DISTINGUISHING KNOWLEDGE FROM BELIEF IN UNDERSTANDING THE LOGIC OF THE POVERTY OF STIMULUS ARGUMENT[*]

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ABSTRACT: Along with the thesis that natural language grammar includes a transformational level, what distinguishes the Chomskyan program of investigation in Theory of Grammar from other approaches is the thesis that the grammatical knowledge internalized by every person is partially innate (i.e. partially given *a priori* by a system of task-specific cognitive biases of *Universal Grammar*), and not a byproduct of multi-task learning mechanisms of 'general intelligence'. This scientific thesis may be right or wrong, and can only be questioned by taking into consideration its empirical coverage and the logic of its arguments. At the core of this issue is the *Poverty of Stimulus Argument* (APS), whose logic has been deeply misunderstood by many anti-nativists, such as, for instance, Geurts (2000), who fails to recognize the relevance of the distinctions between 'knowledge' and 'belief', and between 'conscious' and 'unconscious' cognition, which are crucial to the full understanding of the logic of the PSA. The aim of this paper is to clarify this particular misunderstanding.

1. INTRODUCTION

Ever since Chomsky's seminal works on linguistic nativism (Chomsky 1967, 1975), a lot has been said about *Plato's Problem* (Chomsky 1986) and the *Poverty of Stimulus Argument* (PSA), whose conclusion is that grammatical knowledge is partially innate. The PSA is structured as in (1).

(1)　*if*　　(A) all native speakers know some particular aspect of their language (call it property P);

　　　and　 (B) the information contained in the primary linguistic data (i.e. positive evidence of what are possible expressions according the grammar of the target language) is not sufficient for anyone to learn (the rule(s) behind) property P;[1]

　　　then　(C) knowledge of (the rule(s) behind) property P must be innately specified.

Over the years, proponents of linguistic nativism have gathered numerous empirical generalizations that hold in all languages observed so far, and the relevant grammatical patterns can be detected in the linguistic behavior of every human being since the earliest stages of language acquisition. Although kids often make many mistakes, overgeneralizing certain rules (e.g. over-regularizing the past tense of *grow* as **growed*, instead of *grew*), there are certain kinds of overgeneralization mistakes that they never make, which shows that they know the corresponding rules since the very beginning, even though the stimulus is poor in that regard (that is, there is not

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[1] That is, the information in the input data that the child has access to is compatible with more than one grammatical rule, and the only kind of evidence that could possibly rule out the 'wrong grammars' is negative evidence: i.e. utterances of strings of words (ultimately, morphemes) of the language which are ungrammatical, plus some indication that those are not sentences of the language (e.g.*"you should not say 'hat green', because that's not correct English; you should say 'green hat' instead!"*). Nevertheless, despite the absence of negative evidence in the relevant contexts of language acquisition, no child ever produces utterances that indicate she had internalized one of the 'wrong grammars'.

enough evidence in the Primary Linguistic Data (PLD) to trigger the learning of a given grammatical principle from scratch). Island effects, conservativity of determiners, restrictions on the co-referential interpretation of nominal expressions (anaphoric, pronominal and referential), and locality conditions on displacement are examples of those pieces of grammatical knowledge that have been argued to be instances of what is being called "Property P" in (1).[2]

Nevertheless, the idea that language cognition is partially innate has faced a lot of resistance from many linguists and non-linguists of different theoretical orientations in the last half-century. By standard scientific practice, any attempt to refute the innateness thesis must be structured as follows:

(2) ANATOMY OF A SUCCESFULL ANTI-NATIVIST ARGUMENT
   a: Start out from the empirical facts that nativists take to be evidence for innateness (rather than any other facts that nativists never argued to follow from innate knowledge of grammatical principles, to begin with);[3]
   b: Reproduce, faithfully and precisely, the argument offered by generativists for the claim that the specific facts in (a) are evidence for linguistic nativism;
   c: Demonstrate, with scientific rigor, some fallacy in the argument in (b);[4]
   d: Present a non-nativist analysis for the facts in (a), explaining them in terms of known multi-task principles of general intelligence rather than in terms of innate grammar-specific principles (without facing any of the problems in (c), or equivalent ones).[5]

In many occasions, the line of reasoning of the anti-nativists does not even take the first step in (2a). Usually, the attacks on linguistic nativism don't ever mention any of the relevant empirical

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[2] cf. Crain & Nakayama (1987), Crain & Pietroski (2001, 2002), Lidz, Waxman & Freedman (2003), Crain, Gualmini & Pietroski (2005), Gualmini & Crain (2005), Pearl & Lidz (2006), Conroy, Takahashi, Lidz & Phillips (2006), among others.

