

Solving the UG Problem

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Many generalizations are impossible to learn via primary linguistic data, so they are assumed to be part of our genetic endowment. Generativists have tried to reduce Universal Grammar (UG) to a minimum, in particular by appealing to computational efficiency. In principle, this is an important improvement. The bottom line, however, is how well this computational approach explains the data. Unfortunately, it does not. Thus current analyses of subject–AUX inversion still appeal implicitly to several UG constraints in addition to structure dependence. Moreover, this fails empirically even in the wildest cases, such as forming questions by reversing the word order of a declarative. Fortunately, there is a way out of this impasse. Learners realize that different orders of constituents correlate with different meanings. Generating Tense in Comp compositionally derives a polar interrogative interpretation. The logically prior properties of the perceptual and conceptual systems impose constraints that are sufficient to explain language acquisition.

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1. The Problem with Universal Grammar

Language is a bidirectional link between sound and meaning. To explain how this system works, a first step is to describe as much of the facts as possible. The earliest efforts to address this problem typically involve a rich descriptive apparatus, which is gradually simplified by uncovering generalizations and explaining some of the facts by principles and laws recruited from other domains with which language interacts. The properties of the language that learners attain are determined by three factors (Chomsky 2005): Genetic endowment (the topic of Universal Grammar), personal experience, and principles that are language- or even organism-independent.

Some facts are particularly problematic for the descriptive apparatus. Chomsky replaced the question of what takes place in languages by the question of what takes place in speakers. In this biolinguistic perspective, the problem of acquisition becomes crucial: Once we have proposed a model of linguistic

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competence, we have to provide a convincing scenario about the way children come to master a system as complex as language so quickly and uniformly. For some 50 years in the generative framework, the answer was assumed to be in Universal Grammar (UG).¹ Many of the generalizations expressed by generative principles seem to be impossible to learn on the basis of primary linguistic data because it would require negative data. So children seem to know more about language than what they could learn from their experience. This is the argument of poverty of stimulus (POS). Generativists conclude that UG restricts the acquisition path. Children do not have to learn these principles since they are part of their genetic endowment, and they cannot err outside of the path traced by these principles: They only choose among the options provided by UG those which conform with their experience.²

However, this enrichment of UG creates a tension with the explanatory value of the model. UG contains the unexplained elements of S_0 : “UG is the residue when third factor effects are abstracted. The richer the residue, the harder it will be to account for the evolution of UG, evidently” (Chomsky 2007a: 19).³ In contrast, operations and principles recruited by the faculty of language from other cognitive domains have a greater explanatory potential. Therefore:

A primary goal of linguistic theory since has been to try to reduce UG assumptions to a minimum, both for standard reasons of seeking deeper explanations, and also in the hope that a serious approach to language evolution, that is, evolution of UG, might someday be possible. There have been two approaches to this problem: one seeks to reduce or totally eliminate UG by reliance on other cognitive processes. (Chomsky 2011: 263)

Adherents to this approach often base their explanations on the communication function of language and the social context of normal use of expressions. Many rely on the statistical analysis of massive collections of utterances. They often

¹ See, for instance, Chomsky (1973: 232): “[T]he fundamental empirical problem of linguistics is to explain how a person can acquire knowledge of language [...]. To approach the fundamental empirical problem, we attempt to restrict the class of potential languages by setting various conditions on the form and function of grammars; the term ‘universal grammar’ has commonly been used to refer to the system of general constraints of this sort”.

² For a comprehensive presentation of the argumentation that UG constraints canalize acquisition, see Crain (1991). Crain & Pietroski (2006: 64) still adhere to the view that a UG component plays a prominent role in language acquisition: “[H]uman languages are transformational, and subject to constraints that (at least apparently) do not reflect basic principles of logic or communication or learnability [...]. The findings [...] reveal young children’s staunch adherence to the universal and unifying principles discovered by linguists working in the generative enterprise”.

³ Chomsky (2010a) mentions his attempts to generalize rules and constraints as examples of this goal (see also Boeckx & Hornstein 2009). But generalizations do not imply that the rules or constraints should be dispensed with, only that their essence is better captured in these broader forms. Moreover, a minimal descriptive apparatus does not necessarily reduce the explanatory burden: A single highly implausible element on evolutionary grounds can raise severe problems of explanation. Also, we must evaluate the system as a whole, to insure that the generalization really reduces apparently different phenomena to the same operation, and does not require that we state the distinctions elsewhere in the system. For instance, the Move ‘generalization’ necessitates countless uninterpretable features that are construction (and even utterance) specific, so this system may be *less* general overall than a standard phrase structure system.

attempt to account for linear sequences of words and neglect properties such as ambiguities and non ambiguities due to the hierarchical organization of sentences. Chomsky has a harsh evaluation of this approach: “It has achieved almost no results, though a weaker variant — the study of interactions between UG principles and statistical-based learning-theoretical approaches — has some achievements to its credit” (Chomsky 2011: 263). A similar judgment holds for alternatives that propose to account for the acquisition of instances of POS by claiming that the learning capacity is better than asserted, or that the available data is richer (Berwick *et al.* 2011, Chomsky 2011).

The second approach to the UG problem is to try to reduce it by invoking more general principles. Chomsky assumes that these language-independent principles fall into two categories. First, there are interface conditions that the expressions generated by a language must satisfy because they are imposed on language by the systems with which it interacts. Second, assuming that language is a computational system, it is subject to ‘natural laws’ of computation, such as principles of efficient computation.

We can regard an explanation of properties of language as *principled* insofar as it can be reduced to properties of the interface systems and general considerations of computational efficiency and the like. (Chomsky 2005: 10)

He underlines the fact that these language-independent principles derive from a very general initial condition whose importance has been recognized since the origins of evolutionary biology: Natural selection necessarily operates within the options of form and development allowed by the laws of nature. “A very strong proposal, called ‘the strong minimalist thesis’, is that all phenomena of language have a principled account in this sense, that language is a perfect solution to interface conditions, the conditions it must satisfy to some extent if it is to be usable at all” (Chomsky 2007a: 20). In principle, this is an important improvement over a theory based on a UG store of constraints since it crucially relies on externally motivated properties, as argued extensively in Bouchard (2002).

In generative grammar, the emphasis is on computational tools: Interface conditions play a rather secondary role and function as external filters that the computations must satisfy. Consequently, the computational system for human language (C_{HL}) is the main explanatory tool and little appeal is made to precise interface properties to explain precise linguistic properties. Very telling in this regard is the fact that when Chomsky (2005: 10) discusses these two types of language-independent principles, he provides several references to papers on efficient computation, but not one to studies on interface systems. The key explanatory concept is computational efficiency.

The bottom line however is how well this computational approach explains the data. Unfortunately, it does not fare well: it ends up requiring much more UG enrichment than is explicitly recognized, and it is also empirically inadequate because the system as a whole does not capture the facts about the acquisition of language. A clear illustration of this state of affairs can be found in the discussion of a stellar case of Poverty of the Stimulus — structure dependence. Despite 50 years of revisions of the initial characterization, the posited UG is not better

grounded, it requires the addition of several auxiliary hypotheses, and even then it does not actually handle the original examples, or the extended set of examples, and fails empirically even in the wildest cases. So in effect, it has achieved almost no results. Fortunately, there is a way out of this impasse. But first, let's see the nature of the problem.

2. Structure Dependence and UG

The formal precision of generative grammar has helped uncover many properties, but as I will now show, the engineering model actually gets in the way of figuring out what is going on, and why things are as they are. A good example is the decades of discussions surrounding what takes place in polar interrogatives like (1b).

- (1) a. The man is happy.
b. Is the man __ happy?

This kind of construction raises a key question: Why does the tensed verb appear in a particular position? From the earliest studies (Chomsky 1968, 1971: 25–28), this subject–AUX inversion has been used to argue that rules are structure dependent, and it is still discussed regularly today in essentially the same form as over four decades ago (Crain 1991, Pinker 1994, Bolender *et al.* 2008, Berwick & Chomsky 2008, Chomsky 2010a, 2010b, 2011, and Berwick *et al.* 2011, among many more). Structure dependence is important in generative argumentation for reasons that go far beyond the desire to find the precise description of question formation. The significance of this constraint lies in the assumption that it is innate, a language-specific property, because “the sample data for selecting a correct target hypothesis does not seem rich enough without positing *a priori* the principle in question” (Berwick & Chomsky 2008).

