# Child Temperament

## New Thinking About the Boundary Between Traits and Illness

David Rettew, MD

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Chapter 1

# A Brief History

My youngest son was born in June 2012, in the year of the dragon. According to Chinese astrology, this fact alone portends that he will be brave, passionate, and unpredictable. And because he was born in the year of the water dragon, the news gets even better, as he should also show an ability to control these outward tendencies. Despite this auspicious sign, however, it is quite likely that when my son begins kindergarten with others born the very same year, the class will not be filled with similarly behaving children. Likewise, two siblings born to the same parents who do their best to bring up their offspring the same way are not likely to have carbon-copy personalities. Temperament is good at finding ways to mix things up, to introduce variability under conditions that appear to be the same. Even genetics, which many people expect to reign supreme, can seem to lose power in this arena. Two thrill-seeking parents can easily wind up with a shy, risk-averse child. A driven and meticulous adolescent can emerge from a mother and father who are freewheeling and scattered. Adding more complexity, some early traits that arise in young children stay rock solid all the way into adulthood, while others disappear in youth never to return again, and still others fade from view like an underground stream, only to emerge later in life stronger than ever.

The mysteries that surround our developing personalities have fascinated parents, teachers, and scientists for thousands of years. Personality traits have been linked not only to the stars and the year of birth, but also to the basic elements of the earth, the temperature of the blood, the secret

and forbidden drives of our libido, and, more recently, to the complex code embedded in our DNA. As diverse as these proposed influences are, a common and enduring thread is the idea that at least some of the factors that make us who we are exist well beyond our control.

The topic of temperament and personality has long been a source of engaging conversation around the dinner table, a focus of academic discussions, and even a subject within political debates. But more and more, a clinical aspect is being added to the mix. For decades in the mid-20th century, the ever-expanding fields of temperament and personality generally existed in parallel with the vast medical literature on disease. The study of behavioral differences among people tended to be housed in university psychology departments, while the medical school downtown focused on psychiatric illness and the emergence of "true pathology." As odd as it may sound to those working outside of the mental health fields, the experts on clinical depression have mostly not been concerned with trying to understand happiness, and studies of human anxiety usually excluded the examination of thrill seekers.

This picture is slowly changing. The critical work of Chess and Thomas and their colleagues in the 1950s and 1960s thrust the concept of temperament into mainstream psychiatry, although many others before them laid the groundwork for this shift. Today, temperament and its role in psychiatric disorders, from major depression to attention-deficit/hyperactivity disorder (ADHD) to autism, are major areas of investigation. This book addresses what is known about this important topic and explains how such knowledge can be used in schools, in homes, and in clinical settings. Before examining the accumulating evidence demonstrating that temperament is inextricably linked to psychopathology, however, it is worth a brief look back at how our thinking about temperament has evolved.

## Historical Theories of Temperament

The idea that certain factors lead to differences in how people habitually act and feel is hardly new. For millennia, philosophers and physicians have tried to account for the readily observable fact that different people have different behavioral tendencies. In ancient Chinese culture, the belief emerged that mental functioning is related to a balance in the forces of energy (or *ch'i*) between the more active and action-oriented



*yang* and the more cautious and inward *yin*. This essential dichotomy which splits temperament into an *approach* dimension and a *withdrawa* dimension, has been maintained in many current theoretical structure of temperament. Linked to energy levels that are always in flux, one' temperament under this perspective is hardly locked in as a lifelong trait Rather, behavior patterns are ever changing and subject to the fluid instability of the world.

### *Ancient Greco-Roman Physicians*

Early Western theories of personality, however, subscribed to a somewhat more constant view of behavioral predisposition that was derived not from the heavens or from constantly changing energy levels, but from within. Galen (ca. 131–200), a Greek physician who traveled widely throughout Roman Asia Minor during the rule of the emperor Marcus Aurelius, became one of the most influential medical scholars of his time, with many of his works enduring as the definitive authority for well over a thousand years. Drawing upon the work of earlier scholars such as Hippocrates and the Greco-Roman physician Vindician, who lived a couple of centuries earlier, Galen developed a unified theory of personality. His theory maintained that one's basic pattern of emotional behavior was due to the relative internal concentration of the four humors: yellow bile, black bile, phlegm, and blood. These four fluids, in turn, were related to a person's relative balance of the four basic substances: fire, earth, water, and air. The word *temperament* is derived from the Latin word *temperare* meaning "to mix," and the balance, or imbalance, of these humors was hypothesized to lead to four main personality types called choleric (ambitious, labile), melancholic (thoughtful, worried), phlegmatic (relaxed, content), and sanguine (social, pleasure seeking). A more detailed description of Galen and his theories can be found in a book that bears the ancient physician's name (Kagan, 1994).

When I describe some of these past theories of temperament to audiences today, it often provokes a bit of a smug smile and perhaps a feeling of gratitude for being able to live in a more enlightened age, when scientists no longer study bile in order to understand personality. Nevertheless, if one simply substitutes serotonin, dopamine, norepinephrine, and GABA (gamma-aminobutyric acid) for phlegm, blood, black bile, and yellow bile, it becomes clear that in some fundamental ways, not much has changed. An important parallel between ancient temperament

theories relating to the four humors and modern biological hypotheses of temperament relating to levels of neurotransmitters is that in both frameworks, the same substances play key roles not only in determining personality traits, such as overall mood, but also in disease states, such as clinical depression or melancholia.

While the balance of the humors was thought to be intrinsic to the individual, it was also believed to be responsive to the environment, especially the weather. Personality could thus change with the seasons, and societies living in different climates were predicted to have different predominating traits that characterized that culture. People from dry and cool areas, for example, would be expected to possess a generally melancholic personality in comparison to those living in warm, moist areas. These ideas provided a basis for some ethnic stereotypes that persisted well into the 19th and 20th centuries.

In the earliest theories, we can see temperament and personality described both in terms of dimensions (e.g., larger relative amounts of black bile corresponded with traits such as sad and reserved) and in terms of types into which groups of individuals with a similar constellation of traits can be categorized. This dual classification scheme remains with us today and is discussed in detail in Chapter 2.

### *Early 20th-Century Ideas*

While a casual telling of the history of temperament may leap from Galen all the way to the 1950s and the work of Chess and Thomas, much happened in the interim. Many important scholars and researchers of the early 20th century are not household names, even among scientists. At the same time, more famous theorists such as Carl Jung and Ivan Pavlov, who are popularly known in other contexts, crop up in the literature as unexpected advocates for the notion of innately driven personality predispositions.

In 1896, Bernhard Hellwig wrote *The Four Temperaments in Children*, in which he discussed not only the four main temperament types but also the optimal way in which parents and teachers could work with these different types of children. With little modification, he maintained the historic temperament categories of sanguine, choleric, melancholic, and phlegmatic. The sanguine child (about 20% of the population) was mainly happy with a lot of nervous excitement, but also prone to deceit. Choleric children (10%) were bold but prone to angry outbursts. The melancholic type (5%) described a more sullen and dejected predisposition, and the phlegmatic type (also 5%) was cool and often unmotivated. The rest, it is important to note, did not fit easily into any of these categories. These temperaments were thought to be related to the temperature of the blood and therefore to the climate of a particular country, but other factors could figure into the equation. Some children, Hellwig argued, had a temperament determined by "outward circumstance," thus contributing to the age-old nature-versus-nurture debate. Perhaps most notable, however, was his early attention to the importance of what would later be called a temperament "goodness of fit" between a child and his or her surroundings, and the need to shape a child's environment so that it optimally adapts to the child's traits. Hellwig wrote that parenting and teaching practices need "to suit the different temperaments of various children" (1896, p. 3) well before the emergence of Individualized Education Programs.



In the early 20th century, psychodynamic theories of personality became popular, led of course by Sigmund Freud and later by scholars such as Carl Jung. Although a full summary of their contributions is well beyond the scope of this book, a few aspects have particular relevance. While some of Freud's early writings allowed for the possibility of innate behavioral differences between infants, his core theories de-emphasized temperament as it is understood today and focused on personality as based in universal sexual and aggressive drives and how they are handled in early stages of life. In contrast to the idea that various substances are responsible for different traits, Freud espoused the idea of a more unified type of energy or libido that is present in everyone, with variations among people arising from how the ego and superego defend against these urges.

