The Future of General Linguistic Theory

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In this paper, I argue that contemporary theories of language do not adequately account for the relationship between human language and cognition, and there are three reasons why: generative linguistic theory, as a general theory for language, maintains an unfeasible conception of mind; it initiated, and perpetuates, a gross misinterpretation of Saussure's views on language; and its methods of analysis take too much for granted. The paper begins with an overview of generative linguistic theory and its connection to modern cognitive science, focusing on the role and status of linguistic description and its relationship to the mind(-brain). This connection is then refined by outlining the major goals of theories of language, specifically, theories that purport to account for the human language faculty. I claim that theories meeting such goals account for nothing of substance, since their object of study is ultimately a Cartesian ghost. If our goal is to understand human language in general, we must change how we look at the relation between language and thought. This entails a change in how we view the data comprising language-particular theories, and how language-particular theories (individual grammars) provide the basis for general linguistic theory.
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1 Introduction

While reading through the literature on formal linguistic theory, one is likely to encounter references to Ferdinand de Saussure (1857-1913) and René Descartes (1596-1650). The references one finds will probably treat their ideas as incompatible, but there is at least one thing that unites these two thinkers. Saussure and Descartes are widely considered to be founders of their respective fields, modern linguistics and modern philosophy. As such, Saussure, like Descartes, is principally concerned with sound methods, fundamental principles, and above all, a radical doubt (Godel, 1984, pp. 84-85; Russell, 1945/1972, p. 563). The method of radical doubt—the process of questioning everything in pursuit of absolute certainty (Broughton, 2003)—is the foundation upon which Descartes's theory of knowledge, or epistemology, rests. For Descartes, *cogito ergo sum* [I think therefore I am] "makes mind more certain than matter, and my mind (for me) more certain than the minds of others" (Russell, 1945/1972, p. 564). Hence the physical world, including natural human language, is knowable

only by way of the mind, and the mind is a thing that thinks.[1] Since doubting is a form of thinking, one cannot deny Descartes's ultimate premise of *cogitationes sunt* [there are thoughts] (p. 567), nor can one deny that, by virtue of our thinking, we exist.

Such methods are sound, but not the Cartesian conception of mind that follows from it. The mind, as noted, is a thing that thinks, though Descartes "nowhere proves that thoughts need a thinker" (Russell, 1945/1972, p. 567). The mind simply *is*, and it is what separates mindful animal (humans) from the mindless (non-human animals, automata, machines) (cf. Descartes, 1637/1910, pp. 60-61). Humans, possessing minds, are able to exercise their thoughts in ways wholly unique to them, for example, in the ordinary use of language. To understand natural human language requires understanding our ability to have and use it, which in turn requires understanding the relationship between language and mind. One could say that the mind (or thinking thing) is antecedent to language, and true understanding of the latter requires investigation of the thoughts (knowledge) contained in the former. Saussure, by contrast, sees in language "only a most complex phenomenon, involving physical and psychological processes, individual freedom and social constraint, change and stability" (Godel, 1984, p. 85). Under this view, one cannot treat language as if it were a discrete object out in the world (or tucked away in the mind) that can be directly observed or analyzed. This is because no such definite object exists—there is only an emergent system that *necessarily requires* a thinker. Given that language is at once a cognitive and social product, along with the inherent difficulties of observing and analyzing a complex system of this sort, Saussure's primary concern is *pour montrer au linguiste ce qu'il fait* [to show the linguist what he is doing] (Benveniste, 1963, p. 13; Godel, 1984, p. 84).

Saussure and Descartes both demonstrate an acute appreciation for their respective objects of study, and for the methods used to investigate them. But when it comes to the study of language, the problem that most bothered Saussure—the fact "that those who speak about language and explain linguistic facts have no adequate idea of the very object they are studying" (Godel, 1984, p. 84)—persists to this day. For example, D'Alessandro and van Oostendrop (2017) (henceforth D'AvO) repeat Saussure's primary concern when they write that "there is very little agreement about the ontology of the object of study among linguists" (p. 2). For D'AvO, the crux of such disagreement is straightforward: it is the irreconcilable difference between approaches, distilled to "Chomsky vs. Saussure" (p. 2), which they describe as in (1).

(1) In the first [Chomskyan] line of thought, language is seen as a cognitive object, something which resides in the mind of an individual speaker […] and communities present chaotic mixtures of these idiolects. The

[1] "A thing that thinks, [Descartes] says, is one that doubts, understands, conceives, affirms, denies, wills, imagines, and feels—for feeling, as it occurs in dreams, is a form of thinking. Since thought is the essence of mind, the mind must always think, even during deep sleep" (Russell, 1945/1972, p. 565).

> other line is the Saussurean view … in which language resides in a community, and the language production of individual speakers is an imperfect reflection of those speakers.

These approaches are said to be "incommensurable in the well-known sense of Kuhn (1962): they are different in scope" (D'Alessandro & van Oostendorp, 2017, p. 2).[2] Their difference in scope hinges upon two things: whether language is treated as a cognitive object (as existing in the mind), and "sufficient loopback to a strong theory" (p. 4), i.e., a universal or general theory for language.

The Chomskyan line of thought owes its success to a complete acceptance of the Cartesian conception of mind, a misinterpretation of Saussure's theory of language, and a selective reformulation of post-Bloomfieldian linguistics (in particular, the work of Zellig Harris). Taken together, we have "an agenda for generative linguistic theory" (Jackendoff, 2002, p. 19), an agenda that, according to D'AvO, provides for sufficient loopback to a strong theory. If we take contemporary linguistics to be "a mosaic of different views and methodologies" (D'Alessandro & van Oostendorp, 2017, p. 4), then generative linguistic theory is but one (group of) tile(s) out of many others, and a complete picture of language is achievable only through the combination of them all (p. 3). The combination of all tiles is then the purview of a general linguistic theory, the goal of which is to understand human language in general (i.e., the complete picture). Generative linguistic theory is not, nor can it be, the sort of strong general theory needed to bring the mosaic together. This is so because generative linguistic theory, as a general theory for language, simply does not make sense. The reasons for the nonsense are threefold: generative linguistic theory, as a general (universal) theory for human language, is based on an outdated conception of mind, a priori assumptions about what language is, and unhelpful methods of analysis. The subject matter of general linguistics calls for a different approach, a unified theory of language predicated on sound methods of analysis and a radical doubt.

