality or direction (.00).

It is apparent that raters had a difficult time translating parental interview data into variables 8 and 9. Activity level and approach-withdrawal had good reliabilities, and the other variables were low to moderate in reliability.

Rational and factor analyses led Thomas, Chess, and Birch (1968) to define three types:

1. "Easy Temperament" is defined by high scores on regularity, approach, adaptability, mild or moderate intensity of reaction, and predominance of positive mood.
2. "Difficult Temperament" is the polar opposite of "Easy Temperament," with irregularity, withdrawal, nonadaptability, intense reactions, and negative mood. This type is on the opposite end of a continuum with "easy temperament."
3. "Slow-to-Warm-Up Temperament" consists of mild negative reactions and slow adaptation to new stimuli or persons but only mild intensity of emotional reactions and no irregularity.

Consistency of the nine temperament categories from 6 to 8 months (Huttunen & Nyman, 1982) and 1 to 4 years (Thomas & Chess, 1986) to the ratings at 5 years of age did not show very high prediction. Although some of the correlations were significant, very few exceeded .30. The most reliable were activity and Adaptability. Prediction of adult ratings on the nine variables from ratings at 1 to 5 years of age was even worse. None of the correlations exceeded .30. Adaptibility, and approach-withdrawal at 3 and 4 years of age did correlate low but significantly with their manifestations in adults. Intensity and mood at 4 years also correlated significantly. The adjustment factor at ages 4 and 5 predicted a clinical diagnosis at adulthood, and at 3 and 4 predicted an easy versus difficult rating derived from interviews and a questionnaire given to adults. The nine child temperament variables accounted for about 7 to 9% of the variance in ratings derived from the interview

but 15 to 18% of the adult temperament data derived from the questionnaire. Mood and adaptability were the most successful in predicting adult adjustment.

Rothbart and Derryberry

Thomas and Chess did not speculate on the biological or genetic origins of their basic traits of temperament. Rothbart and Derryberry constructed a developmental theory of temperament using more sophisticated statistical, observational, and laboratory methods and current psychobiological models. They defined temperament as constitutional differences in reactivity and self-regulation, influenced over time by heredity, maturation, and experience (Rothbart & Derryberry, 1981). Reactivity, which refers to arousability of physiological and behavioral systems by stimulus intensity, novelty, and other signal qualities, may be positive or negative in terms of affective response. Self-regulation refers to the processes that modulate reactivity such as approach-avoidance/withdrawal, attack, inhibition, orienting toward or away, self-soothing versus self-stimulation, and seeking excitement versus seeking comfort from others.

Figure 1-1 shows their developmental model (Rothbart, Derryberry, & Posner, 1994). Traits are arranged from top to bottom in order of emergence in developmental age and the biological loci in the brain. *Negative emotionality* or discomfort is observable from the newborn period. *Frustration/anger* in response to goal-blocking, and *Approach* to cues of reward or novelty with positive affect, can be seen from 2 months on. *Fear* in response to cues for punishment or novelty, and expressed in distress, avoidance, and behavioral inhibition, develops from 6 months on. The last developing traits are *affiliation* and *effortful control*. Effortful control represents a more conscious cognitive control system operating through attention and cognitive processing of information. It is important in the inhibition of aggression and the modulation of fear.

Buss and Plomin

Buss and Plomin (1975, 1984) define temperament as earlier occuring traits (observable by 2 years of age) that are strongly genetic in origin. No one would argue with the first criterion, but the second is more problematic. Certainly, temperament traits should show some degree of heritability, but how much? Heritabilities can vary with age. A trait that appears to be highly heritable during infancy may have attenuated heritability with age, or vice versa.

