Absence of Evidence is Not Evidence of Absence: the Pirahã Case

Cilene Rodrigues[a]

ABSTRACT

After Everett's (2005), the theoretical basis of Generative Grammar has been severely attacked. The mere possibility of existing a language with no self-embedding was taken by many people interested in linguistics be a conclusive proof that the notion of universal grammar is a spurious theoretical construct. However, the arguments for the unavailability of self-embedding in Pirahã are mostly based on the absence of evidence for self-embedding in the language. This calls for a serious discussion of the validity of scientific arguments within linguistics, as absence of evidence is not the same as evidence of absence. Unlike many of the language analyzed throughout this volume, Pirahã is a language with almost no morphological clues to its syntactic structure. Thus, its syntax may not be transparent, and relying on Pirahã superficial simplicity (E-language) as a way of measuring its underlying complexity (I-language) can be a serious *faux pas*. In this paper, we show that once one investigates the syntax-semantics interface, focusing on interpretative dependencies, evidence for self-embedding in the language are found. Thus, the beauty of the Pirahã grammar as a systematic recursive system is expressed in the cognitive abstract processes of its speakers.

KEYWORDS: Pirahã; syntax; self-embedding; semantic-dependencies

RESUMO

Desde Everett (2005), as bases teóricas da Gramática Gerativa têm sido severamente atacadas. A mera possibilidade de existir uma língua sem auto-encaixamento foi entendida por muitas pessoas interessadas em linguística como uma prova cabal de que a noção de Gramática Universal é um construto teórico espúrio. No entanto, os argumentos para a não-existência de auto-encaixamento em Pirahã apoiam-se na indisponibilidade de evidências contrárias. A aceitação desse tipo de argumentação indica a necessidade de discussão sobre a validade de argumentos com peso científico dentro da linguística formal, pois ausência de evidência não é evidência de ausência. Diferentemente de muitas das língua analisadas neste volume, Pirahã apresenta poucas pistas morfológicas sobre sua estrutura sintática. Portanto, a sintaxe Pirahã não é transparente, e confiar na simplicidade da língua (linguagem externa) para fazer julgamentos sobre a complexidade da gramática (linguagem interna) pode ser um passo falso. Neste artigo, mostramos que quando consideramos a interface sintaxe-semântica, focando em dependências interpretativas, encontramos evidências bastante robustas de auto-encaixamento em Pirahã. A beleza da gramática Pirahã,

[a] PUC-Rio, crodrigues@puc-rio.br

como um sistema computacional sistematicamente recursivo se revela, portanto, nos processos cognitivos abstratos realizados por seus falantes.

PALAVRAS-CHAVE: Pirahã; sintaxe; auto-encaixamento; depedências semânticas

Introduction

This volume contains many papers about morphological agreement and its relation to syntactic processes in different languages. Consider, as an example, the verbal agreement in (1). [Datum from Camargos, this vol.: 1, example (3)]

(1)   ne-pytywà Tentehar   a'e
        2SG-help   Tenetehára 3
        'The Tenetehára helped you'

(1) constitutes a positive evidence for object-verbal agreement in Tenetehára. On the other hand, the contrast in (2) provides us with negative evidence for the hypothesis that the object can also control agreement on the morpheme that follows the verb. That is, (2) shows that only the external argument (the subject in (2)) can trigger on agreement the post-verbal morpheme. [Data from Camargo, this vol.: 12, examples (19) & (20)]

(2)   a.   ne-r-exak   rakwez   kwarer ka'a   r-upi   **a'e** ri'i
                  2SG-INV-see UDPAST boy   forest   OBL-in   3   EM
                  'The boy certainly saw you in the forest'

           b.   *ne-r-exak   rakwez   kwarer ka'a   r-upi **ne** ri'i
                  2SG-INV-see UDPAST   boy forest OBL-in 2   EM
                  'The boy certainly saw you in the forest'

That is, in our field, statements and hypotheses about a specific E-language or I-language can be proven (or disproven) on the basis of positive and negative evidence.

