Biolinguistic Platonism remains an Oxymoron

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1. Introduction

More than thirty years ago Jerold J. Katz published the first ontological criticism (Katz, 1981) of Noam Chomsky's linguistics (henceforth CBL for Chomsky's Biolinguistics), and since then numerous publications have restated and clarified the criticism (e.g. Katz & Postal, 1991; Katz, 1996; Postal, 2003, 2004, 2009, 2012). In spite of the serious nature of the criticism, it has been largely ignored by Chomsky and occasional attempts to address it (e.g., Collins, 2009) have been unconvincing. Recently the matter has finally generated public debates (e.g., Hornstein, 2013a) and publications explicitly acknowledging the existence of such criticism (e.g., Ulfsbjorninn, 2012, Krivochen[1], 2013; Watumull, 2013). One author stated that: "a fallacy free and dispassionate[2]—if disputatious—rebuttal is necessary and proper" (Watumull, 2013, p. 1). Showing that the charge of internal incoherence is unfounded would be indeed important for anyone defending biolinguistics (BL) that is based on the same ontology as Chomsky's BL. And, given that Watumull's

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[1] Krivochen acknowledges but does not attempt to resolve the incoherence in CBL. Instead he offers an alternative account. For the purpose of evaluating CBL it is not relevant whether Krivochen's alternative succeeds, merely that he acknowledges the incoherence of CBL.

[2] It has to be noted that Watumull's rebuttal is hardly dispassionate. Throughout he engages in quite personal attacks against Postal (e.g., "for Postal this nonsense is nonfinite" p. 3, "Reductio ad absurdum, supposedly" (p. 3), "Nonsense! Postal would spout" (p. 4), "Alas, it is Postal who is confused" (p. 5), "[Postal's] objection is a non sequitur" (p. 7), "Postal must assume that our finite brains can access an infinite set of Platonic sentences" (p. 8)).. Furthermore Watumull ridicules Postal for finding it odd that Chomsky has never replied

to the criticism and insists "Biolinguistics has no single author: it is a research program pursued by numerous individually-thinking scientists subordinate to no individual however foundational and influential" (p. 1). This appears irrelevant (Postal has never denied that fact) and hypocritical because he also holds that "modern linguistics — generative linguistics (subsuming biolinguistics) — [was] established and expounded by Noam Chomsky" (Watumull, 2012, p. 224), suggesting that Postal's term 'Chomsky's biolinguistics' *is* correct.

article has been judged as "vigorous rebuttal of Postal's argument … [that] argues (convincingly in my view) that Platonism and the biolinguistic program are perfectly compatible" (Hornstein 2013b) it shall be the focus of my paper. Watumull presents the problem and its putative solution as follows:

> Prima facie, the ontologies of these levels are incommensurable: set-formation, phrases, and so on in linguistics; action potentials, neurons, and so forth in neuroscience. … The concept that unifies the research is computation — essential to which is information — and the concept that unifies computation is the Turing machine. Indeed, the beauty of the Turing machine is that in its abstractness it subsumes and thereby relates all computational primitives; *in principle* therefore it renders commensurable the computational ontologies of linguistics and neuroscience — or so I would endeavor to prove in the TPLT. (Watumull, 2012, p. 227, my emphasis)

At issue of course is whether it *is* possible, in principle, to unify the ontologies of abstract linguistic objects and concrete biological brains. Below I argue that Watumull's rebuttal fails because its author [1] seriously misunderstands several points of the Katz & Postal criticism, [2] conflates ontological issues in very much the same way that Chomsky does, and [3] relies on "simplistic prototypes of theories" (Watumull, 2012, p. 232) that are based on dubious entities like "as yet undiscovered neurobiological primitives" (Ibid., p. 227), genetically encoded "semantic primitives that recognize syntactic categories" (Ibid., p. 239), and a "genetically installed linguistic oracle" (Ibid., p. 239).

