The Origin of Syntax: Debates between Formalism and Functionalism

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One of the favorite questions that humans have constantly been asking themselves is what distinguishes them as a species from all others. Besides the apparent physiological and anatomical differences, humans are most interested in their sophisticated ability to think—a capacity that has been considered enormously superior to that of all other animals. While the question about humanity got reduced to the question of human thought, the task of understanding it was not made any easier, given that thinking is an internal process that is difficult to observe directly. Studying human thought therefore has to be carried out by studying the products of thinking. It is from these products that we attempt to trace back to related cognitive processes, which further make up a cognitive mass—something that makes us feel like we are humans.

Among the many products of human thought, language is the most important and intricate to consider. Language and thought are, in fact, so intertwined that it is even difficult to tell whether they are independent of each other or whether one actually resides on top of the other. As language is so very close to thought, understanding it becomes the most important step in understanding who we are and how we think. However, this is as far as consensus could go. Different researchers have had contrastive proposals about what language is and where language comes from. Some consider language to be mere structures and computations; others take language basically as a way of communicating meaning. Such is the division between formalist and functionalist linguistics since thirty years ago. These proposals, though seemingly different, should not contradict one another since they focus on very different aspects of language; however, the history of the 20th-century linguistics shows vehement debates and incongruities.

The question this paper focuses on is where syntax comes from—a crucial question related to where language comes from, since syntax is apparently one major part, if not all, of language. The goal of this paper is to review several opposing proposals in the formalist and functionalist paradigms, to dissect them into individual dimensions, and to examine the reasons for these proposals to be theoretically antagonistic.

In the following sections, I will start by atomizing the question into several dimensions of theoretical positions. With these dimensions teased out, we will see how differently formalist and functionalist theories account for the origin of language. With these (meta-theoretical) discussions, I wish to show that theoretical debates are not constructive at the current stage,

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1 One may of course argue that research on the biological or neurological basis of thought/consciousness studies the source rather than the product of thought. I am however considering the metaphysical aspects of human thoughts here.
2 Examples of other products of human thought include human culture—material as well as spiritual, reasoning, decision making, categorization, etc. Besides material cultures which are real physical products, we can also see these other thought processes as components rather than products of thought.
3 This paper looks at the origin of syntax from an evolutionary perspective. Therefore, the acquisition of syntax, though a topic related, will not be included in the current discussion. The relation between language acquisition and the evolution of language is actually questioned by Pinker and Bloom (1990: 707), who hold that “language acquisition in the child should systematically differ from language evolution in the species, and attempts to analogize them are misleading.” While not completely endorsing their idea, I do think that the origin of syntax can be an approached in its own right.
because at present, no convincing evidence supports or refutes each paradigm totally. I wish to point to a more integrated view about the origin of syntax, which may be consistent with Hauser et al.’s (2002) recent proposal which I view as a possibility to incorporate the fruitful findings of formalist and functionalist research in the past decades. I argue that in order to progress our understanding of the origin of syntax, we need to (a) stop arguing against the alternative paradigms, (2) start looking for a possible theory that integrates contrasting believes, and (3) obtain more empirical evidences from different disciplines to verify and revise the theory.

1. Issues concerning the origin of syntax in formalism and functionalism
Since what concerns us is how language came into existence, we need to, first of all, define what language is, and what role syntax plays in language. Two questions need to be asked separately about the evolution of language: (1) how did meaningful units evolve, and (2) how did syntax evolve (Bickerton, 2001). These two parts compose the essence of language—syntax, which is the skeleton of language, and word, which is the flesh that fits into the structures. There is little dispute about the importance of these two parts in any linguistic theory, even though from time to time, we do see different weights being placed on either component. The study of language and its evolution is naturally reduced as the study of syntax and its origin, if we accept that syntax is the one most important part of our linguistic competence. So, what is syntax?

