

# The Incoherence of Chomsky's 'Biolinguistic' Ontology

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## 1. Background

I am indebted to the editors of *Biolinguistics* for their unsolicited invitation to comment in this forum along with John Collins. A bit of background. 2004 saw the publication of a book of mine whose chapter 11 explicated the harsh claim that a selection from the work of Noam Chomsky *was the most irresponsible passage written by a professional linguist in the history of linguistics*. The only justification would depend on the claim being both essentially correct and important. Given the extraordinarily influential (even dominant) role which Chomsky's work has uncontroversially played in the linguistics of the last half century, if the claim of massive irresponsibility is true, there is no way it could fail to be important, at least to linguists. For it would support the view, central to Postal (2004), that much of the persuasive force of Chomsky's linguistics has been achieved only via a mixture of intellectual and scholarly corruption.<sup>1</sup> So one would only need to focus on issues about the truth of the claim. But I do not intend to revisit directly the responsibility issues of chapter 11; anyone concerned with them can refer to the original. Such a move is in any event unmotivated, since Collins's remarks do not address *most* of the criticism in chapter 11 and none of that in other chapters (and of course nothing from Levine & Postal 2004).

Rather, the present goal is only to briefly indicate why Chomsky's ontological position, his so-called biolinguistics, is *absurd*.<sup>2</sup> The issues of irresponsibility and Chomsky's ontological position are closely intertwined. It is, I suggest, the hopeless quality of Chomsky's ontology which underlies the irresponsibility addressed in chapter 11. For the failures of intellectual standards I invoked involved remarks aiming to justify his ontological view. If Chomsky had a *defensible* position on this matter, he presumably would have defended it seriously over something like the four decades (see fn. 14 below) since he began advancing it. This would have required addressing the extremely strong critiques made of it; these have previously multiply accused the position of being

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I am greatly indebted to Shalom Lappin and Geoffrey K. Pullum for very helpful discussion of the issues of this article. All errors and inadequacies are mine.

<sup>1</sup> A view even more explicit in Levine & Postal (2004).

<sup>2</sup> Incidentally, it is not improper to issue such a characterization *prior to* justification in this article because it has been justified in much previous work cited below, which Chomsky has ignored. Section 4 documents another, ironic, reason.



incoherent.<sup>3</sup> But such responses are inexistent. Instead one has throw away passages like that criticized in chapter 11 and occasional defensive remarks by *others* favorable to Chomsky's ideas. Collins's contribution here seems to fall into this latter pattern. From this perspective, these comments are mostly substantively repetitive. Perhaps though they may help familiarize an audience unaware of the previous work with some of its essential points.<sup>4</sup>

## 2. Oddities

It is odd for my opposite in the present exchange to be anyone other than Chomsky. For a reader might ask this. As the target of a vitriolic and shocking accusation like that addressed against Chomsky in Postal (2004: chap. 11), one appearing in a refereed volume published by one of the most prestigious university presses in the world, would *they* not seek to vigorously refute the charge? But in the intervening five years, Chomsky has, to my knowledge, not even mentioned the criticism; ditto for the uncompromising criticism in Levine & Postal (2004). By exercising his undeniable right of silence here, Chomsky leaves unimpeded the inference that he has not attempted a refutation because he cannot; see fn. 9 below for the substanceless alternative which Chomsky has adopted. In the present discussion, Collins has then chosen to defend something its own author is unwilling to.

It is equally odd that any remarks of *mine* should appear in a journal named as is this one. For my view is that not only is there no such thing as biolinguistics as this term is understood in the work Chomsky has influenced, *there cannot be such a thing*. The reasons are the same as those precluding there being a biomathematics or a biologic understood in the same way.<sup>5</sup> The objects treated in these latter fields are not physical objects, ipso facto not biological objects. And so it is with those treated in linguistics proper. These are natural languages (NLs), which like numbers, propositions, etc. are abstract objects, hence things not located in space and time, indeed not located *anywhere*. They are also things which cannot be created or destroyed, which cannot cause or be caused. Rather, NLs are collections of other abstract objects normally called *sentences*, each of which is a set. This view defines a contrasting ontology of NL one can, following Jerrold J. Katz, its modern developer, call the *realist view*.<sup>6</sup> What preceded in this

<sup>3</sup> See Langendoen & Postal (1984: chap. 6), Katz & Postal (1991), Katz (1996), and Postal (2003, 2004: chap. 11).

<sup>4</sup> Anyone interested in the ontological matters touched on here is advised to consult the works of Jerrold J. Katz listed in the references. Those writings manifest substance and quality of argument at an incomparably higher intellectual level than the material criticized here.

<sup>5</sup> Were mathematics biological, brain research might resolve such questions as whether *Goldbach's Conjecture* is true. Were logic biological, one might seek grants to study the biological basis of the validity of the principle of *Modus Ponens*. The ludicrous character of such potential research is a measure of the folly of the idea that these fields study biological things. One aspect is that a biological grounding of such fields would render their truths *contingent*, mere empirical properties of human nature, like facts about the normal range of blood pressure, etc. That clashes utterly with the recognized *necessary* nature of e.g. *Modus Ponens* and similar principles, which gives them *inter alia* their prescriptive force.

<sup>6</sup> Katz's terminological choice was not persuasive definition. Rather (see Quine 1953: 14), *realism* names one of the three main mediaeval points of view regarding universals, that

paragraph was not a defense of the realist view, only a brief exposition of its essence.

The realist ontological position evidently contrasts utterly with Chomsky's biolinguistic one. The driving force behind my 2004 concern with the passage chapter 11 analyzed was my perception of irresponsibility in the way Chomsky had dealt with earlier criticisms of his own position advanced by advocates of the realist view. Nothing has changed since. Chomsky (2005) repeats the same sort of things at issue in chapter 11 without citation of any of the criticisms arguing his views are incoherent.

### 3. Chomsky's Biolinguistic View

The underlying substantive question of the ontological character of NL is an unavoidable topic for linguists. It concerns such issues as what sort of things NL sentences are, where they stand in the universe of objects, how they relate to other things which have a connection to NL — knowledge of NL, use of NL, physical structures involved in the learning and use of NL, etc.

To these deep and complicated issues the realist position, like Chomsky's biolinguistic one, offers basic answers. My goal here is *not* to as such defend the realist position; see e.g. Katz (1981, 1984, 1996, 1998), Katz & Postal (1991), Langendoen & Postal (1984: chap. 6), and Postal (2003, 2004: chaps. 11, 13) and Carr (1990). Rather, I seek only to (re)show that what Chomsky has called the biolinguistic view is not even a serious *competitor* for the correct ontology of NL. Such a demonstration supports the realist position only indirectly by eliminating one alternative.

