

# Syntax: Its Evolution and Its Representation in the Brain

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Poeppl (2008) observes that there is no clear correspondence between units of analysis in linguistics (especially the abstract and arbitrary-looking principles of syntax) and biological units of neuroscience, concluding that current neurolinguistic research presents a case of cross-sterilization, rather than cross-fertilization. Here the proposal is developed that decomposing syntax into intermediate evolutionary layers, into its evolutionary primitives, not only makes syntax compatible with gradualist accounts, but it also renders it more tangible and less abstract. In this approach, at least some complexities (and oddities) of syntax, such as Subjacency effects and the small clause core, can be seen as side-effects/by-products of evolutionary tinkering. It is conceivable that such evolutionary considerations are a necessary missing ingredient in any attempt to establish links between the postulates of syntax and the units of neuroscience. This article considers concrete linguistic data and suggestions as to where and how to look for neurobiological correlates of syntax.

*Keywords:* evolution of syntax; ergativity; small clauses; subjacency

*Nothing in biology makes sense except in the light of evolution.*  
(Dobzhansky 1973)

## 1. Introduction

Poeppl (2008) observes that there is no clear correspondence between units of analysis in linguistics (especially syntax) and biological units of neuroscience, concluding that current neurolinguistic research presents a case of cross-sterilization, rather than cross-fertilization (see also Poeppl & Embick 2005).

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Quite a bit is now known about the units of neuroscience: that neurons receive signals from other neurons through their dendrites, and transmit their own signals to other neurons through their axons; that signals are passed between neurons by synapses; that the human cortex includes around  $10^{10}$  neurons, and that each of these neurons has  $10^4$  synapses; and so on, and so forth. The theory of syntax has likewise led to significant accumulation of knowledge and crosslinguistic generalizations. But it is indeed hard to see how to match the units such as axons, neurons, or synapses, with the postulates of syntactic theory, such as Merge, Move, Theta Criterion, EPP, Subjacency. Nor is it likely that direct correlations of this kind will be found.

At the same time, language/syntax has to be represented in the brain somehow, and some new findings point in this direction. Pulvermüller (2002, this volume) argues that there is a neurobiological basis for words and sentences in terms of neurons. For him, language mechanisms are organized as nerve cells and their mutual connections. To cite one application, concrete words referring to objects and actions are proposed to be organized as widely distributed cell assemblies composed of neurons in sensory and motor areas. In contrast, highly abstract grammatical function words and affixes are assumed to be more focally represented in the left-hemispheric core language areas of Broca and Wernicke (Pulvermüller 2002: 49). His assumption is that there are one-to-one correspondences between linguistic representations and neuronal entities and between linguistic processes and neuronal processes (p. 209).

Ullman (2008) argues that specific language processes, such as irregular vs. regular past tense formation, activate two different types of memory: Declarative and procedural, respectively (see also Pinker & Ullman 2002). When it comes to language, declarative memory specializes for the storage of the Lexicon, including irregular morphology. Procedural memory, on the other hand, specializes for syntax and regular morphology, including sequences and rules, implicit knowledge, and rule-governed hierarchical (de)composition of complex forms. It is also of significance that the two memory systems overlap to some extent: Both can learn some of the same types of knowledge or skills, but with different computational and neural bases (see also Wray 2002: sect. 2.3).

The question is then not so much whether language/syntax is represented in the brain, but whether we can hope to find more direct correlates between the units of syntax and those of neuroscience. I suggest that one needs to explore a route which has, surprisingly, not been explored seriously — to challenge syntactic theory to decompose its postulates into more primitive entities, which would stand a better chance of being commensurate not only with the units of neuroscience, but also with the notions of evolutionary biology.<sup>1</sup>

Many properties of present-day syntax *look* arbitrary and abstract, including the two discussed in this article (Subjacency and the small clause core of clauses/sentences), leading to a wide-spread view among syntacticians that a gradualist evolutionary approach to syntax is impossible: Its principles are just too abstract for evolutionary forces to target them (e.g., Bickerton 1990, 1998,

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<sup>1</sup> In this respect, Kinsella (2009) calls for a syntactic theory which would be compatible with adaptive evolutionary processes.

Lightfoot 1991, Chomsky 2005). My contribution stands this argument on its head, and proposes that decomposing syntax into intermediate evolutionary layers, into its evolutionary primitives, not only makes syntax compatible with adaptationist accounts, but it also renders it more tangible and less abstract. In this approach, at least some complexities (and oddities) of syntax can be seen as side-effects/by-products of evolutionary tinkering.<sup>2</sup> It is conceivable that such evolutionary considerations are a necessary missing ingredient in any attempt to establish links between the postulates of syntax and the units of neuroscience.

Section 2 explores the nuts and bolts of the proto-syntax proposal. I first discuss the significance of the commonly accepted analysis according to which every modern clause/sentence unfolds from the small clause core, then explore the possibility that transitive constructions were tinkered out of the intransitive ones, leading to two types of present-day languages (ergative–absolute and nominative–accusative), and finally consider the consequences of the proposal that proto-syntax was based on (intransitive) small clauses. Section 3 mentions some corroborating evidence for this view from language acquisition, aphasia, and genetics. Section 4 considers another linguistic universal, Subjacency, and offers a novel way of looking at it, consistent with the evolutionary proposal explored here. Section 5 concludes this article.

