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May 2015

Leaving the myth behind: A reply to Adger (2015)

Two recent publications by Vyvyan Evans (*The Language Myth* and a short essay *There is no language instinct*[1]) have attracted unusually severe criticism from the minimalist community. While some of this criticism was presented informally in the blogosphere, David Adger (2015) published his remarks in an academic journal, making them deserving of a reply[2]. Adger alleges that Evans seriously misunderstands the commitments of Noam Chomsky and generativist linguists[3] and concludes "that the book and the article are useless for anyone coming from outside the field who wants to understand the issues" (Adger, 2015: 76). Given the long tradition of misunderstandings of Chomskyan commitments, any thoroughgoing clarification ought to be welcomed[4]. Unfortunately, Adger's remarks contribute little to such clarification because he (i) fails to evaluate Evans' work appropriately, (ii) narrowly focuses on alleged misunderstandings but provides no thorough clarification of the Chomskyan framework, (iii) reveals an inadequate understanding of issues he claims expertise in, (iv) ignores work completed outside of the

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[1] *The Language Myth* (Evans 2014a) is a general audience book, and *Real Talk: There is no language instinct* (Evans 2014b) is a précis essay loosely based on the book.

[2] This reply addresses only the remarks in Adger (2015). For a reply some of the other criticism see Evans (2015).

[3] *The Language Myth* does not directly address, nor does it seek to address, a particular theory or program argued for by Chomsky—it does use terms such as 'Minimalist Program', 'Generative Grammar', and so on. Instead, it specifically focuses on the Universal Grammar thesis, as presented by Pinker (1994), and in Pinker's later popular writing, and the associated 'worldview', as evident in Pinker's popularisation. The book presents six myths, which it claims, collectively form what it dubs the 'language myth', as presented in Pinker's popular books on language and mind.

[4] For some discussion of those misunderstandings see Behme (2014 a, b)

Chomskyan framework that casts legitimate doubt on the appropriateness of this framework, and, in related fashion, (v) fails to address specific challenges to the Chomskyan framework discussed in *The Language Myth*. Instead of overcoming those doubts, he focuses on alleged misunderstandings and terminological issues that are largely irrelevant to his conclusion that currently "the best theories we have [to provide a scientific understanding of language] are all generative" (Adger, 2015: 80). Therefore, Adger's attempted rebuttal misses not only the intended target but also leaves unimpeded the inference that he has not attempted a refutation of the substantial challenges to the current Chomskyan framework because he cannot.

1. Building cannons to kill a fly

Since its publication *The Language Myth* has generated a surprising amount of hostile attention. One leading minimalist issued a call to (intellectual) arms: "criticize this in all venues, especially where non-linguists gather. Consider it part of your linguistic public service" (Hornstein, 2014). A "panel of experts" led a public "debunking", accusing Evans of making serious errors and ignoring decades of research (Dunbar et al., 2014). Legions of minimalists invaded Evans' Facebook page and imposed an extended debate about the exact wording of rather dated Chomskyan texts on him. In addition, the publisher of Evans' book has been publicly reprimanded: "The scandal of [Evans'] published work goes beyond the work itself. The bigger scandal is that Cambridge University Press (Yes, CUP, the CUP!!) published this junk. … CUP has embarrassed itself with this book and it owes Generative Grammar an apology." (Hornstein, 2015a) and it has been suggested that "either *Language* hates 2/3 of the field (always a possibility) or the editors are filled with self-loathing …, [and] that the editors have lost all critical sense and are willing to admit the most egregious junk into its journals (Hornstein, 2015b) because *Language* plans an extended review event of *The Language Myth*. Adger's article condemns Evans for misunderstanding and misrepresenting virtually every detail of the

theoretical commitments associated with the Chomskyan enterprise while saluting the Chomskyan revolution which, he asserts, has provided the requisite tools to investigate the "function [that] powers our ability to connect meaning with sound and sign, generating the linguistic structures we use in everyday life." (Adger, 2015: 76).

One might have expected this minimalist fury to have been generated by a monumental work introducing groundbreaking research which suddenly threatens a well-established and universally accepted framework. Yet, *The Language Myth* is a relatively slender volume aimed squarely at a non-academic audience; the tone is conversational throughout and jargon kept to a bare minimum. In addition to informal summaries of scientific work, the author provides a good deal of anecdotal evidence and discussion, its presentational style and tone is that of a popular, trade book, rather than an academic monograph, and it uses snappy rhetoric to make a somewhat "dry" subject matter as appealing as possible to a wide, lay audience. True to its provocative title, the book argues that Chomskyan Universal Grammar is a myth and both points to and criticizes problems arising from the "rationalist language science" inspired by Chomsky and popularized by Steven Pinker's influential book *The Language Instinct.* Evans suggests that the narrow focus on syntax impedes progress in research on the complex phenomenon of human language, and urges that researchers ought to move beyond misleading computer analogies and modularity concepts. In support of these arguments, *The Language Myth* presents research results from a wide variety of sources (e.g. paleo-archaeology, genetic dating of ancient DNA, computer modelling, evolutionary theory, cognitive anthropology, comparative physiology, human neuroanatomical architecture, experimental psychology, field linguistics, primatology, social cognition, linguistic typology, etc.) that, Evans claims, cast severe doubts on the narrowly focused Chomskyan framework, and show the benefits of considering language as a complex trait that evolved over time, embedded in general cognition and human culture.