However, since there are around 7.000 languages in the world, and some of them are still understudied, being spoken only by monolinguals, it may not be easy to prove (or disprove) statements or hypotheses about unfamiliar languages, given that accessing their speakers' I-language might turn out to be difficult. Thus, the grammar of less known native languages can be a research challenge and might be subject to either incomplete analyses or misanalyses. In this paper, we consider Pirahã, a language spoken in the Brazilian Amazon by about 400 hundred natives, mostly monolinguals, as an example of research challenge in formal linguistics.

Although many aspects of the Pirahã grammar is still obscure to us, Pirahã became a famous language after Everett's (2005) claim that it has a non-recursive grammar, disallowing self-embedding altogether. In this paper, we wish to reopen the discussion, presenting new fieldwork data, showing that, contrary to Everett's claim, self-embedding seems possible and productive in Pirahã.

In contrast to the many languages that compose this volume, Pirahã is a language with almost no morphological clues to its underlying syntactic structure. It exhibits no verbal or nominal agreement, and almost no functional categories. Prepositions with no semantic contributions (e.g. *of*), determiners and complementizers seem to be all absent or morphologically impoverished. Thus, a good description of the Pirahã grammar can helps us understanding less-transparent, abstract syntactic processes, as well as the interfaces between syntax and the other components of the grammar.

The take-away lesson from the discussion on recursion in Pirahã is that: (a) differences among languages are not unbound; (b) absence of evidence is not evidence of absence.[1] That is, given all that we know about human language and cognition, especially in comparison with other species,[2] we should not expect to find a radically different language, a language that would differ from others in profound ways. If we

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[1] This aphorism is also known as *argument from ignorance* (*argumentum ad ignorantiam*, where ignorance is understood as lack of contrary evidence) and it basically states that propositions built on assumptions like *P is true because it hasn't been proved false or P is false because it hasn't been proved true* can be fallacious. They should be considered non-fallacious only if we can presume that our knowledge base is complete. That is, only when we have an optimal understanding of X (X being the object under investigation), we can safely assume propositions about X to be either true or false in face of absent empirical evidence. Also, propositions based on arguments from ignorance are problematic because they shift the burden of proof to the person who is questioning them. If one claims that X does not exist because evidence for X was not found, one's critics will unfairly receive the call of duty, becoming responsible for finding evidence for the existence of X.

[2] See Premack (2007), Hauser and Fitch (2002), Fitch (2010)

claim to have found a language like that, we must provide strong empirical evidence supporting our claims. Not finding empirical data against our hypothesis is not enough to conclude that it is right, especially when we are working with a grammar (i.e. psychological structured representation of a body of linguistics knowledge) that cannot be easily accessed.

The paper is organized as follows: in section 1, we go through the debate about the (non)existence of recursion/self-embedding on Pirahã. In sections 2 and 3, we present fieldwork evidence for self-embedding in this grammar. Section 4 is devoted to the conclusions.

1.   (Non-)Recursion in Pirahã: a summary of the debate

Hauser, Chomsky & Fitch (HCF - 2002), understanding recursion as (internal and external) Merge, starts with the assumption that recursion is universal, being the core mechanism behind the engine of Grammar (NFL- Narrow Faculty of Language). That is, Merge is the sole combinatorial operation that allows human beings to go beyond iteration of symbols, forming complex hierarchical linguistic structures in pairing sounds and meaning. The emergency of this operation within the cognitive system, a consequence of some rewiring in the brain, is taken to be the great leap forward in human evolution (Chomsky 2010, Bolhuis et al. 2014, Berwick and Chomsky 2015). Thus, merge as a recursive operation is unique to humans, but universal within the species, providing us all with linguistic structures that can be complex and unbounded in length, and might as well be responsible for some of our high level cognitive abilities, such as theory of mind, the powerful skill of simulating the mind of others (de Villiers, 2007).

Everett (2005) understood the term recursion as synonymous of representations with self-embedded constituents (e.g. sentences within sentences, nominal expressions within nominal expression etc.),[3] and claimed that Pirahã is a non-recursive language, disallowing self-embedding altogether.

