Three Grades of Grammatical Involvement:
Syntax from a Minimalist Perspective
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This paper presents a Whig history of Minimalism, suggesting that it is the natural next step in the generative program initiated in the mid 1950s. The program so conceived has two prongs: (i) unifying the disparate modules by demonstrating that they are generated by the same basic operations and respect the same general conditions and (ii) assessing which of these basic operations and conditions are parochial to the faculty of language (FL) and which are reflect more general features of cognitive computation. What makes Minimalism “minimal” is the conviction that the bulk of the operations and principles in FL are proprietary to that cognitive module. The paper illustrates the aims of the project by discussing some ways of reducing Binding Theory to the theory of Movement.

0. Go into a bar and ask a generic patron: “what do linguists study?” Any linguist will tell you from experience, that the standard answer to this question is “Language” or, more likely “languages.” How do linguists know this? Because the first remark made when it is discovered that one is a linguist is “how many languages do you speak?” Nothing engenders greater surprise than a reply in the very low single digits (try “one” if ever asked and watch the surprise). Linguists study (properties of) languages. That’s what they do. Or did, until Chomsky changed the field’s subject matter in the mid 20th century.

Modern Generative Grammar (GG) was founded on a 17th century question: What does language tell us about the mind? What do minds look like when seen through a linguistic prism? Framed by this question, the ultimate objects of linguistic investigation are human minds with languages being a means to the descriptive end of characterizing linguistically capable minds. Generative Grammarians of the Chomsky stripe (include me in here) probe human mental structures by considering the specific properties of its most distinctive product, natural language (NL). Thus, linguistics studies languages in roughly the way physics studies cyclotrons, viz. linguistics investigates the properties of NLs with the ulterior motive of descrying human mental structures. From this Chomskyan angle,

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1 Thanks to Noam Chomsky and Neil Smith for valuable comments on earlier drafts. I am quite sure that neither agrees with many of the (hopefully) substantive points I make but their comments have helped me make clear (at least to myself) what I have been thinking.

2 Hat Tip to W.V.O. Quine 1966:156-174 for the title.

3 If one considers mental properties as features of brains and is inclined to identify minds and brains then whenever I use the terms minds you should read minds/brains. I will largely desist from this slash notation and stick to minds.

4 This is one way of doing linguistics. There are others, guided by other questions and interests. That said, this intellectual lode star brings with it a reassessment of the philological spirit that characterizes much earlier (and current) investigation. Philology is useful as a tool and its virtues must be assessed on a case by case basis. Some philological facts might be interesting, some not. Deep description per se is not the name
the properties of languages are interesting to the degree that they shed light on the special (if any) mental powers/brain structures required to support a cognitive product with these specific complexities.  

With this perspective in mind, it is possible to reconstruct the history of GG as mirroring the steps required for addressing and answering the following question: on what kind of mind do our linguistic capacities supervene? This uber question breaks down into three sub-queries: (i) what kinds of rules characterize NLs (what do grammars of specific languages look like?). More exactly: What kinds of mental powers are required to speak a given NL, e.g. English? (ii) how are such systems of rules acquired (or: what features of these rules are due to the ambient linguistic environment and what due to the cognitive system(s) that constructs these rules from the linguistic data available, i.e. what does Universal Grammar (UG) look like?). Put another way: Of the powers/structures that are special to knowing, e.g. English, which more generally required for knowing any natural language? and (iii) why these kinds of rules and not others (why does UG have the properties we find and not other conceivable ones?). Alternatively: Of the more general...
powers which undergird linguistic capacity in general, which are part of cognition more generally and which are special to linguistic competence?

(i)-(iii) roughly define three epochs of generative research; (i) the first centered on the kinds of rules exhibited by NLS (e.g. grammars require certain kinds of phrase structure and transformation rules), (ii) the second focused on what Chomsky dubbed Plato’s Problem and concentrated on factoring out the common characteristics of the varying kinds of grammatical rules (thus outlining the basic features of UG) and (iii) the third aims to understand why UG is structured as it is and not some other way (e.g. why are anaphors locally c-commanded by their antecedents?). As we shall see below, (iii) segues into the question of which properties of UG are specific to linguistic cognition and which, though recruited for linguistic ends, reflect more generic features of cognition (and hence of the mind). In what follows, I provide a Whig history (aka: rational reconstruction) of the generative enterprise that emphasizes how addressing these three questions advances our understanding of the structure of the human mind/brain.7

1. We start with (i): What does competence in a particular language consist in? What kinds of rules and systems of rules do NL grammars have? From the get-go, the focus was on the rule systems (aka grammars) required to generate sound meaning pairs; more particularly on recursive rule systems because for all practical purposes NLS contain an infinite number of objects (phrases and sentences) and thus can only be finitely specified via a recursive set of rules (viz. a grammar). Moreover, given the aim of generating unbounded sound-meaning pairs the relevant rules must be pretty abstract.8 The early descriptive work concentrated on finding what kinds of rules were required

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7 The reader should be warned that this last remark reflects a personal view of the Minimalist enterprise. Noam Chomsky (p.c.) remarks that “most work from the beginning has proceeded by appealing to general scientific rationality (getting rid of PS [phrase structure, NH] stipulations by X-bar theory) or what we might regard as general principles of computational economy (e.g. minimal search, strict cycle) rather than cognitive processes.” I believe that this is correct. All versions of the Minimalist Program aim to eliminate “stipulations” for the obvious methodological reasons. The other part of the program, the one rooted in “general principles of computational economy,” has, in my opinion, proven to be more contentious because more difficult to specify (as Chomsky notes in his discussion of operative complexity in e.g. Chomsky (2000)). Furthermore, I believe that there is another conception of the program building on Chomsky’s evolutionary parable (Chomsky 2000, 2012) and that I recount below which rests less on claims concerning computational efficiency and more on observations about cognitive genericity whose foundations are less problematic (in my view) given the general aims of the Minimalist Program. However, here is not the place to argue this. The reader however should be aware that some of what follows might differ from other popular ways of implementing the general program.

8 The discussion of weak vs strong generative capacity revolved around this issue. String properties fail to be impressive when the aim is to express meaning as well as phonetic form.
(transformations, phrase structure rules). There were endless papers and theses that described the properties of specific constructions in specific languages: ‘The structure of relative clauses in XXX,’ or ‘Complementation in YYY,’ or ‘Question formation in ZZZ.’ These investigations led to the discovery of a set of key notions: structural description, factorization, command, clausemate, island etc. and revealed how complex the rule interactions in any given grammar could be (rule ordering, feeding/bleeding relations, command domains etc.). These also started pointing to possible commonalities across different constructions (islands applying to “movement” dependencies\(^9\), rules applying cyclically, A-over-A restrictions on rule application, Cross-over restrictions etc.). This work quickly demonstrated just how subtle and complex are the kinds of rules that native speakers tacitly know about their natural language. Indeed, this very complexity quickly raised Plato’s Problem in a dramatic way: how could humans acquire these complex systems so quickly and uniformly despite the degraded and inadequate evidence available. We return to this in a moment.

This first line of inquiry led to several key results. For example:

- **NLs are generated by grammars consisting of recursive rules of two broad types:** Phrase Structure Rules with a specific endocentric format, and transformational rules that are generally subject to locality conditions of various sorts.\(^10\)
- **Expressions in a sentence allow both for local dependencies between “adjacent” items and non-local dependencies between non-adjacent items.** Indeed, there are three kinds of ‘non’ adjacency; those mediated by “move,” those mediated by “binding/construal” and those mediated by phrase structure dependencies.
- **Transformations are structure dependent operations, exploiting hierarchical rather than linear properties of the phrase marker.**
- **Grammars embody a cycle wherein rules apply again and again in larger and larger domains.**

In sum, this important work established (conclusively in my view) that a speaker’s linguistic competence is a very complex capacity with many interacting parts and several apparently distinctive properties. These detailed insights set the stage for the next obvious question: Given their evident complexity, how is it possible for humans to acquire these NL computational systems? The obvious answer is that native speakers come to the task of acquiring a language with biologically innate mental powers that facilitate this very complex task.

