

Jeffrey Lidz

The explanatory power of linguistic theory

1 Introduction

Chapter 8 of *Syntactic Structures* (Chomsky, 1957) elucidates the idea of levels of representation in linguistic theory, introduced in earlier chapters, using the phenomenon of *constructional homonymity* as a probe. Chomsky observes that a single string may have two interpretations, supporting the idea that that string has distinct derivations. In some cases, the analysis is both independently supported and obvious. The phonetic string [əneɪm] can be interpreted as two words, either with the word boundary before or after the [n], *a name* vs. *an aim*. Thus, there must be more to a linguistic representation than just a string of phones. Instead, we have an additional morphological level of representation, where each of these possibilities is independently justified (for example, by *a football*, *an elephant*, *his name* and *her aim*), and hence provides an automatic explanation for the ambiguity. Similarly, a string consisting of one analysis at the phonological and morphological levels can nonetheless have two syntactic analyses, giving rise to familiar ambiguities at the level of phrase structure. The two analyses of *I saw the man with the telescope* are independently justified by sentences such as [[*The man [with the telescope]*] *is tall*] or [*I [hiked [with the snowshoes]]*]. Chomsky goes on to argue for levels of representation determined by different transformational analyses, based on the ambiguity of *the shooting of the hunters*, where *the hunters* may be interpreted as shooter or shot, analogous to *the growling of lions* or *the raising of flowers*, respectively. Here, there is a single analysis at the phonological, morphological and phrase structural levels, but still there is an ambiguity. The analytic idea was that the NP is derived via transformation from a kernel sentence, either *The hunters shot something* or *Someone shot the hunters*. The argument was that this ambiguity is predicted by a theory containing transformations, but not one whose only level of syntactic analysis was phrase structure. The transformational theory was thus to be preferred due to the transparency of the explanation, given that the relevant ambiguity follows automatically from independently justified pieces of analysis.

This notion of explanation, of capturing generalizations in a way that explains more than just the facts they were crafted to describe, remains a central part of linguistic theory today. Chomsky states “any scientific theory is based on a finite number of observations, and it seeks to relate the observed phenomena and

to predict new phenomena by constructing general laws in terms of hypothetical constructs such as (in physics, for example) mass and electron.” (Chomsky 1957, p. 49). At the time, the new phenomena to be explained were facts about the particular language under investigation, what Chomsky called “external conditions of adequacy.” And the hope was that conditions of generality would allow for a theory of grammar in which basic terms such as phoneme or phrase could be justified independently of any particular language.

Moreover, in Chapter 6, Chomsky explores the relation between the general theory of grammar and the language particular grammars that follow from it, suggesting that the strongest requirement we could put on such a relation would be that the theory “provide a practical and mechanical method for actually constructing the grammar, given a corpus of utterances.” It is worth noticing that this formulation is stated from the perspective of the scientist. How would a scientist take a corpus of sentences in a language and, using the theoretical vocabulary of the general theory, discover the grammar behind the corpus?

But in the years immediately following *Syntactic Structures*, these ideas about justifying grammars were ported over wholesale as a theory of the cognitive mechanisms that lay the foundation for language acquisition (Chomsky, 1959, 1965). Although *Syntactic Structures* never mentioned human cognition or children’s language acquisition, it put into place the pieces required for expanding the reach of linguistic theory quite broadly. Indeed, that such an expansion was already in the air in 1957 can be seen in Lees’ review of the book. Lees notes that if it were possible to expand the reach of linguistic theory to include language acquisition, “then the mechanism which we must attribute to human beings to account for their speech behavior has all the characteristics of a sophisticated scientific theory,” (Lees 1957, p. 406) by which he means that the general principles of grammar, discovered on the basis of linguistic analysis, would contribute to an explanation of language acquisition, despite not being designed for that purpose. Lees spells these ramifications out slightly more when he says, “If we are to account adequately for the indubitable fact that a child by the age of five or six has somehow reconstructed for himself the theory of his language, it would seem that our notions of human learning are due for some considerable sophistication.” (Lees 1957, p. 408).

Indeed, it is this notion of generality and sophistication to which we now turn, connecting the transformational structures revealed by constructional homonymity to explanations of how the relevant grammatical principles contribute to children’s ultimate attainment of a grammar for their language.

2 Constructional homonymy and the poverty of the stimulus

2.1 Movement and reflexives: a puzzle

Consider the sentences in (1-2) (Barss, 1986).

