

preferred term for “phenomenalist” in other contexts (e.g., Jackendoff 1992a, p. 158). An argument offered in *Foundations* (p. 304) is that the study of mental events independently of possible referents in the real world – undoubtedly a common practice in psychology and linguistics – is already the beginnings of phenomenism.

But while some areas of psychology may be able to get by with a phenomenalist ontology, those of most interest to linguists, namely perception, cognition, and language, are not among them. Here the psychologist very often doesn't even care about the exact nature of the internal events, as long as the responses come out right. The important thing about language is that its phrases and sentences are keyed to the same events in the environment for all of its users, regardless of what goes on in their heads.

The phenomenism of *Foundations* will ensure that it will preserve the traditional Cartesian aloofness of GL from behaviourist and corpus-based approaches to language, in spite of the new interdisciplinary forum it has created. Neither does *Foundations* offer any points of contact with applied linguistics. To take a single example, the search for a sensible lexical and phrasal semantics, so central to *Foundations*, is going on with equal urgency in modern lexicography, a new corpus-based discipline with strong links to the empirical study of second-language learning (e.g., Humblé 2001). Yet it seems that neither can help the other.

The difference between Cartesian and empirical linguistics can be illustrated by asking how “valid” *Foundations* is, in the old psychological sense of really being about what it claims to be about. How representative are the numbered phrases and sentences of English in *Foundations*, of the English language as a whole? With the ready availability of corpora of high validity for the major languages, it is significant that linguists in general are still not required to estimate for us the percentage of the language that their structures will cover, and the size of the remaining piece that will require a different treatment. The relativity of structures to individual languages poses the same problem. It is fortunate that English had the international status to allow GL to direct so much of its efforts on a single language. But even if English were the only language in the world we would still have the validity problem. As Jackendoff puts it, “there are just so many goddamned words” (2002, p. 377). We need some assurance that our semantic structures have invariance over a good part of the language we are studying, and are not trapped in lexical pockets. And ideally we would like to know which structures have some chance of being invariant over languages, or at least a few languages from different groups.

Perhaps the explanation for the gulf between Cartesian and empirical approaches is that the terms “pure” and “applied” have a special meaning in linguistics that does not imply that the theory and its referent remain the same across domains. “Pure” in linguistics could also mean that we are dealing with a different kind of reality. *Foundations* makes the case more strongly than ever before.

## How Jackendoff helps us think

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**Abstract:** The nature of the relationship between language and thought has been quite elusive. We believe that its understanding is crucially dependent on the available notions of language and thought. *Foundations of Language* offers an unusually clear and complete account of both, providing a fruitful and much needed framework for future research. No doubt it will *help us think* better about these elusive complexities.

In a recent article published in this journal, philosopher Peter Carruthers put forward the hypothesis that natural language

(more specifically, the Logical Forms [LF] underlying natural language sentences) is the mechanism that enables what he calls “intermodular and non-domain-specific thinking” (Carruthers 2002). According to this view, each domain-specific-module can translate its mentalesse thoughts into LFs due to the language faculty. This common format, in turn, is what enables the combination and integration of information from different modalities to occur.

I believe that one of the reasons that Carruthers appeals to LFs is the prestige of Chomsky's theories. In some respects this prestige is fully deserved, but because of his selection, Carruthers is “limited” by a theory that has no semantic motivations, and which is not concerned with linguistic performance (only competence). And all this in spite of the fact that his main concern is to understand “how we think.”<sup>1</sup> On the other hand, Carruthers' hypothesis is based on a syntactocentric theory: All generative power comes from syntactic structure alone; the semantic and phonological components are derived from it.

One of Jackendoff's main concerns in his new book, *Foundations* (Jackendoff 2002), is to provide a critical view of the syntactocentric viewpoint that permeates modern linguistics and the isolation from the discipline that it has imposed on the rest of the mind/brain sciences. In what I see as an important *methodological lesson* of *Foundations*, we must begin our theorizing by establishing the *boundary conditions* of a specific problem (e.g., by “thought” we understand such and such . . .). Only then will we be able to see what kind of architecture may arise from it, while making as few assumptions as possible. In a certain sense, this is what *Foundations* is all about – and on a massive scale.

