

# What Is Un-Cartesian Linguistics?

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Un-Cartesian linguistics is a research program with the aim of rethinking the nature of grammar as a domain of scientific inquiry, raising new questions about the constitutive role of grammar in the organization of our (rational) minds and selves. It reformulates the ‘Cartesian’ foundations of the modern Universal Grammar project, shifting emphasis away from the study of a domain-specific ‘innate’ module separate from thought, to the study of a *sapiens*-specific mode of cognition conditioned by both grammatical and lexical organization, and thus a particular cognitive phenotype, which is uniquely also a linguistic one. The purpose of this position paper is to introduce and motivate this new concept in its various dimensions and in accessible terms, and to define the ‘Un-Cartesian Hypothesis’: that the grammaticalization of the hominin brain in the evolutionary transition to our species uniquely explains why our cognitive mode involves a capacity for thought in a propositional format.

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## 1. Cartesian Linguistics

Non-human primates listening to sound sequences governed by an artificial ‘grammar’ can extract formal rules by which such sequences are formed (e.g., Wilson *et al.* 2011, Rey *et al.* 2012). Grammar proper, on the other hand, as used by humans to structure and convey propositionally meaningful information, remains a barrier that no other species has crossed (Tomasello 2008). What then is the significance of grammatical organization for our particular cognitive phenotype?

In theory, grammar could be an arbitrary convention, carrying no particular significance for the genesis of our species-specific mode of cognition. Consistent with that, a popular conception identifies different domains by the terms ‘thought’ and ‘language’, with the former usually regarded as primary and the latter as an *expressive tool* (though on some Neo-Whorfian views, a particular language may also *influence* thought, which thereby comes to ‘depend’ on language). On this conception we first *think* (or intend to say something), and then we

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say what we think. *How* we say it is a contingent cultural convention. Speaking grammatically is then no more or less of a mystery than that we follow social norms. No special explanatory riddle arises, and there could be no such thing as a 'science of grammar' unveiling them.

Another option, however, is that thought of a *sapiens*-specific variety and language are inherently integrated as two sides of one coin. Consistently with this other intuition, language without thought expressed in it would be a parody, and thought not expressible in language would not be thought of the same kind. Moreover, since no one would want to identify language with a system of pronunciation, and it is clear that language *is* (almost continuously in our waking lives) used internally for purposes of thought as well, in addition to being used for communication, it is a natural suggestion that the cognitive mechanism generating human-specific thought and those generating language should be the same. That they are is the Un-Cartesian thesis, and Un-Cartesian linguistics is the research program seeking to determine to what extent it holds.

What is meant by 'language' here? Very crudely, human language exhibits two major principles of organization: the lexicon (the words) and the grammar (relations between the words). Both correlate with the existence of different kinds of meanings, which structure our cognitive space insofar as it is human-specific. The Un-Cartesian suggestion is that language thereby becomes a *principle of cognitive organization* and no *separate* theory of human-specific thought is required. The naturalization of grammar as a scientific domain, on this view, does not proceed by de-semanticizing grammar into a purely formal domain of 'syntax', but by re-describing it as a *cognitive principle* from which the major dimension of human-specific thought—reference, predication, and truth-conditional content—fall out.

On what will be called the contrasting 'Cartesian' view here (Arnauld & Lancelot 1660), thought is rational and universal by definition, while language in the ideal case 'mirrors' thought sufficiently so as for grammar to become a 'science' (i.e. be 'rational' or 'universal' grammar).<sup>1</sup> No explanation is here offered for why thought of this kind exists, and language in particular cannot now be invoked as the mechanism to explain it. An answer to the above question of what cognitive change grammar induces might now just be: none. The exact *same* meanings and thoughts are available, whether or not we express them in language. Put differently, although language is a unique 'window' into the mind, it does not *constitute* what is seen through that window, which is accessible more directly non-linguistically through introspection, turning language into a kind of 'detour'. The mind, in short, while perhaps not *externalizable* without language, would be the same if it didn't cognize grammatical relations: for it has its own principles of organization—perhaps those of logic or perhaps it can engage in processes of 'representation', 'social cognition', or 'mentalizing', regarded as independent of language.