Freud's daughter Anna further developed the idea of defense mechanisms and personality traits in children. While she remained a strong proponent of psychoanalysis throughout her career, Anna Freud was also able to acknowledge the existence of child temperament without naming it as such. In her well-known work *Normality and Pathology in Childhood*, she describes the existence of "general characteristics of the personality" that are part of a child's "individual constitution." Using psychoanalytic language, she wrote, "experience shows that a child's chances of remaining mentally healthy are closely connected with his reaction to the unpleasure which is released whenever drive derivatives

remain unsatisfied. Children are very different in this respect, apparently from the outset" (Freud, 1965, p. 134).

One component of Freudian theory that has important implications for the boundaries between normal and pathological behavior is the idea that the processes that shape normal variation in personality and those that lead to pathological symptoms are one and the same. Indeed, the central focus on a person's attempt to defend against quite inappropriate sexual and aggressive impulses was a primary reason many people began to move away from Freud's concepts.

In the 1920s, Swiss psychiatrist Carl Jung hypothesized that an individualized personality could be described as a point in three-dimensional space along the following three axes: thinking-feeling, intuition-sensation, and, most famously, introversion-extraversion. Although he may be better known for more mystical-sounding constructs such as archetypes and the collective unconscious, some of Jung's writings suggest a willingness to consider a child's predisposition along these three axes—a perspective akin to what is now described as temperament. In his 1923 work *Psychological Types*, Jung seemed to struggle somewhat against the prevailing "psychological" theories of personality development, writing that this view needs to "yield before the equally unarguable fact that two children of the same mother may at a very early age exhibit opposite types, without the smallest accompanying change in the attitude of the mother. . . . This experience compels me to conclude that the decisive factor must be looked for in the disposition of the child" (Jung, 1923, p. 415). Jung's work in this area paved the way for the development of other personality structures and instruments such as the Myers-Briggs Type Indicator and the Keirsey Temperament Sorter, both of which helped push the focus away from the academic study of children and toward the assessment of adults for commercial and vocational purposes.

Around the time of the Great Depression, early versions of many modern concepts of temperament and personality began to take root. American psychologist Gordon Allport is credited as one of the founding fathers of personality psychology and the idea that personality is made up of individual traits that he categorized as cardinal (dominant), central (consistent), and secondary (exhibited under certain situations) (Allport, 1961). Temperament was thought of as a component of personality. Also around that time, researchers began to design observational studies of children. Psychologist Mary Margaret Shirley followed a small group of



infants and toddlers and described the changes she observed during the first two years of life. She described temperament traits as a "nucleus of personality" (Shirley, 1933).

### *Emerging Behaviorism and Medical Models*

Also emerging in the early 20th century were researchers who took a more experimental approach to temperament and personality through the use of animal studies and, for human studies, the now-ubiquitous questionnaires. Along with these instruments came early versions of a statistical technique called factor analysis, which investigators used to coalesce the many items of a questionnaire into a relatively small number of higher-order factors or dimensions. Much of this work was done with adults and college students. Using these techniques, researchers such as Webb and Burt from England, Heymans and Wiersma in Germany, and Cattell in the United States converged on the idea of major temperament dimensions such as extraversion or conscientiousness (Rothbart, 2011; Webb, 1915) that are part of the "Big Five" scheme used today (Digman, 1990; McCrae & Costa, 2003). These early studies laid the groundwork for additional scholars such as noted personality researcher Hans Eysenck (1967) to begin systematic investigations into the underlying neurobiology of major traits.

The second half of the 20th century was also witness to a major challenge to then-dominant Freudian theories of child development—behaviorism. Under this view, children do not come into the world preprogrammed to act in particular ways because of humors or the temperature of their blood. Neither is their development shaped by channeling instinctual sexual and aggressive drives. Instead, infants are more like a "blank slate"—to use English philosopher John Locke's term—to be shaped by learning and experience. The two main types of learning that were studied at that time included classical conditioning and operant conditioning. In classical conditioning, exemplified by the work of Russian physiologist Ivan Pavlov, learning occurs through *association*. He demonstrated in dogs that if the *unconditioned stimulus* of food presentation is paired with another *conditioned stimulus* such as a ringing bell or a whistle, then over time, the physiological response of salivation can be triggered by the presence of the conditioned stimulus alone (Pavlov, 1927).

Interestingly, Pavlov was also a major student and proponent of tem-

perament, although that work receives far less attention in Psychology 101 classes than does his salivation work with dogs. Ironically, these same dogs and the way they seemed to differ from one another behaviorally led Pavlov to investigate further the way these traits affected the dogs' ability to be conditioned (Gray, 1980). Toward the end of his career, Pavlov applied his studies of temperament to psychopathological states. He examined how animals develop an "experimental neurosis," during which they became increasingly agitated and disturbed as they were put through more challenging experimental procedures (Plaud, 2003). He also studied how quickly people shut down under extreme stress or pain, a reaction called transmarginal inhibition, which has direct implications for conditions such as post-traumatic stress disorder (PTSD).

Coming back to behaviorism, the other broad type of learning—operant conditioning—occurs when the probability of a behavior occurring increases or decreases based on whether the behavior is *reinforced* or *punished*. A child will continue to act defiantly, for example, if he or she learns that such behavior works to produce the desired effect. Anxious behavior can also be learned, and therefore unlearned. When a child performs an elaborate ritual to ensure that nothing bad happens to her family, and then nothing bad occurs, that ritual has just been reinforced and will therefore be more likely to continue.

The behaviorists, including luminaries such as John Watson and B. F. Skinner, drew a stark contrast both with the Freudians and with those who emphasized the inherited aspect of personality. Their focus was on the observable and measurable behavior itself rather than the inner workings of the unconscious, which was reportedly accessible only in fleeting and indirect glimpses. Proponents from each of the two schools of thought were predictably quite critical of each other, but in many ways managed to keep themselves apart, arguing from afar in separate conferences, seminars, and scientific journals. This divergence was partially due to different educational pathways, with the Freudian or psychodynamic theories taught as part of the training for psychiatrists and behaviorism taking root in academic psychology. The ability of prominent scholars of one theory to remain insulated from evidence being produced by researchers in the same field, sometimes even on the same university campus, seems remarkable. While one group of psychologists was vehemently defending the supremacy of a blank slate model of children whose behavior is shaped through association, punishment, and reward, a lab down the hall was successfully breeding animals on the basis of their inherited behavioral tendencies. This type of disconnect continues today, despite the modern revolution in information accessibility.



### *Chess and Thomas*

It was into this world of the feuding behaviorists and Freudians that the work of Stella Chess, Alexander Thomas, and their colleagues emerged. In what came to be known as the New York Longitudinal Study (NYLS), the husband-and-wife research team, who were both psychodynamically trained child psychiatrists, began to follow a group of 138 white, middle-class infants and 95 economically disadvantaged infants of Puerto Rican descent (Chess, Hertzig, & Thomas, 1962). While such a project in and of itself was not completely novel in the 1950s, Chess and Thomas directly observed the children rather than relying on maternal reports, and they further included other aspects such as IQ testing and a clinical psychiatric assessment. The study began in 1956 and was designed with mainly psychoanalytically oriented goals in mind (Klein, 2011). However, their observations began to hint at mechanisms that did not seem to fit with any of the dominant frameworks of child development at the time. Siblings raised under very similar conditions were often observed to be quite different. Children of loving and skilled parents could be extremely challenging behaviorally, while other children who were raised under quite adverse conditions sometimes proved to be remarkably resilient. These findings propelled Chess and Thomas to suggest that child behavior was at least partially due to more innate and autonomous biological factors.

This constituted a major challenge to both of the dominant schools of thought at the time. The idea that behavioral traits could be somewhat inborn ran counter to both the behaviorists' notion of rewards and punishments and the analytical view that prioritized the role of early traumatic experiences and internal conflict. While Chess and Thomas certainly did not pretend that their theory was completely their own, their willingness to advance these ideas and challenge the status quo caused them to take a significant amount of academic heat.

The idea that children are born with significant behavioral tendencies was not only scientifically incongruent to the prevailing theories of child development but also potentially dangerous politically. Many scholars in the 1960s had lived through World War II and had seen the horrific mis-

use of power in Nazi Germany, which stemmed from the central premise that certain groups of people were intrinsically different and superior to others. Furthermore, the fabric of moral life from a religious perspective depended on a person being responsible for his own behavior. When it came to young children, that responsibility was held by the parents, such that negative child behavior was seen as a reflection of parental deficiencies. The practice of "mother blaming" for all kinds of childhood conditions was particularly prominent during this era (Caplan & Hall-McCorquodale, 1985). Thus, the idea of innately driven temperament traits stood to undermine fundamental concepts of individual responsibility and was seen as a potential platform for further prejudice and discrimination.

