

The more common abnormal genetic conditions are multifactorial in their causation and are characterized by a complex interaction of genetic and environmental factors. The genetic effects are complex and determined by the interaction of many genes, each contributing a small effect. Cleft lip and palate, congenital dislocation of the hip, pyloric stenosis, talipes, and equinovarus are well-known examples; perhaps the best known examples are anencephaly and meningomyelocele, known collectively as neurological tube defects. Carcinogens have been found to induce some kind of chromosomal rearrangements that are associated with a variety of human cancers (Radman, Jeggo, & Wagner, 1982).

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KENNETH A. ZYCH  
Walter Reed Army Medical  
Center, Washington, D.C.

#### GENETIC COUNSELING GENETIC FACTORS IN BEHAVIOR

### GENIE

The case of Genie involves an adolescent who experienced a degree of social isolation and experiential deprivation so far unparalleled in medical literature. The case came to light in 1970, when Genie was 13½ years of age.

From the age of 20 months to 13 years, 7 months, Genie was confined to a small bedroom at the rear of the family home. There, she was physically harnessed to an infant potty seat. At night, when she was not forgotten, she was removed from the harness and put into a sleeping bag which had been modified to hold Genie's arms stationary. She was then put into a crib with wire mesh sides and a wire mesh cover.

Genie received a minimum of care and stimulation. She was fed only infant food and wore no clothing. There was no TV or radio in the home, and as there were two doors separating her bedroom from the front of the house, where the remainder of the family lived, she could hear little of any family conversations. As her bedroom was set in the back of the house, away from the street, she heard few environmental noises. Her room contained only the potty and crib—no carpet, no pictures on the walls. The room's two windows were covered up except for a few inches at the top. Genie's mother, having become blind shortly after Genie's birth, was unable to care for Genie, and so it was

Genie's father and brother who were her primary caretakers. Together, they committed many acts of cruelty and abuse, among which was their consistent unwillingness to talk to her and beatings inflicted on Genie for making noise.

When Genie was found, she was extremely malnourished. She weighed only 59 pounds and was only 54 inches tall. Never having been fed solid food, she was unable to chew or bite. She could not stand erect, and could barely walk. She was incontinent for feces and urine. Having been beaten for making noise, she was silent. She knew only a few words. She was essentially unsocialized and untrained.

Genie's case caught the attention of the scientific community because of the unique opportunity it offered for studying the human potential to "catch up" as it were—to develop social, cognitive, and linguistic knowledge after the typical points in development. Particular interest in Genie's potential for linguistic development was fostered by Lenneberg's (1967) critical age hypothesis for language acquisition. Lenneberg proposed that, as is the case with many maturationally timed species-specific behaviors, there is a critical period for first language acquisition—between the ages of two and puberty, beyond which a first language could not be learned. Genie faced the task of first language acquisition at 13½. Thus, her ability to learn language directly tested Lenneberg's hypothesis.

In the 9 years she was studied, Genie showed very uneven language learning ability. Most important in this regard is the striking contrast between her acquisition of morphology and syntax on the one hand and her acquisition of semantic knowledge on the other. Genie's acquisition of vocabulary and of how to express meaningful relations through words steadily progressed and increased, whereas her utterances remained largely ungrammatical and hierarchically flat (Curtiss, 1977, 1981, 1982). Genie's case, then, supports a weak form of Lenneberg's hypothesis in that while she developed some language, she did not acquire language fully or normally. Her case also suggests that different components of language are differentially vulnerable to the age at which language acquisition is carried out. In particular, her case points to the separability of a conceptual or referential linguistic component (which involves lexical knowledge and knowledge of semantic roles, and which is resilient in its developmental potential) from a grammatical component, which involves the constraints and rules of grammar, for which the acquisition potential appears to be far more maturationally constrained.

Although most of the scientific investigation carried out with Genie concentrated on her language development, a considerable number of standardized intelligence tests and tests of Piagetian operations were also administered. Remarkably, Genie evidenced 1 year's mental growth every year past her discovery and demonstrated full operational intelligence in spatial knowledge, with

less developed ability in some other areas, specifically, those relying on verbal mediation.

The cognitive profile that Genie displayed lends support to a modular view of the mind in which grammar represents a distinct faculty of mind, separate from other components of language and separate from other mental abilities. For details regarding Genie's case history and language acquisition (see Curtiss, 1977). For details regarding her nonlinguistic cognitive abilities (see Curtiss, 1979). For a discussion of Genie's case and the critical age hypothesis, see Fromkin et al., 1974. For a discussion of Genie's case in connection with theories of language learning and cognitive development (see Curtiss, 1981 and 1982).

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SUSAN CURTISS  
University of California,  
Los Angeles

#### EXPRESSIVE LANGUAGE DISORDERS LANGUAGE DEFICIENCIES AND DEFICITS LINGUISTIC DEVIANCE

#### GENIUS

The original conception of genius was of a deity that would reside within an individual and have a profound influence on the development of his or her mental powers and spiritual growth. Recently the concept of genius has been subsumed within psychology and philosophy. Galton (1869) developed a quantitative concept of genius as an innate or inherited ability, and Lombroso (1891) conceived of genius as a manifestation of abnormal psychology—as akin to madness. Hirsch (1931) even proposed that the genius should be viewed as a separate psychobiological species.

The term genius is now used chiefly to denote exceptionally high talent, ability, or achievement. However, it has been largely supplanted by the terms gifted or gift-

edness. As originally used in his research on heritability, Galton (1892) intended that genius should denote an "ability that was exceptionally high, and at the same time in-born" (p. VIII). However, he also suggested that it should not be considered a technical term. Galton attempted to demonstrate that genius or exceptional ability is inherited.

In approaching his monumental longitudinal study of gifted children, Terman (1925) used the term gifted, but he nevertheless titled the entire series of books that resulted *Genetic Studies of Genius*. It should be noted, however, that Terman had extended the concept of the origins of genius, "The origins of genius, the natural laws of its development, and the environmental influences by which it may be affected for good or ill, are scientific problems of almost unequalled importance for human welfare" (1925, p. V). Terman went on to suggest that there were three problems related to genius: its nature, its origins, and its cultivation. Clearly then, the stage was set for nature-nurture research.

Research on the origins and nurturance of genius has often taken the form of studies of eminent people or very high achievers. In Volume II of *Genetic Studies of Genius* (1926), Catherine Cox and others (including Lewis Terman) studied the early mental traits of 300 geniuses. Galton had also pioneered in this approach to the study of genius (1869). More recently the biographical research of the Goetzels (1962) continues this tradition, as reported in *Cradles of Eminence*.

Recent research by Bloom (1985), however, focused on living subjects who have achieved world recognition. The research by Bloom and his predecessors agrees in the finding that genius, giftedness, special talent, and high ability often appear as precocious behavior; for instance, accomplishments in youth that far exceed normal achievements. There is also increased recognition of the influence of family, schooling, and other variables in determining giftedness. The term genius is now used less frequently than it was, although it is sometimes evoked to denote truly exceptional giftedness.

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