Chomsky's 20<sup>th</sup> century version of the 'science of language' picked up the banner of 16<sup>th</sup> century Cartesian linguistics (Chomsky 1966), yet it took a stance

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<sup>1</sup> A historically interesting question, nonetheless, is how 'Cartesian', in these terms, Descartes himself ultimately was; see in particular Cottingham (1998).

on language and thought different from the early Cartesian one, if only for reasons of methodological caution. If language is to become subject to scientific inquiry as a natural object in its own right, the suggestion is, the proper object of study is to be ‘I-language’, a formal computational system internal to the brain interfacing with, but different from thought, and in particular seen in abstraction from the use of language for such purposes as reference. A ‘formal’ and ‘internalist’ stance was thus adopted, with ‘syntax’ viewed as separated from ‘semantics’ and forming the core of the enterprise.<sup>2</sup> Today, the standard view remains that language is divided from ‘thought’ by an ‘interface’, though an important idea has gained ground recently according to which thought might be *optimally* represented or expressed by language, making this interface particularly *tight*.<sup>3</sup>

Since the Un-Cartesian research program seeks to make plausible that grammar yields—rather than (optimally) ‘expresses’—a form of meaning that would not exist without it, there is *no* ‘interface’ between language and (a *sapiens*-specific mode of) thought: The organizational principles of grammar *are* the ones that define a thought system unique to our species, explaining its apparent absence in species that cannot fathom grammar. This is a claim about the nature of grammar as a domain of scientific inquiry, and as such it is ipso facto a *universal* claim: a claim about what grammar, *as such* or by its nature, happens to be. Grammar, on the other hand, is *not* said to be universal because it is ‘innate’, let alone ‘modular’. Universal grammar is also not here defined as the study of a genetic endowment for a formal-computational system underlying syntax, but as the study of a cognitive type. Nor does the program exclude cross-linguistic variation, the study of which is central to this research program, insofar as grammar is nowhere manifest except in the languages spoken around the globe. The claim, rather, is that such variation does not *affect* the organizational principles of grammar that are those of universal and *sapiens*-specific thought.<sup>4</sup>

Neither does the program take issue with the desire of some to apply the term ‘thought’ to pets, insects, or computers, or with the view that we can think in images or feelings, or the view that there is a generic notion of ‘mental repre-

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<sup>2</sup> See Chomsky (2000). In a footnote to section 9.3 of *Syntactic Structures*, Chomsky remarks that “much of our discussion can be understood as suggesting a reformulation of parts of the theory of meaning that deal with so-called ‘structural meaning’ in terms of the completely nonsemantic theory of grammatical structure” (Chomsky 1957/2002: 103). The notion of ‘grammatical meaning’ developed below could be regarded as a further development of this early notion of ‘structural meaning’. I thank an anonymous reviewer for clarifying this paragraph.

<sup>3</sup> Chomsky (2007), Berwick & Chomsky (2011). It remains the case in this framework that human thought—our species-specific cognitive type—is not the subject of the inquiry. The subject is a formal computational system, whose functioning as a thought system depends on its association with language-external systems, which in particular account for reference and truth (see also Pietroski to appear). A ‘Cartesian’ view is also maintained in many discussions of the evolution of language today, where the ‘evolution of thought’ is barely thematized. A Cartesian assumption is even maintained in a putatively non-Cartesian framework such as Davidson (2004), where thought is said to *depend* on language. For the propositionality of such thought does not, on this view, strictly come *from* language, but from the embedding of language in an interpretative infrastructure in which rational agents try to make sense of the propositional attitudes of other agents.

<sup>4</sup> This includes all variation of the kind documented in, say, Evans & Levinson (2009).

sentation' that applies to many species, independently of conscious apperception or intentional modes of reference. The concern is solely with the explanation of the fact that, at a species level, humans think differently from any other animal – differently, indeed, even from other species within the genus *Homo* (Tattersall 2008), judging from their archaeological records, not to mention other primates. Since this difference must fall out from something, the hypothesis that it falls out from grammatical organization competes with others. The claim here is that generic notions such as domain-general, 'recursion', 'social cognition', or 'theory of mind' will turn out to be too unspecific, whether in conjunction or in isolation. That is, non-linguistic explanatory constructs are either insufficient or turn out to be language-dependent.

## 2. What Is Grammar?

On the one hand, grammar is one of the most immediate aspects of human experience. We cannot as much as open our mouths when uttering a word in context without such words exhibiting grammatical properties. They will come out as nouns or verbs, predicates or subjects, modifiers or arguments, etc., and they never *lack* such properties.<sup>5</sup> Most words, moreover, don't come alone and when they combine with others they combine in grammatical ways, largely so as to form *sentences*. These are structures unique to our species and, somewhat mysteriously, capable of truth and falsehood.<sup>6</sup> Because of this, they are also capable of conveying *knowledge*: If they are true, the world is as the sentences say, independently of whether we believe this, for truth is independent of belief.

