these semantic representations independently of the syntax and then have the problem of relating the two independent representations.

Linguistics fit for dialogue

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Abstract: *Foundations of Language* (Jackendoff 2002) sets out to reconcile generative accounts of language structure with psychological accounts of language processing. We argue that Jackendoff's "parallel architecture" is a particularly appropriate linguistic framework for the interactive alignment account of dialogue processing. It offers a helpful definition of linguistic levels of representation, it gives an interesting account of routine expressions, and it supports radical incrementality in processing.

It is easy to argue that dialogue is the basic setting for language use (Clark 1996). Yet historically, generative linguistics has developed theories of isolated, decontextualized sentences that are used in texts or speeches, in other words, in monologue. In turn, this failure to address dialogue at a linguistic level is one of the main reasons why psycholinguistics have also ignored dialogue. In contrast, Pickering and Garrod (in press) propose a specific mechanistic account of language processing in dialogue, called the *interactive alignment* model. This account assumes that in dialogue, interlocutors align their linguistic representations at many levels through a largely automatic process. It also assumes that alignment at one level can promote alignment at other levels. This explains why coming to a mutual understanding in dialogue is generally much easier than interpreting or producing utterances in monologue. In this commentary we consider how Jackendoff's framework in *Foundations* relates to this account.

Jackendoff considers how linguistic theory can elucidate language processing (Ch. 7), a surprisingly fresh approach from a generative linguist. However, he does not explicitly consider how his "parallel architecture" might relate to language processing in dialogue. Here, we argue that the architecture turns out to be particularly helpful in understanding how interactive alignment comes about. First, it is consistent with multiple independent levels of representation with links between the levels. Second, it offers interesting insights into the linguistic representation of semi-fixed or routine expressions such as idioms, which we argue play an important role in dialogue processing. Finally, it is consistent with incrementality in both production and comprehension, which appears necessary for understanding dialogue.

Independent levels and the interfaces between them. Jackendoff assumes that phonological, syntactic, and semantic formation rules generate phonological, syntactic, and semantic structures respectively, and these are brought into correspondence by interface rules, which encode the relationship between different systems (Ch. 5). This produces an architecture which is "logically *non*-directional" and hence not inherently biased toward either perception or production (Ch. 7, p. 198). These two general features of Jackendoff's account make it especially attractive as a linguistic framework for interactive alignment. First, interlocutors can align representations at different linguistic levels (e.g., Branigan et al. 2000; Garrod & Anderson 1987). These researchers argue that the alignment process is largely automatic (operating through so-called alignment channels) and that alignment at one level (e.g., the syntactic) reinforces alignment at other levels (e.g., the semantic) (e.g., Cleland & Pickering 2003). Hence, alignment channels can affect the application of the formation rules, and interface rules are encoded in the links between the levels. It would be difficult to find such a correspondence with traditional generative approaches where only syntax is generative and where phonology and semantics are "read off" syntactic structures (e.g., Chomsky 1981). Second, the non-directional character of Jackendoff's architecture explains how perception of structure at one level can enhance subsequent production of structure at that level as the literature on alignment in dialogue demonstrates. In other words, so long as the linguistic structures called upon in comprehension and production are the same, there can be priming from comprehension to production and therefore alignment between interlocutors.

The structure of routine expressions. Pickering and Garrod (in press) argue that the interactive alignment process naturally leads to the development of routine expressions in dialogue. In other words, dialogue utterances become like stock phrases or idioms with semi-fixed structure and interpretation. This is reflected in the degree of lexical and structural repetition in dialogue corpora (Aijmer 1996; Tannen 1989). We argue that routinization greatly simplifies language processing because it allows interlocutors to call upon stored representations, which already encode many of the decisions normally required in production or comprehension, rather than having to compute everything from scratch.