- (1) a. Norbert remembered that Ellen painted a picture of herself
 b. * Norbert remembered that Ellen painted a picture of himself
- (2) a. Norbert remembered which picture of herself Ellen painted
 b. Norbert remembered which picture of himself Ellen painted

The facts in (1) illustrate a very simple generalization: a reflexive pronoun must take its antecedent in the domain of the closest subject (Chomsky, 1973, 1981). Only *Ellen* can be the antecedent of the reflexive.

In (2), however, there are two possible antecedents for the reflexive (depending on gender). Either *Norbert* or *Ellen* will do. Here it would seem that we have a constructional homonymy. The sentences in (2) have one phonological, morphological and phrase structural analysis and yet we have two interpretations. Given an independently motivated theory of *wh*-movement, through which the phrase *which picture of himself* simultaneously satisfies the requirement that *paint* take a direct object and the requirement that *wh*-phrases occur in the left-periphery of the clause, we can explain the ambiguity. Specifically, there exists a representation in which the *wh*-phrase is in the position of the object of *paint*. In this position, the local domain of the reflexive is the clause that has *Ellen* as its subject, and in this structure, only *Ellen* can be the antecedent. There exists another representation in which the *wh*-phrase is in the peripheral position of the embedded clause. In this position, the local domain of the reflexive is the matrix sentence and only *Norbert* is in a position to bind the reflexive in that domain.

In (3) we represent the *wh*-phrase in two positions and strike through the one not considered for the interpretation of the reflexive. There are many roughly equivalent formal treatments that can capture the basic insight.

- (3)
- a. Norbert remembered [[which picture of himself] Ellen painted [~~which picture of himself~~]]
 - b. * Norbert remembered [[which picture of herself] Ellen painted [~~which picture of herself~~]]
 - c. * Norbert remembered [[~~which picture of himself~~] Ellen painted [which picture of himself]]
 - d. Norbert remembered [[~~which picture of herself~~] Ellen painted [which picture of herself]]

So, given a theory of movement, either the base position or the surface position of the moved expression can be considered for defining the locality domain for reflexive pronouns contained in the moved expression. The ambiguity highlights the necessity of two representations, despite only one surface syntactic structure, exactly along the lines suggested by Chomsky (1957).

These facts are immediately complicated by the paradigm in (4-5).

- (4)
- a. Norbert remembered that Ellen was very proud of herself
 - b. * Norbert remembered that Ellen was very proud of himself
- (5)
- a. Norbert remembered how proud of herself Ellen was
 - b. * Norbert remembered how proud of himself Ellen was

The facts in (4) are consistent with our generalization about reflexives. Only the local subject can be the antecedent. However, when we move the *wh*-phrase [*how proud of herself*], still only the embedded subject can serve as antecedent for the reflexive, unlike in (2). What distinguishes (2) from (5)? Given the premises that (a) *wh*-phrases occur in the left-periphery and maintain their relation to their base positions and (b) reflexives must be locally bound, we would expect (5) to be ambiguous in exactly the same way as (2). The difference seems to be that the *wh*-phrase in (2) is an argument, but the *wh*-phrase in (5) is a predicate.

Before we pursue a solution based on the predicate-argument distinction, let us first turn to the learnability problem that the constructional homonymy of (2) reveals.

2.2 From Constructional Homonymy to the Poverty of the Stimulus

As we have noted, the analytic problem of identifying a grammar from a corpus that the linguist faces is analogous to the learning problem that children face in

identifying a grammar from the sentences they are exposed to. To the extent that grammars have levels of representation that are not signaled in the surface forms, children must somehow figure out that these levels of representation exist.

In the case of the interaction between *wh*-movement and reflexives, a child who learned each of these phenomena separately would have an analytic choice to make in representing them in a way that covered their interaction. In principle, there are three options: (a) only the surface position is relevant, (b) only the base position is relevant, or (c) either position is relevant. If (a) were true, then (2) would allow only *Norbert* as antecedent. If (b) were true, (2) would allow only *Ellen* as antecedent, and if (c) were true, either could be the antecedent. We have seen that (c) is true. We can determine that the grammar is constructed that way by creating sentences like (2) and seeing what interpretations they have. Do children learning English hear sentences that reveal the correct analysis? If not, then what they know is a projection beyond their experience, based either on other observations or on prior beliefs/constraints concerning how grammars can be built.