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[3] The term recursion has been used in different ways. First, it can be easily confused with iteration, which also gives us infinity. More elaborated analyses follow a line of reasoning stemming from mathematics, understanding recursion as induction, frequently exemplified with the successor function used in Peano's axioms to define the natural numbers ((i) 1 is in **N**, (ii) If n is in **N**, then (n+1) is in **N**). The successor

This grammatical gap was explained by Everett as the result of a highly constrained culture, which was resumed as being a "here and now" way of living. The author, thus, concluded that Pirahã constitutes counter-evidence against the universality of the NFL defined by HCF solely in terms of recursion. But clearly, Everett's argumentation does not hit the nail on the head, as HCF were not talking about self-embedding, but rather about Merge as a generalized transformation mechanism that intermingles with lexical insertion, feature valuation and dislocation. Nevins, Pesetsky and Rodrigues (2009), in a reply to Everett, presented a triple contestation of Everett's claims: First, they correctly pointed out Everett's misunderstanding around the term recursion. Second, they observed that many of the constraints on self-embedding notice by Everett are also true of other languages (e.g. ban on relatives), and, of course, it is not clear that these other languages are subject to the same cultural constraint Everett claimed for Pirahã. Third, they argued that data previously published by Everett do not support the conclusion that self-embedding is unavailable in Pirahã.

More recently, Futrell et al. (2016) did a computer analysis of a syntactic corpus of Pirahã, which were composed by stories originally collect and translated into English by Daniel Everett and Steve Sheldon. These stories/texts were broken into sentences (forming a total of 1.149 sentences) and each sentence was parsed and searched for self-embedding structures. The conclusion of their work is that there is not undisputed

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function is understood to be recursive because its induction step ((ii)) is a procedure that takes its own output as its input, creating a loop that can goes on forever (see Tomalin 2007, Di Sciullo & D. Isac 2008, Corballis 2011). However, recursion can also be defined in terms of computability, where a recursive procedure is one that builds up upon a hierarchy of deferred operations, accumulating unfinished objects. This forces the computation to be carried out in a given order. To exemplify this, consider the natural number 4 (four). At a certain point of the computation, the procedure uses to generate 4 reaches the following derivational step $((((1)+1)+1)+1)$, which is a hierarchy of unfinished/open computations, and these computations have to be closed in a given order, with the procedure moving from the most inner layers to the outer ones. As pointed out in Epstein and Hornstein (2005) and Lobina (2010), recursion in terms of computability might align better with the minimalist notion of generalized transformation. In the present paper, we will not consider the multiple definitions of recursion any further (Rodrigues forthcoming, for a more detailed discussion). For our present purpose, distinguishing self-embedding representations from recursive procedures is sufficient. Syntactic representations containing self-embedded constituents are recursive only in the sense that they are generated by a recursive procedure. These representations are, therefore, one (but not the only one) possible outcome of application of a recursive procedure, which is taken to be the operation Merge within the minimalist program. As pointed out by Pinker and Jackendoff (2005), within linguistics, we must tease apart recursive structures from recursive processes.

evidence for self-embedding in Pirahã, as the corpus does not contain any morpheme that undisputedly marks self-embedding.

The main criticism to this research is that it assumes that the combinatorial properties of I-language are to be evident in E-language. That is, it starts with the assumption that all languages are morpho-phonologically transparent with respect to this underlying syntactic structure. However, this assumption is not warranted. For example, in languages like Portuguese and English, scope interactions among quantified nominal expressions may affect the logic representation of a sentence without modifying its morpho-phonological representation. Therefore, a linguist may not find evidence for this type of interaction by searching at the E-language level (e.g. corpora searching). Finding evidence for this type of interaction requires a step towards abstraction, as they are to be found on the interface between syntax and semantics. Thus, in general, when trying to uncover the underlying syntactic structure of a given language, we are expected to go beyond E-language, considering also processes that might be observed only at the I-language level. Hence, Futrell et al.'s computer analysis informs us only that Pirahã does not seem to have overt morphemes used exclusively to mark self-embedding in . [4]

In what follows, we will discuss new pieces of evidence for self-embedding within VPs and PPs in Pirahã. The evidence was found in the interface syntax-semantics, when we considered interpretative dependencies among constituents.[5]

2.   Obligatory control

Most of the languages we know well exhibit what is called Control (Rosenbaum 1967, Postal 1970, 1974, Hornstein (2001), Landau 2001, Rodrigues 2004). Control can be obligatory (3) and non-obligatory (4).