Chomsky has repeatedly argued that the corpora children have access to are unlikely to contain evidence that syntactic transformations are dependent on constituent structure, not on linear structure. For instance, Berwick & Chomsky (2008: 383) ask us to consider learners exposed to the pair of sentences in (1).

We then ask how a child might [...] choose between two competing rules for question formation, each rule operating via the ‘displacement’ of the auxiliary verb *is* to the front of the representation: rule (A), which is not structure-dependent but refers only to words and ignores phrase structure; and rule (B), which is structure-dependent and refers to phrase structure [...].

- (A) Front the first occurrence of *is*.
(B) Front the structurally most prominent occurrence of *is*.

[...] Application of (A) leads to the correct result when applied to examples such as [(1)], but does not generalize correctly to [(2)], whereas (B) works properly on [(2)]. Children and adult grammars select (B), indicating that structure dependence is part of the *a priori* schematism.

- (2) a. The man who is tall is happy.
 b. Is the man who is tall __ happy? [from rule (B)]
 c. *Is the man who __ tall is happy? [from rule (A)]

Their point is that, if children could access all possible types of formal systems to make hypotheses about what is going on in (1b), they could make several simple structure-independent hypotheses, such as (A). There are many other possibilities, such as those in (3) — if we make the “reasonable” assumption that children encounter declarative sentences like (1a) first, as Crain (1991: 602) puts it.⁴

- (3) a. Move an occurrence of *is* to the front of the sentence.
 b. Move the last occurrence of *is* to the front of the sentence.

These two hypotheses derive the correct order (2b), but (3a) also derives the incorrect order (2c), and (3b) produces the incorrect order (4b) from (4a).

- (4) a. The man is happy because it is sunny.
 b. *Is the man is happy because it __ sunny.

Yet children do not make errors like these, even though the data of experience are too poor to select the correct hypothesis. The standard account is that humans have an innate principle of “*structure dependence* of grammatical rules generally, including rules of question formation” (Berwick & Chomsky 2008: 383).

Chomsky (2010a, 2011) tries to go further and to provide a more principled explanation of these facts. He addresses two questions not previously raised in the traditional literature on structure dependence. First, why is there structural instead of linear locality in grammar?

Suppose it can be shown that linearization is never required for interpretation at CI (conceptual-intentional). Then we would expect it to be introduced solely as a reflex of SM (sensory-motor), where it is plainly needed. That would carry us a step farther towards answering the How and Why questions that remain for Aux-inversion: minimal structural distance (structure-dependence) is the only option (given the third factor consideration MC, Minimal Computation): linear order is simply not available to the computational system at the point where the C-inflection relation is established. (Chomsky 2011: 274)

However, some facts are problematic for the general assumption that linearization is not relevant in semantic interpretation. For instance, Wasow (1979: 36) proposes the Novelty Condition — that an anaphorically dependent element cannot have more determinate reference than its antecedent — in order to account for the facts in (5):

- (5) a. A doctor_i walked into the room. The man_i at first said nothing.
 b. *A man_i walked into the room. The doctor_i at first said nothing.

⁴ This assumption should be checked carefully, as children are very frequently exposed to interrogatives.

True, linear order comes from the sensorimotor system: “[T]he structure of our sensorimotor system is such that we can’t speak in parallel. We just speak linearly” (Chomsky 2010a: 10).⁵ But this linearity is internalized in our brain: Production and perception of the linear arrangement of elements is not purely physical. Linearity must be internalized, otherwise words/signs as we know them would be impossible. A word/sign is a link between a concept and a perceptual form, a *signifié* and a *signifiant* in Saussure’s terms. Without a perceptual form associated with it, a concept is just a concept: it only becomes a meaning — a linguistic element — when it is linked with a perceptual form. So a word is defined in part by its phonological substance, including the order of its phonemes. The internal representation of these phonemes and their ordering is a crucial distinguishing feature of a word. Consequently, some internal linear properties of words are available all along derivations, including when the computational system merges two lexical items A and B in syntax: Since each word has indications on how to linearize its phonemes in the motor system, the linearized phonemes of A will necessarily have to be linearized with respect to those of B. In the case at hand, it is most likely that some aspects of order of the Tensed verb are available to the computational system at the point where it processes Tense.⁶ So the question why there is structural instead of linear locality is not answered.

The second question that Chomsky raises is why it is the Tense of the main clause that moves to C, and not some other element, such as the head of the NP subject, for instance. Assuming that structural locality is relevant, the answer must be that T is structurally the closest node to C. However, the subject in Spec of T is at least as close to C as T. Chomsky obtains the effect that T is nevertheless closer to C by assuming that the subject is not there when T and C are related. Though the subject obligatorily surfaces in Spec of T, it is initially generated internally to VP and is raised later. This appears to be counter-cyclic, but is solved by assuming that CP is a phase but not TP; so the raising of the subject out of VP to T is in the same phase as the movement of T to C: The subject will not be in the way if it moves out of VP only after T has moved to C.

If we try to replicate the experiment, i.e. the derivation, we realize that there are several implicit assumptions in this analysis for which there are no evident principled explanations. Thus, the following stipulations are required:

- i. Something must move in C when a sentence is a polar interrogative.
- ii. T moves to C before the subject NP moves to the T position.
- iii. CP is a phase but not TP, i.e. in any movement analysis, minimal distance involves specifying what counts as a barrier node.
- iv. Though the verbal phrase sister of T is as close to C as T is, T is the target of movement. (See Chomsky (2007b: 16): Why does the full *v**P never raise?)

⁵ This, of course, is Saussure’s (1916) *Principe de Linéarité*.

⁶ Assuming that the system can somehow temporarily “forget about” phonemes and linearity creates a severe problem. The system must be able to retrieve this material later in the derivation to provide a complete surface string for a sentence. It is rather unclear what it means for features to be in limbo for part of the derivation, and how this really restricts the functioning of the system, since the features are nevertheless kept in this obscure storage facility. Actually, adding a novel storage facility to the system makes it more complicated.

As things stand, these stipulations have no discernible principled explanation and have the status of UG statements. Some of these stipulations are dependent on the particular analysis that Chomsky (2010a, 2010b) proposes, and they can be seen as fairly innocuous details to be worked out in his newly proposed analysis. But there are four more constraints that have been implicit in all arguments for structure dependence.

Constraint (i): The rule targets the Tense of the sentence.

The target is Tense, not the word *is*, nor AUX. Thus, when there are two auxiliary verbs as in (6a), tensed AUX is fronted as in (6b), not the other AUX.

- (6) a. John has been reading.
 b. Has John been reading?
 c. *Been John has reading?

Moreover, when there is no AUX as in (7), *do*-support isolates Tense from the verb and only Tense is fronted.

- (7) a. John ate the apple.
 b. Did John eat the apple?
 c. *Ate John the apple?

Without constraint (i), the learner could erroneously assume that you move some element to form a question, any element at all.

- (8) a. The man is happy today.
 b. *Today the man is happy?
 c. *Man the is happy today?
 d. *Happy the man is today?

Constraint (ii): The Tensed element ends up in a particular position, outside the basic sentence (i.e. TP).

Without constraint (ii), the child could make the error of moving Tense to any other positions in the structure. This can be attributed to the presence of a Q-marker on Comp (Baker 1970) that attracts Tense to check it, but that bluntly restates the facts and does not explain why anything at all must be in that position in polar interrogatives. As Chomsky (1995) remarks generally, this kind of formulation, “is a restatement of the basic property, not a true explanation” (p. 233) and “the sole function of these feature checkers is to force movement” (p. 278). Stating that the movement is due to the requirement of checking the Q-feature pushes the stipulation deeper in the system but does not dispose of it.

Constraint (iii): The phenomenon is restricted to main clauses.