Put simply, syntax is how we put words together. Generative linguistics (such as the latest version—Minimalist Program—proposed by Chomsky in 1995) explains how words are placed into legitimate strings. Given lexical items, we need to group two linguistic units into another unit, placing them into a consistently universal hierarchical order (i.e. the X-bar theory). This is called merging. Then there is another mechanism called movement, with which the units that merged into a tree move to nodes at upper levels. Syntax is composed of computational algorithms in its own right. The relationship between syntax and semantics, namely the logical

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4 I am following the conventional distinction between linguistic competence and performance. The discussion in this paper assumes that competence and performance are two separable levels, and that in the study of language evolution, it is linguistic competence, i.e. the internal language, that is, people’s idealized knowledge about language, that has emerged. How people utilize that I-language to communicate is seen as external to the essence of language, and cannot avoid being complicated by biological constraints at the performance level. It is, however, not unlikely that this assumption is challengeable (as is the belief of most functionalists). In fact, this is a methodological take to the study of language. We want to start from the most definable and uncontaminated part of language, and to proceed as far as we can without letting the subject matter be confounded by extra-linguistic factors. Of course, people may well start with the assumption that competence and performance are inseparable, and that performance has always shaped how language looks. However, that way, we would miss the chance of treating language as a self-contained entity, if it actually is. We would also miss the essential part of language by looking at the superficial reflections. This is not to say that linguistic performance is not worth studying. However, in the study of language evolution per se, we do wish to start with the formal properties of language, since that is what we are more certain about. As Chomsky points out in 1968 (62), “it is wrong to think of human use of language as characteristically informative, in fact or in intention. Human language can be used to inform or mislead, to clarify one’s own thoughts or to display one’s cleverness, or simply for play.” It is difficult to speculate what functions language could have served in its early stages, and how those functions could have shaped language into its current appearance.

5 In the literature, two opposing stances, for instance, have been taken regarding the syntax-semantics interface—the lexicalist approach (e.g. Chomsky 1981, Jackendoff 1990, Levin and Rappaport Hovav 1995) versus the constructionalist approach (e.g. Folli 2002, Harley & Noyer 2000, Pustejovsky 1988). The question lies in where syntax is. Lexicalists consider syntactic variations to be mappings from lexical semantic distinctions. Namely, semantics as the core of language drives syntactic variations. Constructionalists prefer to take care of these syntactic variations in a syntactic module, leaving little burden for the lexicon to take care of except filling into syntactic trees. In either stance, however, it is impossible to rely singly on either syntax or the lexicon alone, while disregarding the other.
form (LF), is a derivational process. Different languages phonetically spell out the derivations at different points, some closer to LF, others farther from LF. This explains cross-linguistic variations.

It has been pointed out that the capacity of syntax includes merge and displacement (Bever and Montalbetti, 2002; Hauser et al., 2002). Merging seems more analogous to the general cognitive capacity of combination or composition. However, displacement seems rather unique to language. In fact, researchers of different pursuits have had very diverse views about what syntax is. In the generative paradigm, displacement or movement play an equally important role as merging does. Linguistic units are driven to move in order to get syntactic features checked. The whole process is purely syntactic. In other pursuits of linguistics, however, movement is seen as an awkward operation. Syntax, according to them, is seen as mere combination of meaningful units. This view has certainly had crucial impact on different views about how syntax evolved.

Let’s step back and redefine the issue on the evolution of syntax. Two phases ought to be taken apart—the emergent phase, where syntax (language) came into being, and the steady-state phase, where language has emerged and is subject to minor revisions or fluctuations (Wang, 1991). The word evolution, sometimes used as a synonym of ‘change over time’, may be misleading, since language is certainly changing constantly, and, therefore, the study of language evolution may be taken as the study of language change from its birth up to the current state. This is not what we mean by evolution of syntax in this article. We reserve investigations on the steady-state phase to historical syntax, assuming that once language existed, the variations, fluctuations and changes have been subject to different mechanisms than those that formulate language into its existence. The issue this article deals with is specifically the emergent phase, namely how syntax originated. This is why I called it the origin of syntax.

Investigations of how humans came to have syntax have been revolving around four major issues. (1) Did syntax emerge all of a sudden, or did it evolve over time in a continuous manner? (2) Did syntax evolve to serve certain communicative functions or is it essentially the by-product of human’s computational capability? (3) Is the emergence of syntax part of the general cognitive evolution or did it come into existence as a unique module? (4) Was syntax selected for during human evolution or was it a by-product of more complicated cognitive ability? These opposing stances are not independent dimensions. Frequently, when one believes in one doctrine, they are more likely to believe in a whole set of other doctrines.