This is actually a rather fancy argument in favor of the view that there is a rich species specific innate component to linguistic competence. The more obvious argument rests on the observation that only humans learn languages when exposed to linguistic input. Dogs don’t, chimps don’t, tables don’t. If there were no species specific mental structure unique to humans for language then how could even the first step – selecting the language-relevant data from the environment- take place? The work discussed below

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\(^9\) Ross (1967) did not actually put matters thus. Here it is chopping not movement that islands restrict.

\(^10\) The issue of endocentricity is currently contentious, some (e.g. me) thinking it is important and others thinking not so much (e.g. Chomsky, Collins).
argues that there is innate structure in addition to whatever allows selection of the language relevant data.

Before giving a brief tour of the work generated by Plato’s Problem it is important to emphasize that the possibility of raising the learnability question relies on the accumulated results that the descriptive stage produced. Plato’s problem addresses how to fill the gap between the knowledge that a competent speaker has and the evidence required to fix such knowledge. Without at least a rough description of the knowledge attained asking how it could be attained is silly. In this very obvious sense later GB theories, theories that try to address Plato’s Problem, presuppose the results of earlier inquiry. GB research did not (and could not) question (at least not in a wholesale way) the detailed descriptive results or the utility of the earlier descriptive phase. Rather GB style investigations were animated by a novel question. We turn to this now.

2. Given the complexity and diversity of NLs what powers must we ascribe to human minds given the obvious fact that any child can learn any language in pretty much the same way? A proposal: humans come equipped with a faculty of language (FL) with a Principles and Parameters (P&P) architecture specially structured to support language acquisition. FL has two parts. It contains some invariant principles applicable to any NL and some parameters circumscribing the range of attested variation. The principles distill the common features of earlier construction based rules and allows both for the formulation of general “laws” of grammar that regulate grammatical interactions and a simplification of the rule systems as the common complexities are abstracted out. Both potentially allow for a feasible solution of Plato’s problem in the domain of language. How so?

First, the distilled generalizations are excellent candidates for innate structural features of FL. They serve to circumscribe the class of possible grammars and thereby contribute to solving the poverty of stimulus problem that characterizes language acquisition. Being built in features of FL, the fact that the rules of language particular grammars heed these restrictions need not be learned by the child. The child “knows” this without having to “induce” this. Second, abstracting these features out and treating them as constitutive of FL allows for far simpler rules. As the simpler a rule is the easier it is to acquire, enriching UG simplifies the learning process as what must be acquired on the basis of the

11 GB is short for Government-Binding. The ur-text for this is Chomsky 1982 and GB refers to the theory built thereupon.

12 Two clarifications: (i) I concentrate on GB in the following but not because I consider it much different from the apparently different competing “frameworks” such as GPSG, LFG, and Relational Grammar (RG). To my mind, GB, GPSG, LFG, RG are all pretty much the same theories in slightly different notations. So what I say for GB goes for these as well. (ii) note the qualification ‘wholesale’ in the previous sentence in the text above. As in all empirical work, parts of the received wisdom were reanalyzed and disputed. The point is that GB took for granted that the descriptive details discovered were roughly correct. Unless this is assumed there is no point in trying to abstract out structural commonalities.
primary linguistic evidence (the evidence available to and used by the child) is reduced. The idea is that the simpler a rule is the more the available Primary Linguistic Data bears on it. For example, a rule that says ‘DO X’ is easier to learn than a rule that says “Do X unless Y,Z.” \(^1^3\) Third, in contrast to the earlier “evaluation metric” theory, P&P architectures reduce learning to the setting of local parameters rather than to comparisons of entire grammars, the former appearing feasible, in contrast to the latter. \(^1^4\) It is worth putting up the famous diagram that distilled the project:

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(1) \text{PLD} \rightarrow \text{FL/UG} \rightarrow \text{G_L}
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FL/UG is the function that given the kind of input \(^1^5\) kids receive (relatively simple, well formed, appropriate sentences and phrases) yields a grammar for that input. It does so by using the PLD to specify the values of the various open parameters in the general principles (e.g. deciding on what the bounding nodes are for L, what the binding domain is for L, what the class of phrases are for L, what the cases are in L etc.)

This focus on Plato’s problem led to the elaboration of a modular theory of grammar with rich language specific principles and very simple rules like ‘Move \(\alpha\).’ \(^1^6\) It also focused

\(^1^3\) It is actually not all that clear that the learnability problem was so solved by P&P models (c.f. note 14) but the logic seems correct. Nonetheless the shift to P&P models was conceptually critical for reasons outlined in Chomsky 2012:24ff.

\(^1^4\) I say ‘appearing’ because more than parameters are required to reduce the problem. The problem in brief revolves around how much data is required to set any given parameter and once set does it stay set. Are the parameters independent? Given the usual inventory of parameters the answers appears to be no. But if they are not independent then all parameters must be set together and this is a very hard thing to do. Solving this problem seems to require precisely the kind of technical apparatus parameters were thought to eliminate, viz. an evaluation metric or a language specific learning mechanism. For discussion c.f. Dresher 1999 and Fodor 1998, 2009.

\(^1^5\) If we are being careful, what’s relevant is not the linguistic input (the evidence the child is exposed to) but the child’s intake, what the child uses from this input. I dispense with such important niceties here.

\(^1^6\) Rules like ‘Move \(\alpha\)’ were often taken to replace earlier rules like Question Formation or Raising. However, this interpretation is inaccurate. Rather the earlier construction rules were distilled into (at least two) parts: (i) a common movement component and (ii) specific feature checking rules that distinguished the various kinds of movement phenomena from one another (e.g. Rizzi’s Criteria which checks to make sure that, for example, a WH element like who, what, sits in the specifier position of a +WH C\(^0\) head). If one is so inclined, it is quite easy to compile these various parts into a rule that looks like the old construction based ones, and for good reason. WH movement is not the same as Relativization, which is not the same as Topicalization etc. They do have different properties though they share a common movement aspect. What GB denies is that constructions are fundamental features of UG. Thus, there are no construction based universals e.g. a condition regulating dependencies found in questions but not in relative clauses. Moreover, distilling movement properties from constructional ones and focusing on the former served to conceptually simplify the theory in important ways. For example, it showed that some problems were technical artifacts, e.g. Raising versus Passive in
attention on the unique demands that learning a language imposes. The period was very rich in comparative analysis and the work from the late 1970s to the early 1990s showed what a plausible P&P theory might look like. In GB, this lead to a highly modular FL/UG comprised of several different sub-systems of grammar, targeting different kinds of grammatical properties, applying to different primitives and employing different operations, relations and conditions. Thus we find a theory with modules as in (2):

(2) a. X’ (Phrase structure)
   b. Case
   c. Theta
   d. Movement
      i. Subjacency
      ii. ECP
   e. Construal
      i. Binding
      ii. Control

Though some critical relations crosscut (many of) the various modules (e.g. government), the modules each have their own special features. For example, X’ theory trucks in notions like specifier, complement, head, maximal projection, adjunct and bar level. Case theory also singles out heads but distinguishes between those that are case assigning and those that require case. There is also a case filter, case features and case assigning configurations (government). Theta theory also uses government but for the assignment of theta roles, which are assigned in D-structure by heads and are regulated by the theta criterion; a condition that requires every argument to get one and at most one theta role. Movement exploits another set of concepts and primitives: bounding node/barrier, escape hatch, subjacency principle, antecedent government, head government, γ-marking, head government a.o. Last the construal rules come in four different types, one for PRO, one for local anaphors like reflexives and reciprocals, one for pronouns and one for all the other kinds of DPs, dubbed R-expressions. There is also a specific licensing domain for anaphors and pronouns, indexing procedures for the specification of syntactic antecedence relations and hierarchical requirements (c-command) between an antecedent and its anaphoric dependent.