One can, of course, question whether the evidence presented supports the conclusions drawn and one could also object to the informal style of presentation. Works directed at the general public should be especially carefully presented. The intended audience is unfamiliar with the issues

discussed and cannot easily evaluate how the work discussed compares to other work in the field. Of course, making a scientific subject matter accessible, does lead, of necessity, to simplifying a particular topic. Hence, it is a matter of careful judgement as to how to present issues in order to remain as factually accurate as possible, while enabling lay readers to follow the gist of otherwise highly complex, and sometimes arcane theorizing, and technical discussion. If *The Language Myth* has misrepresented one side in an ongoing scientific dispute and/or misled its intended audience about the main assumptions and commitments of the Chomskyan enterprise, especially about Universal Grammar, the public should be made aware of these failings. Yet, such clarification can be provided in a factual, dispassionate manner. Given the intensity of the negative reaction to *The Language Myth* among some minimalists, the general public—the intended audience of *The Language Myth*—may, accordingly, wonder whether this volume is considered particularly threatening because it presents entirely novel challenges to the Chomskyan paradigm.

This is clearly not the case; none of the arguments presented in *The Language Myth* are unfamiliar to the working linguist. The Chomskyan paradigm (especially the *Minimalist Program*) has faced serious and sustained opposition for decades. Developmental psychologists (e.g. Tomasello, 2003; MacWhinney, 2005) and linguists (e.g. Pullum and Scholz, 2002; Sampson, 2002, 2005) have questioned the cogency of poverty of the stimulus arguments; field linguists have demonstrated that not all human languages share language universals (e.g. Evans and Levinson, 2009); syntacticians have shown inadequacies in data interpretation (e.g. Culicover and Jackendoff, 2005, Jackendoff, 2002, 2011, Johnson and Lappin, 1997; Postal, 2004, 2014, Seuren, 2004); experts on social cognition have shown how language structure is shaped by language use (e.g. Enfield and Levinson, 2006; Everett, 2012; Tomasello, 2008); computational modellers have simulated aspects of language acquisition previously claimed 'unlearnable' without the help of UG (e.g. Christiansen and Chater, 1999, Clark and Lappin, 2011; MacWhinney, 2010); cognitive linguists have developed successful alternatives to the Chomskyan paradigm, (e.g. Croft and Cruse, 2004; Evans and Green, 2006; Geeraerts and Cuyckens, 2007); evolutionary theorists have provided persuasive arguments against the

minimalist version of Chomskyan UG (e.g. Arbib 2012, Bickerton, 2014, Botha, 1999, Hurford 2011, Jackendoff and Pinker 2005, Lieberman 2013, Tomasello 2008); and linguists and philosophers have challenged the unscientific character of the 'Galilean Method' that insulates the Chomskyan paradigm from empirical falsification (Behme, 2014a, 2014b; Botha, 1981; Brame, 1984; Goldsmith 2007; Postal, 2004; Sampson, in press; Seuren, 2004).

Furthermore, it has been argued that the Chomskyan paradigm is internally incoherent (Behme, 2014a; Katz, 1996; Katz, and Postal 1991; Postal, 2009, 2012), and Chomsky himself has admitted that his linguistics rests on an ontological foundation that forces us to "accept things that we know don't make any sense" (Chomsky, 2012: 91), that his work has not produced any independently confirmed results (Chomsky, 2012: 76), that we do not know how Universal Grammar develops into a specific language because "[i]t's hopelessly complicated" (Chomsky, 2012: 54), and that, essentially, we cannot know how language evolved because even the evolution of bee communication is "too hard to study" (Chomsky, 2012: 105). Given the wealth of work questioning the minimalist paradigm and Chomsky's own admissions, it is difficult to understand why the defenders of minimalism focus so much effort on select passages of a volume that, according to their evaluation, is riddled with mistakes and based on hopelessly outdated sources[5]. Even if Evans were guilty as charged on all counts, virtually none of the problems raised by other critics and by Chomsky's own admissions would be addressed. While focussing much energy on a fairly 'soft target' —publications intended for the lay reader—Adger never responds to any of challenges to the Chomskyan paradigm presented in the technical literature cited by Evans. And, as will be shown next, even several of Adger's charges against the 'soft target' do not withstand scrutiny.

2. Who misunderstands what?

[5] Allegedly, Evans relies on "work presented in a 20 year old popular science book" (Adger, 2015: 79). Apparently Adger feels justified making such a negative judgment based on one example while ignoring virtually all of the far more recent work cited throughout *The Language Myth*.

