INFERENCE

Biology and Culture in Language

José-Luis Mendívil-Giró, *reply by* Robert Berwick & Noam Chomsky

In response to "The Siege of Paris"

To the editors:

Why Only Us and "The Siege of Paris" are efforts to show how the minimalist program of generative grammar has developed to allow us to form a plausible and coherent hypothesis about

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the possible paths along which the human faculty of language evolved. That same model of the language faculty can help to clarify the controversial issue of the relative weight of biology and culture in human language. Robert Berwick and Noam Chomsky conceive of human language as a specifically human mosaic of cognitive capacities. Starting from this vision, I suggest a model of the relationship between lexicon and syntax in languages. I propose that syntax is universal and, therefore, a solid candidate for representing the natural conditioning for language. The lexicon reflects the historical and cultural dimension of human languages.

An Unnecessary Controversy

As Antonio Damasio has pointed out, the human brain is a subtle mixture of innate dispositions and development through experience:

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At birth, the human brain comes to development endowed with drives and instincts that include not just a physiological kit to regulate metabolism but, in addition, basic devices to cope with social cognition and behavior. ... Yet there is another role for these innate circuits which I must emphasize because it usually is ignored in the conceptualization of the neural structures supporting mind and behavior: *Innate circuits intervene not just in bodily regulation but also in the development and adult activity of the evolutionarily modern structures of the brain* [emphasis original].[1]

Modern neuroscience has shown that memory, vision, and emotion cannot be explained without the brain tissues that make them possible. The assumption that language is an exception is surprising, even suspicious. In recent decades, insistence on the essentially external, cultural nature of languages has rekindled the traditional claim that language is a social institution.[2] Morten Christiansen and Nick Chater, in a paper entitled "The Language Faculty that Wasn't," state, "It is time to return to viewing language as a cultural, and not a biological, phenomenon."[3] Terrence Deacon's influential theory of the coevolution between language and brain is another example. He imagines "language as an independent life form that colonizes and parasitizes human brains, using them to reproduce."[4] Deacon's position is widely followed

in contemporary functional and cognitive linguistics. Languages are considered external cultural or social objects that settle in brains and contribute to their organization. This is the empiricist vision of the mind and brain. It posits that the structure of the brain and mind dictate the essential structure of languages. The rationalist view says that it is the other way around.[5]

In Chomsky's narrative, the faculty of language exists by definition. As he has pointed out:

To say that "language is not innate" is to say that there is no difference between my granddaughter, a rock and a rabbit. In other words, if you take a rock, a rabbit and my granddaughter and put them in a community where people are talking English, they'll all learn English.[6]

Such a statement, despite how it may appear, is not an oversimplification. It simply insists on a critical misunderstanding: that the capacity of language is innate does not imply that there must be language genes or linguistic neurons, but rather only that human beings have a unique ability to acquire the languages of their environment. Since immersion in a linguistic environment is not enough for language to develop in nonhuman organisms, as W. Tecumseh Fitch has pointed out, there must be something in human children that differentiates them from

other organisms.[7] That something is the object of study of this linguistic tradition. The relevant question, then, is not whether an innate faculty of language, termed universal grammar (UG) in the Chomskyan generative tradition, exists, but what its properties are and from where they are derived.

Those who reject the existence of UG argue that language is developed and used according to general principles of human cognition that are not specific to language. Michael Tomasello rejects the existence of a human faculty of language; he stipulates that the restrictions that the human brain can impose on the structure and nature of languages are general and not specifically linguistic:

For sure, all of the world's languages have things in common... But these commonalities come not from any universal grammar, but rather from universal aspects of human cognition, social interaction, and information processing—most of which were in existence in humans before anything like modern languages arose.[8]

Tomasello invokes "universal aspects of human cognition," principles of cognition that are common to all human beings and specific to them. Since human beings are the only organisms that develop language, these universal principles seem very similar to the notion of UG. A

"characterization of the child's pre-linguistic initial state," describes an aspect of human nature innately present before it is experienced.[9] The same can be said of Cedric Boeckx's notion of a language-ready brain.[10]

Some sort of biological conditioning determines the course of language development and the subsequent structure of the knowledge systems that we call human languages. It is debatable whether the principles that form UG are language-specific or whether they are the same ones that underlie other human cognitive systems. But this discussion soon becomes sterile in the absence of a detailed specification of what those principles are, what language is, and what languages are.

