Temperamental Factors in Human Development

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The initial dispositions to approach or to avoid unfamiliar events are 2 temperamental characteristics of children—among the many that have been described—that appear to be moderately stable over time and associated with distinct, physiological profiles that may be under partial genetic control. The display of high versus low levels of both motor activity and crying to unfamiliar stimuli in 4-month-old infants predicts these 2 temperamental profiles in the 2nd year. This fact implies, but does not prove, that variation in the excitability of those brain areas that mediate motor activity and crying participates in the actualization of the temperamental categories called inhibited *and* uninhibited to the unfamiliar.

The variation among individuals in predominant pattern of behavior and mood is, like the periodicity of the moon, one of the most obvious phenomenon in our everyday experience, yet one of the least well understood. Explanations of these stable patterns have oscillated over the past 2,000 years between an emphasis on environmental forces, such as climate, diet, and social experience, and endogenous, inherent qualities that were presumed to originate in bodily fluids, prenatal events, or genes.

One of the happy consequences of the marriage of the modern synthesis in evolutionary theory with increasingly sophisticated research in neuroscience and genetics is an acceptance of the view that the young infant's behavioral profile interacts with its social environment to produce, over time, a particular constellation of moods and behavioral propensities. The psychological characteristics are neither fixed permanently by biology nor shaped entirely by social interaction. Rather, each child's changing profile is a historical product of genetically influenced reactions accommodating to particular sequences of experience. A useful metaphor represents each person's psychological profile as a pale gray fabric composed of black and white threads—the former symbolic of biology and the latter of experience—so tightly woven that it is not possible to discern any distinctive black or white fibers. (The metaphor is borrowed from W. V. Quine, who used it for a different purpose.)

Temperament has become the preferred name for the variety of initial, inherited profiles that develop into different envelopes of psychological outcomes. An infant's temperament renders some outcomes very likely, some moderately likely, and some unlikely—although not impossible—depending on experience. For example, the temperamental category we call *uninhibited to the unfamiliar* refers to a select group of children—25% to 30% of the White population—who are very likely to become sociable, affectively spontaneous, fearless 10 year olds, and very unlikely to become quiet, shy, and timid, although a small proportion of these children who are outgoing at age 2 acquire a timid demeanor later in life because of intervening stressful experiences (Kagan, 1989; Kagan, Reznick, & Snidman, 1988).

Temperamental constructs are experiencing a renaissance, which is attributable to the work of Thomas and Chess (1977); increased awareness of marked differences in behavior and biology, within as well as between closely related animal species (Clarke, Mason, & Moberg, 1988; Suomi, 1987); and finally, dramatic advances in neuroscience that provide an initial basis for understanding some of these forms of behavioral variation (Adamec & Stark-Adamec, 1986; Dunn & Everitt, 1988). However, these advances are still not sufficiently robust to provide a firm basis for positing a well-defined set of temperamental categories, as biologists have done for the many symptom profiles whose physiological origins have been discovered. Thus, psychologists must continue to rely on descriptive definitions of temperamental categories based primarily on behavior—such as approach or avoidance to novelty and lability or stability of mood—or on functional qualities—such as difficult or easy to care for or adapts well or with difficulty to new situations. Such descriptive and functional definitions are necessary when a new empirical domain is being explored for the first time.

However, we suggest, albeit speculatively, that one class of temperamental categories—not necessarily all classes—rests partly on inherited physiological processes that predispose a child to display certain behaviors and emotions in particular contexts. We suspect that one of

This research was supported by a grant from the John D. and Catherine T. MacArthur Foundation. Parts of this article were presented as an invited address by Jerome Kagan to the Midwestern Psychological Association on May 4, 1990, in Chicago.

We wish to thank Doreen Arcus, Donna Bradshaw, Susan Krupp, Annie McQuilken, Hilary Sokolowski, and Jill Kalen.