Jackendoff provides an interesting discussion of the contrast between lexical storage and on-line construction (Ch. 6). In section 6.5 he specifically addresses the structure of idioms, and in section 6.6, what he calls *constructional idioms.* Constructional idioms are weakly generative constructions such as *take* NP *to task* or *put* NP *in* (*his, her, or their*) *place.* These behave like complex VPs but include a free variable position inside the complex structure. Of course, all such idioms are assumed to be represented in long-term memory, either as complete packages (i.e., for standard idioms) or as frames with variables (i.e., for constructional idioms). In our framework we assume that routines of all these kinds are constructed through alignment processes. They can therefore be "set up" for a particular conversation, with a particular meaning that holds for that interchange alone. In other words, routines can be transient.

Radical incrementality in processing. A crucial feature of Jackendoff's account for dialogue is that it supports radically incremental processing. Of course, there are good reasons for assuming incrementality in monologue comprehension, as well. Here, we merely point out that the fact that interlocutors can complete each other's utterances or clarify what they have just heard strongly suggests that it must be possible to comprehend fragments of language as they are encountered, and the fact that such contributions are constrained by the syntax of the original fragment indicates that incremental syntactic analysis must occur (see Pickering & Garrod, in press).

Where is the lexicon?

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Abstract: In an attempt to provide a unified model of language-related mental processes, Jackendoff puts forward significant modifications to the generative architecture of the language faculty. While sympathetic to the overall objective of the book, my review points out that one aspect of the proposal – the status of the lexicon – lacks sufficient empirical support.

In *Foundations of Language,* Jackendoff (2002) proposes a substantial "reconceptualization" of the generative architecture of language in order to better integrate linguistics into the study of the mind and the brain. This move is attractive because it allows the author to embrace a wide range of findings within the broader framework of cognitive neurosciences. Thus previously unrelated phenomena, such as grammaticalization in Creole languages, tip of the tongue states, or referential dependencies within sentences are discussed in a unified mental model. While I am in perfect

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agreement with the general objective and some of the main conclusions of the book, I call into question Jackendoff's account of the lexicon. My criticism will focus on three points, comparing the traditional account with the author's from a linguistic, a neuronal, and an architectural point of view. The comments are not intended as a rejection or a rebuttal of Jackendoff's proposal as a whole. Rather, the aim is to highlight certain points in the text where the author's attempt at overall integration results in loss of explanatory power within specific domains.

As Jackendoff himself acknowledges (p. 425), the most dramatic modification he brings to the linguistic architecture established in generative grammar concerns the function and content of the lexicon (Chs. 5 and 6). The usual distinction (e.g., Chomsky 1995), between rules as syntactic functions and lexical entries as tokens on which these functions operate, is blurred. In the new model, both types of entities are contained in the lexicon as triplets of phonological, syntactic, and semantic representations. The only difference between the lexical items and the l(exical)-rules is whether they contain typed variables: The former don't, the latter do.

The first problem with such an analysis is that Jackendoff does not provide enough linguistic evidence to ground it. His main argument is that even apparently fixed and memorized expressions, such as idioms and other semi-productive items, follow syntactic regularities, for example, the past tense of *take* in *take something for granted* is *took,* just as in any other case. Moreover, some of the semi-productive items even contain syntactic variables, as the noun phrase (NP) slot (*something*) in the previous example illustrates. Following the same logic, syntactic rules, that is, fully productive items, can be conceived of as structures with variable slots only, and can be included in the lexicon, just as set phrases or fixed idioms are included. While this lexicalist and representationalist approach might prove to be a good analysis of idioms, it certainly does not do justice to a wide range of phenomena syntactic research has been concerned within the last fifty years. As it stands, the model cannot handle derivational rules, for example, movement and constraints thereof, or purely structural-relational notions, such as c-command or government. How is one to account for the difference in grammaticality between the possible sentence *Who do you think will win*? and the complex NP violation **Who do you know [the fact that will win]* in Jackendoff's model? The description of the syntactic component and the two syntactic interfaces is not explicit enough to provide an answer. Since issues of this sort make up the bulk of syntactic research, this lacuna is not negligible. (Of course, this is not to say that representationalist or lexical accounts of syntax are in principle not possible. The question is, How much empirical material they are able to cover?)

