

Behavioral and Brain Sciences

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The Fourth Annual Kyoto Prize in Basic Science: Noam Chomsky

Noam Chomsky has revolutionized our understanding of human language as a phenomenon of the physical world. His great achievement in linguistics has been a theory of generative grammar which, with unprecedented originality, fuses three major strands in the history of the field into a powerful scientific research program. Chomsky's theory unites the tradition in the formal analysis of natural language with the search for explanatory models in historical linguistics. A major tenet of the latter tradition is that linguistic change is lawful (governed by general rules) and hence that relationships between languages can be explained with a model which postulates an abstract common source and sets of rules (sound changes) which predict the differences between languages in terms of systematic changes from the common source. Chomsky adapted this model to the description of individual languages, demonstrating that seemingly unrelated or idiosyncratic properties of sentences result when transformations are applied to the abstract underlying structure of such sentences. He developed a model of grammar consisting of rules which specify the linguistic structure of sentences and principles which govern their application and output. Chomsky claimed that a grammar and the theory it is derived from represent a speaker's "tacit knowledge" of language and that they must therefore be a part of the structure of the mind/brain. Generative grammar is thus a theory about the physical world in the tradition of philosophical grammar going back to the speculative grammarians of the Middle Ages.

Chomsky's psychological interpretation of grammar raises two fundamental questions: How is knowledge of language acquired and how is it put to use? Chomsky has noted that the central issue of the creative aspect of language use remains as much a mystery today as it was to the Cartesians who raised it three centuries ago. The question of language acquisition is related to classical issues in epistemology that are also central to philosophy and psychology. Chomsky has argued that children acquiring a first language do not receive sufficient information to account for the knowledge of language they come to have; hence some knowledge of language must be genetically determined as part of a language faculty of mind/brain which controls language acquisition. Chomsky thus recasts the Cartesian doctrine of innate ideas (as opposed to empiricism, the view that all knowledge is learned from experience) in terms of a species-universal faculty of mind he calls Universal Grammar (UG).

The theory of UG that Chomsky has been developing involves general well-formedness conditions on linguistic structure formulated in terms of basic concepts of grammar (e.g. case, government, and binding). Chomsky and others have shown that these principles of UG apply across languages, despite obvious differences between languages. Thus Chomsky's work goes beyond the achievement of 19th Century historical linguistics, which was to establish the relationships among members of language families. Chomsky's theory of UG identifies the basis of all languages as an inborn property of human beings.

Through generative grammar, the study of language approaches the outlook and methodology of the natural sciences. Chomsky's work on language provides a model for cognitive science: a scientific study of human cognition through the investigation of mental structures, representations, and operations. The Kyoto Prize, the Japanese counterpart of the Nobel Prize, is the first major award to recognize Chomsky's substantial contributions to modern science.

Robert Freidin, *Associate Editor, BBS*

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