Fortunately for Chess and Thomas, they were able to back their ideas with compelling data that were not easily dismissed, and the study of child temperament was brought back into mainstream discourse, even if not everyone was ready to accept it. As for the political concerns, it became apparent that what the researchers were suggesting was a far cry from the eugenics movement. While it is important to be mindful of the way scientific concepts can be misinterpreted and misused, it does not make sense to ignore data because of the possibility that some people may go to the extreme. As we will soon see, the genetic influences on child temperament in no way translate to inevitability or destiny. Parenting, morality, positive and negative life events, education, and many other environmental factors can shape temperament traits and their developmental trajectories. Even without such diverse influences on temperament, there is nothing intrinsic about temperament traits that would suggest that some people and not others should be entitled to preferred freedom, opportunity, or law.

Throughout the 1970s and 1980s, the uneasiness associated with the idea of temperament began to subside and it gained increased attention as a worthy topic of study. Part of the reason for this shift was likely the tremendous explosion of research that documented the biological underpinnings of behavior, both for "normal" personality traits and for pathological conditions such as schizophrenia and bipolar disorder. This surge of scientific investigation, exemplified by the National Institutes of Health naming the 1990s the "Decade of the Brain," coincided with a dramatic increase in the use of psychiatric medications to treat anxiety, depression, psychosis, and attention problems. Strangely, however, the synchronous appreciation regarding the neurobiology of both temperament and psychiatric disorders did little to change the public perception that the two domains were essentially separate. People both within and outside of the mental health community continued to view psychopathology primarily as an externally driven disease, with causes that were qualitatively rather than quantitatively different from those of even similar-sounding personality traits. Children's varying activity levels, for example, were essentially kept separate from the study of ADHD. Panic attacks were thought to "come out of the blue" rather than being related to an anxious personality type. Depressive episodes descended upon people like the flu, without any advance notice.



To some degree, the dichotomy between traits and psychiatric illness continues today, despite the fact that many of the core principles of temperament, as promoted by Chess and Thomas, are no longer considered to be particularly revolutionary. The idea that children are born with some inherent predispositions toward certain traits that can be shaped over time into more or less adaptive functions is unlikely to draw major protest from the scientific community these days. At the same time, major gaps remain in our knowledge regarding fundamental aspects of child temperament, the degree to which temperamental traits are linked to psychiatric disorders, and the mechanisms underlying those associations.

## Goals and Principles of This Book

This book concentrates on what is known about temperament and its relations to psychopathology since the landmark research of Chess and Thomas. It is divided into two parts: Part 1 is a synthesis of what is currently known about temperament and its links with emotional-behavioral problems, and Part 2 is a practical guide to how this new knowledge can be applied by mental health professionals, educators, parents, and others.

Many fine books about temperament have been printed over the years, and a number of them are cited in this and subsequent chapters. The hope here, however, is to provide a bridge between the two prevailing types of volumes that have been produced—research-oriented publications and "how-to" books. The first type chronicles in great detail important studies, often carried out by the author. Such works can be tremendously helpful, especially to those interested in running their own studies at some point. During my training as a child psychiatrist with an academic interest

in temperament, these books were often found on my coffee table. At the same time, readers with an interest in temperament but without a background in research or neuroscience might find that level of detail beyond what is necessary, and lacking in practical application. How-to books, on the other hand, offer a great deal of advice on incorporating temperament into everyday life. These works offer hands-on strategies that are readily applicable, yet may leave data-driven persons (like me) wondering whether such guidance comes from the solid conclusions of controlled studies or the inner workings of a single individual whose opinions have been shaped by his or her own dreams and disappointments. Thus, the goal of this book is to provide not only a readable summary of the current science of temperament but also a scientifically informed guide to applying temperament-based perspectives in real-life settings.

Throughout these chapters, efforts will be made to keep scientific jargon to a minimum and explain even complex neurobiological processes in plain English. While the book is written with a clinician as reader in mind, parents, teachers, and any other persons interested in the topic should have no trouble adapting the text to a different perspective. Another goal is to articulate the importance of these findings beyond their inherent scientific interest. Such value will not be difficult to explain, as the study of temperament and its relations to psychopathology may usher in a fundamentally new way of addressing psychiatric disorders that is potentially less stigmatizing and more effective. A full appreciation of these concepts also compels parents, clinicians, and educators to challenge many long-held beliefs.

Chapter 2 reviews some of the core principles of temperament including its definition, core dimensions and types, and overlap with the concept of personality. Chapter 3 then expands upon certain elements of temperament that have received study such as its degree of stability over time, differences between males and females, and factors such as birth order. Chapter 4 plunges into the neurobiology of temperament, including genetic and environmental influences, brain regions, neurotransmitters, and associated physiology. Attention will be paid here to putting together these different domains as much as possible into a synthesized process, with an emphasis on the idea that genetic and environmental factors impact not only temperament but also each other. After this solid foundation has been laid, the next two chapters get into the heart of the matter—which temperament traits are related to which psychiatric



disorders and the critical issue of how these two constructs are intertwined. It is here that we will address the search for boundaries that separate normally varying temperament traits and pathological psychiatric symptoms.

The second part of the book explores practical applications of this new knowledge of temperament and its associations with psychopathology. Chapter 7 examines how a new understanding of temperament and psychiatric disorders may alter the clinical approach in mental health settings. Case examples will be presented in this chapter but represent composites of many individuals rather than specific examples. Chapters 8 and 9 explore temperamentally based parenting strategies that can be used to add some needed complexity to the "one size fits all" parental advice that is so prevalent today. Then, in Chapter 10, I propose an approach to enhancing school environments and educational processes using a temperament-informed perspective. Finally, the last chapter addresses behavioral medications and how they alter temperament, both during the treatment of psychiatric illness and through the deliberate use of these agents to alter or augment certain human characteristics.

There is certainly a lot of ground to cover. By the end of this book, readers can expect to have a solid and current knowledge base regarding child temperament and the boundaries between traits and mental illness, as well as a new set of temperament-based perspectives and approaches for parenting, teaching, counseling, and treating our children.

Chapter 2

# The Basics of Child Temperament

After more than 40 years of focused attention from scholars across the world, one might think that the fundamentals of child temperament would be worked out by now, including its proper definition, core dimensions, and relations to constructs such as personality. Unfortunately, this is not the case. One main reason for the delay is the fact that beneath the theories and models and logical arguments, temperament must ultimately boil down to brain activity. And while certain regions do specialize in certain functions, the operations of the brain are remarkably interconnected and seamless. Concepts such as temperament, personality, extraversion, and sociability are, in the end, just words that we have created, and searching for an organic line between temperament and personality is a bit like standing in the middle of a desert looking for a natural boundary between Arizona and New Mexico. Nonetheless, science does tend to progress most quickly when there is at least some consensus about what exactly we are studying. And while brain functions are indeed complex and interrelated, there are places where we can "carve at the joints" and separate constructs in a meaningful way.

## Defining Temperament

One definition of temperament from a prominent researcher, Mary Rothbart, is "constitutionally based differences in reactivity and self-regulation" (Rothbart & Derryberry, 1981). Chess and Thomas (1996) described temperament as a child's behavioral style—the *how* or *way* of behavior, distinct from motivation or the *why* of behavior. This definition, as they viewed it, served to separate temperament from ability or motivation. Another distinguished temperament scholar, psychologist Jerome Kagan at Harvard University, defined temperament as "an inherited physiology that is preferentially linked to an envelope of behaviors and emotions" (Kagan & Snidman, 2004).



These various definitions share common threads but include and emphasize different points. Does temperament have to be inherited? Can ability really be excluded? During a "temperament roundtable" in which the participants attempted to achieve consensus about the definition of temperament (Goldsmith et al., 1987), the following core features were listed as requirements of a temperamental trait:

- Appearance early in life. How early is early enough continues to be a matter of debate, but certainly observable components during infancy should suggest at least the emergence of the trait. An extraverted toddler might not yet be able to make small talk smoothly with several friends from day care, but he could show a preference for the excitement of the playground over playing quietly with a puzzle. A regulated infant probably won't take 10 cleansing breaths when getting overstimulated by an intrusive grandmother, but she might have the ability to turn her head and look the other way.
- Genetic influence. When people talk about temperament, words like "innate," "constitutional," and "predisposition" are often used, conveying that it has been present from the very beginning of life. Our knowledge of genes and how they influence behavior has advanced quite a bit in the past few decades, as will be demonstrated in Chapter 4. For now, it is probably sufficient to say that temperament traits are influenced by one's genes but certainly not controlled by them.
- Stability over time. Temperament is considered to be enduring. The level of a particular trait at one point in life is predictive of levels of that trait at a later point, even decades later. Stability, however, is not synonymous with intractability, just as genetic influence should not be confused with genetic destiny. Kagan and Snidman (2004) have used words such as "envelope" or "retaining wall" to describe the idea that temperament influences the probability that certain psychological profiles will be attained later in life.