As is evident, GB style theories describe a rich highly modular FL/UG. These modules employ primitives and principles highly specific to language. This is no surprise. GB developed to address Plato’s problem in the domain of language and so the focus was on the distinctive properties of the linguistic structures mastered. It is important to appreciate how fecund and productive this period of research was. Arguably, we learned more new facts about more typologically diverse languages than ever in the history of the study of language. We learned a tremendous amount about how languages and grammars operate, what they have in common and how they differ. There was an explosion of cross-linguistic investigation that, among other things, largely substantiated the P&P/GB ECM constructions. Thus the move away from constructions to ‘Move α’ conceptions was an important step forward. Nor need it deny the possibility that constructions “exist” in the sense of compiled complexes exploited, for example, in the processing or production of sentences.
3. This success paves the way for a further question: why do we have the UG we have and not another? Or, What are the possible FL/UGs? Why, for example, do grammatical relations exploit c-command? Is this an accident of our particular FL/UG or would any biologically available FL/UG exploit a c-command condition? Why is binding subject to locality conditions like the SSC (Specified Subject Condition) and the TSC (Tensed S Condition)? Is this unique to our FL/UG or a feature of any humans could have had? Why are principles A and B in complementary distribution? Why do islands exist? Etc, etc. The situation is a familiar one in the history of science. Think Gas Laws and Statistical Mechanics! The program with respect to GB and minimalism is the same, though the analogy likely suggests inordinate self-promotion. This conceded, it highlights an important feature of the minimalist enterprise. It takes the results of GB as roughly empirically accurate and aims to deduce its properties from more general properties of cognitive computation. Physicists, bless their hearts, have some useful terminology for this. They distinguish between effective theories and fundamental ones. The former are (roughly) accurate descriptions of the empirical lay of the land. The latter are the general principles in terms of which the empirical successes of the former are to be explained. The Gas Laws are effective, statistical mechanics fundamental. Fundamental theory aims to derive effective theory. GB (and its cognates) are effective theories awaiting elucidation in more fundamental minimalist terms.

What kinds of projects does this perspective invite? One line of investigation puts a premium on standard scientific virtues like elegance, simplicity, naturalness etc, and proposes to find the simplest, least redundant, most “natural” theory that matches the GB laws of grammar. Early Minimalism with its emphasis on the elimination of DS and SS levels, the reduction of case and agreement dependencies to movement and the ambition to eliminate theory internal formatives (e.g. copies replacing traces) is clearly moved in part by such methodological desiderata. Later minimalism in the guise of the Strong

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17 Interestingly, there emerged less consensus about whether FL/UG has specified dimensions of variation (parameters). It is not contested that grammars differ. What is up for grabs is whether the range of variation is finitely specified by FL/UG. For what it’s worth, my own view is that there is little evidence that it is and there is good reason to doubt this on basically minimalist grounds. I discuss this briefly in Hornstein 2009.

18 Wikipedia offers the following illustrative elucidation: “In a certain sense, quantum field theory, and any other currently known physical theory, could be described as "effective", as in being the "low energy limit" of an as-yet unknown "Theory of Everything!" Thus, effective theories are descriptively valuable and the aim of theory is to put these valuable description on more fundamental theoretical ground.
Minimalist Thesis includes these and also places a conception of computational efficiency at the heart of explanatory enterprise.\textsuperscript{19}

I believe that focusing on computational efficiency can be misleading in an unhelpful way. The problem is not so much whether linguistic computations are efficient but whether they are cognitively provincial, i.e. linguistically \textit{sui generis}. Minimalism aims to reduce the computational apparatus found within NL to principles of computation found in other domains of cognition. To the degree that linguistic computation resembles cognitive computations in other domains to that degree its etiology requires no special explanation. What needs a story are those aspects of FL/UG that are linguistically proprietary and the aim of the minimalist program is to reduce these to the bare minimum.

My own view is that the difference between these two perspectives is somewhat overstated given that methodological concerns can be invested with greater metaphysical oomph when framed in terms of Darwin’s Problem: What mental/brain resources/powers must we add to a pre-linguistic ancestor to get UG? Presumably, this ancestor had a pretty rich cognitive life even if linguistically bereft. What cognitive powers must be added to those s/he already had to get UG?

(3) General Cognition + ??? $\rightarrow$ UG

If we take GB to more or less accurately describe UG we can replace (3) with (4):

(4) General Cognition + ??? $\rightarrow$ GB

If we note that (it appears that) linguistic facility arose in the species quite rapidly (on the order of 50-100,000 years), then we have reason to think that what ‘???’ added must be relatively modest (one or two relatively small additions).\textsuperscript{20} In other words, given the small time span that Natural Selection had at its disposal, the UG laws of grammar must largely be the byproduct of general cognition supplemented by one (or two) specialized circuits. Just like constructions are complexes of several kinds of interacting rules so too

\textsuperscript{19} There is some debate as to whether the Strong Minimalist Thesis signals a departure from earlier research or a continuation of the earlier efforts. Martin and Uriagereka (2000) distinguish a weak from a strong minimalist thesis, dubbing the latter \textit{ontological minimalism}. Chomsky (p.c.) takes the view that minimalism is simply the application of scientific rationality to the study of UG, a biological object:

"early minimalism" …fall[s] under computational efficiency. And in fact this seems to me a seamless continuation of the earliest efforts from the 50s), e.g. elimination of T-markers, the massive stipulation of PSG [Phrase Structure Grammar, NH], etc. It all seems to me “metaphysical” in the sense that it is an effort to discover the truth about UG, a biological object, using the methods of scientific rationality that are common fare.

In what follows I would like to avoid taking a stand on these issues and simply note that computational concerns have been foregrounded in recent research and the question of how to interpret these notions so that they gain purchase within linguistics is a more explicit research topic than it has been heretofore.

\textsuperscript{20} C.f. Chomsky 2005, 2012:13 for discussion of the evidence for the rapid emergence of linguistic capacity.
the laws of grammar as described by GB are what emerge when one (or two) novel operation(s) is/ (are) added to cognitively sophisticated but non-linguistic brains. The minimalist project is to identify both these cognitively general and linguistically specialized circuits. The research agenda is to derive the laws of grammar (aka the Principles of UG as described by GB) from simpler mental operations that come in two kinds: those mental operations that predate the emergence of language (and so are part of the mental life of our non-linguistic ancestors) coupled with whatever innovative mental operations were added. We want these latter to be few in number because of the limited time span, preferably one. And these novel operations in combination with the mental/brain structures there before should together yield GB like grammars. That’s the research program.

Chomsky (p.c.) has succinctly summed up matters as follows:

If it’s ever going to be possible to say something sensible about the evolution of language, it’ll be because linguistic computations are not cognitively provincial. If they turn out to be so, too bad, but it seems to me a desideratum to reduce that element.

…that seems to me to lead directly to the search for principles of computational efficiency, not linguistically parochial principles, which would somehow have had to evolve independently.

I could not agree more, with one caveat. I would not necessarily identify ‘non-parochial’ with ‘efficient.’ Generic principles of cognitive computation might be efficient, and likely are. However, what is important in reducing the parochialism of UG rests less on the efficiency of its computational procedures and more on their being cognitively generic regardless of how efficient generic principles of cognitive computation are.

If this is the program, how to operationalize it? One consequence of taking the emergence of linguistic competence to be on the order of 50-100,000 years is that there should be almost no FL/UG internal modular structure. Complexity of this kind requires time for natural selection to work its magic. But there is no time so this kind of internal “complexity” is not what we should see. Conclusion, the internal structure of FL/UG is not modular (though FL itself might be a module). Rather, the differing GB principles and dependencies are all of a piece. This suggests a three-pronged research strategy:

(5) a. Reduction
   b. Generic Computational Considerations
   c. Interface Properties

Let’s consider these in turn. If there is no internal modularity then the internal modular complexity of UG as described by GB is illusory. What look to be different kinds of phenomena (e.g. movement versus binding, case marking versus antecedence, control

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21 What follows is one suggestion of how to proceed. I do not wish to suggest that there may not be other ways. Moreover, even those who accept this general way of proceeding may wish to mix and match different weightings of reduction, computational considerations and interface concerns. This is to be expected. It is possible that many roads lead to Rome and we should explore as many of them as practicable.
versus agreement) are actually manifestations of the same operations. A simple conception can be based on a principle like (6a), illustrated with example (6b) with structure (6c).