Adger provides a long list of misunderstandings, misrepresentations, and mistakes allegedly contained in Evans' work. However, Adger's narrow focus on the Chomskyan paradigm prevents him from accurately evaluating the work he criticizes. He is seemingly unaware of much recent work in cognitive linguistics (e.g. Cognitive Grammar, some versions of Construction Grammar), computational linguistics, and developmental psychology[6], and misrepresents some of the work he cites. Most surprisingly, he also seems unaware of several Chomsky texts (e.g. Chomsky, 1975, 1980, 1999, 2002) which justify Evans' interpretation and challenge some of Adger's claims. Space considerations prevent an exhaustive discussion of all these shortcomings, so only two representative examples will be discussed.

2.1. Do linguists speak of instinct?

Adger claims that Evans' use of the term 'language instinct' is misleading because: "linguists don't use the word 'instinct' as a scientific term. … Linguists talk rather of an innate capacity triggered by, and partly shaped by, experience[7]." (Adger, 2015: 76). But, Evans did not claim that 'language instinct' is used as a scientific term. He explained that psychologist Steven Pinker popularized this term and emphasized that it is the one *he* selected in order to identify the position he argues against: "… the language-as-instinct thesis, as I shall call the language myth" (Evans, 2014: 5). No one can reasonably expect a popular book to be peppered with

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[6] Adger only cites a couple of works challenging Evans' account of language acquisition but neglects to mention the wealth of psycholinguistic work demonstrating the implausibility of the Chomskyan paradigm. The last decade has seen a massive increase in acquisition work and the majority of researchers believes now that children build a grammar in an 'item-based' way, in idiosyncratic, bottom-up fashion, rather than relying on a pre-existing set of abstract rules that guide the process in top-down fashion.

[7] This claim is misleading. Many linguists do not concern themselves with innate capacities at all. Some linguists consider language to be a cultural tool, others believe language is a formal system comprised of abstract objects. Chomsky himself stressed at a time when his framework was far more widely accepted than now "that this framework is taken seriously only by a tiny minority in the field" (Chomsky, 1982: 41). Therefore, Adger's use of the generic term 'linguist' in the above context seems comparable to that of a biologist who asserts "Birds don't fly" and then defends this odd assertion by pointing to penguins or ostriches.

scientific jargon that requires detailed explanation when, instead, familiar terms can be used as close approximation.

One might suspect that Adger is concerned, rather, that even the informal use of the term 'language instinct' may mislead the lay-reader because this term seriously misrepresents the Chomskyan commitment. In that case, one would expect that the claim (linguists do not use the word 'instinct') applies universally, and that minimalists, in particular, refrain from using such a misleading term in work directed at lay audiences. Yet, in such publications minimalists use the term instinct and/or attribute it to Chomsky. Philosopher James McGilvray writes: "Chomsky's work advances the rationalist cause considerably by … treating language - its growth and development and its internal operations - as an 'animal instinct' introduced by mutation into the human species" (McGilvray, 2012: 178). Linguist Cedric Boeckx states: "Darwin establishes connections between our ''language instinct'' (that is where the term comes from) and the abilities that for example birds display when they sing". (Boeckx, 2009: 45) and, last but not least, Chomsky writes: "A natural hypothesis is that children are born with a 'language faculty' (Saussure), an 'instinctive tendency' for language (Darwin)" (Chomsky, 2002: 7). Furthermore, one readily finds those subscribing to Chomskyan commitments making a comparison between human language and biologically determined abilities in other species: "humans are to language what birds are to flight and fish are to water" (Boeckx & Hornstein, 2009: 79), "random mutations have endowed humans with the specific capacity to learn human language" (Chomsky 1980: 36), "In Gallistel's words, in all animals learning is based on specialized 'learning mechanisms,' 'instincts to learn' in specific ways, … human language acquisition is instinctive in this sense, based on a specialized 'language organ'" (Chomsky, 1999), and "[a rational scientist] would now consider the properties of the mind that underlie the acquisition of language and common sense as biological properties, on par in this respect with those that enable a bird to build a nest or produce a characteristic song ... Humans are not adapted, in the same way, to the learning of physics" (Chomsky, 1975: 155).

Furthermore, one finds explicit reference to a 'language instinct' by linguists in their scientific work. *The Cambridge Handbook for Biolinguistics* contains a chapter titled *(Evidence for) the language instinct* (Tsimpli, 2013). In an article published in *Lingua* arguing for a 'second language instinct', one reads: "*Most language acquisition researchers* would agree that there is something akin to a language instinct for native language (L1)" (Schwartz, 1998: 133, emphasis added), and in an article in *Nature* one learns that "Darwin argued that language is an instinct, like upright posture … [and] Chomsky proposed … an innate set of mental computations" (Musso et al., 2003: 774).