Leddon and Lidz (2006) looked at children's input in order to assess whether the correct generalization is supported in their experience. They found that in 10,000 *wh*-questions addressed to children there were no *wh*-phrases that contained a reflexive pronoun, non-reflexive pronoun or a name.¹ So, children must generalize to the rule that either position can be treated as relevant for binding without any direct experience of the relevant form-meaning pairs. And, of course, if there is no evidence at all, then there is no straightforward inductive solution to the learning problem.

We might say that the solution children arrive at is the simplest one in some intuitive sense of simple. Given that the grammar produces two positions, both of which are relevant to some aspect of interpretation (i.e., the upper one determining the scope of the *wh*-phrase and the lower one satisfying the argument structure of the verb), the simplest solution would be that either position could be relevant for interpreting reflexive pronouns inside the moved *wh*-phrase. On this view, children would choose the system that would add the least additional structure to the grammar, perhaps reflecting a domain-general constraint on mental computation.

However, such a solution immediately runs into trouble when we consider the facts in (5) concerning moved predicate *wh*-phrases. Given a different kind of *wh*-

¹ One might complain, fairly, that 10,000 *wh*-questions is not that many and that if we had looked at a bigger corpus we might have found some with the relevant properties. We did search Google for strings containing *wh*-phrases like those in (2) and the only hits we got were example sentences from linguistics papers. This gives us some confidence that our estimate of the experience of children is accurate.

phrase, children evidently generalize differently, treating only the base position as relevant for interpretation. With only the facts of (5) in mind, one might be led to the conclusion that there is some domain general notion of simplicity from which the facts in (5) could follow. For example, suppose that the antecedent for the reflexive must be found at the earliest possible point in the derivation. This would yield the correct facts in (5), but not for those in (2). This discussion illustrates a deep fact about learning, sometimes referred to as the no-free lunch theorem (Wolpert and Macready, 1997), that there is no single inductive bias that will yield the correct generalization for all learning problems. One can form an intuitive basis for generalizing in a diverse set of ways, and each of these may be appropriate for different learning problems, but none of them will be appropriate for all.

Now, given that reflexives contained in fronted wh-arguments behave differently from reflexives contained in fronted wh-predicates, we have a puzzle about how to account for this asymmetry. The existence of the constructional homonymy for (2) could lead us to expect a similar constructional homonymy for (5), contrary to facts. Thus, our task is to discover the grammatical principles from which the asymmetry between (2) and (5) follows. And, as noted, the analytic problem is paired with a corresponding learning problem. Given the general lack of evidence about reflexives contained in fronted wh-phrases, what forces learners to generalize in a way that leads to the appropriate asymmetry? In principle, there are 9 possible combinations of judgments, varying in whether the reflexive is contained in an argument or predicate wh-phrase, and for each of these, whether it takes as its antecedent the matrix subject, the embedded subject or both. Out of these 9 possibilities, learners all seem to converge on only 1, namely the one where the reflexive inside an argument wh-phrase can take either antecedent but the reflexive inside a predicate wh-phrase can only take the embedded antecedent.

This kind of puzzle concerning the factors that force children to generalize in one very specific way out of a wide array of possible generalizations has come to be known as the poverty of the stimulus (Chomsky, 1971).

3 The Predicate Internal Subject Hypothesis

Let us now consider a solution to the analytic problem, due to Huang (1993). The first part of the solution is that we maintain our generalization about reflexives: reflexives must find their antecedent in the domain of the nearest subject. The second part capitalizes on the difference between (2), in which the wh-phrase is an argument of the lower verb, and (5), in which the wh-phrase is the lower predicate

itself. In (2), the domain of the nearest subject is underspecified. If we calculate it in terms of the “base position” of the *wh*-phrase, then the embedded subject is the nearest subject and so only *Ellen* can be the antecedent. If we calculate it in terms of the “surface position” of the *wh*-phrase, then the matrix subject is the nearest subject and so only *Norbert* can be the antecedent. For (5), however, the closest subject is the same, independent of whether we interpret the *wh*-phrase in its “base” or “surface” position.

This calculation of closest subject follows from the Predicate Internal Subject Hypothesis (PISH): The predicate carries information about its subject wherever it goes. Because of PISH, the *wh*-phrase [how proud of himself/herself] contains an unpronounced residue of the embedded subject and so is really represented as [how ~~Ellen~~ proud of himself/herself].

The derivation for the sentence is given in (6).