This paper is organized as follows. Section two introduces the idea of language as a cognitive object (something in the mind), focusing on the revolutionary claims made in *Syntactic Structure* (Chomsky, 1957) and *Aspects of the Theory of Syntax* (Chomsky, 1965), and their connection to cognitive science. In section three we cover the goals of theory construction, and what a theory for language is supposed to explain. The focus of section four is on "the relevant subject matter" (Chomsky, 2021), i.e., what particular and general linguistic theories in part determine, and in part explain. Specifically, section four provides an overview of the major tenets of generative linguistic theory, and their descriptive and explanatory relevance. The latter portion of section four then outlines the development of linguistic theory in America, from Bloomfield to the present. It is argued that current (formalist and functionalist) theories do not account for the relationship between language and thought in any general way.

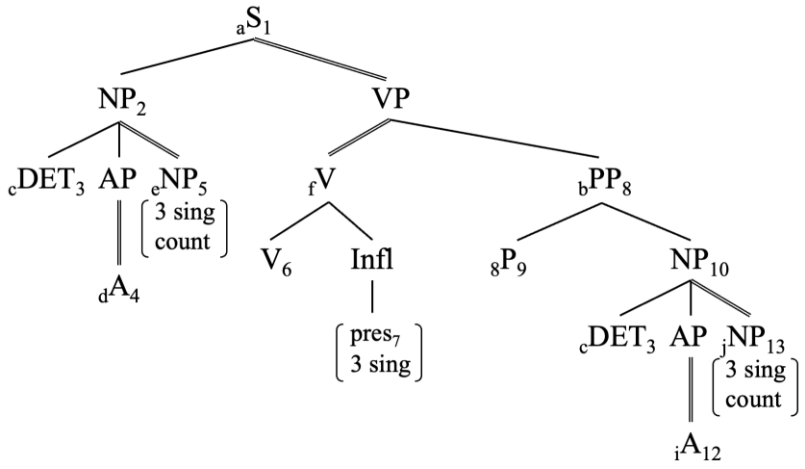
[2] A sense that Kuhn (1977, p. 295, note 4) seemingly regrets.

Some conclusions are provided in section five, including a brief glimpse of what general linguistic theory might look like.

2 Mentalistic Linguistics

"The remarkable first chapter of Noam Chomsky's *Aspects of the Theory of Syntax* (1965) sets in place an agenda for generative linguistic theory," writes Jackendoff (2002, p. 19), "much of which has survived intact for over thirty-five [fifty-six] years." That which has survived informs D'AvO's (2017) current notion of "a strong theory" (p. 4) (including the sufficient loopback), and whatever "looks and smells like science" to Pesetsky (2015, p. 2). In any case, the agenda encompasses three things: standard techniques of linguistic research (methods of analysis), structures like that in Figure 1 (from Jackendoff, 2002, p. 6), and the claim that this sort of structure "is meant to be 'psychologically real': it is to be treated as a model of something in the mind of a speaker of English who says or hears this sentence" (Jackendoff, 2002, p. 19). So, linguistic theory is "mentalistic, since it is concerned with discovering a mental reality underlying actual behavior" (Chomsky, 1965, p. 4). This sort of mentalistic linguistics is foundational to contemporary cognitive science.

Figure 1. *Syntactic Structure of 'the little star's beside a big star'*



George Miller (2003) "date[s] the moment of conception of cognitive science as 11 September, 1956, the second day of a symposium organized by the 'Special Interest Group in Information Theory' at the Massachusetts Institute of Technology" (p. 142). It is here that Chomsky presented the paper "Three Models for the Description of Language" (1956), which "contained the ideas that he expanded a year later in his monograph, *Syntactic Structures* [(1957)], which initiated a cognitive revolution in theoretical linguistics" (Miller, 2003, p. 143). One such idea involves the sentence *colorless green ideas sleep furiously*. This sentence is supposed to demonstrate an intuitive sense of grammaticalness, since

it is semantically nonsensical, but grammatically well-formed (cf. the ill-formed sentence *furiously sleep ideas green colorless*). The ability to differentiate between grammatical and ungrammatical sentences reflects an underlying "*competence* (the speaker-hearer's knowledge of his language)" (Chomsky, 1965, p. 4), so the problem for generative linguistic theory "is to determine from the data of performance the underlying system of rules that has been mastered by the speaker-hearer and that he puts to use in actual performance" (p. 4). Hence the structure in Figure 1 "is more than just a useful description for the purposes of linguists" (Jackendoff, 2002, p. 19)—it is a model of something in the mind.

What makes Chomsky's (1965) contribution revolutionary is the observation that "*performance* (the actual use of language in concrete situations)" (p. 4) is not a direct reflection of underlying competence, and "cannot constitute the actual subject matter of [generative] linguistics, if this is to be a serious discipline" (p. 4). Generative linguistic theory is serious because it "reject[s] [Saussure's] concept of *langue* as merely a systematic inventory of items" (p. 4), returning instead "to the Humboldtian conception of underlying competence as a system of generative processes" (p. 4). More specifically, Chomsky (1964) equates (underlying) competence with Humboldt's notion of (inner) form. The form of language is universal and constitutes the essence of language, i.e., the human language faculty, or competence. Inner form is one's internal representation of form, allowing the individual to use and understand their particular language. A generative grammar is then "a system of rules that in some explicit and well-defined way assigns structural descriptions to sentences" (Chomsky, 1965, p. 8),[3] the former constituting knowledge (i.e., the internalized generative grammar/system of rules) and the latter being the expression of such knowledge (i.e., the assignment of structural descriptions to sentences/generation of the language).