Grammar is also present at least in fragments when we think silently, and although we can speak ungrammatically at times as our attention slips, we cannot violate the laws of grammar: It not only takes extraordinary efforts to try to speak ungrammatically, but we could not convince ourselves that 'the with happy no' is grammatical, or that 'John slept' is not, any more than we could convince ourselves that  $2+2=5$  is an arithmetical truth, while  $2+2=4$  is not. Grammar is present, in a reduced form, even in interjections and fragments (Merchant 2004), and it is hard to imagine the state of mind in which it would be missing altogether, though states of very severe thought disorder (manifest clinically as 'word salad') and catatonia may approximate the phenomenon (McKenna & Oh 2005).

On the other hand, grammar is also completely invisible. What we primarily see or hear in a language is *words* (or, from a linguistic point of view,

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<sup>5</sup> To illustrate, Holmberg (2013) interestingly shows that even answers such as 'Yes' or 'No' are syntactically complex expressions.

<sup>6</sup> One reviewer points out that this line of reasoning is based on the *assumption* that human languages generate truth-evaluable expressions – which is controversial (see Pietroski to appear). What is not controversial and sufficient for present purposes is that some things are true and others false: e.g., 'Snow is white' vs. 'Snow is red'; and that the former proposition is true if and only if snow is white; and that 'the snow's colour' is not true or false, showing that truth-evaluability correlates with grammatical distinctions. That two systems (grammar and something else) account for the emergence of truth-evaluable structures is a possibility, but uneconomical if and when language is sufficient.

morphemes). The particular grammatical *relations* that hold them together, like the relation of predication holding between ‘dog’ and ‘bite’ in the sentence *Dogs bite*, are not there, physically speaking. What we see is ‘Dogs’ and ‘bite’. Nothing in the visual (or auditory) appearance of these words, nor their order, even accounts for one being a *noun*, the other a *verb*, i.e. their status as particular ‘parts of speech’; nor for one being syntactically a Noun Phrase (NP), the other a Verb Phrase (VP), i.e. for their phrasal status; nor for one functioning grammatically as a *referential* expression (referring generically to dogs), the other as a *predicate*, which together yield a *truth value*.

Sometimes little words like *do* or *is*, as in *Dogs do bite* or *This is a dog* can betray the existence of grammatical relations at a morpho-lexical level. Yet neither ‘do’ nor ‘is’ have much lexical content and no such lexical overttness is required for a grammatical relation to obtain. Thus the word ‘is’, which is grammatically obligatory in *This is a dog*, disappears in a structure like *I consider [this a dog]*, in which the grammatical relation of predication between ‘this’ and ‘a dog’ is otherwise the same (and in many languages, copulas such as ‘is’ are missing altogether). Grammatical relations are purely *structural* in this sense. While we can sometimes glean grammar from little words that may signal it, grammar is simply not about words, and we will argue later that it cannot be reconstructed from the content or feature specifications of words either. It is an independent structuring principle, with cognitive effects.

### 3. Words and ‘Concepts’

Words *have* been the focus of the analytic philosophy of language, where the theoretical interest is meaning and more narrowly word meaning and where grammar has barely been a topic of inquiry in its own right.<sup>7</sup> Thus a typical introduction (e.g., Lycan 2008) will begin from presenting the ‘base theory’ of meaning, which simply says that the meaning of a word is its referent, a non-linguistic entity. Complications then ensue, and the more elaborate ‘Fregean’ model is discussed, whereby a word also has (and again lexically) a ‘sense’, or the ‘Kaplanian’ model, where it also has a ‘character’. The content of grammatically complex expressions then has to be reconstructed from that of words, which is the origin of the idea of *semantic compositionality*, to which we return. The lexicon, then, exclusively, injects ‘content’ into grammatical configurations, grammar has no meaning of its own, and meanings are non-linguistic entities.<sup>8</sup>

In psychology, too, words are taken to express putative non-linguistic ‘concepts’, which are conventionally referenced through capitals (DOG, MAN,

<sup>7</sup> Historically, the project has been that of a pure ‘logic of thought’, with language as no more than an analytic tool (typically regarded as a deficient one).