(6) a. If \( \alpha \) is grammatically related to \( \beta \) then merge \( \alpha \) and \( \beta \)
   b. John arrived
   c. \([TP \text{ John } [To \text{ past-finite}] \text{ [vp leave John}]\]

In (6b), \textit{John} is the \textit{leaver}, i.e. it is \( \Theta \)-marked by \textit{leave}. By (6a) it must be merged with \textit{leave} for the latter to \( \Theta \)-mark it as the \textit{leaver}. Furthermore, it is case marked by the finite past tense morpheme that is \( T^0 \). (6a) thus requires \textit{John} to merge with \( T^0 \). Thus, there is a copy/occurrence of \textit{John} merged with \textit{leave} and one merged with \( T^0 \). The structure in (6c) is thus what one requires given the grammatical relations of \( \Theta \)-marking and case mediated by a principle like (6a).

More generally, if one expression enters into a grammatical dependency with other expressions (e.g. \( \Theta \)-marked by one, case marked by another, Wh-checked by a third) then it merges with each. This results in Merge (both External and Internal) being the operation of choice in terms of which all linguistic dependencies are coded. Local dependencies like \( \Theta \)-role assignment are coded via External-merge. Non-local dependencies (be it construal, case marking, or Wh-movement) are products of Internal-merge (aka movement). Showing that something like (6a) \textit{could be true} is very demanding given the abundant apparent counter-evidence coming from the details of GB itself, which, recall, is the target of reduction.

Merge itself is also quite simple: it consists of combining relata. At this level, Merge is unlikely to be specific to language as combining relata must be part of any kind of cognitive computation. As Gallistel and King (2009:208) state matters:

The architecture of the brain must enable it to bring together for computational purposes distinct pieces of information…

This they argue holds for \textit{all} forms of cognitive computation including dead reckoning in ants and caching behavior of jays. Merge plausibly involves an instance of this “bringing together,” as a subpart, or so I have argued (Hornstein 2009). What makes linguistic processes of Merge more complex is that they are able to take the outputs of this more generic operation as further inputs to it. This is second property of Linguistic Merge is what makes Linguistic Merge recursive, allowing it to create unbounded complex hierarchical structures, something that does not arise by simply applying the more cognitively general Merge/”bring together” operation available quite generally in cognition. What allows for this this recursive complexity? Hornstein 2009 proposes that the secret added ingredient is the labeling of the “brought together” relata. When two linguistic objects are “brought together” the result is named after one of the relata (e.g. when \( \alpha \) and \( \beta \) are merged to yield \( \{\alpha, \beta\} \), the result is “named” after one of the relata, e.g. \( \{\alpha, \beta\} \)). This labeling closes the combining relation in the domain of the lexical items

\[22\] An early very important reductive program revolved around islands and subjacency. The aim of the subjacency theory was to deduce islands. Interestingly, the program was also motivated computationally. See Chomsky 1972 for discussion.

\[23\] Elevating this to a bi-conditional implies something like a principle of Greed.
(e.g. \(\{\alpha, \beta\}\) has the combining properties of \(\alpha\)). In effect, labeled elements are endowed with the inherent combinatorial properties of the basic Lexical Items. Chomsky 2008 achieves a similar end with “edge features.” Lexical atoms have inherent “edge features,” which licenses their merging. Licensing further merger of already merged complexes of elements requires endowing these complexes with edge features (thus, \(\alpha\) and \(\beta\) have edge features and \(\{\alpha, \beta\}\) inherits its “edginess” from \(\alpha\) or \(\beta\). The proposal in Hornstein 2009 is that edge features are labels and what labeling does is create an equivalence class of expressions from a lexical atom that have the combinatoric properties of the atomic core.\(^{24}\) In effect, then, Linguistic Merge has a generic subpart and a special labeling operation that allows this more generic cognitive operation to apply to its outputs. Together these two operations result in the recursive hierarchy found in natural language.

The second prong of the program aims to understand many of the apparent features of UG as the result of generic principles of cognition applying to linguistic objects. For example, given finite computational resources (e.g. memory) manageable computations will be bounded. Are the kinds of locality conditions found in UG reflections of this? Perhaps. What other properties might a “nice” cognitive computation system have?

Monotonocity/No Tampering (if \(\alpha\) and \(\beta\) are inputs to an operation then their identities are preserved in the output of that operation, i.e. once a constituent, always a constituent; a nice feature for computational objects to have if constituents are required for further reasons e.g. interpretation, parsing etc.)\(^{25}\). Inclusiveness (grammars can relate atoms not change their inherent lexical properties), Minimality (less remote dependencies are preferred to more remote ones; a reasonable memory reflex), Determinism (grammars do things because they must\(^{26}\)). These kinds of computational considerations seem generic and need not be restricted to language and so should plausibly find purchase in other areas where computations matter within cognition. Some advert to resource issues (time and space limitations) though they are not specifically tied to any particular conception of memory or any particular algorithms.\(^{27}\) As we find out more about the memory and computational resources of biological computing devices, this will likely change (e.g. if biological memory systems are content addressable then things that “look alike” should create computational problems; think minimality effects), as well they should.\(^{28}\)

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\(^{24}\) See Hornstein 2009 for details where much is made of the labeling operation.

\(^{25}\) E.g. Gallistel and King 2009:166 for the virtues of expanding linked lists by adding material to the end rather than inserting the information in the middle.

\(^{26}\) Determinism plays a role in developing efficient parsers, c.f. Berwick and Weinberg 1984.

\(^{27}\) This comports with Chomsky’s (2000) suggestion that we focus on properties required for language to be usable at all. This suggests a nod to generic resource concerns. To be usable by humans implies, for example, usable by beings with memory bounds, pretty bounded memory in fact. It implies being readable by other parts of our cognitive systems. It means acquirable pretty quickly. In short, it means easily embeddable in production systems of various sorts. These are all resource sensitive concerns.

\(^{28}\) It is perhaps worth emphasizing again that what matters to minimalism as described here is not whether these principles enable efficient computation but whether these computational processes are found in other non-linguistic domains of cognition. If these
The third explanatory strategy relates features of the language system back to the demands of the other cognitive systems that use its products. If we assume that linguistic objects must be useable by the other cognitive systems, its products must be “readable” by these other systems and this plausibly imposes conditions on the linguistic objects produced. For example, it is possible that non-linguistic animals parse the world in terms of events. If so, an event based conception of propositional thought pre-dates the emergence of language. In this light, perhaps some of the central grammatical relations (e.g. subject, object) reflect how non-event denoting predicates are integrated into event centered conjunctions (e.g. propositions that have a neo-Davidsonian event structure and DPs must be type lifted in order to coherently conjoin with predicates denoting events). This in turn supports an argument/adjunct distinction with the former more closely tied to the predicates they “modify” and the latter enjoying greater structural latitude.

Combining these strategies together into a single program yields the following project for sifting out the specifically linguistic properties of FL/UG.

- Show that UG operations are largely homogeneous
- Show these operations reflect general computational demands
- And/or they reflect interface requirements
- The resisting residue is specifically linguistic

This is what I take the minimalist program to be. And so conceived it is hard to see why anyone could object. One might not have a taste for such minimalist questions, but there is nothing unsavory about the enterprise itself, which has clear antecedents in classic philosophical questions. This said there has been a lot of discomfort within the linguistic community with minimalism and before moving on I would like to speculate as to why.