Secondly, Jackendoff's proposal to conflate semi-productive and productive processes goes against neuropsychological findings. Pinker (1991; 1997) and Clahsen (1999) present convincing evidence that the mental dictionary and the mental grammar may be kept in different parts of the brain (Pinker 1997, p. 547). A double dissociation is found between lexically stored and rule-generated past tense forms in patients with specific brain lesions, and neuro-imaging studies also reveal a differential recruitment of brain areas. Although Jackendoff mentions some of these data, he has little to say about how to reconcile them with his fully lexicalized model.

Thirdly, the lexicalization of syntactic patterns is not without unwelcome consequences for the whole of the linguistic architecture. In the proposed model, lexical items and the l-rules have a double function; they act as interface conditions, but also provide material for the three generative components. In other words, the lexicon is constantly called upon during the derivation by the independent generative components, as well as the interfaces. Consequently, there is no clear-cut distinction between the subsystems of the grammar; the lexicon seems to have devoured the tripartite architecture. In his attempt to do away with syntactocentrism, Jackendoff seems to introduce heavy lexicocentrism in the design.

This architectural problem is especially acute when the model is extended to explain performance, that is, processing. "Now, when the lexicon is called, should we think of the processor calling the lexicon for a match? Or should we think of the lexicon, as part of the interface processor, as actively attempting to impose itself on the input? This perhaps awaits a better understanding of brain dynamics" (p. 207). Note that the two options make distinct empirical predictions about the relationship between the lexicon and the grammar or the mental processes underlying lexical access and retrieval. For example, one would expect lexical access to be a slower, two-step process in the first scenario (call to the lexicon plus word retrieval), whereas according to the second, access is immediate. Unfortunately, these predictions are not explored in detail, therefore the proposal is not comparable with existing accounts, which formulate empirically testable predictions (e.g., Levelt 1993).

In the foregoing discussion, I have been arguing that Jackendoff's reformulation of the status of the lexicon in the generative design of language lacks empirical support from linguistic, neuropsychological, and architectural viewpoint. As a consequence, more research is needed before Jackendoff's framework can be evaluated against rival theories of the language faculty. Although unification is a welcome development in the history of sciences, and the cognitive domain should be no exception, as Jackendoff convincingly argues, we have to make sure that we are not paying too high a price for it.

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Language shares neural prerequisites with non-verbal capacities

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Abstract: Based on neuropsychological evidence of nonverbal impairment accompanying aphasia, I propose that the neural prerequisites for language acquisition are shared with a range of nonverbal capacities. Their commonality concerns the ability to recognize a limited number of finite elements in manifold perceptual entities and to combine them for constructing manifold entities.

Although the brain figures prominently in the title of the book *Foundations of Language: Brain, Meaning, Grammar, Evolution* (Jackendoff 2002), little attention is devoted to the available empirical evidence on the neural substrate of linguistic competence. One of the most robust facts in neuropsychology is the cerebral asymmetry of the neural substrate of language. In the great majority of people, left brain damage (LBD) causes aphasia, but neither does aphasia affect all aspects of language nor is it the only sequel of LBD.

Aphasia affects syntax, phonology, and semantics, which can all be conceptualized as being based on combinatorial systems of finite elements. Other components of verbal communication cannot easily be reduced to combinations of finite elements because they demand fine-grained distinctions within distinct elements or categories. Such components, like emotional prosody or the pragmatics of communicative exchange, are relatively spared in aphasia but vulnerable to diffuse or right-sided brain lesions, which do not cause aphasia (McDonald 1993; Starkstein et al. 1994).

At the same time, most aphasic patients have difficulties with nonverbal tasks that require the extraction of a limited number of finite elements from a rich perceptual diversity. Such tasks are, for example, color sorting where colors have to be sorted according to

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