(3)   John wants to leave the meeting right now

(4)   Leaving the meeting right now would be a disaster

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[4] But see Sauerland (2010) for evidence that Pirahã might mark subordination through tonal variation.
[5] For time reasons, self-embedding within DPs will not be discussed here. See Salles (2015) for new data from fieldwork on possessive DPs.

Since these sentences involve two predicates with independent external theta-role, control is standardly analyzed as involving a null pronoun (PRO) in the subject position of the non-finite predicate:

(3')   John wants PRO to leave right now

(4')   PRO leaving the meeting right now would be a disaster

However, obligatory controlled and non-obligatory controlled PRO behave quite differently in the syntactic-semantic interface: while Obligatory controlled PRO is subject to principle A of Binding Theory, behaving like an anaphor, non-obligatory controlled PRO behave like a pronoun, obeying, thus, Principle B of the Binding theory (Chomsky, 1981, 1986). Thus, in obligatory control, differently from non-obligatory control, there is an interpretative dependency between PRO and the matrix subject.[6] Given that anaphors are licensed only in structural configurations in which they are bound by a c-commanding antecedent (in accordance with Principle A), it follows that in sentences like (3) PRO must be c-commanded by *John*, the antecedent. Therefore, control is informative about how meaning is composed by the grammar, as the denotation of PRO is syntactic constructed. It is also informative about the syntactic structure itself. In obligatory control, the non-finite predicate must be embedded within the matrix VP, so that PRO can be bound by *John*. That is, the two predicates in (3) are not paratactically conjoined. If they were, PRO would not be controlled by the matrix subject. That is, obligatory control involves predicate self-embedding, predicate within predicate. For this reason, obligatory control can be used as a diagnostic for structures with self-embedded predicates. Knowing that, Rodrigues et al. (forthcoming) did fieldwork in Pirahã looking for obligatory control. The data we found show that obligatory control occurs in Pirahã and can optionally trigger word order changes, which makes evident at that the controlled predicate is subordinated under the matrix VP.

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[6] There is also an interpretative dependency in terms of tenses. The tense of the non-finite clause in interpreted in function with the matrix tense (Wurmbrand, 2001).

Everett (1986, 1991) describes Pirahã as an SOV language, which can turn into SVO if the object is a heavy constituent, as shown in (5) and (6). In (5), the object is a light DP and the SOV word order is maintained. In (6), there is a heavy DP in object position, which triggers SVO order. [Data from Everett, 1986:202]

(5)   ti xíbogi ti-baí

        I milk drink-INTNSF

        'I really drink milk'

(6)   tiobáhai koho- ái   hiab -a   tomati gihió-
        child   eat- ATELIC- NEG-   REMOTE tomato bean
        kasí   píaii taí   píaii
        name also leaf also
        '(The) children do not eat tomatoes or beans or leaf(y vegetables)'

This change in word order caused by the heaviness of the object is commonly called heavy-NP shift (Ross, 1967), a syntactic transformation that shifts the position of the object to the end of the sentences due to phrasal phonological constraints, [7] and it occurs in many languages, including Portuguese: [Data from Brazilian Portuguese]

(7)   a.   Eu dei aquela camiseta para o Arturo
                I   gave that   t-shirt   to the Arturo

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[7] Heavy-NP shift might be the result of stylistic rules (Ross, 1967), but it has been studied as a syntactic phenomenon as well. Pesetsky (1995) analyzes it as rightward adjunction to the VP. In contrast, Larson (1998) proposes that it results from leftward movement of everything inside the VP except a heavy-NP. Kayne (1994), following Larson's analysis, adds that light-NPs, as opposed to heavy-NPs, move leftwards to a higher specifier position. For the purpose of the present paper, any of these analyses can be adopted.