Minimalism’s interests add a new way of “doing” linguistics to the traditional repertoire of methods. Before MP, generative grammar as practiced was largely philology on steroids. Generative Grammar enriched the study of language by adding new (more refined) formal tools for the description of linguistic phenomena. These tools were used to more accurately describe the kinds of NL phenomena that linguists have always been interested in. Things got a bit dicey when work became more abstract (‘move α’ still irks many with constructionist sensibilities), but until minimalist questions were posed, the standard way of doing linguistic research was to find a relatively well-behaved data set in some language (a paradigm) and describe it using the formal tools of transformational grammar.29 The work, in short, was largely data driven. I think that MP changes this; not by challenging the legitimacy of earlier work (as emphasized, MP presupposes the results of this research) but by allowing a more theoretical kind of work to fruitfully emerge, one further removed from the details of particular natural languages. As described above, minimalism is a second order theory: its “data” are the generalizations of GB, which it assumes to be largely descriptively correct. These generalizations, in virtue of being properties facilitate or undergird efficient computation, that is well and good. But even should they prove to be massively inefficient minimalist aims are attained so long as they exist in other domains and can be borrowed by a nascent FL/UG.

29 This is not exactly true. See below for a discussion of subjacency.
generalizations, smooth out the empirical edges found in data describing patterns within a particular natural language. Indeed, given that natural languages are themselves idealizations (packaging the data of interest as ‘Italian’ or ‘English,’ or ‘Swahili’ already involves quite a bit of smoothing) the minimalist starting points are doubly removed from everyday linguistic observations. Thus, by its nature, Minimalism adds an additional layer of abstraction onto several previous ones, and so threatens to focus attention away from the kind of language data that most previous research on language has taken to be the empirical core of the enterprise.

More specifically, due to Minimalism’s reductionist (and computational) interests, it challenges accepted accounting procedures for theory evaluation. Methodologically, it raises the value of simple models with deductive depth (even those with less empirical coverage) over complex deductively shallower accounts (even those that have by traditional conceptions greater empirical reach). Minimalists (I am speaking personally here) have often tried to build “toy” models that have “language like” properties. This can seem “unscientific” in that it appears to ignore “the facts.” After all, aiming to be “language like,” (i.e. aiming to build simple idealized models with features that resemble properties we find in natural languages) is not the same as aiming to describe the actual complexities found in human speech as faithfully as possible. It requires abstracting away from the kind of detail that many linguists have delighted in for generations. Thus, the MP program strongly highlights the well-known tension within linguistics between theoretical depth and empirical coverage and, at least for now, urges us to prize theoretical structure and elegance over coverage of more data points. This proposed recalibration of the methodological value system has led, in my view, to a lot of misunderstanding on both sides. But so it goes. There is nothing new in this and as things unfold hopefully the tension will recalibrate in a positive way. For now, as the hard thing, in my view, is to find any even roughly empirically adequate minimalist story, we should not worry too much if the proffered accounts fail to be as empirically faithful as the more descriptive GB accounts they aim to ground.

There is a second source of disquiet related to this changed value system. The Minimalist question throws into relief a divide within linguistics of long standing. For a minimalist like moi languages and their properties are not particularly interesting in themselves. As stated at the outset, they are a means to another end. Their properties are interesting to the degree that they advance this end. This non-philological sensibility tends to prize what is general in language, not necessarily its filigree features. Not all facts are equally interesting. I believe that Generative Grammar has always taken this attitude, but there is no doubt that MP has sharpened the contrast between “languists” (those interested in language per se) and “linguists” (those interested in language for what it might tell us about minds). For the latter, though God might well be in the details, not all details need reflect the All Mighty’s efforts. This divide in sensibility has not been as stark in earlier periods of research for it didn’t have to be. Now the contrasting interests are very much clearer and hence more of an issue. Of course, if one keeps one interests in sight, there need not be any call for invidious comparison. But humans (and linguists) being what they are once the contrast is highlighted it is natural that it should foment contentiousness.
There is a third source for the heat that Minimalism generates; a kind of metaphysical angst. Let me explain. Chomsky 1983 observed that treating the generative procedure as the object of linguistic study reorients one away from languages to grammars, the latter being ontologically prior to the latter. How so? Principles and parameters theories downgrade the ontological status of languages, understanding them as interaction effects of many collaborating subsystems. Generative procedures, in contrast, are “real.” Minimalism does to grammars what P&P did to languages. Generative procedures/grammars are the complex products of many interacting cognitive operations. On this view, not all heretofore considered “grammatical phenomena” reveal linguistically specific sources. Grammars like languages are interaction effects, and so, ontologically derivative. So, not only does Minimalism valorize a different kind of research, it also suggests that at bottom the earlier objects of linguistic investigation (first language, then grammar) are not “real.” As Woody Allen once observed, nothing is as annoying as having someone prove to you that you don’t exist! Ditto for one’s research area.

For whatever it is worth, my own work over the last fifteen years has embraced the minimalist problematic. I have adopted the position that all dependencies are products of Merge (as in (6) above), E(xternal)- Merge producing phrase structure, I(nternal)-merge movement dependencies. I-merge (aka Movement) mediates non-local dependencies as found in Binding, Control, Relativization, Case assignment, etc. Labeling (an operation which marks the head) is the linguistically unique relation, the one feature of FL/UG special to language. In conjunction with a very general operation of combination (i.e. Merge), labeling suffices to produce hierarchical structures. Dependencies are the by-products of different morphemes with their own requirements interacting by merging and regulated by general computational conditions like: shorter dependencies are preferred to longer ones (Minimality), derivations conserve structure (Extension), computations are bounded (phases). I have examined the properties of systems like these to see what they look like. In my opinion, they have interesting language like properties. I illustrate some of this in the next section taking binding as a concrete example.

4. Consider some features of Binding Theory to illustrate. The GB conception involves three well-known binding principles (7) and several domain restrictions and structural requirements (8,9).

(7) A: A Reflexive must be bound in its Domain
    B: A Pronoun must be free in its Domain
    C: A R-expression must be free
(8) $\alpha$ binds $\beta$ iff $\alpha$ is coindexed with and c-commands $\beta$
(9) The Domain of $\alpha$ is $\beta$ if $\beta$ is the smallest clause (CP) containing $\alpha$ and (i) $\beta$ is tensed or (ii) $\beta$ contains a subject distinct from $\alpha$

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30 The overall project is outlined in Hornstein 2009.
31 The content in this section is based on joint work with Alex Drummond and Dave Kush.
The principles in (7)-(9) suffice to cover a reasonable range of well-known data:

(10) a. John believes himself/*him to love Mary
    b. John believes himself/*him loves Mary
    c. John believes Mary to love *himself/him
    d. John loves himself/*him
    e. John’s mother loves *himself/him
    f. *I expect himself to hug John

The data in (10) illustrate three salient facts that binding theory has aimed to capture: the locality restrictions on licensing bound anaphors, the complementary distribution of bound pronouns and reflexives, and the c-command condition on antecedence. Here’s a minimalist question: why does binding have these three properties? In other words: why do domains condition binding possibilities? Why must antecedents c-command their dependent anaphors? And why are bound reflexives and pronouns in complementary distribution? Here’s a putative reductive answer: binding dependencies are mediated by movement and movement chains have the properties enumerated above.

What’s this mean? Consider sentences like (11):

(11) a. John was expected t to love Mary
    b. *John was expected t loved Mary
    c. *John was expected (for) Mary to love t
    d. John was loved t
    e. *John’s1 mother loves t1 (meaning: John’s mother loves John)

These sentences pattern like the reflexive clauses in (10a-e). Chomsky 1982 collapsed the two cases by proposing that t(races) of movement are kinds of anaphors subject to principle A. Reversing the direction of reduction assumes reflexives are just the morphological “spell out” of traces left by movement and that (10) and (11) are both A-chain dependencies subject to the same licensing conditions. Let’s explore this second tack.

If reflexives are tails of (non-trivial) chains then they must have antecedents, i.e. be part of chains with a head. Moreover, if these are A-chains they must respect the locality and binding conditions on A-chains that we see in (10). They do as (11) indicates. Thus, if reflexive binding is mediated by chain formation then the characteristic properties of this construction immediately follow as chains have these properties, viz: reflexives must have local c-commanding antecedents. So, if reflexive binding configurations are

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32 These descriptive generalizations are long-lived. They were established by Lees-Klima (1963), and Postal (1971) (a.o.) before GB was even a remote twinkle in anyone’s eye. GB recast these generalizations, but retained the empirical descriptions as accurate.