In *Foundations*, as well as in the author's previous work (Jackendoff 1987; 1996; 1997, Ch. 8), the whole problem of the relationship between language and thought is expressed with what I consider to be unusual clarity. In this framework, semantics, phonology, and syntax are different and autonomous computational spaces, each connected to the others by interface rules. Here, the *locus* of thought is at the level of Conceptual Structure, and this is where the integration of information – one of Carruthers' main concerns – takes place. It is the combinatoriality at the level of Conceptual Structure, and not at the level of Syntactic Structure (or LF based on syntactic structures), which enables the integration of conceptual information in the generation of more complex thoughts. In addition, Jackendoff delves into Conceptual Structures and shows us a rich landscape of substructures composed of different tiers (descriptive, referential, and informational tiers; Spatial Structure; Qualia structure).

This architecture leaves language with a role in thought which we believe to be more interesting than the one that a coarse syntactic structure would be capable of providing. It is also a more interesting role than what a hypothetical “semantic level” – distinct from the conceptual level – would be capable of fulfilling. Jackendoff's proposal is basically that the tripartite nature of language *permits* the mapping of unconscious conceptual representations (through syntactic representations) onto conscious phonological representations.<sup>2</sup> As Jackendoff puts it:

Linguistic form provides one means for thought to be made available to awareness (another is visual imagery); we “hear the little voice in the head” and thereby “know what we are thinking.” Notice however that the form of the awareness in question is essentially phonological. What we “hear” is *words*, pronounced with *stress patterns*. At the same time, one cannot define rules of inference over phonological structure, so it is not an appropriate medium for reasoning. The correct level for carrying out reasoning is conceptual structure, and reasoning can take place even without any connection to language, in which case it is unconscious. (Jackendoff 2002, p. 274)

In a stimulating article entitled “How Language Helps Us Think” the author provides some cues on the role of language on thought:

Language is the only modality of consciousness that makes perceptible the relational (or predicational) form of thought and the abstract elements of thought. Through these elements being present as isolable en-

tities in consciousness, they can serve as the focus of attention, which permits higher-power-processing, anchoring, and, perhaps most important, retrievable storage of these otherwise nonperceptible elements. (Jackendoff 1996a, p. 27)

This way of language *helping* thought seems to be compatible with phenomenology:

In particular, in speaking, one's choice of words at the beginning of a sentence may by feedback refine the formulation of subsequent parts of the thought; one's choice of a syntactic structure for realizing the words affects the order in which the rest of the thought must be refined . . . As the expression of the thought reaches conscious form (in my theory, phonological structure), one can "hear" it as "inner language" in advance of uttering it, and quickly re-evaluate it, revise it, or repair it before producing it publicly. This is experienced as "finding out what one is thinking by trying to say it." It is also possible at this point for one to discover that an utterance is "not exactly what one meant." (Jackendoff 1996b, p. 204)<sup>3</sup>

On the other hand, Jackendoff's framework liberates narrow syntax from the burden of having to account for the richness of thought. All semantic distinctions that are reflected in grammar (morphology, syntax, and phonology) are carried out by *mappings* between different levels (which may vary between languages). We believe such an architecture is highly adaptable to future evidence on how language might affect thought. It is also compatible with the idea that learning vocabulary and grammar (i.e., mappings between phonology, syntax, and meaning) might shape the "inner conceptual landscape" in a manner that differs substantially from cognitive systems that lack such devices. As Spelke put it:

Natural languages have a magical property. Once a speaker has learned the terms of a language and the rules by which those terms combine, she can represent the meanings of all grammatical combinations of those terms *without further learning*. *The compositional semantics of natural languages* allows speakers to know the meanings of new wholes from the meanings of their parts. (Spelke, 2003, p. 306, emphasis added)

Jackendoff's ideas seem to run along these lines, with the exception (I believe) that what Spelke calls the compositional or combinatorial character of *thought* in Jackendoff's framework, and the achievements mentioned are made not *by* language but *with the help* of language, that is, with the *help* that a lexicon – and the possibility of mapping conceptual structures onto syntactic and phonological (conscious) structures – provides in terms of *anchoring, manipulation, and explicitness*.