b.   Eu dei   para o Arturo aquela camiseta dos   Beattles que ele tinha me

I   gave to   the Arturo that   t-shirt   of-the Beattles that he had me

pedido

asked

'I gave Arturo the that Beattles T-shirt he had asked me for'

Given that it also occurs in Pirahã, it might as well be responsible for the shift from SOV to SVO that Everett (2005) observed in sentences containing sentential objects, such as (8):

(8)   kohoibiihai hi gáí- sai   hi hi xogi-hiab- iig- á   gáihi

Kohoibiihai 3   say-NOMLZR 3   3 want-NEG- CONT-REMOTE that

'Kohoibiihai said (that) he's not wanting that'

This analysis was not considered by Everett (2005). Instead, he suggests an analysis of (8) as a case of parataxis, according to which the second sentence is juxtaposed to the first one. Thus, he argues, the SVO order observed in complex sentences is positive evidence for the lack of self-embedding in Pirahã: if the second sentence were embedded under the first one, the expected word order would be SOV in (8). However, this conclusion seems a bit premature, as questions about a possible shift caused by the heaviness of the sentential complement was not even raised. Actually, this is not difficult to test. If Pirahã sentential complements cause a word order shift due to its phonological heaviness, we predict that light embedded sentences will not cause this type of shift, maintaining the canonical SOV order. This is exactly what is reported in Rodrigues et al. (forthcoming) for sentences displaying obligatory control. In obligatory control, both SVO and SOV seem to be possible. [Data from Rodrigues et al., forthcoming]

(9)   a.   ti ogabagai kapiiga kagakai   [SVO]

            I want   paper   study

            'I want to study'

      b.   ti ogabagai tiisi ikohaipiha

            I want   fish   eat

            ' I want to eat fish'

(10)   a.   ti kapiiga kagakai ogabagai   [SOV]

            I paper   study   want

            'I want to study'

      b.   ti tiisi ikohaipiha ogabagai

            I fish eat   want

            'I want to eat fish'

In (9), as well as in (10), the dependent predicates (*paper study* and *fish eat*) are semantically understood as the complement of the desiderative verb (*want*) and these predicates assign an external theta-role to an unpronounced external argument, which is interpreted as obligatory coreferent with matrix subject (*I*). Hence, these are *bona fide* cases of obligatory control, and, in harmony to what happens in other language, in both (9)-(10) an interpretative dependency in observed, as the subject of the lower predicate is interpreted in function with the matrix subject. Therefore, given what we know about this type of dependency, we should analyze (9) and (10) under the assumption that the second predicate is embedded predicate is embedded under the first one.

The optional word order in (9)-(10) is also crucial to our present discussion. It shows that there is a clear alternative to Everett's account of (8). Sentential complements might trigger a SOV-to-SVO shift just because sentences are heavy constituents. In order to justify an analysis of (10) as containing two syntactically independent, juxtaposed sentences, one has to unorthodoxly claim that these sentences involve three syntactically independent pieces, as in sketched in (11). Note that an analysis like (11) is not empirically justified and it is actually a buck-passing-game because at some linguistic level (probably at the semantic-pragmatic component) the three pieces in (11) has to be stitched together such that the pronoun *I* is interpreted as the subject of the desiderative predicate *want* and the predicate *paper study* is

understood as the complement of want.[8] In other words, saying that Pirahã is a non self-embedding language is somehow misleading, as it does not tell us how the semantics of the sentences works.

(11)   [ti] [kapiiga kagakai] [ogabagai]

         I   paper   study   want

As discussed in Rodrigues et al., one possible counter-argument to the line of reasoning we're developing here is that we do not really know the morphological status of what we are calling dependent predicates in (9) and (10).   These can actually be nominalized predicates, resulting from some morphological process of compounding. If so, *kapiiga kagakai* and *tiisi ikohaipiha* would better be translated into English as nominal: *paper-studying* and *fish-eating*, respectively, and, therefore, neither (9) nor (10), are structures containing self-embedding. Be that as it may,[9] other pieces of data suggest that an unified analysis of sentential complements as nominal compounds cannot be easily attained. Consider, for example, the sentence in (12).