These examples indicate that (i) a number of generative linguists do not share Adger's concern that the lay reader may be unduly misled by the informal use of the term 'language instinct' or by analogies between human language and animal instincts, and (ii) that the term is also used in scientific publications. On a charitable interpretation, one might grant that Adger used 'linguists' as a generic term that admits of exceptions to general rules rather than as an unrestricted universal quantifier. This charitable interpretation comes at a price though. Since linguists use the term 'language instinct' occasionally in formal and informal discourse, what justifies Adger's vehement objection to its use by Evans[8]? Of course, there might be subtle differences in the intended application of the term 'language instinct' when it is used by defenders or challengers of the Chomskyan framework. But Adger can't expect the lay reader to be aware of them, given that the term is used without qualification in formal and informal discourse alike. Adger claims that "Evans misunderstands what the basic proposal in generative linguistics is" (Adger, 2015: 77). Yet, he wastes time and printing space with terminological quibbles, instead of explaining which of the many proposals of generative linguists he considers to be 'basic'[9], or which of the many definitions of 'innate' he has in mind when vaguely referring to 'innate capacities'. Especially

[8] Apparently, Adger is also unconcerned about the use of the term 'innate language instinct' in reference to his own work. Under the headline *Born to chat: Humans may have innate language instinct* one finds a report on work by Jennifer Culbertson and David Adger which allegedly establishes that humans learning an artificial language "were consulting an internal hierarchy" (Holmes, 2014).

[9] Adger seems to equate Chomskyan linguistics with generativism. But not all generativists subscribe to minimalism and there are 'generative theories' of grammar that don't assume the Universal Grammar thesis.

the inconsistent use of ‘innate’ in the generativist literature has been the source for much confusion, and Adger misses an opportunity to clarify the issue.

2.2. Recursive turtles and libraries

Adger accuses Evans of conflating two notions of ‘recursion’ but fails to mention that Chomskyans do not use terminology consistently when discussing recursion. It has been remarked that “uncertainties concerning the role of recursion in linguistic theory have prevailed until the present day [and] that debates about such topics are frequently undermined by fundamental misunderstandings concerning core terminology” (Tomalin, 2011: 1). The topic has received a great deal of attention over the last decade. For instance, psychologist Marc Hauser, linguist Noam Chomsky and biologist Tecumseh Fitch in 2002 published an influential article claiming that the human language faculty can be conceptualized as having two components (FLB and FLN) and that “The core property of FLN is recursion ... it takes a finite set of elements and yields a potentially infinite array of discrete expressions” (Hauser et al., 2002: 1571). A few years later anthropological linguist Daniel Everett published an article in which he claimed that one human language (Pirahã) lacks this putative core property (Everett, 2005). Ever since, an acrimonious debate has raged about who misunderstands what recursion is (e.g. Nevins, et al., 2009a, 2009b; Everett, 2009; Evans and Levinson, 2009; Levinson, 2013; Legate et al., 2014; Watumull et al., 2014). Unfortunately, the by now voluminous literature about recursion has contributed little to a better understanding of the core issues. And, given that minimalists have recently even indicated that, on their view, recursion can be equated with a single computational operation: “Optimally, recursion can be reduced to Merge” (Berwick and Chomsky, 2011: 29), clarifying this issue is certainly desirable.

In general, when talking about ‘recursion’ one ought to specify whether what is at issue is (i) the class of computable functions, (ii) recursively defined functions, (iii) recursively defined grammars, or (iv) recursive structures. There are many formalizations of the intuitive notion of a

computable function, e.g. Turing machines, μ-recursive functions, Post systems, lambda calculus, combinatorial logic, and cellular automata, all of which have been proven to define the same class of functions. The class of functions characterized by these models of computation is very broad, and according to the widely accepted Church-Turing thesis, includes every computational procedure (for details see Cooper, 2003). A recursively defined function refers to a function that is, in part, defined in terms of itself, e.g. the function for nonnegative integers can be defined by recursion: (a) 0! = 1 if n =0; (b) n! = n (n-1)! if n >0. It can also be defined without recursion: n! = n (n-1) …. 1, where 0! is defined to be 1. This illustrates the point that in general, functions have various definitions. Definition by recursion is simply one type. In fact, in principle, definition by recursion is optional, and so does not describe an intrinsic property of a function. For instance, the Turing machine model of computation is an iterative one. In the more practical world of computers, at the machine code level there are no recursively defined functions. Rather one finds loops and memory structures (stacks, etc.) that keep track of where the machine is in processing.