## 2. Proto-Syntax and the Small Clause Universal

### 2.1. *Small Clause Core in the Light of Evolution*

According to the mainstream syntactic theory, Minimalism and its predecessors, a clause/sentence is derived from a ‘small clause’ construct, an argument–predicate combination which typically excludes clausal functional projections.<sup>3</sup> This core subsequently unfolds/transforms into a full (finite) sentence/clause, after the Merge of, for example, Tense, and Move of the subject into the specifier of the tense phrase (TP).<sup>4</sup> The English sentences, or TPs, in (1) are thus derived from small clause structures such as (2), as illustrated in (3)–(5):

- (1) Maria will stay. / Maria was angry. / Maria is in Bamberg.

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<sup>2</sup> On recursion and epiphenomenal nature of certain syntactic principles, see also Arsenijević & Hinzen (this volume), Nevins (this volume), and Zeijlstra (2008).

<sup>3</sup> The basic argument of this article focuses on intransitive structures — transitive predicates involve additional layers of structure and are probably later syntactic innovations. Section 2.2 offers some rationale for this view, as well as suggestions regarding how transitivity may have arisen, and what consequences this transition may have had on variation in present-day languages.

<sup>4</sup> As pointed out by a reviewer, there are languages for which a TP-analysis may not be desirable, such as ergative languages or the so-called non-configurational languages. While resolving this issue is beyond the scope of this article, suffice it to say that the proposal here is that the small clause core is what all languages share. The way complexity is built above and beyond the small clause core may vary significantly across languages. For some speculation regarding the emergence of transitivity in ergative vs. nominative/accusative languages, see section 2.2; see also fn. 6 regarding some ancient languages.

- (2) Maria stay. / Maria angry. / Maria in Bamberg.
- (3) a. Small Clause: [<sub>SC</sub> Maria stay] →  
 b. [<sub>TP</sub> will [<sub>SC</sub> Maria stay]] →  
 c. TP: [<sub>TP</sub> Maria [<sub>T'</sub> will [<sub>SC</sub> ~~Maria~~ stay]]]
- (4) a. Small Clause: [<sub>SC</sub> Maria angry] →  
 b. [<sub>TP</sub> was [<sub>SC</sub> Maria angry]] →  
 c. TP: [<sub>TP</sub> Maria [<sub>T'</sub> was [<sub>SC</sub> ~~Maria~~ angry]]]
- (5) a. Small Clause: [<sub>SC</sub> Maria in Bamberg] →  
 b. [<sub>TP</sub> is [<sub>SC</sub> Maria in Bamberg]] →  
 c. TP: [<sub>TP</sub> Maria [<sub>T'</sub> is [<sub>SC</sub> ~~Maria~~ in Bamberg]]]

(The strikethrough notation in (3)–(5) and elsewhere indicates the original, pre-Move position of the subject.)

This idea has remained influential and widely accepted in syntactic theory ever since it was first proposed (e.g., Burzio 1981, Stowell 1981, 1983, Kitagawa 1986, Koopman & Sportiche 1991, Hale & Keyser 2002, Chomsky 1995, and subsequent minimalist work).<sup>5</sup> While languages and analyses vary with respect to what type, or how many, functional projections build on top of the small clause, most would agree that the small clause core is a universal property. Why is this so? Why should every sentence, in every language, be built upon the foundation of the small clause?

This can be explained by evolutionary tinkering, if all present-day human languages share a common evolutionary stage, that of small clause proto-syntax. In this view, the building of the modern clause e.g. in English involves (at least) two (semi-autonomous) systems/layers, as well as their complex interaction: An ancient system, and a more recent one.<sup>6</sup> In this scenario, TP/sentence would not

<sup>5</sup> As far as I can tell, Pollard & Sag's (1994) criticism of Stowell's structures applies to those small clauses which are embedded within other clauses but does not necessarily extend to the small clauses from which a clause unfolds, or to the root small clauses, such as the ones illustrated in (17), and which obviously have to be constituents of some kind. For some discussion of the structure of embedded small clauses, and some thoughts on why and how they differ structurally from the small clauses discussed in this article, see section 2.3. Very roughly speaking, small clauses embedded within other clauses get integrated into the matrix clause by various morpho-syntactic processes, so that they show complexities not attested with root small clauses, and their constituency may be distorted by the movement of the small clause subject to (a functional projection inside) the main clause.