The foregoing developments are retroactively associated with what Chomsky (2004) calls "the first cognitive revolution of the seventeenth century" (p. 319). As early as the late 1620s, Descartes was interested in demonstrating how mechanical philosophy could explain the natural world, "including a good part of human perception and action but not workings of the human mind" (p. 319), i.e., our ability to reason, doubt, deny, affirm, and so on. Such workings of the mind manifest in the ordinary use of language, which in turn provides "a basis […] for the 'epistemological argument' for mind-body dualism" (Chomsky, 2016, p. 93). In other words, Descartes's assertion "that each one of us is composed of two different kinds of thing: physical bodies and nonphysical minds" (Rowlands, 2010, p. 12), follows from his method of radical doubt—one cannot doubt their (physical) existence since to doubt is to think, and to think is to use one's (nonphysical) mind. This sort of inquiry into the existence of (other) mind(s) is described as "ordinary science, designed to determine whether some object has a particular property" (Chomsky, 2016, p. 93). Hence the mind, being a nonphysical thing (or substance), is a certain kind of object defined by its

[3] Such rules are nothing more than the post-Bloomfieldian notion of transformations adapted to a generative (derivational) theory of syntax (see Harris, 2002, p. 6).

function (Rowlands, 2010, pp. 10-11). The mind is a thing that thinks (see footnote 1), i.e., a "*res cogitans* [thinking thing]" (Chomsky, 2016, p. 92). This thinking thing is bound up with our ability to use and understand language (competence) which, taken together, constitutes the subject matter of generative linguistic theory.

Before moving on, it is important to note that the Cartesian conception of mind comprises two separate claims: that the mind is a nonphysical thing, and that the mind exists in the head (Rowlands, 2010, p. 12). Most theorists today would claim they have rejected the Cartesian conception of mind, but this is not true (Dennett, 1991, p. 107). For if one rejects the former premise and not the latter, then one has "not fully rejected the Cartesian conception of the mind, but only a part of it" (p. 107). So, when Chomsky (1995/2016) and Jackendoff (2002) now refer to the mind-brain, they are actually referring to the Cartesian "mind-brain identity/exclusive neural realization combination" (Rowlands, 2010, p. 12)—a "Cartesian theater" (Dennett, 1991) fashioned on an incomplete dismissal of the Cartesian conception of mind. This leaves the *res cogitans* [thinking thing] entirely intact, since all mental states and processes begin and end in the head. There is simply no room for the extended mind, nor embodied cognition, as intimated in Saussure's general linguistics.

3 Goals of Theory Construction

The agenda for generative linguistic theory presupposes "a distinction between *data* and *facts*" (Chomsky, 1961, p. 219). The "data consist of certain observations about the form and use of utterances" (p. 219), whereas "facts of linguistic structure […] go well beyond these observations" (p. 219). One such fact amounts to "our intuitive feeling that [(2a)] is a grammatical sentence and that [(2b)] is not" (Chomsky, 1956, p. 116), especially in cases where neither has been seen before.

(2) a. colorless green ideas sleep furiously
    b. furiously sleep ideas green colorless

To find the simplest theory for language, we must consider two things: grammar (theory for each language), and universal grammar (theory for the faculty of language) (Chomsky, 2021, p. 7).[4] The latter "provides the framework within which each language develops" (p. 7), and it "must satisfy the condition of 'explanatory adequacy,' answering the question how a particular language can in principle be acquired from the data available" (p. 7). More specifically, universal grammar specifies (i) the set of possible languages (the search space) and (ii) a

[4] In this context, theory for language encompasses the generation (production) and perception (understanding) of language, both in particular (individual grammar(s)) and in general (universal grammar). It purports to account for what language is, how it arises in the minds of the people who use it, how competence (knowledge) is reflected in performance (its use), the mental organization of such knowledge, etc.

selection procedure "that selects the grammar (or set of grammars) for each language given relevant data" (p. 7). Since the "serious investigation of language use and acquisition presupposes a study of underlying generative processes" (Chomsky, 1964, p. 25); the underlying processes (or rule-governed creativity) are represented "by means of an explicit generative grammar" (p. 22); any explicit generative grammar is based upon (a variation of) rewriting rules (cf. Chomsky 2021, p. 8); and a particular generative grammar is both the result of acquisition (competence) and put to use in performance (p. 8); the formal nature of both (i) and (ii) is entirely predetermined.

It is worth noting that Zellig Harris, the founder of transformational analysis,[5] sees a different relationship between data and theory. Linguistics, unlike most other sciences, "admits of an alternative to theory: an orderly catalog of the relevant data, sufficient to do most of the work that a theory is supposed to do" (Harris, 2002, p. 9). This does not mean that the development of such an 'orderly catalog of relevant data' is not theoretical; rather, the description of particular languages—i.e., "particular linguistics" (Haspelmath, 2021, p. 5)—is inherently theoretical, since a (descriptive) grammar of any given language is in essence a theory of that language.[6] Language-particular description is distinct from general linguistics, which includes both the comparison of languages (generalizations over particular languages) and the "explanation of general features of Human Language" (p. 5).[7] Nonetheless, particular linguistics and general linguistics are equally theoretical: "the difference is merely a matter of different levels" (p. 5).

But what about sufficient loopback to a strong theory? Theoretical linguistics is not the same as linguistic theory (contra Haspelmath, 2021, p. 2), and there are two important reasons why. First, theoretical linguistics necessarily precedes (a strong) linguistic theory: language-particular description results in a grammar (a formal theory of the language); comparison of languages results in generalizations over particular languages, which in turn provide for even more general explanations of Human Language (cf. Haspelmath 2021, pp. 5-6). Second, "[a] formal theory is built through the convergence of a number of proven hypotheses [which] apply at different levels of the analysis" (D'Alessandro, 2021, p. 56). So, convergence of language-particular hypotheses results in one sort of linguistic theory (a formal theory of a particular language, i.e., a grammar), and convergence of cross-linguistic hypotheses would result in another sort of formal theory (a general linguistic theory).