Typical formulations of Chomsky's biolinguistic view of NL spanning almost a quarter century are multiply available:

(1) Chomsky (1983: 156–157)

In contrast, a mentally represented grammar and UG are real objects, part of the physical world, where we understand mental states and representations to be physically encoded in some manner. Statements about particular grammars or about UG are true or false statements about steady states attained or the initial state (assumed fixed for the species), each of which is a definite real-world object, situated in space-time and entering into causal relations.

(2) Chomsky (2000a: 5–6)

The approach is 'mentalist,' but in what should be an uncontroversial sense. It is concerned with 'mental aspects of the world', which stand alongside its mechanical, chemical, optical and other aspects. It undertakes to study a real object in the natural world — the brain, its states, and its functions.

(3) Chomsky (2000b: 8)

We can take a language to be nothing other than a state of the language

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view, often called Platonist.

faculty. [...] So let's take a language to be (say, Hindi or English or Swahili) a particular state attained by the language faculty. And to say that somebody knows a language, or has a language, is simply to say their language faculty is in that state. [...] The language, in that sense, provides instructions to the performance systems. [...] There is another assumption that comes along: [I]t does it in the form of what are called 'linguistic expressions'. [...] The technical terminology for that is that the language generates an infinite set of expressions; that is why the theory of a language is called a 'generative grammar'.

(4) Chomsky (2005: 2)

The biolinguistic perspective views a person's language as a state of some component of the mind, understanding 'mind' in the sense of eighteenth century scientists who recognized that after Newton's demolition of the only coherent concept of body, we can only regard aspects of the world 'termed mental' as the result of "such an organical structure as that of the brain" (Joseph Priestly).

This view is abstracted from any linguistic substance, by which I mean the sort of facts which actual linguistic research (including that by Chomsky) deals with. There is little exegesis of how this philosophical position relates to facts like those subsumed by island constraints, conditions on parasitic gaps, binding issues, negative polarity items, etc. The gap involves the sort of entities linguistics studies, entities normally called *sentences*, a term Chomsky tends to avoid in recent years in favor of substitutes like *expressions*. The issue arises of what the ontology says about such objects. Details aside, since NLs are taken as biological, associated with brains, internal to Chomsky's view, sentences have to be aspects of brains. And there the ontology immediately crashes. For whatever goes on in brains having to do with NLs, it cannot involve sentences but only *sentence tokens*.

At one time, many linguists believed that the substance of NL was formed of utterances.<sup>7</sup> But utterances are not sentences, but merely tokens of sentences, organism-external tokens. Under Chomsky's ontology, with sentences identified with physical aspects of brains or brain functioning, he is, like the descriptivists of decades ago, talking at best about sentence tokens, not sentences, merely *brain-internal tokens*.

Sentence tokens exist in time and space, have causes (e.g. vocal movements), can cause things (e.g. ear strain, etc.). Tokens have physical properties, are composed of ink on paper, sounds in the air, electrical impulses, require energy to produce, etc. Sentences have none of these properties. Where is the French sentence *Ça signifie quoi?* — is it in France, the French Consulate in New York, President Sarkozy's brain? When did it begin, when will it end? What is it made of physically? What is its mass, its atomic structure? Is it subject to gravity? Such questions are nonsensical because they advance the false presupposition that sentences are physical objects.

Excellent accounts of the distinction between sentence and sentence token, originally due to Peirce (1958: 423), explicated in Quine (1987: 216–217) and cited in Katz (1996: 274), are represented in:

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<sup>7</sup> These were the descriptivists, like Leonard Bloomfield. See Katz (1981) for discussion.

- (5) a. Peirce (1958: 423)

There will ordinarily be about twenty *thes* on a page, and of course they count as twenty words. In another sense of the word *word*, however, there is but one *the* in the English language; [...] it is impossible that this word should lie visibly on a page or be heard in any voice.

- b. Quine (1987: 216–217)

ES IST DER GEIST DER SICH DEN KÖRPER BAUT: [S]uch is the nine word inscription on a Harvard museum. The count is nine because we count *der* both times; we are counting concrete physical objects, nine in a row. When on the other hand statistics are compiled regarding students' vocabularies, a firm line is drawn at repetitions; no cheating. Such are two contrasting senses in which we use the word *word*. A word in the second sense is not a physical object, not a dribble of ink or an incision in granite, but an abstract object. In the second sense of the word *word* it is not two words *der* that turn up in the inscription, but one word *der* that gets inscribed twice. Words in the first sense have come to be called tokens; words in the second sense are called types.

There is of course a possible NL ontology which recognizes sentence tokens but no sentences. That was in effect the view of those who took linguistics to be about utterances. And a parallel view could claim that NLs involve nothing but brain-internal tokens. *But that cannot be Chomsky's view.* Moreover, while such an ontology would be thoroughly untenable, it would be far superior to Chomsky's, since it could have at least the virtue of coherence. The most palpable reason his ontology lacks even that is this. While the assumptions of (1)-(4) determine that NL can only yield brain-internal tokens, Chomsky has for more than half a century insisted on a property of NL entirely inconsistent with taking NL to involve brain-internal (or brain-external for that matter) tokens. Specifically, he has repeated dozens of times as in (3) the claim that NL is discretely infinite:

- (6) Chomsky (1957: 13)

Each sentence is representable as a finite sequence of these phonemes (or letters), though there are infinitely many sentences.

- (7) Chomsky (2000b: 51–52)

For example, the most elementary property of the language faculty is the property of discrete infinity; you have six-word sentences, seven-word sentences but you don't have six-and-a-half word sentences. Furthermore, there is no limit; you can have ten-word sentences, twenty-word sentences and so on indefinitely. That is the property of discrete infinity.<sup>8</sup>

Chomsky's ontological position then incoherently asserts the following:

- (8) a. An NL is a physical state of the language faculty conceived as a biological object, an organ, an aspect of a brain.  
b. That organ (brain) state yields an infinite set of expressions.

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<sup>8</sup> Talk of six-and-a-half word sentences is just game playing because there are no half words.

