



Temperament

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Topic

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Introduction

Although the term “temperament” does not have a consensual definition, most scientists would agree on the following sense meaning: A temperamental bias refers to a distinctive profile of feelings and behaviours that originate in the child’s biology and appear early in development.¹

Subject and Problems

The biological foundation is usually genetic, but may be the result of prenatal events. An important source of the biological foundation of a temperamental bias is variation in the concentration of, and density of receptors for, the large number of molecules that can affect brain function, including dopamine, norepinephrine, serotonin, opioids, acetylcholine, corticotropin-releasing hormone, vasopressin and oxytocin.²

This hypothesis implies that there will be a very large number of temperamental biases. Because it is not currently feasible to quantify the neurochemistry that is the basis for the temperamental bias, scientists measure specific behavioural profiles. The behaviours most often attributed to a temperamental bias in infancy and early childhood include high (compared with low) irritability, activity, frequency of smiling, and an approach or avoidant posture to unfamiliar events.

There is some controversy over the validity of parental descriptions of these and other behaviours because the correlation between the parental descriptions, usually based on questionnaires, and direct behavioural observations of comparable features is usually low (i.e. the correlations are less than 0.3).^{3,4}

Therefore, it is good practice to combine parental reports with behavioural observations. A temperamental quality should be regarded as a bias, and not as determining a particular profile, because experience affects the developing phenotype in a serious way. By school entrance, it is difficult to detect the early temperamental biases of most children and a profile of behaviours could be the result of a temperamental bias or the product of experience alone. Not all shy children inherit the temperamental bias favouring that quality. Hence, discussions of temperaments in adults, most often based on questionnaire data, are open to criticism.

Research Context

Two temperamental biases that have been studied more extensively than most refer to the typical behaviours of one- and two-year-olds to unfamiliar people, objects and situations. The 10 to 20% of children who are usually subdued and shy with strangers or avoidant with unfamiliar objects or situations, called “inhibited to the unfamiliar,” are contrasted with the 30 to 40% of children who show the complementary traits of approaching the unfamiliar and are called “uninhibited.”⁵

Independent studies by Kagan^{2,5,6} have discovered that variation in motor behaviour and crying to unfamiliar visual, auditory and olfactory stimuli in four-month-old infants predict these two profiles in the second year of life. Four-month-olds who show high levels of motor activity and distress, called high-reactive, are likely to become inhibited. Infants who show low levels of motor activity and crying, called “low-reactive,” are likely to become uninhibited in the second year.

Research Results

Biological information gathered on these children during early adolescence implied that high- and low-reactive infants differ in level of excitability in the amygdala and its projections when unfamiliar events occur.⁷ At age 11, the children were evaluated for a number of physiological measures that are indirect indexes of limbic excitability. They include right, rather than left, hemisphere activation in the EEG; sympathetic rather than vagal tone in the cardiovascular system; a large Wave 5 from the inferior colliculus in the brain stem auditory-evoked response; and a larger event-related potential at 400 msec to discrepant scenes. Each of these variables was more characteristic of 11-year-olds who had been high-reactive compared with low-reactive. The former showed greater activation of the right rather than the left hemisphere, a large evoked potential from the inferior colliculus to a series of click sounds, greater sympathetic tone in the cardiovascular system, and a larger negative waveform in the event-related potential to discrepant scenes. This variation could be due to any one of a number of neurochemical profiles, including opioids, corticotropin-releasing hormone, dopamine, norepinephrine or GABA.

Although children who were high-reactive infants are at slightly higher risk than most of developing social anxiety, but not at higher risk for phobias to animals or blood, and the low-reactives had slightly higher risk for asocial profiles, these outcomes require very specific rearing conditions. Most of these children will not develop any psychiatric condition.

It is important to appreciate that the power of a temperamental bias lies in its ability to limit or restrain the acquisition of a particular personality, rather than determine a particular profile. The probability that a high-reactive infant will not become an adolescent who is extremely sociable, spontaneous, relaxed, free of worry, and possessing low levels of autonomic and cortical arousal is very high. However, the probability that this class of child will be a quiet introvert with high levels of autonomic and cortical arousal is quite low (probably less than 0.2). Thus, the biology that is the foundation of a temperamental bias functions as a constraint rather than as a determining force.

Conclusion and Implications

Parents should appreciate that each of these temperamental types has advantages and disadvantages in contemporary society. A technological economy requires a college education. Students with higher grade point averages in high school are more likely to be accepted at better colleges and therefore have a higher probability of attaining a gratifying, economically productive career. High-reactive children being raised in middle-class homes are more concerned with academic failure and therefore more likely to have an academic record that will gain them admission to an excellent college. Adolescents who were high-reactive infants often choose locations that allow them to work in environments where they can control the level of uncertainty. Such work allows some control over each day's settings and events, keeping unanticipated interactions with strangers to a minimum. In addition, high-reactives tend to avoid risk and are therefore less likely to drive at high speeds, experiment with drugs, engage in sex at an early age, or cheat on examinations.

The low-reactive, uninhibited child enjoys a share of advantages. Sociability and a willingness to take career and economic risks are adaptive in contemporary American society. The adolescent who is willing to leave home to attend a better college or accept a more interesting job is likely to gain a more challenging position than one who stays close to home because of a reluctance to confront the uncertainties of a distant place. Finally, it appears that during adolescence and adulthood, temperament makes a more substantial contribution to an individual's private feeling tone than to the public personality displayed to others. The developmental journal that leads to a relaxed or a tense feeling tone requires a more substantial contribution from temperament than does a sociable or shy posture with others.

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