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Vol. 46, No. 8, 856–862

the features of this class of temperaments will consist of distinct neurochemical profiles made up of the cerebrospinal fluid, neurotransmitter tracts, and the particular receptor densities for these chemical substances. There are more than 150 known chemicals in the brain—including peptides, monoamines, amino acids, and hormones—and they, along with their receptors, determine thresholds of responsiveness in various parts of the central nervous system. It is likely that the concentrations of many of these chemicals, as well as the densities of their receptors, are under partial genetic control (Oxenstierna et al., 1986). Hence, there will be stable variation in reactivity of those brain sites (e.g., prefrontal cortex, hippocampus, amygdala, hypothalamus, medulla, and corpus striatum) that are known to influence behavior, emotional reactivity, and chronic mood. It is probable that the robust, stable differences in behavior and physiology among related strains of monkeys, cats, dogs, and rats are due, in part, to these mechanisms (Adamec & Stark-Adamec, 1986; Blanchard, Flannelly, & Blanchard, 1986; Clarke et al., 1988; Scott & Fuller, 1965; Suomi, 1987). Even within the Sprague-Dawley strain of albino rats, which is regarded as relatively homogeneous genetically, there is significant variation in motility and defecation in an unfamiliar environment. And the low-motile–high-defecation rats, who are more reactive to novelty, have significantly lower concentrations of dopamine and its metabolites in their corpus striatum than do the complementary group (Pradhan, Arunasmitha, & Udaya, 1990).

We do not claim that all temperamental qualities will include this physiological criterion nor that the physiology determines the behavioral surface in a fixed manner. The assumption that temperamental constructs involve physiology does not require a reductionistic philosophy. We suggest only that some infants are born with a physiology that biases them to develop one rather than another behavioral surface, given certain environments.

A second controversial issue surrounding the idea of temperament, which is more difficult to resolve with empirical evidence alone, is whether some temperamental characteristics should be treated as qualitative categories with respect to their origins, even though the magnitudes of the responses or physiological reactions that represent the operational definitions of the characteristics can be placed on a continuum. This issue is currently unresolved. The two temperamental qualities we call *inhibited* and *uninhibited to the unfamiliar* are defined, in part, by degree of sociable behavior with unfamiliar children, caution toward unfamiliar objects or situations, and reactivity of the sympathetic nervous system (Kagan, 1989). The relevant behavioral and physiological observations (e.g., latency to approach a stranger, time proximal to a parent, acceleration of heart rate) typically form normal, continuous distributions. Hence, most psychologists prefer to view the differences between inhibited and uninhibited children as quantitative, not qualitative. However, the fact that the two groups of children also differ in body build, eye color, and susceptibility to atopic allergies (Kagan, 1984) implies two distinct profiles. Magnusson and Allen (1983) and Hinde and Denis (1986) have made similar arguments for the validity of positing qualitative types of children.

Even though the IQ scores of 10 Down's syndrome and 90 normal children can be placed on a continuum, psychologists regard these two groups as qualitatively different because of other features that distinguish Down's syndrome children from normal children, including the trisomy that indexes a unique biological origin for the Down's syndrome. Max Planck (1936) offered an analogy in the two numerical statements $\sqrt{2}$ and the rational number 1.41. Although these two arithmetical forms are very similar in magnitude and, therefore, seem to differ only quantitatively, they are qualitatively different in their origins. The former is an irrational number that cannot be formed by the ratio of two integers. However, the fact that the bases for low intelligence are qualitatively different for Down's syndrome children than for children living in an impoverished institution does not imply that, for certain interventions, the two types of children cannot be regarded as varying quantitatively.

There are two different, but equally legitimate, ways to study a new domain such as temperament. The most popular, represented by social scientists who prefer a rationalist strategy, is to posit a priori a set of broadly generalizing constructs based on past research, theory, and intuition. The influential work of Rothbart and Derryberry (1981) and Goldsmith and Campos (1982) are prototypic exemplars of this approach. The less popular Baconian strategy, which is more tedious, is initially skeptical of many of the current a priori categories in psychology because they are too broad and not sufficiently sensitive to local context. These investigators prefer to infer a temperamental category from an extensive corpus of data that includes biological evidence. This strategy has the disadvantage of limiting initial investigation to the more obvious temperamental profiles. Extreme degrees of timidity or boldness toward unfamiliar events are two salient characteristics of children; hence, scientists with this bias would be expected to discover these psychological categories first. Our laboratory began to study the two categories, inhibited and uninhibited to the unfamiliar, because they were obvious and easily quantified and only later discovered their physiological correlates. These facts do not mean that these two temperamental categories will eventually become either the most robust or the most significant of temperamental constructs.