[3] This is frequently misunderstood by anti-nativists (or even the ones agnostic on the issue), who see we nativists as arrogant people who apply double standards in our reasoning, where the only facts that matter are the ones we bring up, while any other fact is *a priori* irrelevant, and ignored from the outset. Such view is based on a deep misunderstanding of the real issue. After all, we nativists have never defended that everything in the cognition of grammar is innate. What we defend is that some aspects of grammatical knowledge are innate and universal, while others are learned and idiosyncratic of certain (families of) languages. Therefore, in order to deny the innateness thesis it is absolutely necessary that one considers the very same facts that Chomskyans present as evidence for linguistic nativism (as opposed to any other facts that we have never claimed to follow from grammar-specific innate principles). In this regard, here is what Chomsky has said during the historical the debate with Piaget: *"Suppose I were to say that something in the room is green, and suppose that somebody were to respond, 'Well, that is not so because there is something that is white' – that wouldn't convince me that I was wrong in saying that something in the room was green. Correspondingly, if I say that some properties of language use and structure are determined in the initial state by language-specific principles, it does not convince me that I am wrong if I am told that some [other] aspects of language use and structure are related to other aspects of cognitive development – this is a simple point of logic."* (Noam Chomsky, in: Piattelli-Palmarini 1980: 137-138)

[4] Or demonstrate some fallacy in the description in (a), in which case step (d) would not be necessary.

[5] In the limit, in other to fully demolish the nativist enterprise, one must account for <u>all</u> of the facts in (a), not just a proper subset of them. This has never been achieved, despite some megalomaniac (and just plain false) claims such as the following one by Tomasello (2004: 643): *"[A]ll of the empirical phenomena typically cited in favor of an innate UG are also consistent with the existence of biological adaptations for more general skills of human cognition and communication".*

facts mentioned above. Many times, anti-nativist manifestos contain just vague ideas shaped by pseudo-erudite rhetoric loaded with fancy terminology borrowed from neurology, evolutionist biology, psychology, philosophy, probability theory or computer science; full of strong accusations against generativists' alleged 'deceiving rhetoric'; with plenty of unfaithful and confusing presentations of the claims made by generativists; and, most importantly, without presenting and analyzing even a single example of a concrete grammatical paradigm in any language.[6]

There are, however, some critiques of the innateness thesis where some of the relevant facts are acknowledged (cf. (2a)), and where the argument given by nativists is more or less faithfully reproduced (cf. (2b)).[7] The question, then, is whether those criticisms actually succeed in demonstrating a fallacy in any particular instance of the PSA (cf. (2c)), and in providing an explanatorily adequate account for the facts in terms of general-purpose learning strategies (cf. (2d)).

It is beyond the scope of this paper to discuss the specifics of all those works. Therefore, I do not claim that what I say here is enough to settle the matter in favor of the nativist view once for all. This is a complex issue that demands an extensive discussion, which can be found spread over the technical literature.[8] My contribution here is to call attention to the fact that, regardless of which fact of grammar is being investigated, it often happens that, when anti-nativists search for alleged fallacies in the logic of the PSA, they base their reasoning on misunderstandings.

In the remainder of this paper, I discuss a typical misinterpretation of the logic of PSA on the side of anti-nativists — exemplifying it with Geurts' (2000) attack on nativism in his review of Crain & Thornton's (1998) book —, and I show that his failure to distinguish between 'knowledge' and 'belief', and between 'conscious' and 'unconscious' cognition was a fatal mistake, which ultimately relates to the classical Humean/Goodmanian issue of generalization by induction (cf. also Crain & Pietroski's (2001: 181-183) comments on Cowie (1999)).

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[6] e.g. Moreno (1988), Muller (1996), Graaf (1999), Gross & Navega (2002), Tomasello (2004), Eichler & Fagundes (2005), Parisse (2005); to name a few.

[7] e.g. Cowie (1999), Lewis & Elman (2001), Pullum & Scholz (2002), Goldberg (2003), Akhtar, Callanan, Pullum & Scholz (2004), Regier & Gahl (2004), Elbourne (2005), among others.