<sup>6</sup> As pointed out by a reviewer, ancient languages may have relied more heavily on small clause syntax than modern languages do. In this respect, Latin is famous for its Absolute Ablative (*ablativus absolutus*) constructions, which basically involve small clauses tagged onto finite clauses; comparable constructions exist in modern English as well (see, e.g., Stump 1985 and also Progovac 2009b):

(i) [Urbe capta] Aeneas fugit. *Latin*  
 city captured Aeneas fled  
 'With the city captured, Aeneas fled.'

have arisen from scratch, designed in an optimal way (e.g., Chomsky 2005), but rather it would have been tinkered from/superimposed upon what was already there: the small clause foundation, leading to quirks and complexities that syntax is (in)famous for (Progovac 2008a, 2009a). This approach is gradualist in nature, assuming progression in stages, and is thus in the spirit of Pinker & Bloom (1990) and Jackendoff (1999, 2002).<sup>7</sup>

Evolutionary explanations invoking layering and recency dominance can be found elsewhere, for example, in symbolic reference (Deacon 1997), in the superimposition of timed speech over ancient prosody (Deacon 1997, Pulvermüller 2002), in brain stratification accounts (in Vygotsky's and Piaget's work as well as in the triune brain proposals, such as MacLean 1949). The common theme in all is the inclusion of attainments of earlier stages in the *structures* of later stages, the theme which I explore here for the evolution of syntax.

## 2.2. *Transitivity: An Excursus*

Transitive clauses involve additional layers of structure, and can be hypothesized to have been a later evolutionary innovation. While this article concentrates on intransitive predicates for this reason, the reviewers are correct in pointing out that the exclusion of transitivity needs more justification. This section is written in that spirit. It addresses the questions of how transitivity is treated in syntax and how it could have been tinkered over time from intransitive predicates, as well as how unaccusativity and ergativity may have developed given this evolutionary scenario.

In Minimalism (Chomsky 1995 and subsequent work), it is typically assumed that a transitive clause necessarily involves a *vP*/VP shell, that is, two verbal projections in which the arguments of the verb are generated, while intransitive structures, especially those involving theme arguments (unaccusatives), need not have the *vP*-layer:

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In addition, on the basis of Vedic, Greek and Old Irish evidence, Kiparsky (1968: 51) has argued convincingly that proto-Indo-European, as well as early IE, was characterized by a frequent use of tenseless/moodless (injunctive) forms of the verbs, even in what we would consider today to be finite contexts (for the connections between these, on the one hand, and the small clauses and compounds, on the other, see Progovac 2006; also Progovac 2010b). In this respect, Gonda (1956: 36–37) notices that any attempt exactly to translate these injunctive categories into a modern Western idiom is doomed to fail, given “the vagueness in meaning and the great, and in the eyes of modern man astonishing, variety of its functions [...]. [It] must sometimes be translated by a past tense [...], sometimes by a present [...] or future [...], sometimes by a wish or command”. Deutscher's (2000) discussion of Akkadian is also relevant in this respect. The issue certainly deserves further attention.

<sup>7</sup> Pinker & Bloom (1990) assume the Baldwin Effect, the process whereby environmentally-induced responses set up selection pressures for such responses to become innate, triggering conventional Darwinian evolution. Tiny selective advantages are sufficient for evolutionary change: A variant that produces on average 1% more offspring than its alternative allele would increase in frequency from 0.1% to 99.9% of the population in just over 4,000 generations. This would still leave plenty of time for language to have evolved: 3.5–5 million years, if early Australopithecines were the first talkers, or, as an absolute minimum, several hundred thousand years, in the unlikely event that early Homo Sapiens was the first. Fixations of different genes can go in parallel.

(6) Maria rolled the ball.

- (7) a. [<sub>SC/VP</sub> rolled the ball] →  
 b. [<sub>vP</sub> Maria [<sub>SC/VP</sub> rolled the ball]] →  
 c. [<sub>TP</sub> Maria [<sub>vP</sub> ~~Maria~~ [<sub>SC/VP</sub> rolled the ball]]]

If the transitivity layer is not there, the theme *the ball* will raise to become the subject of the TP:

(8) The ball rolled.

- (9) a. [<sub>SC/VP</sub> rolled the ball]]  
 b. [<sub>TP</sub> the ball [<sub>SC/VP</sub> rolled ~~the ball~~]]

Progovac & Locke (2009) propose that intransitive clauses antedated transitivity, based on the analysis of so-called exocentric verbal compounds, such as *daredevil*, *pickpocket*, *killjoy*, *rattlesnake*, *crybaby*. The make-up of these compounds, which they argue to be 'living fossils' of proto-syntax, lead them to conclude that proto-clauses involved verb-noun structures in which the noun's thematic role was syntactically underdetermined, and largely left open to pragmatic interpretation.

While the noun in these compounds is typically a theme (affected entity) (e.g., *pickpocket*), it could also be an agent or some other role (*crybaby*), or even vague with respect to these possibilities.<sup>8</sup> For example, Serbian *pali-droce* ('ignite-stick, matches') is both a stick that ignites and a stick that gets ignited. Even though English *rattlesnake* happens to refer to a snake that rattles, it would not be impossible to imagine this label used to refer to people who rattle snakes, say as a hobby, on analogy with *scarecrow* (that which scares crows), *pickpocket* (one who picks pockets), etc.<sup>9</sup> Importantly, this dual possibility is not available with syntactically more complex compounds, such as *snake-rattler*, which involve an agentive suffix *-er* and with it a transitivity layer, and thus can only have the latter interpretation.

