The Language Lottery: Toward a Biology of Grammars. David Lightfoot. Cambridge: MIT Press, 1982, 224 pages, $17.95.

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The question of how children acquire speech belongs to that group of problems which the philosopher W.H. Walsh (1958) has described as "essentially contested issues." It is unlikely that there will ever be an agreement as to the origin of language, how children learn to talk, or to the precise relationship between language and thought. Nevertheless, it is important that linguists and philosophers of language ask these questions. Even if there is little agreement on the answers to these questions, much can still be learned from those who make us conceive of old problems in new ways. It may be that we should reserve our highest praise for those who force us to reconsider what we have taken for granted.

David Lightfoot has written a clear and concise introduction to one of the newest and most controversial branches of linguistics. Lightfoot wants to uncover the biological basis of language. His book is not a history of linguistics. Lightfoot's objective is to demonstrate the connection between the structure of the human mind and the character of human speech—he wants to explain how children learn to speak. Many linguists subscribe to an empirical approach to language which "holds that the mind contains nothing beyond what the senses convey" (p. 209). Lightfoot tries to find a middle ground between an empirical and a rationalistic conception of the human mind. He builds his theory on the idea of "genotypical structures." These structures determine an "organism's potential for adapting to the environment." The genotype defines the limits of an organism's performance "by determining what its cells can do" (p. 5). Thus, according to Lightfoot's theory, the genotype mediates between our individual minds and the phenomenal world. The genotype provides a framework for the ways in which we transform the world and ourselves into speech.

Lightfoot's approach to the problem of language acquisition has a long history. Aristotle was the first to suggest that there was a relationship between the mind's structure and the character of human speech. It was not, however, until the 1660's when the two Port Royal philosophers A. Arnauld and C. Launcelot published their *Grammaire générale et raisonée* that Aristotle's insight was systematically developed. Arnauld and Launcelot sought to explain language through an analysis of the human mind. Their procedure was to examine a large number of existing languages with the goal of laying bare what was common to all.

Twenty years later, the Anglican bishop J. Wilkins and his German counterpart G.W. Leibnitz independently continued the Port Royal School's research into the relationship of lanuage and the human mind. Wilkins and Leibnitz pursued a different strategy than their French counterparts. Wilkins was the first philosopher of language to try and construct a universal language which he hoped could serve as an ideal model for human communication. Leibnitz carried this program a step further

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when he proposed a mathematical theory of language. Leibnitz believed that his mathematical model could function as both a means of communication and as a way of clarifying thought.

Lightfoot's *Language Lottery: Toward a Biology of Grammar* belongs to this tradition. One of the weaknesses of this book is that Lightfoot ignores the antecedents for his theory of language. Lightfoot prefers to concentrate on recent advances in molecular biology which he believes open the possibility of a clearer understanding of how children acquire speech. The key element in Lightfoot's approach to language lies in his conception of grammar. Lightfoot defines grammar as "a psychological entity; it is part of the psychological state of somebody who knows some language" (p. 25). Lightfoot explains his theory of grammar when he writes:

> Distinguishing between the contribution of intrinsic, genetically encoded properties and that of environmental factors will constrain descriptions and minimize indeterminacy problems. For any area of grammar, any aspect of linguistic knowledge, three intimately related items will be included in the account: there will be a formal and explicit characterization of what some mature speaker knows; this will be part of a *grammar*, which in turn is part of that person's phenotype. Since it is represented somehow in the mind/brain, it must be a finite system, which can relate sound and meaning for an infinite number of sentences. Also to be specified are the relevant genetic principles common to the species and characterizing the initial state of the organism; these principles make up the *theory of grammar* or *Universal Grammar*, and they are part of the genotype. The third item is the *trigger* experience, which varies from person to person and consists of an unorganized and fairly haphazard set of utterances in some language, of the kind that any child hears (the notion of a trigger is from ethologists' work on the emergence of behavioral patterns in young animals). The universal theory of grammar and the variable trigger together form the basis for attaining some grammar; any grammar must be attainable on the basis of a certain trigger and the genotype. (p. 25)

Lightfoot specifies that any explanation of how children acquire speech must take into account each of these elements: a grammar represents both "the linguistic capacity eventually attained by a native speaker" and "a psychological state" that is rooted in the human genotype (p. 26). The author is concerned with defining the initial state of the mental organ and how that state reacts to the trigger experiences which culminate in mature speech.

In practice, Lightfoot's approach to linguistics draws heavily upon Chomsky's (1957) notion of generative and transformational grammar. What emerges is an abstract, mathematical model of language acquisition which Lightfoot considers "as being a real object with clearer properties than the more everyday notion of language" (p. 85). Much of the book is devoted to explaining how Lightfoot's notion of generative grammar can be given mathematical expression.

The Language Lottery raises a number of important questions which are both specific and general in nature. Specifically, Lightfoot has produced a well written introduction to the new, biological approach to linguistics. It may prove, however, that this book's importance lies in that it addresses the fundamental problem concerning the differences between rationalistic and empiricist theories of the human mind. One of Lightfoot's strengths is that he is aware of the broader epistemological implications of his rationalistic approach to language acquisition. Since the seventeenth century rationalist theories of mind have been in disfavor. Indeed, rationalism has been criticized as being excessively speculative and deterministic. Lightfoot's biological theory of language represents an attempt to find a middle ground between empiricism and rationalism; he believes that advances in molecular biology have provided a basis for testing his