

# A Whole Lot of Challenges for Linguistics

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The most important challenges for linguistics in the coming years involve making better contact with colleagues, with other frameworks and subdisciplines within linguistics, with theories of meaning and conceptualization, with psycholinguistics, with theories of other domains of cognition, with neuroscience, and with education.

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It's a curious assignment to enumerate challenges for linguistics in the twenty-first century, and I'm not very comfortable with the role of prognosticator. There's a strong temptation in these circumstances to pontificate, and I'm afraid I've gotten to an age where I feel entitled to do so. So I'm going to undertake this assignment with two caveats.

First, there are obviously lots and lots of challenges for linguistics. I'm only going to discuss the ones that I'm interested in, without any intention of denigrating anyone else's interests.

Second, the idea of talking about challenges for a century that still has ninety-three years to go is rather presumptuous. Back in 1907, who could have foreseen the transformations in linguistics (in both senses!) during the next ninety-three years? And the radical changes in the agenda of the field have led to challenges that would have been unimaginable in those pre-Saussurean, pre-Bloomfieldian, and pre-Jakobsonian (not to mention pre-Chomskyan) days. So the challenges I'm going to enumerate here are those that I think face the field as it is today, not as it may be in twenty or fifty or seventy-five years. Some of these, I imagine, will be better understood within the next ten to twenty years, though at least one of them will probably take longer than that.

Before speaking of challenges, I want to spend a moment taking stock. A major theme of linguistics in the second half of the twentieth century—perhaps the dominant theme—has been the view of language as a human cognitive capacity. Thus, in addition to traditional linguistic issues of the structure and history of languages and the social manifestations of language, linguists are concerned with how a speaker's knowledge of language is stored in the brain, how the brain processes language, how a speaker's knowledge of language is acquired, how the language capacity is

underpinned by a biological basis, and how language compares to other cognitive capacities in humans and animals. These questions shape our notions of how to describe the synchronic adult language as well as language variation and language change. They were all posed in the 1950s and 1960s by Chomsky, most notably in *Aspects of the Theory of Syntax* (1965), and they have been at the core of linguistic research ever since. Were it not for this reconceptualization of language, the fields of psycholinguistics and language acquisition as we know them today would not exist.

Another major theme of linguistics during the past fifty years has been to view language as a generative system, in which an indefinitely large number of novel utterances and their meanings can be systematically built up from a finite memorized lexicon and a finite set of generative rules. The generative account of language, first appearing in Chomsky's *Syntactic Structures* (1957), grew out of work from the first half of the century by logicians and mathematicians such as Frege, Russell and Whitehead, Carnap, Tarski, Turing, and Emil Post—again, mostly unimaginable in 1907. It was this generative approach to language that gave the mentalistic and biological program its teeth, that allowed it to go beyond the philosophical speculations of, for instance, the Cartesian linguists, Humboldt, and Sapir, and also beyond the formal techniques of structuralist linguists like Bloomfield and Harris.

I think it's fair to say that it was this integrated combination of mentalism and generativism that set linguistic theory on an altogether higher plane than anything that had gone before. (Well, if you don't think this was a *higher* plane, at least you'll acknowledge it was a *different* one.) It was this combination that suddenly made linguistics of interest not just to philologists and anthropologists but to philosophers, psychologists, brain scientists, and even literary theorists and musicians, not to mention a far broader literate public, and it was this combination that led to the founding of numerous new linguistic departments all over the world during the 1960s and 1970s.

Since the 1970s, we have seen a flowering of linguistic research and the development of a wide range of frameworks and research traditions, most of which have developed either from the generative tradition or in reaction to it. Oddly enough, many of them abandon either the emphasis on mentalism and biological roots of language or else the emphasis on linguistic creativity and generative (or combinatorial) mechanisms. I take both of these moves to be a mistake, though obviously the practitioners of these frameworks do not (see other articles in this issue). This wouldn't be a problem, except that the sociology of the field has led each framework to go off in its own direction, pretty much ignoring (or at best denigrating) all the others.