One of the best analogies I have come up with for temperament is in music. If a person's life is a symphony, then his or her temperament is the main key of that piece of music. This key, whether F major or A minor, does not restrict the endless possibilities that can arise in the symphony, but it is always there, influencing the tone of the music throughout the piece. The key of a composition is detectable to the discerning ear and intuitively perceived by nearly everyone. From time to time it may change, but eventually, it comes home.

## Frameworks of Temperament

There are two main ways to carve up the overall concept of temperament. The most common, a *variable-centered approach*, divides temperament into a number of dimensions such as extraversion or novelty seeking. These dimensions are then subdivided into smaller and more specific components or facets, such as impulsivity or perceptual sensitivity. A contrasting, albeit related, strategy is to group people who have similar behaviors across a variety of dimensions into types or classes. These two approaches are not contradictory; rather, each perspective can inform the other. There are even statistical procedures, such as factor mixture models, that produce a hybrid between the two approaches. Before getting into that level of complexity, however, let us look at some of the primary dimensions of temperament that have been proposed, studied, and modified over the years.

### *Chess and Thomas*

With the help of their colleagues Herbert Birch, British psychiatrist Sir Michael Rutter, and others, Chess and Thomas took the extensive data from the New York Longitudinal Study and hypothesized that child temperament could be organized into nine main dimensions, listed below (Thomas, Birch, Hertzig, & Korn, 1963). While considerable refinements have taken place since this structure was introduced, the nine dimensions have endured as a cornerstone of developmental psychology as it is taught around the world.

1. Activity level. Here the emphasis is on actual motor activity. Children with higher activity levels often prefer physical play in contrast to play that involves extended sitting.



2. Rhythmicity (regularity). Taking into account patterns of sleeping, eating, and elimination, this dimension reflects how predictable these functions are over time. For example, some young children get tired each night at nearly the same time, whereas others seem to have no regular pattern at all. Older children with high rhythmicity might have specific routines that involve snacking or sleeping habits.
3. Approach or withdrawal. This aspect examines a child's response to novelty such as a new person or a new place. A child with a high-approach temperament exhibits more exploration, whereas those on the withdrawn side show more negative emotions and avoidance of new experiences. The high-approach child might be excited to take vacations in new places, try the latest roller coaster, and meet the new student in class. The child with lower approach, by contrast, is likely to show restraint and caution and prefers predictable routines.
4. Adaptability. This dimension captures the ways in which a child can modify and be modified to function in a particular environment over the long term. In a school context, this trait can be related to the tendency for some children to do well from year to year regardless of the teacher, whereas others show marked variation across grades as they encounter new teachers and educational styles.
5. Threshold of responsiveness. Regardless of the actual type of response, this trait covers the amount of stimulus it takes to elicit a response in a child. People often talk about how easy it is to "push someone's buttons" or "rock their boat." This dimension also encompasses responses to sensory stimuli such as sounds, textures, and tastes.
6. Intensity of reaction. Once a reaction is triggered, this dimension captures the amplitude of the response, whether positive or negative. For children with high-intensity reactions, happy emotions are expressed with enthusiasm and joy, and negative reactions may be characterized by rage or panic. Youth with lower intensity tend to stay on a more even keel.
7. Quality of mood. The baseline emotional state is what is being discerned here, ranging from a generally happy and pleasant disposition to one that is generally negative and unfriendly.
8. Distractibility. This dimension refers to how easily external stimuli can interfere with a child's current activity. Kids with high distract-

ibility tend to bounce from one thing to another, especially when other children and activities are available, whereas low-distractibility children are not easily sidetracked.

9. Attention span and persistence. The attention span component reflects how long a child continues to focus on a particular activity. Persistence is a related concept but adds a degree of being able to overcome obstacles that might get in the way of an overall goal. This dimension can be observed across many settings, especially with older children, as they perform schoolwork, play board games, or try to learn a new sport or skill.

In addition to the variable-centered framework that breaks down temperament into specific dimensions, Chess and Thomas also proposed a person-centered scheme consisting of three temperament types that describe groups of children who possess a similar profile of several traits. The "easy" child group (roughly 40% of the sample) exemplified traits such as high regularity, positive quality of mood, high adaptability, and average to high levels of mood intensity. In contrast, the now-famous "difficult" children showed low regularity, low quality of mood, withdrawal, high intensity, and low adaptability. This group represented about 10% of the sample. Since the "difficult child" label emerged, the term has exploded into common language, now referring to all kinds of challenging behavior. Finally, there was a "slow to warm up" group. These children, especially in new situations, looked similar to the difficult group, although perhaps at a lower level of intensity. Like the difficult group, these kids generally showed low rhythmicity. However, if given the chance, they could become much "easier" with time, showing more positive responses as they became accustomed to the new situation. This group represented about 15% of the children studied.

For those doing the math, these groupings still leave 35% of the children uncategorized. Similar to the ancient Greek and Roman temperament scholars, Chess and Thomas also found a sizable segment of their sample who could not easily be placed in one of their boxes. Who are these people who keep coming up and why can't they be categorized easily? One reason a child might not fall into one of the main profiles or types is because he or she possesses a combination of traits that doesn't fit any of the major patterns, such as low regularity, low adaptability, and high mood. For others, however, the problem in categorizing arises not from the particular combination of traits that are displayed but rather



from how inconsistently the traits are displayed across various settings. For example, certain children might be labeled as difficult at home but easy at a child care facility. The richness of the data that were collected in the NYLS compelled the researchers to acknowledge the fact that their data sometimes challenged one of the core tenets of temperament, namely that it describes the manner in which a child typically behaves and reacts. For many children, behavior is unpredictable and the word typical does not seem to apply. This understudied but potentially very important component of temperament is discussed in more detail in Chapter 3.

### *More Cooks in the Kitchen*

The pioneering work of Thomas, Chess, and their colleagues put child temperament back onto the radar screens of countless mental health professionals who had previously given little thought to the topic. Their work brought in new followers, new enthusiasm, and, inevitably, new skeptics. Among the questions from challengers was whether or not the framework of these nine proposed dimensions was indeed the best way to conceptualize temperament. One criticism pointed to the fact that the nine dimensions were derived without the application of modern statistical procedures to determine empirically which types of traits hold together as discrete entities. In the 1960s, many of the statistical procedures used today, such as factor analysis, principal component analysis, cluster analysis, and latent class analysis, were still in their infancy. Some of the analyses had been described, but in the absence of computers, their applications were tedious and esoteric. Although observation and good clinical judgment are critically important (and many now consider them dying arts), they are prone to bias. In addition, there is always the possibility that Chess and Thomas missed including some important elements of temperament that would therefore not be part of their final model.

Steadily, the nine-dimension framework was put to the test, even utilizing data from Chess and Thomas themselves. While many of the dimensions seemed to hold up well to scrutiny, some refinements appeared to be warranted (Martin et al., 1994). Dimensions such as attention span and distractibility were thought to be better conceptualized as being part of the same factor rather than separate dimensions (which may be why both dimensions became criteria for disorders such as ADHD). Other dimensions such as rhythmicity looked as though they might need to be subdivided, as many children were rhythmic in some parts of their life (e.g., sleeping) and less so in others (e.g., eating). Sensitivity was another

dimension that seemed prone to losing coherence. Some children with autism, for example, are incredibly sensitive to the tactile sensation of clothing tags against their skin while at the same time have remarkable tolerance for pain.

Throughout the 1970s and beyond, more and more researchers were studying temperament and personality and coming up with classification schemes, or taxonomies, that bore some resemblance to that of Chess and Thomas but often departed from it in important ways. Hans Eysenck proposed three main higher-order dimensions of personality: neuroticism, extraversion, and psychoticism (Eysenck & Eysenck, 1975). In the temperament arena, researchers such as Buss and Plomin, Cloninger, and Rothbart proposed systems of their own. The temperament dimensions proposed by these scholars and the instruments designed to assess them provide the basis for much of the research that is reviewed in this book.