A long-term debate between generative grammarians and anti-generativists is the divergent believes in whether language is an innate property belonging to humans only or whether language emerged out of semantic complexity and is the product of a continuous evolving process. Nativists see language as a species-specific capacity. Only humans possess language and no matter how hard primatologists tried to show that chimpanzees have a comparable ability to manipulate symbols, this ability is considered primitive and qualitatively different compared with the highly complex language system of human.

Schoenemann (1999) gives a review of the contrasting believes in the two camps. He takes Chomsky (1968, 1980), Bickerton (1990), Pinker and Bloom (1990), and Pinker (1994) as the target figures in the innatist paradigm. Innatists, according to his review, believe that syntax is genetically encoded, and that “there is an innate cognitive structure, unique to human language

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6 Books like Bybee et al. (1994) call this latter phase which is commonly referred to as historical linguistics the “evolution of grammar”. This is an example of mixed use that we should be cautious about when using the term “evolution”.
(though potentially co-opted by other cognitive processes), that determines what sort of basic structures and processes will be reflected in the syntax of any natural human language (310).” According to this view, there is a physical location in the brain that specifically processes syntax, called the syntax module. This is consistent with the notion of Universal Grammar (UG), which is the common basic grammatical design underlying all languages. The logic is that because humans have a biologically/genetically shared device specifically designed for language, it is easy for children to acquire languages without being exposed to negative linguistic evidences (since they are ‘programmed’ and ‘pre-wired’ to set the parameters right, which should be easy to do in a short time). Also because of this genetic commonality, humans though speaking different languages share the same biological and cognitive mechanisms in developing the UG into individual languages. The study of language is therefore equivalent to the study of UG, since that is the core of all languages, and the closest reflection of the biological foundation.

Accordingly, legitimate linguistic studies are supposed to be focused on the syntax of UG (e.g. the works of most generative syntacticians, including those of Chomsky himself), the acquisition of syntax (e.g. Pinker 1984, 1989), historical and comparative syntax with regard to principles and parameter setting (e.g. Lightfoot 1979), and the cognitive and biological bases of syntax (e.g. Bever 1970, Lenneberg 1967, Grodzinsky 2000, Jenkins 2000).

The advantage of this theory is that it treats language as an independent entity for investigation. As a result, we are discovering the purified ‘true’ language, the UG that is abstracted from intuitions over (ideally all) human languages. The more powerful this UG could account for all natural languages available, the more likely it is to be true. The less syntax needs to depend on or interact with other modules, the more likely it is itself a self-contained module. Since syntax is postulated as what language is primarily about, the point is then to clearly draw the boundaries of syntax, to see it as an independent entity, and to get rid of unnecessary contaminations from context or pragmatics, so that we may better understand syntax, thus language. This view is also known as the autonomy of syntax view (i.e. AUTO-SYN; see Chapter 2 of Newmeyer 1998 for details).

So what could be the evolutionary origin of merging and movement? As discussed, merging seems to be more similar to general cognition. It is basically about putting things together and composing. Digging deeper into the question of composition, however, it is actually not as simple as adding things up in mathematics. How do we know what to put together? How do we interpret the things that are placed together? In order to know what things to put together, we need to have syntactic categories. Certain syntactic categories (such as determiners and nouns) are meant to go together, while others (such as determiners and verbs) are not. Movement is even more intricate. Lexical items carry features, so feature-checking drives movement. It is difficult to find a comparable cognitive mechanism that is similar to movement in syntax, not to mention the intricate government and binding relationships.