In addition to the verb-noun compounds discussed above, there are other constructions across languages which seem to still exhibit these simpler ('fossil') structures, in which the thematic role is left syntactically unspecified, and thus open to pragmatic interpretation. Consider, for example, the intransitives in ergative/absolutive languages, as illustrated in the following example from Tongan (Tchekhoff 1979: 409):

<sup>8</sup> The proposal differs somewhat from that of Casielles & Progovac (2010), who also propose that intransitive (thetic) structures evolved prior to transitive structures. The difference is that in Casielles & Progovac the conclusion is that the expression of themehood (unaccusativity) preceded the expression of agenthood, the latter associated with the *vP*-projection. It may be that the morphosyntactic differentiation between the theme and agent, as attested in the data discussed in Casielles & Progovac, represented a somewhat later evolutionary development. The issue deserves further attention.

<sup>9</sup> The so-called exocentric compounds of this type are attested in a variety of (unrelated) languages, with similar images, although they ceased to be productive in most (for details and examples, see Progovac & Locke 2009 and Progovac, to appear).

- (10) 'oku kai 'ae iká. Tongan  
*PRES eat the fish*  
 'The fish eats.' / 'The fish is eaten.'

The syntax leaves it unspecified whether the only argument *the fish* of the intransitive verb above is the agent or the patient/theme (see also Gil 2005 for a discussion of comparable structures in Riau Indonesian). It is only through the addition of an agent argument (e.g., *the man*), presumably in the vP layer, that the role of *the fish* would be disambiguated to necessarily represent a patient/theme. The addition of the agent morpheme (*-er*) in verb-noun compounds has a comparable effect, as illustrated above for the compounds such as *rattlesnake* vs. *snake-rattler*.

What characterizes ergative languages, in contrast to nominative/accusative languages, is that the subject of an intransitive predicate is morpho-syntactically equivalent to the object of a transitive predicate (see, e.g., Dixon 1994). This kind of syntax also seems to characterize the exocentric compounds discussed above. Adopting the protosyntactic proposal advocated in Progovac & Locke (2009) and Progovac (to appear), one can envision the subsequent development of two types of languages, nominative–accusative and ergative–absolutive. With ergative–absolutive languages, the only argument in intransitive structures will remain marked (or unmarked) with the same absolutive case, regardless of its theta role, while the special marking (ergative) will be reserved for the argument introduced in the higher (innovative) structural layer — say, vP for concreteness. In nominative–accusative languages, on the other hand, the only argument in intransitive structures has to be associated with the same higher functional layer (TP) with which the highest argument of a transitive predicate is associated (see examples (6) and (8)), thus rendering the two indistinguishable on the surface.

As pointed out by a reviewer, a transition from intransitive to transitive structures is also clearly observed in the emergence of Nicaraguan Sign Language (NSL), which developed spontaneously by deaf children in the 1970s and 1980s (see, e.g., Kegl *et al.* 1999). According to the authors, the early pidgin stages of NSL do not use transitive [NP V NP] constructions, such as (11) (Kegl *et al.* 1999: 216–217). Instead, the structure is typically broken into two (intransitive) clauses, [NP V NP V] sequences, with each verb taking only one argument, as illustrated in (12)–(14):

- (11) \*WOMAN PUSH MAN.

- (12) WOMAN PUSH MAN GET-PUSHED.<sup>10</sup>

<sup>10</sup> As pointed out by Kegl *et al.* (1999: 217), even though the gloss is passive in the second NP–V sequence, the form is not passive, but is rather marked with the first person point of view. As opposed to PUSH in the first NP–V sequence, where PUSH is articulated from the perspective of the pusher, the GET-PUSHED part is signed with “the signer’s body jolting backwards, as if having received the thrust of a push by some unspecified agent”. The GET-PUSHED type of data may be comparable to the examples such as *Problem solved*, *Case closed*, etc., which also appear to be passive, but may not be syntactically so, as discussed in fn. 15.

(13) WOMAN PUSH MAN REACT.

(14) WOMAN PUSH MAN FALL.

Typically, the primary meaning is expressed with the first verb, while the second verb tends to express the result or termination of the event. They found that second generation signers drop the second verb, creating constructions that can be seen as transitive [NP V NP] structures.

In fact, if transitivity indeed arose in a comparable fashion in the evolution of human language, then the *vP/VP* shell of modern syntactic theory can be seen as a ghost of this evolutionary past, which entertained structures with two verbs.

### 2.3. 'Fossils' of Proto-Syntax

There are good arguments for the small clause core analysis outlined in section 2.1. First, a full clause/sentence (TP) appears to have two subject positions, both of which can sometimes be overtly filled. In (15), there is an expletive (meaningless) subject in TP (*there*), and another subject (*a spider*) in the small clause, which agrees with the verb. In (16), one piece of the subject, *the spiders*, occurs in TP, while the remaining piece, the so-called floating quantifier (*all*), occurs in the small clause (see, e.g., Koopman & Sportiche, 1991):<sup>11, 12</sup>

(15) [<sub>TP</sub> there was [<sub>SC</sub> a spider in the room]]

(16) [<sub>TP</sub> the spiders were [<sub>SC</sub> all in the room]]

These data implicate two (partly overlapping) layers of clausal structure, each with a subject position (see Progovac 2008a, 2008b for more examples of such overlap in other languages, involving aspect, tense, and agreement). In an evolutionary framework, overlap and redundancy are unsurprising — as put in Carroll (2005: 170–171), “multifunctionality and redundancy create the opportunity for the evolution of specialization through the division of labor”.