Without (iii), the embedded Tense could be targeted and fronted to the embedded Comp (9b), or to the main clause Comp (9c).

- (9) a. Mary said the man is happy.
 b. *Mary said is the man __ happy? [not direct discourse]
 c. *Is Mary said the man __ happy?

There is another constraint that is implicit in the discussion: This change in word order produces a sentence with a different meaning.

Constraint (iv): The special word order correlates with a question meaning.

Without (iv), the child could just “play” with the rule, with no change in meaning as in (8).

Chomsky (2010a, 2010b) tries to explain away Constraint (i) by having T in the most prominent structural position in the sentence. However, this is obtained at the cost of adding stipulations (i) to (iv) to the theory, so on the whole there is no clear progress here. As for Constraints (ii), (iii) and (iv), he implicitly assumes them like everyone else. Therefore, in this analysis, we have no answer to the basic question: Why does the tensed verb appear in a particular position?

These appeals to UG preclude the analysis from providing a principled explanation of the facts. The four constraints above and structure dependence are roughly of the same degree of complexity as what they are supposed to account for: They restate in technical terms what the facts are. However, we are not told *why* these particular facts hold: Why is Tense involved in question formation? Why is it only the Tense of the main clause? Why does having Tense in Comp correlate with a meaning of polar interrogative? We are just told that these facts correlate with random system-internal features and constraints. The constraints have to be stipulated, listed in UG, because they follow from nothing. Science is not merely interested in what is, in inventories of facts and assertions of existence (regardless of how crafty the formulations may be); science is mostly interested in why things are as they are, in modalities of what is possible. It may be that these “system-internal constraints [...] are efficacious in forestalling wrong turns a child might otherwise take” (Crain 1991: 602), but they are quite inefficient in elaborating an explanatory scientific theory, precisely because they are system-internal and have no independent, external motivation.

3. Structure Dependence and the Facts

3.1. Constraints on How, but Not on What Can Be Attained

Not only is structure dependence conceptually weak, it also fails empirically to explain even the wildest cases. For instance, no human language forms questions by linearly reversing the word order of a declarative. Though this is usually presented as a far-fetched possibility, it is actually feasible if the only condition is structure dependence. Consider how Cinque (1994, 2010) derives the mirror order of adjectives in French *vase chinois bleu* from the structure reflected in the English order *blue Chinese vase*.

- (10) a. basic structure in order predicted by LCA: *bleu chinois vase* →
 b. movement of N: *bleu vase chinois* →
 c. remnant movement of N+ADJ: *vase chinois bleu*

First, the N is raised as in (10b). Then a phrase WP that contains *vase chinois* is moved above *bleu* to the Spec of some category Z that has an uF that happens to attract phrases like WP. With tools like these, it is possible to save the LCA whenever it does not directly predict the correct scope of Adjs (see an extensive discussion of what this analysis implies in Bouchard 2002, 2011). By appropriately setting the features, tools like move and remnant move can just as easily have structure-dependent derivations for questions that reverse the word order of a declarative. The derivation can even be better motivated than in the case of adjectives. For instance, consider the assumption that an interrogative sentence like (1b) has a Q-marker in Comp that attracts the tensed verb. In addition, the sentence has a specific interrogative intonation. Kegl *et al.* (1996) assume that this intonation is anchored in the Comp with a Q-marker and it spreads over the structure (but see Bouchard 1996). Since the Q-marker in Comp can trigger the movement of a Q-feature checker (Tense) and the specific intonation, a child can make the “natural” analogy that the Q-features that spread on every constituent, phrasal or terminal, can each trigger movement.⁷ So in (11), the Q-marked *money* locally adjoins to the local DP to check its feature with the Q-feature of *the*: this eliminates the Q-features of *money* and *the*, but leaves the feature of the DP untouched; the Q-marked DP then locally adjoins to the VP to check its feature with the Q-feature of *took*; finally, the Q-marked VP locally adjoins to the DP to check its feature with the Q-feature of *John*.⁸

- (11) John took the money →
 John took **money** the →
 John **money the** took →
money the took John

Of course, the derivation could be made much more complex under other assumptions. Details like these aside, the main point is that, even with structure-dependence and constraints (i) to (iv), the analytical tools that we commonly find in various analyses of other data allow us to derive constructions that are impossible in any language. Structure dependence restricts how the child can invert the order of words, i.e. it proscribes doing it by applying a linear rule, but it does not prevent the child from inverting the order as in (11). So structure

⁷ Sportiche (1995) assumes that the Q-marker that triggers the rising intonation in the French intonational questions (i) also triggers a movement, i.e. the raising of the whole IP to the Spec of the Q-morpheme.

(i) Tu aimes ce livre? French
 ‘You like that book?’

⁸ There are abundant examples of this kind of derivation with remnant movement in the Cartography project, some with even more complexity. See for instance the analyses of adverbs in Cinque (1999) and of DP and IP in Cinque (2002), the derivation of possessive constructions in Kayne (2006) and *of*-phrases in Kayne (2002).

dependence fails empirically. In fact, just about anything is possible under those assumptions. For instance, suppose that the direct object is fronted instead of Tense in polar interrogatives in a language: This would ‘demonstrate’ that constraint (i) is parameterized between Tense and direct object, i.e. languages choose which of the two is a Q-feature checker (or alternatively the direct object ends up closer to Comp in that language because it is forced to check some agreement features early). If Tense moved to a position other than COMP, you only have to change the list of landing sites: The Q-marker would also appear in another position (or Tense nevertheless moves to Comp but covertly). If Tense moved out of embedded clauses in some language as in (9c), escape hatches could easily be provided, as in the many cases where movement theory assumes movements out of complement clauses, i.e. *wh*-movement, subject raising, long head movement in some Balkan languages (Rivero 1994 and references therein). We could also appeal to Relativized Minimality (Rizzi 1990): If we discovered a case of a polar interrogative with AUX Inversion in an embedded clause, this would ‘demonstrate’ that only the embedded Tense has the crucial Q-feature. Berwick *et al.* (2011: 1230) strongly criticize Perfors *et al.* (2011) because they do not “explain why *Is the boy who lost left* fails to have the following interpretation: (is it the case that) the boy who is lost left?”. But Berwick *et al.* fare no better in their account of this fact, if you look at the whole system. The subject being higher than Tense in the structure, the system can determine that the Tensed AUX inside the relative clause of the subject is the closest Tense to Comp, assuming that all the other elements in the subject are irrelevant under Relativized Minimality. The reason why that sentence does not get this erroneous interpretation in their system is due to assumptions like the subject is not yet high in the structure when T moves to Comp. This is an ad hoc ordering of the Subject Raising transformation after the Tense Raising transformation: there is no other reason to assume this ordering but the end result. Compare this with the free ordering of the raising of two quantifiers (May 1985): Assuming that the subject must raise and Tense must raise, both in the same phase, the two orderings of rules should be equally possible, and is only ruled out by blunt stipulation.

All of this and much more is possible in the movement analysis because these constraints are random facts, which therefore could be replaced by other random constraints in UG. Given current assumptions in minimalism, the grammars produced from these tools overgenerate radically.

3.2. *Crosslinguistic Variation in Question Formation*

Contingent constraints also fail to provide an informative account of crosslinguistic variation in question formation. Some languages indicate that a sentence has a question interpretation by means other than a special order. For instance, Québec French and Korean express the illocutionary force of interrogation not by putting Tense in a special position but by marking the Tense of main clauses with a Q-particle, *-tu* and *-ni*, respectively.⁹

⁹ An interrogative particle is found in several varieties of French, varying in form between *-tu* and *-ti*. It historically comes from a reanalysis of the sequence *t-il* in questions like (i):

- (12) a. Paul a-**tu** fini? *Québec French*
Paul has-QP finished
 'Has Paul finished?'
 b. Je fais-**tu** ça correctement?
I do-QP this correctly
 'Am I doing this correctly?'
- (13) Chelswu-ka mues-ul po-ass. *Korean*
Chelswu.NOM INDEF.ACC see.PAST
 'Chelswu saw something.'
- (14) Chelswu-ka mues-ul po-ass-ni. *Korean*
Chelswu.NOM INDEF.ACC see.PAST.QP
 i. 'What did Chelswu see?'
 ii. 'Did Chelswu see something?'

