

Noam
CHOMSKY



On Nature and Language

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On Nature and Language

NOAM CHOMSKY

with an essay on
"The Secular Priesthood and the
Perils of Democracy"

Edited by
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Preface

Invited by the University of Siena, Noam Chomsky spent the month of November 1999 at the Certosa di Pontignano, a fourteenth-century monastery and now a research facility of the University. It was an extraordinarily intense and exciting month, in which faculty and students of the University of Siena had a unique opportunity to come in close contact with different aspects of Chomsky's work, discuss science and politics with him, exchange and sharpen ideas and projects, and interact with him in many ways. The texts collected in this volume are related to activities that took place in connection with this visit.

The first chapter provides an introduction to some basic concepts of linguistic theory and to some elements of the history of the field which are crucial for understanding certain theoretical questions addressed in the following chapters.

The second chapter is related to a particular occasion. Chomsky's sojourn in Siena was organized twenty years after his visit to the Scuola Normale Superiore of Pisa, an event which, through the memorable Pisa Lectures, has profoundly influenced the field of theoretical linguistics ever since. In connection with this anniversary, Chomsky received, on October 27, 1999, the "Perfezionamento honoris

causa,” the honorary degree delivered by the Scuola Normale Superiore. In that occasion, he gave the Galileo Lecture “Perspectives on Language and Mind,” which traces central ideas of current scientific linguistics and of the modern cognitive sciences to their roots in classical thought, starting with Galileo Galilei’s famous praise of the “marvelous invention,” alphabetic writing, which allows us to communicate with other people, no matter how distant in space and time. The Galileo Lecture is published here as the second chapter.

The third chapter is focused on the relations of the study of language with the brain sciences; it addresses in particular the perspectives for an integration and unification of the abstract computational models, developed by the cognitive sciences, with the study of the physical substrate of language and cognition in the brain. A preliminary version of this text was read by Chomsky as a plenary lecture at the meeting of the European Conference on Cognitive Science (Santa Maria della Scala, Siena, October 30, 1999); the same issues were also addressed in a somewhat more general setting in the public lecture “Language and the Rest of the World” (University of Siena, November 16, 1999).

The fourth chapter presents, in the form of an interview, a discussion on the historical roots, concepts, and ramifications of the Minimalist Program, the approach to language which took shape under the impulse of Chomsky’s ideas in the course of the 1990s, and which has progressively acquired a prominent place in theoretical linguistics.

Chomsky also gave a second public lecture entitled “The Secular Priesthood and the Perils of Democracy” (University of Siena, November 18, 1999), and bearing on the other major focus of his interests and activities: the responsibility of the media and other intellectual organizations in modern society. The text corresponding to this

lecture is published here as the fifth chapter. The same topic was also addressed by Chomsky in other talks and seminars, particularly in connection with his recent volume *The New Military Humanism*.

In the course of his sojourn in Siena, Chomsky also gave a series of informal seminars on the latest technical developments of the Minimalist Program, and reported on this topic at the workshops connected to the research program "For a Structural Cartography of Syntactic Configurations and Semantic Types" (Certosa di Pontignano, November 25–27, 1999).

The common denominator uniting the first four chapters of this book is the idea of studying language as a natural object, a cognitive capacity that is part of the biological endowment of our species, physically represented in the human brain and accessible to study within the guidelines of the natural sciences. Within this perspective, introduced by Chomsky's early writings and then developed by a growing scientific community, theoretical linguistics gave a crucial contribution to triggering and shaping the so-called cognitive revolution in the second part of the twentieth century. Based on about forty years of scientific inquiry on language, the Minimalist Program now develops this approach by putting at the center of the research agenda a remarkable property of language design: its elegance and concision in accomplishing the fundamental task of connecting sounds and meanings over an unbounded domain. Much of the interview presented in the fourth chapter is devoted to elucidating this aspect of current research, and exploring analogies with other elegant systems uncovered by scientific inquiry in other domains of the natural world.

The second and third chapters of this book are immediately accessible to non-specialists. The fourth chapter, while essentially non-technical, refers to certain concepts of modern theoretical linguistics and to aspects of the recent history of this field. The aim of

the introductory chapter is to provide some theoretical and historical background for the following discussion on minimalism.