- (6)
- a. Build predicate
[proud of herself]
 - b. Add subject
[Ellen [proud of herself]]
 - c. Modify
[how [Ellen [proud of herself]]]
 - d. Insert aux
[is [how [Ellen proud of herself]]]
 - e. Raise subject
[Ellen [is [how [~~Ellen~~ proud of herself]]]]
 - f. *wh*-movement
[[how [~~Ellen~~ proud of herself]] [Ellen [is
~~how [Ellen proud of herself]]]]]~~
 - g. Embed
[Norbert [remembers [[how [~~Ellen~~ proud of herself]] [Ellen [is
~~how [Ellen proud of herself]]]]]]]~~

Because the phrase *how proud of herself* contains a silent residue of *Ellen*, the nearest subject to the reflexive is *Ellen*, independent of whether this is calculated in the base position or in the derived position. The reflexive must be bound within that domain and so *Ellen* is the only possible antecedent for that reflexive. This analysis explains the asymmetry straightforwardly. We maintain the general rule through which the binding domain for the reflexive can be identified based on any of its positions in the derivation, but with the complication that in predicate questions both positions yield the same binding relations.

Now we have two related questions. First, is there independent evidence for PISH? If there is, then the binding facts follow deductively from PISH plus the theory that any occurrence of the reflexive can be treated as relevant for the calculation of binding domains. Second, if the binding asymmetry is not exhibited in speech to children and if PISH offers an explanation of the binding asymmetry, is PISH exhibited in speech to children? That is, if children can't learn the binding asymmetries by observation, then could they learn PISH? If they can, then we would see the deductive character of the learning theory. If they cannot, then we would both see the deductive character of the learning theory, and isolate a piece of the general theory of grammar that licenses those deductions. In other words, if PISH cannot be learned, then it must be innate (or follow deductively from something else, either learned or innate) so that we can explain how children come to generalize in just the right way.

Let us repeat the conclusion. As long as the learner knows the PISH, then the predicate-argument asymmetry follows deductively. The learner requires no experience with *wh*-phrases containing reflexives in order to reach the correct generalization.

This argument says only that learners must know PISH prior to encountering sentences like (2). It doesn't yet require that knowledge to be innate. So, the poverty of the stimulus problem posed by (2) shifts to the problem of determining whether subjects are generated predicate internally.

4 Independent evidence of PISH and its acquisition

Our next question is whether we have independent support for PISH and whether the data that supports PISH can also lead to its acquisition. Several important patterns of facts argue in favor of PISH.

4.1 Scope ambiguities

The first concerns the relative scope of negation and a universal quantifier in subject position (Ladusaw, 1988; McCloskey, 1997). Consider the following sentences:

- (7)
 - a. Every horse didn't jump over the fence
 - b. A Fiat is not necessarily a reliable car
 - c. A Fiat is necessarily not a reliable car

The important thing to notice about these sentences is that (7a) is ambiguous, providing yet another constructional homonymy, but that neither (7b) nor (7c) is. (7a) can be interpreted as making a strong claim that none of the horses jumped over the fence or a weaker claim that not all of them jumped. This ambiguity concerns the scope of negation. Does the negation apply to something that includes the universal or not? If it does, then we get the weak reading that not all horses jumped. If it does not, then we get the strong reading that none of them did.

How does this scope ambiguity arise? The case where the subject takes scope over negation is straightforward if we assume (uncontroversially) that scope can be read directly off of the hierarchical structure of the sentence. But what about the reading where negation takes wide scope? We can consider two possibilities. First, it might be that the negation can take the whole sentence in its scope even if it does not occur at the left edge of the sentence. But this possibility is shown to be false by the lack of ambiguity in (7c). If negation could simply take wide scope over the entire sentence independent of its syntactic position, then we would expect (7c) to be ambiguous, contrary to fact. (7c) just can't mean what (7b) does. The second possibility is PISH: the structure of (7a) is really (8), with the struck-out copy of every horse representing the unpronounced residue of the subject-predicate relation:

(8) every horse didn't [~~every horse~~] jump over the fence

Given that there are two positions for *every horse* in the representation, we can interpret negation as either taking scope relative to either the higher one or the lower one.

Is there evidence in speech to children concerning the ambiguity of (7a)? If there is, then that might count as evidence that they could use to learn PISH and hence solve the poverty of the stimulus problem associated with the predicate-argument asymmetry. Here we run into two difficulties. First, Gennari and MacDonald (2006) show that these sentences do not occur in speech to children (and are pretty rare in speech between adults). Second, when we present such sentences to preschoolers, they appear to be relatively deaf to their ambiguity.