But perhaps most intriguing evidence for small clause constructs, typically not discussed in syntactic literature, comes from the use of such constructs in root contexts (see, e.g., Akmajian 1984, Roeper 1999, Potts & Roeper 2006, Progovac 2006, 2009a):

<sup>11</sup> Comparable data can be found across languages. In (i), from Arabic, one conjunct is in TP (*Kareem*), while the rest of the conjunction is in the small clause (Aoun *et al.* 1994):

(i) Kariim keen huwwe w Marwaan çam yilçabo. Arabic  
 Kareem was he and Marwaan ASP playing  
 'Kareem and Marwaan were playing.'

<sup>12</sup> One should point out that the argument due to quantifier float in (16) is not conclusive given that there are alternative analyses of quantifier float which treat these quantifiers as adverbs (e.g., Kayne 1975, Bobaljik 1995). Bošković (2004) is a recent defense of the original proposal of quantifier float (16), which also attempts an explanation of the ungrammaticality of examples such as (i), brought up by a reviewer:

(i) \* They arrived all.



- (17) Maria stay?! / Maria angry?! / Maria in Bamberg. (e.g., picture caption) / Him stay?! / Me late?! / Me first! / Family first! / Problem solved. / Case closed.

These small clauses, with arguably a single layer of clausal structure, can be seen as ‘living fossils’ of a proto-syntactic stage in the evolution of human language, with TP representing a later addition/innovation (Progovac 2008a, 2009a).<sup>13</sup> Put another way, in the evolution of human language, clauses such as *Me late* antedated clauses such as *I am late. / I will be late. / I might be late.* The existence of the quirky clauses in (17), and the universal unfolding of clausal structure from the underlying small clause (section 2.1), both begin to make sense if seen as vestiges of gradual evolution of syntax, but remain mysterious otherwise.

Uriagereka (2008) looks at embedded small clauses, such as the bracketed clause in (18), and concludes that the structure of these (embedded) small clauses is rather basic, and may involve finite-state syntax, the simplest type of syntax in Chomsky’s hierarchy.<sup>14</sup>

- (18) I cannot imagine [<sub>sc</sub> Maria angry].

One of the arguments Uriagereka invokes for the primitive nature of (embedded) small clauses is the long-noted observation that these clauses do not have an internal source of structural case for their subjects, which are thus assigned case by an external element, the verb *imagine* in (18). Progovac (2006) argues that root small clauses, of the type illustrated in (17), likewise do not have a structural

<sup>13</sup> This is in the spirit of Jackendoff (1999, 2002) and Bickerton (1990, 1998), who claim that previous stages of evolution left traces/fossils in present-day languages, or continued to live in parallel with more complex structures (‘living fossils’). According to Ridley (1993: 525), living fossils are species that have changed little from their fossil ancestors in the distant past, such as lungfish, for example.

<sup>14</sup> A reviewer points out that there is a possibility for recursion in embedded small clauses, casting doubt on the view that such small clauses involve finite-state syntax:

- (i) I consider [considering syntax boring] a mistake.

However, recursion in small clauses seems more restricted (and forced) than recursion with e.g., finite clauses. In Progovac (2010a), I point out that there is a clear contrast between recursion in finite CP clauses (ii), which seems free and unlimited, and recursion in embedded small clauses (iii), which seems restricted to one or two levels of embedding:

- (ii) Mary believes [that John knows [that the neighbors noticed [that he fell off his motorcycle]]].

- (iii) ?? I will let [John imagine [Peter see [Mike fall off his motorcycle]]].

The argument there is that there is a continuity of clause complexity (from small clause to finite clause), which correlates with the continuity in recursion potential. Significantly for the arguments made in this article, small clauses which are not integrated into finite clauses, and which do not involve even structural case checking (see the discussion later in the text), do not allow recursion or embedding at all (Progovac 2010a):

- (iv) a. \*Him worry [case closed].  
b. \*Him worry [her happy [problem solved.]]

mechanism for checking case on their subjects, providing another argument that they are creations akin to embedded small clauses. Since with root small clauses there is no external source of case either, their subjects surface with what can be analyzed as default case, in the sense of for example, Schütze (2001) — witness the accusative on the pronominal subjects in (17). The evolutionary perspective explored here sheds light on the existence of both embedded and root small clauses, the latter typically not recognized as objects worthy of syntactic inquiry.

As pointed out by a reviewer, the embedded small clause in (19) seems to involve a displacement (Move) of the unaccusative subject to a position in which it checks accusative case (20), as has been more recently assumed in Minimalist literature (e.g., Bošković 2004; see Pollard & Sag (1994) and references there for equivalent and much earlier subject-to-object raising proposals in alternative frameworks).