2. Preliminaries

Part of Watumull's alleged refutation seems to be based on a serious misunderstanding of the reason for (Katz and) Postal's criticism. He writes: "For Postal, language is a Platonic object, and *therefore* he concludes that the biolinguistic assumption of a physical basis for language is "absurd" (Postal 2009: 104)" (Watumull, 2013, p. 1, my emphasis). It is surprising that Watumull seems to think Postal believes Chomsky's ontology is incoherent *because* Postal holds that language is a Platonic object. Postal has repeatedly argued that Chomsky's ontology is incoherent *regardless* of whether or not Platonism is true, and this has been pointed out explicitly:

> While Postal is offering Platonism as an alternative to Chomsky's incoherent biolinguistic view, he states explicitly that the incoherence critique remains valid even if Platonism or other alternatives are rejected: "But, logically, efforts to show the superiority of a platonist view of NL to NC's biolinguistic one were unnecessary because on purely internal grounds, NC's foundational position is untenable regardless of the superiority of any other position. That holds since it is incoherent and so fails to qualify even as a rational candidate for the proper view of NL ontology" (Postal, 2012, p. 5) (Behme, 2012, p. 2)

Given that this point seems to be missed repeatedly, let me state once more explicitly that Postal holds Chomsky's ontology to be incoherent because Chomsky assumes language to be both: (i) part of the human brain (that is a finite, physical object) and (ii) based on set-theoretic objects generated by the operation Merge (e.g., "a generative grammar as being based on an operation of Merge that forms sets" (Chomsky, 2012, p. 91)). *Because (i) and (ii) cannot apply simultaneously to the same object (e.g. an I-language) Chomsky's ontology is internally incoherent*. This incoherence arises entirely independently of whether a critic defends linguistic Platonism as Postal does or linguistic naturalism as I do.

A second confusion arises when Watumull attributes to Postal the view that our brains are able to access infinity: "Postal must assume that our finite brains can access an infinite set of Platonic sentences" (Watumull, 2013, p. 8). Postal neither must nor does assume that brains can access an infinite set of Platonic sentences. Au contraire, Postal assumes that our brains only can access finite tokens. Some of these tokens can be *representations of* infinite sets. However, on Postal's view no set can be accessed directly by a brain because sets do not exist in time and space.

The Platonist position does not deny that complex mental activities are *associated with* language use and with mathematical calculation. The important point is that when we solve an equation, we do not literally manipulate, or have access to, numbers, or variables, or differential operators. Rather, we undergo a series of changes in cognitive states, which in complex and poorly understood ways faithfully *mimic* the relationships holding between the abstract objects that mathematics defines. But the Platonist denies that language *is* part

of human biology (e.g., complex mental activities) and that knowledge of language and language are identical.

3. Substance and Property Dualism

Watumull claims his arguments establish "that the ontologies of Platonism and biolinguistics—properly defined—are not mutually exclusive and contradictory, but in fact mutually reinforcing and consilient in a coherent and compelling philosophy of language" (Watumull, 2013, p. 1). He stipulates that I-language is "internal to an individual" (e.g. a biological object) and "a system of d-infnity (discrete / denumerable / digital)" (e.g., a platonic object) (Watumull, 2012, p. 224) and concedes that "prima facie, the ontologies of these levels are incommensurable… [and require] a novel and nontrivial unification" (Watumull, 2012, p. 227).

Given that platonic and biological objects are of a fundamentally different nature, any coherent ontology containing both must assume either substance dualism or property dualism. One could classify Postal's view as substance dualism. He holds that platonic objects are real, that is, exist independently of human (or any) brains, and that their essential properties are not shared by any physical object (for details see Postal, 2004, 2009). On Postal's view, languages are entirely distinct from human brains. But human brains can acquire knowledge of language, presumably based on specific properties of human (and as far as we know only human) brains. What these properties are need not to concern us here, except that they are physical properties of concrete neurobiological objects. So in Postal's ontology two fundamentally different kinds of objects exist: abstract or formal objects (e.g., languages, taken as collections of sentences) and concrete or physical objects (e.g., brains which can acquire knowledge of languages). I call this view explicit Platonism (EP).

Watumull rejects EP and holds a view I call implicit Platonism (IP). He proposes that an object (like the human brain) can have both: physical and abstract properties: "I-language has mathematical and biological aspects" (Watumull, 2013, p. 4), and he holds that "Language is a complex phenomenon: we can investigate its computational (mathematical)

properties independent of its biological aspects just as legitimately as we can investigate its biological properties independent of its social aspects" (Watumull, 2013, p. 6). Elsewhere he envisions a theory that provides formalized "definitions of linguistic primitives in order that 'linking hypotheses' (not mere correlations) to as yet undiscovered neurobiological primitives can be formed" (Watumull, 2012, p. 227). The linguistic and neurobiological primitives have distinct ontological natures, yet both are to be found in human brains. This form of dualism is also known as computationism and stipulates that the "mind is a collection of programs (or algorithms) that can be embodied ("instantiated") in either brains or machines" (Bunge, 2003, pp. 181-2). However, the notion of embodiment is not unproblematic. Computational algorithms are device-independent but the actual procedure that is instantiated in a particular device, and the way that algorithm is physically realized in available hardware can differ from device to device.