The notion of a recursively defined grammar is ambiguous. On one reading, it refers to a grammar of rewriting rules whose rule set contains some rule(s) that can be reapplied in the course of a derivation. For example, in the grammar {S -> A B, A -> a A, A -> a, B -> S B, B-> b}, the rule S -> A B can be applied more than once thanks to the rule B -> S B, which reintroduces S, and A -> a A can be successively applied to its own output. On another reading, 'recursively defined grammar' refers to a grammar that has some operation(s) that can be applied initially to some stock of basic elements (e.g. lexical items) but then iteratively to structures previously built by the operations. Minimalist Merge is an example of this combinatorial approach. Merge is not recursive in either the sense of "defined by recursion" or the sense of a recursive rewriting grammar. When Chomsky refers to recursion in the context of minimalism, he is tacitly referring to iteration of the merge operation. Two other examples of combinatorial systems are categorical grammar and tree-adjoining grammar. For example, in tree adjoining grammar, the initial elements are trees representing basic linguistic patterns, and larger structures are built using the operations of substitution and tree adjunction. The class of grammars that

enumerate sentences either by rewriting rules or combinatorial operations has been aptly termed "generative-enumerative" by Pullum and Scholz (2001)[10]. The language (set of sentences) generated by any generative-enumerative grammar are effectively computable: there is a procedure—a computable function— using the grammar that recursively or computably lists the sentences of that language. Such languages are said to be recursively or computable enumerable[11]. In fact, unrestricted rewriting grammars are as powerful as Turing machines (and, of course, vice versa): given an arbitrary language accepted by some Turing machine there is some unrestricted grammar that generates the same language (for details see Partee et al., 1990).

Finally, recursive structures in linguistics are typically linguistic trees (but could be other structures) in which a constituent of type T occurs within a constituent also of type T. Recursive linguistic trees could be right branching, left branching, or center-embedded (or some mixture). These recursive structures have received a lot of attention in the linguistic and psychological literature (e.g. Christiansen and Chater, 1999, de Vries et al. 2011, Elman 1991, Fitch and Friederici, 2012).

Adger never attempts to provide a precise definition of 'recursion'. He claims that "[Chomsky's] idea is that our language abilities arise because of a special property of the human mind and this property can be scientifically understood as a kind of mathematical function. Like an engine, this function powers our ability to connect meaning with sound and sign, generating the linguistic structures we use in everyday life" (Adger, 2015: 76). This formulation either reveals a deep confusion about the ontological status of mathematical functions and cognitive states, or it is so vague that it is virtually meaningless. Mathematical functions are abstract objects, which do not exist in space or time. Hence, they cannot power any transitions between cognitive states, which

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10 The term "generative-enumerative" was introduced by Pullum and Scholz (2001) to contrast with so-called model theoretic frameworks, which have not played a role in the debates between minimalists and their opponents. For discussion see also Pullum (2007).

11 More formally, a computably/recursively enumerable set is the range of some partial recursive function. A partial function is a function that is not necessarily, but could be, defined on all elements of its domain. A total function is one that is defined on its entire domain. Computability theory in general deals with the larger class of partial functions.

exist in space and time. Adger appears to conflate abstract models of grammars (which can be expressed with the help of mathematical functions) and the biophysiological implementation of grammars (sequences of brain-states).

Any useful model of a postulated I-language should specify a well-defined structure preserving function between the mathematical function and the sequences of brain-states. Adger never attempts to establish such a function but repeatedly refers to human capacities and mathematical functions as if they were objects of the same kind. For example, he writes: "proposals about the structure of the human capacity for language (that is, what the mathematical function is)" (Adger, 2015: 77) and "…the generative view is consistent with evolutionary theory. It says that there was some genetic event, enough to allow human brains to take advantage of a particular computable function, which then created structures that could be used to soup up our thinking" (Adger, 2015: 79). In these cases it is unclear that Adger understands that human brains and human capacities are of a distinct ontological kind from computable functions and that, therefore, it is impossible for computable functions to interact with genetic events.

Adger's attempt to explain the proper use of the two distinct notions of 'recursion' he introduces is problematic as well. Instead of providing precise explanations, he offers two myth-analogies that are supposed to illustrate the difference between "category recursion" (likened to a pile of turtles stacked on each other) and "recursion as computable function" (compared to instructions for finding books in a given language in Borges' library of Babel). In some cases, simple analogies provide informative illustrations of sophisticated concepts. This is not such a case, because the analogies are too vague to clarify anything.

For example, when writing "language has, at its heart, a computable (recursive) function: the Pirahã could tell which of Borges's books are in their language just as well as you or I can" (Adger, 2015: 78), Adger might be implying that minimalists have provided a function from corpora to language names: for any book in the Borges library as argument, the function would provide as value a name of the language it instantiates. The names could be (Goedel numbers of)

generative grammars[12]. Alternatively, Adger could just be talking vaguely about a parser along with a grammar or grammars (G) that can do language identification (i.e. answer yes/no questions: is this text T in language L by parsing T using G(L)). In either case, it is not clear how the analogy is supposed to illuminate the relationship between recursion as computable function and its implementation in a human brain[13].

Because Adger's discussion of 'recursion' is so vague, his challenges to Evans' arguments are problematic. Adger writes: "Evans presents arguments against "recursion" being specifically human and against it being necessary in language. But he doesn't seem to know that there are two ideas at play here, and his discussion is not just confused, it's out of date" (Adger, 2015: 78). This criticism is misleading and uncharitable. Evans mentions 'recursion' several times and while not carefully defining what he means by 'recursion', he explicitly states that he does not equate human and non-human abilities:

"Surely equating starling and human recursive abilities is stretching the point too far? But remember, I'm not equating anything. I'm not trying to show that *the facility of starlings to recognise patterns of warbles and rattles* amounts to anything like the complexity involved in human language syntax. My claim is simply this: recursion appears not to be a uniquely human trait; to maintain that human language is a singularity, totally unrelated to the abilities and communication systems of other species, incorrectly skews our view of language. And it impoverishes our study of it" (Evans, 2014: 34, emphasis added).