I recently had the task of responding to an issue of *The Linguistic Review* devoted to "The Role of Linguistics in Cognitive Science" (Ritter 2005) in which the authors were encouraged to use my *Foundations of Language* (Jackendoff 2002) as a starting point (my response is Jackendoff 2007c). What struck me, unfortunately, was how little most of the authors acknowledge the sorts of work done by the others and how this work impinges on their own. One of the more egregious examples, to my taste, is Michael Tomasello (2005) casting aspersions on the importance of Poverty

of the Stimulus in the theory of language acquisition, and claiming that language can be learned from the input with no innate support. In another article in the issue, Joan Bybee and James McClelland (2005) make similar claims. Meanwhile, the article directly after Tomasello's is Susan Goldin-Meadow (2005) discussing her well-known research on Home Sign, where children with *no* linguistic input at all invent a communication system with many language-like properties. Things like this go on in the field all the time.

The problem is exacerbated by methodological disputes: whether made-up examples are appropriate sources of evidence, or whether one ought to use only historical evidence, or corpus evidence, or evidence from psychological experiments, or from brain imaging (see again other articles in this issue as well as Ritter 2005). My own position is that each source of evidence is valuable for certain purposes, that each much be used with care, and that we need all the tools we can get.

These concerns lead to my first challenge for the field:

*Challenge 1.* Getting people to pay attention to other frameworks, to address the phenomena that other frameworks take as central, and to engage in conversation with a willingness to uncover and possibly even relinquish their own deeply held beliefs.

This is not easy. It's hard enough to keep up with the literature in your own framework. Young people especially feel they have to learn their mentor's framework and not question it, because otherwise how will they get a job? And I've heard of well-known senior linguists saying to students things like, "You aren't entitled to criticize framework X [which said senior linguist happens to work in] because you don't work in it." How is this to be fixed? One way is collaboration across frameworks. I've known psychologists who disagree violently about something and therefore decide to do an experiment together to see who's right. Couldn't that happen in linguistics? An important starting point is inculcating the attitude that one is not in this field to score points off someone else, but rather to find out how language works.

This challenge is unfortunately sociological rather than empirical—which doesn't make it any less serious. Let me now turn to some scientific challenges that are central to my own research. My work, of course, is solidly within the ambit of the mentalistic generative program, stressing the continuity of linguistics with cognitive science. During the past fifteen years, though, I have come to question much of the technology of mainstream generative grammar, and I have been developing alternatives that I have argued better achieve the scientific goals of generative grammar (Jackendoff 1997, 2002; Culicover and Jackendoff 2005). Many aspects of these alternatives are adapted from independent developments in nonmainstream generative frameworks such as Head-Driven Phrase Structure Grammar (HPSG), Lexical Functional Grammar (LFG), Construction Grammar, Role and Reference Grammar, Autolexical Syntax, and some variants of Cognitive Linguistics. (Note that very few of these frameworks talk to each other, much less to mainstream generativists.) The main features of my alternative conception of language are these:

- Rather than syntax being *the* generative engine of the grammar, it is one among several, including at least phonology with its internal tiers and semantics with its internal tiers.
- Grammatical structure is determined by the satisfaction of constraints, rather than by algorithmic construction.
- Syntax does not entirely determine semantics; rather, it provides some cues to semantic structure, and not always in canonical fashion.
- Syntactic structure is not full of covert elements being moved around; rather, it is fairly superficial and flat, and there is no movement.
- There is no strict distinction between lexical items and rules; rather, there is a continuum of regularity in pieces of stored structure from idiosyncratic to general along several dimensions.

This conception of language leads to a number of challenges for research. I note that these are not just things that *I* need for *my* theory. These are needed by everybody who wants a theory of how language works.

*Challenge 2.* We need a more adequate theory of meaning. This is something I've been working on for thirty-five years (Jackendoff 1972, 1983, 1990, 2007a), and I feel like I'm just beginning to get below the surface. For me, what it takes for a theory of meaning to be adequate includes at least four aspects.

- It must speak to the psychological/biological concerns of a mentalistic theory of language. It has to integrate fully with a deeper understanding of the human conceptual system: how it is used in reasoning, how it integrates with perception and action, and how it is rooted in and built upon primate cognition.
- The theory must be sufficiently formal that one can determine the consequences of one's hypotheses in detail.
- The theory should show how much of linguistic structure is determined by meaning (unlike cognitive linguists and many functionalists, I don't think the answer is *all* of it).
- The theory should provide a rigorous account of all those parts of meaning that are *not* expressed lexically, morphologically, or syntactically. In the past fifteen years, work on pragmatics, on coercion and co-composition, on constructional meaning, on ellipsis, and on discourse have shown us how much of the meaning that is communicated by language is not spoken (see references in Culicover and Jackendoff 2005). But there is no overall integrated theory of meaning that pulls all these together.