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[5] Without which there would be no transformational-generative grammar, and no generative linguistic theory (see footnote 3; also section 4.3). Chomsky's departure from Harris (his teacher and advisor) on matters of theory and analysis is interesting.

[6] This is of course recognized by Chomsky (1957, p. 49; and elsewhere), but the role and status of language-particular theories (particular grammars) within generative linguistic inquiry is problematic.

[7] Haspelmath (2021) "use[s] the unusual spelling 'Human Language' (with capitalization) in order to emphasize that this is a distinct phenomenon from the various particular languages that we can observe and study directly" (p. 3, note 1).

This returns us to the issues raised at the outset of this paper. Harris (2002) writes that "a theory should not be thought of as representing the final truth, but only as organizing the results of certain methods of analysis, 'true' as far as it goes" (p. 9). Descartes and Saussure appreciated this fact: the former's theory of knowledge and the latter's approach to linguistics are both predicated on a method of radical doubt (Russell, 1945, pp. 563-567; Godel, 1984, pp. 84-85). The same cannot be said for Chomsky's generative linguistics, which takes "[t]he standard techniques of linguistic research" (Jackendoff, 2002, p. 19) and "the formal nature of the system under investigation" (Chomsky, 2021, p. 6) entirely for granted. The agenda for generative linguistic theory represents a 'truth' of sorts, with very little regard for the data (and phenomena) it purports to explain, let alone the methods of analysis used to explain it.

4 The Relevant Subject Matter

A theory of language is supposed to do two things: (i) explain the data that constitute the theory's subject matter, and (ii) determine the relevant subject matter (Chomsky, 2021, p. 6). The previous sections have largely focused on the relationship between data and (particular) generative grammar(s). We now turn to the deeper facts about language, i.e., the relevant subject matter of general linguistic theory. The faculty of language, it is claimed, "provides the framework within which each language develops" (p. 7). It is also claimed that this faculty must satisfy "the Basic Property of language: it must provide mechanisms for a language to generate an unbounded array of hierarchically structured expressions in a form that can be interpreted at two interfaces with external systems" (p. 7).[8] A theory for the faculty of language, as noted, "must satisfy the condition of 'explanatory adequacy,' answering the question of how a particular language can in principle be acquired from the data available" (p. 7). And "if we take language to be a property of the organism in accord with the 'Biolinguistic Program' […] explanatory adequacy requires the further condition that [the search-space and selection-procedure] be feasible" (pp. 7-8). In general, then, an adequate and/or feasible theory "must provide a realistic abstract account of language acquisition on the basis of Primary Linguistic Data" (p. 8)—it must account for a poverty of stimulus, or "the huge gap between the data available and what the child knows" (p. 8).

Returning to Chomsky's (2021) "dual problems of theory construction for language" (p. 8), i.e., grammar (theory for each language) and universal grammar (theory for the faculty of language), we can identify the three things in (3) that a simple, adequate, and feasible linguistic theory must accommodate. A language-particular theory (i.e., a generative grammar, representing one's knowledge of language) accounts for (3a) and (3b), while a general theory for language (e.g., universal grammar) primarily accounts for (3c).

[8] Specifically, "at the conceptual-intentional level CI for expression of thought and at the sensorymotor level SM for externalization in some medium, typically sound" (Chomsky, 2021, p. 7).

(3) a. Poverty of Stimulus: “the huge gap between the data available and what the child knows” (2021:8)
b. Basic Property of Language: “mechanisms for a language to generate an unbounded array of hierarchically structured expressions” (2021:7)
c. Faculty of Language: “the innate endowment for language acquisition” (Chomsky 2021:5)

As we saw in section three, there is more to a strong theory than explanatory adequacy and feasibility. The theory must also be as simple as possible. A generative grammar is “a system of rules” (Chomsky, 1965, p. 8), and “the simplicity measure of a rule system is the number of symbols under the conventions and notational transformations that capture legitimate linguistic generalizations” (Chomsky, 2021, p. 11). Hence, the simplest generative linguistic theory is defined in part by its conventions: a distinction between obligatory and optional rules, and between ordered and unordered rules (i.e., (il)legitimate linguistic generalizations); and in part by its formal notation: e.g., one rule, X → YW(B), in place two, X → YW and X → YWB (pp. 9-10). Chomsky’s “notations and conventions” (p. 11) then provide for “a quasi-mathematical proof that the sentence contains within itself the property of recursiveness” (Parkinson, 1970/1972, p. 59), i.e., the Basic Property of Language in (3b).

Such talk of simplicity raises the issue of complexity in language. The sort of complexity reflected in Figure 1 supposedly results from the “externalization of syntactic structure to the sensorimotor system […] typically phonetic form” (Chomsky, 2021, p. 12). Externalization is distinct from “language proper” (p. 12), for all externalization does is relate two entirely independent systems: “narrow syntax, a system of pure structure, and [the sensorimotor system], which imposes a requirement of linear order for reasons that have nothing to do with language” (p. 12). The system of pure structure (language proper, narrow syntax) is the purview of phrase structure grammar, transformational generative grammar, X-bar theory, the principles and parameters framework, and the current minimalist program (pp. 11-13)—i.e., every iteration of the simplest theory for language. At the same time, each iteration of generative linguistic theory is supposed to account for (3), i.e., aspects of language proper. Thus, there is a vicious circularity to the dual problems of theory construction which, together, comprise the primary goal of theories of language noted at the outset of this section: “to explain in the best way the data that constitute the subject matter of the theory, along with determining just what is the relevant subject matter” (p. 6). A careful (yet brief) evaluation of the relevant subject matter shall demonstrate the extent to which generative linguistic theory is a product of its own circular agenda.

4.1 Infinite Use of Finite Means

The expansion of Chomsky's 1956 paper into *Syntactic Structures* (1957) "was motivated in part by an interest in the problem of accounting for the ability of a speaker to produce and understand an indefinite number of new sentences" (Chomsky, 1961, p. 222). Since "[a] generative grammar can be regarded as an attempt to characterize certain aspects of this ability, and a particular theory of generative grammar is a proposal concerning its general and universal features" (p. 222), there is an inherent circularity to the entire generative enterprise. Take, for example, the first paragraph of the preface to *Aspects of the Theory of Syntax* (Chomsky, 1965) (henceforth *Aspects*) provided in (4).