Inhibited and Uninhibited Children

During the first 10 years of our work, we discovered that a majority of two-year-old children classified as extremely shy with strangers and timid in unfamiliar situations, compared with a sociable and spontaneous profile to unfamiliar people, events, and contexts, preserved their profile to the eighth year and, in addition, displayed distinctive peripheral, physiological characteristics that implied differential thresholds in the limbic system to novel and challenging events (see Kagan et al., 1988, for a summary of those data). In the next phase of our research, we sought to identify, during early infancy, distinct profiles that might predict which children become inhibited and which uninhibited as they enter the second year.

Young infants do not display marked differences in shyness toward strangers or timidity to novel events. However, initial clues to the behaviors to study came from research with animals as well as with infants. Studies of varied animal species revealed that the amygdala, which receives sensory information from all modalities, is the source of two important efferent circuits whose targets seem to be related to the obvious variation among infants in motor reactivity and crying to unfamiliar stimuli (Dunn & Everitt, 1988; Kelley, Domesick, & Nauta, 1982; Mishkin & Aggleton, 1981). One system, originating in the basal area of the amygdala, projects to the ventromedial striatum and then to the skeletal motor system (Nauta, 1986). When this circuit is activated by novel events, infants are likely to show an increase in motor activity that takes the form of increased muscle tension, flexing and extending of limbs, arching of the back, and protrusion of the tongue (Rolls & Williams, 1987). A second system, which originates in the central nucleus of the amygdala, projects to the cingulate cortex and central gray. One of the many targets of the central gray is the vocal cords and larynx. Research with animals has suggested that distress calls are mediated by this circuit (Jurgens, 1982); hence, it is likely to participate in the distress cries of the human infant. Because high levels of both motor activity and crying to unfamiliar stimuli might be mediated by low thresholds in the amygdala and its projections, it follows that study of these two behaviors might supply early predictors of inhibited and uninhibited types.

A second clue came from the work of LaGasse, Gruber, and Lipsitt (1989), who found that infants who increased their sucking rate (because they decreased their temporal interval between sucking bursts) when the water they were ingesting turned sweet, became inhibited in the second year, whereas the infants who showed only a small increase in sucking rate were more likely to become uninhibited. Furthermore, van den Boom (1989) has reported that infants classified as either very high or very low on irritability in the first two weeks of life differed in sociability at one year; the nonirritable infants were significantly more sociable (perhaps uninhibited) than were the highly irritable infants. The corpus of evidence, although limited, implies that a combination of high motor activity and frequent crying to novel stimulation in young infants should predict the later display of inhibited behavior, whereas the opposite profile should predict uninhibited behavior. We recognize the speculative basis for this prediction because of the extrapolation from research with animals to human infants.

Prediction of Inhibited and Uninhibited Children

Classifying Infants

We implemented a study of middle-class White mothers who had been screened for consumption of coffee, cigarettes, and alcohol and eliminated all infants who were born premature or with pre- or perinatal complications. These healthy infants were observed in our laboratory at 2, 4, 9, 14, and 21 months of age. Preliminary results from this sample were reported in Kagan (1989). We now report the final results for the entire sample of 94 children.