Since syntax is so peculiar according to the generative theory, there are now two stances one can take in viewing this theory. You can either embrace the theory about merging and movement if you believe that their explanatory power has been repeatedly attested in different languages by various researchers, or you may demean this whole idea about syntactic derivations.

\[7\] Chomsky himself seems to remain pretty vague about what a syntax module is. It is an autonomous device that is self-contained, but we do not know if he actually refers to a physical location in the brain or the independent complex cognitive processes at the metaphysical level. His use of the term *syntactic module* and *language organ* is often the target of assail by anti-generativists.
holding that this theory is pure imagination of abstract entities moving here and there, and that language need not be so peculiar as formal linguists depict. If you embrace the idea as formalists do, you would have to think that syntax is a module that has suddenly emerged, since it is so complicated, and we have not yet seen any other cognitive capacity similar to it, or any similar ability among other animals. This, of course, precludes the striking similarities bird songs bear with human language. However, as Hill (1974) points out, findings in bird song are best seen as independent evolutionary development under similar ecological environments that bear no common evolutionary origins. Therefore, what follows from the generative belief is that syntax is a sudden bang that occurred to humans only. It is not to be found in any species other than human; not even a pre-cursor of language organ is to be found in chimpanzees, our closest kins among all primates. The primitive cognitive abilities that chimp researchers attempted to demonstrate are considered not only quantitatively insufficient, but also qualitatively inferior to those humans possess for language. This is a conclusion based on observations of repetitive unsuccessful attempts to teach chimps language and of course the ideology that guides researchers’ judgment that chimps just don’t learn language. However, time and again, we see people drawing opposite conclusions based on the same set of data. Some are optimistic and impressed by the results of chimp research (e.g. Deacon, 1997); others remain dubious or resilient (e.g. Jenkins 2000). The decision is often subjective and ideological.

In stark contrast to formal linguists are functional linguists, such as Bates and MacWhinney (1982), Hopper (1987), Lakoff (1991), and Sampson (1997), who see syntax as nothing too different from human’s general cognition. Their methodological inclination is to see grammar as anything but a module that requires peculiar language-internal explanations. Accordingly, syntax is at its best regarded as an extended lexicon (Fillmore et al., 1988; Goldberg, 1995). Goldberg (1996: 3-4) summarizes the tenets of functional and cognitive linguistics, in which the term ‘syntax’ was not used even once. The term ‘grammar’ was used in place of syntax, which may more or less reflect the ideological division already. Grammar, according to Goldberg (1996), emerges out of conventionalized patterns. Like the lexicon, it is composed of pairings of form and meaning. Semantics and pragmatics are directly associated with grammar; which requires no transformations between deep structure and surface structure as depicted in the classical transformational grammar. The primary function of language is to convey meaning. This communicative function shapes grammar, which makes necessary distinctions only when there is a semantic, pragmatic or discourse basis. As summarized in Table 1, it is apparent that most of the functional tenets were proposed in reaction to the formalist propositions. The goal of this paper, however, is not to argue for or against one discipline, but to look at the evolutionary foundations each camp has to come up with in order to account for their believes and to further point out directions for future research.

Based on the functional perspective, syntax originated out of semantic complexity (Schoenemann, 1999). People started off using very simple symbols or signs to convey primitive mental concepts. Syntax came into existence when human ancestors find the available signs insufficient to express their thoughts, so they started putting signs together. How did they know how to put the signs together? There is this principle of iconicity that relates grammatical relationship to general cognitive operations. For instance, causes usually precede effects; what

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8 Hill’s (1974) view is that different species when placed in similar ecological condition may go through similar evolutionary processes independently. Bird songs have striking similarities with human speech. However, birds are apparently distantly related to humans in genetics. Though bird songs are not homologous but analogous to human language, they still offer us insights about how language might have evolved in certain ecological surroundings.
happens first naturally precedes what happens next. Gradually, using these basic compositional principles that were already ready for use in general cognition, humans develop grammar into more and more complex forms. In this view, then, the emergent phase for syntax is longer in duration. It was not a big bang. Instead, it actually ‘evolved’ with stages similar to those of the evolution of other cognition. When grammar finally became full-fledged, people learn it from those who already have it. There is no internal device for grammar per se. There may be a general cognitive mechanism that guides learning.9