However, anything that a physical system yields is physical. Consider a liver and its production of bile, a heart and its production of pulses of blood; all physical and obviously finite. And so it must be with any cerebral physical production. There is for Chomsky thus no coherent interpretation of the collection of brain-based expressions being infinite, since each would take time and energy to construct or, in his terms, generate (see below for common equivocation on this term), store, process, or whatever.

That taking NL to be both biological and infinite is incoherent was observed in Langendoen & Postal (1984: chap. 6) in direct criticisms of Chomsky's positions, characterized there via the terminology 'radical conceptualism'. This past century critique illuminates the substantive repetitiveness of the present remarks, motivated by Chomsky's refusal to confront the matter.

(9) Langendoen & Postal (1984: 131–132)

Even for an attested NL like English, the claim that a grammar, even a psychogrammar, generates mental representations immediately creates otherwise unnecessary fundamental problems. Evidently, either standard or radical conceptualist must minimally assume that any actual human mind or brain is finite, and thus that its very nature limits the objects which are in fact representable therein, for trivial non-linguistic reasons. Consequently, if psychogrammars generate mental representations of sentences and mental representations are, as the term suggests, things actually present in real minds, in something like the sense in which, say, data or computations are present in real computers, the radical conceptualist position claims that NL grammars have a finite output, one containing no representation of cardinality greater than some finite  $k$ . This is inconsistent not only with the traditional generative position but with claims in the very works where radical conceptualism is advocated that the domain of grammar is infinite.

The incoherence of a *biolinguistic* view claiming NL is infinite was specifically observed as well in Katz & Postal (1991: 547–548), Katz (1996), and Postal (2003, 2004: 300–301). Although constantly returning to foundational issues, Chomsky has never mentioned any of these criticisms either.<sup>9</sup>

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<sup>9</sup> Worse, he indulges in the make believe that not only are his foundational assumptions viable, but that those (always unnamed) who purport to reject them in fact nevertheless *adopt them without realizing it*.

- (i) Chomsky (1999: 33)
  - a. We study these objects more or less as we study the system of motor organization or visual perception, or the immune or digestive system.
  - b. It is hard to imagine an approach to language that does not adopt such conceptions, at least tacitly. So we discover, I think, even when it is strenuously denied, but I will not pursue the matter here.

These assertions imply that *inter alia* the authors of the works cited in e.g. fn. 3 tacitly adopt Chomsky's incoherent foundational assumptions without knowing it. But those authors have made these assumptions explicit, forcefully and repeatedly rejected them and argued for their incoherence.

Six years later, the same assertion is not only made but strengthened to a claim that the need for coherence would actually require those rejecting his ontology to adopt it.

The incoherence of Chomsky's position is worth putting slightly differently. To say a collection is discretely infinite is to say its members can be put in one to one correspondence with the members of one of its own sub-collections and also with the positive integers. What Chomsky's ontology then asserts is that the human brain component he calls FL or a particular state of it defining a particular NL embodies as aspects a collection of things which can be put in such a correspondence with the integers 1, 2, 3,.... But there can't even begin to be enough of *anything* in a human brain or its functioning to ground such a correspondence. It is no accident then that across the decades of adumbrating his biolinguistic view, Chomsky has never even sought to specify the nature of supposedly biological entities which manage to have a transfinite cardinality.

At least three different professional linguist supporters of Chomsky's biolinguistic view who have in effect addressed this criticism of the incoherence of his position in conversation or correspondence with the present author have advanced the following defense.<sup>10</sup> This grants that while a finite physical system cannot *actually* assemble an infinite number of expressions as elements of the physical world, it can nonetheless theoretically accomplish infinite generation under an *idealization* in which time and physical constraints are eliminated. This possibility putatively exists because the physical structure embodies a recursive system of rules, which jointly specify an infinite collection if given the 'resources'.

Such an account involves though illegitimate equivocations on the concepts idealization, recursive, rule and generate. The invocation of the first has nothing in common with its sensible use, as when in making certain practical physical calculations one idealizes to a system in which there is no friction. The 'idealization' here is rather parallel to one which claims the solar system has an infinity of planets (e.g. of tinier and tinier sizes filling the spaces between the usually cited planets). Actually, this silly 'idealization' is sounder than the one at issue, since at least, all the putative (though nonexistent) entities are physical.

Second, nothing physical is a rule or recursive. Physical things are destructible, recursive functions not. At best a physical structure can encode rules. But that involves an interpretation of physical things as representing particular abstractions, something Chomsky's explicit brain ontology has no place for. And, as discussed in Postal (2003), Chomsky's view here amounts to a pun on the word *generate*. Standard formal theory use of this item refers to a relation between two sets, sets being nonphysical objects; see e. g. Partee, ter Meulen & Wall (1993: 435) and below. Such things do not exist in space or time,

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(ii) Chomsky (2005: 2)

The decision to study language as part of the world in this sense was regarded as highly uncontroversial at the time, and still is. A more careful look will show, I think, that the arguments advanced against the legitimacy of the approach have little force (a weak thesis) and that its basic assumptions are tacitly adopted even by those who strenuously reject them, and indeed must be, even for coherence (a much stronger thesis).

But unlike the earlier realist documents I have cited and unlike the present one, Chomsky's claims here are of course entirely unsupported by argument.

<sup>10</sup> Some suggested that Chomsky has at least implied something like this defense in conversations and lectures. But since such a formulation has not to my knowledge appeared in any publication, I do not attribute it by name to anyone.

thus are not subject to the laws of nature. That is why assumptions that some are infinite raise no problems of coherence. However, in quotes like (3), *generate* is used in the sense of a relation between a physical object and some physical outputs, roughly as a synonym of *produce*. But every physical production takes time, energy, etc., and an infinite number of them requires that the physical universe be infinite and, internal to Chomsky's assumptions, that the human brain be.<sup>11</sup>

The inadequate defense of Chomsky's infinite brain output ontology hinges on a failure to specify seriously the ontological nature of NL sentences (expressions). The view essentially also equivocates on both the notions expression/sentence and grammar. On the branch where a putatively biological NL is a physical thing, the expressions it 'generates' are also physical; each has time and space coordinates; they have to be some kind of *tokens*. But on the branch of the equivocation where the biological NL 'ideally' generates an infinite collection, most of the 'expressions' in the collection cannot be physical objects, not even ones in some future, and the NL cannot be one either.<sup>12</sup>