The sequence in (14) is interpreted either as a yes/no question or as a question bearing on *mues-ul*. The two interpretations correspond to different intonations: The intonation peak is on the subject or the verb under the yes/no question interpretation, whereas an intonation peak on *mues-ul* results in a questioned-phrase interpretation (Cheng & Rooryck 2000). So instead of the positional strategy used by English to provide a signifiant for the illocutionary force of polar interrogative, Korean uses the morphological marking *ni*, and yet another signifiant — intonation — to distinguish between the existential and interrogative interpretation of *mues*. The option of intonation that our physiology provides as a signifiant is also used in French, as in (15), where a particular rising intonation suffices to express the illocutionary force of interrogation.¹⁰

- (15) Jean a acheté un livre? *French*
Jean has bought a book
 'Has Jean bought a book?'

Particle marking and Q-intonation show that Tense is not targeted for either linear or hierarchical proximity to Comp: Tense is targeted because of its

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- (i) Pierre mange-t-il? *French*
Pierre eat.3.SG -he
 'Does Pierre eat?' or 'Is Pierre eating?'

¹⁰ The fact that a rising intonation encodes interrogative force may be related to the fact that in many languages, an intonational rise signifies incompleteness, whereas an intonational fall indicates completeness (Vaissière 1995, Bouchard 2002: 375–376). For instance, when a speaker enumerates the items of a list, a rising intonation on an item (represented as <) indicates that the enumeration is not completed, whereas a falling intonation on the last item signals completeness.

- (i) a. Il y avait Paul<, son frère<, ses soeurs<, et sa mère.
 b. There was Paul<, his brother<, his sisters<, and his mother.

This may explain why an intonational rise is frequently used to signal polar interrogatives: It indicates that the discourse is not completed, hence it is a request to complete the information.

meaning. Of course, it is always possible to add elements to the theory to maintain that Tense is targeted for its hierarchical proximity to Comp. One could propose that the Q-intonation is anchored in the Comp with a Q-marker and spreads over the structure, as Kegl *et al.* (1996) assume, and assert that the interrogative particles *-ni* and *-tu* (and for good measure, the Q-intonation), trigger the movement of Tense to the Comp with a Q-marker, but covertly in these cases. One could then claim that this Q-marker captures a generalization about the role of Comp in all polar interrogatives. However, this is a false generalization: In so doing, we are not capturing a generalization but creating it, at a cost. This is similar to a putative universal that Morris Halle used to discuss in his classes: Every word of every language ends with the phoneme /a/. This universal is validated by the fact that many words do end in /a/. What about all those words that do not? With a twinkle in his eye, Morris would say that this demonstrates that there is a rule (or several) that deletes the /a/ (or prevents it from being pronounced) under certain conditions. Our job as linguists is to figure out what those conditions are. Of course, Morris was just illustrating how easy it is to create false generalizations, with auxiliary hypotheses to save the day. Note that his false generalization is better substantiated than the one about the Q-marker in Comp: Every language has at least a few words that end in /a/, whereas most (if not all) languages fail to show a surface, pronounced Q-marker in Comp.

There is another way in which languages vary in question formation: Languages do not target Tense in the same way. In English, only AUX (*be, have, modals*) or dummy *do* are targeted, whereas in French, in addition to AUX (*être, avoir*), lexical verbs can also be involved in various complex ways.

- (16) a. L'enfant aimait ce jouet. French
 'The child liked that toy.'
- b. L'enfant aimait-il ce jouet? Pronoun copy
the child like-he that toy
 'Did the child like that toy?'
- (17) a. Il aimait ce jouet. French
 'He liked that toy.'
- b. Aimait-il ce jouet? Pronoun-verb inversion
liked-he that toy
 'Did he like that toy?'

This difference between the two languages comes from the way the grammar of a language can deal with a syntactic head that has multiple functional specifications marked by its morphology. For instance, how can a Verb+Tense word such as *liked* or *aimait* function? There are two logical possibilities. First, they may function as a unit, so whatever is under the scope of T or V is also under the scope of the other, and whatever has scope over T or V also has scope over the other. Second, they may function independently from one another: Something under the scope of the head may be under the scope of T or V without being under the scope of the other, and something with scope over the complex head may have scope over T or V without having scope over the other.

English functions as in the first case, so *do*-support is required to separate the main verb from Tense when only Tense is targeted as in polar interrogatives. French exhibits the second possibility. We see this in portmanteau words such as *du* ‘of.MASC.SING.DEF’, *des* ‘of.PLUR.DEF’, *au* ‘to.MASC.SING.DEF’ and *aux* ‘to.PLUR.DEF’: These words have features of both a preposition and a determiner, and the sets of features appear to interact with other constituents independently from one another. Thus, in *aux enfants* ‘to the children’, *aux* expresses both the features of a preposition (*à*) that has a DP argument and the features of the Det (definite plural). This portmanteau effect in French, and its absence in English, explains why Tense is not targeted in the same way in these two languages. For instance, if *not* must have scope only on the verbal (predicative) part of the sentence and not on Tense, this explains the presence of *does* in (18), which removes Tense from the scope of the negation.

(18) Mary did not eat peanuts.

(19) Marie ne mangeait pas d’arachides. French
 Marie NEG eat.PAST not of peanuts
 ‘Marie did not eat peanuts.’

In French, *pas* is the negative element and the particle *ne* indicates the scope of the negation. So negation has scope over *mangeait*, but the portmanteau effect allows negation to scope over the verbal part *mang-* without scoping over the Tense part *-ait*. The same effect is found in the polar interrogative in (17): The whole form *aimait* is generated in Comp, but only the Tense part *-ait* is relevant for the polar interrogative interpretation. The equivalent sentence in English is ‘*Did he like that toy?*’ and it requires *do*-support. See Bouchard (1995: sect. 5.4) for a detailed account of variations like these. In particular, whereas adverb placement is just a correlation with ad hoc features in the movement analysis (Emonds 1978, Pollock 1989, Piattelli-Palmarini & Uriagereka 2004), in the portmanteau analysis, it follows from the necessity to choose how to analyze V+T, a parameter that derives from the junction point between syntax and morphology.

4. UG Meets Semantics

Insofar as a model based on structure dependence is intended to cover such cases and explain such facts as those presented in the previous section, and it fails to accommodate them, and so do approaches based on claims of a better learning capacity or richer data, this indicates that a feature common to all these models is seriously amiss. These approaches are all based on the generativist description of what is going on: they assume that the generalizations and ‘laws of grammar’ that generativists discovered are roughly empirically correct. But facts, i.e. observational propositions, are part of a theory, they are not external to it and independent (Lakatos 1970): Their status can be questioned in the face of an overwhelming problem. A residue of unexplained elements that will not go away for 50 years is indicative of a serious problem. It may well be that what generativists claim that children know requires several domain-specific devices like those

listed in UG, but that is irrelevant because that this is not what children know, as I will now argue for subject–AUX inversion (For reasons of space, I cannot look at more cases here, but see references at the end of the conclusion). Under the view that Tense moves when there is subject–AUX inversion, the two options of particle marking and Q-intonation, as well as the four constraints (i) to (iv) and structure dependence, are accidental properties: They do not seem to be derivable one from another and each requires a stipulation. This weakness comes from the fact that this view neglects an important aspect of what is learned: The semantics of the construction, the fact that each order in (1) correlates with a different meaning. If children are only exposed to the difference in linear order in (1a–b), it may be that they do not have access to data rich enough for some inferential techniques to determine what is going on in their language. But by the context of use, they are also exposed to the difference in meaning between these two sentences.¹¹ Crucially, bringing in the semantics of the sentences changes the picture of what is going on to a point where the syntax of (1a–b) is not at all as represented in the transformational analysis: The movement analysis gets in the way of figuring out what children learn. “Chomsky’s arguments, and mathematical evidence of unlearnability of syntax, made fundamental assumptions about *what* is learned that merit closer scrutiny. In particular, they assumed that syntax is independent from meaning, and that the task for the learner is to identify rules that generate legitimate strings of syntactic elements and that do not generate illegitimate strings” (Bishop 2009: 188). But children do not learn those kinds of rules, they do not learn that transformations apply under particular constraints in constructions like (1a–b): They learn that a different order comes with a different meaning (see Matthews 1993: 211–214 on the unjustified conflation of generative grammars with what a child allegedly knows).