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<tr>
<th>Table 1. Grammar as defined in formal and functional linguistics.</th>
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<td><strong>Formalism</strong> vs. <strong>Functionalism</strong></td>
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<tr>
<td>1. Syntax is autonomous. It is a module that interfaces with other components, and is independent of context.</td>
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<tr>
<td>2. Syntax exists not for communication per se. It is related to the ability to compute and to compose.</td>
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<tr>
<td>3. Humans have a language acquisition device that is generically and biologically designed for language learning per se.</td>
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<td>4. There is Universal Grammar that contains the basic syntactic properties all languages share. UG is realized as different languages through setting of parameters.</td>
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<td>5. Syntax is about structures. It is separable from meaning or semantics. It is also different from lexical items.</td>
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<tr>
<td>6. Syntax has hierarchical structures. Bickerton (1990) holds that social hierarchies in human society may be a reflection of the hierarchy in language.</td>
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It certainly does not mean that functionalist do not have their weaknesses. Predictions following their theoretical viewpoint are that (1) a primitive ability to use symbols can be found in non-human primates; (2) there should be no language-specific impairments; any linguistically related cognitive disorders should have a more general cognitive breakdown; (3) there should be no impairments specifically sensitive to syntax; (4) since language is used for communication, there should be very different linguistic structures for different communicative purposes (given that there is a range of very diversified communicative purposes); hence, it should be difficult to find very general consistent structures in a language; (5) there should be few linguistic universals if any, since there is no biological device that guides and limits possible linguistic developments; the acquisition of different languages should also be relatively different10; (6) language may be

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9 Schoenemann (1999: 311-318) also attacks formalists for ignoring certain important evolutionary principles, which I will not elaborate here. These include (1) evolutionary change most likely occurs through incremental steps; (2) these steps are most likely builds on prior adaptations; (3) behavioral change drives genetic change; (4) complex features evolve only if they are adaptive; (5) evolutionary explanations can be different for different aspects of an evolved feature; (6) special, separate evolutionary explanations are not necessary for features which are logically necessary for a given adaptation.

10 This, of course, can be remedied by claiming that there is this universal learning process or universal stages of cognitive development that guides language learning, which brings us back to the debates between Chomsky and
constantly in the emergent phase; that is, since grammar is not stabilized on biological and
genetic bases, communicative functions constantly drives its changes and the grammar we have
today should be qualitatively different from the grammar that our ancestors used thousands of
years ago.

However, most of the evidences we have so far point to the opposite of those predictions.
There is yet no chimp that demonstrates sophisticated ability to use symbols. There are lesions
and genetic diseases that cause linguistic-specific impairments. There are aphasics that have
syntactic difficulties (inflectional agreement) but no semantic impairments. Languages in the
world seem to show universal structural patterns, and the language we use today does not seem
fundamentally different from that used by our ancestors.

So here comes the breaking line. Do you want to grant an abstract entity called AUTOSYN
which includes self-contained metaphysical operations that have so far been powerful accounting
for quite a wide range of languages in the world, while accepting that there is this somewhat
awkward evolutionary scenario that treats language as a biological miracle? Or would you rather
see grammar as an epiphenomenon to semantics and communication, and hold that it is based on
more general evolutionary accounts that seem more reasonable, while failing to recognize
language universals and the strong intuition that syntax is a powerful individual device in
language? At this point, there is yet no single way to falsify the arguments of each side. We
simply do not have enough evidence. Ideological debates therefore will continue for decades to
come.

I have tried to show that formalists and functionalists do have opposing viewpoints. With
regard to the origin of syntax, formalists grants it as a *deus ex machina*—a heavenly fortune on
humans. Functionalists see semantics as the core of language, holding that language develops
from pre-existing cognitive capacities. Language is thought to have co-evolved with general
cognition and biological adaptations. That is, language, cognition, and biology shape one another
in evolution.

If functionalists think that communication is the driving force for language to exist, why
do formalists think syntax originated? Does it serve any ‘function’? As pointed out, language
does not necessarily evolve for people to communicate. We really do not know if communication
plays such an important role in language. Superficially we do use language to communicate
every day. But that does not mean language existed for that purpose. Believing in the
communicative function of language as its driving force in evolution is no different from
believing that humans became bipedal in order to walk and run. We do walk and run with our
feet every day, but that does not guarantee that we became bipedal for that reason. We may have
become bipedal to free the hand for grabbing, to stand upright so that we can see farther, or to sit
because it feels more comfortable. There are many seemingly possible reasons for evolutionary
products. We simply do not know what happened.

