

## **A Matter of Free Choice**

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My brother and I are virtual physical replicas of each other and, as we grow older, appear more and more like our father. We share the same vanishing hairline, squinty brown eyes, and sardonic, sometimes irreverent sense of humor. We went to the same schools, had many of the same teachers, and suffered similar agonies of post-puberty. But we have completely different temperaments. I grew up stiff-necked, intense and combative, willing to break before I would bend. My brother is easy-going, non-competitive, always seeing the best in others. He is everyone's best friend. Oddly, I am the risk-taker and the dreamer, the grasshopper to his ant. He is steady, calculating, rarely risking unless he has considered all of the possible outcomes and whittled the possibilities to his favor. Our careers reflect our differences: Mine has filled with volatility, peaks and valleys, cycle after cycle while his has been stable, steadily progressing from one year to the next, one promotion after another. If genes determine outcome, I wondered, how could we be so different?

## **Genes Influence Who You Are, Not What You Do**

I discovered that "genes" - strands of DNA inherited and passed along by generations of ancestors - influence the development and function of the brain, ultimately controlling how we move, think, feel, and behave. While the exact role genes play in the development of the brain remains unknown, research suggests that genes guide the formation and proper placement of neurons in the brain. Studies performed by the Enhancing Neuro Imaging Genetics through Meta-Analysis Consortium (ENIGMA) indicated that genes affecting overall brain size correlated with IQs well as the volume of the hippocampus where memory is centered. In fact, fifty percent (50%) of your IQ is attributable to your genes. In other words, your intelligence potential is established at birth. How much of IQ potential you actually achieve is a matter of environment - education, exercise, diet - and what you subsequently do with what you've been given.

Biological factors are also believed to determine an individual's "temperament", a person's characteristic way of responding emotionally and behaviorally to external events. These characteristics are fairly fixed and observable soon after birth. Children from the same parents raised in the same family environment often have different, even opposite temperaments as my brother and I do. One child may be quiet, studious, very deliberate in their actions while their sibling is loud, active, and easily distracted. A temperament trait is neither positive or negative, but a description of how a child naturally reacts to his environment.



Psychologist Jerome Kagan, author of "The Temperamental Thread", says that temperament is analogous to the psychological profile of a dog breed. Just as a pit bull is different from a beagle who is different from a collie, people differ because they have different neurobiologies. Kagan claims there are many thousands of temperaments, some common while some are rare. As the result of years of his own research and examination of other researchers in the field of temperament studies, he believes that a having particular temperament does not mean that a certain personality type will naturally result. For example, high reactivity or sensitivity in a child would be generally assumed to result in an adult that is shy, anxious, timid, or cautious. However, research tests repeatedly indicate that no more than 25% of adults who had high sensitivity as a child fit the expected adult profile. On the other hand, the temperament that one exhibits as a child is much more predicative of what a person's personality will not be as an adult. Only about 5% of children considered highly sensitive become ebullient, risk-prone, socially outgoing adults.

In other words, genes do not determine behavior or outcomes, but they play a role in what we do and why we do it. Our genes influence how we respond to the environment around us, but our response is equally influenced by the environment.

Humans are not the only species whose actions are the result of interplay between genetics and environment. Some birds, for example, can produce elements of song without ever hearing

another bird sing (genes), but need to hear songs during their development to produce the song of their own species correctly. Further evidence of the role environment can play in animals, including humans, is found in the presence of “imprinting”, what scientists call the ability to learn an essential piece of information at the right stage of development. Most of us are familiar with the instances where baby ducks and geese substitute a human for their mother, faithfully trailing after their “mother” everywhere he/she goes. We also learn “aversions” through our environment, for example, avoiding foods which make us sick or other animals which can harm us such as snakes and barking dogs.