Watumull (and Chomsky as well) face an important limitation here. Their explicit goal is to provide an account of *human* language instantiated in *human* brains, to model "a specific form of human intelligence, … that of language" (Watumull, 2012, p. 223). Similarly Chomsky has focused on the study of human language for decades because by "studying *the properties of natural languages*, their structure, organization, and use, we may hope to gain some understanding of the specific characteristics of *human* intelligence" (Chomsky, 1975, p 4, my emphasis). And this goal of biolinguistics raises a problem for the purely mathematical/computational approach Watumull is taking. One of the supposed "benefits" of the computational approach is that it can ignore human biology because human biology is just one of a potentially very large number of computational platforms. But if one attempts to account for how human language is implemented in the human brain, the platform cannot be ignored. Hence for biolinguistics it is not only important to establish that 'the linguistic computational program' can be instantiated in *any* hardware but that it can be embodied in a human brain.

4. The slippery slope from IP to EP

Watumull's asserts that he is "convinced of the existence of "a Platonic heaven [of] arithmetic and [...] set theory," inter alia, that "the truths of arithmetic are what they are,

independent of any facts of individual psychology, and we seem to discover these truths somewhat in the way that we discover facts about the physical world" (Chomsky 1986: 33)" (Watumull, 2013, p. 4). The notion of a "Platonic heaven" is misleading because it suggests that there is a place in which platonic objects exist. If this were the case then platonic objects either (i) need to have a dual existence if they are *also* embodied in human brains (IP) or (ii) they exist separately from and independently of brains (EP). Watumull seems to gravitate towards (ii) when he states that linguistic objects are "reducible to or properly characterized as mathematical objects... [that in his] theory of natural language (see Watumull 2012), the quiddities that define a system as linguistic are ultimately mathematical in nature" (Ibid.). Elsewhere he postulates that his research program "give[s] the highest degree of reality to the mathematical form of I-language" (Ibid, p. 226) and that "the theory needs to be mathematical because the phenomenon (I-language, CB) is mathematical" (Ibid., p. 229).

If the essential properties of language are mathematical in nature, it seems to follow that only non-essential or accidental properties of language could be biological properties. This suspicion is confirmed by "biology is the ladder we climb to the "Platonic heaven" of linguistic Forms" (Watumull, 2013, p. 7). Watumull never attempts to provide an explanation of what *specifically biological* properties language has[3]. It turns out that there could be none. This follows from his discussion of multiple realizability: "The rules of arithmetic for instance are multiply realizable, from the analog abacus[4] to the digital computer to the brain; mutatis mutandis for other functions, sets, etc." (Watumull, 2013, p. 4). Multiple realizability requires of course that the substrate in which the computational program is 'embodied' is neutral. Were the embodiment of the program to require specific biological properties, then it would no longer be multiply realizable. This suggests that

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[3] Watumull is goes even so far to claim he has conducted "a rigorous mathematical and biological analysis *of the hypothesis* that a "computational mechanism of recursion", such as Merge, is unique to language" (Watumull, 2012, p. 236, my emphasis). He seems to believe hypotheses are the kinds of things that can be grown in petri dishes or injected with radioactive tracers and then biologically analyzed.

[4] This example is incorrect. An abacus is more accurately described as a "calculating aid" and needs to be distinguished from computers/calculators that can or do encode e.g. the rules of arithmetic (e.g. a slide rule is an analog mechanical calculator and Babbage's Analytical Engine is a digital mechanical computer). In any serious discussion of multiple realizability it is important to be precise about where the rules for doing calculations actually reside.

whatever might have been biological about Watumull's ontology can be eliminated. Seemingly he has moved all the way from IP to EP.