Under the supposed idealization, the elements said to be generated divide into two distinct types. Those limited enough in size and small enough in number to be given a physical interpretation can at least be made grossly consistent with a biological perspective (by conflating sentence and sentence token). But almost all sentences are too complex and too numerous even for that and thus must be given a distinct interpretation. In effect, a distinction is made between real sentences and merely 'possible' ones, although this 'possibility' is unactualizable *ever* in the physical universe. According to the biological view, that is, the supposedly 'possible' sentences are, absurdly, actually biologically impossible. Thus internal to this 'defense' of Chomsky's biolinguistic view, the overwhelming majority of sentences *cannot be assigned any reality whatever internal to the supposed governing ontology*. This means the ontology can only claim NL is infinite because, incoherently, it is counting things the ontology cannot recognize as real. In effect, despite a perhaps enticing conceptual packaging, in talking about the idealization and infinite output, the attempted defense of Chomsky's biolinguistics abandons its physicalist (biological) basis but does this *surreptitiously* by adopting inconsistent assumptions about the nature of expressions, NLs, rules, and grammars.<sup>13</sup>

<sup>11</sup> Were it true that Chomsky's linguistics, which claims that NL is both biological (hence an element of the physical universe) and yet infinite, has shown that NL is infinite, then, it *has shown that the physical universe is infinite*. Would a physicist even bother to laugh!

<sup>12</sup> Everett (2005) claimed rightly that if NL were biological, syntactic trees should be visible in CAT scans. Anderson & Lightfoot (2005) reject this idea, speculating that it "seems to reflect more on the adequacy of current brain imaging techniques than it does on the nature of language" (p.81). But this defensive speculation is ungrounded at best. They give no idea of what physical structure they imagine NL sentences have that could be scanned, no indication of where the supposed limitations of current scanning technology lie, hence none about what scanning progress is supposedly required. Electron microscopes can provide images of individual atoms. As in Chomsky's writings, missing is an appreciation of the logical gap between physical and abstract objects. That renders the idea of physically scanning sentences as illusory as that of scanning *Syntactic Structures*, contrasted with the perfectly possible scanning of one of its tokens (copies).

<sup>13</sup> The fallacious character of the argument considered here was in effect already dissected in [a](#)



One could put the matter still differently. The proposals at issue here defend a biolinguistic view which incorporates the infinity claim only under a counterfactual. That is, if there were infinite time and the human brain were infinite, then a biological production of tokens could have an infinite output. But real inquiry is not concerned with things which could exist if the world were different than it is. One cannot justify a claim that there are perpetual motion machines via a counterfactual conditional.

Almost as if to *emphasize* the incoherence of his view of NL, Chomsky has recently stated:

(10) Chomsky (2005: 4)

Universal Grammar (UG) [...] must provide [...] means to construct from these lexical items the infinite variety of internal structures that enter into thought, interpretation, planning, and other human mental acts, and that are sometimes put to use in action, including the externalization that is a secondary process.

Here Chomsky says flatly that an *infinite* variety of internal structures *enter into thought and other human mental acts*. But that entails that human mental acts are infinite, an incoherent consequence for anyone who, like Chomsky, takes the human mind to merely be some aspect of the very finite human body and lifespan; see (4). Again, Chomsky systematically confuses NL sentences, which are abstract and possessed of no location internal or external to minds, with some kind of mental representation or physical coding of (a very finite) subset of them.<sup>14</sup>

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Katz (1996) (irrelevantly in terms of the type/token issue for *mathematics*). Due to space limitations, I only excerpt one passage.

(i) Katz (1996: 275)

Less canny nominalists than Quine and Goodman have said that the term 'expression' means 'possible expression token'. There are, of course, now enough tokens for all the mathematical objects, but only because of the non-actual ones among them. The non-actual ones make the numerical difference. But, from a nominalist standpoint, a non-actual possible token is an unacceptable entity if anything is. Expressions destined to occur at some time and place in the future, even in the distant future, can be legitimately regarded as tokens, as it were, *sub specie aeternitatis*. But expression tokens fated never to occur — because there simply isn't enough matter in the universe — cannot be legitimately regarded as tokens in any sense. Since the customary notion of a token is that of a concrete thing which instances a type, a never to be actual token is, strictly speaking, a contradiction in terms.

<sup>14</sup> Tracing the *origin* of Chomsky's biolinguistic foundational doctrine is hard. Katz (1981) showed to be mythical the widespread idea that this dates to the *beginning* of his linguistic work by noting (i):

(i) Chomsky (1955: 21–22)

I think that there is hope of developing that aspect of linguistic theory being studied here on the basis of a small number of operational primitives, and that introduction of dispositions (or mentalistic terms) is either irrelevant, or trivializes the theory.

Katz observed that this entirely non-mentalistic view, inconsistent with all of Chomsky's recent decade talk of NL as mental/biological, is absent from the published 1975 version of

One other point is worth making about any claim that NL is both biological and infinite. Chomsky claims (see fn. 9) that in his perspective one studies NL like biologists study the digestive system; see fn. 9. This is ludicrous in many ways, notably as an account of Chomsky's own work in linguistics, which nowhere resembles biological research. To see this clearly, one should consult actual pieces of biological science. One might (thanks to David E. Johnson for this reference) look at Hokkanen (1986), a study of how physical constraints and laws limit the maximum weight of an animal living on the land portion of the earth. Similarities with any work by Chomsky appear to be zero.

I am unaware of any reports by Chomsky of his use of x-ray machines, microscopes, tissue samples, and so on. So in total contrast to actual biological science, in four decades he has not specified *a single physical property* of any linguistic object, not surprisingly from a realist point of view, since they have no such properties. The illusory nature of Chomsky's claim is palpable with respect to claims of infinity. What is supposed to be the *empirical* evidence for it? Chomsky provides nothing of the sort.<sup>15</sup> Moreover, he could not, since, as argued above, the claim of biological infinity is incoherent and there can be no empirical evidence for an empirical impossibility. See the discussion of the *Veil of Ignorance Argument* in Katz (1990) and Katz & Postal (1991).

While the clash between Chomsky's jointly held views that NL is biological and infinite is the most blatant incoherence in his ontology, it is by no means the only one. Consider:

(11) Chomsky (2005: 11)

An elementary fact about the language faculty is that it is a system of discrete infinity. Any such system is based on a primitive operation that takes  $n$  objects already constructed, and constructs from them a new object: [I]n the simplest case, the set of these  $n$  objects. Call that operation Merge.<sup>16</sup>

Merge is according to Chomsky the essence of human syntax. And yet he describes it in *set-theoretical terms*. See also:

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this work, which postdates Chomsky's adoption of the psychological/biological point of view. The excision was one basis for the myth mentioned above. While Chomsky's *right* to exclude (i) is unchallengeable, what function did it serve other than obfuscating the real history?