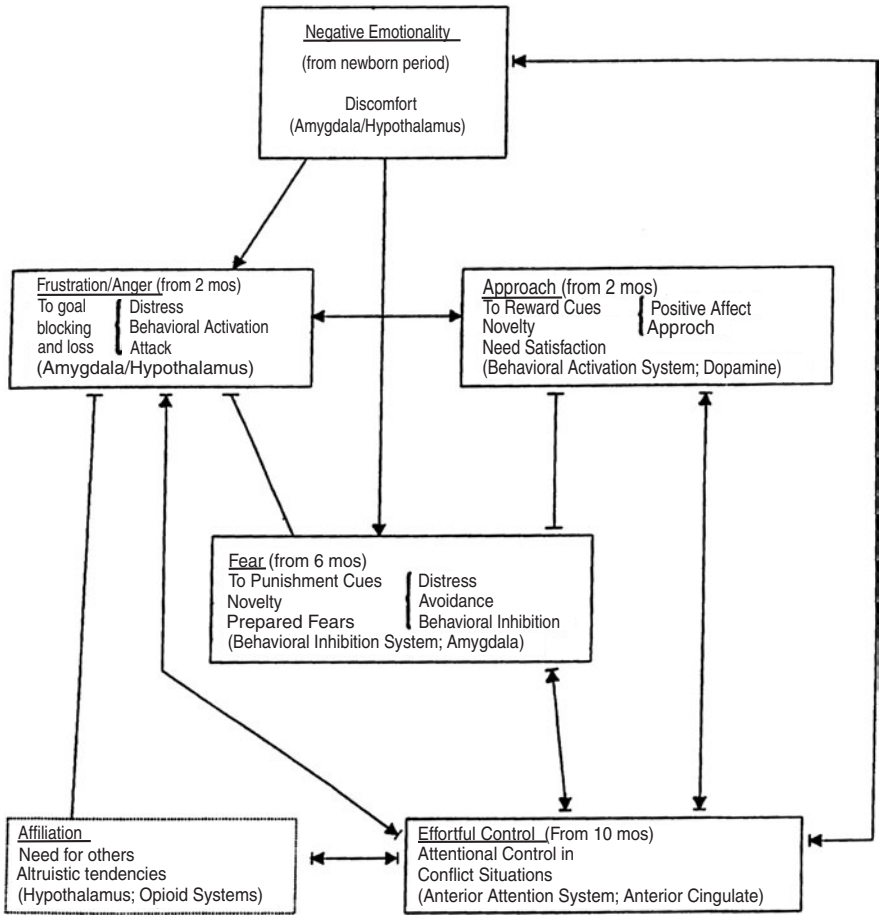

Figure 1-1. A developmental model for the differentiation and integration of temperament systems. From "A psychobiological approach to the development of temperament," by M. K. Rothbart et al., 1994. In J. E. Bates and H. D. Wachs (Eds.), *Temperament: Individual differences at the interface of biology and behavior* (p. 107). Washington, DC: American Psychological Association. Copyright 1994 by the American Psychological Association. Reprinted by permission.

Buss and Plomin developed rating scales of temperament for parents to describe their children and a self-report test for adults. In the 1975 versions, there were four basic traits of temperament, described as follows:

Parent Rating Scales

1. *Emotionality:* gets upset and cries easily, is easily frightened and/or has a quick temper, and is not easygoing.

2. *Activity:* always on the go from the time of waking, cannot sit still for long, fidgets at meals and similar occasions, prefers active games to quiet ones.
3. *Sociability:* likes to be with others, makes friends easily, prefers to play with others rather than alone, is not shy.
4. *Impulsivity:* difficulty in learning self-control and resistance to temptation, gets bored easily, goes from toy to toy quickly.

Factor analyses of items showed good factorial validity; most of the items loaded on the scales to which they had been rationally assigned.

Self-Report Questionnaire (for older children and adults)

1. *Emotionality:* general, fear, anger
2. *Activity:* tempo (fast), vigor (energy, forcefulness)
3. *Sociability:* makes friends easily vs. shy, likes to play with others vs. alone
4. *Impulsivity:* inhibitory control (lack of), decision time (quick), sensation seeking, persistence (lack of)

Factor analyses confirmed the assignment of items to each of the four scales, but questions about the factorial unity and heritability of the impulsivity scale led the researchers to drop it from their system. In our opinion, this was a mistake. Our own factor analyses consistently have shown that impulsivity and sensation seeking are joined in a common factor in both three and five factor levels: Impulsive Sensation Seeking. Socialization also is included (Zuckerman, Kuhlman, Thornquist, & Kiers, 1991). This factor is similar to those found in other adult personality systems (Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993). By excluding I from EASI, the investigators removed a vital part of personality structure and possibly the one most rooted in genetics and biology.