Let’s look at the facts in a more theory-neutral way. What do learners ‘realize’ in comparing (1a–b)? That the Tensed auxiliary *is* can appear in two different positions, and the meanings of the two resulting sentences are different. Is this a reason to postulate a transformational rule? In English, a difference in word order usually correlates with a difference in meaning. In generative grammar, it is assumed that there are two kinds of these correlations between positions and meanings, and they have two different syntactic derivations. First, a movement analysis is proposed when an element appears ‘displaced’ from where it is interpreted, as in (20), where the sentence-initial *wh*-phrase is interpreted as the direct object of *kiss*.

¹¹ Slobin (1975: 30) offers an important reminder on the matter:

Most studies of child language comprehension put the child into a situation where there are no contextual cues to the meaning of utterances, but in real life, there is little reason for a preschool child to rely heavily on syntactic factors to determine the basic propositional and referential meaning of sentences which he hears. Judith Johnston and I have gone through transcripts of adult speech to children between the ages of two and five, in Turkish and English, looking for sentences which could be open to misinterpretation if the child lacked basic syntactic knowledge, such as the roles of word order and inflections. We found almost no instances of an adult utterance which could possibly be misinterpreted. That is, the overwhelming majority of utterances were clearly interpretable in context, requiring only knowledge of word meanings between actors, actions, and objects in the world.

(20) Who did John kiss?

The second type of correlation between positions and meanings is the one that speakers learn when they are exposed to pairs as in (21).

- (21) a. John saw Mary.
b. Mary saw John.

The correlation in (21) is systematic: If *John* is in position A, it is interpreted as the one who sees; if *John* is in position B, it is interpreted as the seen one.¹² The question is whether Tense in the question (1b) is interpreted in the same way (in the same position) as it is interpreted in the declarative (1a), hence a case of movement as in (20), or the pair in (1) is an instance of an element appearing in a different position with a different interpretation as in (21). In order to determine this, we must figure out how Tense contributes to the meaning of the sentences in (1a) and in (1b).

We can describe the meaning and form alternations in (1) in terms of the notion of ISSUE. Ladusaw (1996), following ideas of Frege and Davidson, proposes that the main predication expressed by a sentence is a description of a class of events and this description is the ISSUE about which we must make a judgment. In an affirmative declarative sentence like (1a), the speaker expresses a positive judgment by placing the syntactic counterpart of the ISSUE under the immediate scope of the deictic Tense, i.e. the Tense of the main clause that is determined with respect to the moment of speech, with respect to ‘reality’ (Bouchard 1998, 2002). It is a typical property of (main) sentences that they are obligatorily tied to our indexical system of immediate experience by means of a deictic element. This deictic anchoring is presumably required to establish the truth conditions of the sentence. Though Tense is by far the most frequent deictic anchor, some languages anchor their sentences with deictic Location or Person instead (Ritter & Wiltschko 2009).¹³ Because this deictic element relates to the event of the whole sentence, it is a prominent element in the set of combinatorial relations of the sentence: That is why scholars who represent these relations in terms of hierarchical structure intuitively put this deictic anchor at the head of the sentence, with the syntactic counterpart of the ISSUE — the VP — as a complement of Tense. As is well known, one of the arguments — the subject — is external to the VP. This comes from the fact that the relation between the deictic anchor and the ISSUE is forced to be less direct than a simple combination of Tense and the VP. As indicated in Bouchard (1995: 168), an event is a relationship between various actants, whereas Tense identifies a point in time. Event and point in time cannot be directly related because they are ontologically different:

¹² The idea that the order of two constituents is a possible signifiant seems to have been part of Saussure’s thinking, though he never developed it in any detail. For instance, in Bouquet & Endler (2002: 48), Saussure alludes to a sign that consists in placing a certain sign before a certain other.

¹³ Young English speaking children often use verbs without Tense in simple clauses, in violation of the adult grammar of their language. This is most likely because their utterances are not detached from the immediate environment in the early stages of language acquisition, so they are ostensibly linked to it without recourse to a deictic element.

One is a point, the other a network of points. The relation is therefore established between the point in time and one of the points of the event, one of its actants, the subject. The subject is this privileged actant from whose perspective the event is related to time, as determined by lexical specifications of the verb. By situating the subject with respect to the temporal point, the network of relations that the subject entertains with the other actants — the ISSUE — is also situated. This explains the two particular relations that Tense establishes in a sentence. On the one hand, Tense appears in a close combination with the predicative part: Either it combines syntactically with the VP or morphologically with its head. On the other hand, the result of this first combination in turn combines with the subject (in hierarchical terms, the subject is the specifier of that constituent).

This analysis provides a principled explanation to the special status of the subject argument (instead of listing the peculiar property as a special feature like EPP), because it is based on an externally motivated factor (what Chomsky 2005 refers to as a ‘third factor’). The notion of principled explanation is important on general grounds. As Lakatos (1970) remarks, some scientific propositions are considered to be external because they are logically prior to the object of study, since this object presupposes them. In linguistics, the most basic observational proposition given the status of initial condition is that language is a system that links concepts and percepts. Therefore, language is determined by the subsystems that govern these elements, namely the conceptual system found in human brains, and the sensorimotor systems of human bodies. Since the properties of these subsystems are presupposed by the definition of the object of study of linguistics, the linguistic community deems them to be self-evident, determined by logically prior sciences. Thus, the sciences that account for acoustics, the physics of articulation, the cognitive aspects of how humans conceptualize the world, and so on, are given an observational status. For instance, Tesnière (1959) (following Saussure 1916), Kayne (1994), Bouchard (2002) argue that some phrasal structural properties can be derived from the observational proposition that words must be ordered in oral languages because our articulatory system does not allow the production of two words simultaneously. The explanation for this linearization does not lie in linguistic theory, but rather in whichever science accounts for properties of the articulatory apparatus of human beings that produces the sounds of language. In analyzing a language with a different modality such as a sign language, it is therefore crucial to take into account the differences in linearity/simultaneity, among others, as argued forcefully in Bouchard & Dubuisson (1995) and Bouchard (1996). Properties of the conceptual and perceptual substances provide a strong basis of explanation because it is possible to relate the explanandum to an explanans that is independently motivated since it comes from domains that are logically prior to language.¹⁴

¹⁴ In the Minimalist Program, minimal computation is by far the ‘third factor’ that is most typically called on. However, efficient computation may be the least sound basis for explanation. At the formal level of the elaboration of a theory, it is efficacious to have a theory that satisfies conditions of simplicity and non-redundancy. But maximal efficiency does not appear to be adequate to explain natural phenomena (Johnson & Lappin 1999). In biological systems, efficiency is typically a mix of economy and redundancy to insure robustness. Language also is typically replete with redundancies. For instance, the fact that the expression is feminine is indicated three times in (i.a); the fact that the subject is first

In contrast with a declarative sentence, in an interrogative like (1b), the deictic Tense is expressed outside of the extended syntactic counterpart of the ISSUE, i.e. the VP plus the subject. In hierarchical terms, Tense is in the position where we find complementizers. Evidence for the Comp position comes from the fact that the sentence-initial placement of the tensed verb is not compatible with the presence of a complementizer. For instance, French has two types of exclamatives, one with inversion (22a) and one with a complementizer (22b); however, the two never co-occur (22c) (Goldsmith 1981).

- (22) a. Est-elle belle!
 b. Qu'elle est belle!
 c. *Qu'est-elle belle!

In languages that allow 'doubly filled Comp' such as Québec French, *wh*-interrogatives can involve inversion of the tensed verb as in (23a) or filling the position with complementizer *que* as in (23b); however, it is not possible to have both the tensed verb and *que* preceding the subject as in (23c-d).