 (12)   ti kapiiga kagakai sogabagai Kapoogo

         I paper study   want   Kapoogo

         'I want Kapoogo to study'

In (12), the DP *Kapoogo* is the subject of *kapiiga Kagakai 'paper study'*. Thus, (12) shows that desiderative verbs can take non-controlled, full sentences as its complement. Since Pirahã does not morphologically marks Case, we do not know yet weather (12) is an exceptional case marking configuration or not, but, it is evidence that

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[8] According to Rodrigues et al.'s informant (Iapohen Pirahã - a native speaker), the sentence in (i) is not acceptable in Pirahã. Hence in (9)-(11), the desiderative verb S-selects the depedent predicate.

(i)   * ti ogabagai
          I   want

[9] To avaluate this anternative analysis for (9) and (10), we would need to collect in Pirahã data like (i), in which the complement of the controlled predicate is a complex DPs, containing another predicate.

(i)   I want to eat the fish that you cooked yesterday.

its embedded predicate may not be a nominalized predicate. An important syntactic property of (12) is that only the embedded VP (*kapiiga kagakai*) can appear between the matrix subject and the matrix VP, the embedded subject (*Kapoogo*), must be occur after the matrix verb, as the unacceptability of (13) indicates. [Datum from Rodrigues et al., forthcoming]

(13)   *ti Kapoogo   kapiiga kagakai sogabagai

          I Kapoogo paper   study   want

The contrast between (12) and (13) support the conclusion that only light verbal complements can appear between the subject and the verb, triggering the SOV order. When the verbal complement is a full CP or TP, as in (8) and (12), it is too heavy to appear before the verb. Thus, it is either spell-out after the verb or will be a split constituent, as in (12).

Another strong piece of evidence in favor of self-embedding in Pirahã is (14), in which the complement of the matrix desiderative verb is another desiderative verb that, in its turn, take the non-finite predicate *kapiiga kagakai* as its complement. That is, multiple self-embedding seems possible in Pirahã. [Datum from Rodrigues et al., forthcoming]

(14)   ti kapiiga kagakai ogabagai sogabagai

          I paper   study   want   would-like

          'I would like to want to study'

Given (14), there is no alternative, but accepting the availability of self-embedding in Pirahã. An analysis of obligatory controlled embedded predicates as nominalizations would lead us to the conclusion that there are two nominizations in (14), one embedded within the other!

In sum, Everett's claim that the SVO order observed in sentences with sentential complements is positive evidence for the ban on self-embedding in Pirahã makes the wrong predication with respect to control configurations. In obligatory control, both SVO and SOV order are possible. The licensing of SOV order in these configurations provides us with evidence that the controlled predicates is syntactic and semantically embedded within the matrix predicate. This is in accordance with the interpretative dependencies observed in obligatory control.

3. Prepositional phrases

If we do a *picture matching* experiment with native speakers of English and Portuguese, in which the task is to point to one of the pictures below (figure 1) after hearing a sentence, we expect them to point to the second picture of the second row after hearing (15). In contrast, if they hear (16), we foresee that they will point to the first picture in the second row.
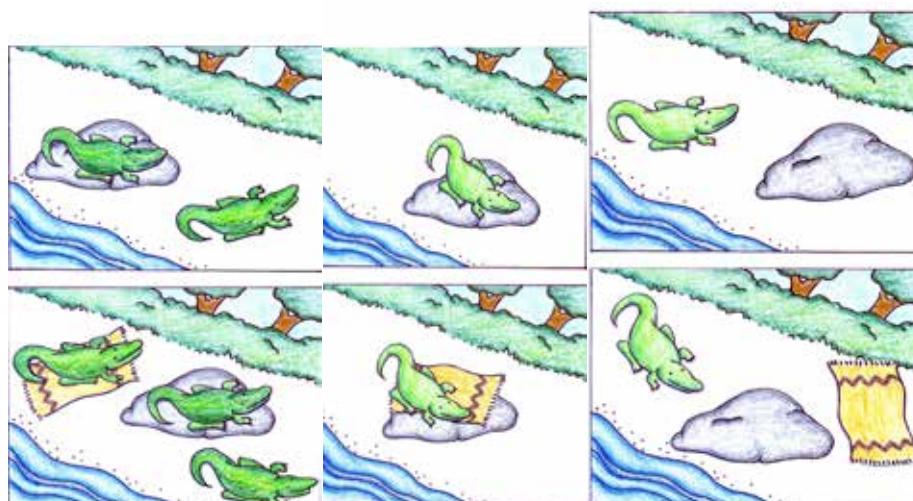

