

Recursive Misrepresentations: a Reply to Levinson (2013)*

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Citing cross-linguistic grammatical data and specific corpus studies, Stephen C. Levinson (*Language* 89.1, 149-162; henceforth *L13*) argues against the idea that "recursion, and especially recursive center-embedding, might be the core domain-specific property of language". On the basis of "facts from interactive language use", L13 offers an alternative conjecture: that language inherits its recursive properties "from the action domain". In this reply, we will not take any particular stand on the "core domain-specific properties of language" or L13's conjecture about the cognitive roots of recursion. We write instead to express our concern at the pervasive misrepresentations of fact and faulty reasoning presented in L13 in support of its claims. L13's argument can be summarized as follows:

1. *Crosslinguistic peripherality of embedding*: "Many languages ... show little evidence of indefinite embedding." A response to this fact that views embedding as part of a "'toolkit' whose tools may not be all deployed [...] fits ill with the claim [...] that 'recursion' (understood as embedding) may be the one crucial domain-specific feature of linguistic ability."
2. *Rarity and shallowness of center-embedding*: Corpus studies have shown that degree-2 center-embedding "occurs vanishingly rarely in spoken language syntax", and degree-3 center-embedding is hardly observed at all. These conclusions converge with the well-known psycholinguistic observation that "after degree 2 embedding, performance rapidly degrades to a point where degree 3 embeddings hardly occur".
3. *Ubiquity and limitlessness of center-embedding in interactive discourse*: "Whether or not languages have clear syntactic embedding, however, they always seem to make use of 'pragmatic embedding'" — "embeddings in interactive discourse that have the same basic properties exhibited in sentential syntax, but that are distributed over two (or more speakers)", with no depth limitation.
4. *Conclusions*: Points 1 and 2 cast doubt on the claim that "a core element of language design is indefinite embedding of the kind produced by a context-free grammar." Claims 1-3, taken together, suggest that "'recursion' understood propositionally" is not so much a universal property of grammar as a property of human psychology, most evident in language use" (with possible evolutionary roots in the "action domain") which languages have a limited option of recruiting for use in sentence-syntax.

We begin by summarizing our empirical and logical concerns about points 1-3. We argue that L13's grammatical, statistical and formal claims are at best unwarranted, and in many instances demonstrably false. L13's reasoning is similarly flawed — in particular, the presumption that center-embedding can serve as a proxy for embedding in general (and that clausal embedding can stand proxy for recursion in general). If our concerns are justified, no support remains for the conclusions summarized in point 4. Furthermore, as we discuss in the concluding section, though these conclusions are pitched as relevant to specific published claims about the role of syntactic

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clause, since it is interpreted in the scope of the matrix intensional predicate "disbelieve". See Legate 2011 for further discussion:²

(3) Kapuru-nyina-mi ka-lu-rla-jinta wati-ki
 disbelieve-sit-NPST PRS.IMPRF-3PLSUBJ-3DATOBJ-3DATOBJ man-DAT

yali-ki [kuja-ka ya-ni wirliny].
 that-DAT COMP-PRS.IMPRF go-NPST hunting

'They don't believe that man that he is going hunting.'
 (Legate 2011, 114, citing Warlpiri Dictionary Project 1993)

L13 follows its discussion of Warlpiri with a consideration of Nordlinger's (2006) analysis of similar constructions in Wambaya (Nordlinger 1998). L13 claims that it is "a completely live issue as to whether we are dealing with structural dependence or parataxis" (L13, 151) — despite the fact Nordlinger's central point in the cited discussion is the contention that constructions in Wambaya that resemble adjoined relative clauses are "clearly subordinate" (2006, 7).³ L13 dismisses her arguments as follows: "Nordlinger argues that the 'subordinate' construal may be forced by prosody, but as Hale noted, there is often a pause between clauses of these types in Australian languages generally". (L13, 151). In fact, L13 has misrepresented both Nordlinger's and Hale's claims.