- (23) a. À qui as-tu parlé? Québec French
 'To whom have you spoken?'
 b. À qui que tu as parlé?
 'To whom that you have spoken?'
 c. *À qui qu'as-tu parlé?
 'To whom that have you spoken?'
 d. *À qui as que tu parlé?
 'To whom have that you spoken?'

The fact that Tense is in Comp in interrogatives means that it holds a different relation with the ISSUE, and this affects the interpretation. In Bouchard (1998, 2002), I suggest that with Tense outside (in COMP), the ISSUE is presented as being separated from Tense, as not being established. This induces a polar interrogative interpretation, a request to know whether the ISSUE should be considered established or not. Under this view, Tense is not moved to COMP. Instead, Tense is generated as combining externally, with the whole sentence, in contrast with the two internal relations with the VP and the subject that occur in affirmative clauses.

This external combination is possible because [Tense + ISSUE] is an inter-

person plural is marked twice in (i.b); the interrogative meaning is expressed by both a particular word order and a particular intonation in (i.c).

- (i) a. La petite chatte.
 the.FEM small.FEM cat.FEM
 b. Nous marchons
 Pronoun.1.PL walk.1.PL
 c. Are you coming?

To reconcile linguistic theory with the potential biological messiness of language, it is more fruitful to appeal to the other components of the third factor, namely the design properties of the conceptual and perceptual properties of signs.

pretable syntactic combination, whereas [Tense + N], or [Tense + Det], etc. are possible syntactic combinations, but they are not interpretable (no more than V as Spec of N etc.), so these combinations do not occur. There isn't a *rule* of question formation, and the notion of construction has no status in the theory: There is a combination Tense + ISSUE which results in polar interrogative interpretation. There isn't a movement involved in (1b) because Tense entertains a single relation with the ISSUE, different from the ones in the declarative (1a). What is going on is not fronting as in rules (A) or (B) of Berwick & Chomsky (2008), but rather rule (C).

(C) Merge deictic Tense from outside with the whole ISSUE (VP plus subject).

Tense is generated there directly, it does not move from another position, no more than *John* or *Mary* in (21). As expected, other deictic anchors function like deictic Tense in questions. Thus Ritter & Wiltschko (2009) observes that in yes/no questions in Halkomelem, the locative AUX *li* appears in Comp. Here too presenting the ISSUE as not deictically established results in a polar interrogative interpretation.

In short, Merge applies freely, and declaratives and interrogatives involve two ways of merging Tense that result in structures that are interpretable. A system with free Merge permits radical overgeneration, but in general this is not a problem since the ungrammatical combinations are filtered by selection restrictions, as indicated in Bouchard (1979, 1982, 1984, 1991). This is a principled explanation since it is a foundational notion that words and constituents have meanings, and a selection restriction results from the compatibility of these primitive properties. Grimshaw (1979) and Pesetsky (1982) were among the first generativists to argue that the semantic primitives are epistemologically prior to the primitives of c-selection.¹⁵ However, some matters remain unclear concerning Tense. There is a restriction on what Tense can merge with (at least in English and French): The element must morphosyntactically be verbal. Though event DPs and small clauses may also be construed as descriptions of events, they do not make good interrogatives, as a reviewer pointed out (24). Of course, they also do not make good declaratives (25).

- (24) a. *Did [the emperor's death]?
b. *Did [the emperor dead]?

- (25) a. *The emperor's did death.
b. *The emperor did dead.

¹⁵ There are also many attempts to constrain free Merge syntactically, but they are descriptive, not explanatory. For instance, Svenonius (1994), Holmberg (2000), Adger (2003), Di Sciullo & Isac (2008), assume that lexical items have categorical features that must be checked against the categorical feature of selected objects, and that this checking is a defining condition on the application of Merge. This added mechanism is costly and purely descriptive. As Koster (2009: 8) remarks, this is no progress from Chomsky (1965), since Merge essentially functions like a Phrase Structure rule: Lexical items have features that say what kind of element they take as a sister. Moreover, c-selection features do not extend straightforwardly to the merger of adjuncts, since an adjunct is not selected by a lexical item.

So some finer distinction must be made between the ISSUE of a VP and the semantics of event DPs and small clauses that will explain why only the former is compatible with the semantics of Tense. For now, I do not know what that difference is, so I will leave it as a descriptive restriction in wait of a principled account.

We now see why all the properties described in the constraints above are interrelated in questions. (i) Tense is involved because of its relation with the ISSUE. (ii) Tense is in Comp because in that position it establishes a particular semantic relation with the ISSUE. (iii) The Tense of the main clause is involved because the ISSUE is a matter of the utterance, of the main predication of the whole sentence.¹⁶ (iv) The interpretation results in a polar interrogative meaning because the combination [Tense + ISSUE] presents the ISSUE as not being established. Together these properties have the effect that, in a displacement analysis, the movement of Tense appears structure dependent. But this is an illusion. Question formation is not structure dependent, it is meaning dependent.

What learners realize when exposed to (1a–b) is that if Tense is in a sentence-internal position, it is interpreted as establishing the ISSUE with respect to deictic time, and if Tense is in a position external to the ISSUE, it is interpreted as not establishing the ISSUE. Learners expect these kinds of correlations because, given Saussurean arbitrariness, they are conservative about order and do not mess with it in order not to lose the systematicity of what it conveys: As with signs in general, a difference in form is expected to correspond to a difference in meaning, and vice-versa. They will normally need rich, positive evidence before they use a different word order, such as a meaning difference, just as they learn other position-meaning correlations with the phonemes of lexical signs, and the order of arguments like *John* and *Mary* in (21), of pre- and post-nominal adjectives in French, and countless other examples.¹⁷

As expected, the juxtaposition of the Tense-bearing head with the whole ISSUE-constituent (VP plus subject) is not the only possible signifiant to express this particular relation between Tense and the ISSUE: Some languages use other signifiants, such as marking Tense with a dedicated particle, or superimposing a particular intonation on the whole projection of Tense, as we saw in (12) to (15).¹⁸

¹⁶ According to Henry (1995), inversion is also possible in embedded interrogatives in Belfast English, as in (i):

(i) She wonders had she picked the dish.

This may be due to a Celtic influence. It would be interesting to look into the Tense system of Belfast English to see if the embedded Tenses can be deictic, directly tied to the moment of speech, instead of indirectly through a concordance with the Tense of the main clause.

¹⁷ Given conservatism (a well-motivated principle on evolutionary grounds), Schoenemann (2005: 65) argues that

positive evidence can actually be used as a weak form of negative evidence (i.e. “if this form is correct, then another is unlikely to be correct, barring future positive evidence to the contrary”). Chomsky (1981) has pointed out that if children notice that “...certain structures or rules fail to be exemplified in relatively simple expressions, where they would be expected to be found, then a (possibly marked) option is selected excluding them in the grammar, so that a kind of ‘negative evidence’ can be available even without corrections, adverse reactions, etc.” (p. 9). Regier (1996) showed that this can be implemented for learning word meanings as well.

¹⁸ Hurford (2011: 278–279) also proposes a semantic approach to structure dependence in Subject–AUX inversion, but it differs significantly from the one proposed here. The key for him is that

5. Empirical Arguments to Move Tense?

It could be argued that we must assume that Tense moved in (1b) because the Tensed verb in Comp exhibits displacement properties with respect to selection and agreement. For instance, the modal *can* is semantically associated with *eat* in (26a), not with *fly*.

- (26) a. Can eagles that fly eat?
 b. Can [[eagles that [*v** [fly]] [*v* [eat]]]?