It should be clear that, when using 'recursion' in this context, Evans is referring to a pattern recognition ability in starlings, and that this ability, while qualitatively different from human

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[12] One can only speculate if this is what Adger had in mind and it is pointless to elaborate in detail on a speculation that could be incorrect.

[13] It may be objected that Adger did not claim he was attempting to explain how the computational function is implemented in the brain. However, given that he defends Chomskyan biolinguistcs and claims that "our language abilities arise because of a special property of the human mind and [that] this property can be scientifically understood as a kind of mathematical function" (Adger, 2015: 76), he ought to offer some explanation for how a mathematical function can be a property of a human brain.

capacities, is, nevertheless, from an evolutionary perspective, continuous with the ability of humans to recognize recursive patterns in speech. Calling 'recursion' a human trait in this context is, in fact, less ambiguous than Adger implies. A justified criticism of Evans' claim would have to show that the recursive patterns recognized by starlings are not merely less complex than those occurring in human syntax but of an entirely different kind—and hence, not continuous with human capacities. Presumably, Adger cites Michael Corballis' criticism of the starling research conducted by Gentner et al. (2006) to establish that just such a difference in kind exists[14]. Corballis uses the term 'recursion' to refer to both: recursively defined functions and recursive structures: "Recursion is a computational procedure that calls itself, or that calls an equivalent kind of procedure. A distinction can be drawn between tail recursion and center-embedded recursion" (Corballis, 2007: 698).[15] In the context of the starling research Corballis is only interested in center-embedded recursion and questions whether "the starlings in the study by Gentner et al. (2006) parsed the AnBn sequences in terms of center-embedding. It is much more likely that they used a simple strategy such as counting or subitizing the numbers of As and Bs, and then matching them" (Corballis, 2007: 701-2). Like many psychologists, Corballis considers only center-embedding 'true recursion', and he argues that it has not been demonstrated that starlings are capable of discriminating such structures from others: "There are considerable challenges to be met in order to demonstrate true center-embedding, whether in the context of animal protolanguage or nonlinguistic sequential calls. For the present, at least, *there is no*

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14 It is surprising that Adger would rely on Corballis (2007). According to leading supporters of minimalism many psychologists are confused about recursion. For example an article reporting work on tamarin monkeys "was immediately mis-interpreted as concerning 'recursion' … This was an unfortunate mischaracterization, because the Fitch & Hauser paper drew no conclusions about, and indeed made no mention of, recursion" (Fitch and Friederici, 2012: 1941). In the article Adger relies on, Corballis states that he "examine[s] two recent attempts to demonstrate recursive parsing in nonhuman species, one by Hauser and Fitch (2004) in tamarins, and the other by Gentner, Fenn, Margoliash, and Nusbaum (2006) in starlings (*Sturnus vulgaris*)" (Corballis, 2007: 698). One has to wonder why Adger thinks that someone who, according to Fitch and Friederici, is confused about recursion in tamarins would be an expert on recursion in starlings.

15 Psychologists (e.g. Christiansen and Chater, 1999; Fitch and Friederici, 2012; Levinson, 2013) and linguists (e.g. Pinker and Jackendoff, 2005; Harder, 2010; Jackendoff, 2011; Karlsson, 2010; Kinsella, 2010) consider the distinction between right branching (by Corballis here referred to as tail recursion) and center-embedded structures important and some of them argue that only the ability to generate the latter is a 'species property' of human language. This view has been challenged (Paap and Partridge, 2014). But even though Adger relies on Corballis (2007) for his critique of Evans, he neither comments on the challenge nor does he pay any attention to the distinction.

convincing evidence that any nonhuman species is truly capable of recursive syntactic parsing" (Corballis, 2007: 703, emphasis added).

Here the ambiguity in the use of the term 'recursion' might support Adger's claim that Corballis' article had refuted Evans' claims. But it is not clear that Evans and Corballis mean the same thing when they use the term 'recursion'. For example, Evans was not claiming that starlings are capable of recursive *syntactic parsing*. Instead, his claim was that there might be no unbridgeable cognitive gulf between the abilities of humans and non-human species and the starling research was just one of the many examples Evans discussed. Therefore, even if Corballis' interpretation of the results of the starling research is correct, it does not follow that all non-human animals are incapable of recognizing recursive patterns. Adger focusses much attention on an alleged mistake by Evans about an issue ('starling-recursion') that has already received much attention in the literature (e.g. Anderson, 2008; Chomsky, 2009b; Fitch, 2010; Hauser et al. 2014; Jackendoff, 2011; Russo and Trevis, 2011). This focus would be justified if starling recursion would be the only challenge to the claim that "[t]here are in fact crucial features of human language that appear to be isolated in the biological world" (Chomsky, 2013: 35; see also Anderson 2008; Boeckx, 2006; Chomsky, 2002, 2005, 2007; Hauser et al. 2014). But, as demonstrated throughout *The Language Myth,* this is clearly not the case. Adger does not provide any evidence against numerous other examples that threaten the Chomskyan paradigm. Again, it is surprising that these more serious threats remain unaddressed.