Though Hale (1976) did observe a "characteristic falling-rising intonation [...] followed almost invariably by a pause" in clause-initial adjoined relatives in Warlpiri and some other Australian languages, he also noted that this tendency is not found when the adjoined relative follows the main clause: "when the main clause precedes the subordinate clause, the intonation over both clauses is more often falling, and the pause between them, if any, is brief" (p. 78). Far from showing that adjoined relatives are independent sentences or instances of parataxis, the distribution of this prosodic pattern actually provided Hale with an argument that the adjoined relative is base-generated as a right-sister to the main clause, and appears in initial position only as the result of an optional "transformational rule which positions them to the left of the main clause and Chomsky-adjoins them to the top-most S-node" -- thus "account[ing] for the prevailing tendency to pause between a preposed subordinate clause and the main clause since, after preposing [but not before], the former would be removed from the latter by two S-nodes".

For Wambaya, the disambiguating prosody to which Nordlinger refers is the "fall—rise intonation" (2006, 17) characteristic of subordination, which crucially disappears under a

² Hale himself offered relevant examples of subordination in the part of his paper devoted to the adjoined relative clause in Kaytetye [Kaititj], which he analyzed in much the same terms as Warlpiri. In the following example, for instance, the dependent clause (marked with the dependent complementizer clitic *ar*) is clearly a constituent of the matrix clause since it serves as the host for the matrix second position clitic *ŋ* "you":

[agir-ar ampwari-nhi-wal] ŋ api-n
 kangaroo-Comp die-Past-Dir you.Nom go-Imper
 'Go up to the kangaroo that died' (Hale 1976:100)

³ Nordlinger 2006 also contains excellent corrective discussion regarding the treatment and portrayal of the 'adjoined relative clause' in Australian languages more generally.

coordination construal.⁴ Furthermore, Nordlinger provides independent arguments from word order distinctions for subordination in Wambaya. To wit, though coordinate clauses follow the temporal ordering of the events, and adverbial clauses may precede or follow the main clause, the finite clausal object of a matrix speech/perception predicate obligatorily follows the matrix, as in (4), and relative clauses obligatorily follow the noun they modify.

- (4) Didima irri ngaya [nganku ngiy-a
 tell 3pl.A(NP) 3sgF.Obl this.II.sg.Erg 3sg.F.A-Past
- ngirra bungmanya-nka gijilulu].
 steal old.woman.II-Dat money.IV(Acc)

'They told her (that) she'd stolen the old woman's money.' (Nordlinger 2006, 18)

The final Australian language mentioned by L13 is Kayardild (Evans 1995), where the existence of clausal embedding is beyond dispute, since case morphology is assigned to subordinate clauses, and is affixed to the subconstituents of such clauses outside their other morphology (Kayardild being famous for "case-stacking"). It is true, as L13 states, that Kayardild disallows multiple levels of clausal embedding, but L13 also accepts Evans' morphological explanation of this fact: the morphology assigned to the subconstituents of a subordinate clause is both obligatory and "terminal". A second level of subordination would yield patterns of affixation that the morphology would block. If Kayardild has subordinate clauses, and there is an independent morphological explanation for those constructions in which subordination is blocked, it is hard to see why the language was even discussed as an example of the supposed cross-linguistic peripherality of clausal embedding.⁵

Finally, L13 (p. 152) asserts that "languages with very limited morphology often offer no clear evidence for subordination at all", referring the reader to "Englebretson 2003 on Indonesian" for a relevant example. We note first that Englebretson (2003) is describing a particular variety spoken in Yogyakarta, on the basis of a corpus of conversation comprised of only 36,265 words. Subordination in other varieties of Indonesian and Malay is well-documented, much-studied and beyond dispute; see among many others Sneddon 1996, Cole and Hermon 1998, 2005. Yet even in Englebretson's limited Yogyakarta corpus, we do in fact find subordination. Example (5), for instance, includes a relative clause introduced by the relative complementizer *yang*:

- (5) Kamu kan pernah lihat pencopet [yang di= Koperasi Pemuda] itu?
 2sgPRT ever see pickpocket REL at co-op youth that
 'Have you ever seen that pickpocket on the Koperasi Pemuda [bus line]?'
 (Englebretson 2003, 15)

⁴ Nordlinger cautions that this claim about intonation is a "purely impressionistic observation, which needs to be verified by proper prosodic analysis" (p17, fn 15), but in any case does not describe any "pause". As far as we can tell, the sole mention of "pause" occurs elsewhere (p. 19, note 16), where the *absence* of a pause is cited as support for the claim that an entirely different construction (which superficially resembles the adjoined relative) should be analyzed as an embedded complement question.