(19) I watched three men arrive.

(20) a. [SC arrive three men] →  
 b. [XP three men [SC arrive ~~three men~~]]

The position into which the SC subject moves is often considered to be the same position in which the matrix object would surface, such as for example, Agr<sub>OP</sub> position (Bošković 2004). On this analysis, the subject is not moving within the small clause, but rather out of the small clause and into a matrix clause position. Given this analysis, one can still maintain that the SC itself is a rather basic creation, with no functional layers of its own.

As argued in Progovac (2006), the main difference between embedded small clauses and root small clauses boils down to the following: While the former are integrated into the rest of syntactic structure by for example, Move and/or structural case checking involving the subject of the small clause, root small clauses such as the ones in (17) arguably involve no structural case on the subject, no Move, and only one layer of structure. This distinction correlates with the contrast below:

(21) a. Problem solved.  
 b. I want the problem solved.

The article is only required in the embedded small clause (21b), but not in the root small clause (21a), which correlates with the postulated structural case checking involving the subject of the small clause: While structural case requires the presence of a DP (Longobardi 1994), default case can be associated with mere NPs (see e.g., Schütze 2001 and examples such as *the real me*; for details of the analysis of root small clauses, see Progovac 2006).<sup>15</sup>

<sup>15</sup> While I assume here and elsewhere that passive-like examples such as *Problem solved* and *Point taken* involve a single Merge and no Move, a reviewer is right to point out that this assumption needs defending, especially in the light of examples such as (i) below, provided by the reviewer:

Serbian unaccusative clauses provide an unambiguous argument for the empirical reality of root small clause syntax. Unaccusative verbs, i.e. intransitive verbs whose only argument is a theme (e.g., *arrive*, *fall*, *come*, *appear*), are analyzed cross-linguistically as starting/merging their subjects as complements/objects of the small clause (e.g., Perlmutter 1978, Burzio 1981):

- (22) a. [<sub>SC</sub> arrived three men]] →  
 b. [<sub>TP</sub> have [<sub>SC</sub> arrived three men]]] →  
 c. [<sub>TP</sub> three men [<sub>TR</sub> have [<sub>SC</sub> arrived ~~three men~~]]]]

The unaccusative Serbian sentences in (23) would be derived from the corresponding unaccusative small clauses in (24), as illustrated in (25):

- (23) a. Zima je stigla. Serbian  
*winter.FEM.3SG AUX.3SG arrived.FEM.SG*  
 'Winter has come.'  
 b. Vlada je pala.  
*government.FEM.SG AUX.3SG fallen.FEM.SG*  
 'The government has collapsed.'

- (24) a. Stigla zima.  
 b. Pala vlada.

- (25) a. Small clause: [<sub>SC</sub> stigla zima]] →  
 b. [<sub>TP</sub> je [<sub>SC</sub> stigla zima]]] →  
 c. TP: [<sub>TP</sub> zima [<sub>TR</sub> je [<sub>SC</sub> stigla ~~zima~~]]]]

The prediction is, if there are small clause counterparts to these unaccusative clauses, then they should surface in the unaccusative VS word order. This is indeed the case in Serbian, as illustrated in (24).<sup>16</sup> Unaccusative small clauses are

- (i) Problem presumably solved.

The question here is where the adverb is attached. It is typically assumed in Minimalism (e.g., Cinque 1999) that adverbs are attached above the *vP*/VP shell and that arguments get to precede such adverbs only if they move to higher clausal projections. It is interesting in this respect that, unlike adverbs, parentheticals are not licit inside these small clauses (ii), in sharp contrast to the finite counterparts (iii):

- (ii) \* Problem, I believe, solved.  
 (iii) The problem, I believe, has been solved.

While (i) seems to call for a functional projection inside the small clause, (ii)–(iii) seem to argue against the presence of such a projection. The issue warrants further attention.

<sup>16</sup> The closest counterpart in English would be the semi-fossilized unaccusative clauses, which necessarily surface in VS order, such as the underlined expression in (i):

- (i) Come November, he will go hunting.

According to a reviewer, *come* in (i) can be analyzed as a preposition recently grammaticalized from a verb. Even if so, the construction it grammaticalized from would have involved an unaccusative verb followed by its only argument.

more than just a theoretical construct in Serbian: They are in productive use, wearing the unaccusative syntax on their sleeve (for details see Progovac 2008b; see also Casielles & Progovac 2010 for comparable data from Spanish and other languages).

That (unaccusative) small clause syntax can have a life of its own is further confirmed by the existence of fossilized/formulaic clauses, which cannot even be expanded into full sentences (thanks to Ana Progovac, p.c., for bringing these to my attention). If expanded, they automatically acquire the literal, non-formulaic reading:<sup>17</sup>

- (26) a. Pala karta. Serbian  
           *fallen card*  
           ‘Card laid, card played.’<sup>18</sup>  
       b. #Karta je pala.  
           ‘The card fell.’
- (27) a. Proš’o voz.  
           *gone train*  
           ‘The opportunity has passed.’  
       b. #Voz je prošao.  
           ‘The train is gone.’