Finally, some remarks on Jackendoff's methodology. Although one may not agree with everything he says, his manner of theorizing has one undeniably rare quality: The reader will always understand what is being said. His concepts are well defined and troublesome issues are left open rather than being artificially "solved." I believe that explicitness and clarity are an important part of what we call science. Nature is full of patterns, the mind/brain is a sort of pattern processing device, and thus, when humans begin to speak *clearly* about something, suddenly, voilà! – you have the makings of science. Besides its original ideas on language and cognition, and its impressive integrative power, I see *Foundations* as a tremendous lesson on scientific discourse.

#### NOTES

1. Carruthers's proposals are at least problematic: How does an account based solely on domain-specific modules and LFs deal with the complexities of "language production," for which it has been necessary to postulate non-verbal processes such as "macroplanning" and "microplanning"? (Molina 2002). On the other hand, how does this account deal with the fact that we can have bare or wordless concepts (i.e., concepts that do not have a word associated with them), such as "the pathetic strands of hair that some men drape carefully but ineffectively over their bald spots" (Dennett 1998, p. 286) or "the moist residue left on a window after a dog presses its nose to it" (Murphy 2003, p. 389)?

2. For Jackendoff's concept of consciousness see Jackendoff (1987; 1997, Ch. 8).

3. I am, however, somewhat uncomfortable with the idea that in language production, "feedback and attention [are] not possible until there is a conscious phonological structure available" (Jackendoff 1996b, p. 205). This is because it is stated that in language production, besides being capable of monitoring the phonology, syntax, and semantics of the sentences that *reach* our inner speech, it also appears to be possible to monitor *the construction of the preverbal message*, for which no overt conscious clues are still available. In other words, it appears that the speaker can directly monitor the preverbal messages he is preparing to express, and he may register a message *before* its formulation has started. As Levelt puts it:

The speaker no doubt also monitors messages *before* they are sent into the formulator, considering whether they will have the intended effect in view of the present state of the discourse and the knowledge shared with the interlocutors . . . The main work is done by the Conceptualizer, which can *attend to internally generated messages* and to the output of the speech-Comprehension System." (Levelt 1989, p. 14, emphasis added)

What kind of "unconscious" monitoring would this be? Would it be part of what could be called the "dynamic of thought"?

## Grammar and brain

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**Abstract:** Jackendoff's account of relating linguistic structure and brain structure is too restricted in concentrating on formal features of computational requirements, neglecting the achievements of various types of neuroscientific modelling. My own approaches to neuronal models of syntactic organization show how these requirements could be met. The book's lack of discussion of a sound philosophy of the relation is briefly mentioned.

I agree with Jackendoff (2002) on the main principles outlined in *Foundations of Language: Brain, Meaning, Grammar, Evolution*: The discussion of the foundations of language should be based on considerations of the brain's neural circuitry along with its functional properties, on a "two way street" (p. 22); strict reductionism and autonomous functionalism are inappropriate. The challenges to cognitive neuroscience presented in Chapter 3, section 3.5, and the list of basic questions on pp. 422–23, are well selected.

I disagree on the following points: (1) It is not true that *only* structures built of (formal symbolic) discrete combinatorial units (p. 423) can explain the productivity of language (pp. 38–39). (2) The competing design feature of "brain style modelling" is inappropriately characterized by mere reference to a few models (p. 23). (3) It is not correct that "we don't even have an *idea* of how a single speech sound such as /p/ – much less a category like NP – is instantiated in neural firings or synaptic connections" (see below). (4) A book on the foundations of language should find some place for basic philosophical and methodological discussion, and not merely presuppose standards (Cartesianism, the formal view of axiomatization). (For a contrasting Leibnizean view, see Schnelle [1991a; 1991b, Part III; 1996b], and, for an intuitionistic computational foundation, Schnelle [1988].)

My specific critique will elaborate point 3:

1. The possibility of an analysis based on active and interactive feature representation units in terms of neuronal groups, columns, and modules is briefly mentioned in the author's reference to Hubel and Wiesel 1968 (see *Foundations*, p. 23). However, the author disregards its important role for the representation of actively interactive features in the Jakobsonian sense (Schnelle 1997) and their fruitful analyses by Szentagothai, Mountcastle, Arbib, and others (cf. Arbib & Erdi 2000, Schnelle 1980; 1981), as well as the related computational Theory of Neuronal Group Selection of Edelman (1987, and his subsequent books).

2. The author also completely neglects neuroanatomic and