⁵ Round (2013, 189-201) proposes an alternative to Evans' (1995) analysis of the Kayardild inflectional system that does not constrain embedding as Evans' analysis does. If Round's alternative is correct, Kayardild might then be the single language identified appropriately in L13 as requiring a syntactic restriction on unbounded recursive clausal embedding.

Englebretson (2003) appears to have been cited by L13 because of his claim that "complementation [...] does not exist in this language variety" (p.1), where complementation is defined as "a clause which serves as the subject or object of another clause" (p.22). This is a significantly narrower claim than L13's claim of "no clear evidence for subordination at all". Yet even this narrower claim is not accurate. Despite setting remarkably stringent criteria for identifying subordination,⁶ Englebretson acknowledges the existence of a number of unambiguous clausal arguments — including (6), in which the subordinate clause is marked as an argument of *mengata-* 'say' by the applicative suffix *-kan*. Note additionally that the subordinate declarative clause has a relative clause further embedded within it, thus providing what L13 would call an instance of degree 2 embedding (a point of particular relevance to L13, to which we return below):

- (6) saya lebih ingin, me- ... lebih suka untuk mengata-kan
 1sg more want (truncated) more like PURP AT.word-APPL
- [silahkanlah keluarga itu menentu-kan ...
 go.ahead-PRT family that.DEM AT.certain-APPL
- cara berhubungan yang paling baik bagi mereka berdua gitu lho.]
 way MID.connect REL most good for 3pl MID.two thus PRT

'I prefer to say: let the family go ahead and determine the best way of relating for the two of them.' (Englebretson 2003, 87)

The remaining language cited as one of "many languages that show little evidence of indefinite embedding" is Amele (p. 151, fn. 4). To illustrate its supposed absence of embedding, L13 refers the reader to a WALS article by Comrie and Kuteva (2008), which presents a single sentence from that language in support of a specific claim about relativization.⁷ In fact, however, Roberts' (1987) grammar of Amele reveals that the language shows a number of constructions that are good candidates for embedded clauses, including center-embedding of sentential complements:

- (7) Naus uqa [ege qila bele-q-an fo ec] sisil-t-en.
 Naus 3sg 1pl today go-1pl-Fut QU NMLZ ask-1sg-3sg.RemPst
 'Naus asked me whether we would go today.' (Roberts 1987, 48)

⁶ It is not enough for Englebretson for a clause to form a single intonational unit with an appropriate matrix predicate, even in the default predicate-complement word order; instead, the clause must be unambiguously morphologically marked as an argument of the verb, which for this variety of Indonesian means either indexed by an applicative morpheme or promoted to subject ("trigger") position of a passive verb. He then considers it noteworthy (2003, 88) that only 11 of the 263 potential clausal arguments he identifies in the corpus succeed in meeting these conditions.

⁷ Comrie & Kuteva's example involves subject relativization (the topic of their article), and the relative clause is characterized as "the same as an unmarked simple (declarative) clause". A more careful reading of Roberts' (1987, 49-56) description of Amele relative clauses, however, indicates that this identity with unmarked simple declaratives is an accident of the example chosen. Relative clauses differ from declarative clauses in that the relativized noun must be initial in a relative clause, whereas declarative clauses show unmarked S IO DO V ordering (Roberts 1987:70). As a consequence, the unmarked and relativized positions happen to coincide for subject relatives. In addition, relative clauses are optionally marked with the "subordinating demonstrative conjunction *eu* 'that' which follows the relative clause" (Roberts 1987:49). Comrie & Kuteva's example omits this optional marker.

Remarkably, for a language that supposedly lacks evidence of embedding, Roberts even offers an example of two-level center-embedding (characterized as "clumsy" but "grammatical"):⁸

(8) Naus ija [Duwe [cabi haun wele cehe-i-a ec]
 Naus 1sg Duwe gardennew alreadyplant-3sg-TodayPst NMLZ
 mad-en ec] ma-t-en.
 say-3sg.RemPst NMLZ say-1sg-3sg.RemPst

'Naus told me that Duwe had said she had already planted her new garden.'
 (Roberts 1987, 17)

Point 2. Rarity and shallowness of center embedding: L13 summarizes its cross-linguistic findings as a "demonstration that parataxis can be hard to distinguish from embedding, especially since an embedding-like construal is likely to be driven by the pragmatics even when there is no syntactic motivation for it" (p. 153). As we have seen, this conclusion does not withstand basic scrutiny of L13's own sources. Every language discussed by L13 shows evidence of clausal embedding, and in the sole example where clausal embedding is known for a fact to be limited to a single level (Kayardild), L13's own source provides an independent reason for this limitation (though see fn. 5).