[8] e.g. Smith, Tsimpli & Ouhala (1993), Smith & Tsimpli (1995), Marcus (1999), Laurence & Margolis (2001), Crain & Pietroski (2001, 2002), Fodor & Crowther (2002), Lasnik & Uriagereka (2002), Legate & Yang (2002), Yang (2002, 2004, 2006), Lidz & Gleitman (2004), Lidz & Waxman (2004), Crain, Gualmini & Pietroski (2005), Gualmini & Crain (2005), Kam, Stoyneshka, Tornyova, Sakas & Fodor (2005), Frank, Mathis, Gussine, Stowe & Vindiola (2006), Pearl & Lidz (2006), Pearl & Weinberg (2007), among many others.

2. A FLAWED ANALOGY

In his failed attempt to mockery and expose the alleged fallacy of the PSA, Geurts presents the following analogy as part of his argument.

(3)   *if*   (A') most people know that there are no three-legged animals;

        and   (B') the knowledge that there are no three-legged animals is acquired in the absence of negative evidence. (Surely none of us have ever observed that there are no three-legged animals, and most of us haven't been told about this, either);

        then   (C') the knowledge that there are no three-legged animals is innate.

The reasoning in (3) is presented by Geurts as being logically equivalent to the one in (1). Geurts, then, proceeds on exposing the *non-sequitur* in (3), and – under the assumption that the equivalence holds – he concludes that such problem carries over to (1), which would be a proof that the PSA would be a fallacy. The real fallacy, however, lies in Geurts' claim that the reasoning in (1) and the one in (3) are logically equivalent to begin with. They are obviously very distinct in every relevant respect, which makes Geurts' logic flawed from the outset. Let us submit Geurts' comparison to close scrutiny. First, consider the following bold statement he made about the PSA.

> This is a precarious argument, not only because it contains a handful of terms which are ill-defined, but also because one of its premises is of negative form. (Geurts 2000: 524)

Geurts is very concerned with philosophical implications of what it means for someone to know something, or, specifically, to learn the knowledge of a grammatical property. He then accuses Crain & Thornton – and Chomskyans in general – of basing their argument on vague and ill-defined concepts. At this point, Geurts pretends to concede a point to the opponent, claiming that there is something wrong with the whole argument regardless of that particular point.

> [E]ven if it were clear what it means to learn knowledge of a property P on the basis of primary linguistic data, it may be very hard to prove that this is impossible for any given instance of P. (Geurts 2000: 524)

Geurts, then, formulates his attack based on the idea that Chomskyans naively take for granted that there is a fundamental difference between linguistic knowledge and knowledge of the world. For him, this is a mistake.

> This [i.e. (3)] is a patent howler, but the remarkable thing is that the argument seems to improve if it refers to linguistic knowledge instead of knowledge of the world. [...] Another reason for wary of this argument is that it is biased towards the view that there is something special about linguistic knowledge, and though it may well be that this is so, we don't want to prejudge the issue. (Geurts 2000: 526-527)

Geurts' fatal mistake is failing to acknowledge an obvious difference between these two kinds knowledge, which plays a crucial role in Chomsky's PSA (cf. (1)). Not taking this difference into account is what prejudges the issue, introducing a misleading bias toward the wrong conclusion. Regarding the definition of (*linguistic*) *knowledge*, there is no need to go deep into philosophical lucubrations to conclude that Geurts missed the point. Whatever type of mental state or cognitive skill one ultimately takes 'knowledge' or 'linguistic knowledge' to be, one must not lose perspective of whether this holds at the conscious or at the unconscious level. In order to appreciate that distinction, first we need to take a closer look at a sample of the relevant facts of the matter, as exemplified in the next section with evidence for (universal) island constraints on WH-displacement in natural language.

3. A CONSTRAINT ON DISPLACEMENT

Consider the English sentences in (4), comparing each one with its correspondent in (5).

(4) a: I know [John kissed *Mary* yesterday]

b: I know [John gave *flowers* to Mary]

c: I know [John was born *in Japan*]

d: I know [Mary killed Peter *last week*]

e: I know [the policeman arrested Mary *because she killed Peter last week*]

f: I know [Mary killed Peter *with a knife* last week]

(5) a: I know [*who* John kissed __ yesterday]

b: I know [*what* John gave __ to Mary]

c: I know [*where* John was born __]

d: I know [*when* Mary killed Peter __]

e: I know [*why* the policeman arrested Mary __]

f: I know [*how* Mary killed Peter __ last week]

The basic pattern is trivial. Indirect/embedded questions (cf. (5)) are formed by arranging the constituents in the same way they would be arranged in the corresponding non-question structure (cf. (4)), except for one important twist, which can be (informally) defined as the *RULE A* in (6).