To this day, there remains no universally agreed-upon structure or framework for child temperament (Rothbart, 2004). The renewed interest in temperament has spawned new generations of researchers who have proposed their major dimensions of temperament, as well as new ways to measure them. Readers of child temperament studies now commonly encounter different taxonomies from article to article. Those who conduct their own temperament research and plan their own studies must decide between choosing an existing framework (and the accompanying rating scales that typically go along with them) versus coming up with their own structure and assessment scales, an endeavor that can take quite a bit of effort.

On the one hand, the coexistence of many different ways to understand and categorize temperament dimensions adds richness to the field. The question of which taxonomy is most accurate is also, to some degree, a testable question that can be addressed in research studies and then generate lively discussions at conferences. One the other hand, competing frameworks can make it very difficult to interpret and compare studies across different research groups. When that happens, the progress of the entire field can decelerate.

Consider, for example, two studies trying to find genes that are related to a particular trait. Both studies focus on the famous serotonin transporter gene, a gene that is involved in the proper flow of the brain neurotransmitter serotonin (more about that in a later chapter). Both studies are interested in the relations between that gene and a temperamental



propensity to experience negative emotions like sadness or anxiety. Furthermore, let's assume that both studies also chose a sample of children around the same age and measured temperament by having the child's mother fill out a questionnaire. One study, however, adopted the framework of one prominent temperament researcher and used a scale that measures the trait of negative affectivity, while the other chose a different instrument that measures the trait of harm avoidance. While both of these dimensions do indeed get at the tendency to experience negative emotions, they are not identical with regard to the wording of the questionnaire items, the relative number of items that refer to sadness versus anxiety, or the inclusion of other subcomponents like how easily someone becomes fatigued.

Now assume that both studies are published and one of them finds a statistically significant link to the serotonin transporter gene and the other does not. This very common scenario in science is called nonreplication and, if it happens enough, can lead to researchers and funders of researchers to abandon particular areas of investigation. The question is, however, whether these studies are truly similar enough to call this disagreement a nonreplication or whether the disparity has more to do with the fact that their dimensions of interest, while similar in many ways, are different enough to cause these varying results. Without further investigation, it is very difficult to know.

This situation has led some leaders in the field of temperament to call for consensus building and at least a trimming of the number of different frameworks used. There seems to be some agreement that such efforts are worthwhile until the process gets down to which frameworks should be used and which should be dropped. Then it gets complicated. Researchers who have proposed particular taxonomies for temperament and have developed instruments in their service have invested a lot of scientific capital in them. Having their scheme devalued could result in a loss of prominence, reputation, academic momentum, and, in some cases, royalties. While everyone agrees in theory that we need to let the data decide these debates, separating the human element is not always simple.

## Major Dimensions of Child Temperament

Before getting too discouraged about the roadblocks to categorizing temperament traits, it is worth noting that the field has definitely moved for-

ward since Chess and Thomas opened the door. Many of the major and minor temperament dimensions that have emerged from multiple classification frameworks are now generally accepted. Debate and refinement will undoubtedly continue, but the following represents what to many are the core dimensions of temperament as they are understood today. A summary of these dimensions can be found in Table 2.1.

TABLE 2.1.
**Major Temperament Frameworks Since Chess and Thomas**

| Founder | Negative Emotionality/ Withdrawal | Extraversion/ Approach | Sociability | Activity | Regulatory Ability | Scales |
|---|---|---|---|---|---|---|
| Rothbart | Negative Affectivity | Extraversion/ Surgency | | | Effortful Control | Infant Behavior Questionnaire; Child Behavior Questionnaire; Early Adolescent Temperament Questionnaire |
| Cloninger | Harm Avoidance | Novelty Seeking | Reward Dependence | | Persistence | Temperament and Character Inventory (and Junior version) |
| Gray | Behavioral Inhibiting System | Behavioral Activating System | | | | |
| Buss and Plomin | Emotionality | Shyness (R*) | Sociability | Activity | | EAS Temperament Schedule |
| Kagan and Snidman | Behavioral Inhibition | Behavioral Disinihibition | | | | Laboratory Observation Protocol |

*R = reversed

- Negative emotionality. Nearly every temperament taxonomy contains a dimension related to how easily a child experiences negative emotions such as anxiety, sadness, or anger. Some have labeled this dimension neuroticism, in deference to some of its historical roots, while others have used the term emotionality (Buss & Plomin, 1984) or negative affectivity (Rothbart, Ahadi, & Evans, 2000). In temperament schemes that are less focused on the outward manifestation of traits and more aligned with underlying motivational systems, this dimension has been labeled harm avoidance (Cloninger, Przybeck, & Svrakic, 1991), which is described as a reflection of a person's sensitivity toward cues of punishment or part of the behavioral inhibition system (Gray, 1987). It has further been suggested that this broad dimension can be broken down into two main areas that operate somewhat independently of each other, namely negative responses to being limited (frustration, irritability) and negative responses to novelty (shyness, fearfulness) (Rothbart, Ahadi, Hershey, & Fisher, 2001).
- Extraversion. Another dimension with good consensus but a few wrinkles to work out refers to approach behavior and the tendency to engage the world and other people. Versions of this quality have been called extraversion, surgency, novelty seeking, and approach. It is thought that extraversion reflects the functioning of an individual's behavioral activating system (BAS) (Gray, 1982). Components of this broad dimension include qualities such as impulsivity, sensation seeking, spontaneity, dominance, and exuberance. There is often but not always a social component to the dimension as well, with highly extraverted people being gregarious and gaining enjoyment from being the center of attention.
- Regulatory ability. The ability to control the output of the previously mentioned dimensions is often considered to be a trait in itself. Across different theoretical frameworks, the trait has been called effortful control or persistence. Like the other broad dimensions, it can be further broken down into interrelated but somewhat separate domains, such as the regulation of attention, emotion, and behavior (Althoff et al., 2010).

Some temperament schemes don't specifically include regulatory processes as a separate major dimension, under the idea that it is already incorporated into other dimensions. For example, a child with high levels of negative emotionality can be presumed to have difficulty regulating that emotion. According to other perspectives, however, the *experience* of the emotion of anger is distinct from its *expression*, and a child with high

negative emotionality and high regulatory ability could well feel anger intensely but not show it. Developmentally, regulatory abilities progress rapidly throughout childhood. Not many 2-year-olds can powerfully feel an emotion without expressing it; however, the same cannot be said for many teens. Thus, the inclusion of this dimension as a separate major player may depend somewhat on age.

One perhaps oversimplified analogy that illustrates the complexity of the relations between regulatory ability and other traits is the observed speed of a car as a function of the accelerator and the brake. Consider two cars coming to a stop at an intersection, both at 30 miles per hour. The first car is moving slowly because the driver is pressing only very gently on the accelerator and the brake is not being applied. The driver of the second car is actively stepping on the brake after having used the accelerator more aggressively. Negative affectivity and extraversion would be considered accelerator-type systems, while regulatory ability is the brake, and one cannot judge the degree to which both systems are being engaged simply by looking at the speed of the car.

The accelerator and brake, like most analogies, falls short with additional scrutiny. In cars, the accelerator and brake systems operate independently, with the accelerator delivering force to the axles and the brake applying friction to the wheels. In the brain, however, things aren't divided up so cleanly, and the accelerator and brake regions are connected both anatomically and physiologically. The output of one system thus modifies the other from the very start.

### *Other Proposed Dimensions*

Beyond the "big three" above, several other dimensions have been proposed as major traits and have found their way into the scientific literature.

- Activity level. This trait is sometimes included as a stand-alone, higher-order trait in frameworks such as the Buss and Plomin (1984) model. In their system, activity refers to a hurried, fast-paced lifestyle and the experience of bursting with energy. In other frameworks, the dimension is seen as a component of extraversion.
- Sociability. When the activity or extraversion dimension is kept distinct from social qualities, sociability can emerge as a major independent dimension on its own. Think here of the difference



between a lion and a tiger—two animals with comparable activit levels but very different levels of sociability. Lions live in prides They hunt together, look after one another's cubs, and hang out i groups, while tigers are much more solitary creatures, usually com ing together only to mate.