Of course, the evidence relevant to the question of embedding varies from language to language. Across the languages of the world, a variety of considerations may clarify the syntactic status of its clauses. Evidence for embedding can be found, for example, in the use of complementizers not available in matrix clauses, selection of clause-types by higher predicates, semantic opacity and scope phenomena, dependent mood, sequence of tense, long-distance movement, quantifier binding, constraints on anaphora, and characteristic prosody. Which tests are relevant in a given language depends on other properties of the language: its lexical resources, morphological peculiarities, prosodic patterns, and so on. Wherever possible, a researcher hopes that evidence from more than one relevant factor will converge on the same conclusion.

Center embedding can also test for subordination. If we find a putative subordinate clause sandwiched between elements of a matrix clause, no obvious analysis in terms of parataxis or juxtaposition can explain the observed order.⁹ Nonetheless, center embedding enjoys no special pride of place in linguistic analysis, but is just one of many phenomena that can demonstrate clausal subordination in the languages of the world.

Nonetheless, L13, after summarizing its supposed "demonstration that parataxis can be hard to distinguish from embedding", declares: "these difficulties are circumvented if instead of focusing on edge-recursion we focus on center-embedding". The discussion then proceeds to a discussion of processing problems posed by center-embedding and the alleged rarity of center-embedding in language use — as if special facts about center-embedding can stand proxy for facts

⁸ Example (8) is elicited data. Roberts (1987) notes that in recorded texts, the nominalizing particle *ec* is typically absent and the speech verb "say" is elided, leaving only the agreement suffixes associated with this embedding verb. No such option is discussed for embedded questions, which is why we reproduce an embedded question to illustrate center-embedding in (7).

⁹ See, for example, the discussion by Nevins et al. (2009, 375) of a center-embedded complement clause in Pirahã (ex. 23) noted by Everett (1986, 278 ex. 290).

about clausal embedding in general. Taken together, L13's cross-linguistic claims, psycholinguistic observations and claims about language use are presented as preparation for the claim that embedding is limited or peripheral in sentence syntax, but "is exhibited in a much more fulsome way outside of sentential syntax".

But L13's shift from general properties of clausal subordination to specific claims about center-embedding is illegitimate. The field has been known since Chomsky and Miller (1963a, b) that certain types of degree 2 center-embedding (specifically, self-embedding) present special processing difficulties not characteristic of other instances of embedding — but this fact holds of languages and constructions where there is no difficulty distinguishing parataxis from embedding, such as English relative clauses. Likewise, if it should turn out that certain center-embedded structures are rare, no conclusions can be drawn about embedding as a whole unless other clauses whose embedded status is beyond doubt are also rare to a similar degree. L13's decision to "focus on center-embedding" as a means of clarifying the true status of all clausal embedding is therefore misleading.

Once again, there are also factual problems. Though the processing difficulties posed by degree 2 center-embedding are uncontroversial, L13 makes the further claim that they are specially restricted in production as well, calling attention to the supposedly remarkable rarity of multiply center-embedding clauses in naturally occurring texts. L13 cites Karlsson (2007), who gathered statistics from corpora in seven European languages. According to L13's description of Karlsson's findings, degree 2 center embedding is said to occur "vanishingly rarely in spoken language syntax" (p. 155), and no examples of degree 3 were observed in the corpora — facts taken to support L13's claim that there is something peripheral about syntactic embedding.

Corpus statistics, however, must always be evaluated against a baseline, before concluding that the relative rarity of a given phenomenon requires special explanation. Neither L13 nor Karlsson provides such an evaluation. In recent work, however, Bader (2012; see also Trotzke, Bader and Frazier 2013) provides a first step toward the proper assessment of quantitative data concerning embedding. His results are both instructive and cautionary in the context of L13.

