

1966, mentioned (p. 128) as an early model outside the tradition of generative grammar, sharing Jackendoff's current view of parallel architecture for different structural components. But apart from this fundamental similarity, several other important points of similarity emerge in this work:

1. Retreat from the insistence on derivational/transformational rules in recognition of their lack of realism.
2. Serious attention to the need for a model of linguistic competence to be made usable as the basis for a model of performance.
3. Adoption of a more constrained view of Universal Grammar falling far short of the innateness of abstract grammatical categories, as envisioned in the Principles and Parameters model. Besides being constrained, Jackendoff's view is much more articulated, and is presented with a scenario explaining how it might have developed incrementally in human evolution, rather than appearing suddenly and mysteriously as a whole.
4. Conclusion that the distinction between "rules" of language and lexical items does not have to be seen as so fundamental, as in more orthodox Chomskyan models.
5. A view of the lexical item more like Lamb's version of the lexeme, including the consideration of a possible separate internal syntax for the word (morphotactics).
6. A view of semantics that includes many aspects treated as syntactic in more orthodox generativism and sees the possibility of going beyond single sentences to take discourse relations into account.
7. Serious attention to the relation of language to other matters of neural functioning like visual perception.

There is no indication that Jackendoff is aware of Lamb's more recent work (as summarized in Lamb 1999). Lamb's interest in relating his model of language to the brain began in classroom presentations and public lectures in the late 1960s. It took about 30 years, however, before Lamb was sufficiently satisfied to publish the results, though his product is a textbook introduction to what he now terms "neuro-cognitive linguistics," rather than a research monograph. The neuro-cognitive model is a development of the stratificational which "uses mainly linguistic evidence but attempts also to integrate the findings from psycholinguistics and neurolinguistics" (1999, pp. 7–8).

Lamb's relational networks are more sophisticated and less limited than those of the connectionists cited by Jackendoff. In discussing recent attacks against this form of connectionism, Lamb states: "We shall see that some of them are based on misunderstanding of connectionism – or at least, of what connectionism ought to be – while some of them, along with additional evidence, oblige us to refine the theory" (1999, p. 4).

Though excluding Lamb's more recent work, Jackendoff nevertheless attempts to synthesize a remarkable breadth of research areas from different disciplines. More attention to Lamb's work, however, would not only open up possibilities of an enriched dialogue among scholars, it would provide a potential for bringing in an implementation of the model in a way that has a chance to ultimately relate to the neural connections involved in the brain. The parallel architecture model has justifiably retreated from the old model of derivational rules, which constituted more a mathematical abstraction than a realistic way to look at language as a system acquired and used by humans. Lamb's more recent model, however, provides a way to relate language modeling more positively to neural facts, and it would be well worth examining how relational networks of the Lambian sort could be used to implement this model.

The most fundamental difference between Jackendoff's stratificational model and Lamb's concerns nativism. Lamb has always been skeptical of claims of innate universal grammar, while Jackendoff sees nativism as the most essential feature of the older Chomskysm to be retained. Still, he presents a modified and articulated variety of the latter, and Lamb has always been more concerned with questions of language structure than with language acquisition, meaning that his model is not totally incom-

patible with nativism in general. Dialogue based on this model is much more feasible than with relation to older, more monolithic forms of nativism.

Cartesian and empirical linguistics: The growing gulf

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Abstract: Jackendoff's *Foundations of Language: Brain, Meaning, Grammar, Evolution* (2002) achieves a major shift in the focus and methods of Generative Linguistics (GL). Yet some of the original restrictive features of GL, cognitivism and Cartesianism in particular, remain intact in the new work and take on a more extreme form with the addition of a phenomenalist ontology.

Jackendoff's *Foundations* presents a striking new view of language as a component in a general theory of mind. By taking a more piecemeal interpretation of the traditional formalisms of Generative Linguistics (GL) and supplementing them with a new semantics, it opens up GL to a wide range of research areas in cognitive science. Since *Foundations* is also a true product of the GL tradition, certain of its chapters (notably Chs. 3, 5, 6, 11, and 12) also make an excellent introduction to state-of-the-art GL for language researchers in other disciplines.

But some traditional principles of GL, strongly at variance with the objectives of interdisciplinarity, have passed unchanged into *Foundations*. The first is "cognitivism" (Keijzer & Bem 1996; MacAogáin 1999), the practice of referring to all linguistic competences as "knowledge" or "cognition," including those that are unconscious. The difficulty with cognitivism is that it leaves us with only one form of activation, regardless of how levels and interfaces were ascribed to the structure so activated. All we ever have is the whole lot "running off" as a unit in f-mind. But in order to model the most elementary of behaviour systems, we already need several forms of activation that are irreducibly different; two at the very least to correspond to perceptions and wants. In addition, we need a separation between forms of activation that are belief-forming or want-forming from those that merely determine content. In spite of the mentalistic idiom, these distinctions are well established in neurology, down to the invertebrates, and are separable also in psychological models of cognition, inference, learning, and decision-making, which embody notions of reinforcement and adaptation.

While cognitivism can be defended in a lot of cognitive science, wherever truth, value, and reinforcement are well-defined in the task environment, in GL, where grammaticality is all we have, its effect is to split language off irretrievably from behaviour and the environment, as is acknowledged by the f-prefixes of *Foundations*. The cognitive linguist can claim to be already working on the physicalist account, in conjunction with the brain sciences. But adding neurological glosses to the cognitivist account leaves it just as isolated as it was before from the quantitative study of language as a form of response to the environment.

The isolation is compounded in *Foundations* by the addition of a phenomenalist or "conceptualist" ontology, most explicitly in the attack on the notion of external object (Ch. 10). Phenomenalism retreats from the external world to the world as perceived by individuals, or in the language of *Foundations*, it pushes the world back into the mind (p. 303). This is necessary, according to Jackendoff, to open up the border between GL and psychology and thus to "integrate semantics with the other human sciences" (p. 329).

The suggestion is that psychology, and perhaps other human sciences, are phenomenalist in nature. "Psychological" (as opposed to "philosophical" or "truth conditional") is Jackendoff's

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.”¹ 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.² 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-