- Shyness. In many ways, shyness would seem like the prototypica temperament trait. Going back to the three required criteria of temperamental trait, shyness does often emerge very early in life tends to be stable over many years, and has been shown to be unde at least moderate genetic influence. Shyness refers to the tendenc to be timid, withdrawn, and uncomfortable in social situations. I differs from traits such as sociability because most people who ar shy enjoy and even crave social contact, but find it very difficult an anxiety provoking. Further study of shyness, however, has revealed it to be a bit more complex. One study from Norway found tha among children between the ages of 18 months and 9 years, thos characterized by their mothers as being shy fell into two mai groups: those whose shyness was driven by high levels of genera anxiety (high negative emotionality) and those whose shyness was function of low approach behavior accompanied by lower sociabil ity and activity (Janson & Mathiesen, 2008).
- Behavioral inhibition. The term *behavioral inhibition* was coine by Jerome Kagan and his colleague Nancy Snidman. The research ers followed a group of subjects from infancy into adulthood, an many other scientists such as Dina Hirshfeld-Becker have continue the investigation with other groups of people. Behavioral inhibi tion (or BI for short) refers to the tendency to show restraint an fear when presented with novel situations or people. Studies hav shown this trait to be present in about 10–15% of 2-year-olds, wit approximately the same percentage showing an opposite patter of behavioral disinhibition—children who are bold and approac novelty (Kagan, 1994).

There is a great deal of research surrounding BI and its associatio with particular genes and patterns of brain function. BI has been describe as a risk factor for later psychopathology, in particular anxiety disorder (Chapter 5 explores this association in more detail). Here I discuss how B fits into other temperament frameworks. Unlike the majority of personal

ity and temperament researchers, Kagan and his colleagues have focused their research efforts on this one trait rather than trying to organize an entire temperament structure. Relative to some of the dimensions recently described, BI might also be understood as the combination of high negative emotionality and low extraversion or approach. The overlap between BI and plain old shyness has certainly been noticed, although certain distinctions exist between the two labels.

Our research group in Vermont applied a statistical analysis called latent class analysis to a group of children (average age 11) whose mothers completed a temperament questionnaire about them that contained items related to the construct of BI (Rettew et al., 2004). The analysis was used to examine patterns of children's scores, and then to divide the children into a small number of groups on the basis of their scores. The results showed that while most children manifested no excessive reticence and fear of novel people and situations, there was a small group that did. In this way, the analysis supported the construct of BI. However, the procedure also found evidence of groups of children who were restrained in the face of novel people or novel situations, but not both. Thus, our analysis suggested that analyzing BI as a single trait may be lumping together two distinct traits that can also exist independently. Regardless of whether BI is its own entity or a combination of other traits, important work continues with behavioral inhibition and disinhibition, which will be covered as we explore the neurobiology of temperament and its relations to emotional and behavioral problems.

## Temperament Types and Profiles

Whether the research community settles on three, nine, or ninety main temperament dimensions, there are even more ways in which the traits can mathematically combine in an individual to form an overall temperamental profile. For researchers who use person-centered approaches, the unit of study is not a temperament dimension but an individual person. Given that brain connections are both extensive and nonrandom, however, there is probably good reason to suspect that there is a relatively small number of temperament profiles within a population.

Chess and Thomas attempted to define some of these groups with their designation of the difficult, easy, and slow-to-warm-up categories.



As mentioned, they arrived at these particular groups through careful observation. Since then, other researchers have also tried to characterize groups of children with a similar clustering of traits. In a long-term investigation known as the Dunedin Study, based on the sample's location in New Zealand, researchers have been following a large group (more than 1,000 individuals) from early childhood into adulthood (Caspi et al., 1995). Using a statistical procedure called cluster analysis on three temperament dimensions—lack of control, approach, and sluggishness—the researchers identified five temperament types: undercontrolled (high lack of control and high approach), inhibited (high lack of control and high sluggishness), confident (high approach), reserved (high sluggishness but moderate lack of control), and well-adjusted (average levels across dimensions).

More recently, two Norwegian researchers studied a group of nearly 1,000 children across multiple time points from 18 months to 9 years of age (Janson & Mathiesen, 2008). Using a person-oriented procedure called I-States as Objects Analysis applied to the Emotionality, Activity and Shyness (EAS) Temperament Survey (Buss & Plomin, 1984), they also identified five groups, although the composition of these groups differed somewhat from those in the Dunedin Study. The researchers labeled their groups undercontrolled (high emotionality, sociability, and activity), confident (low shyness and emotionality with high activity and sociability), unremarkable (moderate to low levels of all dimensions), inhibited (low activity and sociability with high shyness), and uneasy (moderate to high shyness and emotionality).

In a study from our research team that involved 200 Vermont families and 447 children with an average age of 11, we attempted to identify profiles of temperament on the basis of the mothers' ratings. The sample contained a higher percentage of children with significant behavioral problems than is normally found in a community sample (Rettew, Althoff, et al., 2008). Rather than relying on our observations to determine the groupings, we used a statistical procedure called latent profile analysis. This procedure takes data from a number of different variables, in this case the child's score on the four temperament dimensions of the Junior Temperament and Character Inventory (Luby et al., 1999), and tries to identify groups of kids with similar profiles. The procedure does this by trying different groupings of numbers until it finds a good "fit"

with the actual data. When we applied this procedure to our data, three groups or classes provided the best fit. The profiles of those three classes are shown in Figure 2.1.

FIGURE 2.1

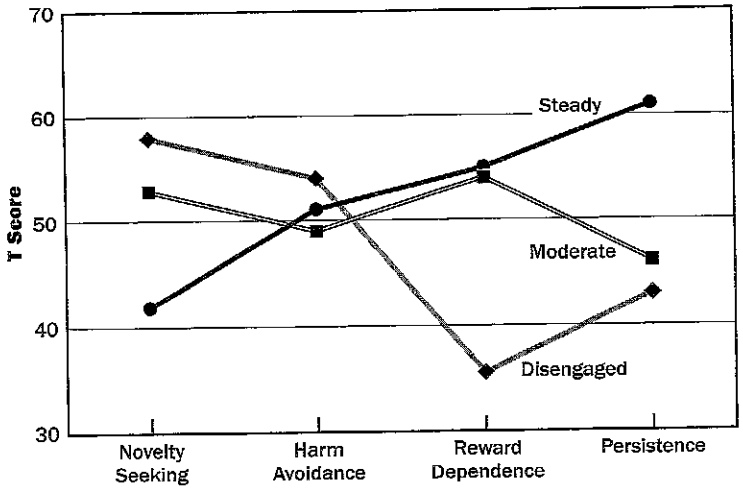


*Figure 2.1. Profiles of temperament as determined though latent profiles analysis. The moderate group shows average levels across all dimensions; the steady group is characterized by low novelty seeking and high persistence; and the disengaged group shows moderately high levels of both novelty seeking and harm avoidance with low levels of reward dependence (adapted from Rettew, Althoff, et al., 2008, and used with permission).*

The largest class, representing 45% of the sample, was the "moderate" class. They tended to have average levels of the four temperament traits. (Incidentally, one of the trickiest and least scientific parts of these kinds of studies is giving the profiles meaningful names, as the computer only labels them class A, B, etc.). The "steady" class was characterized by low novelty-seeking scores and high persistence scores (36% of the sample). This group showed the highest performance of the three groups when it came to school achievement, social functioning, and involvement in activities. The last and smallest group (19% and mainly boys) we called the "disengaged" class, as their profile featured relatively high scores for novelty seeking and harm avoidance (the latter trait similar to negative emotionality and behavioral withdrawal) and relatively low scores for persistence and reward dependence (the latter trait similar to sociability and seeking others when stressed). This group was not doing well, as measured by their school and social functioning and by their



levels of problem behavior. Other important aspects of this group are further described in Chapter 5.

Unlike Chess and Thomas, we were not left with a large number of children who didn't fit into any class, because our particular statistical procedure classified everyone as well as possible. If individuals within a class are too heterogeneous, the procedure indicates that more classes are needed to describe the sample. Nevertheless, one can argue that the analysis can "force" a conclusion of more structure than there actually is. Other procedures such as configural frequency analysis don't classify the entire sample (Aksan et al., 1999) and there is legitimate debate about which statistical technique is best.

It is easy to get lost in all the different studies, with their various methods, samples, and types of profiles. The partially overlapping names for the different types or profiles generate the same sorts of problems when comparing one study to another that are encountered comparing similar-sounding temperament traits. From the confusion, however, some general trends are beginning to arise. Many studies have successfully grouped most of the child participants into a relatively small number of temperament profiles. Table 2.2 summarizes these temperament groups.