In the Chomskyan view, a language is a particular state of the faculty of language; it is a system of knowledge, known as internal language, or I-language. This is contrary to the view of a language as an external system, a cultural object that the brain assimilates and represents internally. This difference is at the root of the disagreement between the two traditions about the relative weight that nature and culture have in explaining the structure of languages.

In my opinion, the error of the externalist approach is that it assumes that there can be no universal linguistic aspects of human cognition. Why should there not be universal linguistic aspects of human cognition, since only humans can learn languages? The rejection of this possibility is related at least in part to the fact that the externalist approach operates with an inductive conception: language is not a cognitive capacity, but a theoretical construct derived from comparing languages and establishing generalizations in a Greenbergian manner. Language cannot be separated from languages. And, paradoxically, the species-specific ability to learn languages has to be considered non-linguistic. In the previous quotation from Tomasello, this is clearly expressed: languages, he says, emerged after the existence of general cognitive conditioning factors. This means that languages are independent cultural phenomena that, more or less, adapt to the format required by human brains and their universal general cognitive principles.

From a cognitive perspective, such a view is unsustainable. It would be tantamount to saying that the skin of an elephant is an external object that adapts to the shape of the elephant's body. The shape of the skin depends on the shape of the body, but this does not permit us to ignore the

fact that the skin is part of its body, and not an external object that has adhered and adapted to it. The notion of language in the externalist tradition is incomplete.

Syntax and Lexicon in Languages

The main discrepancies between the internalist and externalist views of language are summarized in the following table.

Table 1.

Language	Internalist view	Externalist view
Origin	Natural / Biological	Cultural
Development	Innate	Learned
Location	Internal / Individual	Interiorized / Collective
Variation	Superficial (Universal)	Deep (Relative)

The internalist and externalist views of language.

The source of this discrepancy is an incomplete conception of language from the externalist point of view. The vision is incomplete because it denies that universal linguistic principles of human cognition exist. This biased view of language could actually be due to a

misunderstanding regarding what the term language refers to. The externalist tradition inappropriately identifies a language with what is actually a *part* of a language, more specifically, with the lexicon of a language. The same table that compares the internalist and externalist views of language could also describe differences between the two main components of languages, syntax and lexicon.

Table 2.

Language	Syntax	Lexicon
Origin	Natural / Biological	Cultural
Development	Innate	Learned
Location	Internal / Individual	Interiorized / Collective
Variation	Superficial (Universal)	Deep (Relative)

The nature of syntax and lexicon.

According to this model, the natural/biological and cultural factors in human language match two components of the language faculty: syntax and lexicon. Syntax is considered to be mainly natural, innate, internal to the mind and brain, common in languages, and invariable. Lexicon is considered to be mainly cultural, learned from the environment, internalized but collective, and

variable in diverse linguistic communities. This table is, in fact, consistent with Berwick and Chomsky's model of the faculty of language.

An Interface for Language Externalization

According to the model proposed by Marc Hauser, Chomsky, and Fitch, the human faculty of language (FL) can be conceived as a complex system minimally composed of three components:

a conceptual-intentional system, related to meaning and interpretation;

a sensory-motor system, related to the perception and production of linguistic signals; and

a computational system, responsible for the creation of the recursive and hierarchical syntactic structures that underlie linguistic expressions—the Basic Property of language, according to Berwick and Chomsky.[11]

Berwick and Chomsky hypothesized that the relationship between the computational system and the two other components, the conceptual-intentional and sensory-motor systems, is

asymmetric. The computational system would have evolved adapting itself to the conceptual-intentional system, forming an internal language of thought (ILoT) aimed at representing reality and ideas.[12] In Chomsky's words, "the earliest stage of language would have been just that: a language of thought, used internally."[13] This ILoT, common to the species, would have subsequently been connected to the sensory-motor system for externalization and, therefore, for communication. Externalization is ancillary and secondary, a process exposed to fluctuations in the environment and, therefore, susceptible to change and diversification:

That is pretty much what we seem to find: a computational system efficiently generating expressions interpretable at the semantic/pragmatic interface, with diversity resulting from complex and highly varied modes of externalization, which, furthermore, are readily susceptible to historical change.[14]

Under this scenario, the FL must also include a component derived from the environment whose purpose is to systematically connect the derivations generated by the ILoT—resulting from the interaction between the conceptual and the computational systems—with sensory-motor systems. This component is what differentiates languages from each other and constitutes the

genuinely cultural component of every human language. I refer to this component as a *lexical interface* (see Figure 1).

Figure 1.