Several studies on the acquisition of quantification have shown that when given a Truth Value Judgment Task (TVJT), preschoolers, unlike adults, display a strong preference for the isomorphic interpretation of sentences like (19-20) (Musolino (1998), Musolino et al. (2000), Lidz and Musolino (2002), Musolino and Gualmini (2004), Noveck et al. (2007), among others). This isomorphism is not strictly grammatical, however (Gualmini et al., 2008; Musolino and Lidz, 2006; Viau et al., 2010). Rather, under certain discourse conditions, children's ability to detect the nonisomorphic structure may appear. Conroy (2008) and Viau et al.

(2010) argue that the isomorphic interpretation is children's first interpretation and that children's well known difficulty with revising structure (Trueswell et al., 1999) makes it difficult for them to access the nonisomorphic interpretation.

So, even if such sentences did occur in speech to children, their dominant interpretation from the children's perspective is the one where the subject scopes over negation (even when that interpretation is not consistent with the context or the intentions of the speaker) and so this potential evidence is unlikely to be perceived as evidence of PISH. And if PISH is not learned from that, then we are left with a mystery of how it comes to be responsible for the pattern of facts in (2).

4.2 Bare plurals

A second argument in favor of PISH concerns the interpretation of bare plural subjects (Diesing, 1992), like in (9)

- (9) Linguists are available (to argue with)

This sentence is ambiguous between a generic and an existential reading of the bare plural subject (Carlson, 1977). Under the generic reading, it is a general property of linguists (as a whole) that they are available. Under the existential reading, there are some linguists who are available at the moment.

Diesing observes that these two interpretations are associated with different syntactic positions in German, as illustrated in (10).

- (10) a. ... *weil ja doch Linguisten Kammermusik spielen*
 since PRT PRT linguists chamber music play
 ‘...since there are linguists playing chamber music.’
- b. ... *weil Linguisten ja doch Kammermusik spielen*
 since linguists PRT PRT chamber music play
 ‘...since (in general) linguists play chamber music.’

The existential interpretation arises when the subject occurs inside the VP (i.e., to the right of the VP-level adverb *ja doch*), providing evidence for the availability of a VP-internal subject position crosslinguistically. The generic interpretation arises when the subject occurs outside of VP (i.e., to the left of *ja doch*).

Diesing argues that we can capture a cross-linguistic generalization about the interpretations of bare plural subjects by positing that the same mapping between position and interpretation occurs in English. The difference is that in English,

the existential interpretation is associated with the unpronounced residue of the subject inside the predicate. PISH allows us to link the German and English facts together in a way that PISH-less theory would not. So we can take it as evidence for PISH.

Let us turn now to acquisition. Should learners take evidence of existential interpretations of bare plural subjects to be evidence of PISH? Maybe, if they already know something about how positions relate to interpretations. But in the end, the issue is moot because (Sneed, 2009) showed that in speech to children, bare plural subjects are uniformly used with the generic interpretation. How children come to know about the existential readings is itself a poverty of the stimulus problem (and one that could also be solved by antecedent knowledge of PISH and the rules for mapping from syntactic position to semantic interpretation). So, if we think that the predicate-argument asymmetry whose acquisition we are trying to explain follows from PISH, then we still need a source for PISH in speech to children.

4.3 Active-passive coordination

A final argument in favor of PISH comes from Burton and Grimshaw (1992). These authors show that it is possible to coordinate an active and a passive verb phrase:

- (11) Norbert insulted some psychologists and was censured

The argument takes advantage of three independent generalizations. First, passives involve a relation between the surface subject and the object position of the passive verb, represented here by the invisible residue of Norbert:

- (12) Norbert was censured [~~Norbert~~]

Second, extraction from one conjunct in a coordinated structure is ungrammatical (Ross (1967)'s Coordinate Structure Constraint):

- (13) * Who did [Norbert criticize the book] and [Jeff insult ~~who~~]

Third, extraction from a conjunct is possible as long as the extracted phrase is associated with both conjuncts (Across The Board extraction, Ross 1967):

- (14) Who did [Norbert criticize ~~who~~] and [Jeff insult ~~who~~]

So, if there were no predicate internal subject position in (11), then we would have the representation in (15):

- (15) Norbert [_{T'} insulted some psychologists and [_{T'} was censured [~~Norbert~~]]

This representation violates the coordinate structure constraint and so the sentence is predicted to be ungrammatical, contrary to fact. However, if there is a predicate internal subject position, then the sentence can be represented as an across the board extraction:

- (16) Norbert [_{T'} [_{VP} [~~Norbert~~] insulted some psychologists] and [_{T'} was censured [~~Norbert~~]]

So, we can understand the grammaticality of (11) straightforwardly if it has the representation in (15), as required by PISH.