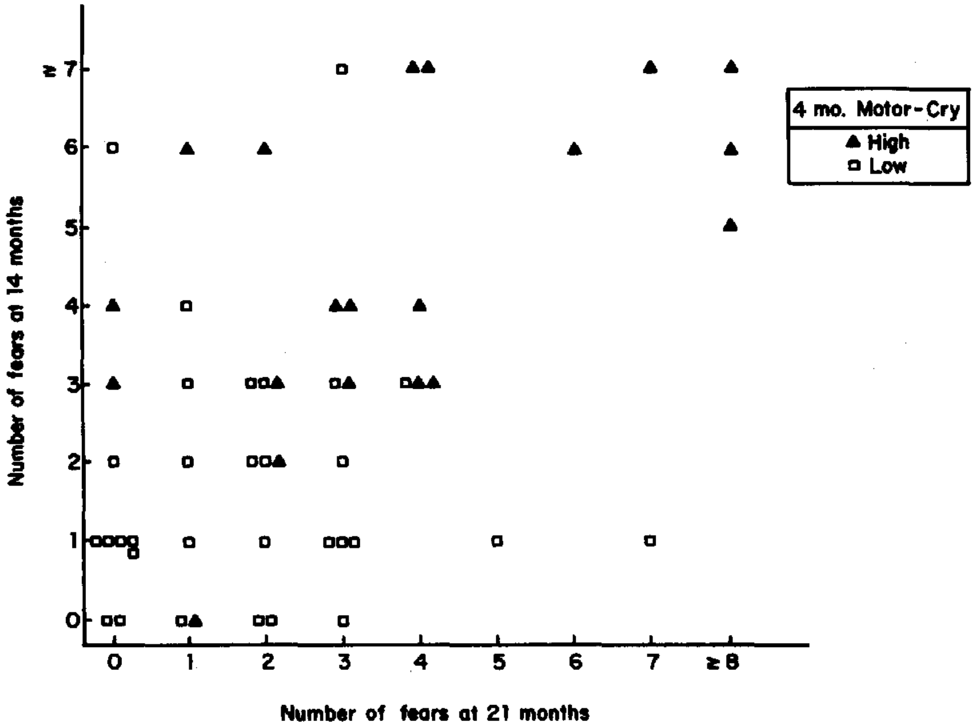
When the infants were four months old, they were videotaped while they viewed varied sets of three-dimensional visual stimuli and listened to a tape of a human female speaking three different nonsense syllables at three different levels of loudness, and while their mother looked at them silently with a smiling face. Each infant's behavior record was scored for motor activity and fretting or crying for each stimulus episode. Sixty percent of the infants were judged to display low levels of limb movement, protrusion of the tongue, and arching of the back, and 40% were judged to have high levels of motor activity; 55% were judged to be very low in irritability—minimal fretting or crying—and 45% were judged to be highly irritable. The reliability of these judgments, based on agreement with independent coders who scored frequency of particular motor acts as well as fretting or crying on each trial, was high. Each of the 94 infants was classified into one of four groups: high motor activity and high crying (Group H, with 23% of the sample); low motor activity and low crying (Group L, with 37%); low motor activity and high crying (22% of the sample); and finally, high motor activity and low crying (18% of the sample). Note that there were no differences among the four groups in experience with surrogate care outside the home; 53% of the infants experienced part or full-time surrogate care because the mother worked (see Kagan & Snidman, 1991, for more details).

Assessing Fear

These children were observed again in our laboratory at 9, 14, and 21 months in situations designed to assess fear to unfamiliar events; fear was operationally defined as fretting or crying to an unfamiliar event or procedure (placement of electrodes, placement of a blood pressure cuff, facial disapproval from an examiner or the mother, a noisy rotating wheel, request to taste liquid from a dropper) or failure to approach an unfamiliar object (a robot) or unfamiliar adults, despite a friendly invitation to do so. At 9 months, 45% of the children showed low fear (0 or 1 fear) and 20% showed high fear (4 or more fears). At 14 months, 48% showed low fear and 32% high fear. At 21 months, 34% showed low fear and 31% high fear.

As anticipated, and reported elsewhere (Kagan & Snidman, 1991), Group H infants were significantly more fearful than were Group L infants at both 9 and 14 months, whereas the other two groups showed intermediate levels of fear, $F(3, 90) = 2.7$, $p < .05$, at 9 months, and $F(3, 90) = 7.8$, $p < .001$, at 14 months. This difference in behavior was maintained at 21 months of age for 84 children who were exposed to novelty (e.g., an unfamiliar room containing novel objects, application of heart rate electrodes and blood pressure cuff, request to accept a

Figure 1
Number of Fears at 14 and 21 Months for Infants Classified as Either High-Motor–High-Cry or Low-Motor–Low-Cry at 4 Months of Age



liquid through an eye dropper, an unfamiliar woman, a person dressed as a clown, and a radio-controlled robot). As at the earlier ages, crying to any of the unfamiliar events or failure to approach the unfamiliar person, clown, or robot, despite a friendly invitation, were coded as indicative of fear. As Figure 1 reveals, 50% of the 20 Group H infants showed high fear (4 or more fears), 30% showed moderate fear (2 or 3 fears), and 20% showed low fear (0 or 1 fear). By contrast, only 10% of the 31 Group L infants showed high fear, 45% showed moderate fear, and 45% showed low fear, $\chi^2(2) = 12.9, p < .01$. The two groups who had the mixed activity–cry profiles at 4 months once again displayed intermediate fearfulness at 21 months (39% showed high and 35% low fear).

