

## Chapter 2

# WHAT'S IN THE LEXICON?

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**Abstract** What aspects of an utterance must be stored in long-term memory, and what aspects can be constructed on-line in working memory? This question has not played a significant role in linguistic theory, and indeed it would seem to be a question of performance rather than competence. However, if taken seriously, it leads to some radical conclusions about the organization of the grammar. In particular, the lexicon — the store of memorized elements — contains not only words but regular affixes and stems, plus phrasal units such as idioms and constructions. One consequence is a much less rigid divide than usual between lexical items and rules of grammar. The resulting architecture in part resembles the approaches of HPSG, Construction Grammar, and other non-Chomskyan versions of *generative grammar*. It offers the possibility of a better rapprochement between linguistic theory and psycholinguistic studies on language processing than has been possible in more traditional Chomskyan architectures.

**Keywords:** Lexicon, grammar, idioms, grammatical constructions, linguistic theory, psycholinguistic studies.

### 1. Introduction to the architecture

Chomsky's *Aspects of the Theory of Syntax* (Chomsky, 1965) set a program for linguistic theory that has essentially defined the field for 35 years. Over that time much has changed in our conception of rules of grammar and how they interact. However, certain more basic claims and assumptions of the theory have remained unchanged. During the past few years I have been engaged in a re-evaluation of this program, asking what has changed and why, what has not changed and why not, and, of the parts that have remained intact, which are worth preserving and which are in retrospect probably mistaken in light of subsequent research in linguistics, psychology, and neuroscience (Jackendoff, 1997a;

2001). The present paper explores some issues within this re-evaluation, in particular addressing the question of storage versus computation that is the topic of this volume. It is useful to begin with a brief outline of the larger picture.

Three foundational observations lie at the heart of all generative linguistics since *Aspects*. The first is that the object of investigation is language as encoded in the human mind/brain, rather than language as an abstract object or as a cultural artifact. This stance is essentially agreed upon by everyone working on language within cognitive science. The second observation, a point driven home in Chomsky's earlier *Syntactic Structures* (Chomsky, 1957), is that human language permits the encoding of an unlimited number of messages of potentially unlimited complexity, based on combinatorial principles (or *rules of grammar*) applying to a finite stock of discrete elements. Chomsky proposes that the central issue for theoretical linguistics is the characterization of these combinatorial principles, in a way compatible with their instantiation in the mind. This proposal is taken for granted in most of the linguistics community, but in much of cognitive science and neuroscience it either does not play a central role or is even disputed, as we shall see presently.

The third observation, which has led to the most controversy, is that the rules of grammar differ from one human language to the next, and therefore that adults must have acquired these different principles as children, on the basis of the language in their environment. Moreover, the principles cannot be acquired by instruction from those who already speak the language, since speakers have no awareness of the principles — they have only intuitions regarding grammaticality and appropriateness of sentences. Therefore, children must be constructing the principles on their own, largely unconsciously. Chomsky claims that the nature of grammatical principles is such that they cannot be acquired unaided by a general-purpose information processing device; rather, children must come to the task of language acquisition with some inherent preconception of what language is supposed to be like. Following the terminology of linguists of the Cartesian tradition, he calls this unlearned preconception *Universal Grammar*. He proposes that a higher goal for linguistic theory is to characterize Universal Grammar, which he sees as the basis of the human language capacity.

The idea that there is a specialized human language capacity has provoked widespread dissent over the years (e.g. Edelman, 1992; Elman et al., 1996; Deacon, 1997). Many linguists and psycholinguists dispute it as well (e.g. Lakoff, 1987). I agree that we should reject a cartoonish view of Universal Grammar as a “box” in the mind totally isolated in form and function from other mental capacities — a view that Chomsky

sometimes seems to be proposing (e.g. Chomsky, 1995). But I believe there is merit in regarding the language capacity as a specialization built on top of other cognitive capacities in the primate repertoire, different in content but not in overall character from other cognitive specializations. One can then ask exactly what new must be added to preexisting capacities (beyond more memory) in order for a primate to learn human language; it seems reasonable to hypothesize that the additions are nonzero, given the complexity of language. One finds strains of this way of posing the issue in *Aspects*, but it is not the way the issue has been framed in the collective consciousness of the field.

These three foundational observations and the issues they raise are in my opinion absolutely essential to linguistic theory — as important now as they were in 1965. *Aspects* instantiated them in the theory by means of a basic assumption about the form of the grammar that seemed reasonable at the time and that has driven research ever since, but which I think on reflection has proven to be mistaken. This assumption concerns the way in which the grammar realizes the “discrete infinity” of language. In *Aspects* the creative or generative power of language is invested in the syntactic component, specifically the principles that combine lexical items into phrase-structure (the *base* component). By contrast, the phonological and semantic components of language are taken to be “interpretive,” that is, their structure is taken to arise by means of a derivation from syntactic structure. Moreover, lexical items (words) are taken to be inserted in their entirety into syntactic structures; their phonological and semantic aspects are carried over into phonological and semantic structures respectively through the process of “interpretation.”