33 There are two ways to implement the “spell out” idea. One proposes morphological rules that spell out of traces as anaphors of various sorts (c.f. Idsardi and Lidz 1997). A second treats anaphors as part of doubled constructions with their antecedents (c.f. Kayne 2001, Zwart 2001). Hornstein 2001 is an implementation of the Idsardi-Lidz view. For current purposes the differences between these various approaches is irrelevant so I adopt the simple spell-out-traces-as-anaphors concretion.
actually chain structures then three of their salient properties follow immediately. From a minimalist perspective, this is a nice interim conclusion that immediately prompts another minimalist question: why do chains have these properties?

Current Minimalism offers a story. The principle proposed in (6) requires interacting expressions to merge in order to enter into grammatical dependencies. Chains are structures that code the multiple dependencies/relations that lexical items typically enjoy. The chains relevant for reflexive binding have the configurations in (12):

(12)  
   a. [DPₜ ....[ DPₜ to ...]]  
   b. [DPₜ ....[ DPₜ +Tns ...]]  
   c. [DPₜ ....[ Subj to ... DPₜ ]]  
   d. [DPₜ .... DPₜ ...]  
   e. [[DPₜ X] .... DPₜ ...]]  
   f. …[DPₜ ...DPₜ ...]…

Of these, only the chains in (12a,d) are well-formed (i.e. licitly derivable) using standard minimalist assumptions. We will now illustrate the relevant principles returning to the binding examples in (10). Consider first the derivation of (10d/12d), repeated here as (13):

(13)  
John loves himself

John receives two Θ-roles from love; the internal argument and the external argument. By (6), this requires John to merge into two different thematic positions, the first merger being as complement of V and the second as specifier of v (indeed extension prohibits the alternative derivation from spec v to complement of V). Next, John₁ in spec v raises to TP Spec T where it receives/checks nominative case, and John₂ receives accusative case via movement to outer Spec v.

(14)  
   a. [John₁ v [love John₂]]  
   b. [John₁ T⁰ [John₂ [John₁ v [love John₂]]]]

The unacceptability of (10c/12c) arise from a violation of minimality, a generic computational principle that minimizes dependency length. The object John cannot move to satisfy the higher thematic role of believe because the higher DP Mary is closer and could also bear the higher Θ-role. (10b/12b) derails as it is a violation of Full Interpretation plus Greed; once a DP’s requirements are met (all its relevant features are checked) then it can no longer be merged. In effect the derivation stops at (15) as the A-chain headed by John is both case and Θ marked and so John cannot move again.

(15)  
   ….[John T⁰ [John v [loves Mary]]]

Again it is not implausible that Greed and Full interpretation are generic principles not unique to FL/UG (roughly: Determinism: only do something to check the features that need checking; act only when you must).

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34 The DPs are copies left under movement. For ease of exposition I have used Subscript h to denote the head of the chain, and t the tail.
35 The numbers on the copies are for ease of exposition only.
This leaves (10e,f/12e,f). (10f/12f) reflects the GB prohibition against lowering rules (recall that we are assuming that reflexives morphologically mark the tail of the chain). In minimalist accounts lowering is illicit as it violates the Extension Condition. (10e/12e) is a more interesting case. There are several things one might say about it (and I think that at some time or other I have said them all!) but for the nonce let me just observe that deriving this dependency requires an application of I-merge/Move in which a dependency is established between sub-trees that are unconnected at this point in the derivation (*John I-merges from the complement of love to the specifier of mother and, to stay on the right side of the Extension Condition, mother has not yet merged with loves John*). I-merge/Move is commonly restricted to single connected subtrees, i.e. for α to target β for movement, α and β must be in a common connected tree at that point in the derivation. If this holds in general, then (10e/11e/12e) cannot be derived as the derivation would require movement from one sub-tree to another. Or, to be more precise, the only possible derivation within a single rooted tree violates the Extension Condition, plausibly an instance of the more general requirement that grammatical relations once established cannot be destroyed, which is itself an instance of a yet more general principle that favors monotonic computation. Specifically, (16b) cannot be derived from (16a) as the constituent structure of (16a) is not preserved in (16b), i.e. (16a) is not a constituent of (16b) and thus the indicated I-merge/movement violates the Extension Condition.

(16) a. [[mother] v [loves John]]
   b. [[John[mother]] v [loves John]]

Once again, Extension smells like a computational principle with reach beyond the domains of language. So, if one adopts something like (6a), which requires treating reflexivization as an instance of movement, it appears (with a little fudging and some not too exuberant hand waving) that the grammatical properties of reflexives can be naturally accounted for without much that is clearly specific to the domain of language. The upshot is that a combination of reduction (A-binding = A-movement) plus general principles of computation (viz. Economy, Monotonicity, Determinism) yields several central features of the GB analysis of reflexive dependencies. What of the others?

The most grammatically interesting remaining fact concerns the complementary distribution of bound pronouns and reflexives; where one is licensed the other is not. Why? The GB binding principles A/B essentially stipulate this complementarity by

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36 This is a stipulation. It is not clear theoretically why reflexives generally mark chain tails and it would be nice to see if this is always the case or not (c.f. Polinsky and Potsdam 2002 for apparent cases of backwards reflexivization). Should this prove to be accurate, then it calls for an explanation. To date I know of none that are not stipulative.

37 This is interaboreal or sidewards movement. Truth be told, I am a very big fan of this kind of movement and believe that there is actually another reason for why (10e/11e/12e) are unacceptable. However, here is not the place to get into that. The irrepressibly curious are urged to take a look at Drummond, Hornstein and Kush (In Progress) and note 38.

38 This complementarity is quite universal for the local reflexive/local pronoun cases. I follow convention in taking this to be an accurate description of binding data cross linguistically.
enforcing contrary requirements in the same domain (Hey You, anaphor! You’re gotta be bound in this domain! Hey You pronoun! You’re gotta be free in this domain!). How is this complementarity to be accounted for if reflexives are tails of A-chains? Here’s one possibility with the right reductive flavor: whereas reflexives are tails of A-chains, bound pronouns are the tails of a certain species of A’-chain. More particularly, just as reflexives are the realization of A-chains that span two (or more) Θ-positions, so bound pronouns are what one finds in chains like ones in (17). Here the movement from one Θ-position to another transits via the edge of CP, an A’-position.

(17)  a. [...]DP...[A’ DP ...DP...]]
    b. [Everyone [said [CP Everyone that [Bill [likes everyone (him)]]]]]
    c. A_θ-A’-A_θ chains

It is worth observing that given (6a) and the computational assumptions we have already been making, (17b) must be the structure of a bound pronoun configuration. FL/UG, via (6a), requires that everyone merge into both θ-positions if it is to be θ-related to both. The presence of Bill prevents direct A-movement from the lower complement of likes to the higher θ-position of said (such movement violates minimality) so transiting via the intermediate Spec C is required. In other words, given our starting assumptions, something like this must be the structure of bound pronoun constructions.

Say that something like this is correct and let’s consider some consequences. First off, we derive the complementary distribution of bound pronouns and reflexives.

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39 For the cognoscenti, this is an improper movement chain. Chains of this kind have recently been proposed as underlying tough constructions, c.f. Hicks 2009. This was first proposed in Brody 1993 and exploited also in Hornstein 2001. The idea that bound pronouns can be treated in a similar way was first mooted in Kayne 2002.

40 A more adequate description is that the flanking Θ-roles are mediated by a link in a phase edge position, rather than an A’-position. This reduces the A-A’ distinction to a (perhaps) more natural phase based one. There are two kinds of binding chains reflecting two kinds of dependency: those within a phase (intra phase) and those between phases (inter phase). If this is the right cut, then we should not expect a third kind of anaphoric expression that has domains between those licensing pronouns and those licensing reflexives. I don’t know if this is correct.