Furthermore, 40% of the Group H infants, but not one Group L infant, showed high fear at both 14 and 21 months. By contrast, 52% of the Group L, but only 10% of Group H infants, showed zero, one, or two fears at both ages ($p < .01$, by Fisher's exact test).[1] Although five Group H infants showed a large decrease in fear between 14 and 21 months, only two Group L infants changed from low to high fear. This asymmetry in behavior change is expected because more parents try to change the behavior of fearful children than fearless ones. Thus, the initial behavioral profile at 4 months is not deterministic; there is always a possibility for change, as the metaphor of the pale gray fabric implied.

Heart Rate Acceleration to Sour Tastes

One of the procedures administered at 14 months provided data especially relevant to our hypothesis of a difference in sympathetic reactivity between inhibited and uninhibited children. As noted earlier, one of our major assumptions is that inhibited children, and by inference high-motor–high-cry infants, have a low threshold of reactivity in the central nucleus of the amygdala and its projections to the hypothalamus, sympathetic chain, and cardiovascular system. One of the distinguishing features of older inhibited, compared with uninhibited, children is that the former consistently show a larger heart rate acceleration and pupillary dilation to mild psychological stress; both are indexes of sympathetic reactivity (Kagan et al., 1988).

Research with animals has indicated that sour and bitter tastes produce larger cardiac accelerations than do most other taste qualities (Campbell, Bindra, Krebs, & Ferenchak, 1969). Taste information travels from the gustatory nerve to the nucleus tractus solitarius in the

[1] This result is being replicated in an independent sample of White infants who were administered very similar procedures at 4, 9, 14, and 21 months. Of 117 children seen at 14 and 21 months, 43% of the Group H infants (15 of 35) showed high fear and only 7% low fear at both ages. By contrast, 33% (15 of 45) of Group L infants showed low fear and only 4% (2 children) high fear ($p < .01$, by Fisher's exact test).

medulla and then, simultaneously, to the parabrachial nucleus and the amygdala (Finger, 1987). Efferents from the parabrachial nucleus and amygdala, which synapse on the sympathetic nervous system, can produce an acceleration of heart rate. Thus, lower thresholds in these circuits should be associated with larger cardiac accelerations to sour or bitter tastes.

In one of the procedures in the 14-month battery, the infant was administered, by eyedropper, a drop of water, followed by three trials in which a mildly sweet substance was presented, followed by three trials in which a mildly sour taste (lemon juice) was presented. We computed the magnitude of cardiac acceleration on each of the trials, using the initial baseline heart period (the inverse of heart rate) as the comparison value, but eliminated any trial on which the child fretted or made a large movement of the trunk or limbs, each of which could affect heart rate.

There was a high negative correlation between baseline heart rate and the magnitude of cardiac acceleration to the tastes (an instance of the law of initial values). Thus, we compared the two groups on magnitude of acceleration separately for those infants whose initial baseline heart rates were below or above the mean heart period of the entire group (mean heart period was 490 ms).

The majority of children showed cardiac accelerations on both the sweet and sour trials. As expected, more children (89%) showed larger accelerations to sour than to sweet tastes.

Although there was no difference between Group H and Group L infants in magnitude of acceleration on the sweet trials, the two groups did differ in magnitude of acceleration to the sour taste. For those children whose initial baseline heart rates were low (>490 ms), the mean of the largest acceleration on any of the sour trials was 78 milliseconds; for children whose initial heart rate was high (<490 ms), the mean of the largest acceleration was 42 milliseconds.