(6)   RULE A: Instantiate the phrase where lies the focus of the question as its corresponding WH-expression (person=*who*, thing=what, place=*where*, etc), and place it at the initial edge of the target sentence (in this case, the sentence complement to the verb *know*).

The data in (7) and (8) show that this type of non-local relation is unbounded with respect to the distance between the WH-expression (WHex) and the predicate it saturates.

(7)   a: I know [John gave *flowers* to Mary]

        b: I know [she thinks [John gave *flowers* to Mary]]

        c: I know [she thinks [you doubt [John gave *flowers* to Mary]]]

        d: I know [she thinks [I forgot [you doubt [John gave *flowers* to Mary]]]]

(8)   a: I know [*what* John gave __ to Mary]

        b: I know [*what* she thinks [John gave __ to Mary]]

        c: I know [*what* she thinks [you doubt [John gave __ to Mary]]]

        d: I know [*what* she thinks [I forgot [you doubt [John gave __ to Mary]]]]

One can argue that *RULE A* in (6) is trivially learnable solely from exposure to the environment, with no need for an innate domain-specific grammatical bias. If a child happens to have access to a sample of sentences like (7) and (8) – as question/answer pairs, for instance – she could easily figure out two recurrent patterns. The first one is that, depending on the type of the phrase constituting the focus of the question, there is a single fixed morpho-phonological shape it takes. The second one is that that there is a single fixed position where the WHex always goes.

Children might figure out (i) that the position which all WHex occupy in the input data is *'the single correct position where any WHex should be'* and (ii) that the morpho-phonological shape it takes is *'the single correct form it should take'* as a mere consequence of a default domain-general learning strategy found elsewhere. For instance, if a child is exposed to a significantly large number of emeralds, and observes that all of them are green, she doesn't just conclude that those emeralds she saw are green. Rather, she concludes (by inductive generalization) that all emeralds are green.

Logic alone does not lead to this conclusion. No matter how huge the number of observed emeralds is, there is no guarantee that the next emerald will also be green. Therefore, the child's experience is also compatible with an infinite number of conclusions other than just *"all emeralds are green"*. For example, it is also compatible with (i) *"all emeralds observed so far are green, and the*

others may be green or not"; (ii) *"all emeralds are green, except those whose volume is greater than*

44m³ "; (iii) *"All emeralds observed so far are green, and all the ones observable after tomorrow are*

blue"; (iv) *"all emeralds are green, except one third of those ones once touched by Aristotle"*; an so

on. Although all such alternative conclusions are also compatible with the (typical) experience, none

of them is entertained by anyone. Hence, there must be some *a priori* cognitive bias which favors the

conclusion that *"all emeralds are green, period!"*, on the basis of some metrics of simplicity (notice

that all other alternatives are more complex, containing an additional condition, a restrictive clause).[9]

By the same reasoning, the *RULE A* in (6) could be learned by inductive generalization of the

same kind at work in other domains of cognition, with no need to postulate any domain-specific bias.

However, this is not the whole story. The non-local relation involved in indirect question formation is

unbounded with respect to the distance between the WHex and its corresponding gap, but it is not the

case that any gap in an argument position can be associated at a distance with any fronted WHex

regardless any structural property of the sentence. Notice that (9b) and (10b) are impossible.

(9) a: I know [^{S} John gave flowers to [^{NP} the girl [^{S} *Peter* loves __]]]

   b: * I know [^{S} *who* John gave flowers to [^{NP} the girl [^{S} __ loves __]]]

(10) a: I know [^{S} John ignores [^{NP} the fact [^{S} that Peter loves *Mary*]]]

    b: * I know [^{S} *who* John ignores [^{NP} the fact [^{S} that Peter loves __]]]

Thus, as a matter of fact, there are certain syntactic domains whose boundaries work like

'firewalls', such that no WH-expression outside that domain can search for its associated gap (or,

alternatively, the predicate that selects for it) inside that same domain.[10] Interestingly, such constraint

on displacement is a linguistic universal, found in language after language. This is not predicted by

RULE A in (6), which, in conclusion, cannot possibly be a correct (partial) picture of English grammar.

A closer approximation to the actual rule is given in (11).

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[9] As discussed by Chomsky & Fodor (in Piattelli-Palmarini 1980: 255-275), regardless of specific issues of grammar, this approach to generalization by induction is not free of problems when applied to 'general cognition', as it leads to the 'induction paradox', which goes back to work by Nelson Goodman (and further back to work by David Hume).