It is of relevance here that formulaic speech in general has been argued to be processed by the more ancient structures of the brain, showing resilience in cases of aphasia and other disorders (e.g., Code 2005 and Wray 2002).

Given this, processing of formulaic speech in the form of small clauses may provide a promising track to explore in neuroscience, one that can shed light on the distinction between what I postulate here to be (fossils of) proto-syntax and the more complex and more recent TP syntax. The production/perception of a TP may have to tap into two distinct neural mechanisms, with possibly some overlap: the one that supports the proto(-syntax) of small clauses, and another that supports the more recent TP syntax, necessarily activating the procedural memory. In other words, one may find neurobiological correlates of finiteness (TP expression) by comparing and contrasting the processing of small clauses (*Problem solved; Stigla zima*) with the processing of full finite clauses, such as *The problem has been solved; Zima je stigla.*) In addition, in the light of the discussion of transitivity in section 2.2., one may also expect to find neural correlates of transitivity by comparing and contrasting the processing of compounds such as *rattlesnake* with the compounds such as *snake-rattler*.

Furthermore, one may find that the proto-syntactic constructs, at least the formulaic ones, are more likely to be accessible to both procedural and declarative memories (see Pinker & Ullman 2002), as formulaic speech typically is (Code 2005, Wray 2002). Such constructs straddle the boundary between the lexicon and syntax, constituting good candidates for providing a transition from

<sup>17</sup> The verbs in Serbian examples are past participles, which, unlike English translations might suggest, cannot be analyzed as adjectives.

<sup>18</sup> Thanks to Ann Sawyer (p.c.) for the idiomatic translation.



subsumes Move) was the only evolutionary breakthrough for syntax (e.g., Hauser *et al.* 2002, Chomsky 2005). Berwick's (1998: 338–339) words echo the common sentiment among syntacticians, that “there is no possibility of an ‘intermediate’ *syntax* between a non-combinatorial one and full natural language — one either has Merge in all its generative glory, or one has no combinatorial syntax at all”.

But there is an alternative possibility (also mentioned in Cinque 1978, Bouchard 1984, Postal 1997, Boeckx & Grohmann 2007, and Progovac 2009b), that No Move is the default, and motivating Move a special, marked option. The constructions that prohibit Move are much more numerous and diverse than those that allow it, and they also do not form a natural class. If Subjacency is an elsewhere condition, a by-product of the evolution of syntactic complexity, rather than a principle of grammar, then it is unsurprising that there is still no satisfactory account of Subjacency (for discussion along these lines and references, see Progovac 2009b).<sup>21</sup>

My argument is that proto-syntax, based on small clauses introduced above, did not have Move or subordination/recursion (Progovac 2009b, 2010a; see also fn. 14). Initial clausal combinations arguably looked like paratactic constructs in (30). Indeed, neither root small clauses (31), nor their paratactic combinations (32), allow any manipulation by Move.<sup>22</sup>

- (30) a. Nothing ventured, nothing gained.  
 b. Easy come, easy go.  
 c. Monkey see, monkey do.  
 d. No money, no come.
- (31) a. \*When problem solved?  
 b. \*Whom worry?!
- (32) a. \*What ventured, nothing gained?  
 b. \*Who monkey see, do?

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<sup>21</sup> As pointed out by a reviewer, there are also pragmatic approaches to Subjacency, such as Kuno (1987), for example. While pragmatics probably plays a role, it is also inevitable to conclude that syntactic structure plays an important role as well, especially given contrasts such as the one illustrated below, which would be difficult to reduce to pragmatics, but which clearly involve two different syntactic structures, one of which, coordination, as I argue, is more ancient and thus not subject to Move:

- (i) What did you eat the chicken with ~~what~~?  
 (ii) \*What did you eat the chicken and ~~what~~?

<sup>22</sup> A reviewer points out that movement out of a small clause such as *When problem solved* does not occur because it seems impossible to have adverbials in such clauses in the first place (but see fn. 15 for seemingly possible use of adverbs in root small clauses). This still leaves us with evidence from the rest of the examples in (31)–(32), given that arguments and adverbials are equally affected. And, if indeed adverbs are not welcome in such clauses, this reinforces the view that these clauses are very rudimentary creations, arguably creations without functional categories.

According to, for example, Traugott & Heine (1991) and Deutscher (2000), grammaticalization of subordination proceeds through three stages: parataxis/adjunction, coordination, and subordination, the older stages clearly being preserved alongside the innovations. If comparable stages/processes characterized language evolution (see e.g., Jackendoff 1999, Progovac 2009b, 2010a), then such evolutionary tinkering left us with multiple possibilities which partly overlap in function (see (33)–(35) below).

In this proposal, adjuncts and conjuncts are seen as older syntactic structures, less integrated into sentential fabric, which found their niche and continued to be used in parallel with subordination, a more recent innovation.<sup>23</sup> In this view, then, the reason why Move is prohibited out of adjunct or conjunct clauses is not because it would involve crossing some (combination) of structural barriers/boundaries, but rather because these are fossil structures, patched onto more complex syntactic structures, but still preserving their opacity with respect to Move. This would render these Subjacency effects epiphenomena of evolutionary tinkering. But does subordination bring any tangible novel possibility not afforded by adjunction or coordination?

