



Opportunistic processing of language



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ABSTRACT

This paper is an attempt to tackle the idea of opportunism in language processing seriously – and its implications for language theory if one is to avoid what Poeppel and Embick (2005) call “interdisciplinary cross-sterilization”, that is the failure of linguistics and psycholinguistics to communicate with each other. It is also an attempt to force a deeper reflection on 1) the shape of a viable and useful theory of language, and 2) the relation between (and respective place of) linguistics and experimental psycholinguistics in the study of language. Towards that, I review a number of psycholinguistic findings with a view to showing how routinely parsers opt for opportunistic (as opposed to ‘elegant’) wayouts from processing dilemmas. Most of the evidence reviewed involves research of a cross-linguistic type, the common thread being that different languages resort to different solutions to the same processing problems, even when a unitary solution to at least many of these problems would be computationally within easy reach. The main purpose of this review is to provide a quantitatively suggestive account of how massively opportunism works in setting processing biases. Based on it, I go on to suggest that grammars can only be psychologically viable if they incorporate a fairly large number of interacting constraints, a default ability to generate pieces of structure without a commitment to satisfy large-scale well-formedness conditions, and no strict, fixed ordering of operations. These observations are compatible with a view of language as a complex, dynamical system of co-adapted traits, a system containing a fairly large number of possible initial states and a fairly large number of functionally optimal (opportunistic) continuations of those states. This work assumes the merits of espousing psychological adequacy.

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1. Introduction

In a fairly recent publication, Jackendoff (2011) addresses the “first-principles” question posed by Chomsky (1995), namely: “How perfect is language?”, with perfection “defined in terms of elegance, lack of redundancy, and computational efficiency” (p. 589–90). This is a central theme in modern language theory. To the idea of perfection, Jackendoff opposes the concept of *graceful integration*, a concept that is compatible with adaptationist views of language and redundant architectures. If redundancy is characteristic of the linguistic mind, then the first-principles question may be tackled very differently, as we no longer need to try to “squeeze” it out of *all* linguistic representations and *all* linguistic processing. A biolinguistic approach

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that takes graceful integration and redundancy as foundational need not spend time looking for the “perfect” derivation. In essence, this debate is about the true nature of language.

A key feature of Jackendoff’s system (also espoused by LFG (Lexical Functional grammar), HPSG (Head-Driven Phrase Structure Grammar) and OT (Optimality Theory), among others) is the idea that grammar is essentially a process of constraint-satisfaction, the integration of multiple soft constraints. In its defence, he mentions processing considerations (p. 600):

(...) unlike a derivational formalism, a constraint-based formalism lends itself to a direct relation to theories of processing. **The current consensus on sentence processing is that it is deeply “incremental” or “opportunistic”**: the processor uses whatever information is available at the moment, whether from phonology, syntax, semantics, or discourse or visual context, to build hypotheses about what is to come in the sentence and the sentence’s likely interpretation (...). As observed by Sag (1992) and by Sag and Wasow [2011], a constraint-based grammar is ideally suited to this sort of processing, because constraints have no inherent directionality and no inherent ordering. They can be applied starting in phonology, moving through syntax to semantics, as in language perception, or the other way round, as in language production; they can be applied left to right, top down, or bottom up, depending on circumstance. (emphasis added).

This paper supports the idea of opportunism in language processing with new data – and discusses its implications for language theory if one is to avoid what Poeppel and Embick (2005) call “interdisciplinary cross-sterilization”, that is, the failure of linguistics and psycholinguistics to communicate with each other (see also Ferreira, 2005: 368–370; Phillips and Lewis, 2013; Lewis and Phillips, 2015). It is also an attempt to force a deeper reflection on 1) the shape of a viable and useful theory of language, and 2) the relation between (and respective place of) linguistics and experimental psycholinguistics in the study of language. Indeed, in some corners of linguistic theory sometimes discussions on such central topics as constraints vs derivations or perfection vs graceful integration (i.e. on the nature of language) are embedded in the wider context of the discussion of other cognitive domains, such as mammalian vision or insect navigation (Chomsky, 2005: 2; Jackendoff, 2007, 2011). While that is of interest to linguists, it is surely also a good idea to see how opportunistic language is in itself directly. As it turns out, and as the many linguists who are informed about and/or take part in experimental research on language know, evidence for opportunism in determining processing biases is vast now.

This work assumes the merits of endorsing psychological adequacy. The gist of what I intend to say is that grammars can only be psychologically viable if they incorporate a fairly large number of interacting constraints, at least a few parallel generative engines, a default ability to generate *pieces* of structure without a commitment to satisfy large-scale well-formedness conditions, and indeed no strict, fixed ordering of operations. In essence, therefore, this work aims at strengthening the thesis, put forward many years ago by researchers like Elizabeth Bates or Brian MacWhinney (among many others), that language processing is very much an interactive phenomenon. In a way, then, the answer to the question *how perfect is grammar?* is partly answered here by saying that grammar is ‘perfect enough to get its job done’. This simplistic assertion may be countered by pointing out that linguists do not agree on what that job is in the first place. There are basically two views on that: either language is for humans communicating with one another, or it is for the expression of “inner speech” (Chomsky, 2000: 148). To that I would reply that *even if* language’s true essence *were* the expression of inner thought, that *thought* would not be of the ‘elegant’ kind that starts with the generation of a piece of structure and is absolutely insensitive to and immune from everything else that the mind may conjure up while the entirety of that structure is formally constituted from beginning to end. This idea of perfection inspires many popular tenets of formal grammar such as the so-called *Phase Impenetrability Condition* (Chomsky, 1999: 9: any goal in the c-command domain of a phase head is impenetrable to a goal outside the phase). This condition seeks to ensure that, once a *phase* has been completed, there occurs a transfer of its computational content to the phonological and semantic components for building phonological and semantic representations. Once this happens the contents of the previous syntactic computation are no longer available. The basic philosophy behind this theoretical construct is that the language faculty can only process limited amounts of structure at one time, so locality and phases ensure that everything proceeds by steps and that each step does not involve long searches in memory. This orderly serial thinking is precisely the kind of theoretical claim that can be addressed in a laboratory: all one needs to do, in principle, is to show that semantic effects may obtain inside a proposed phase.

In a way too, this contribution seeks to partly answer the question of how far there can and should be convergence between grammars and the findings of psycholinguistic research on language processing by saying that convergence is not only desirable but attainable if we abandon the elegance metaphor. With it we also need to abandon the idea that language is ‘optimal’ or ‘perfect’ as an “extra-human” entity with a “remarkable capacity ... to evolve and adapt to human hosts”, a “creature” that is “outside the biological world altogether” (Chomsky, 2000: 80). If, instead, we view it as complex, dynamical system of co-adapted traits, with a fairly large number of possible initial states and a fairly large number of functionally-optimal (opportunistic) continuations, then an extraordinarily large number of apparently unrelated phenomena fall into place – including the evidence to be reviewed in this contribution. I am not claiming that there cannot be aspects of language use and language comprehension and production which are not of an eminently interactive nature: the rather more conservative claim made here is that whatever syntactocentrism and serial processing we may ultimately find, the true nature of language cannot be reduced only to that.

The structure of this work is as follows: section 2 briefly visits a series of facts where opportunistic structuring of grammar chunks is discernible, most having to do with agreement. This is scattered evidence and will be presented here merely as a

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