Standard philosophy of language semantics and standard formal semantics, which are not mentalistic, are not going to fit the bill. Mainstream generative grammar has no articulated theory of meaning; most other frameworks adopt some version of formal semantics without question. The exception is Cognitive Linguistics, which claims to be mentalistic but makes little contact with contemporary cognitive

psychology and often rejects formalism. As I said, I've been working on my own approach, Conceptual Semantics, for thirty-five years with these goals in mind, but there is still a vast amount of work to do.

Many linguists shy away from the goals I've set, especially the first one, saying, "I'm only interested in *linguistic* semantics. It's not a linguist's job to deal with all the complexity of world knowledge and how language connects to perception." My answer is: Whose job is it, then? If linguists don't do it, it isn't as if psychologists are going to step in and take care of it for us. At the moment, only linguists (and to some extent philosophers) have any grasp of the complexity of meaning; in all the other disciplines, meaning is reduced at best to a toy system, often lacking structure altogether. Naturally, it's daunting to take on a problem this size. But the potential rewards are great: if anything in linguistics is the holy grail, the key to human nature, this is it.

*Challenge 3.* We need to integrate linguistics with psycholinguistics. Psycholinguists complain that linguistic theory offers little insight into how processing could work. Linguists often respond by hiding behind the competence-performance distinction: "We're describing the speaker's linguistic knowledge. It's a different and somewhat mysterious question how that knowledge is put to use in real time in performance."

Certain aspects of mainstream linguistic theory present particular problems for interpretation in processing terms. One of these is the algorithmic construction of structure. The theory builds syntactic trees from the top down (or, in the Minimalist Program, from the bottom up), and the last things to be developed in the derivation are the pronunciation and the meaning. By contrast, in actual sentence perception, one starts with sound and ends with a meaning, with syntactic structure as an intermediary; and in sentence production, one starts with a meaning and ends with a sound, with syntactic structure again as an intermediary. Neither of these coincides with the order of a mainstream derivation, so theoreticians often say that the order of derivation and the movement of constituents is somehow "metaphorical," with no processing implications, and they leave the connection between the metaphor and reality a mystery.

The response of many psycholinguists has been to swear off generative grammar. In many cases they have gone running off to the charms of the connectionists, who in twenty years have not offered an account of the most elementary facts of linguistic structure—they're still talking about irregular past tenses. In other cases, psycholinguists have retreated into areas where generativism has little impact, such as phonetics. And even among those who would like to maintain contact with linguistic theory, most of them muddle by with a sort of 1970s vanilla-flavor conception of syntactic structure.

My work on the Parallel Architecture and Simpler Syntax offers a linguistic theory that potentially can integrate much more closely with psycholinguistics. It claims that knowledge of language consists of a repertoire of stored structures of varying degrees of generality, which are unified into full utterances in working

memory. This approach can be translated directly into processing terms, and it makes claims about the relative time-course of processing and the burdens on the processing system (Jackendoff 2002, chap. 7; 2007b). It thus presents opportunities for psycholinguistic experimentation that can test aspects of the theory, and such work has actually been undertaken in the past few years by a very small number of researchers (Piñango 2000; Piñango, Mack, and Jackendoff forthcoming; Pylkkänen and McElree 2006). But again, a huge amount of work has to be done to develop and test the theory's psycholinguistic claims.

For those who do not want to adopt the Parallel Architecture, the challenge is to show how some other linguistic framework can integrate as well or better with theories of processing. The prize, should this undertaking succeed, is a unified theory of language and language processing, in which competence is not an idealization isolated from the realities of brain computation but rather an integral part of performance (see also Hawkins forthcoming).