(4) The idea that a language is based on a system of rules determining the interpretation of its infinitely many sentences is by no means novel. Well over a century ago, it was expressed with reasonable clarity by Wilhelm von Humboldt in his famous but rarely studied introduction to general linguistics (Humboldt, 1836). His view that a language 'makes infinite use of finite means' and that its grammar must describe the processes that make this possible is, furthermore, an outgrowth of a persistent concern, within rationalistic philosophy of language and mind, with this 'creative' aspect of language use […]. What is more, it seems that even Panini's grammar can be interpreted as a fragment of such a 'generative grammar,' in essentially the contemporary sense of the term.

Here we must disentangle four things: Humboldt's philosophy of language, rationalistic (Cartesian) philosophy of language and mind, the creative aspect of language use, and generative grammar. As noted in section two, a generative grammar is a system of rules that characterize a language (specifically, its sentences). Furthermore, "every speaker of a language has mastered and internalized a generative grammar that expresses his knowledge of his language" (Chomsky, 1965, p. 8). So, a generative grammar is "a description of the tacit competence of the speaker hearer that underlies his actual performance in production and perception (understanding) of speech" (Chomsky 1966/2009, p. 118, note 2). In *Syntactic Structures* (1957), "[t]hree theories of generative grammar [were] proposed for comparison and study" (Chomsky, 1961, p. 221): a finite-state grammar, "a formalized and somewhat generalized version of the theory of immediate constituents, reinterpreted as a theory of generative grammar" (p. 221), and a transformational grammar. Indeed, the former "is the simplest type of grammar which, with a finite amount of apparatus, can generate an infinite number of sentences" (Chomsky, 1957, p. 24). And yet "such a limited linguistic theory is not adequate" (p. 24) because it cannot "explain or account for the ability of a speaker of English to produce and understand new utterances, while he rejects other new sequences as not belonging to the language" (p. 23). Simply stated, neither a finite-state grammar nor a modified phrase structure

grammar can account for intuitions about grammaticalness. Indeed, the simplest sort of theory that *can* account for this ability (the analysis of grammaticalness) is one based on transformational-generative grammar.[9]

The ability in question becomes the creative aspect of language when it is restricted to a certain type of rule (Chomsky, 1964, pp. 21-22) and merged with Humboldt's notion of "*Form*" (pp. 17-21). It is important to note, however, that the original notion of (inner) form is not necessarily rule-based, and Humboldt's famous aphorism (infinite use of finite means) is open to interpretation (Losonsky, 1999, pp. xxix-xxx).[10] Chomsky's (1964, pp. 23-25; 1966/2009, p. 127, note 39) interpretation is in terms of explicit rules of a very specific kind which, when coupled with an intuitive sense of grammaticalness, forms the basis of the competence-performance distinction (cf. Chomsky, 1965, pp. 24-26; 1966/2009, p. 75).[11] Generative linguistic theory is then framed as being "within the general framework of the study of human intellectual capacities and their specific character" (1964, pp. 25-26), i.e., the Cartesian conception of mind. Putting this all together, "Chomsky sees the emphasis upon the fact that in the employment of language we 'make infinite use of finite means', […] as well as the attempt to give an account of this creative potential, as one of the key contributions of the tradition of rationalistic linguistic theory" (Rieux & Rollin 1975, p. 65, note 3).

4.2 Cartesian Cognitive Science

If by now the comingling of generative linguistic theory with Descartes's theory of mind is not apparent, the titles of two important works will make it clear: *Cartesian Linguistics* (Chomsky, 1966) and *Rules and Representations* (Chomsky, 1980). Thus, we have in Chomsky's theory of language a canonical example of Cartesian cognitive science at work, very much akin to "David Marr's (1982) theory of vision" (Rowlands, 2010). We saw in section two how the histories of cognitive science and generative linguistics are intertwined. In this section, we shall see just how enmeshed these two sciences are.

Traditional (Cartesian) cognitive science makes a fundamental distinction between sensation and perception (Rowlands, 2010, p. 26). Vision

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[9] Which is based on a modified and elaborated notion of 'linguistic level of representation' (see Chomsky, 1957, pp. 18, 24; also 1955/1975).

[10] In particular, "Chomsky's understanding of Humboldt's idea that language makes infinite uses of finite means entails that the means are rules and the uses are the sentences that can be constructed on the basis of the rules. For Humboldt, however, the boundless or infinite domain is 'the essence of all that can be thought,' not sentences. So while for Chomsky the infinite domain is sentences, for Humboldt the infinite domain is what language is about or what it expresses" (Losonsky, 1999, p.xxx).

[11] That is, it determines the relevant subject matter. "Terminology related to 'competence' includes 'core grammar' (Chomsky, 1981). The distinction between competence and performance can be seen as a distinction between language and its use" (McGilvray, in Chomsky, 1966/2009, p. 118, note 2).

[like language] "seems to be a process that takes place both in the world and in the brain" (p. 26).[12] In particular, "light [sound] has to first strike the retina [ear drum], and this is a worldly occurrence rather than an intracranial one" (p. 26). But for "perception to occur, the brain must then process the information it receives" (p. 26). So, both approaches to the study of perception (Chomsky and language, Marr and vision) can be characterized as in (5): to study perception is to study "the intervening processes whereby it transforms visual [auditory] input or sensation into visual [speech] perception" (p. 26).