Chomsky (2011) and Berwick *et al.* (2011) follow the generative tradition and assume that when words separated in a string exhibit semantic/phrasal relations that are prototypically exhibited by adjacent words, there is a step in the derivation where the ‘displaced’ constituent is in that position. So there is a step in the derivation of (26) where *can* is in the position represented by *v*. Originally, Chomsky (1957) observed some systematic similarities between sentences such as declarative-interrogative pairs, active-passive pairs and declarative-wh-question pairs, and he argued that these regularities were difficult to capture with phrase structure rules. He suggested that the similarities were due to a common underlying structure, to which each of the sentences was transformationally related. “The general problem of analyzing the process of ‘understanding’ is thus reduced, in a sense, to the problem of explaining how kernel sentences are understood, these being considered the basic ‘content elements’ from which the usual, more complex sentences of real life are formed by transformational development” (Chomsky 1957: 92).¹⁹

children surely must be [concerned] with making communicative utterances. When a child asks a question, she usually has a referent in mind that she is interested in finding out about. That’s why she asks the question. *Is Daddy home yet?* is a question about Daddy. The natural thing for a child learning how to ask questions in English is to realize that you put an expression for the person or thing you are asking about just after the appropriate auxiliary at the start of the sentence. (Hurford 2011: 278)

This casual impression is the basis for his meaning-based rule:

Meaning-based: To ask a question about something, signal the questioning intent with an appropriate auxiliary, then use an expression for the thing you are asking about. (This expression may or may not contain another auxiliary, but that doesn’t distract you.) (Hurford 2011: 279)

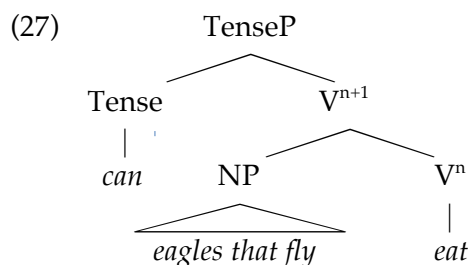
Hurford’s approach to semantics is highly referential and often reduces meaning to causal relations between words and objects. He talks about “a connection between hierarchical syntactic structure and the structure of the situations or events one is talking about” (p. 279).

On the empirical side, the proposal is almost vacuous. It accounts for none of the properties (i) to (iv) discussed above. It just stipulates that (i) Tense (‘auxiliary’) is involved, and says nothing about (ii) the Comp hierarchical position Tense occupies in questions. Concerning the fact that (iii) Tense must be from the main clause, the rule makes the vague stipulation that it involves the ‘appropriate auxiliary’, with a parenthesis to specifically exclude an auxiliary internal to the expression targeted by the question. However, this does not exclude all the other embedded auxiliaries as in (4b), (6c) or (9b). The fact that (iv) this construction correlates with a polar interrogative meaning is a total accident in this account. There is also no account of the fact that the ‘targeted expression’ happens to be the subject of the sentence (including ‘expletive’ *there* and *it*).

¹⁹ This relation to simpler, more natural constructions to express quasi-logical properties is

Some linguists may feel that some positions, some syntactic relations, are natural, and that they tacitly interpret some elements in those positions. From the casual observation that, in some languages, some semantic relations between items are expressed by having these items occupy certain positions in a sentence, it is an easy step to assume that the mapping of semantic representations onto morphosyntax should be universally positional, i.e. that this is the ‘conceptually natural’ syntactic relation. But this idea faces the problem of accounting for all the cases in which languages use other means than linear juxtaposition to express relations, such as intonation, case marking, the use of loci in sign languages, etc. These conflicting facts force the adoption of a more complex model of grammar. For instance, case-marked elements typically have a relatively free ordering. This forces the adoption of costly constructs, such as assuming that Case-marked elements have a scrambling feature that induces pied-piping even after Case assignment, with the pied-piped element ‘attracted’ by a higher probe (Chomsky 2000). So Case-marking languages mysteriously happen to have extra mechanisms that conspire to give the impression of a freer order.²⁰ The positional view implicit in movement theory requires a stipulation barring these other coding possibilities from relating directly to semantics, and further stipulation of the additional mechanisms (such as the various kinds of features that trigger move), therefore facing a considerable empirical burden.

Returning to (26), *can* does not have to be in a lower position next to *eat* in order to bear on *eat* rather than *fly*. Consider a possible (simplified) structure for (26a):



Since the modal is the sister of the verbal projection of *eat*, a simple rule of interpretation will have it apply to *eat* and not to *fly*.²¹

Another argument to assume that Tense moved in (1b) is based on the fact

assumed to be part of a more general behavioral strategy: A “hierarchical organization of behavior to meet some new situation may be constructed by transforming an organization previously developed in some familiar situation” (Miller & Chomsky 1963: 485).

²⁰ Proponents of Lexical Functional Grammar and Relational Grammar observed that this kind of approach does not provide a natural account of free order. Culicover & Jackendoff (2005: 190) remark that this theory “misses the traditional insight that linear order, case-marking, and agreement are independent grammatical devices that each can be used to link phonological structure to meaning; none of them is dependent on the others, but in some languages they may co-occur redundantly”.

²¹ As shown in Bouchard (1984, 2002), this kind of analysis can be extended to long-distance dependencies as in *wh*-questions without the need of special rules of movement or devices such as the metavariables (\Uparrow and \Downarrow) of Lexical Functional Grammar (Kaplan & Bresnan 1982) or SLASH propagation as in Generalized Phrase Structure Grammar (Gazdar 1982, Gazdar *et al.* 1985).

that the Tensed verb agrees with the subject as if this verb and the subject were in the same relation as in (1a). Hence, for a sentence like (28), Chomsky (2011: 272) assumes that there are heads “in the positions of the inflectional elements” and Berwick *et al* (2011: 1214) “indicate the actual position of interpretation with \mathbf{dv} , and the logically coherent but incorrect position by \mathbf{dv}^* ”.

(28) [do [eagles that \mathbf{dv}^* fly] \mathbf{dv} eat]

However, this positional view of agreement is not a fact. It presumes the result it aims for, namely that this agreement is dependent on a particular structural relation between the subject and Tense, and that this relation only holds in a structure corresponding to the declarative sentence. But the assumption that agreement depends on a structural relation faces empirical problems when there is agreement between a pronoun and its antecedent as in (29a), and even more when there are multiple antecedents as in (29b), or it occurs across sentences as in (29c), or in contexts of pragmatic anaphora as in (29d):

- (29) a. John_i showed Mary a picture of *his*_i / **her*_i uncle.
 b. John_i spoke to Mary_j in the presence of Bill_k and they_{i,j,k} all agreed to leave.
 c. John_i came in. *He*_i looked very happy.
 d. A pointing to B who is trying to catch up with a woman who is skating very fast:
 “You’ll never be able to catch up with *her*.”

To maintain that agreement in general depends on a particular kind of structural relation (like Spec–Head, for instance), very unlikely structures and operations will have to be postulated to account for these examples. Or else two theories of agreement will be required: a structure-based theory for subject–tense agreement, and another one for cases as in (28). However, a unified account of all types of agreement is possible, without excessive structural material: This is the approach to agreement proposed in Bouchard (1984, 1987, 1995: 225–226). Under this view, agreement is a consequence of interpretation, as expressed in (30) (see also Baker & Brame 1972, Jackendoff 1972, Fauconnier 1974, Lapointe 1980, Hoeksema 1983, Chierchia 1987, Pollard & Sag 1992).²²

(30) *Coherence Condition on Coindexation*

Coindexed elements must be interpreted coherently.