Perhaps because this “syntactocentric” architecture was so successful in promoting lively research on linguistic structure, it was not noticed that by 1980 or so evidence against it had begun to accumulate. A revolution in phonology during the middle 1970s (e.g. Goldsmith, 1976; Liberman and Prince, 1977) led to a view of phonological structure in which many of its properties are autonomous of syntactic structure. It is built not out of units derivable from syntactic structure by “bracket erasure” and “re-adjustment” (Chomsky and Halle, 1968), but out of a collection of independent “tiers” such as segmental and syllabic structure, metrical structure, and intonational structure, connected by “association lines.” In other words, the unlimited class of phonological structures of a language is the product of an autonomous generative phonological component — perhaps not as elaborately recursive as syntax, but autonomous and generative nevertheless. This view of phonological structure rapidly came to be universally accepted by phonologists, but

few in either syntax or phonology seem to have noticed how it challenges the syntactocentric architecture.

Similarly in semantics. At the time of *Aspects*, virtually nothing was known about the formulation of semantics in generative grammar (only the rudimentary and much-attacked work of Katz and Fodor, 1963 and Katz and Postal, 1964). But in the following fifteen years, at least three different traditions of semantics were developing: the formal semantics of Montague and his school (Partee, 1975; 1976), the Cognitive Grammar of Langacker, 1987; Lakoff, 1987, and their school, and my own Conceptual Semantics (Jackendoff, 1978; 1983; Pinker, 1989). Despite the mutual incompatibility of these traditions, they concur in viewing semantics as a combinatorial system of considerable complexity and subtlety — and one *not* strictly derivable from syntactic structure. Thus semantics too is properly viewed as an autonomous generative component, not as a derivative of syntactic generativity.

However, three autonomous generative components cannot simply operate independently of each other. A sentence is after all a correlation between sound and meaning, mediated by syntactic structure. Rather, as a matter of “conceptual necessity” (to use the term of Chomsky, 1995), the grammar also must contain *interface* rules that determine how the three structures correspond to each other or that place the three structures “in registration” (or that “bind” them in the neuroscience sense). The resulting skeletal architecture of the grammar is shown in Figure 2.1; this is a bare minimum. (In particular, a further interface directly between phonology and semantics would be a promising addition, in order to account for the well-known topic/focus effects that are based on stress and intonation without any additional syntactic marking.)

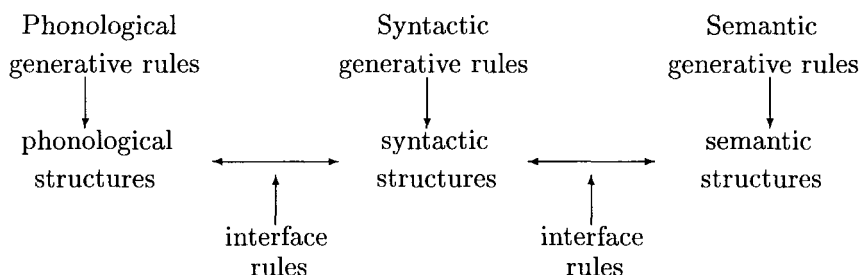
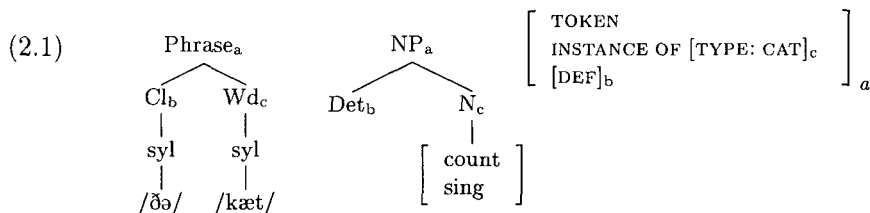


Figure 2.1. The skeletal architecture of the grammar.

The structure of a sentence can thus be segregated into independent substructures, each of which contains only information proper to one of the components of the grammar. (2.1) is the structure of the phrase *the*

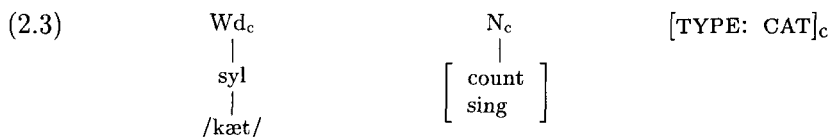
*cat* (phonological and syntactic structures in standard notation; semantic notation in the formalization of Jackendoff, 1983—readers should feel free to substitute their own favored semantic notation).



In (2.1) the subscripts indicate how the parts of the structures correspond: the entire phonological phrase corresponds to the entire NP and the entire semantic constituent; the Clitic corresponds to the Determiner in syntax and the definiteness feature in semantics; the Word corresponds to the N in syntax and the type-constituent in semantics. This treatment contrasts with the traditional notation for this phrase, shown in (2.2), which on one hand mixes phonological and syntactic information — *the* and *cat* are after all phonological information — and which on the other hand fails to show all the phonological and semantic structure.



What is the structure of a word in this architecture? As in every theory, a word is a bundle of phonological, syntactic, and semantic features. However, in the present theory, it is impossible to insert a word in its entirety into any of the three tree structures, because that would mix types of information. Rather, a word is distributed across the three structures, and provides part of the linkage between them. For instance, *cat* looks like this:



Thus a word is a stored association of three kinds of structures, plus a subscript that links them. In other words, the lexicon is not a component that inputs to the syntactic component, but rather a part of the interface

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