Figure 1: From Sândalo et al. (forthcoming)

(15) a.   Alligator on the mat on the stone on the sand

       b.   Jacaré no tapete na pedra na areia

(16) a.   Alligator on the mat, on the stone, on the sand

       b.   Jacaré na tapete, na pedra, na areia

In (15), we have a cascade of self-embedded prepositional phrases. Semantically, it means that there is an interpretative dependency, according to which the reference of each DP node is defined *top-down*,[10] the reference of *alligator/jacaré* is build upon the reference of *mat/tapete*, whose reference is defined based on the reference of *stone/pedra*, whose reference is defined upon the reference of *sand/areia*. These reference dependencies are a reflex of the underlying syntactic structure of (15), in which the DP *alligator/jacaré* contains the PP *in the mat/no tapete*, the DP *mat/tapete* contains the PP *in the stone/na pedra*, and the DP *stone/Pedra* contains the PP na areia.[11]   This is different from what we have in (16), which is a coordination of prepositional phrases, and the reference of each DP is defined independently.

The difference between (15) and (16) is not only in syntax and semantics, but also in processing. Maia (forthcoming) observes that coordinations like (16) are more accessible default forms. However, the early spontaneous use of sentences like (15) in acquisition suggests that these structures are available in children and adult grammar. Also, the acceptability of (17) in Kaingang, a native language spoken in the south of Brazil, indicates that structures with multiple self-embedded PPs are available in many languages, despite their processing issues. [Datum from Sândalo et al, forthcoming]

(17) Kãkénh tá runja kãki lata ki krẽkufár vyn kỹ   pó   ki
      canoe on bucket inside can in fish   grab thn rock   in
      krẽkufár rẽ   fi
      fish   near put
      'Grab the fish in a can inside a bucket in the canoe then put (it) near the fish in the rock'

If we accept the ban on self-embedding in Pirahã, we predict that native speakers of this language do not license interpretative dependency of this sort, allowing only coordination readings. This prediction does not born out, however. Sândalo et al.

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[10] Notice that these semantic building blocks can also be assembled bottom-up as in (i). However, for some speakers, (i) harder than (14) to process as a self-embedding structure.

   (i)   a. Alligator in the sand in the stone in the mat
          b. Jacaré na areia na pedra no tapete

[11] See Perez (forthcoming) for discussion on interpretative dependencies in structures with self-embedding.

(forthcoming) did a picture matching pilot experiment using the same set of the pictures in figure 1. The pilot was done with a young native monolingual speaker of Pirahã called *Ioá Pirahã*.[12] The results demonstrate that at least this speaker has no problem in producing and interpreting sentences involving multiple self-embedded PPs.

In the first part of the experiment, each individual picture of figure 1 was introduced to the speaker, and he was asked to describe it. As a result, sentences like (18) were elicited. Notice that the sentences in (18) are potentially ambiguous, describing either pictures with coordination of entities (i.e. pictures 1 of the first and second rows) and pictures with interpretative dependencies (i.e. pictures 2 of the first and second rows).

(18)   a.   koxoahai bege apo xaxai apo
                alligator floor on stone on

        b.   koxoahai bege   apo xaxai apo tahoasi apo
                alligator floor on   stone on mat   on

In the second part of the experiment, we reversed the roles. One of the experiments pronounced the elicited sentences out lout and the participant had to point to the picture that matched the sentence he heard.