*Challenge 4.* The theory of language must be integrated with the theory of other cognitive capacities in humans and animals. Much of the argument about the innateness of the language capacity during the past forty years has proceeded in a vacuum with respect to evidence about the representational character of other capacities. When I read claims, say, that language is the result of generalizing the hierarchical structure of hand movements to vocal signaling (Corballis 1991), I wonder what we actually know about the structure of hand movements. Not very much compared to what we know about the structure of language. Thus, in such comparisons, our detailed knowledge of language is inevitably dumbed way down.

The proper way to approach the problem, I think, is to seek comparably detailed theories of the mental representations involved in other cognitive capacities. David Marr (1982) was attempting this for the visual system before his premature death in the early 1980s, and most of the rest of the vision community (to the extent that they understood his goals at all) dropped the ball in favor of the emerging attractions of neural imaging. Fred Lerdahl and I developed a quite detailed theory of the representations involved in music (Lerdahl and Jackendoff 1983), and Lerdahl has continued to pursue this enterprise, including evidence from psychological experimentation (Lerdahl 2001). I've begun experimenting with the representations for complex action, for theory of mind, and for social cognition in a recent book (Jackendoff 2007a).

Looking across domains of cognition that have been studied this way, one important point emerges: no other capacity seems amenable to an account in terms of algorithmic derivations; rather, systems of interacting constraints seem to be the rule elsewhere. This suggests either that the algorithmic view of language is correct and language is *really* unique, or that the constraint-based view of language is correct and language looks in this respect much more like other cognitive capacities.

Often people approaching the question of the innateness of language have taken an all-or-nothing attitude: either language is irretrievably special, or else it's all a

product of general-purpose machinery. I don't think it's at all wishy-washy to say the answer lies somewhere in between, and I've been exploring such possibilities actively, most recently in a pair of articles in *Cognition* that I've done with Steven Pinker (Pinker and Jackendoff 2005; Jackendoff and Pinker 2005). As Pinker has emphasized (Pinker 1997), *all* cognitive capacities are special in their own way—think of bat sonar, for instance—and they all have their own innate aspects. That's what makes different species' behavior different. There is no reason that language should be unique in this respect.

Here, however, is an area where the challenge is not entirely for linguists—it's mostly for those who study these other capacities. If anything, linguists should be challenging *them* to give us the kind of comparative evidence we need. But since linguistics is providing the benchmark for what a theory of representation should be like, linguists should be cultivating active collaboration with these other areas: vision, audition, action and motor control, reasoning, and so on. So the challenge for linguists is to get out there and talk to people in these other fields, persuade them of the value of pursuing theories of representation, and collaborate, collaborate, collaborate!

*Challenge 5.* How does the brain actually do it? From lesion studies and neuroimaging, we know a lot about rough localization of various aspects of linguistic memory and language processing—although a lot of this is still in dispute. From event-related potential (ERP) and behavioral experiments, we know a lot about the timing of various events in the course of language processing. At the very micro scale, we know a lot about how neurons function and interact with each other. But at the intermediate scale, where the real action is happening in language, we still don't have a clue. How are things as simple as speech sounds stored in memory as parts of words? How are words and morphemes combined in working memory into larger utterances? How does Broca's area do whatever it does? And so on. Answering these questions in detail probably requires understanding the interactions of many thousands of neurons at least, and it will therefore probably call for investigative tools not yet dreamed of.

This again is not primarily a challenge for linguistics: it's a challenge for neuroscience and computational simulation. But again, the challenge for linguists is to keep challenging the neuroscientists: Can your model of neural computation do *this*? (Where *this* is a well-known property of language such as free combination or reduplication or phrase structure.) I've been saying for many years now that I don't expect to see this problem solved in my lifetime, and I see no reason to change that prediction. Nevertheless, it is a goal important to keep in mind, because it shapes how one does linguistics as well. As a linguist, one can turn the question around and ask oneself, *Is this* something that it's plausible for neurons to do? (Where plausibility rests in part on understanding how other cognitive capacities work.)

*Challenge 6.* A quite different sort of challenge is how we can use what we know about language for social good. One very important example has been the influence of linguistics on public acceptance of signed languages as languages. Another is the ongoing efforts to preserve endangered languages. In the latter case, I am less interested in the preservation of languages as a source of data for linguists—although this is not unimportant—but more in the efforts on behalf of the communities that speak these languages, to keep the culture, traditions, and history alive against the overwhelming encroachments of dominant cultures and economic systems.