A key element of Chomsky's biological view development is found here:

(ii) Chomsky (1972: 169, n.3)

Since the language has no objective existence apart from its mental representation, we need not distinguish between 'systems of beliefs' and 'knowledge,' in this case.

Besides its clash with (i), view (ii), central to all of Chomsky's ontological thinking since, was merely dogmatically asserted, not argued or defended.

<sup>15</sup> The most he ever offers is discourse like (7), which doesn't qualify as any kind of science. Pullum & Scholz (2005) call claims like that in (7) *the standard argument*, and argue it is fallacious.

<sup>16</sup> The unclear claim that discretely infinite collections are 'based' on some operation is completely unsupported. They can, as in e.g. Peano arithmetic, be regarded as collections characterized by some finite set of axioms.

## (12) Chomsky (2005: 15)

With minimal technical apparatus, a syntactic object  $X$  with label  $A$  can be taken to be the set  $\{A, X\}$ , where  $X$  is itself is a set  $\{Z, W\}$ .

But even a set of concrete elements, say two pencils, cannot be found in time or space, is not subject to gravity, cannot be destroyed, etc. The space/time coordinates of each pencil could be specified, but not those of the set itself. The pencils can be photographed, x-rayed, weighed, etc., but the set cannot be physically recorded. See Quine (1987: 217–218) and Katz (1996) for further discussion of the abstract nature of sets (classes). Therefore, since Chomsky's current foundational view stipulates that an NL is an organ state, incoherence emerges from the fact that he takes NL to be set-based. For an organ state, an aspect of the spatiotemporal world, cannot 'generate' an abstract object like a set. So Chomsky's ontology provides no way in which his biological notion of NL could coherently relate to the set-theoretical claims he advances about syntactic structure. No aspect of NL can manifest both a set structure and be a biological object, as the latter have a physical structure not a set-theoretical one. Contradictorily, Chomsky is stating that sentences both do and do not exist in space/time. Viewed slightly differently, in advancing set-theoretical accounts of NL structure, Chomsky again just abandons his own *putative* ontology and proceeds, but only incoherently, as if he had a realist one which permitted him to sensibly view sentences in set-theoretical terms. That is, his ontology is evidently so awful that even *he* pays no attention to it when actually considering real linguistic matters.

The aspect of Chomsky's ontology just criticized has also been defended by supporters of Chomsky's position in private discussion. The defense claims in effect that Chomsky's appeal to formal science (e.g. his set-theoretical discussions) are no different than e.g. a physicist's appeal to mathematical formulations. In using formal structures, the defense runs, Chomsky is no more committed to claims that NL is formal than a physicist's use of mathematics involves a commitment to the abstract nature of physical reality. The flaw in this defense is that in fact Chomsky's appeal to formal science in his characterization of NL and a physicist's appeal to formal science via e.g. invocation of various complex mathematical equations are entirely distinct. For the physicist never *identifies* his equations with the physical structures characterized or conversely. But as in (11), Chomsky takes the putative biological entity to be constructing abstract objects, sets. This is entirely distinct from using some piece of formal science to describe something nonformal. And this conflation by Chomsky of formal and physical objects is one of determinants of the incoherence of his ontological position.

Space precludes discussion of other types of incoherence in Chomsky's biolinguistics. See Katz & Postal (1991).

#### 4. Irony

The untenable aspects of Chomsky's ontology have a mildly ironic character since its inadequacy *was in effect pointed out by Chomsky himself almost half a century*

ago:<sup>17</sup>

(13) Chomsky (1961: 7–8)

A grammar, in the sense described above, is essentially a theory of the sentences of a language; it specifies this set (or generates it, to use a technical term which has become familiar in this connection) and assigns to each generated sentence a structural description. It is not, however, a model of the speaker or hearer. It neither synthesizes particular sentences, as does the speaker, nor does it recognize the structure of presented sentences, as does the hearer. It is quite neutral as between speaker and hearer in this respect. [...] Notice that although the grammar  $G_i$  mastered by the user of a language is of course finite, it is not to be expected (and, in the case of natural languages, it is not in fact true) that a finite automaton *can* be constructed which will be able to accept (or generate) all and only the sentences generated by  $G_i$ , or which will be able to ‘understand’ just these sentences (i.e., give the structural descriptions assigned to these sentences by  $G_i$  as outputs, when these sentences, but not others, are provided as inputs). This is no stranger than the fact that someone who has learned the rules of multiplication perfectly (perhaps without being able to state them) may be unable to calculate  $3,872 \times 18,694$  in his head, although the rules that he has mastered uniquely determine the answer. [...] It would be *absurd* [emphasis added — PMP] to require of the grammars of (1a) that their output be the kinds of sets of strings, or sets of structural descriptions, that can be handled by strictly finite automata, just as it would be absurd to require (whether for the purposes of mathematical or psychological researches) that the rules of arithmetic be formulated so as to reflect precisely the ability of a human to perform calculations correctly in his head. Such a requirement would have neither theoretical nor practical motivation.

Among the many assumptions in passage (13) are (14a–e):

- (14) a. There are things called sentences;  
 b. these form a set;  
 c. grammars are *theories* of these sentences;  
 d. grammars *generate* the sets of sentences;  
 e. some view is absurd.

While these 1961 remarks of Chomsky’s were essentially reasonable, one can still discern definite flaws. It is erroneous to equate theories and Turing machines. Theories are sets of *statements*, not elements of a computer program. One consequence of their faulty identification is that (14c–d) confuse the issue of whether NL grammars are generative, proof-theoretical or model theoretical; see e.g. Pullum (2007), Pullum & Scholz (2001, 2005), Postal (2004: chap. 6). From the current perspective, this is a marginal issue, which I say no more about.

The major inadequacy in (13) was that while recognizing the reality of sentences and collections of them, it offered no account of the kinds of things Chomsky took sentences and NLs to be or what they are made of? This gap has

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<sup>17</sup> I had forgotten about this passage when writing Postal (2004), which did not cite the 1961 work.

been persistent; see Postal (2003: 249).<sup>18</sup> Should they be assumed to be psychological, biological, physical, abstract? And why? But his absurdity claim had definite if partial relevant implications.