<sup>8</sup> In fact there are six major philosophical textbook answers to the question of what ‘meaning’ is: (i) a non-linguistic mental ‘idea’, (ii) a mind- and language-independent ‘proposition’, (iii) ‘reference’ (in a purely semantic or causal sense), (iv) a convention of use, (v) beliefs, (vi) nothing (meaning does not exist). Strikingly, in every single of these approaches, grammar is systematically irrelevant to the existence of propositional meaning (see Hinzen 2006, 2007, for discussion).

etc.) (e.g., Fodor 1998). The meaning of words ('language') resides in concepts ('mind', 'thought'), and meaning again pre-exists language and is independent of it. However, concepts such as DOG or MAN identify words such as *dog* or *man*, and a word in any given language is a lexeme only when viewed *together* with a given meaning or concept that it encodes. If so, DOG is nothing *other* than the English word *dog*, viewed together with its meaning but in abstraction from its *sound* (which unlike meaning is rarely regarded as an inherent property of concepts by concept theorists). What then might we be talking about, if we talk about concepts and *don't* mean words?

Concepts of some kind can be found in infants that do not yet articulate language, and in non-human species (Carey 2009, Gallistel 1998). Yet it is clear and widely accepted that the 'concepts' available to non-linguistic and pre-linguistic beings are not the same.<sup>9</sup> The question therefore again arises whether speaking of concepts in a narrowly human sense, on the one hand, and of words, on the other, really makes an empirical distinction. For every concept that we know or have, there is a word that identifies this concept, and that is identified by it. If there was no word or phrase to identify it, how would we know a concept existed and what that concept was?

Beyond the word level, the theoretical utility of the non-linguistic term 'concept' becomes even less clear. Do sentences 'express concepts', too? 'Complex concepts', perhaps? That we should have simple 'concepts' such as DOG or MAN makes good pre-theoretical sense: We have such 'concepts' in the sense that we know, in a general if vague sense, what kind of things these are, often based on their perceptual features: Thus we know that the former bark, the latter don't; the latter talk, which the former don't, etc. That is, concepts in this sense connect with our *semantic memory* (Tulving 1972). One could not say the same of the (typically phonologically 'light-weight') words and morphemes like 'the', 'to', 'do', 'is', 'has', '-ed' or '-s', which express grammatical relations in sentences: The language-independent notion of 'concept' has no grip on these items. The same applies to the 'silent' words posited by classical generative linguistics, like the implicit PRO subject of the embedded verb *blow* in sentences like *John likes [PRO to blow his nose]*, or the trace *t* of the moved *wh*-expression in *What did you blow t?*. In fact, we only need to go into the domain of lexical verbs, and we will see our intuitions wavering as to whether a word like 'bite' expresses a 'concept' (of an object that is an 'event') or perhaps rather a relation *between* concept pairs, such as DOG and MAN or DOG and SAUSAGE.

If it comes to a proper grammatical relation such as predication, it seems that we have no 'concept' of predication at all. If one was posited, how would it relate to our grasp of the grammatical relation itself that holds between the concept functioning as the subject and the concept functioning as predicate? Why is understanding the grammar not sufficient? In general, how we *count* putative

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<sup>9</sup> In particular, as Carey stresses, conceptualization in non-linguistic beings is still continuous with perception; it also remains stimulus-controlled, non-combinatorial, and non-propositional, and concepts are not employed for purposes of intentional reference, with a capability to refer to anything at all no matter how remote in space and time (Fitch 2010: 187-194). Arguably, no non-human primate ever *learned* any human concept either (Pettito 2005). See further DeVilliers 2007, in press, Penn *et al.* 2008, Terrace 2005).

non-linguistic concepts, which are largely inaccessible without language, is opaque. We could ask whether *Shem kicked Shaun* and *Shaun was kicked by Shem* express ‘the same concept’. Yet it is their grammatical identities and differences that capture precisely in what way they are identical and in what other ways they are different, and no appeal to a realm of ‘concepts’ appears to be required. We could ask whether *John sleeps* and *John is sleeping* express ‘a different concept’. But when asked which difference this is, it is not clear whether we could do better than recapitulating the grammatical distinction between the two kinds of predicate involved, verbal and gerundive, respectively, and the meaning differences that this distinction entails.<sup>10</sup>

Rather than saying we have ‘concepts’ of grammatical function words, grammatical constructions, or parts of speech distinctions, it may make more sense to say that, in addition to concepts in the sense of a form of semantic memory, we have *grammar*, and that it is for this reason that we understand constructions beyond the level of content words. If concepts are words, and over and above words there is only grammar, what does the term ‘thought’ even add?