(5) *sensation* → ? → *perception*

Refocusing on generative linguistic theory, we see the above schema borne out in the following way. Chomsky's self-styled "Cartesian linguistics" (e.g., in 1964, 1965, 1966/2009, 1968/2006) encompasses two fundamental claims: language has both an inner and outer aspect, and these two aspects "need not be identical" (Chomsky, 1966/2009, p. 79). In other words, "[t]he underlying organizing of a sentence relevant to semantic interpretation [deep-structure] is not necessarily revealed by the arrangement and phrasing of its given components [surface-structure]" (p. 79).[13] A primary objective for Cartesian linguistic theory involves "the precise specification of two kinds of abstract device, the first serving as a perceptual model, and the second as a model for acquisition of language" (Chomsky, 1964, p. 26). As depicted in (6), the perceptual model "assigns a full structural description D to a presented utterance U, utilizing in the process its internalized generative grammar G, where G generates a phonetic representation R of U with the structural description D" (p. 26).[14] The only difference between (5) and (6) is that the latter specifies the alleged output (R/D) of perception proper (application of G to U).

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[12] It may seem unfair to compare language to vision, since (as one reviewer points out) language must be produced in order for it to be perceived. It is indeed unfair, but the comparison demonstrates a fundamental issue of generative linguistic theory, and why a new sort of general linguistic theory is necessary. Dennett (1991) describes the problem in the following way: "One of the skeletons in the closet of contemporary linguistics is that it has lavished attention on hearing but largely ignored speaking […] no one—not Noam Chomsky, and not any of his rivals or followers—has had anything very substantial (right or wrong) to say about systems of language *production*" (p. 231).

[13] Furthermore, "[t]he deep structure that expresses the meaning is common to all languages, so it is claimed, being a simple reflection of the forms of thought. The transformational rules that convert deep to surface structure may differ from language to language" (Chomsky, 1966/2009, p. 81). This amounts to just one of many variants of the facts vs. data distinction; others include language proper vs. externalization, universal grammar vs. (particular) grammar, explanation vs. description, competence vs. performance, search space vs. selection procedure, and so on.

[14] "In Saussurian terms, U is a specimen of *parole* interpreted by the [perceptual model] as a 'performance' of the item R which has the structural description D and which belongs to the *langue* generated by G" (Chomsky, 1964, p. 26).

(6) U → PERCEPTUAL MODEL → D

The learning model in (7), on the other hand, "is a device which constructs a theory G (i.e., a generative grammar G of a certain *langue*) as its output, on the basis of primary linguistic data (e.g., specimens of *parole*), as input" (Chomsky, 1964, p. 26).[15] Thus, general linguistic theory is "an attempt to specify the character of the device [in (7), i.e., the learning model]" (p. 26), and a particular grammar is "an attempt to specify the information available in principle […] to [(6)] that makes it capable of understanding an arbitrary utterance, to the highly non-trivial extent that understanding is determined by the structural description provided by the generative grammar" (p. 26).

(7) *primary linguistic data* → LEARNING MODEL → G

To evaluate a particular generative grammar G, "we ask whether the information that it gives us about a language is correct, that is, whether it describes correctly the linguistic intuition of the speaker" (Chomsky, 1964, p. 26). To evaluate "a general theory of linguistic structure that is sufficiently explicit to offer an actual hypothesis about the character of [the device in (6)], we ask whether the generative grammars that it selects meet the empirical criterion of correspondence to the speaker's linguistic intuition, in the case of particular languages" (pp. 26-27). In general, then, Chomsky's theory of language, just like Marr's theory of vision, "is built around two related concepts: *representations* and *rules*" (Rowlands, 2010, p. 29), both of which occur inside the head (p. 30). Rules apply to some input to produce representations, which are then instantiated in the heads of thinking animals.

In sum, generative linguistic theory is interested in characterizing two abstract devices, one that uses an internalized generative grammar (knowledge of language) for production and perception, and another that accounts for the acquisition of said grammar (acquisition of knowledge). The latter learning machine is endowed with a faculty of language (cf. footnote 15), so to understand this device is to understand human language in general. This enterprise then accommodates the three things listed in (3): the faculty of language, basic property of language, and poverty of stimulus; and it does so in the simplest way possible.

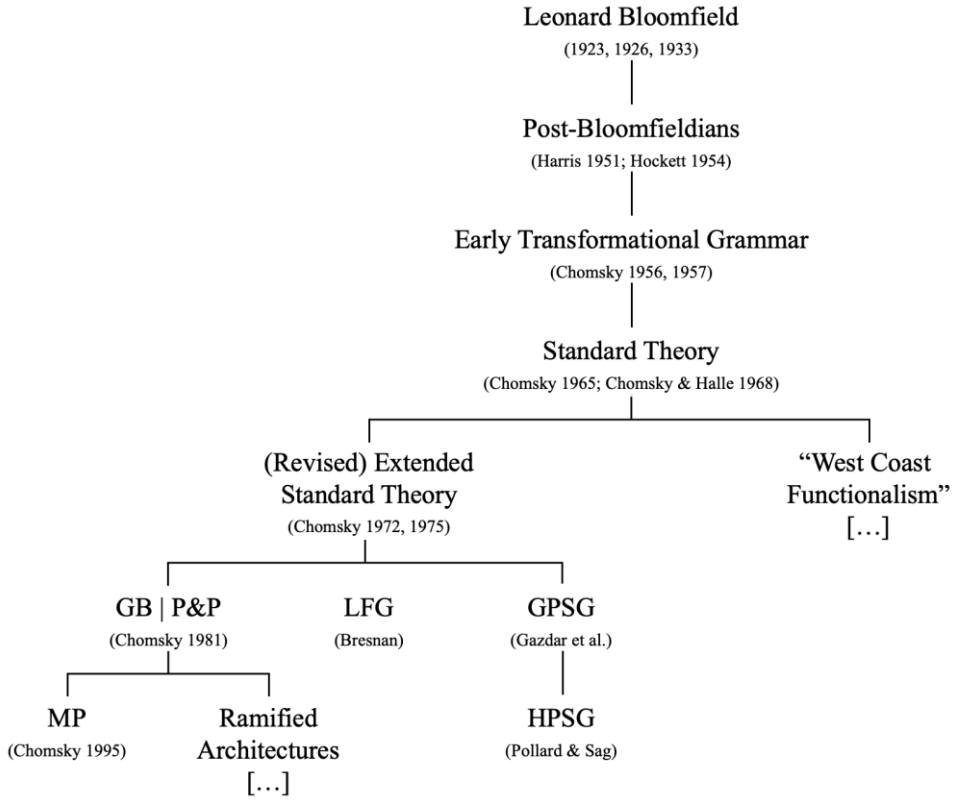
4.3 Aspects of Theories of Syntax

Let us consider again Figure 1 of section two. It goes without saying that "any adequate theory of language must begin with the fact that even the simplest sentences contain this rich a structure" (Jackendoff, 2002, p. 18). Indeed, contemporary linguistic theories begin with this fact, and it is important to