In 1961 Chomsky saw as absurd any requirement that NL grammars reflect the limitations of human beings, e.g. the limitation of being able to parse expressions only up to certain lengths or complexities. This was good sense. Least importantly, those limitations reflect not properties of NL, but properties of a type of organism and, as Chomsky noted, could be partly altered, e.g. by providing external memory. There is nothing specifically linguistic about the fact that people cannot parse or produce sentences which are a million words long. The same thing also precludes e.g. additions of sequences of numbers with a million elements. It is just the inherent biophysical limitations of finite organisms, which bound every physical world activity. More importantly, if NLs are collections of abstract, set-theoretical objects, there is no coherent way that any physical limitations of human beings could determine their nature.

Nonetheless, Chomsky's later ontological position, as alluded to in Postal (2004), incorporates what Chomsky called absurd in 1961. Moreover, it does this in the absence of any argument for abandoning his earlier view, *which Chomsky has never provided*. The later position incorporates the absurdity simply because it identifies an NL with an aspect of human nature, necessarily attributing to it any and all limitations of the latter.

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<sup>18</sup> One finds only remarks like these:

- (i) Chomsky (2000a: 160)  
The representations are postulated mental entities, to be understood in the manner of a mental image of a rotating cube, whether it is a consequence of tachistoscopic presentations or a real rotating cube, or stimulation of the retina in some other way; or imagined, for that matter.
- (ii) Chomsky (2001: 91)  
No questions arise about the ontological status of the set of expressions {Exp} generated by L; its status is somewhat like that of potential visual images or plans for limb motions.

But there is no sensible comparison between the subjective, episodic, individual mental things Chomsky refers to and e.g. an English sentence, which is not subjective, not episodic and which can be known by innumerable people. My plans for limb motions are temporally limited and mine, but no English sentence is either. Katz put the matter quite nicely:

- (iii) Katz (1996: 292)  
Different speakers who intuit the fact that a sentence is well-formed or ambiguous are epistemically related to one and the same grammatical object. That object is no more one speaker's than another's. The sentence is independent of all the speakers. In contrast, different people who introspect the colour of an after-image, the intensity of a pain, or the displacement of a figure in double vision are epistemically related to different things.

Basically, (i) and (ii) simply illustrate Chomsky's failure to rationally distinguish type and token.

## 5. Sentences/Expressions as Unreal

The contradiction between Chomsky's claims that NL is both infinite and biological is, I speculate, what underlay his truly desperate claim in the passage criticized in Postal (2004: chap. 11) that *sentences are not real*.<sup>19</sup> I break the claim into two parts:

- (15) Chomsky (1999: 34)
- a. These [that is, expressions, the language faculty outputs — PMP] are not entities with some ontological status; they are introduced to simplify talk about properties of [the language faculty], and they can be eliminated in favor of internalist notions.
  - b. One of the properties of Peano's axioms PA is that PA generates the proof P of ' $2 + 2 = 4$ ' but not the proof P' of ' $2 + 2 = 7$ ' (in suitable notation). We can speak freely of the property 'generable by PA', holding of P but not P', and derivatively of lines of generable proofs (theorems) and the set of theorems without postulating any entities beyond PA and its properties.

Consider first (15a). It might seem for a microsecond that the contradiction between NLs being infinite collections of sentences and NLs being (states of) organs vanishes if there really are no sentences at all. But (15a) doesn't even begin to resolve that contradiction. Since Chomsky takes FL and its states to be finite, were there no real expressions, there would remain nothing in his ontology to have the cardinality of the integers. To say there are no sentences/expressions is to say the collection of them is the null set, which cannot be put into one to one correspondence with any other set. Or, slightly differently, (7) above says there are six word, seven word, ten word, twenty word, etc. sentences, with no bound. That is supposedly why NL is infinite. But (15a) says sentences aren't real. Thus NL in Chomsky's terms can again only be infinite because he is counting unreal

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<sup>19</sup> For while he has never addressed this contradiction seriously, he could not have been unaware of it. He himself documents such awareness. The issue arose in a question after the 1996 lecture published as Chomsky (2000b); see Postal (2003).

- (i) Chomsky (2000b: 62–63)
- QUESTION:* Infinite use of finite means; doesn't it entail an inconsistency? Isn't the model of an infinite potential in, a finite organ inherently inconsistent?
- CHOMSKY:* That was the problem until about a century ago. It did look like an inconsistency. One of the important discoveries of modern mathematics is that it isn't an inconsistency. There is a perfectly coherent sense to notion of infinite use of finite means. That is what ended up being the theory of computability, recursive function theory and so on. [...] So, yes, it looks like an inconsistency but it simply isn't. There's a very simple account of it that is not inconsistent. I can't go into it any further here.

Chomsky only addressed the irrelevance of how a finite abstract procedure can specify an infinite set. But the questioner's *organ* reference shows he addressed not that issue but rather the sense that could be made of the elements of an infinite set in organ state terms. Chomsky's implication that recursive function theory solves that problem was fakery, as that piece of formal science can say nothing about the issue.

things, utilizing ‘reasoning’ that equally demonstrates that there are an infinite number of ghosts in e.g. Buckingham Palace.

Issues of infinity aside, (15a) states that all linguistics-internal references to sentences can be eliminated in favor of purely proof-theoretic talk about grammars. If so, one would be able to translate e.g. the following into such terms, permitting the so-called elimination Chomsky invoked:

(16) The sentences *Steve likes monkeys* and *I hate monkeys* end in the same word.

Obviously such true descriptive statements are the foundation of grammatical work. Or consider:

(17) The grammatical English example *The letter was never shown her* falsifies a common view of English syntax.

This expression is the sort appealed to in linguistics to argue for and against (see Postal, 2004: 240–242) specific hypotheses. How is it to be eliminated in favor of whatever Chomsky is willing to say exists? The problem is that (16) talks about partial identity between two things Chomsky claims are nonexistent, while (17) claims that a particular object whose existence he denies is inconsistent with general properties of a right grammar. How can parts of nonexistent things be identical? How can something unreal be used to argue for or against some claim? Can ghosts falsify some theoretical physical claim?

Basically then, internal to Chomsky’s views, (15a) is *prima facie* gibberish. In all cases like (16) and (17), the burden of proof that the situation is not that falls entirely to Chomsky. And, typically, he has nowhere even tried to meet such a burden.