Strelau

Strelau was the most powerful influence in reviving the interest in temperament in the West. The conferences he organized in Poland beginning in the 1970s brought together temperament researchers from the United States and Western and Eastern European countries. Strelau was influenced by Neo-Pavlovian theorists such as Teplov and Nebylitsyn. Before Strelau's approach, the concepts of nervous system traits such as excitation, inhibition, and mobility of nervous processes had been operationally defined by laboratory methods such as conditioning, psychophysical, and psychophysiological methods. Dogs and humans were diagnosed into personality types based on these methods. Strelau was the first to try to translate these into behavioral terms using ratings and questionnaires. The Strelau Temperament

Inventory (STI, Strelau, 1983) was his first attempt to operationalize Pavlovian constructs in behavioral terms. The basic three scales were:

Strength of excitation, or the ability to work under intense, distracting, or disturbing conditions. This also was called "strength of the nervous system" and persons with such strong nervous system were called "low reactives."

Strength of inhibition, or the ability to exercise behavioral restraint and to remain calm under provocation. In Western slang, such persons might be called "cool."

Mobility of nervous processes, or the ability to shift from states of excitation to inhibition or back to excitation. It could be expressed in quickness of starting work and ease of relaxing and falling asleep.

An additional variable, *Activity*, was added to the theoretical structure. Strelau's theory is one of stimulus regulation by behavior. Activity was defined as driven by the need for stimulation and the regulation of arousal level. It sounds very much like Zuckerman's (1979, 1994) construct of sensation seeking and the earlier model of an "optimal level of arousal."

The items for the test were rationally derived without item or factor analysis. A consequence was high correlations between the three subscales and a lack of correspondence with the real factorial structure among the items. Some of these admitted deficiencies were psychometrically remedied in a revised STI (Strelau, Angleitner, Bantelmann, & Ruch, 1990). However, a more detailed analysis of the theory of temperament led away from Pavlovian constructs to a new temperament system that looks more like Western dimensions (Strelau & Zawadzki, 1993). These new scales are described here:

Formal Characteristics of Behavior Temperament Inventory (FCB-TI)

1. *Briskness*, or the tendency to react quickly, to keep a high tempo in activities, and to shift easily in behavior according to situational demands.
2. *Perseveration*, or the tendency to continue behavior when the situations eliciting the behavior are no longer present.
3. *Sensory Sensitivity*, or the ability to sense or react to low-intensity sensory stimulation.
4. *Emotional Reactivity*, or intense emotional reactivity to provocative stimuli; emotional sensitivity and low emotional endurance.
5. *Endurance*, or the capacity to react adequately in situations of intense and long-lasting stimulation.
6. *Activity*, or the seeking of high stimulation through behavior or stimulating surroundings.

The new scales are factor analytically derived and have good reliabilities, although they are as yet not extensively studied. Strelau describes his system as one of adult temperament, but it could easily be applied to children and seems to draw on earlier concepts of "reactivity" or "strength of the nervous system."

Goldsmith and Campos

Goldsmith and Campos (1986) used a variety of methods for infant temperament including inventories, laboratory methods, and caretaker interviews. The theory suggests that temperaments are initially related to emotional responses and represent emotional or affective traits. Their Toddler Behavior Assessment Questionnaire includes five scales, all of which include an emotional dimension. (Activity is regarded as always related to emotional arousal, a dubious assumption):

1. Activity Level
2. Pleasure
3. Social Fearfulness
4. Anger Proneness
5. Interest Persistence (Interest is regarded as an emotion in Izard's (1993) system of classification of emotions.)

Kagan

Kagan's earlier work involved a long-term longitudinal study of 44 boys and 45 girls from "birth to maturity" (Kagan & Moss, 1962). The cohort was studied at ages 0–3, 3–6, 6–10, 10–14, and as adults, 19–29 years of age. The variables were dynamic interpersonal ones reflecting the psychoanalytic zeitgeist during the 1950s, that is, aggression, dependency, sexuality, anxiety, and repression. This study is more thoroughly reviewed in the 1991 edition of this book. One notable result was that practically no child variables from birth to age 3, and few from ages 3 to 6, were predictive of the adult ratings. Whether this was because of the inappropriateness of some of the variables used for children or to a real lack of connection between temperament at early ages and adult personality is hard to say. At the time, Kagan regarded these traits as an outcome of parent-child environment, but later, like others of us from that generation of personality psychologists, he became convinced that temperament had primarily biological roots.

In the 1980s, Kagan began primarily to use laboratory methods to define what he described as the *inhibited* temperament. Behavioral methods consisted of infant and child reactions to novel stimuli, situations, or strangers