Chomsky proposes that language may have been a by-product of the evolution of other
nonlinguistic components. This is best uttered by Gould and Lewontin (1979) as the spandrel
theory in evolution. Language, though now used primarily for communication, may not have

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Piaget (Piattelli-Palmarini, 1980). Therefore, children of different languages acquire languages in approximately the
same way. However, a further question is where this universal learning process comes from. If there is a biological
basis for it, does that mean it is innate somehow? How is the innate learning device different from the language
acquisition device (LAD)?

11 Evidences regarding this have been controversial too. Elizabeth Bates, for example, argues that people with
genetic impairment (the KE family), Down Syndrome or William Syndrome, shows abnormal cognitive
characteristics not specific to language.
come to existence for that purpose. It could have been an accidental gift from other developments, such as advanced computational abilities. Therefore, the theory that creatures with linguistic capacity are selected by nature because language gives them better chance to survive is not solidly grounded. It is difficult to imagine a complicated system like language just came into existence because of a sudden mutation and the spread of that mutated gene to other populations due to its superiority in survival. It may be easier to picture *homo sapiens* that are already capable of certain complicated computational capacities gained the ability to use language as a by-product.\(^{12}\) This Chomskyan view that Pinker and Bloom (1990) argue against seems to be more like a functional explanation on language origin—language builds on pre-existing cognitions.\(^{13}\)

In summary, functionalists and formalists have opposite ideas concerning the issues in the origin of syntax. Functionalists consider syntax an advanced version of semantic complexity, which gradually evolved from more primitive abilities in our primate ancestors. This linguistic ability has commonalities with other channels of cognition, and originated to fulfill the need to communicate. It enhanced human’s communicative capacity thus enhancing the probability for its survival, either intellectually or socially. Different stories have been told about language evolution, some more apparent than others. There are theories that say language enables cooperation and hence fortifies social bonds. There are also theories that compare language (gossiping) to grooming in monkeys, saying that language establishes social relationship which gives better chance for the spread of one’s genes (Dunbar, 1997). At this point, we have heard various interesting stories that are unfortunately not scientifically falsifiable.

Formalists, on the other hand, are pretty proud of the progress in syntactic theory in the last century. With empirical cross-linguistic evidences being accumulated rapidly, formalists are more and more convinced that generative grammar accounts for how language works. Syntax has independently evolved as a module; it is a species-specific and domain-specific device. As to whether natural selection accounts for its emergence, there is more disagreement. Pinker and Bloom (1990) give credits to natural selection as the driving force, while Piatteli-Palmarini (1989) votes for non-selectionist positions. Our current understanding does not afford us to determine which one is a better story.

### 2. Chomsky’s recent view on the evolutionary origin of syntax

Chomsky used to be conservative about studying language evolution, as he considers it ‘rather pointless … to speculate about the evolution of human from simpler systems’ (Chomsky, 1968: 62). In a recent paper by Hauser, Chomsky, and Fitch (2002), however, Chomsky for the first time laid out a clear map of what language is, and how it evolved. In this paper, it is argued that two kinds of questions should be distinguished—they are questions concerning ‘language as a communicative system’ and questions concerning the ‘computations underlying this system’ (1569). The computational capacities evolved for reasons other than communication, and were used for communication at a much later stage with physical limitations and modifications. It is maintained that human language is unique to human and discontinuous from the communicative systems of all other animals.

\(^{12}\) That is to say, *homo sapiens* might already have basic computational abilities. Language is then something that we developed on top of that. Merging and movement do not seem so strange if we think of language as basically firings of neurons to compute at rapid rates.

\(^{13}\) Pinker and Bloom (1990) are opposed to Chomsky and Gould’s non-adaptive stance. They argue that natural selection could have played an important role.
They further elaborate this distinction into two senses of the faculty of language, *faculty of language—broad sense* (FLB) and *faculty of language—narrow sense* (FLN). FLB includes everything related to language, the core computational system (i.e. FLN or syntax), conceptual-intentional systems (i.e. semantics and pragmatics), and sensory-motor systems (i.e. physiology of speech, phonology and phonetics). FLN, which includes only the abstract computational system, of course, refers to syntax. This proposal is basically a translation of minimalist syntax into the scope of language faculty, covering such linguistic terms as syntax, LF, and PF under more general terms (as illustrated in Figure 1).

