



# The epigenesis of stuttering

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## Abstract

This paper examines the data on which the Demands and Capacities Model (DCM) is based with the purpose of identifying areas where future research might determine consilience among genetic influences at the physiological, behavioral, and cultural levels. The determination of consilience across different levels would tend to validate the genetic influence on stuttering, but more importantly it would also sharpen the focus of researchers interested in the various possible expressions that genetic influences might have and the way in which they influence the development of the disorder.

**Educational objectives:** The reader will (1) learn about the distinction, as outlined in the DCM, between environmental/contextual influences on stuttering development and intrinsic/genetic influences on stuttering development; (2) learn about the concept of consilience and its usefulness in conferring validity on parallel constructs at the physiological, behavioral, and cultural levels of stuttering theory; and (3) be able to identify potential areas for research that might help in refining our understanding of the genetic influences on stuttering development.

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During the past 10 years, there has been much interest in genetic explanations for stuttering. This paper explores a number of possible genetic influences, but from a broader perspective.

In 1990, after many public presentations, my colleagues and I wrote and published the Demands and Capacities Model (DCM) of stuttering development

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(Starkweather, Gottwald, & Halfond, 1990). This model of stuttering development had been inspired by E.O. Wilson's book *Sociobiology* (Wilson, 1975), which delineated a number of the ways in which genetic predisposition in animals could interact with environmental events to produce both individual and social expressions of behavioral patterns. It seemed to us that an examination of the interactions between genetic and environmental influences on stuttering development would also be useful.

A thorough examination of the literature on stuttering then extant contained many findings that shed light on (1) the specific environmental/contextual<sup>1</sup> events that made stuttering behavior in a child more or less severe and (2) the specific organismic traits that hindered or helped the development of fluent speech. Further, the data suggested that there were four areas of functioning — motoric, linguistic, emotional, and cognitive — in which influences on the development of fluency in a child's speech could be identified. For some variables, there were few data, and it was necessary to lean on the accumulated clinical wisdom of speech pathologists who have worked with young children. For other variables, the data from studies of adults could be applied to children only with considerable caution. But there was enough information, either solid or inferred, to create a model of the development of stuttering. The sources of influence for this model are listed in Appendix A.

It seemed obvious, since these influences were not mutually exclusive, that they could simultaneously coexist and therefore summate to produce a net effect on the child. It also seemed likely, if not obvious, that each child had a threshold of influence above which the net effect of these influences could create or inhibit disfluency. Only one assumption needed to be made: that the more disfluent a child's speech was, the more opportunities there would be for reactions of struggle and avoidance to develop. Thus we could show at least the outline of a model of the influences on stuttering development. Further, clinicians were able to obtain sufficient guidance from the model, incomplete though it was, to develop a set of principles with which to assess individual families for the purpose of identifying the influences, both organismic and environmental, that were affecting a particular child's fluency development.

As a result of such assessments, clinicians were able to develop individualized plans for intervening with very young children, plans that proved to be remarkably helpful (Starkweather et al., 1990). The percentage of children who recovered after being treated with methods based on this model was well over 90%, substantially higher than the percentage that would be expected, even by the most optimistic reports, to recover by chance. Further, and even more compelling, the time taken for these children to recover was, on the average, only 8.6 weeks (Starkweather

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<sup>1</sup> When discussing speech and language behavior the word "environment" will be taken to include linguistically contextual variations, so, for example, the tendency for speech rate to be faster in longer than in shorter utterances is described as an "environmental" influence. Other environmental influences on speech would be such things as the lengthening of phoneme durations in the later parts of utterances, the contextual effects of coarticulation, all of the pragmatic variations including word choice and formality, and many more.

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