[15] "To perform this task, [the learning model] utilizes its given *faculté de langage*, its innate specification of certain heuristic procedures and certain built-in constraints on the character of the task to be performed" (Chomsky, 1964, p. 26).

understand why. Bloomfield's (1923/2000) review of Saussure's *Cours de linguistique générale* provides insight into "how the origins of European structuralist linguistics appeared from a contemporary American viewpoint" (para. 1). On the one hand, it highlights the way in which the histories of American and European structuralism are related: they both start with Saussure's "clear and rigorous demonstration of fundamental principles" (p. 33); i.e., "the theoretical basis for a science of human speech" (p. 35). On the other hand, Bloomfield's review highlights a crucial point of departure between the two structuralisms, for as Bloomfield states: "I should differ from de Saussure chiefly in basing my analysis on the sentence rather than on the word; by following the latter custom de Saussure gets a rather complicated result in certain matters of word-composition and syntax" (p. 34). It is then useful to differentiate between two sorts of structuralism: American structuralism, beginning with Bloomfield but most closely associated with "the theoretical and methodological principles of the so-called post-Bloomfieldian school" (Lyons, 1977, p. 230); and Saussurean structuralism, including, but not limited to, the various European schools of thought (e.g., the Geneva School, Prague Linguistics Circle, Copenhagen School, etc.). We are presently concerned with the American branch, depicted in Figure 2, for two reasons. First, "many of the principles of post-Bloomfieldian structuralism were not only alien to, but at variance with, the principles of […] Saussurean (including post-Saussurean) structuralism" (p. 230). Second, "the work of Harris and his colleagues [the post-Bloomfieldians], with its strong tendency towards rigorous formulation of distributional principles, served as the foundation upon which generative grammar has been built" (Lyons, 1968, p. 157). The goal of this section is to provide an overview of contemporary linguistic theory (the terminal nodes in Figure 2) by focusing on when and by whom common metatheoretical assumptions were introduced. This will help us see the connection between Cartesian cognitive science and modern linguistics, and why no current theory adequately accounts for the relationship between language and cognition.

Figure 2. *Development of Contemporary Linguistic Theory in America*



4.3.1 Bloomfield

We begin with Bloomfield's (1923/2000) decision to base his analysis on the sentence rather than the word. According to Bloomfield (1926), a sentence, being a type of phrase, is a non-minimum free form (pp. 156-158). A sentence (or phrase) is composed of words (minimum free forms), which may in turn be composed of morphemes (minimum forms) (pp. 155-156). Hence "every utterance [comprising a language] is made up wholly of forms" (p. 155). Bloomfield makes no distinction between *langue* and *parole*, considering a language to be "the totality of utterances that can be made in a speech-community" (p. 155). So, the various linguistic forms are "recurring units of speech [*parole*], from the sentence, which is the largest, to the smallest [morpheme]" (Matthews, 1993, p. 8),[16] and to study language is to study nature of these recurring units. Since it is assumed that "each linguistic form has a constant and specific meaning" (Bloomfield, 1933, p. 145), and "linguistic study

[16] As it relates to Saussure's theory of language, "the implication [of Bloomfield's approach] is that the sign is basically a unit of speech: 'words, word-groups, and sentences are all signs'" (Wells, 1947, pp. 7f.; in Matthews, 1993, p. 9).

must always start from the phonetic form and not from the meaning" (p. 162), semantics is entirely excluded from grammar. Very generally, the grammar of a language contains all the regular or "recurrent patterns" (Matthews, 1993, p. 14), and the lexicon is its "appendix […] a list of basic irregularities" (Bloomfield, 1933, p. 274).

4.3.2 Post-Bloomfieldians

The post-Bloomfieldians are then the inheritors of "a general set of assumptions and attitudes" (Matthews, 1993, p. 14) concerning grammar, meaning, and the lexicon. They take Bloomfield's *Language* (1933) "as a fresh starting-point" (Matthews, 1993, p. 18) from which to consider three interrelated issues: (i) whether semantics (the study of meaning) actually belongs in linguistics (p. 23); (ii) "whether an account of the formal structure of a language can be given independently of an account of meanings" (p. 23); and (iii) "whether it is possible, in theory, to determine this structure without in part relying on meaning" (p. 23). In order to reliably consider these issues, the post-Bloomfieldians, most notably Harris (1951), developed rigorous procedures of analysis (Lyons, 1968, p. 157; Matthews, 1993, p. 25). Such procedural linguistics relied heavily on the notion of levels: "when the phonology of a language had been worked out, the next step was to identify its morphemes; then, after that, their classification and the constructions in which they stand" (Matthews, 1993, p. 27). Crucially, the description of a lower order level, e.g., phonology, "could not rely on what was as yet a purely intuitive understanding of larger grammatical units" (p. 25), i.e., morphology or syntax (or meaning); and furthermore, "a description of formal structure should be separate from and precede an account of meanings" (p. 26). So just as Chomsky's first chapter of *Aspects* set the agenda for generative linguistic theory, "the post-Bloomfieldian's set the agenda for general linguistics in America […] especially in the field of morphology and syntax" (p. 20).

4.3.3 First Chomskyan School

The period between *Syntactic Structures* (Chomsky, 1957) and the mid-1970s comprises "the first Chomskyan school" (Matthews, 1993, p. 34). Its defining features are listed in (8), most of which we have already discussed. The distinction in (8c) is discussed in sections three and four, where evaluation refers to finding the simplest theory for language.