41 Recall, we are here assuming that bound pronouns are the morphological spell out of traces (viz. copies for the cognoscenti). A note for the cognoscenti: there may be worries about the fact that everyone said that Bill likes him cannot and does not mean that everyone said that Bill likes everyone. Given current technology, the latter sentence is derived from a different selection of atomic lexical items than the first. In technical terms, their numerations differ, the latter involving two selections of everyone the former but one. It is further standard practice to assume that each selection from the numeration is interpreted “once” so the quantificational force of everyone is interpreted once only and hence the former sentence does not mean what the latter does. For more extensive discussion of these issues, c.f. Hornstein 2001:195, note 24 and references therein.

42 There are various ways of implementing this proposal. For detailed discussion see Drummond, Hornstein and Kush (in progress).
Reflexivization lives on A-chains with multiple Θ roles. Bound pronominalization lives on chains with multiple Θ-roles flanking a mediating A’ copy. Reflexives and (bound) pronouns (i.e. the visible morphemes) are the morphological realizations of chain tails. As A-chains have no A’-links, reflexives cannot be licensed where pronouns are and as pronouns require at least one A’ link pronouns cannot be licensed where reflexives are. Furthermore, if this is correct, the domain of reflexivization will necessarily be “smaller” than that for bound pronouns (as the latter spans domains (more accurately: phases) while the former does not) so where two θ-positions can be linked via an A-chain a pronoun chain cannot exist, as there is no available mediating A’-position (and vice versa). The upshot is the domains where bound pronouns are licensed will be different (because “bigger”) than those where reflexives are. Or, to put this in GB terms: reflexives and bound pronouns must be in complementary distribution with reflexives being in (more or less) the same clause as its antecedent and pronouns being in different clauses from their antecedents.44

More interesting still, assuming (17), we are able to explain certain other characteristic properties of bound pronoun configurations in natural language. We illustrate a couple in what follows.45

Bound pronouns cannot c-command their antecedents (i.e. Strong Cross Over (SCO)), they must generally c-command their antecedents (the c-command condition (CCC)) and they must follow their antecedents (Weak Cross Over (WCO). These features follow if bound pronouns are the tails of A’-chains mediating the dependent Θ-roles. Let’s consider each property in turn.

We are assuming that a bound pronoun configuration has the structure in (18):

(18) […]DPh…[A’ DP …DP1 (=pronoun)…]]

As (18) indicates bound pronouns are tails of chains with an intermediate A’-link.46 A SCO violating sentence like (19a) has the structure in (19b). The derivation of (19b)

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43 More accurately, I believe, the complementary distribution of reflexivization and pronominalization. Morphological reflexives and pronouns are relatively surfacy manifestations of the more grammatically interesting dependency. For some discussion c.f. Hornstein 2007 and Drummond et.al 2011. Note: as in the case of reflexives discussed above, I leave it as a stipulation that tails of complex chains are spelled out as pronouns. As in the case of reflexives it is worth trying to find out if there are cases of backwards pronominalization and if there aren’t it would be worth trying to understand why not. None of this is attempted here.

44 Again, this abstracts from a lot of detail. It is likely that D and v are also phases in which case “clausemate” is a misnomer. Rather, refelxivization is an intra phase dependency while pronominalization is an inter phase dependency.

45 This discussion draws heavily on Kayne 2002 and forthcoming joint work with Alex Drummond and Dave Kush. See Drummond et. al. (in progress) for discussion.

46 Recall, that it is tails of chains that are morphologically spelled out is stipulated. Why tails and not any other link? Good question! There is so far as I know no completely satisfactory answer. One possible one arises from treating pronoun-antecedent relations
Moves (aka: I-merges) the higher DP into the lower position, thereby violating Extension. This renders the derivation ungrammatical and (19a) unacceptable with the indicated binding.

(19) a. He\textsubscript{1} thinks that everyone\textsubscript{1} left
    b. [everyone, (=he) thinks [everyone [everyone\textsubscript{0} left]]]

In other words, SCO effects are essentially Extension Condition violations if bound pronouns are the morphological residues of movement.

The c-command condition on bound pronouns works in the same way. If bound pronouns are tails of chains then they must be c-commanded by the head of that chain. Why? Because Extension guarantees it.\textsuperscript{47} Move/I-merge functions as in (20):

(20) I-merge/move: [., ..., Y...] ---\(\rightarrow\) [,..[Y, ..., Y...]]

If we assume that all constituents in the input are also constituents in the output (Extension), then the target of I-merge/move must c-command the launch site. Hence if bound pronouns are products of movement, i.e. tails of chains, then their antecedents must c-command them.

Lastly, consider WCO effects:

(21) His\textsubscript{1} mother kissed nobody\textsubscript{1} (meaning: Nobody’s\textsubscript{1} mother kissed him\textsubscript{1})

If sidewards movement is disallowed (as assumed heretofore, but see notes 38 and 49), then sentences with the indicated antecedence relations are ungrammatical. If the pronoun marks the tail of the chain then if Extension regulates derivations the movement must be from the Spec of D before the containing DP is merged. So, if there is no sidewards movement, then WCO structures are also going to be ungrammatical.\textsuperscript{48}

as grounded in doubling structures where the pronoun is the head of the relevant construction left behind after movement of its antecedent (the proposal advanced in Kayne 2002). The A-over-A principle will then prevent the head from moving (see Hornstein 2009 for relevant discussion of how the A-over-A reduces to minimality). However, there follows a second question: why can’t the antecedent be the head of the phrase, as, for example, in clitic doubling constructions where the DP stays put and the pronominal clitic moves? At present, there are to my knowledge no good answers to these questions, despite their obvious interest and relevance.

\textsuperscript{47} Once again, bracketing the option of sidewards movement.

\textsuperscript{48} The above is generally correct, but not always so (c.f. Hornstein 2009 and references therein). Note our discussion has abstracted from the possibility of sidewards movement. What happens if we relax this assumption? We then expect some cases of binding to appear to violate the c-command condition. There is some evidence suggesting that this is indeed possible:

(1) Nobody’s\textsubscript{1} mother likes\textsubscript{1} his hat
    (2) [ [Nobody [mother]] likes his\textsubscript{1} hat]]

If we allow sidewards movement then WCO derivations are possible. I leave this as an exercise. However, it can also be shown that such derivations violate derivational economy, i.e. Merge-over-Move. So, \textit{if} movement respects derivational economy, and pronominal binding lives on chains, then even allowing sidewards movement, leaves WCO configurations ungrammatical. I confess that I really like this line of argument!
In sum, if we reduce binding configurations to chain relations then most of the major properties of binding; domain restrictions, c-command requirements, complementarity, SCO, WCO follow. This is a big payoff for reduction. Further, the two different chain structures (the A-chain configuration for reflexivization and the A'-chain for pronominalization) and their respective properties also follow naturally from (6) together with the assumption that Merge is subject to Extension, Full Interpretation and Minimality; plausible generic features of cognitive computation. Thus, the core features of GB binding theory can be reduced to generic features of cognitive computation plus assumption (6a). They are thus what we expect to find in any FL/UG arising from minds embodying very simple rules of combination coupled with the generic kinds of computational principles characteristic of our general mode of cognition.

5. We have discussed some theoretical virtues of reducing binding to movement. However, especially in the case of bound pronouns, there are some severe apparent empirical problems with such a proposal. The biggest of these from a GB perspective is the apparent failure of bound pronouns to either respect or induce island effects. I have now used the word ‘apparent’ twice above signaling (I hope strongly) that things may not be quite as they appear. In this section, I would like to illustrate a line of argument that suggests that bound pronouns may actually respect island conditions. The aim is to give you a taste of the reasoning involved as one of the interesting features of the minimalist program, I believe, is that it provokes reinvestigation of well known truths, and mentally turning these over often yields unexpected nuggets of new data.