Turn briefly then to (15b). One must presume that by analogy, this bizarre claim is supposed to support that in (15a). Ignoring the pointless subjectivity (“We can speak freely”), all (15b) states is that one can view the derivation of theorems in formalized arithmetic proof-theoretically. No doubt. But as such that gives no ground for why the derivation of ‘ $2 + 2 = 4$ ’ and non-derivation of ‘ $2 + 2 = 7$ ’ rather than e.g. the opposite pair of derivations is desirable. Viewed proof-theoretically, these formulae are meaningless. It is potentially misleading that they are given in a notation which everyone understands how to link to statements about *numbers*. For according to (15b), numbers are exactly the entities distinct from PA and its properties which need not be posited. But if there were no numbers, there would be no (standard) interpretation of the PA formalism, no question of the truth of any of the theorems and hence no significance to what strings are derivable or not. Significance is only given by the notion truth, which is not proof-theoretic in general (although there are (complete) systems where derivability and truth are coextensive). In short, looked at in terms of interpreted mathematics rather than as an uninterpreted formalism, Chomsky’s claim about ‘without positing any entities’ is absurd.

Moreover, the notion ‘expression’ in a generative system is identified with the last lines of generated derivations/proofs. How can there even be derivations/proofs if there are no lines? But if there are such lines, it is incoherent to

state that expressions which correspond to last lines in proofs, are unreal. If they are, there are no derivations and the biolinguistic ontology makes no contact with linguistic reality at all.

## 6. Chomsky's Ontology: Summary

The inescapable conclusion is that Chomsky's ontological position is simply not serious. His twenty-five year history of ignoring the need to show how there is any consistent position claiming that NL is both biological and infinite highlights the point. I see no way to interpret his silence on this matter in the face of repeated published claims of incoherence other than as in Postal (2004: chap. 11), that is, as utterly irresponsible.

## 7. Collins's Remarks

Finally, I turn John Collins's remarks. These exist because of two different types of relevant error in Postal (2004: chap. 11). The first was my having bothered to comment on Chomsky's analogy between grammars and issues of axiomatized arithmetic in (15b) and, worse, to have pursued that to the point of invoking Gödel's incompleteness theorems. This was attempted overkill on my part; as in the preceding sections, the absurdity of Chomsky's ontology and his irresponsibility in dealing with critiques of it are perfectly documentable without mentioning anything about such theorems.

The second and graver error was my statement:

(18) Postal (2004: 303)

So, if Chomsky's remarks are correct 'not only would it be impossible to *prove* Gödel's incompleteness theorems, it would be impossible to even *formulate* them.

This was an awful and misleading formulation, and Collins is entirely correct to dismiss it as erroneous. Certainly, Collins is right that Gödel's proof was entirely formal, proof-theoretic. That is the basis of its extraordinary force. Because he showed how to represent statements *about* arithmetic, that is, meta-mathematical statements, as statements in the formalism of arithmetic (via the device of Gödelization of the symbolism of logic utilized). So certainly, contrary to (18), Gödel's incompleteness theorems are *formulated* independently of reference to a collection of truths of arithmetic.

Here is how two logicians put it:

(19) a. Quine (1987: 85)

He [Gödel — PMP] showed how, given any proper proof procedure, to construct a sentence in the notation of elementary number theory that says of itself, in effect, via Gödel numbering, that it cannot be proved. Either it is false, and provable, God forbid, or true and not provable; presumably the latter. One could strengthen the proof procedure by adding this stray truth as a further axiom; but, by a repetition of the argument, there will always be others.



## b. Hintikka (2000: 39)

What the incompleteness of formalized first-order arithmetic shows is the need of distinguishing sharply between the truth of arithmetical statements and their provability. [...] Gödel's result [...] showed that the model-theoretical notion of arithmetical truth is not exhausted by the proof-theoretical notion of formal provability.

One observes that while both Quine and Hintikka characterize the proof in proof-theoretic terms, in indicating its significance they of course reference the notion of truth. Without that reference, the proof is an uninterpreted piece of arithmetical reasoning. That is, the significance of the proof-theoretic demonstration arises because there is a notion of truth of arithmetic independent of such demonstrations.

What I intended (but failed utterly) to express adequately was that it would be impossible to state the *significance* of Gödel's purely proof-theoretic demonstration without a comparison of the incomplete collection of provable formulas with the collection of true formulas. Viewed in purely proof-theoretic terms, it is of no significance that some Gödel number is not derivable from some set of axioms. What renders it of enormous importance is that under the intended interpretation, the unprovable formula states a truth.

Once the badly misleading implications of my remark (18) are cleared away though, the mistake therein turns out to be irrelevant to the general point I was making. For what Chomsky's invocation of Peano arithmetic in (15b) was supposed to show was that it made sense to deny the reality of NL sentences, which could somehow be reduced to talk of states of FL just as it made sense to deny the reality of numbers, which could somehow be reduced to talk about arithmetical axioms. But if the analogy shows anything, it is the exact opposite. If there are no numbers independent of sets of axioms, there are no truths about them. And statements of the meaning of Gödel's proof, like e.g. Quine's or Hintikka's, become senseless. For the only way one can have the meta-mathematical conclusion that formalized arithmetic is incomplete, is by appealing to true formulas which are not provable, which requires true formulas...showing that derivability is distinct from truth. Therefore, since sensible discussion of Peano's axioms and their theorems inevitably invokes the notion of true statements about the numbers, by parity of reasoning, sensible discussion of (generative) grammars and the derivations they generate would have to involve the relation between those derivations and something else, presumably, actual NL sentences. Just as it makes no sense to think of Peano's axioms exclusively as an uninterpreted formalism, it makes none to think of NL grammars as such.

I conclude then about Collins's remarks as follows. His genuine determination of a serious error in Postal (2004: chap. 11) has no bearing on the adequacy of Chomsky's ontology and almost none on the question of the responsibility of the passage criticized by me there.

The last claim is reinforced by the fact that the attempt to absolve Chomsky's passage of irresponsibility on Collins's part must fail due to its very structure. My Chapter 11 indicated that the putatively irresponsible passage

involved *twenty* successive sentences. Each was listed and analyzed, and claims of irresponsibility were advanced about many of them. The point which Collins defends in this journal only surfaced *in sentence fifteen*. But nothing Collins says addresses anything about the others, nor anything from the other chapters. In spite of that, the last line of his submission states:

(20) Collins (2009: 104)

Postal's remarks are certainly not the most irresponsible in the history of linguistics; equally, they go no way to show that Chomsky's remarks are either.