[10] If we adopt the standard movement-based view, we may say that the boundaries of those syntactic domains (which Ross (1967) called *Islands*) work like 'Chinese walls' without gates, so that no phrase can move out of those domains leaving a gap inside them. Notice that I am focusing on the facts here, describing them pre-theoretically, rather than committing to a specific analysis. This discussion is not about traces, indices, chains, variables, operators, or derivations. It is about the pattern in the facts above. Moreover, what I show here is a partial picture of the phenomenon of Islandhood. I am abstracting away from other types of Island, and from the issue of whether or not they can be given a unified account.

(11)   *RULE B*: Instantiate the phrase where lies the focus of the question as its corresponding WH-expression (person=*who*, thing=what, etc), and place it at the initial edge of the target sentence, <u>unless that makes the gap end up within a sentence embedded inside an NP that does not also include the WH-expression associated with that gap</u>.

A remarkable property of (11) is that it contains an additional condition making it as complex as all the weird generalizations about the color of emeralds mentioned above. Yet, the typical linguistic behavior of children acquiring English (or any other language) is that they don't systematically produce utterances like (9b) or (10b), which indicates that they are not considering the simpler version of the rule in (6), and go straight to (11). This is quite the opposite of what we would expect if language acquisition were totally guided by that same domain-general cognitive bias that lead us to conclude that *"all emeralds are green, period"*. Notice that the simpler rule in (6) is also compatible with the PLD, which means that children must be somehow *a priori* biased against (6).

At first, it is tempting to say that children do not produce utterances like (9b) or (10b) simply because they never encounter sentences exhibiting WH-dependencies across 'S-within-NP structures' in the PLD, hence they assume that to be impossible and then 'figure out' the *RULE B* (11). That would be an appeal to 'indirect/implicit negative evidence', which is just a restatement of the problem rather than a solution. As observed by Marcus (1999: 294), *"[i]mplicit negative evidence is only useful if a learner knows which non-appearances matter, and which ones do not"*.[11] As a matter of fact, there are infinite alternatives to (11) which are also compatible with the experience/PLD, and infinitely many non-appearances that could potentially matter in principle, but which children never take to be forbidden by the grammar. Let us consider the possibilities in (12), for instance.[12]

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[11] When it comes to this issue of distinguishing the non-appearances that matter from the ones that do not, I endorse the position by Nevins (2004), who says the following: *"The function of what is called Universal Grammar, then, is not really to <u>provide</u> a grammar, but rather to provide a set of constraints on what can and can't be a possible grammar. [...] [W]hat Universal Grammar can do is <u>prevent</u> the learner from ever considering a host of irrelevant answers. [...] On the picture of Universal Grammar developed here, it is not a set of <u>do's</u> in theory construction, that guide the learner [...] but rather, by virtue of its circumscribed search space, [...] a set of <u>don'ts</u> for what hypothesis never to bother with. [...] [T]he actual mechanism that the learner exercises in pursuing "a positive truth" (...) is actually quite dumb: it's what computer scientists call a 'British Museum search', because it is likened to trying to find a pottery shard in the British Museum by simply looking through the whole museum. However, what I want to argue here is that even the 'British Museum' part of the 'British Museum search' is a powerful enough restriction on any search (say, because it excludes the Tate Gallery): excluding irrelevant domains of search, and automatically dismissing irrelevant sources of generalization, is all that UG seems to do for the learner [...] The problem of underdetermination is aided, then, by restricting the family of possible generalizations to only include certain factors."*. For relevant discussion, see Baker (2005) and Pearl & Lidz (2006).

[12] It could well be that, for some random child out there, the PLD contains positive evidence of indirect questions that are incompatible of some (or all) of the rules in (12). That, however, does not invalidate the point being made, since (i) this is

(12)   *RULE C*: Instantiate the phrase where lies the focus of the question as its corresponding WH, and place it at the initial edge of the target sentence, <u>unless there are less syllables between the WH and the gap than in the word immediately after the gap</u>.

    RULE D: Instantiate the phrase where lies the focus of the question as its corresponding WH, and place it at the initial edge of the target sentence, <u>unless the word immediately before WH rhymes with the word immediately after the gap, and the subject of the matrix clause is plural.</u>

    RULE E: Instantiate the phrase where lies the focus of the question as its corresponding WH, and place it at the initial edge of the target sentence, <u>unless the utterance is addressed to a female relative dressed like a clown, on the day of her birthday.</u>

The inescapable conclusion, then, is that some domain-specific constraint akin to (13) ought to be innate,[13] unless someone demonstrates that this follows from some known domain-general principle also found in other aspects of cognition (and this hasn't been demonstrated yet).