In German, relative clauses may be embedded (which we will abbreviate as *M*) or extraposed (*X*). The *X* option avoids the disruption of syntactic dependency for well-known and independently motivated processing reasons (Hawkins 1994, 2004). Both *M* and *X* relative clauses may contain a noun phrase that introduces another relative clause. This second relative clause may itself be either extraposed or embedded within the higher relative clause. These combinations produce four different structures: *X-in-X*, *M-in-X*, *X-in-M* and *M-in-M*. The last of these is an instance of degree 2 center embedding. Bader estimated the frequencies of these structures in a very large German corpus of 92 million sentences. Of these, 2157 sentences contain two relative clauses, including 23 that contain three or more relative clauses. Out of the 2157, 423 are doubly center-embedded relative clauses (instances of *M-in-M*). On average, then, double embedding occurs at a frequency of just above 4.6 per million sentences, a figure which one might indeed be tempted to describe informally as "vanishingly rare".

Crucially, however, Bader found that the relative frequencies of *M* vs. *X* options for a relative clause introduced within a larger relative clause are very similar, though not identical. The differences can be attributed to well-known processing preferences. Crucially, these frequencies do not depend on the syntactic position of the higher relative clause. Most important, though the

frequency of double center-embedding in Bader's corpus is low, it is close to its expected frequency if the grammar and processing factors are independent (cf. Chomsky and Miller 1963a, b). Absent principled comparisons of the sort undertaken by Bader, the significance that L13 attaches to the subjective "rarity" of multiple center embedding is at best premature and most likely misplaced.

Furthermore, even if a more principled application of statistics were to show that multiple center-embedding is unexpectedly rare in some corpus, such a finding would not "undermine the idea that natural languages are not regular and necessarily context-free or higher" (L13, p154). Nor would it support L13's assertion that "it remains an interesting question whether treating, say, English as regular (with large numbers of simple rules) is more complex than treating it as context-free (with fewer, more complex rules; see Perfors et al. 2010)."

In fact, there is now broad consensus that a variety of syntactic models (including Tree Adjoining Grammar, Combinatorial Categorical Grammar, Minimalist Grammar and others) converge onto the "mildly context sensitive" class, which appears to have the appropriate descriptive power for natural language syntax (Joshi 1985). The inadequacy of regular language has been known for decades. Furthermore, L13 seems to suggest that regular grammars may be in effect sufficient despite being less powerful than context free grammars, since center-embedding structures are very rare. But the paper (Perfors et al. 2010) that L13 cites in support of this claim shows no such result. In that study, the authors considered three handcrafted context free grammars: one contained recursive rules, one contained only depth-limited non-recursive rules, and the third contained a mixture of both. A Bayesian analysis of a small child-directed English corpus showed that the grammar with a mixture of recursive and non-recursive rules has the highest posterior probability and is thus favored. But all three grammars under consideration are context-free, and regular language is not mentioned at all; it is puzzling how L13 could interpret Perfors et al. (2010) as in favor of regular languages. In a related study, three of the same authors (Perfors, Tenenbaum and Regier 2006) did compare a regular grammar with a context-free grammar (see Berwick, Pietroski, Yankama and Chomsky 2011 for further discussion). However, they found that the context-free grammar is favored even when one only considers very simple child-directed English, where each utterance averages only 2.6 words, and no utterance contains center embedding or remotely complex structures. In sum, L13's "interesting question" about the descriptive adequacy of regular language was settled long ago in the formal studies of grammar — and is also refuted from an empirical and quantitative perspective by the very paper that L13 cites.

Point 3. Ubiquity and limitlessness of center-embedding in interactive discourse: As its pièce de résistance, L13 presents the following claim: that "there are [center] embeddings in interactive discourse that have the same basic properties exhibited in sentential syntax, but that are distributed over two (or more speakers) [...] with no parallel limit on embedding" (p. 154). The dialogue in (9), for example, is described as an instance of degree 1 center embedding:

- (9) A: May I have a bottle of Mich?
 B: Are you twenty-one?
 A: No.
 B: No. (L13, 155 ex 12)

L13 describes this interaction uncontroversially as one in which "the second question leaves the first unanswered until a preliminary question is addressed". L13 then proceeds to describe the

interaction as "a nested dependency just as in *The boy the horse kicked has a broken leg*" and proposes to account for it with a context free grammar that generates recursive center-embedding:

(10) Q&A \rightarrow Q (Q&A) A

Strikingly, no evidence is offered for the claim that interactions like (9) are governed by a rule such as (10). Example (9) does indeed contain two question-answer pairs that are both temporally nested and informationally connected, but temporal nesting and informational connectedness do not in and of themselves argue for a center-embedded *structure*. For one thing, the absence of one or another property makes no difference to the well-formedness of discourses that differ minimally from (9). The very natural discourse in (11), for example, has the same temporal nesting as (9) but lacks informational connectedness. The equally natural discourse in (12) has informational connectedness but the question-answer pairs are interdigitated, rather than nested:

(11) A: Do you carry Michelob?
B: (*sees A has a wet umbrella.*) Is it still raining?
A: Yes, unfortunately.
B: It's over there, near the plastic cups.