- Moderate. This group shows moderate levels across traits and encompasses what other researchers have called average or "unremarkable," a word that seems to have an undeserved negative connotation.
- Mellow. Individuals in this group may or may not be low on stimulus seeking but show relatively high frustration tolerance and can be persistent and focused in working toward their goals. In our own research, we called this group "steady," given their high persistence and low novelty seeking.
- Agitated. This group shows low distress tolerance and low regulatory abilities, with high levels of approach and activity.
- Confident. This group similarly shows high approach or extraversion, but in contrast to the agitated group possesses better regulatory skills and lower anxiety.
- Anxious. This group manifests low approach and high negative emotionality. Like the mellow class, these children tend to avoid the spotlight but are nervous and fearful and can become dysregulated in the process.

**TABLE 2.2.**
**Temperament Types**

| Group Name | Description | Approximate Frequency in General School-Age Population (%) |
|---|---|---|
| Moderate | Average levels of the main dimensions with no prominent outliers | 35 |
| Mellow | Lower levels of approach and energy but not particularly anxious and with good regulatory skills | 20 |
| Agitated | High energy but also prone to experience negative emotions that can be hard to regulate | 10 |
| Confident | High extraversion and sociability with low anxiety and good regulatory skills | 20 |
| Anxious | High negative emotionality but lower regulation ability and lower extraversion | 15 |

In hearing these assignments, many readers may now be trying to fit themselves or their children into one of the groups. Thus, it is a good time to mention that some children will appear to cross two or more categories while for others no group will seem particularly characteristic. While imperfect, the use of profiles is an important development in temperament research because it keeps the focus of study on the individual rather than on the more abstract temperament dimensions. How particular combinations of traits fit together could also offer clues about underlying brain function and the way in which one region may exert regulatory control over others. Finally, a grouping by temperamental type may set the stage for customized guidance and intervention programs that are tailored to the unique features of each class. For these reasons, a profile approach can work well for both scientific research and practical applications, and we will use these five temperament types as the primary groupings in Part 2 of this book.

## Measurement and Assessment

The most widely used tool for assessing child temperament in both research and practice is a questionnaire given to a parent. Older children and adolescents sometimes complete questionnaires themselves. These



questionnaires usually tie into one of the prevailing temperament frameworks shown in Table 2.1. In some systems, different questionnaires are used for children of different ages. For example, Rothbart and her colleagues have developed distinct instruments to be used for infants, young children, adolescents, and adults (Capaldi & Rothbart, 1992; Gartstein & Rothbart, 2003; Rothbart et al., 2001). Other instruments are designed for wider age ranges such as the Junior Temperament and Character Inventory (Luby et al., 1999), although a preschool version has also been developed (Constantino et al., 2002).

These rating scales typically contain a number of statements (the number of items can range from as few as 20 to more than 200) that the informant rates as being characteristic or uncharacteristic of their child's usual behavior. Most rating scales allow for a graded response from "very uncharacteristic" through "very characteristic," with a neutral middle option. The responses then get converted into numbers, say 1 for "very uncharacteristic" through 5 for "very characteristic." Each item is usually designed to tap into just one of the major dimensions that the scale assessed. The total score for a dimension such as negative emotionality is then calculated as the sum or average of the scores for all the items that "load" onto that dimension. Because responders often tire of the process and start making quick responses without thinking them through, study designers tend to randomly scatter questions for each dimension throughout the questionnaire rather than having, for example, all the negative emotionality items first then all the extraversion items, and so on. In addition, the wording of many of the items is reversed, which requires another step in converting the reverse-scored items to accurately reflect the trait. For example, an extraversion item might read "does not like being the center of attention at a social gathering." The mother of a very extraverted child might rate that item a 1 for "very uncharacteristic," which in the scoring algorithm would convert to a 5 to reflect higher levels of extraversion.

Proponents of the questionnaire method point to a number of advantages over other types of temperament assessment strategies. Perhaps the strongest advantage is that people who know the child best are involved in the assessment. Kids often act in atypical ways in new settings like a doctor's office or a research lab. Having a parent do the instrument allows for a broad perspective on the child's behavior across time and multiple settings.

Another reason parental questionnaires are so widely used is, frankly, because they are easy to administer. Short questionnaires can be done in about 10 minutes. They can even be completed online or on paper at home, enabling researchers to collect information on large samples of people they may never meet.

Research evidence shows that this assessment strategy yields fairly reliable results. When investigators create a new questionnaire that they would like others to use in their studies, they are obliged to examine the instrument's psychometric properties, such as its internal consistency, test-retest reliability, and validity. Test-retest reliability can be assessed by having parents fill out the same questionnaire twice over a brief period of time. Interrater reliability can be measured by having two raters assess the same behavior using the same instrument.

Cross-informant agreement refers to the level of correspondence between two qualified raters, such as the mother and father, or a parent and a teacher. This type of agreement is a bit more complex than simple interrater reliability (e.g., when two researchers look at the same video of a child and then rate what they saw). Although a mother and a father are likely to see much of the same child behavior, different adults may evoke different responses in the child (more on that later) or tend to see the child in different contexts.

When it comes to ratings of child temperament, cross-informant agreement between two people who know the child well is often good but not great. A correlation coefficient (or r value) reflects the amount of association between two variables, and can range from 0 (no relation whatsoever) to 1 (perfectly aligned association). The correlation coefficient can also be negative if the value of one variable goes up when that of the other variable goes down. The correlation between a person's height and weight, for example, tends to be around 0.4. For behavioral ratings between a mother and father, the average correlation is around 0.3 (Achenbach & Rescorla, 2000), which is enough to be considered "statistically significant" but indicates that there certainly are some discrepancies between the two informants. Why these associations are not stronger is a matter of interest to scientists and is discussed in more detail later in the book. For now, it may be enough to say that the sources of disagreement go beyond simply the flaws of the instruments themselves.

The questionnaire method is not without critics, and those skeptical of relying on parental questionnaires point to a number of possible problems. First, observing behavior is not as easy as it sounds. Parents are not trained to assess behavior and they certainly aren't objective. As a result, all kinds of factors can get in the way of accurate reporting, including a tendency to rate the behavior you want rather than the behavior you see, a difficulty in separating your own temperament from that of the person you are trying to observe, and allowing preconceived notions to dominate the actual data coming in (Rettew et al., 2009). For example, a father may have formed the concept that his son is extraverted on the basis of a few dramatic examples. When he fills out a temperament questionnaire about his son, that attitude could shape his responses, even in the face of contradictory evidence. A further complication, called a *contrast effect*, can arise when a parent is asked to rate the temperament of multiple children within the same family. Jim Hudziak, director of the Child Psychiatry Division at the University of Vermont, uses the hypothetical example of a lucky mother of two boys: the most active child in town and the second most active child in town. When she completes a temperament instrument for the two kids, she might well rate her most active child as quite active and her other son as not particularly active because of the relative difference between her sons. In studies involving twins, similar effects can arise. For these reasons and more, some researchers prefer to rely on trained observers rather than questionnaires.



Observational scales and protocols in child temperament are surprisingly scarce in the temperament literature. One protocol that has been developed is called the Laboratory Temperament Assessment Battery or LAB-TAB (Goldsmith et al., 1993) and an observational measure called the Infant Behavioral Record can also be administered, usually as part of the widely known developmental assessment called the Bayley Scales of Infant Development (Bayley & Shaefer, 1963).

Perhaps the best-known observational assessment methods for temperament were developed by Kagan's group, and they have now been further adapted by others such as Nathan Fox (Fox et al., 2001; Kagan, 1994). Instead of using rating scales, Kagan's method involves children performing standardized activities that are video recorded in the laboratory and then coded by trained research assistants. During my child psychiatry training, I was one of those coders. The laboratory protocols, which were adjusted for a child's age, involved a series of short activities designed to elicit certain traits. One of the procedures for 4-year-olds was called the "risk room," which sounds a lot scarier than it was. A child entered a room

with his or her mother to find a number of new things to explore. There was a box with a hole in it where the child could insert her hand, a balance beam just a few inches off the ground, a Halloween mask, and things that made noise when shaken. Some children came in and immediately went through every piece of equipment in rapid succession. Others stayed close to their mother, who was instructed to be as neutral as possible, before making a tentative attempt with one or two pieces. After a few minutes, a research assistant, usually a friendly young woman, came into the room and tried to prompt the child to interact with all the pieces of equipment. The presence of an encouraging adult was enough for many kids to leave their mother's side and demonstrate their prowess on the various apparatuses. In other cases, however, the presence of a new adult signaled even more danger and the child froze or refused to participate.

After the risk room, a research assistant took the child into a different room for more activities such as a vocabulary test, or to take the child's pulse and blood pressure. There was also an exercise in which the child was instructed to perform very low-level crimes, such as scribbling in a textbook or pouring a small amount of juice on the table. At one point, the door to the room opened and a gloved hand set a box on the floor. (This event replaced a clown coming into the room, which was scratched after creating quite a bit of anxiety for some children.)