The materials collected in this volume were published in Italian and English with the title *Su natura e linguaggio* as the first volume of the *Lezioni Senesi*, Edizioni dell'Università di Siena, in April 2001. The present volume differs from the Siena volume in that the introductory chapter has been considerably enriched, and the Galileo Lecture has been added, with permission from the Scuola Normale Superiore of Pisa.

The twentieth anniversary of the Pisa seminars provided a good occasion for a new visit to Tuscany, but very little (if any) of the time Chomsky spent in Siena was devoted to celebrating the past. Most of the time and the best energies in this intense and unforgettable month were devoted to exploring and discussing new ideas and new directions for future research on language. We hope that the texts and materials collected here will convey not only the content, but also the intellectual commitment and the excitement that pervaded the discussions between Pontignano and Via Roma.

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Editors' introduction: some concepts and issues in linguistic theory

1 The study of language in a biological setting

Dominant linguistics paradigms in the first half of the twentieth century had centered their attention on Saussurean "Langue," a social object of which individual speakers have only a partial mastery. Ever since the 1950s, generative grammar shifted the focus of linguistic research onto the systems of linguistic knowledge possessed by individual speakers, and onto the "Language Faculty," the species-specific capacity to master and use a natural language (Chomsky 1959). In this perspective, language is a natural object, a component of the human mind, physically represented in the brain and part of the biological endowment of the species. Within such guidelines, linguistics is part of individual psychology and of the cognitive sciences; its ultimate aim is to characterize a central component of human nature, defined in a biological setting.

The idea of focusing on the Language Faculty was not new; it had its roots in the classical rationalist perspective of studying language as a "mirror of the mind," as a domain offering a privileged access to the study of human cognition. In order to stress such roots, Chomsky

refers to the change of perspective in the 1950s as “the second cognitive revolution,” thus paying a tribute to the innovative ideas on language and mind in the philosophy of the seventeenth to early nineteenth centuries, with particular reference to the Cartesian tradition. What is new in the “second cognitive revolution” is that language is studied for the first time, in the second half of the twentieth century, with precise formal models capable of capturing certain fundamental facts about human language.

A very basic fact of language is that speakers are constantly confronted with expressions that they have never encountered in their previous linguistic experience, and that they can nevertheless produce and understand with no effort. In fact, normal linguistic capacities range over unbounded domains: every speaker can produce and understand an unbounded number of linguistic expressions in normal language use. This remarkable capacity, sometimes referred to as a critical component of the “creativity” of ordinary language use, had been noticed at least ever since the first cognitive revolution and had been regarded as a crucial component of human nature. Nevertheless, it had remained fundamentally unexplained in the classical reflection on language. For instance, we find revealing oscillations in Ferdinand de Saussure’s *Cours* on this topic. On the one hand, the *Cours* bluntly states that “la phrase, le type par excellence de syntagme . . . appartient à la parole, non à la langue” (p. 172) [the sentence, the type of phrase par excellence, belongs to *parole*, not to *langue*], and immediately after this passage, the text refers back to the definition of *parole* as “un acte individuel de volonté et d’intelligence . . . [which includes] les combinaisons par lesquelles le sujet parlant utilise le code de la langue en vue d’exprimer sa pensée personnelle . . .” (p. 31) [an individual act of will and intelligence . . . which includes the combinations by which the speaking subject utilizes the code of *langue* in view of expressing

his personal thought]. The freedom of the combinations of elements which characterizes a sentence is “le propre de la parole.” On the other hand, “il faut attribuer à la langue, non à la parole, tous les types de syntagmes construits sur des formes régulières . . . , des groupes de mots construits sur des patrons réguliers, des combinaisons [which] répondent à des types généraux” [it is necessary to attribute to *langue*, not to *parole*, all the types of phrases built on regular forms . . . , groups of words built on regular patterns, combinations which correspond to general types](p. 173). The Cours's conclusion then seems to be that syntax is half way in between *langue* and *parole*: “Mais il faut reconnaître que dans le domaine du syntagme il n'y a pas de limite tranchée entre le fait de langue, marqué de l'usage collectif, et le fait de parole, qui dépend de la liberté individuelle” (p. 173) [but it is necessary to recognize that in the domain of the phrase there is no sharp limit between the facts of *langue*, marked by *collective usage*, and the facts of *parole*, which depend on *individual freedom*]. The source of the oscillation is clear: on the one hand, the regular character of syntax is evident; on the other hand, the theoretical linguist at the beginning of the twentieth century does not have at his disposal a precise device to express the astonishing variety of “regular patterns” that natural language syntax allows. See also Graffi (1991: 212–213) for a discussion of this point.