This challenge has been taken up by many well-known linguists such as William Labov, Walt Wolfram, John Rickford, Catherine Snow, Lily Wong Fillmore, and John Baugh, and it is a major preoccupation of the Center for Applied Linguistics. I personally have been working with a group of linguists and educators, in part through the Language in the Schools Committee of the Linguistic Society of America (LSA); a first workshop was held at Tufts University in spring 2006.<sup>1</sup> The issue we have been addressing is that schools of education, for the most part, teach little about the contemporary understanding of language: the structure of Mainstream English, the systematicity of dialects, the cognitive challenges faced by beginning readers and English language learners, and the sociology of language prejudice. Most classroom teachers therefore are typically left to deal with language problems in classrooms in terms of what they take to be “common sense,” which in many respects proves counterproductive to the educational enterprise (Adger, Snow, and Christian 2002; Haussamen et al. 2003).

Among the difficulties teachers face are these:

- Most teachers have little formal knowledge of the structure of language and of the strong dependence of skilled reading on the components of language. The teaching of the structure of language as part of language arts was largely abandoned twenty-five years ago, so most teachers do not even have any background from their own primary and secondary education.
- They think there is a uniform “proper, correct English,” not recognizing the distinctions between formal and informal language that every speaker commands, and not recognizing the distinctions between the styles of written and spoken language.
- They have little knowledge of the systematic principles behind the complexities of English spelling, and of how these complexities affect native English speakers and English language learners.
- They think that children speaking nonmainstream dialects such as African American Vernacular English (AAVE) and Appalachian English are speaking “sloppy” English, showing little appreciation of the grammatical principles associated with dialects.
- They think that children will get confused if they speak more than one language, or that children speaking another language at home won’t be able to acquire English—showing little understanding of multilingualism.
- At the same time, they think that English language learners ought to be able to pick up the language within a year and then succeed in mainstream classes,

showing little understanding of second language acquisition, the impact of immigration, and the process of assimilation to a new culture.

- They discourage the use of languages or dialects other than Mainstream English in the classroom, even if they themselves speak these languages or dialects.
- They frequently diagnose children's poor Mainstream English skills as learning disability, which in turn is treated with inadequate tools, and which also results in social stigma that can last for the rest of the child's school career.

These attitudes are things that we as linguists fulminate about all the time, and many of them arise from deeply entrenched "folk theories" of language. But more appropriate attitudes are not getting disseminated into the larger educational community, even when the information is out there for teachers to learn from. Part of the difficulty is that educators are at least as suspicious of linguists as psycholinguists are. In any event, the result is large populations of schoolchildren who do not command Mainstream English adequately for educational purposes.

There is no question that what needs to be taught in school above all is speaking, understanding, reading, and writing in Mainstream English. This is essential not only for its own sake but for success in every other subject, from history to science and mathematics—not to mention for success in later professional settings. This situation is particularly problematic in light of the large and rising proportion of students, all over the country, who either come from non-English speaking homes or speak non-Mainstream dialects.

The goal of the group I've been working with is to develop materials that can be used to train teachers about language, and to pair these materials with practical materials and techniques that teachers so trained can use in their classrooms. Neither of these is especially useful without the other. At the present stage, we are trying to determine what is needed, what is feasible, and what can work. Many of the participants have developed pilot projects of various sizes. The hope is to stitch these pieces together, to determine what other pieces might be needed for a program of more comprehensive scope, and to discuss how to get such a program out into the broader community.

We have no illusions as to the practical and political difficulties of this program of work. Nevertheless, it is worth trying—the education of the nation's children is at stake. More than anything else I've discussed here, I think projects like this are the most important thing a linguist can do with his or her life, and I challenge readers to go out and find their own way to contribute.

## Note

1. The linguists at the workshop included Maryanne Wolf, Rebecca Wheeler, Carolyn Adger, Anne Lobeck, Kristin Denham, Anne Charity, Maria Luisa Parra, and Jay Keyser. The educators included Stephanie Gottwald, Sasha Yampolsky, Rachel Swords, Deirdre Carlson, Beth Keyser, David Pippin, and Amy Jackendoff.