5. In search of biological properties

Given that for Watumull the biological properties of language are at best accidental properties, one might wonder based on what he calls his view *bio*linguistics. He offers the following definition

> Let the ontology of some research program be defined as "biolinguistic" if it assumes, investigates, and is informed by the biological basis of language… At issue here is the particular definition of biolinguistics that identifies language as I-language— i.e., a computational system (a function in intension) internal to the cognitive/neurobiological architecture of an individual of the species Homo sapiens sapiens—the properties of which are determined by the three factors that enter into the design of any biological system: genetics, external stimuli, and laws of nature (Watumull, 2013, p. 2)

And elsewhere he admits that his theory depends crucially on "as yet undiscovered neurobiological primitives" (Watumull, 2012, p. 227) and on genetically specified "oracular information" (Ibid., p. 239). Naturally, one would expect genetic research to play a dominating role in Watumull's research agenda. However, upon closer inspection it turns out that Watumull's mathematical BL shares the shortcomings of Chomsky's BL and other varieties of BL. None of these programs pay any attention to the putative *biological* properties of language. Watumull obscures this fact when he writes:

> … the theoretical and empirical contributions of the diverse subprograms in which these scientists work are so numerous and important that none can be "dominant" (Postal 2009: 104): in the intersection of cognitive science, linguistics, and the formal sciences, the formal properties and functional architecture of linguistic cognition *are* being specified; evolutionary biology *is* investigating possible homologues/analogues of language in nonhuman animals; genetics *is* discovering some of the genes entering into the development and operation of the language faculty; neuroscience *is* mapping the physical substrate of linguistic

processing; and this is but a subset of the biolinguistics program (Watumull, 2013, p. 1, my emphasis)

Here he is clearly speaking of work that is being done, not about work that should or could be undertaken in the future. However, he provides not a single example of "genes entering into the development and operation of the language faculty". This is unsurprising because no such genes have been discovered by biolinguists. He also fails to provide any example of the "physical substrate of linguistic processing" that is allegedly being mapped by neuroscience. Watumull then leaves unimpeded the inference that Postal was correct to point out that "in total contrast to actual biological science, in four decades [Chomsky] has not specified a single physical property of any linguistic object" (Postal, 2009, p. 256). But if language is a biological object, as anyone holding a BL view must assume, then language must have at least some biological, that is 'physical' properties. Furthermore, specifically biological linguistic properties must be at least in some aspect different from biological non-linguistic properties. Again though, in four decades the BL enterprise has not specified a single biological property that is uniquely linguistic.

Watumull claims throughout his article that language has biological properties but, like Chomsky, he never specifies any. Several passages illustrate the emptiness of the 'biological' commitment. First one finds "evolution has encoded within the neurobiology of Homo sapiens sapiens a formal system (computable functions) generative of an infinite set of linguistic expressions" (Watumull, 2013, p. 1). No attempt is made to specify which part of our neurobiology has the astounding property allowing the brain to "generate" an infinite set of linguistic expressions. Next, Watumull wants to establish a similarity between mathematical and linguistic encoding:

My brain (and presumably Postal's) and my computer encode a program (call it ADD) that determines functions of the form fADD $(X + Y) = Z$ (but not W) over an infinite range. Analogously, my brain (and Postal's) but not (yet) my computer encodes a program (call it MERGE) that determines functions of the form fMERGE $(\alpha, \beta) = \{\alpha, \beta\}$—with syntactic structures assigned definite semantic and phonological forms—over an infinite range[5]. These programs

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[5] This assertion begs the question of whether NL grammars are proof-theoretic or model-theoretic, an issue discussed in Postal (2004) and Langendoen and Postal (1984).

are of course limited in performance by spatiotemporal constraints, but the programs themselves—the functions in intension— retain their deterministic form even as physical resources vary (Watumull, 2013, p. 5)

But there is a significant tension in treating language as both biological and computational. If one treats language as an abstract 'computational program', then its biology is trivial (mere production details or platform neutral realizers). Watumull gestures at a difference between computers and brains that allows the former to encode program ADD but only the latter also to encode MERGE[6]. But again he fails to specify a single neurobiological property that could account for this difference between brains and computers (the former being a self-organizing analog system, the latter a fixed-architecture, programmable device with algorithmically predictable and limited effects). Instead, he continues: "I-language is a cognitive-neurobiological token of an abstract type; it "generates" sets in the way axioms "generate" theorems" (Ibid.). To say that a set of axioms "generates" a set of theorems is to conflate what the brain is doing and what an abstract network of structural relations with no temporal/spatial/causal connections to the world is 'doing'. In other words, Watumull assumes the claim (that what the brain does is the same as what the abstract Turing machine 'does') itself as the basis for defending that same claim.