The critical formal contribution of early generative grammar was to show that the regularity and unboundedness of natural language syntax were expressible by precise grammatical models endowed with recursive procedures. Knowing a language amounts to tacitly possessing a recursive generative procedure. When we speak we freely select a structure generated by our recursive procedure and which accords with our communicative intentions; a particular selection in a specific discourse situation is a free act of *parole* in Saussure's sense, but the underlying procedure which specifies the possible “regular patterns”

is strictly rule-governed. Over the last fifty years, the technical characterization of the recursive property of natural language syntax has considerably evolved, from the assumption of “generalized transformations” forming complex constructions step by step beginning with those underlying the simplest sentences (Chomsky 1957), to recursive phrase structure systems (Katz and Postal 1964, Chomsky 1965) capable of producing deep structures of unbounded length, to a recursive X-bar theory (Chomsky 1970, Jackendoff 1977), to the minimalist idea that the basic syntactic operation, “merge,” recursively strings together two elements forming a third element which is the projection of one of its two subconstituents (Chomsky 1995a, 2000a). Nevertheless, the fundamental intuition has remained constant: natural languages involve recursive generative functions.

The new models built on the basis of this insight quickly permitted analyses with non-trivial deductive depth and which, thanks to their degree of formal explicitness, could make precise predictions and hence could be submitted to various kinds of empirical testing. Deductive depth of the models and experimental controls of their validity: these are among the basic ingredients of what has been called the “Galilean style,” the style of inquiry that established itself in the natural sciences from the time of Galileo Galilei (see chapters 2 and 4 for further discussion of this notion). Showing that the language faculty is amenable to study within the guidelines of the Galilean style, this is then the essence of the second cognitive revolution in the study of language. Initiated by Chomsky’s contributions in the 1950s, this approach has profoundly influenced the study of language and mind ever since, contributing in a critical manner to the rise of modern cognitive science (see, in addition to the references quoted, and among many other publications, Chomsky’s (1955) doctoral dissertation, published in 1975, Chomsky (1957) and various essays in Fodor and Katz (1964)).

2 Universal Grammar and particular grammars

The modern study of language as a mirror of the mind revolves around a number of basic research questions, two of which have been particularly prominent:

- What is knowledge of language?
- How is it acquired?

The first question turned out to be of critical importance for the program to get started. The first fragments of generative grammar in the 1950s and 1960s showed, on the one hand, that the implicit knowledge of language was amenable to a precise study through models which had their roots in the theory of formal systems, primarily in the theory of recursive functions; on the other hand, they immediately underscored the fact that the intuitive linguistic knowledge that every speaker possesses, and which guides his linguistic behavior, is a system of extraordinary complexity and richness. Every speaker implicitly masters a very detailed and precise system of formal procedures to assemble and interpret linguistic expressions. This system is constantly used, in an automatized and unconscious manner, to produce and understand novel sentences, a normal characteristic of ordinary language use. ①

The discovery of the richness of the implicit knowledge of language immediately raised the question of acquisition. How can it be that every child succeeds in acquiring such a rich system so early in life, in an apparently unintentional manner, without the need of an explicit teaching? More importantly, the precise study of fragments of adult knowledge of language quickly underscored the existence of “poverty of stimulus” situations: the adult knowledge of language is largely underdetermined by the linguistic data normally available to the child, ②

which would be consistent with innumerable generalizations over and above the ones that speakers unerringly converge to. Let us consider a simple example to illustrate this point. Speakers of English intuitively know that the pronoun “he” can be understood as referring to John in (1), but not in (2):

(1) John said that he was happy

(2) * He said that John was happy

We say that “coreference” between the name and the pronoun is possible in (1), but not in (2) (the star in (2) signals the impossibility of coreference between the underscored elements; the sentence is obviously possible with “he” referring to some other individual mentioned in the previous discourse). It is not a simple matter of linear precedence: there is an unlimited number of English sentences in which the pronoun precedes the name, and still coreference is possible, a property illustrated in the following sentences with subject, object and possessive pronouns:

(3) When he plays with his children, John is happy

(4) The people who saw him playing with his children said that John was happy

(5) His mother said that John was happy

The actual generalization involves a sophisticated structural computation. Let us say that the “domain” of an element A is the phrase which immediately contains A (we also say that A c-commands the elements in its domain: Reinhart (1976)). Let us now indicate the domain of the pronoun by a pair of brackets in (1)–(5):