![Figure 1. Computations and representations in the Minimalist Program (adapted from Townsend and Bever, 2001: 76 with modifications)](image)

They propose that comparative study of the communication systems in different species (as has been done by Hauser, 1996) can help us understand which part of the language faculty has homologues or analogues to the communicative behaviors of other animals, and which part genuinely belongs to humans only.

Then Hauser et al. continue to divide possible evolutionary accounts of FLB and FLN into three hypotheses. Hypothesis 1 considers the whole FLB strictly homologous to animal communication. Everything human possesses related to language is a continuous evolutionary product. Human language and the communicative system of non-human animals share the same set of functional components. This would be the view held by most functional linguists as discussed in section 1. The way to falsify this hypothesis is to find linguistic traits that no other animals possess. Hypothesis 2 says that the whole FLB is uniquely human adaptation for language. This is the stance taken by Pinker and Bloom (1990). The way to falsify it is to find linguistic traits that are shared by other animals. As I pointed out, so far, evidence has not been able to point exactly to one side or another. Arguments for or against each hypothesis are usually subjective.

Hypothesis 3 considers only FLN uniquely human. FLB remain evolutionarily continuous. This is a more clearly uttered standard Chomskyan view of grammar—syntax is the core of language and it is unique to human. This hypothesis can be seen as a medial position between hypotheses 1 and 2, and thus more complicated to falsify. We need to show that (a) the traits of FLB other than FLN can be found in other animals, (b) no other animals have anything similar to FLN, and (c) there is indeed a clear distinction between FLB and FLN, and that they are separable independent components.

Hauser et al. go on to examine comparative research concerning the sensory-motor system, the conceptual-intentional system, and the ability of recursion and discrete infinity in
FLN. Empirical evidences suggest that the sensory-motor systems, like speech organs, have more commonalities with other animals. We are less certain about the conceptual-intentional system, since research looking for a theory of mind in chimpanzees have diverse results. It is likely that other animals have something quantitatively different but qualitatively alike. It is also possible that even the conceptual-intentional system is unique to humans. After examining number representation and rule learning in animals, Hauser et al. are suspicious that animals other than humans have any ability similar to syntax in language.

Hauser et al. is an ambitious work that attempts to incorporate much past empirical work on comparative studies under one framework while keeping it consistent with the generative doctrines. I actually see it as a framework that has the potentiality of incorporating formalist and functionalist claims about language origin. Here, FLB corresponds to the grammar that functionalists look at. It is communicative in function, common to general cognition, and has a continuous evolutionarily history. FLN corresponds to the core syntax in formal linguistics. It is unique to human, and computational in nature. We finally see a possibility of integration, rather than opposition.

3. Final remarks
The latter half of the 20th century has witnessed decades of booming interests and vehement debates over language evolution. One cannot help wondering whether we are now better prepared to answer this question than 150 years ago when the Linguistic Society of Paris banned such discussions in 1866. These current debates from time to time originated from opposing ideological backgrounds. As pointed out, until we have better understanding in various other fields, we will not be able to tell which scenario is necessarily and sufficiently true. In the past century, we did have significant advances in related fields like genetics, neuroscience, computer science, psychology and linguistics. These advances may make us feel we are better prepared to tackle this issue. However, we have also seen vehement ideological debates based on different theoretical positions. It is probably time that these debates stop before another linguistic society has to ban all futile arguments based on purely ideological oppositions.

I think we need more work that integrates rather than separates. The extreme positions are usually ideological rather than empirical. The truth, I think, should lie between the extremes. Methodologically extreme positions have done their job pushing scientific fronts. However, when enough research space is created, it is time to fine-tune the positions into more constructive positions rather than mere diverse positions. The new millennium should see more integrated works not only drawing evidences from multiple disciplines as Hauser et al. advocated, but also incorporating different theoretical positions. Only going in this direction will we come up with fruitful results and come closer to how language and syntax may have evolved.

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14 The following disciplines are feeding important knowledge into research on the evolution of language: linguistics, evolutionary biology, comparative zoology, cultural/ecological anthropology, archaeology, paleoanthropology, genetics, neurology, psychology, computational simulations/connectionism, creole studies, historical linguistics, and language acquisition.
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