This circularity is not resolved by asserting that, "we are endowed physically with a competence that does define a set that could be generated by indefinite computation" and defining competence as "the ability to handle arbitrary new cases when they arise" such that "infinite knowledge" defines an "open-ended response capability" (Tabor 2009: 162)" (Ibid.). Nothing in these assertions gives even the slightest hint of any neurobiological properties that are implicated in our putative linguistic competence. Seemingly unaware of the complete lack of *biological* content of his biolinguistic speculations Watumull continues, "I-language is a way of representing an infinite set by a finite table (a function)… I-language "would arrive at every [sentence] in some finite time, having used only a finite quantity of tape. And everything about the process could be defined by a finite

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[6] This example seems to contradict the multiple realizability claim because, apparently, only brains but not computers can encode MERGE. Charitably one can assume that the failure of computers to encode MERGE is merely contingent and that, at least in principle, computers can encode MERGE.

table." This gives a rigorous sense to the linguistic notion "infinite use of finite means." (Ibid.). One might argue about how rigorous this speculation is but it certainly does not contain any information about neurobiological properties. The peak of uninformative verbosity is reached when Watumull attempts to explain what makes an object a linguistic object: "In order for an object to be classified as linguistic, it must be generated by I-language; in other words, to be a linguistic object is to be generated by I-language. And thus I-language explains why a given natural language contains the member expressions it does" (Watumull, 2013, p. 6). This passage is not only uninformative but also question begging. Langendoen and Postal (1984) Postal (2003) argue that there are unlearnable natural languages, hence incapable of being "generated" by any actual I-language.

Finally, some of Watumull's speculations clearly leave the realm of scientific theory construction. For example:

> … the structures Merge generates in parsing (i.e. the reverse derivations the child performs in recognizing and analyzing linguistic data) necessitate querying to be interpretable (i.e. mappable into the initial (genetically determined) state of I-language). Some answers are given in the structure (e.g., those defining arrangements of phrases, etc.), obviating oracle queries; *residual answers need to be given in the genetic endowment as oracular information* (e.g., the semantic and syntactic primitives of Pinker 1984) and/or derived from mathematical law. So designed, acquisition is the process of running a bootstrapping PAC algorithm on a hierarchy of queries, the answers to which specify the setting of language-particular parameters. (Watumull, 2012, p. 240, my emphasis)

The 'oracular information' is provided by a device that is connected to a Turing machine and to which queries can be addressed and from which answers are returned. Watumull provides no biological description whatsoever of the putative genetically preinstalled oracle capable of answering noncomputable questions virtually instantly. Hence it is impossible to evaluate whether such a device could have evolved. In short, Watumull's "argument" might satisfy the intelligent design community but it has nothing to do with scientific theory construction. Because Watumull fails to anchor his speculations in human biology his "theorizing" exemplifies what Chomsky has ridiculed decades ago: "People may study

whatever abstract object they construct, as a form of mathematics. The matter has no empirical relevance, no relevance to the real world" (Chomsky, 1987, p. 35).

Despite having failed to specify a single biological property of I-language Watumull surprisingly asserts: "for mathematical biolinguistics to have defined I-language as a Turing machine is not to have confused the physical with the abstract, but rather to have abstracted away from the contingencies of the physical" (Watumull, 2013, p. 7). But in order to abstract away from contingencies, one needs first to be clear what the physical (e.g., neurobiological) properties are, and then specify which of those are eliminated for the model one constructs. That unjustified radical abstractions are highly problematic has been explicitly stated by Chomsky in his recent criticism of connectionism:

> if you take a look at the core things [connectionists are] looking at, like connections between neurons, they're far more complex. They're abstracting radically from the physical reality, and who knows if the abstractions are going in the right direction? (Chomsky, 2012, p. 67)

Yet for Watumull, dealing with actual biological properties is seemingly a waste of time. He is interested in the "making of abstract mathematical models of the universe to which at least the physicists give a higher degree of reality than they accord the ordinary world of sensation" (Weinberg, 1976, p 28, cited by Watumull, 2012, p. 226). At this point any natural scientists might wonder what is still separating Watumull's proposal from full-blown Platonism.