(13)   A displaced phrase X cannot be associated with a gap Y if Y is within a sentence embedded inside an NP that does not also include X.

Most native speakers of English (or any human language) do not consciously know the facts above. Although every speaker will easily and uniformly recognize, for instance, (8d) and (10b) as being respectively 'OK' and 'not OK', speakers, in general, are not aware that all structures exhibiting the same pattern of (10b) – i.e. a gap inside an S-within-NP structure, whose antecedent is outside that domain – are universally 'not OK'. This is a fact that most people do not know until being called attention to. If we ask a random naïve speaker on the streets about how (embedded) questions work, the very best answer we could possibly get is something like: *"the structure of an indirect question is identical to that of its corresponding 'regular subordinate', except that there is a gap somewhere, which is semantically associated with a WH-expression pronounced at the very beginning of that subordinate clause that defines the indirect question"*. Unless our random informant has studied Linguistics before, it does not get any better than this. Most people think this is the whole story.

But this is not the whole story. And naïve speakers do not know the rest of the story. Namely: that, in ALL languages, NO example structurally equivalent to (10b) in the relevant sense could be

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not true of all children anyway; and (ii) aside from the three alternatives in (12), there are infinitely many others, so that there will always be some non-appearances that could potentially matter, but which actually do not.

[13] Thus, the actual rule in (11) would emerge from a combination of (13), which is innate, and (6), which might be learned.

labeled as 'OK' by any native speaker. Most speakers have no idea what exactly counts as 'structurally equivalent' to begin with. Yet, according to numerous observations made by linguists, EVERY speaker of EVERY human language behaves in a way consistent with those facts. That is, EVERY speaker of EVERY human language judges EVERY example structurally equivalent to (8d) as 'OK' and EVERY example structurally equivalent to (10b) as 'not OK'.

The same holds for many other grammatical patterns that are pervasive across all human languages. Where does that come from? How does everyone know, for each and every stimulus, which one is 'OK' and which one is 'not OK'? Thus, there are two kinds of *knowledge* at issue.

4. KNOWING VERSUS BELIEVING

On the one hand, there is the knowledge possessed by linguists, which is conscious. We can refer to it as the awareness that certain grammatical patterns hold across all speakers (adults and, as shown by Crain & Thornton (1998), children as well). Such knowledge is not linguistic knowledge. It is knowledge of the world, to the same extent that our knowledge that there are four-legged animals is knowledge of the world. On the other hand, there is the linguistic knowledge possessed by naïve speakers, which is unconscious. We can refer to it as the state of having an internalized grammatical system, whose inner workings yield, as byproducts, those patterns recognized by the linguists. The naïve speaker is usually aware of the topic of the conversation, many aspects of the pragmatic context, and the like. At best, (s)he is also aware of which words are being said, and in which order. But, in the typical case, (s)he is not aware of the inner workings of his/her internalized grammatical system generating those patterns, just like (s)he is not aware of the laws of physics that underlie the acoustic aspects of his/her speech and make it possible for those sound waves to exist in the first place.

The PSA in (1) concerns only the *unconscious* knowledge that speakers have: i.e. the inner workings of their internalized grammatical system. How about Geurts' parody of the PSA in (3)? Is it about *conscious* or *unconscious* knowledge? Is it really about *knowledge* after all?

The first premise of Geurts' distorted version of the PSA (cf. (3)) states that *most people* know that there are no three-legged animals in nature. Right there, we detect a significant difference with respect to the original PSA, in which the first premise is that *everyone* has those relevant bits of

grammatical knowledge. Thus, it is a matter of *most people* versus *everyone* having whatever knowledge is under consideration. Since both (1) and (3) are arguments for the innateness of some kind of knowledge or another, this issue of *most people* versus *everyone* is relevant, as any innate genotypic feature of the species (be it knowledge or something else) would necessarily be present in all individuals (setting aside phenotypical anomalies, of course). Stating that not everyone has such knowledge makes the first premise incompatible with the conclusion. In order for (3) to have any remote chance of being parallel to (1), the premise A' in (3) must be rephrased as "*everyone* knows that there are no three-legged animals". This is an empirical claim that could, in principle, be right or wrong, just like the analogous claim that every speaker knows a certain grammatical principle X. For both PSAs, the validity of the conclusion crucially depends on the truth of their premises.