Finally, the Chomskyan claim for uniqueness of recursion in human language and his focus on binary Merge as central computational operation has been challenged even from within the generativist perspective. For example, linguist Ray Jackendoff argues convincingly that on the Chomskyan I-language conception it needs to be established that the relevant mental representations exhibit recursion[16]. But, since there are currently no brain research tools available that could investigate brain structures directly, one has to infer recursion indirectly from the linguistic behaviour. It is reasonable to assume that linguistic behaviour is integrated with other

[16] Jackendoff (2011) distinguishes between formal and structural recursions, for details see there.

cognitive capacities. Given the fact that the visual system is capable of detecting domains with two- and three-dimensional organization, that display unlimited possibilities for hierarchical embedding, one cannot rule out that linguistic recursion is a simpler case of a more complex form of recursion:

"Since recursion is a feature of mental computation manifested in the visual system, the possibility arises that the language faculty did not develop binary Merge out of the blue, but rather adapted the richer form of recursion … to linguistic purposes. According to such a scenario, syntactic recursion is actually part of the general-purpose part of the language faculty (FLB), permitting a more graceful integration of language with the rest of the brain. To be sure, language is different, in that it has put recursion to use in mapping between signals and thoughts; that sort of recursion is indeed unique in the animal kingdom. But if recursion occurs in the visual system as well, it *does* tell us something new about language, pace Chomsky, namely that recursion per se is not what makes language distinctive" (Jackendoff, 2011: 594, original emphasis).

Here Jackendoff is stressing that distinctive properties of language are not explained by recursion. In his eagerness to find fault with Evans' interpretation of the starling research, Adger seemingly overlooked that besides recursion additional properties are required to account for the full richness of human language, and he never explained why the Chomskyan framework would be preferable when accounting for them.

3. (Un)biological organs

Adger's discussion of biological systems was presumably intended to clarify how the conceptualized language module might be biologically implemented. Without providing any reference, Adger claims that Evans incorrectly attributes to Chomskyans the view that "language

should be anatomically lumped together in a single bit of our brains. But there's no logic to this." (Adger, 2015: 79). First, Evans does not hold the view Adger attributes to him. Consulting the text one finds "a mental module is realized in dedicated neural architecture … deals with specific type of information … [and] must be already programmed as part of the human genome" (Evans, 2014: 134). What makes something a module on this (Fodorian) view is functional unity not spatial localization. Evans accurately describes Fodor's and Chomsky's commitment before providing evidence suggesting that there are "very little grounds for thinking language is a module of mind … [and] that the modular view of mind provides only an overly simplistic view of the nature of human cognition" (Evans, 2014: 135). The evidence discussed by Evans suggests that one cannot assume the modularity of mind as established fact, but rather one needs to provide compelling arguments for it. Adger never attempts to meet this challenge.

Second, while the view that language is located in a narrowly defined part of the brain could be incorrect, it is not illogical. In fact, Chomsky seems to be committed to such a view and often draws an analogy between the language faculty and the visual system. He emphasizes the similarities regularly: "Endowed with these principles, a System provided with adequate experience will develop a grammar of the peculiar and specific sort characteristic of human language, just as a human visual System develops to a relatively steady state given early interactions with the environment" (Chomsky, 1981: 8), "knowledge of a particular language grows and matures along a course that is in part intrinsically determined … rather in the manner of the visual system or other 'bodily organs' (Chomsky, 1985: 5), and "… in the mammalian visual system (there you can experiment), certain kinds of stimulation at particular points of life are necessary for the system to function at all and there is some variation in the way it functions depending on the kind of stimulation. As far as we know, language is sort of like that" (Chomsky, 2000: 56). Adger is of course free to use analogies he finds more convincing. But, given that he purports to defend Chomsky's view, it is surprising that he calls illogical the view of Evans, which is close in spirit to Chomsky's favoured analogy to the visual system (a fairly localized perceptual and cognitive organ).