The rationale for using the largest acceleration (of the three trials) is supported by recent research (Johnston, Anastasiades, & Wood, 1990) indicating that the largest heart rate acceleration to a cognitive task, relative to exercise, was the most sensitive index of heart rate activity outside the laboratory as well as a correlate of self-reported anxiety in male adults. We compared the number of Group H and Group L infants whose largest acceleration to the sour tastes was above the mean of their baseline heart rate group (larger than 78 ms for low heart rate infants and larger than 42 ms for high heart rate infants). We found that 75% (15 of 20) of Group H infants showed large accelerations, compared with 31% (9 of 29) of Group L infants, $\chi^2(1) = 9.0$, $p < .01$.[2] (See Footnote 2 for replication.)

These data suggest that the Group H infants, who are likely to become inhibited, have a lower threshold of excitability in the circuits that involve the amygdala and the sympathetic nervous system than do Group L children—a conclusion in accord with the extensive corpus of evidence on older inhibited and uninhibited children.

Discussion

These data enhance our understanding of the early anlage of inhibited and uninhibited children. We acknowledge that until direct measurements of neural activity in limbic areas are made, explanations that rely on variation in excitability of limbic circuits must be viewed with caution. Perhaps the most persuasive evidence will come from assessments of animals, preferably primates, who differ in their behavioral reaction to unfamiliarity. Suomi (1987) is addressing this problem with rhesus monkeys.

However, research with children can provide indirect support for the hypothesis that inhibited and uninhibited children possess different thresholds of excitability in the amygdala and its varied projections to motor and autonomic targets. The strong predictive relation between high versus low levels of motor activity and distress to unfamiliar stimuli at four months and fearful behavior in the second year is in accord with that interpretation.

These data also provide partial support for the argument that inhibited and uninhibited children belong to qualitatively different groups rather than represent extreme values on a single dimension of fearfulness or sociability. The combination of high motor activity with frequent crying at 4 months, not either response alone, best predicted high levels of fear at 9, 14, and 21 months. Children who showed high levels of motor activity but no distress were much less fearful than the Group H infants. Similarly, children who were low in motor activity but very irritable were more fearful than the Group L infants who displayed both low levels of motor activity and minimal crying.

An unpublished analysis of these data, in collaboration with Hal Stern and David Rubin of the Department of Statistics at Harvard University, revealed that treating the Group H and Group L infants as qualitatively different groups led to a slightly better prediction of fear at 14 months than did an analysis that treated motor activity and crying as additive in a linear regression model. This result is comparable with the finding that related strains of macaques cannot be placed on a continuum of either fearfulness or central nervous system arousal because each strain shows a unique profile of behavioral and physiological responses to an imposed stress (Clarke et al., 1988). That is why no scientist would combine rhesus and fasicularis or albino and hooded rats in a study of the effects of a drug on fearful behavior. Thus, scientists studying temperamental characteristics in children have a choice in their conceptualizations. For some questions with unselected populations, the assumption of a continuum between extremes may be useful. But investigators should not automatically treat all subjects as falling on a continuum simply because the statistics used most often in data analyses require that assumption.

[2] This result missed significance when the initial baseline heart rate was treated as a covariate in a regression analysis. For the sample described in Footnote 1, 73% of Group H children showed large accelerations to the sour taste, compared with 52% of Group L infants, $\chi^2(1) = 4.7$, $p < .05$.

Only a small proportion of infants—about 10% of healthy White children—show a combination of high levels of motor activity and crying to stimuli at 4 months; high fear at 9, 14, and 21 months; and large cardiac accelerations to specific stressors. These well-defined variables are not positively correlated in a large, unselected sample. Disease categories provide a relevant analogy. A large group of adults will vary on three continuous dimensions: body temperature, weight loss over the past 12 months, and self-reported fatigue at the end of the day. However, the correlations among the three dimensions in a large, unselected sample will be close to zero because each of these three continuous variables has several independent causes. But because an infection with tubercle bacilli is common to all three continuous variables, there will be a small group of individuals within the larger sample who will be high on all three characteristics. These persons belong to a special diagnostic group (see Bergman, 1988, for a similar argument). Stated more formally: If each of many dependent variables has more than one origin, and these origins are independent, but one origin is common to all of the dependent variables for a small proportion of the sample, then the correlations among the dependent variables will be low, even though there is a category of individuals that is high (or low) on all of the variables.