At first blush, there seems to be no three-legged animal in nature, as far as genotypes are concerned. This is not obvious, however. In fact, it can be either true or false. For the sake of discussion, though, let us take for granted that there really is no three-legged animal, and then follow Geurts' flawed logic. The issue that really matters is whether or not everyone (or most people) knows that three-legged animals do not exist. And here is where Geurts' analogy breaks down, since the kind of knowledge under discussion is *conscious*.

Is it really the case that everyone knows that three-legged animals don't exist? Of course not. I, for one, don't know that. I certainly don't recall ever coming across any three-legged animal (except for phenotypical anomalies, like a dog that lost one of its four legs in an accident, which is irrelevant to this debate). So, I have a feeling that such creatures don't exist. But, do I *know* that there is no three-legged animal in nature? No, I don't. I simply *believe* that there is no three-legged animal in nature. I believe that very strongly (just like I believe that Santa Klaus, unicorns, and golden pots at the end of rainbows don't exist either). But there is no way I can really *know* if that is the case, although that might indeed be the case.

More importantly, NOBODY *knows* that. Not even Zoologists know that. They might know about continuous and intense searches for three-legged animals around the globe whose results report not a single three-legged animal found. They might know all about sophisticated theories with mathematical models that predict the impossibility of three-legged animals, due to some deep reason,

like a fundamental biochemical property underlying the structure of all species in the entire animal kingdom, or some symmetry principle underlying the physics of animal locomotion, which ultimately made it impossible for three-legged animals to survive natural selection. But none of that is enough for them to know that there are no three-legged animals in nature. All that sophisticated knowledge possessed by zoologists is not knowledge about nature. It is knowledge about observations made on a proper subset of natural events, and knowledge about the predictions of scientific theories (which may be right or wrong). Such knowledge can lead to a *belief* that there are no three-legged animals in nature: a *belief* that seems to be shared by most (perhaps all) people, myself included.

Unfortunately, most people outside science and philosophy simply go too fast and mistakenly treat such *beliefs* as if they were *knowledge*. Ironically, Geurts naively made this very fundamental mistake, despite his cry for a precise definition *knowledge*, and his claim that Chomskyan linguists are not careful enough with that. For Geurts, *believing* that there are no three-legged animals (which is based only on observations of a finite number of events, constrained by the limits of the senses) is the same as *knowing* that there are no three-legged animals. By that flawed logic, we can say that, before taking their first science lessons in school, ALL human beings *know* (i) that the earth is flat; (ii) that the sun moves while the earth remains static; (iii) that the moon continually changes its shape, shrinking and stretching, in monthly cycles; and so on. Of course, all those are misuses of the term *knowledge*, and so is what Geurts does.

The belief that there are no tree-legged animals in nature is conscious (i.e. everyone is fully aware of his/her own beliefs) and it is about the external world (i.e. animals, no matter how many legs they might have, are not themselves elements of human psychology). A belief about the external world is something that may be challenged and shown to be wrong in face of new observations. This is especially the case with beliefs that something doesn't exist. All it takes for this belief to end is to show the believer one example of that thing which he or she believes not to exist. Precisely because beliefs are conscious mental states, any individual inevitably changes his/her beliefs immediately after being exposed to the relevant counter-evidence. For instance, consider a man who spent his entire life in a little isolated place having contact only with humans, birds, snakes, and spiders. This person never saw a four-legged animal. Therefore he believes there isn't any. If we show him a dog, he will

immediately change his mind, and start to believe in the existence of four-legged animals. In principle, the same kind of situation could happen to any of us who believe in the non-existence of three-legged animals. Of course, in order for that to have the potential to happen, it must be the case that three-legged animals exist in the first place. Maybe they do, maybe they don't. We just don't know. But if they do, and if we are exposed to them, we will then not only believe in their existence, but also know about their existence, just like we know about the existence of four-legged animals.

The knowledge of grammatical principles that belongs in the formulation of the PSA is fundamentally different. Unlike the belief in the non-existence of three-legged animals, or the knowledge of the existence of four-legged animals, knowledge of grammatical principles is unconscious. Moreover, it concerns the internal (mental) world. Knowing *Island Constraints* or *Binding Principles* (or whatever deeper principles those ultimately follow from) is not the same as consciously knowing all relevant cross-linguistic empirical generalizations about long-distance dependencies that concern linguists. Such knowledge is not about facts external to one's cognitive system (i.e. the results of psycholinguistic experiments ran in a laboratory; or descriptive generalizations about cross-linguistic variation, as reported by some linguist after doing the necessary field work). Rather, such knowledge consists of an unconscious mental system of rules, which cause the facts to be what they are, as far as that particular speaker is concerned. Whether or not other people share an identical system of rules in their mental grammars is something that goes beyond the limits of that knowledge itself, as that would concern the 'external world'. Thus, if John knows (13), then, as a consequence, John will judge (5a-f) & (8a-d) as 'OK' and (9b) & (10b) as 'not OK', meaning that the former, but not the latter, are legitimate products of John's own I-Language.[14]