Conceptual-intentional Systems (Semantics & Pragmatics)	Computation System (Syntax)	Lexical Interface (Morphology & Phonology)	Sensory-motor Systems (Phonetics & Physiology)

Internal Language of Thought

I-language

The anatomy of an I-language.

The lexicon of a language, according to the traditional view, is where sounds and meanings are systematically matched. It should not be thought of as the set of word-like elements that syntax combines to create sentences. The word-like elements of Berwick and Chomsky's model belong to the ILoT, not to the lexical interface. The lexical interface should be interpreted as an area of long-term memory that connects, on the one hand, the syntactic derivations produced by the computational system in interaction with the conceptual-intentional system and, on the other hand, the sensory-motor system that processes and produces the linguistic signals used for communication. The lexical interface should be

understood as a set of systematic pairings between syntactic structures and phonological representations. This conception of the lexicon has been developed in recent years in the nanosyntactic model, although it would also be compatible with the vocabulary items in distributed morphology.[15]

Like any organic system, each person's I-language is conditioned by internal factors derived from biology and external factors derived from the environment. Any I-language is formed by four components (Figure 1). Three of these components—the conceptual-intentional, computational, and sensory-motor systems—are essentially universal because they are organism-internal and naturally conditioned. The fourth, the lexical interface, is culturally variable since it is the result of internalization from environmental stimuli.

According to this model, the acquisition of language does not imply the internalization of the entire system of the I-language, but only of one of its components: the lexical interface. The development of language in the individual can be glossed as the process of learning to externalize the ILoT in the same way as the members of our community do.

For each component above, I have indicated the scope of traditional grammar with which it is centrally associated. The conceptual-intentional system is related to semantic and pragmatic interpretation. I do not mean to imply that there is no linguistic and cultural variation in this respect, but that there is underlying uniformity. We can ask someone in what language they speak, in what language they think, or in what language they dream, but it is strange to ask in what language they mean.[16] The very fact that two linguistic expressions can have the same meaning shows that there is a layer of meaning deeper than the linguistic forms that externalize it. I have assumed that syntax is uniform, but in this case, I refer to the Basic Property and not to the fact that the apparent syntax of languages is diverse. The hypothesis underlying much of modern formal linguistics is precisely that differences in syntax, or morphosyntax, arise from differences in the linguistic formants that each language uses to externalize and linearize the syntactic derivations produced by the internal computational system. In traditional terms, any difference between the structure of languages is morphological and phonological.[17]

Explaining Discrepancy

Breaking down the structure of an I-language (Figure 1) allows us to better understand the disparity of opinions within current linguistics concerning the balance of culture and nature in language design. Not all linguists use the word *language* in the same sense. A crucial difference is that the externalist tradition identifies a language with only one of its parts, the lexical interface. For this reason, generativist authors tend to reject many of the statements about languages that externalist authors make, such as that languages

are external to the mind;[18]

can vary profoundly;[19]

are learned using general mechanisms of statistical learning;[20]

cannot lead to a universal theory of grammatical categories;[21] and

owe their structure to the historical processes of change and not to a faculty of language.[22]

Some of these claims would be more acceptable if they referred to only the lexical interface rather than to the whole I-language.

The notoriously divergent opinions held by linguists regarding the nature of language and languages are largely a consequence of an incomplete vision of what a natural human language really is. This vision misidentifies languages with their learned and historically modified externalization components. From the generativist point of view, it is reasonable to think that to a large extent lexical interface shown in Figure 1 is something external and cultural; however, to assert that it is a language is not admissible. Of course, it might be argued, by Tomasello, for example, that this component is the object of study when one wants to study language and not cognition in general. This is a crucial error. Any I-language is also part of general cognition. Contrary to the claims made by Tomasello, a language is not a cultural system represented in the brain. If anything, this is the definition of the lexical interface, the cultural component of languages. A language is a system of knowledge that includes a variable cultural component, but also universal linguistic aspects of human cognition.

A Two-fold Proposal

The division of labor between nature and culture in the design of human language arises from the differences between the components of any human language. Internal systems, such as the conceptual system and syntax, are conditioned by biology and the laws of nature.[23] The externalization system, the internalized lexical interface, is conditioned by environmental and cultural factors.[24] There are hints that strong empirical support exists for a proposal to identify nature and culture in language with, respectively, syntax and lexicon. The evidence can be grouped into two basic categories, related to the asymmetry in acquisition and to the asymmetry in the degree of variation of each component:

The poverty of stimulus argument is especially strong when applied to the development of syntactic knowledge, as opposed to the acquisition of the lexicon. Connectionist and statistical learning models work better with certain aspects of phonology and morphology than with syntax.[25]

It is easier to make descriptive generalizations about syntax than about morphology, since all languages have syntax, but not all have morphology or the same types of morphology. Syntactic structures and syntactic relations are much more general in languages than

morphological categories.