Importantly, in addition to allowing Move, subordination also provides a recursive mechanism for embedding multiple viewpoints one within another, typically unavailable with either coordination or adjunction, privileging (35) over (33)–(34) in this respect.<sup>24</sup>

(33) [As you know,] [as Mary knows,] he is a linguist. *adjunction/parataxis*

(34) He is a linguist, [and you know it,] [and Mary knows it]. *coordination*

(35) You know [that Mary knows [that he is a linguist]]. *subordination*

If so, then subordination (and with it the possibility to apply Move across clauses) would have significantly increased the expressive power of language, in a concrete and tangible manner, constituting a plausible target for natural/sexual selection (see Progovac 2009b for a full(er) treatment of Subjacency along these lines).

<sup>23</sup> Clausal conjuncts and adjuncts have been repeatedly noted *not* to be fully integrated into syntactic fabric, resembling separate utterances. First, they are often parsed as separate intonation-phrases (Nespor & Vogel 1986, Stowell 1981, An 2007). Next, adjuncts have been analyzed as merging in a different plane (Chomsky 2001), and conjuncts as sitting on parallel planes (Goodall 1987).

<sup>24</sup> As brought up by a reviewer, Reis (1995: 53) argues that certain parenthetical constructions in German do allow the stacking of points of view, as in:

(i) Was glaubst du schätzt er, wieviel das Auto kosten wird?  
*what believe you estimates he how.much the car cost will*  
 'How much do you think he estimates that the car will cost?'

Indeed, some of the German data discussed in the paper seem to be in transition, neither clearly integrated nor clearly parenthetical. While my claim is *not* that parentheticals can never express the stacking of points of view, it does seem that this kind of stacking becomes automatic, unambivalent, and streamlined only under subordination.

## 5. Discussion and Conclusions

The central postulates of present-day syntax *look* arbitrary and abstract, including the two universals discussed in this article: the small clause core of every clause/sentence, and the islandhood of for example, conjuncts and adjuncts. This leads many syntacticians to conclude that a gradualist/adaptationist approach to syntax is impossible: The principles of syntax are just too abstract for evolutionary forces to target them. Similar considerations have led to Poeppel & Embick's (2005) conclusion regarding cross-sterilization between syntax and neuroscience (section 1). On the other hand, my proposal is that decomposing syntax into intermediate (evolutionary) layers not only makes syntax compatible with gradualist/adaptationist accounts, but it also renders it potentially commensurate with the units of neuroscience.

If proto-syntactic small clause constructs discussed in this article involve a simple concatenation grammar, perhaps just one instance of (Proto-)Merge (Progovac 2009a), then determining how they are processed in the brain, in contrast to their finite counterparts, can lead to important insights in neurolinguistics.<sup>25</sup> Indeed, separating out the relevant (evolutionary) layers may be necessary in formulating precise hypotheses regarding how syntax gets represented in the brain. The production/perception of a TP may have to tap into two distinct neural mechanisms, with possibly some overlap: The one that supports the proto(-syntax) of small clauses, and another that supports the more recent TP syntax, necessarily activating the procedural memory. In other words, one may find neurobiological correlates of finiteness (TP expression) by comparing and contrasting the processing of small clauses (*Problem solved; Stigla zima*) with the processing of full finite clauses, such as *The problem has been solved; Zima je stigla.*) In addition, one may expect to find neural correlates of transitivity by comparing and contrasting the processing of compounds such as *rattlesnake* with the compounds such as *snake-rattler*.

It is also of note that many root small clauses discussed in this article are formulaic expressions, the observation relevant not only for declarative and procedural memory considerations, but also for the finding that formulaic speech is processed by the more ancient structures of the brain. Thus, one may find that the proto-syntactic constructs, at least the formulaic ones, are accessible to both procedural and declarative memories (see Pinker & Ullman 2002), as formulaic speech typically is (Code 2005, Wray 2002).

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<sup>25</sup> As pointed out by a reviewer, the claim that proto-syntactic creations involve a basic concatenation of two elements finds support in various functionalist approaches to language. Many philosophers have emphasized the foundational nature of the subject/predication formations (e.g., Strawson 1964; see also Potts & Roeper 2006). More recently, Krifka (2008) has proposed that bimanual tool making might have constituted a pre-adaptation for topic/comment structures, noticing that the non-dominant hand can be likened to the topic of a sentence, and the dominant hand to the comment. Hurford (2007) and Casielles & Progovac (2010) discuss the significance of the topic-comment structures in the evolution of human language. Given the discussion in Casielles & Progovac (2010), it may be that topic-comment structures were preceded by comment-only structures (or wide-focus structures), often characterizing thetic unaccusative statements. The issue deserves further attention.



In order for the neurolinguistic research to produce cross-fertilization, rather than cross-sterilization, syntactic theory will have to turn aggressively to these important interfaces—syntactic representation in the brain, and evolution. The approach explored in this article is in that spirit. Even at first sketch, it reveals some new directions that may indeed pave the way to new discoveries.

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