The physicist Pierre Duhem, in a 1954 essay, *Quantity and Quality,* noted that most scientists strive to describe their data in mathematical statements. Because mathematics assumes continuous magnitudes as a primary axiom and because the most popular statistical procedures make a similar assumption, there has been a preference among most psychologists to classify all phenomena in terms of continuous dimensions. This premise is linked to the assumption that every psychological phenomenon will be understood eventually as a result of the addition of these magnitudes. But Duhem added that nature also consists of qualities that cannot be formed simply by adding quantities. Duhem recalled Diderot asking jokingly, "How many snowballs would be required to heat an oven?" (p. 112).

A second implication of this work points to the importance of distinguishing between two different members of the family of affects that contemporary investigators usually label *anxiety* (Marks, 1986). The inhibited child is vulnerable to a specific form of anxiety that is generated by unfamiliar people, settings, or challenges. This affect, which we might call *anxiety to novelty,* dissipates as the person eventually assimilates the event and discovers ways to cope with it.

A different set of conditions produces a related, but we believe, distinctively different affect that might be called *anxiety over one's personal qualities.* This class of anxiety, which also can be chronic, is acquired as a result of identification with one's parents, class, or ethnic group; failure at life tasks that are valued by the individual; or rejection by significant others. Each of these experiences, which are prominent during childhood, produces a special form of anxiety different from the anxiety to novelty. It is reasonable to suggest that crossing individuals who are high or low on these two related, but different, emotions will yield four different types of individuals.

Questionnaire scales that are presumed to measure adult introversion–extraversion contain heterogeneous groups because an individual can obtain a high score on an introversion scale for different reasons. We believe that introverted adults who showed no excessive timidity or shyness prior to school entrance were not temperamentally inhibited, but acquired their introverted style as a product of experience. Similarly, extraverted adults who were very shy and fearful during the preschool years are different from those who were uninhibited during these early years. Historical data can be helpful in making more accurate classifications of the origins of adult personality profiles.

Finally, we note that acknowledging temperamental variation among children and adults can change the construction each of us imposes on the behavior of others, be they our research subjects or our friends. The popular view, which has a long history in Western essays from Descartes and Locke to Freud and Rogers, makes mental constructions a primary origin of emotional reactions. Almost every modern theory of personality assumes that provocation of motives, conflicts, standards, and beliefs, acquired over time, can produce the specific physiological reactions characteristic of strong emotions, even though all acknowledge that feedback from the bodily events influences psychological processes. But it is believed that the primary source of certain bodily changes is in what the mind has learned. Thus, the usual interpretation of a child with a school phobia is that past experiences with parents has led the child to develop a fear of abandonment if he or she left home.

However, it is heuristic to turn the penny upside down—as James and Lange did in their discussion of emotion—and play with the possibility that, for some individuals on some occasions, the brain generates a physiological state that provokes the mind to invent some basis for the change in feeling tone. To return to the child with school phobia, it is possible that fear of abandonment is not always the root cause of school phobia. Rather, for some children, temperamental characteristics produce a spontaneous discharge of limbic circuits and the sudden generation of a conscious state of uncertainty that requires an interpretation. Because school is a place in which stressful events occur, the child concludes that he or she is afraid of school. For this small group of children, the origin of the phobia may not be primarily a derivative of past experiences with parents.

One of the consequences of this point of view—like one of the perspectives of a Necker cube—is that some of us may, on occasion, be too tolerant of extreme emotional reactions in others because most Western citizens believe that psychological characteristics originating in biology are less subject to personal control than are those that originate solely in past experience. That assumption is probably invalid most of the time; it is extremely difficult to change the chronically anxious mood of a child who has been abused. Nonetheless, the concept of will, which is regarded as a psychological rather than a biological process, is so central to Western conceptions of human nature that it is easier to be persuaded that each person's will can monitor moods and behaviors more effectively if they were learned than if they were influenced, in part, by the person's inherent biology. Although this belief is neither logical nor empirically proven, it represents a potential danger to which we should remain alert as temperamental constructs gain favor in the years ahead.

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