While these activities took place, the coders were instructed to observe the children for signs of distress and events such as smiles and spontaneous comments. All of these data points would then go into a final determination of how inhibited the child was, ranging from very uninhibited to very inhibited. With some practice and instruction, my ratings of behavioral inhibition became quite reliable with other raters and with Kagan himself.

This type of protocol, involving trained observers, has some advantages over parental questionnaires. The fact that the children were engaged in roughly the same activities while their temperament was being measured was a major plus in terms of reliability. On the other hand, it is difficult to know how much of a child's behavior in the lab is truly reflective of typical reactions rather than an artifact of the testing procedures. Since the goal of this particular protocol was to assess a child's temperament specifically with regard to new situations and people, a stronger case could perhaps be made for this observational method compared to assessments designed to measure other traits.



In summary, both types of assessment thus have relative advantages and disadvantages and offer important windows into a child's temperamental style. There is also no law against using both questionnaires and observational methods within a single study. Indeed, a striking difference seen between a temperament questionnaire as completed by a parent and a child's behavior as observed in a laboratory setting can reveal valuable clues about what might trigger some kids to act so differently in different settings.

## Temperament and Personality

As long as researchers of temperament focused their efforts on very young children and researchers of personality focused on adults, there were few territorial disputes about the boundaries between the two constructs. However, as personality researchers began looking at younger people, and as temperament studies began to include adults, debate was bound to ensue.

As in temperament research, multiple frameworks have been created for understanding personality structure, each with accompanying instruments such as the Myers-Briggs Type Indicator (MBTI), the Minnesota Multiphasic Personality Inventory (MMPI), and the NEO Five-Factor Inventory (NEO-FFI). Unlike in the world of child temperament research, however, there are fewer classification systems that pervade the academic literature (although quite a few exist in clinical and commercial practice). Arguably the most-utilized framework for personality structure is known as the Big Five and corresponds to what are considered to be the five main higher-order personality traits: neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. The neuroticism and extraversion dimensions have obvious counterparts in temperament, and the conscientiousness dimension maps closely to the regulation domain in temperament. The agreeableness dimension also has good correspondence with sociability as well as some ties with certain definitions of extraversion, depending on the degree to which social aspects are included. Perhaps the only Big Five dimension without a clear home in temperament is the dimension of openness to experience, which does not replicate well, especially in samples of younger children (Shiner, Masten, & Tellegen, 2002). This trait refers to an individual's tendency to embrace new ideas and conventions versus being more conservative. The

prominent cognitive components of openness may make it more difficult to connect clearly to a temperament trait present in infancy.

Another prominent personality structure that remains widely used was developed by Robert Cloninger and colleagues at Washington University. The original system, as measured by the Tridimensional Personality Questionnaire for adults, consisted of three main personality dimensions: novelty seeking, harm avoidance, and reward dependence (Cloninger, Przybeck, & Svrakic, 1991). When the structure was modified to form the Temperament and Character Inventory (Cloninger et al., 1994), these three dimensions became temperament dimensions onto which three "character" dimensions were added. Personality, in this theoretical context, includes temperament but requires additional elements, regardless of a person's age. This system is consistent with the common conviction that temperament is a narrower construct that forms the foundation upon which the more complex notion of personality is built.

Some prominent temperament and personality researchers have concluded that there really is no clear distinction between the two domains. Costa and McCrae, who developed the NEO-FFI on the basis of the Big Five, declared that their instrument could in many ways be considered to be a temperament instrument (McCrae et al., 2000). The boundaries can get particularly blurry as the age range of the various instruments expands to include the assessment of personality in children and the assessment of temperament in adults. Scientists in Belgium, for example, have tried to drop the age floor of the Big Five framework down into adolescence using an instrument called the Hierarchical Inventory of Personality in Children, which utilizes the Big Five structure but adapts the questions to be more developmentally appropriate (Mervielde & De Fruyt, 1999). Rothbart and her colleagues, meanwhile, have developed scales such as the Adult Temperament Questionnaire that push the construct of temperament well beyond childhood years (Evans & Rothbart, 2007).

In the end, it is unlikely that any clear boundary will be discovered that separates temperament traits from personality traits on the basis of actual behavior. What may continue to distinguish them, however, are the driving forces behind the behaviors. For example, an individual's personal narrative—the conscious understanding of who we are and how we got to our particular place in life—may have a causal role for personality but not temperament. Consider, for example, a youngest sibling



born into a highly extraverted family. This boy may well have inherited a tendency to be somewhat more extraverted than average, but compared to his older brothers and sisters, he seems positively restrained. In fact, he begins to acquire the label of "the cautious one" or the "rational kid" from his parents and siblings until, over time, it becomes part of his identity. If this boy is asked to fill out a temperament or personality scale as an adolescent, his extraverted scores would likely be lower than those an observer outside the family would choose. Even more insidiously, his self-concept might begin to modify his actual behavior and cause him to behave in less extraverted ways. This influence of a person's narrative or self-concept on behavior would likely be considered a component of personality but not temperament, even though it relates to the same observable behavior.

One theory of temperament and personality held that temperament was the genetic aspect of personality (Buss & Plomin, 1984). Indeed, Kagan (1997) wrote, "the environment acts on that temperament to produce personality." Rothbart and Bates have also proposed that temperament is a bit more limited in comparison to personality, which includes aspects such as values, attitudes, skills, and social cognitions (Rothbart & Ahadi, 1994). There may indeed be qualitative differences between temperament and personality, but the precise boundary between the two domains seems as difficult to define as the point at which a boy becomes a man.

## Temperament in Nonhuman Animals

The concept of temperament has been studied in several species, most notably rats, dogs, and monkeys. Temperament assessment batteries, based on human infant protocols, have been developed for species such as rhesus macaque monkeys and have revealed traits analogous to human temperament dimensions, such as behavioral inhibition (Schneider et al., 1991). The orientation of temperament research in animals often relates to evolutionary questions such as how different traits are adapted to particular environments. For example, among animals that live in groups, does having members with different temperaments confer an advantage to the whole group? Certainly temperaments differ between species of similar types of animals. Birds such as mallard

lucks and Canada geese stick together in huge flocks and can become ıabituated to human beings, whereas species like the common loon .hun human contact and often swim alone. Even within a species, there :an be dramatic temperamental differences as well. Dogs, for example, ıave been specifically bred not only for physical features but for tem-)erament. Guides to dog breeds are full of descriptions of temperament. Some breeds are more aggressive, some more excitable, and some more locile. These predispositions, however, do not preclude the possibility :hat individual differences within a breed can be striking, especially ınder varying environmental conditions.

While few would have a hard time accepting the idea that primates )r dogs have well-established temperamental variation, its establishment n sheep, birds, and guppies may come as more of a surprise. Canadians Denis Réale at the University of Québec and Marco Festa-Biancet at the University of Sherbrooke studied wild Rocky Mountain bighorn sheep in Alberta. They found consistent behavior over a period of years in how individual ewes approached a large corral that the researchers created and baited with a salt lick. They characterized the sheep as either bold or shy and found that this categorization related to other behaviors, such as the ability to wean lambs (Réale et al., 2000). The bighorns' temperament did not seem to be related to survival until a cougar showed up and started preying upon the herd. Then, the bolder ewes seemed to have an advantage, perhaps due to their ability to stand their ground against the predator (Réale & Festa-Bianchet, 2003). Interestingly, the reverse was found in guppies. In a captive and safe environment, the bold guppies are more dominant and have a reproductive advantage. The tables turn, however, when a larger fish enters the tank. Then, the bolder guppies tend to be easier prey than the tentative ones, who spend more time hiding in cover (Dugatkin & Alfieri, 2003). There is evidence that individual birds select mates on the basis of having similar temperamental traits (van Oers et al., 2008), perhaps our most direct evidence to date that birds of a feather really do flock together (sorry, I just couldn't resist).

In summary, quite a lot of temperament research has been done since the seminal studies of Chess and Thomas, which has refined our understanding of what the core temperamental traits are and how they tend to fit together in groups of individuals. Despite the multitude of investigations,



however, uncertainty and debate still surround the most basic tenets of child temperament and its boundaries with related concepts such as personality. The next chapter builds upon some of these core principles and goes into more depth about temperament traits as they relate to gender, age, and culture. Chapter 3 also explores the scientific debates that pervade the research community in its continuing effort to understand the fundamental ways in which children differ from one another.