For the sake of illustration, let's take a look at the two parallel situations in (14) and (15). In (14a), a speaker who knows the constraint in (13) is faced with alleged evidence that structures like (10b) are actually possible. In (15a), a person who "knows" (i.e. believes) that there are no three-legged animals in nature is faced with alleged evidence that such animals actually exist.

(14a)   X – Consider the following string of words: *"I know who John thinks that Peter loves"*. Is that a possible sentence of your language?

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[14] For the definition of I(internal)-Language, as opposed to E(xternal)-Language, see Chomsky (1986).

Y – Yes, it is.

X – How about *"I know who John ignores the fact that Peter loves"*? Is this a possible sentence too?

Y – No, it's not.

X – You're wrong. Both are examples of OK sentences of English. It's a matter of logic. In the first case, we have the word *who* pronounced at the beginning of the larger subordinate clause, which semantically stands for the person being loved by Peter. So, we can paraphrase that as *"I know the identity of the person **x**, such that John thinks that Peter loves **x**"*. Likewise, the second can be paraphrased as *"I know the identity of the person **x**, such that John ignores the fact that Peter loves **x**"*. So, logically speaking, if the first example is OK, the second one should be as well. Moreover, here are some examples of this kind of sentence being used in oral and written language. Take a look!

(15a)   X – Is there any four-legged animal in nature?

Y – Yes, there are many. For example: horses, cats, cows, dogs, zebras... and the list goes on and on.

X – Is there any two-legged animal in nature?

Y – Of course. Just look at yourself, or at me.

X – Is there any three-legged animal in nature?

Y – No. There is absolutely none whatsoever.

X – You're wrong. That's what everybody thought until last month, myself included. But I just came from an expedition to an island in the Pacific Ocean, where I made a fantastic discovery. I found a whole population of an animal species that was not yet catalogued. Those animals look like rabbits in all respects, except that their fur is green, that they all have exactly three legs. As a matter of fact, I brought seven of those animals to examine here in my laboratory. They are inside that cage. Let me remove the cover and show them to you. Look at them! See? Oh, you can hold it if you want.

The parallelism breaks down when it comes to the consequence of the exposure to new facts that challenge one's knowledge. In the first case (14b/14b'), the facts do not change the speaker's knowledge at all. In the second case (15b/15b'), the person has no choice but accepting the facts, and realizing that (s)he was wrong. This contrast is illustrated below with two alternative continuations for each of the dialogues above ('#' indicates unattested/unexpected/bizarre behavior).

(14b) # Y – I see! Your logic is flawless. I was wrong. I can see what the intended meaning is supposed to be. So, *"I know who John ignores the fact that Peter loves"* is indeed a possible sentence of my language.

(14b') Y – I see! Your logic is flawless. I can see what the intended meaning is supposed to be. However, for some reason, that second example just doesn't sound right to me. It's not about the meaning. It's something else I can't put my finger on. It just sounds like word salad. It may be OK for other speakers, like the ones who produced the data you just showed me. But, to me, it feels like my brain just can't compute that as being a sentence. I don't know why, but my judgement stands still, despite your beautiful reasoning, which doesn't seem to apply to the inner workings of my mind.

(15b)   Y – Oh, I see! This looks like an animal to me. Moreover, it has three legs. So, you've convinced me that I was wrong. Now I know that three-legged animals indeed exist.

(15b') #Y – Oh, I see! This looks like an animal to me. It's alive, it breathes, it moves, and, I assume it reproduces. Moreover, it has three legs. However, that creature you've just showed to me just doesn't look real to me for some reason I can't put my finger on. It just looks unreal. Others may take that as an example of a three-legged animal but, to me, it feels like it isn't. I don't know why, but my judgement stands still despite your alleged empirical evidence for your position. This thing you claim to be a three-legged animal – which I'm seeing and touching now – simply doesn't seem to exist in the world I live in, as I perceive it.

5. CONCLUSION

As demonstrated above, once we consider the relevant data, and acknowledge the distinction between knowledge and belief, Geurts' (2000) point against linguistic nativism vanishes away.

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