Watumull is not entirely unaware of how hopeless any attempt to rely on biology to account for formal linguistic properties must be: "neurobiology cannot answer the question whether some pattern is linguistic" (Watumull, 2013, p. 7). This being the case it unsurprising that he could develop his entire thesis without paying any attention to the neurobiological properties of brains. Instead of "unifying mathematical Platonism and biolinguistics" (Watumull, 2013, p. 8) he has unintentionally demonstrated that only the formal properties of language are properly called 'linguistic properties'. Hence, Watumull's thesis provides no refutation but a vindication of (Katz and) Postal's ontological view of language. Similarly, it is no challenge to claim that Postal "must assume that our finite

brains can access an infinite set of Platonic sentences" (Ibid.). Apart from insisting that knowledge of language is indirect and mediated by (linguistic) tokens, Postal makes no claims about how brains can access Platonic sentences. And, judging by Watumull's article, it would appear that biolinguists are in no position to answer this 'how' question either. Given that the putative neurobiological properties of I-language play no explanatory role in Watumull's BL ontology, they probably can be eliminated. What is left then is a full-blown Platonist ontology for language: linguistic objects have formal, mathematical properties and human brains have physical, neurobiological properties. This result might be pleasing to Postal but it does not establish that "the only author of I-language is nature" (Ibid.). I-language continues to be an internally incoherent construct of Chomsky's and other BLs "theories"[7].

6. Implications

I have argued that Watumull fails to establish that "the ontologies of Platonism and biolinguistics… [are] mutually reinforcing and consilient in a coherent and compelling philosophy of language" (Watumull, 2013, p. 1). The claim that I-language is "a concretization (an "embodiment" in the technical sense) of a mathematical abstraction (a Turing machine)" (Watumull, 2013, p. 9) remains vacuous because Watumull did not specify a single neurobiological property of the human brain that can be implicated in the alleged embodiment. It would appear that he only metaphorically unified mathematical Platonism and biolinguistics because he relied on the notion of a bodiless embodiment.

From Watumull's failure it does not follow, however, that it is impossible to provide an internally coherent foundation for BL. He clearly states that his "work and the ontology it

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[7] I am using 'theories' here and elsewhere in a non-technical sense. Given (i) that Chomsky spends a considerable amount of time attacking critics by arguing that they attribute theories or hypotheses to him when he has never proposed such and (ii) that it is virtually impossible to discern what the currently applicable title for the results of Chomsky's putative research activity is, I need to state explicitly that "theory" as used by me refers to Chomsky's theorizing work within the current BL program. If he is not theorizing but programming then it refers to his programming etc. Sadly such nit-picking is well motivated. Chomsky notoriously ridicules authors who merely use a wrong term to refer to his work: "Boden does not seem to comprehend the terms she uses" "Boden perversely insists on being wrong" (Chomsky, 2007) and focuses extensively on such alleged incompetence instead of addressing the substance of a criticism (for discussion of this unhelpful habit see also Botha, 1989:Levine & Postal, 2004; Seuren, 2004; Behme 2011, 2013)

assumes are not representative of all biolinguistic research" (Watumull, 2013, p. 1). Other biolinguists might succeed where he failed. But at the moment there seems little reason for optimism. BL is the only biological science I am aware of that has not identified specifically biological properties of its object of study. According to one of the leading proponents of BL since "the early fifties … the topic we were interested in was, how could you work [the formal science of linguistics, CB] into biology?" (Chomsky, 2012, p. 21). Given the complexity of language it would of course be unreasonable to expect that we know *all* biological properties of language by now. But it is reason for concern that seemingly in 60 years we have not discovered *any* specifically linguistic biological properties of the hypothesized language organ[8].

On the other hand, researchers working under the BL umbrella clearly have made progress in identifying and describing many non-biological properties of language that were unknown 60 years ago. Given that this progress was possible in the complete absence of any knowledge about the neurobiological properties of human brains, it cannot be ruled out that actual work in BL depends no more on biology than the work of Platonists like Katz and Postal does. Presumably for this reason Postal stated that when doing actual work on syntactic structure Chomsky is "advancing set-theoretical accounts of NL structure, [and] 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" (Postal, 2009, p. 257). Watumull has provided no motivation for working linguists to become interested in neurobiology and it remains to be shown whether there is any meaningful biological component to CBL.

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[8] Watumull's inability to specify neurobiological properties of language is quite representative for BL in general. For example one leading proponent of BL recently replied to a request to explain how the UG is encoded in the genome with: "…Does anyone really know how things like learning biases get coded in the genome? Does anyone know how the bee dance or the dead reckoning behavior of ants gets coded in the genome? But, seriously, *I don't know, or, right now, care.* That question is way above my pay grade" (Hornstein, 2012, emphasis added). Another prominent biolinguist admitted: "I don't know much about mutations" (Pietroski, 2013). The fact that one can practice (very productively) BIOlinguistics without even caring how the putative FL is genetically encoded or knowing much about mutations speaks volumes.

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