Furthermore, Chomsky has recently written extensively about the evolution of the language faculty and claimed it is based on a single mutation: "Some small genetic modification somehow that rewired the brain slightly… So some small genetic change led to the rewiring of the brain that made this human capacity available... The simplest assumption - we have no reason to doubt it - is that what happened is that we got Merge." (Chomsky, 2012: 13 -14). Similar claims are made elsewhere: "… it could be that explosion of brain size led to some small rewiring which yields unbounded Merge, and everything else that it has come up with, and that yields the semantic interpretations" (Chomsky, 2009a: 41). Here Chomsky states that the essence of the language faculty was caused by a small or slight rewiring of the brain, which also might indicate that it is a fairly localized part of the brain[17]. Adger claims that a localized view is "a straightforward misunderstanding of what it means to be a biological system" (Adger, 2015: 79). If this is the case, it would seem, Chomsky, who likens the language faculty to the visual system and possibly to a localized area in the brain, also commits a straightforward misunderstanding.

4. Beyond Myth-busting

Given that Adger's goal is to defend the Chomskyan framework, it is not surprising that he spends most of his efforts on challenging Evans' proposal that this framework is based on six interrelated myths. His article makes it appear as if Evans' book is exclusively a critique of the Chomskyan framework. Yet, large parts of *The Language Myth* are unrelated to the Chomskyan framework and present Evans' positive 'counter-story'. Adger only mentions (and dismisses) a superficial cartoon of Evan's alternative to the Chomskyan Language myths:

"Evans' new proposal is that humans have a different instinct: an instinct for cooperation. But he doesn't tell us, in either the article or the book, how the 'cooperation instinct' explains anything

[17] .Chomsky never provides any specifics about the putative 'slight rewiring'. The default assumption would be that a fairly localized brain-rewiring would be called 'slight'. If Adger can provide concrete neuroanatomical evidence supporting his own view about the putative language organ, he ought to cite it.

about language, or why it's any kind of improvement. I'm all for people trying out different approaches to understanding human language, which is a gloriously complex phenomenon, and perhaps we can learn things about language by looking at it from the perspective of the cooperation instinct, but it's hardly an actual proposal" (Adger, 2015: 79).

This blanket dismissal suggests that Adger has not read much of *The Language Myth* besides the passages he objects to. Only from a very syntacto-centric vantage point would it make sense to ignore Evans' detailed discussion of similarities (and differences) between animal and human communication, of the importance of embodied cognition, of cultural transmission, of linguistic diversity, of diachronic language change, of the life long process of language learning (no one achieves a 'steady state' at the end of puberty), of human neurobiology, of co-evolution driving the interdependence of language and brain, of the intricate interplay between language and visual perception, and much more. While language is unarguably a gloriously complex phenomenon, Adger's own approach is reminiscent of the Indian tale about a group of blind people who stand besides each other and touch an elephant to learn what it is like. Each person feels one part of the elephant, and when they compare notes they discover that they are in complete disagreement. Refusing to take seriously the 'notes' of anyone but himself, Adger misses much of the glorious complexity of language. In contrast, many psycholinguists have been exchanging 'notes' with other researchers and have learned much about the parts of the 'language-elephant' not covered by their own research.

5. Conclusions

Minimalists have directed harsh criticism at *The Language Myth* and *There is no language instinct,* but little of this criticism seems to concern substantial issues. Alleged misunderstandings or misinterpretations of the Chomskyan commitment and the Chomskyan framework are in large degree due to the imprecise and, at times, inconsistent formulation of its basic assumptions. Chomskyans refer informally to language as an instinct, do not use key terms (e.g. I-language) consistently, do not provide precise definitions of important concepts (e.g. 'innate', 'language

organ', Universal Grammar), and they regularly conflate the meanings of 'recursion' Adger wishes to keep separate. Given that most of *The Language Myth* has been ignored by Adger, he is no position to judge whether it makes a valuable contribution or should be dismissed. And he has given little reason to think that the minimalist research program can shed light on there being "new exciting challenges to be addressed about how language is implemented in the brain, how what we know about language structure can improve statistical translation techniques, how language interacts with other systems in our minds and how it's put to use in situations of social complexity" (Adger, 2015: 80). Adger seems to believe that generative grammarians continue to play *the* central role in syntactic research, and that they ought to shape the agenda of a larger, multidisciplinary research community. Yet, as Chomsky pointed out decades ago: "this framework is only taken seriously by a tiny minority in the field … it does not represent a major tendency within the field in statistical terms" (Chomsky, 1982: 41). It is arguable whether this evaluation was accurate in 1982. But, Chomsky could have hardly offered a better prediction for that state of the field in 2015. Anyone who wishes to defend the Chomskyan framework ought to move beyond the fruitless quarrelling that has distracted so much attention from the real issues, and address the following questions: [i] what are the specific theories Chomskyans are currently committed to, [ii] which concrete findings from developmental psychology and neurobiology support the Chomskyan framework, and [iii] how can the Chomskyan paradigm overcome the familiar, long standing challenges stated in the technical literature, including those by other generativists (e.g. Culicover and Jackendoff, 2005; Jackendoff, 2011; Seuren, 2004).

Acknowledgments:

We thank Robert Borsley, Nick Chater, Morten Christiansen, Michael Corballis, Ray Jackendoff, David Johnson, Robert Levine, Paul Postal, and Geoffrey Pullum for comments on earlier drafts and take full responsibility for any remaining errors.

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