The condition states that there can be no clash in the features of coindexed elements: Either the two elements have the same value for a feature, or one of them does not have the feature. Agreement follows from the Coherence Condition. In the case of subject–tense agreement, these elements are related in order to

²² I define the condition in terms of coindexation because this is the most frequent means used to express the relation between two coreferential/agreeing elements. But this formalism is not crucial: It could be any other procedure with formally similar effects such as an arc in a general graph. The relation is of the type Saussure calls *rappports associatifs*, which are mediated by a paradigm and the link between the two terms is established *in absentia*.

mediate the relation between the ontologically different event and Tense, as mentioned above. This is what triggers agreement between subject and Tense (Bouchard 1995: 226–227). This agreement does not depend on a structural configuration, but is due to the lexical specifications that determine which actant of the event mediates the link between the event and a point in time, i.e. between the ISSUE and Tense.²³

6. Conclusion: The UG Problem Solved

A learner exposed to the pair of sentences in (1) is not driven to choose between various movement rules because what is going on in polar interrogatives in English is not that words or phrases are moving around. Instead, deictic Tense is being combined from outside with the ISSUE-constituent. This relation is different from the one in declaratives and results in the illocutionary force of a polar interrogative. There is no reason why children would make errors as in (2c), (4b), (6c), (8c–d), (9b–c), or (11) by analogy, since this is not at all analogous to what they are doing. Children learn that a sentence is anchored deictically, they learn which of Tense or Person or Place is the deictic anchoring in their language, and they learn that this deictic anchoring can result in a declarative meaning. Children also learn how the deictic anchor is inserted with respect to the rest of a sentence to express that declarative meaning in their language, that is, they learn a sign — what form (*signifiant*) their language uses to express the declarative meaning (*signifié*). They also know that a different form corresponds to a different meaning: In the case at hand, they learn that a particular order of combination of the deictic anchor, or a marker on it such as *-tu* or *ni-*, or an intonation on the sentence, corresponds to a polar interrogative meaning. These are important aspects of the data provided by the interfaces. The Primary Linguistic Data is saturated with information germane to acquiring what is really going on in questions like (1b).

Given the actual richness of the PLD *about the relevant properties*, nativist speculations about a geno-typically specified UG are patently otiose. The canalization of language acquisition is not done by contingent UG constraints on the functioning of the formal apparatus, but is due to the substantial properties of the linguistic signs. “Infants somehow select language-related data from the ‘blooming buzzing confusion’ of the external world” (Berwick *et al.* 2011: 1208–1209). In particular, they learn signs, both unitary signs (morphemes, words) and

²³ Aissen (1989) discusses data that favor an account of agreement as a consequence of interpretation for Tense agreement. She gives examples from several languages where Tense does not agree with the subject, but rather with the combination of the subject and a comitative. Since phrases in two different, non-coordinated positions agree with Tense, there is no direct way to account for this kind of agreement in a structural analysis. On the other hand, if agreement is a consequence of interpretation, one simply has to assume that the index of both the subject and the comitative determine verbal agreement in these languages, as in other cases of multiple antecedents such as (20b).

The analysis of agreement as a consequence of the Coherence Condition also gets support from sylleptic agreement (agreement based on meaning instead of form), to which it extends naturally, as shown in Bouchard (1995: sect. 3.3.2.4).

combinatorial signs (forms such as juxtaposition in a particular order or markings on heads or dependents, or particular intonations, all of which can be linked to particular meanings such as argumenthood, adjuncthood, polar interrogative; see Bouchard 1996, 2002). This is the logical minimum: it is necessary, and sufficient to generalize from the data they are exposed to.

Question formation in English is a meaning-dependent insertion of Tense in a particular position, and not the result of a syntactic operation moving things around. This is revealed by the fact that a POS argument based on movement rules in these sentences fails in the wildest cases, even when it is backed by structure dependence and several other constraints attributed to UG. That procedure can pair sounds with more interpretations than competent speakers permit, as well as pair the polar interrogative interpretation with more sounds than competent speakers permit. Structure dependence is noise in the experiment due to a faulty experimental method, chiefly, the assumption of natural positions of interpretation and movement. The noise is so intense that its users fail to see that the method does not account for even the wildest cases, and they fail to discuss why those combinations of forms are attributed the meaning of polar interrogative. This is similar to a situation where someone would discuss the pair of sentences *John saw Mary* and *Mary saw John* without mentioning how the difference in the way the words combine corresponds to a difference in interpretation. They ignore this most elementary property of the sentences and just try to describe what goes where linearly and hierarchically. Some 50-plus years after examples like (1) were initially offered, why Tense ends up in Comp remains a total mystery in this approach.

Transformationalists think about question formation as potentially linear as in the errors in (2c), (4b), (6c), (8c–d), (9b–c), or (11) because the vision of their theory allows it: Linear systems are part of the set of possible formal systems among which they are trying to find the subset that generates human languages. So it is one option that they must rule out by a language-specific constraint in UG, like structure dependence. But errors as in (2c), (4b), (6c), (8c–d), (9b–c), or (11) are actually ruled out by a principled reason: In these ungrammatical cases, either there is no sign like a special order changing the relation of Tense with the ISSUE, or no particle marking the sentence with semantics relevant to polar interrogatives, or the semantics resulting from the combination of the elements in that order is uninterpretable.

Over the years, there has been a lot of swapping of one theoretical device for another with similar effects, for example, from a rule that explicitly moves AUX across the subject to a feature that attracts the tensed V to Comp, from cycles to phases, and so on. These shuffles do not improve overall UG stipulations. Hauser *et al.* (2002) propose a divide between the faculty of language in the broad sense (FLB) and in the narrow sense (FLN) in an attempt to reduce the content of UG (i.e. FLN). Many mechanisms of FLB are present among non-human animals, and in non-linguistic activities in humans. “That is not the case, though, of FLN, which is something like a residue of the uniquely human nature of the language faculty, which, by definition, cannot be compared to anything existing in the mind of other species (nor even in other domains of the human mind)” (Boeckx & Longa 2011: 265). If this residue UG/FLN was extremely

limited, we would be approaching the ‘strong minimalist hypothesis’. However, despite the expressed intent to eliminate UG — this repertoire of the unexplained elements of S_0 , current generative models still appeal to several of these elements in their actual analyses. Here is an illustrative sample taken mostly from Hornstein & Boeckx (2009) and Narita & Fujita (2010):

- constituency;
- endocentricity labeling;
- c-command;
- functional categories that proliferate in cartography;
- parameters (intractable number of micro or macro) distributed over different modules of FL;
- bind and binding conditions;
- displacement;
- uninterpretable features and specifications about which elements they may attach to and when;
- agreement;
- cycle/phase bounding nodes;
- Phase Impenetrability;
- Transfer;
- locality conditions (Ross’s Problem: why does locality hold for move but not pronominalization?)
- condition on theta assignment: arguments must be initially merged in theta-positions;
- Numeration: once a NUM is exhausted, a new NUM can be selected to extend it cyclically (Uriagereka (2002: 7);
- Linearize: there has to be a procedure *Linearize*, with something like the LCA to constrain it.

The goal of eliminating the unexplained elements listed in UG will remain a very unfinished business as long as the emphasis is on computational tools and the facts are seen as resulting from the application of these tools. Because it still constantly resorts to dumping unexplained elements into UG, generative grammar uningenuously exposes the inadequacy of many of its claimed explanations of linguistic facts.

Given the epistemological problems that the concept of UG raises, there should be very strong empirical reasons to resort to it. One main source is the logical problem of language acquisition. But Plato’s problem is not insurmountable in the case of language. We know so much because the evidence we have is very informative about signs and how they combine. Contra Fodor (2001), children do not need a dedicated Learning Machine like UG to figure out what grammar/syntax underlies the language they are exposed to: Whatever Learning Machine enables them to learn signs also enables them to learn combinatorial signs such as dedicated orders of signs.

Foregoing UG does not mean that every possible option is admitted and that languages can vary infinitely. There are factors other than language-specific UG conditions that canalize grammar very stringently. Language being a system that links concepts and percepts, it is shaped by constraints from the CI and SM systems that predate it and thus are not specific to it. In any model, the logically prior properties of the perceptual and conceptual systems necessarily impose boundaries within which a child charts a highly circumscribed course in language development. I make the parsimonious hypothesis that these properties are sufficient and are the only canalization elements of language. We have seen how this works in circumscribing question formation: this kind of system covers the full range of examples just discussed, adequately capturing what knowledge speakers acquire, while minimizing any posited language-specific innate endowment. SM and CI factors also account for the restrictions on other well-known constructions that have been used to argue for POS and UG. See for instance the account of classical islands in Bouchard (1984, 2002: 348–358), as well as the seminal work of Erteschik-Shir (1973), and the scopal analysis in Szabolcsi & den Dikken (1999) and Szabolcsi (2002); the account of binding conditions suggested in Bouchard (2006) and developed in Bouchard (in progress); the way the meaning of Negative Polarity Items accounts for the restrictions on their distribution without appealing to UG constraints, as shown in Giannakidou (2001).

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