- (6) John said that [he was happy]
- (7) * [He said that John was happy]
- (8) When [he plays with his children], John is happy
- (9) The people who saw [him playing with his children] said that John was happy
- (10) [His mother] said that John was happy

The formal property which singles out (7) is now clear: only in this structure is the name contained in the domain of the pronoun. So, coreference is excluded when the name is in the domain of the pronoun (this is Lasnik's (1976) Principle of Non-coreference). Speakers of English tacitly possess this principle, and apply it automatically to new sentences to evaluate pronominal interpretation. But how do they come to know that this principle holds? Clearly, the relevant information is not explicitly given by the child's carers, who are totally unaware of it. Why don't language learners make the simplest assumption, i.e. that coreference is optional throughout? Or why don't they assume that coreference is ruled by a simple linear principle, rather than by the hierarchical one referring to the notion of domain? Why do all speakers unerringly converge to postulate a structural principle rather than a simpler linear principle, or even no principle at all?

This is one illustration of a pervasive situation in language acquisition. As the experience is too impoverished to motivate the grammatical knowledge that adult speakers invariably possess, we are led to assume that particular pieces of grammatical knowledge develop because of some pressure internal to the cognitive system of the child. A natural hypothesis is that children are born with a "language faculty" (Saussure), an "instinctive tendency" for language (Darwin); this

cognitive capacity must involve, in the first place, receptive resources to separate linguistic signals from the rest of the background noise, and then to build, on the basis of other inner resources activated by a limited and fragmentary linguistic experience, the rich system of linguistic knowledge that every speaker possesses. In the case discussed, an innate procedure determining the possibilities of coreference is plausibly to be postulated, a procedure possibly to be deduced from a general module determining the possibilities of referential dependencies among expressions, as in Chomsky's (1981) Theory of Binding, or from even more general principles applying at the interface between syntax and pragmatics, as in the approach of Reinhart (1983). In fact, no normative, pedagogic or (non-theory-based) descriptive grammar ever reports such facts, which are automatically and unconsciously assumed to hold not only in one's native language, but also in the adult acquisition of a second language. So, the underlying principle, whatever its ultimate nature, appears to be part of the inner background of every speaker.

We can now phrase the problem in the terminology used by the modern study of language and mind. Language acquisition can be seen as the transition from the state of the mind at birth, the initial cognitive state, to the stable state that corresponds to the native knowledge of a natural language. Poverty of stimulus considerations support the view that the initial cognitive state, far from being the *tabula rasa* of empiricist models, is already a richly structured system. The theory of the initial cognitive state is called Universal Grammar, the theory of a particular stable state is a particular grammar. Acquiring the tacit knowledge of French, Italian, Chinese, etc., is then made possible by the component of the mind-brain that is explicitly modeled by Universal Grammar, in interaction with a specific course of linguistic experience. In the terms of comparative linguistics, Universal

Grammar is a theory of linguistic invariance, as it expresses the universal properties of natural languages; in terms of the adopted cognitive perspective, Universal Grammar expresses the biologically necessary universals, the properties that are universal because they are determined by our in-born language faculty, a component of the biological endowment of the species.

As soon as a grammatical property is ascribed to Universal Grammar on the basis of poverty of stimulus considerations, a hypothesis which can be legitimately formulated on the basis of the study of a single language, a comparative verification is immediately invited: we want to know if the property in question indeed holds universally. In the case at issue, we expect no human language to allow coreference in a configuration like (2) (modulo word order and other language specific properties), a conclusion which, to the best of our current knowledge, is correct (Lasnik (1989), Rizzi (1997a) and references quoted there). So, in-depth research on individual languages immediately leads to comparative research, through the logical problem of language acquisition and the notion of Universal Grammar. This approach assumes that the biological endowment for language is constant across the species: we are not specifically predisposed to acquire the language of our biological parents, but to acquire whatever human language is presented to us in childhood. Of course, this is not an a priori truth, but an empirical hypothesis, one which is confirmed by the explanatory success of modern comparative linguistics.

3 Descriptive adequacy and explanatory adequacy

It has been said that language acquisition constitutes "the fundamental empirical problem" of modern linguistic research. In order to underscore the importance of the problem, Chomsky introduced,