vealed the heritability of 11 common character traits. The findings, published in the Journal of Personality and Social Psychology, reported that social potency is 61% influenced by genes; traditionalism, 60%; stress reaction, 55%; absorption (having a vivid imagination), 55%; alienation, 55%; well-being, 54%; harm avoidance (avoiding dangerous activities), 51%; aggression, 48%; achievement, 46%; control, 43%; and social closeness, 33 percent.

Other recent studies have compiled lists of traits most influenced by heredity. Physical characteristics that are most genetically determined include height, weight, tone of voice, tooth decay, athletic ability, and age of death, among others. Intellectual capabilities include memory, IQ scores, age of language acquisition, reading disabilities, and mental retardation. Emotional characteristics found to be most influenced by heredity were shyness, extroversion, neuroses, schizophrenia, anxiety, and alcohol dependence. It is important to note that these are tendencies and not absolutes. Many children of alcoholics, for instance, do not become alcoholics themselves. Many social and cultural factors intervene as humans develop, and the child of an alcoholic, who may be genetically vulnerable to acquiring the disease, may avoid drinking from witnessing the devastation caused by the disease. (For a fuller discussion of the role of environment, see Nature-Nurture Controversy.)

Recent work has shown that genes can both be influenced by the environment and can even influence the environments in which we find ourselves. A 1990 study found that animals raised in environments requiring significant motor activity actually developed new structures in the brain that were significantly different from the brain structures of animals raised in environments lacking motor stimuli. Observations from such experiments have revealed that complex environments actually “turn on” sets of genes that control other genes, whose job it is to build new cerebral structures. Therefore, living in an environment that provides challenges can genetically alter a person’s makeup. Additionally, a genetic predisposition to introversion can cause people to isolate themselves, thus changing their environment and, in the process, altering their development of social skills. This, then, contributes further to their genetic predisposition to introversion.

There also appears to be universal, inherited behavior patterns in humans. Common behaviors across diverse cultures include the patterns of protest among infants and small children at being separated from their mothers. A study conducted in 1976 found that separation protests emerge, peak, and then disappear in nearly identical ways across five widely diverse cultures. Other studies have found universal facial expressions for common emotions, even among pre-literate hunter-gatherer cultures that have had no exposure to media. It used to be thought that the human smile was learned through observation and imitation, but a 1975 study found that children who had been blind from birth began smiling at the same age as sighted children. Many of these behaviors are thought to be instinctual. Aside from the infant/developmental behaviors already mentioned, other inherited behavior patterns in humans include sex, aggression, fear, and curiosity/exploration.

Further Reading

Heterosexuality

Sexual attraction to members of the opposite sex.

The sex drive, or sexual desire, is an unlearned, powerful drive that humans share with other animal species. Heterosexuals experience sexual desire in relation to members of the opposite sex. This contrasts with homosexuals, where the object of sexual desire is a member of one’s own sex. Most researchers believe that children begin to notice physical differences between males and females by about age two. As children grow, they learn about sex roles and sex differences by observing their parents and other adults, including teachers, child care providers, and from play experiences and the attitudes and behavior of peers. Gender identity becomes firmly established, that is, the young boy understands that he is a boy, and thinks of himself as a boy.

Sex researcher Alfred Kinsey (1894-1956), who founded the Institute for Sex Research at Indiana University in 1942, believed that sexual orientation in humans is complex, ranging from exclusively homosexual to exclusively heterosexual, with most people’s sexual desires falling somewhere between the two. In fact, some individuals practice bisexuality, that is, they engage in sexual relations with both members of their own sex and members of the opposite sex. Kinsey’s controversial study, popularly known as the “Kinsey Report,” was published in 1948 under the title Sexual Behavior in the Human Male. His theory caused heated public discus-
sion, since sexual behavior was considered a taboo subject for public discussion and study. In fact, until the late 1960s, any sexual behavior outside of exclusively heterosexual was considered either a mental illness or perversion. Although homosexuality continues to be prohibited by law in many locales, it is no longer listed as a mental disorder by the American Psychiatric Association.

Although much research into underlying causes of sexual orientation has been done, little conclusion evidence has emerged about why one individual is heterosexual and another homosexual. Researchers have studied biological and genetic determinants, hormone levels, and environmental factors. It seems from evidence available in the mid-1990s that environmental and biological factors combine in the complex process of human development to establish sexual orientation.

See also Sexuality

Further Reading

Heuristics

A methodical procedure for discovering solutions to problems.

The principal feature of heuristics is the formulation of a hypothetical solution to a problem at the beginning of an investigation of the problem. This working hypothesis serves to direct the course of the investigation, and is modified and refined as relevant facts are discovered and analyzed. During the course of the investigation, the heuristic method reduces the range, and increases the plausibility of possible solutions of the problem. Unlike an algorithm, however, which is a methodical procedure that necessarily produces the solution of a problem, heuristics does not necessarily lead to the solution of a problem. Heuristics has been fundamental in the acquisition of scientific knowledge, and, in fact, is an essential component of many forms of complex human behavior.

Ernest R. Hilgard

1904-
American psychologist who conducted pioneering work in hypnotism.

Ernest Hilgard distinguished himself through his studies of the role of hypnosis in human behavior and response. Hypnotism, often regarded as nothing more than a stage trick by pseudo-psychics, is in fact an important psychological tool; it can be used to alter behavior (smoking cessation, for example), and to relieve pain. Much of Hilgard’s research and writing on the topic was done with his wife, Josephine R. Hilgard (1906-1989).

Born in Belleville, Illinois, on July 25, 1904, Ernest Ropiequit Hilgard was the son of a physician, and he showed an early interest in science. Interestingly, it was engineering, not psychology, that originally attracted Hilgard; he received a bachelor’s degree in chemical engineering from the University of Illinois in 1924. He decided that he wanted to study psychology, and he went to Yale, where he was awarded his Ph.D. in 1930. His initial area of interest was conditioned responses. He did extensive research with the human eye lid; as part of this research he developed a photographic technique for examining the responses. His work demonstrated the relation between voluntary and involuntary responses, and won him the Warren Medal in Experimental Psychology in 1940.

Begin work on hypnosis

Later, Hilgard became intrigued by the mechanism behind hypnosis. In part, this was not an unusual move: his work on voluntary and involuntary responses focused on the control factor, as does hypnosis. The popular stereotype of hypnosis, in which a person falls into a trance-like state after staring at a moving watch and then involuntarily being made to bark like a dog, is hardly all there is to the process. Nor is hypnotism some mystical power that channels evil forces. It is true that, under certain hypnotic conditions, patients can be given suggestions that they will follow—moving a limb, for example, or holding it rigid. But to treat hypnotism as nothing more than showmanship misses the point. Hypnosis is a tool that, used under the right circumstances, can be useful and even beneficial.

Hilgard, working with his wife and other colleagues, began experimenting and collecting data on hypnosis as a means of, among other things, treating pain. One of the interesting aspects of Hilgard’s research into hypnosis is the concept of what he calls the “hidden observer.” Osten-sibly, a person undergoing hypnosis to manage pain, for example, feels no conscious pain. That does not mean the pain is not there, however; nor does it mean that the patient’s subconscious is not registering the pain. In one experiment conducted by the Hilgards, subjects were hypnotized and told they would feel no pain or discomfort when an arm was placed in ice water, or when a tourniquet was tied at the elbow to restrict blood flow to the