(12) A: Where are my keys?
B: Oh, are you ready to leave now?
They're on the kitchen table.
A: Yes, I'm ready to leave

Does a center-embedded structure underlie temporally nested sets of question-answer pairs such as (9), licensed by a dedicated embedding rule of discourse syntax? In light of the temporal and informational variants seen in (11) and (12), and the absence of any evidence or argumentation to the contrary, it seems equally plausible to attribute these discourse possibilities to a general human capacity for conversational multitasking. People can carry on more than one conversation at once, even with the same person. If a secondary conversation is initiated by a speaker in order to gain information crucial to an already initiated conversation (as is the case in (9)), the result will, of course, be a temporally nested structure, since the secondary question is prompted by the primary question, and the secondary answer is crucial to formulation of the primary answer. But we need not appeal to a recursive grammatical rule to explain the temporal sequencing of question-answer pairs under such circumstances — just a general multitasking capacity that *fails to forbid* nesting, put to use by speakers with specific informational needs best met by nesting.

We are not claiming that that there is no structure underlying discourse, nor do we dismiss the possibility that future research might show that a rule such as (10) plays a role in (9) after all. Our objection is not theoretical but methodological. As discussed at the beginning of the previous section, claims about embedding at the sentence level are tested in a variety of ways, just like any claim about any type of syntactic constituency. We should demand no less from claims at the discourse level. Though L13 hails as "very surprising" the claim "there are embeddings in interactive discourse that have the same basic properties exhibited in sentential syntax", L13 fails to offer even one "basic property" of sentential embedding that holds of the discourses discussed by L13, and offers no discourse-specific arguments either.

In fact, we do know of one consideration that might ultimately provide support for a center-embedding analysis of (9), but its implications for L13 are not positive. In particular, it is not at all obvious to us that temporal nesting of question-answer pairs is in fact free from depth limitations as L13 claims. Consider the following pragmatically plausible extension of (9), which L13 would analyse as an instance of degree 2 embedding at the discourse level.

- (13) A: May I have a bottle of Mich?
B: Are you twenty-one?
A: Is that the drinking age around here?
B: Yes.
A: No.
B: No.

This interaction strikes us as decidedly odd. We find it almost impossible to keep track of which question is answered by the two final utterances. The acceptability of the interaction improves dramatically when information is added to the final two answers that makes it clear which question is being answered by each utterance:

- (14) A: May I have a bottle of Mich?
B: Are you twenty-one?
A: Is that the drinking age around here?
B: Yes.
A: Unfortunately, I'm not twenty-one yet.
B: Sorry, I can't sell you a beer.

In light of (12), the source of the unacceptability of (13) might be ambiguity between a nested and interdigitated parse of the interaction, but we might also be observing the ameliorable processing difficulty that is the hallmark property of center (self-)embedding past degree 2 (Chomsky and Miller, 1963b, 467). If that is so, L13's analysis of (11) as center-embedding will be supported, but at the cost of L13's central claim: that discourse-level center-embedding is free of the constraints that limit its sentence-internal counterpart. By asserting as fact a similarity between discourse-grammar and sentence-grammar (center-embedding) and a difference (constraints on center-embedding), without proper evidence for either the similarity or the difference, L13 has done its cause no favor.¹⁰

¹⁰ L13 does not present any examples of discourse embedding that illustrate rule (10) for cases more complex than (9). A single example (p. 155, ex 14) is claimed to illustrate degree 2 embedding, but despite a diagram that appears to center-embed an interaction resembling (9) in a larger discourse constituent, the larger constituent does not instantiate (10) at all, as simple inspection will make clear. (Both the question and its answer appear to the left of the smaller constituent, and what appears to the right is a stage direction for an action undertaken as a consequence of the discourse as a whole.) L13's other examples of supposed center-embedding stray even farther from (10) and minimal pairs with (9), counting repairs and repetitions as instances of recursive embedding and subordinating certain question-answer pairs with no obvious motivation. Remarkably, L13 includes a supposed example of interdigitation (p. 159, ex 22), citing it as *support* for the claim that discourse-syntax mirrors sentence-syntax (which we have argued is exactly backwards; cf. our discussion of (12) — on the grounds that "cross-serial dependencies" have also been noted in sentence syntax. Since L13's example merely consists of two connected utterances by speaker A punctuated by a "what?" and a "wow" from speaker B (with no obvious connection between the "what" and "wow"), we see no reason to accept this analysis in any case.