If bound pronouns live on Θ laden chain links mediated by an A’-copy, then we expect such chains to induce Wh-island effects. Consider the logic and some data. (22) schematizes a bound pronoun configuration:

(22) [...]DP1...]CP DP2 [TP [...]DP3...]]

Assume that we have an element within the embedded TP that moves to the matrix clause. If this expression is sensitive to the Wh-island effect then a structure like (22) should reduce acceptability. As is well known, adjunct WHs like why, how are trapped by filled CPs:

(23) Why/How did John wonder who sang Moondance

The fronted WHs in (23) cannot be interpreted as originating from the embedded clause. With this in mind consider sentences like (24):

49 Assumption (6a) seems not parochially tied to language either. It is more the reflection of the general idea that syntax subserves grammatical relations, i.e. more generically, that function and form are tightly related, or, for two computational expressions to cognitively interact they must syntactically relate.

50 The tone here is a tad too confident. I have asserted that Extension, Monotonicity, Full Interpretation, Minimality are plausibly generic principles of biological computation. Of course, it would be nice to provide evidence that they are actually exploited in other cognitive domains. I think here is where the wise refer to future research.

51 There are others but they are more recondite. This serves to give a good taste for the theoretical and methodological virtues of the reduction.
a. How did Mary hear that most men washed their cars
b. It’s with Turtle Wax that Mary heard that most men washed their cars
c. How did most men hear that Mary washed their cars
d. ##It’s with Turtle Wax that most men heard that Mary washed their cars

The oddity in (24d) is the reflex of failing to interpret with Turtle Wax as originating from the embedded clause. It can only modify heard and despite all of Turtle Wax’s many subtle virtues increasing auditory acuity is not among them. In (24c), the bound pronoun their with antecedent most men requires there to be a copy in the CP of the embedded clause, as in (25). This prevents how from transiting through this Spec C position on its way to the matrix. In effect, the copy of most men functions like who in (23) to block the movement of the adjunct how. Note, if we replace their with my in (24d), the embedded reading becomes readily available. Conclusion: there is evidence that pronominalization can induce weak island effects as would be expected on the proposed movement account.

What of the converse? Are bound pronouns banned from islands? Here the evidence seems damning:

(26) Every Bulgarian scientist married someone who knew him as a child

In (26), him sits within a strong island (a relative clause) but can still be interpreted as bound by everybody, a quantificational antecedent. This suggests that bound pronouns are not products of movement. Or does it? Consider the following speculative line of argument.

Lasnik 1976 discovered an odd kind of principle C fact. Definite descriptions appear to resist binding by an antecedent that c-commands them.

(27) a. Every guy kissed Mary before he/*the guy left the party
   b. Mary kissed every guy before he/the guy left the party

As the acceptable (27b) indicates, this cannot be because definite descriptions cannot have quantificational antecedents for some interpretive reason. Indeed, given the current wisdom that treats pronouns as definite descriptions with very modest descriptive content, we would expect no semantic restriction against such binding. Consider one more pair of contrasting data, this time where c-command does not appear to be the relevant factor:

(28) a. Every guy persuaded Mary that he/*the guy was intelligent
   b. Mary persuaded every guy that he/the guy was intelligent

(27) and (28) together indicate that some pronouns that are interpreted as bound variables can be replaced with bound definite descriptions while others cannot be. Is this a significant grammatical contrast? Perhaps. Here’s an inchoate proposal: only pronouns without definite description surrogates are grammatically licensed, i.e. only some bound

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52 Jeff Lidz first found this kind of data in Kannada. The English facts are built following the account he outlined logic.
54 Also discussed extensively in Hornstein and Weinberg 1990.
55 I owe this point to Alex Drummond.
pronouns (those that obey the descriptive generalization noted in Lasnik 1976) are generated by the syntax (via I-merge/move). If this is correct, then bound pronouns within islands should allow definite description surrogates. As (29) indicates this seems to be correct.

(29) a. Every Bulgarian\textsubscript{1} scientist married someone who (he/the scientist)\textsubscript{1} knew as a child
    b. Every Bulgarian\textsubscript{1} scientist married someone who knew (him/the scientist)\textsubscript{1} as a child

So, if we exclude those bound pronouns that can have definite description surrogates, then bound pronouns are subject to island effects.

We can go a little further. Generative Grammarians generally assume that FL/UG targets sentence structure. Thus, cross-sentential phenomena are not the province of FL/UG. Assuming this, Wilson (1984) provides interesting data that shows apparent semantic binding holding across a discourse. Note that the pronouns/definite description in (30) function like bound variables despite having non c-commanding quantificational antecedents. Note too that the pronouns and definite descriptions are interchangeable, as expected if not formed via E-merge/Move.

(30) Every doctor in this town is very busy. Consequently he/the doctor has a secretary to arrange his calendar. She/the secretary books his/the doctor’s appointments to prevent confusion.

My tentative conclusion: there exists interesting evidence that the grammar has a rule of pronominalization that results in bound variable readings. However, though sufficient to yield a bound variable interpretation, pronominalization is not necessary. There is another route to pronominal anaphora that is not subject to the restrictions imposed on products of FL/UG.

This conclusion, of course raises many more questions. Here are a few:

- The contrast in (28) indicates that the contrast in (27) is not one of c-command as there is every reason to think that both the subject and object in (28) c-command the embedded clause, unlike in (27) where it is plausible that the object does not c-command the adjunct. What then is the source of the contrast?
- If semantic binding does not require the operation of the grammar, why are any bound pronouns subject to its strictures?
- What’s the grammatical basis of Lasnik’s (1976) observations if it is not principle C?

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56 This was proposed for resumptive pronouns in Aoun, et. al. 2001
57 Such cases were first discussed, to my knowledge, by George Wilson. He noted that many E-type pronouns are better analyzed as akin to flagged variables in a natural deduction system. Jeff King subsequently developed this approach in great detail. For a similar cut between syntactically licensed and semantically licensed binding see Aoun et. al.’s analysis of true versus apparent resumptive pronouns. Strong resumptive pronouns are of the latter variety and are only licensed within islands.
58 These are described as telescoping effects in the GG literature.
I believe that the minimalist approach limned here has plausible answers to these questions but here is not the place to lay them out. My job today is not to convert you to Minimalism but to tantalize you by offering a taste for the sorts of questions it adds to the mix and to the kind of research it encourages.

6. I have here attempted to outline the Minimalist Program’s basic ideology and how it fits into the larger Generative enterprise. Generative Grammar has always taken the structure of the faculty of language to be its object of study. As such there have been (and always will be) at least three questions to ask which involve three distinct, related and progressively more general notions of grammatical competence: (i) What’s the structure of \( L \)? (i.e. What does linguistic competence of a particular grammar amount to?) (ii) What’s the structure of UG? (i.e. What does the capacity to acquire a grammar consist in?) (iii) Why does UG have the particular structure it has? (i.e. what is distinctive about the cognitive capacity that is UG; how much is special to the task of acquiring grammars and how much is shared with other cognitive systems of knowledge?). I have suggested that MP specifically aims to address the third question and is the next obvious step for Generative research to take. I have further suggested ways of operationalizing the program so as to generate minimalist theories of the right flavor. I have also tried to illustrate in semi concrete form how this might proceed. It goes without saying that the specific proposals are controversial (as they should be). What I hope to have shown is that the Minimalist Program is the next natural next step in the Generative Enterprise’s investigation of the structure of the Faculty of Language and that it is not premature to begin to investigate the question it poses.

Bibliography


Chomsky, N. 2000. Minimalist Inquiries. In *Step by Step*, R. Martin, J. Uriagereka and D. Alex Drummond points out that on a morphological trace conversion view of anaphora we would not expect the grammar to license binding of definite descriptions for the class of bound definite descriptions is completely open ended. On the other hand that the grammar should regulate the distribution of a small class of grammatically dedicated morphemes (e.g. reflexives, pronouns) is not at all surprising. This underlies an account in Drummond et. al. (in progress) of Lasnik’s “Principle C” effects. C.f. Drummond et. al. for possible answers to the mooted questions.

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