(8) a. Grammar as a system of regular rules
    b. Grammar as a theory of a language
    c. Discovery vs. evaluation procedures

The first Chomskyan school builds upon the methods and assumptions of the post-Bloomfieldians (see Chomsky 1955/1975, p. 165, note 18; 1961, p. 122,

note 7; 1961, pp. 128-129, note 23; 1964, p. 7, note 1; 1964, p. 11, note 4; etc.; also, Lyons, 1968, p. 157). Chomsky also carries forward the post-Bloomfieldians' affirmative answer to the question of whether an account of linguistic structure can be given independent from meaning (Matthews, 1993, p. 23). And yet Chomsky's (1957) account incorporates "the analysis of grammaticalness" (p. 24), which in turn requires that "the notion of 'linguistic level of representation' […] be modified and elaborated" (p. 24). The linguistic level in question is syntax, and its rules, in the form of a generative grammar, represent one's knowledge of language. The post-Bloomfieldians' distinction between formal structures (syntax) and meaning (semantics) then becomes a distinction between knowledge (of syntax) and meaning, since the grammaticalness of sentence (2a) "cannot be identified with 'meaningful' or 'significant' in any semantic sense" (p. 15). Syntax, however, is not the only level: there is one for phonemes, one for morphemes, and so on (Chomsky, 1955/1975, p. 66). Each level has its own primes that are concatenated into larger strings, hence the primes of phrase structure consist of "such symbols as *Sentence*, *Noun Phrase* (*NP*), *Verb Phrase* (*VP*), *Noun*, *John*, *ing*, etc." (p. 69). This sets up an order between the relevant levels or components, such that "a central *syntactic component* […] generates strings of minimal syntactically functioning elements" (Chomsky, 1964, p. 9), which are then interpreted by "a *phonological component* and a *semantic component*" (p. 9). These three components, in addition to the lexicon, are foundational to Chomsky's linguistics, manifesting in every iteration of generative linguistic theory (cf., e.g., 1970, 1981, 1995/2016; also footnote 8).

4.3.4 Second Chomskyan School to the Present

The second Chomskyan school emerges in the 1970s with the extended standard theory. This period is more difficult to characterize, since it is "distinguished less by the emergence of a single positive idea than by the decay of several old ones" (Matthews, 1993, p. 43). In *Remarks on Nominalization* (Chomsky, 1970), for example, Chomsky suggests that a lexicalist analysis rather than a transformationalist one best accounts for certain complex word forms. Thus, lexicalism ensues, along with highly elaborated accounts of the lexicon (inherited from Bloomfield) and other grammatical components, especially phonology and morphology (see Desjardins, 2023 for discussion). Successors of the (revised) extended standard theory include Government and Binding/Principles and Parameters (Chomsky, 1981, etc.), and the Minimalist Program (Chomsky, 1995/2016); Generalized Phrase Structure Grammar (Gazdar et al., 1985), and Head Driven Phrase Structure Grammar (Pollard & Sag, 1997); Lexical Functional Grammar (Bresnan, 1982; Bresnan et al., 2016); and the Parallel Architecture (Jackendoff, 1997, 2002, 2015). Within each of these we find a lexicon and a central syntactic component, in relation to other domains (potentially phonology, morphology, etc.). The designation "West Coast Functionalism" (Noonan, 1999, p. 11) encompasses those approaches to language

that are less directly associated with Chomsky's theorizing. This includes "Cognitive Grammar, Construction Grammar, Emergent Grammar, Functional-Typological linguistics" (p. 11), among others. My reason for maintaining a connection between the so-called formalist and functionalist traditions (Noonan, 1999, p. 12), aside from sharing many of the same (post-)Bloomfieldian characteristics, is this: they both rely on rules and representations to account for deeper facts about language. In standard generative linguistic theory, the rules and representations are straightforward (see section four). They are harder to spot in West Coast Functionalism, where (derivational) rules and representations become (declarative) inheritance hierarchies of lexical items and constructional schemas (p. 26). In both cases, they represent knowledge and serve as recognition (perception) devices of incoming (input) data (p. 27, and section 4.2). If we simply appeal to Construction Grammar (or any other functionalist or formalist framework) instead of the Minimalist Program as our theory of language as a mental phenomenon, then we have made no progress toward a non-Cartesian cognitive linguistics.

5 Conclusion

We saw in section two how the first chapter of *Aspects* solidified "the specifically Chomskyan revolution" (Pesetsky, 2015, p. 1), providing "an agenda for generative linguistic theory" (Jackendoff, 2002, p. 19). This agenda entails a certain set of goals and objectives which, as noted in section three, presupposes a distinction between data and facts on the one hand, and between particular and general theories of language on the other. The distinction between data and facts, particular and general linguistics, manifests within the generative enterprise as a distinction between grammar and universal grammar: the former treats of data (people's intuitions, or knowledge, of their language), and the latter treats of facts (deeper insights about human language in general). In both cases, however, the subject matter is the same, for as Chomsky says: "the empirical data that I want to explain are the native speaker's intuitions" (Hill, 1962, p. 158).

The subject matter of generative linguistic theory is a Cartesian ghost (cf. Ryle, 1949, pp. 15ff.), an ethereal system of rules and representations—grammar as knowledge—trapped within the mind-brain. We might try to account for knowledge of language in an alternative theory (e.g., Head Driven Phrase Structure Grammar, or the Parallel Architecture), but we will still be trying to account for the ghost. What is needed is a non-Cartesian approach (Rowlands, 2010) to general linguistic theory, and a deeper appreciation for the distinction (and relationship) between particular linguistics and general linguistics (Haspelmath, 2021). In other words, the construction of language-particular theories and general linguistic theory must be viewed in a different way—as relational theories of informational objects. This means we cannot take the status of linguistic description for granted. Any reasonable general (higher order) linguistic theory is only as good as its first order ontological commitments, and for those we rely on sound methods of analysis and fundamental principles, i.e.,

particular linguistics. In this way, the problems that motivated Descartes and Saussure to question what was handed to them, and to be sure of what they were trying to explain, are as relevant now as they were then.

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