This approach could help to clarify harmful misunderstandings regarding the nature of language and languages that have arisen in recent decades. These misunderstandings have offered a fragmented and incoherent view of the science of language and detracted from the development and the social perception of our discipline. Internalist and externalist research programs are more complementary than they are incompatible, despite the fact that most practitioners appear to ignore this.

José-Luis Mendívil-Giró

Robert Berwick and **Noam Chomsky** *reply:*

José-Luis Mendívil-Giró suggests a way to reconcile externalist conceptions of language with our own internalist view, which is that the human language faculty and the particular forms it assumes as I-languages are properties of the individuals who use them. Mendívil-Giró understands the externalist tradition as one that "identifies a language with only one of its parts, the lexical interface," which he defines as "a set of systematic pairings between syntactic structures and phonological representations." Whether

externalists accept this interpretation, we do not know. If they did, it would relieve many of our qualms. We have no idea what it means to regard a language as an entity independent of humans, as attaching to humans, as acquiring its own properties, and so on.

Michael Tomasello's view that the language faculty reduces to "universal aspects of human cognition" is at least coherent, but it seems to run into two rather serious problems. First, its efforts to account for non-trivial properties of language are easily refuted or reduce to hand-waving. Second, the view fails to account for dissociations between language and other cognitive processes, matters studied in Lenneberg's pioneering work and since carried much further.[26]

Mendívil-Giró's own proposal is a serious one and raises a number of interesting questions. A computational system involves rules and atomic elements. Mendívil-Giró observes correctly that the atomic elements of our model belong to the internal language of thought (ILoT). The ILoT yields semantic-pragmatic interpretations—essentially linguistically articulated thoughts—at the conceptual-intentional interface. In his alternative proposal, our atomic elements are to be distinguished from the elements of the lexical interface.

As Mendívil-Giró identifies it, the lexical interface is a cultural product. The extent to which it is remains to be confirmed. We find strong empirical evidence that its elements have a rich innate component.[27] Work by Lila Gleitman and Charles Yang, in particular, has shown that lexical items are acquired on extremely limited evidence.[28] Other inquiries reveal that even the simplest lexical items have rich and complex meanings.[29] It appears, then, that a serious "poverty of the stimulus" problem arises and that, as usual, nature and nurture have integrated in a complex manner.

Another question is whether the elements of lexical interface should be distinguished from the atomic elements of the ILoT, yielding a conception of language that is more complex than that of *Why Only Us*. As Mendívil-Giró observes, important work within the internalist generative enterprise develops such ideas, but we are not convinced. The question seems to remain very much open. It is also not clear how the ILoT yields interpretations at the conceptual-intentional level if divorced from the lexical interface, or how the system guarantees that the right connections are established between the conceptual-intentional interface and the sensory-motor output. Such problems do not arise if the atomic elements of ILoT integrate the relevant

information about semantic-pragmatic output. That case would be consistent with the assumptions that the atomic elements for a particular I-language are in part culturally conditioned, in the "instructions" for the sensory-motor and conceptual-intentional interfaces, and are richly innate as well. These issues, raised constructively in Mendívil-Giró's discussion, merit further inquiry.

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More Letters for this Article

A Slight Alteration

Philip Pilkington

reply by Robert Berwick & Noam Chomsky

Noam Chomsky and Robert Berwick proposed that a slight alteration in our neural networks allowed a great change, like a push-down stack. Philip Pilkington argues that the computer analogy is imprecise.

Unbounded Merge

Anna Maria Di Sciullo

reply by Robert Berwick & Noam Chomsky

Could the language faculty have evolved gradually? Anna Maria Di Sciullo does not think so. In this letter, Di Sciullo traces past research of this idea, and looks at what is left to explore.

Tough Luck

Rob DeSalle & Ian Tattersall

reply by Robert Berwick & Noam Chomsky

"Tough luck" were the final words of Richard Lewontin's paper "The Evolution of Cognition," reflecting his view that human cognitive function would never be atomized in a genetic context.

Progress Overlooked

Pedro Tiago Martins

reply by Robert Berwick & Noam Chomsky

Robert Berwick and Noam Chomsky's rhetoric is misleading, claims Pedro Tiago Martins. Martins believes that the real work in the study of language evolution is being done elsewhere.