The result of the pilot suggests that speakers of Pirahã are able to produce, process, comprehend and differentiate ambiguous prepositional phrases. Ioá consistently paired sentences like (18) with the pictures involving interpretative dependencies, as illustrated in (19). [Data from Sândalo et al, forthcoming]

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[12] In this experimental task, we were helped by Augusto Diarroi, a non-native speaker of Pirahã, who has some knowledge of the language. Augusto's father is Pirahã. Both Augusto and Ioá live in Pequiá, a Pirahã village, located in the district of Humaitá/Amazon.

(19)
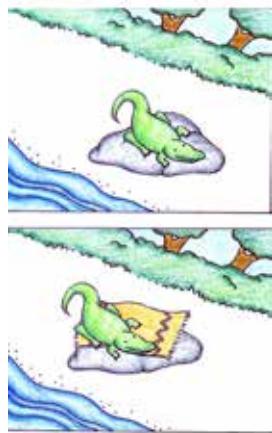
Paired picture	*Target sentence*
	➜ koxoahai bege apo xaxai apo alligator floor on stone on 'Alligator on the stone on the floor'
	➜ koxoahai bege apo xaxai apo tahoasi apo alligator floor on stone on mat on 'Alligator on the mat on the stone on the floor'

Importantly, as shown in (20), in the second part of the experiment, when asked to describe the pictures the experimenter pointing to, Ioá modified the sentences in (18), introducing *piai* a coordinative particle translated as *also* by Everett (1990))[13] every time the experimenter pointed to a picture involving coordinated entities. [Data from Sândalo et al., forthcoming]

(20)
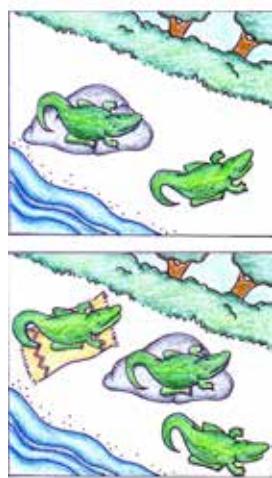
Paired Picture	*Target sentence*
	➜ koxoahai bege apo xaxai apo piai alligator floor on stone on also 'Alligator on the floor (and) on the stone also'
	➜ koxoahai bege apo xaxai apo (piai) tahoasi apo piai alligator floor on stone on also mat on also 'Alligator on the floor, on the stone, (and) on the mat also'

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13 *'pí(x)ái conjunction. Free form. And, to join or add, also'* (Everett, 1990:57)

These results clearly show that Pirahã speakers are capable of differentiating structures with coordination from structures with semantic dependencies. Thus, it might be that the sentences in (18) not ambiguous, allowing only readings with interpretative dependencies. At any rate, we can concluded from this results that structures containing self-embedded PPs are available in Pirahã; speakers have at least preference for treating (18) as containing self-embedded PPs; and a possible structural ambiguity is resolved by inserting an overt coordinator *piai*, forcing a coordinative reading.

4.   Conclusion: *absence of evidence* is not the same as *evidence of absence*

Everett's (2005) arguments for disputing the universality of *merge*, a syntactic mechanism that builds representations recursively (Hauser, Chomsky & Fitch, 2002), illustrate a misunderstanding, both theoretically and empirically. First, Everett's definition of recursion as synonymous of self-embedding is a simplification. Given the technical definition of recursion, a language might have a recursive combinatorial system, although it may disallow self-embedding altogether. In addition, as we have shown above, the fact that Everett, as well as Futrell et al (2016), did not find any unambiguous occurrence of self-embedding in the data they analyzed does not lead to the conclusion that Pirahã is non-self-embedding language. The assumption that all the abstract properties of I-language have to be transparently manifested in the corresponding E-language is not warranted. An utterance might not easily reveal properties of its correspondent underlying syntactic structure. As Di Scuillo (2002) puts it, E-complexity is not a reliable way of measuring I-complexity. When we probed for structures with interpretative dependencies, such as controlled sentential complements and cascades of prepositional phrases, Pirahã speakers provides clear evidence that their I-language is not different in terms of recursion (and self-embedding). Therefore, what Pirahã shows us is that the aphorism *absence of evidence is not evidence of absence* is a general truth.

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