One can only read the phrase 'go no way' in (20) as expressing the author's belief that his remarks fully refute the charge of chapter 11. But in the absence of discussion of what preceded sentence fifteen, that is evidently impossible.

To conclude, nothing interferes with the conclusion that Chomsky's promulgation of his ontological views perfectly instantiate what was called 'junk linguistics' in Postal (2004).

## References

- Anderson, Stephen R. & David Lightfoot. 2006. Biology and language: A response to Everett (2005). *Journal of Linguistics* 42, 377–383.
- Carr, Philip. 1990. *Linguistic Realities*. Cambridge: Cambridge University Press.
- Chomsky, Noam. 1955 [1975]. *The Logical Structure of Linguistic Theory*. Chicago, The University of Chicago Press.
- Chomsky, Noam. 1957. *Syntactic Structures* (Januar Linguarum, Series Minor 4). The Hague: Mouton.
- Chomsky, Noam. 1961. On the notion 'Rule of Grammar'. In Roman Jakobson (ed.), *Proceedings of the Symposia in Applied Mathematics XII: Structure of Language and Its Mathematical Aspects*, 6–24. Providence, RI: American Mathematical Society.
- Chomsky, Noam. 1972. *Language and Mind*. New York: Harcourt Brace Jovanovich.
- Chomsky, Noam. 1983. Some conceptual shifts in the study of language. In Leigh S. Cauman, Isaac Levi, Charles D. Parsons & Robert Schwartz (eds.), *How Many Questions? Essays in Honor of Sidney Morgenbesser*, 154–169. Indianapolis, IN: Hackett Publishing Company.
- Chomsky, Noam. 1999. Derivation by phase. *MIT Occasional Papers in Linguistics* 18. Cambridge, MA: MIT Department of Linguistics. [Revised version published in Michael Kenstowicz (ed.), *Ken Hale: A Life in Language* (Current Studies in Linguistics 36), 1–52. Cambridge, MA: MIT Press, 2001.]
- Chomsky, Noam. 2000a. *New Horizons in the Study of Language and Mind*. Cambridge: Cambridge University Press.
- Chomsky, Noam. 2000b. *The Architecture of Language*. New Delhi: Oxford University Press.
- Chomsky, Noam. 2000. Minimalist inquiries: The framework. In Roger Martin,

- David Michaels & Juan Uriagereka (eds.), *Step by Step: Essays on Minimalist Syntax in Honor of Howard Lasnik*, 89–155. Cambridge, MA: MIT Press.
- Chomsky, Noam. 2002. *On Nature and Language*. Cambridge: Cambridge University Press.
- Chomsky, Noam. 2005. Three factors in language design. *Linguistic Inquiry* 36, 1–22.
- Collins, John. 2009. A question of irresponsibility: Postal, and Chomsky, Gödel. *Biolinguistics* 3, 100–104.
- Everett, Daniel L. 2005. Biology and language: A consideration of alternatives. *Journal of Linguistics* 41, 157–175.
- Hintikka, Jakko. 2000. *On Gödel*. Belmont, CA: Wadsworth.
- Hokkanen, Jyrki E.I. 1986. The size of the largest land animal. *Journal of Theoretical Biology* 118, 491–499. [An OCR-scanned version is available online at: <http://www.miketaylor.org.uk/dino/hokkanen/Size-Hokkanen.html>.]
- Katz, Jerrold J. 1981. *Language and Other Abstract Objects*. Totowa, NJ: Rowman and Littlefield.
- Katz, Jerrold J. 1984. An outline of Platonist grammar. In Thomas G. Bever, John M. Carroll & Lance A. Miller (eds.), *Talking Minds: The Study of Language in Cognitive Science*, 17–48. Cambridge, MA: MIT Press.
- Katz, Jerrold J. 1996. The unfinished Chomskyan revolution. *Mind and Language* 11, 270–294.
- Katz, Jerrold J. 1990. *The Metaphysics of Meaning*. Cambridge, MA: MIT Press.
- Katz, Jerrold J. 1998. *Realistic Realism*. Cambridge, MA: MIT Press.
- Katz, Jerrold J. & Paul M. Postal. 1991. Realism vs. conceptualism in linguistics. *Linguistics and Philosophy* 14, 515–554.
- Langendoen, D. Terence & Paul M. Postal. 1984. *The Vastness of Natural Language*. Oxford: Basil Blackwell.
- Levine, Robert E. & Paul M. Postal. 2004. A corrupted linguistics. In Peter Collier & David Horowitz (eds.), *The Anti Chomsky Reader*, 230–231. San Francisco, CA: Encounter Books.
- Partee, Barbara H., Alice ter Meulen & Robert E. Wall. 1993. *Mathematical Methods in Linguistics*. Dordrecht: Kluwer.
- Peirce, Charles S. 1958. *Collected Papers of Charles Sanders Peirce*, vol. 4. Cambridge, MA: Harvard University Press.
- Postal, Paul M. 2003. Remarks on the foundations of linguistics. *The Philosophical Forum* XXXIV, 233–251.
- Postal, Paul M. 2004. *Skeptical Linguistic Essays*. New York: Oxford University Press.
- Pullum, Geoffrey K. 2007. The evolution of model-theoretic frameworks in linguistics. In James Rogers & Stephan Kepser (eds.), *Model-Theoretic Syntax at 10 – Proceedings of the ESSLLI 2007 MTS@10 Workshop, August 13–17*, 1–10. Dublin: Trinity College Dublin.
- Pullum, Geoffrey K. & Barbara C. Scholz. 2001. On the distinction between model-theoretic and generative-enumerative syntactic frameworks. In Philippe de Groote, Glyn Morrill & Christian Retoré (eds.), *Logical Aspects of Computational Linguistics: 4<sup>th</sup> International Conference – LACL 2001 (Le Croisic, France, June 27-29, 2001) Proceedings* (Lecture Notes in Artificial

- Intelligence 2099), 17–43: Berlin: Springer Verlag.
- Pullum, Geoffrey K. & Barbara C. Scholz. 2005. Contrasting applications of logic in natural language syntactic description. In Petr Hájek, Luis Valdés-Villanueva & Dag Westerståhl (eds.), *Logic, Methodology and Philosophy of Science: Proceedings of the Twelfth International Congress*, 451–503. London: King's College Publications.
- Quine, Willard van Orman. 1953. *From a Logical Point of View*. Cambridge, MA: Harvard University Press.
- Quine, Willard van Orman. 1987. *Quiddities*. Cambridge, MA: Harvard University Press.

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