Point 4. Conclusions: But what *is* L13's cause? L13 has claimed that sentential embedding is cross-linguistically limited and that center embedding is "surprisingly rare" in language use, while center-embedding at the discourse level is ubiquitous, unconstrained, and common. We have argued that L13 is wrong on all these points: its cross-linguistic claims misrepresent the facts; the move from embedding to center-embedding is logically illegitimate; there is nothing self-evidently surprising about the frequency with which center-embedding occurs in texts; and the claims about embedding in discourse are completely unsupported. Still, suppose L13's empirical claims had turned out to be accurate. What broader conclusions would be warranted?

L13 offers the beginning of its answer in the very first paragraph: that its conclusions will bear on the the well-known proposal by Hauser, Chomsky, and Fitch (2002; henceforth HCF) "that the sole feature of language that may be domain-specific is the recursive nature of syntax". "The aim of this short report", L13 continues, "is not to engage in further commentary, but rather to clarify that there is one central sense of the term recursion — namely embedding [...] — that clearly is not exclusive to syntax, and that is exhibited in a much more fulsome way outside of sentential syntax". In its concluding section, however, L13 states its conclusions more strongly: "The idea that recursion, and especially recursive center-embedding, might be the core domain-specific property of language is rather directly undercut by the facts from interactive language use."

We would draw a very different conclusion. If the organization of discourse parallels the organization of syntactic structure as strongly as L13 suggests, we would conclude that the core rule responsible for syntactic structure (e.g. Merge) extends beyond the sentence level — i.e. that the "faculty of language - narrow sense" (to use HCF's terminology) controls some aspects of discourse. Far from undercutting the idea that recursion "might be the core domain-specific property of language", such a discovery would be interesting in its own right, but entirely orthogonal to HCF's proposal.

Needless to say, if it were true that sentence-internal clausal embedding is more constrained than its discourse-level counterpart, figuring out the reasons could be an interesting topic for syntactic research. As noted by Nevins et al. (2009) in a similar context, "although Merge may *in principle* combine any two lexical items or phrases an unbounded number of times, not every imaginable instance of Merge is acceptable in actual languages. There are many restrictions on Merge that constrain the repertoire of structures that individual languages allow [...] These restrictions, and the laws that underlie them, form a continuing topic of syntactic research and debate." HCF's claim concerned the human capacity to recursively combine words and phrases into larger units. Though English clausal embedding provides a convenient, standard illustration of this capacity, there are countless other ways that the same point can be made. If we were attempting to illustrate this capacity with Kayardild examples, for instance, we would not be able to demonstrate syntactic recursion with clausal embedding, but a clause containing a VP containing a complex nominal would do just as well. That is why "the metaphor of universal grammar as a 'toolkit' whose tools may not be all deployed" (L13, 152) is apt, and L13's claim that it "fits ill" with HCF's conjecture is misguided. While it is conceivable that an investigation of specific restrictions on clausal embedding *might* turn out to bear on deeper issues of the sort discussed by HCF, there is no reason to expect it to.

L13 makes a further claim, which strikes us as potentially interesting. If sentential embedding is found at the discourse level, perhaps it is in some fashion evolutionarily connected to the human "action-planning system in general", a system that "needs to be able to hold a stack of

subgoals, and check them off one by one". Perhaps. But this proposal is pure speculation: an intriguing start for a future research program, but unsupported (for now) by evidence or argument.

Far be it from us to condemn speculation in linguistics. From speculations grow useful theories, from which may grow specific hypotheses about the puzzles of human language. HCF's proposal concerning syntactic recursion is itself a speculation of this sort, no more or less worthy in principle than L13's claims about the "action domain". We do believe, however, that a speculation like L13's, if advanced on the basis of misrepresentations, mischaracterizations and confusion about basic issues, is not off to a good start.

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