## References

- Adger, Carolyn, Catherine E. Snow, and Donna Christian, eds. 2002. *What Teachers Need to Know about Language*. Washington, DC: Center for Applied Linguistics.
- Bybee, Joan, and James McClelland. 2005. Alternatives to the Combinatorial Paradigm of Linguistic Theory Based on Domain General Principles of Human Cognition. *The Linguistic Review* 22: 381–410.
- Chomsky, Noam. 1957. *Syntactic Structures*. The Hague, the Netherlands: Mouton.
- . 1965. *Aspects of the Theory of Syntax*. Cambridge, MA: MIT Press.
- Corballis, Michael C. 1991. *The Lopsided Ape*. New York: Oxford University Press.
- Culicover, Peter W., and Ray Jackendoff. 2005. *Simpler Syntax*. Oxford, UK: Oxford University Press.
- Goldin-Meadow, Susan. 2005. What Language Creation in the Manual Modality Tells Us about the Foundations of Language. *The Linguistic Review* 22: 199–226.
- Haussamen, Brock, with Amy Benjamin, Martha Kolln, Rebecca S. Wheeler, and members of NCTE's Assembly for the Teaching of English Grammar. 2003. *Grammar Alive! A Guide for Teachers*. Urbana, IL: National Council of Teachers of English.
- Hawkins, Jack. Forthcoming. Language Universals and the Performance-Grammar Correspondence Hypothesis. In *Language Universals*, edited by Chris Collins, Morton Christiansen, and Gerald Edelman. New York: Oxford University Press.
- Jackendoff, Ray. 1972. *Semantic Interpretation in Generative Grammar*. Cambridge, MA: MIT Press.
- . 1983. *Semantics and Cognition*. Cambridge, MA: MIT Press.
- . 1990. *Semantic Structures*. Cambridge, MA: MIT Press.
- . 1997. *The Architecture of the Language Faculty*. Cambridge, MA: MIT Press.
- . 2002. *Foundations of Language*. Oxford, UK: Oxford University Press.
- . 2007a. *Language, Consciousness, Culture: Essays on Mental Structure*. Cambridge, MA: MIT Press.
- . 2007b. A Parallel Architecture Perspective on Language Processing. *Brain Research* 1146: 2–22.
- . 2007c. The Role of Linguistics in Cognitive Science: The State of the Art. *The Linguistic Review* 24.
- Jackendoff, Ray, and Steven Pinker. 2005. The Nature of the Language Faculty and Its Implications for the Evolution of Language (Reply to Fitch, Hauser, and Chomsky). *Cognition* 97: 211–25.
- Lerdahl, Fred. 2001. *Tonal Pitch Space*. Oxford, UK: Oxford University Press.
- Lerdahl, Fred, and Ray Jackendoff. 1983. *A Generative Theory of Tonal Music*. Cambridge, MA: MIT Press.
- Marr, David. 1982. *Vision*. San Francisco: Freeman.
- Piñango, Maria M. 2000. Canonicity in Broca's Sentence Comprehension: The Case of Psychological Verbs. In *Language and the Brain*, edited by Y. Grodzinsky, L. Shapiro, and D. Swinney, 327–50. San Diego, CA: Academic Press.
- Piñango, Maria M., Jennifer Mack, and Ray Jackendoff. Forthcoming. Semantic Combinatorial Processes in Argument Structure: Evidence from Light Verbs. *Proceedings of the Berkeley Linguistics Society* 32S.
- Pinker, Steven. 1997. *How the Mind Works*. New York: Norton.
- Pinker, Steven, and Ray Jackendoff. 2005. The Faculty of Language: What's Special about It? *Cognition* 95: 201–36.
- Pylkkänen, Liina, and Brian McElree. 2006. The Syntax-Semantics Interface: On-line Composition of Sentence Meaning. In *Handbook of Psycholinguistics*, 2d ed., edited by M. Traxler and M. A. Gernsbacher, 539–80. New York: Elsevier.
- Ritter, Nancy, A. 2005. On the Status of Linguistics as a Cognitive Science. *The Linguistic Review* 22:117–34.
- Tomasello, Michael. 2005. Beyond Formalities: The Case of Language Acquisition. *The Linguistic Review* 22:183–98.

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