Do sentences like (11) occur in speech to children? I don't know of any evidence about this, but I also don't think it matters. It doesn't matter because if the learner encountered (11), that datum would support either PISH or the conclusion that movement out of one conjunct in a coordinate structure is grammatical (i.e., that the coordinate structure constraint does not hold). If there is a way of determining that the learner should draw the PISH conclusion and not the other one, I don't know what it is.

5 Putting it all together

We began with the observation that a reflexive pronoun contained in a fronted argument *wh*- phrase shows different binding possibilities than one contained in a fronted predicate *wh*- phrase. We argued that this presented an analytic problem and an acquisition problem. The analytic problem is simply to explain the asymmetry. The acquisition problem is that children encounter no direct evidence about these interpretations, and hence however they come to acquire the asymmetry must involve significant projection beyond their experience.

We then argued that the analytic problem dissolves if PISH is adopted. On this view, we maintain the general theory that the binding domain of a reflexive may be established with respect to any of its positions in a derivational structure. This explains why reflexives contained inside argument *wh*-phrases can be bound either in the base or surface position of the *wh*- phrase. In the case of predicate *wh*-phrases, the predicate-internal subject position (containing an unpronounced copy of the subject) is carried along with the *wh*-phrase. Consequently, a reflexive

contained in that *wh*-phrase will always find its binding domain defined as the *wh*-phrase itself, and hence must be bound by the predicate internal subject. This explains the lack of ambiguity of sentences like (5).

Further, we argued that antecedent knowledge of PISH would explain how children acquired the predicate-argument asymmetry. If children know that the surface subject is a derived position, then the predicate-argument asymmetry would follow deductively, as described above. We then asked whether this asymmetry could be acquired from experience. We considered three phenomena that provide independent support for PISH and showed that none of these provide a likely database from which children could discover PISH. In each case, the relevant data that would force the child to reach that conclusion is lacking from children's experience. Thus, we are led to the conclusion that PISH is innate.² Given that everyone seems to acquire grammars containing PISH, but that children do not encounter experiences that would provide evidence for PISH, it must be that PISH-less grammars are impossible for children to construct.

6 Final thoughts

The central ideas of *Syntactic Structures* continue to resonate 60 years after its publication. Perhaps the most important analytic proposal in *Syntactic Structures* is the introduction of transformations, the idea that a phrase structural analysis of a sentence does not exhaust its syntactic structure. Instead, a sentence can be viewed as a sequence of phrase structure analyses, which together define the syntax of that sentence. On top of the analytic proposals, *Syntactic Structures* also took steps towards identifying considerations of explanation in linguistics, noting that we should aim to justify a grammatical proposal not simply with respect to coverage in that language, but also with respect to a more general grammatical vocabulary in which all analyses are couched. This move towards identifying the criteria of explanation in linguistics set the stage for placing grammatical theory in the domain of human psychology. The problem that linguists face in justifying grammatical analyses are equally faced by children learning their language. If we view a grammar as a kind of knowledge, then children must construct this knowledge based on evidence that is only a shadowy reflection of the grammar that

² Logically, another possibility remains, namely that the predicate internal subject hypothesis is not itself innate, but derives from a more general feature of grammars (either learned or innate). Since I know of no arguments deriving this hypothesis from other features of grammar, we leave the discovery of such a feature for others to pursue.

generated it. Viewed this way, *Syntactic Structures*, despite never mentioning human psychology, was the first step towards a rationalist computational theory of mind. It set up the hypothesis that children's grammatical knowledge is severely constrained by a Universal Grammar that defines the space of possible grammars (Chomsky, 1965), which illustrated what a computationally explicit and innately structured theory of the human mind could look like in one domain. This illustration opened the possibility that such immanent structure could be found in many domains of the mind, an idea whose consequences we are continuing to grapple with today both within linguistics and across the cognitive sciences.

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