#### 4. Meaning in Language

A typical traditional *semantic network* representation of semantic memory will indeed represent concepts in the form of words, which form the nodes of a network (e.g., BIRD, ANIMAL; see Collins & Quillian 1969, Baddeley 1990). The nodes are viewed as *categories*, each stored along with a number of associated *properties*, which reflect our *general and shared knowledge* about members of the category. Thus BIRD might be associated with HAS WINGS, CAN FLY, and HAS FEATHERS. As one node is activated, activation spreads to associate nodes. Connections can come with different degrees of ‘strength’, reflecting statistical data about co-occurrence of experiential features in our environment, and there can be typicality effects (e.g., CANARY > OSTRICH in the category BIRD). Such a network can also be structured ‘hierarchically’ in the sense that the node represented by CANARY includes all the properties typically associated with BIRD, which in turn includes all the typical properties of ANIMAL. Because of its structure, a network of this nature can verify propositions against knowledge maintained in long-term memory, such as ‘A canary is a bird’ or ‘A canary can fly’.<sup>11</sup>

A semantic network of this kind appears as a possible model for how our *lexical knowledge* – meaning at the level of words, without grammar – might be structured. Semantic associations will bind various words together and e.g. entail

<sup>10</sup> As M. Sheehan notes, the assumption here is that at the level of grammatical meaning, the same meaning differences can be expressed in all languages, though they need not be expressed with the same lexical resources, which are variable. Mandarin can express Tense and Aspect distinctions, but lexicalizes only the latter.

<sup>11</sup> Neurobiologically, semantic memory is spread out widely across the brain, with reliable activations throughout the left temporal and parietal heteromodal cortex (Binder & Desai 2011, as consistent with temporal atrophy seen in semantic dementia, which specifically affects semantic memory (Hodges & Patterson 2007). It is not, that is, in one particular locus or a modular notion separate from where ‘language’ processing might take place.

that DOG is highly associated with BARK but not with FEATHERS, while the reverse is true for BIRD. These associations are not *grammatical relations*: Grammar is what a semantic network *lacks*. A semantic network in this sense thus is a model of how much meaning we can obtain in the absence of grammar.

Incipient grammar on the other hand *is* visible in 'property terms' such as 'CAN EAT' or 'HAS WINGS', where 'can' and 'has' effectively express grammatical relations between subjects (identifying categories or instances of them) and predicates (depicting properties attributed to these categories or instances). The notion of 'property' itself appears as a grammatical term in disguise, since whether the concept 'WING', say, functions as a property is something that we can in general only tell from its grammatical position in a sentence. Thus a sentence might be either about a wing (saying that it is broken), or about a bird (and say that it has wings). It is grammar, too, that makes a distinction between *A collie is a dog* and *A dog is a collie*, only one of which is true, and which differ merely with regard to which indefinite noun phrase plays the role of the grammatical predicate and which plays the role of the referential expression (subject). Why could the mechanism by which our brain *connects* concepts productively and propositionally, not just *be* grammar?<sup>12</sup>

Evidence that it must be, at some point, is that grammatical relations between words are *sui generis* and crucially *independent* of the statistical and hierarchical organizational principles of semantic memory, opening up a richer and different semantics. Thus the utterance *This dog has feathers* could be true (though surprising), even if dogs generally lack feathers. *Birds fly* could be true, yet not necessarily because most birds fly (they might not, for some reason). Crucially, *Birds fly*, *Birds often fly*, and *Most birds fly* are three grammatically distinct sentences, and they express three distinct propositions or thoughts. *A bird could have two heads* and *Necessarily, 2+2=4* might both be asserted, yet the former does not mean that I have found or expect to find such a bird, and the latter does not mean that I have never found that 2 and 2 made 5. Truths *are* often asserted on the basis of experience, but truth is not an experiential category. We know that if what we say is true, it is not true because we believe it is: It is true because of what it says and the world is as the sentence says: an objective matter.

If thinking was a matter of semantic associations only, there would be no subjects and predicates, no topics and comments, no presuppositions and assertions, no truth values. It might also be that we would be lacking another memory: episodic memory, which Tulving (1972) classically distinguished from semantic memory. The former refers to *individually and first-personally experienced* memories specific to time and place (e.g., *I was bitten by a dog yesterday*), with a connection to a notion of 'what happened to me' (re-lived experience) and the circumstance of its acquisition. Such memory is necessarily conscious in the sense that it only exists when retrieved. I may know for a fact that a dog bit me yesterday, yet this is episodic memory only when I *re-live* the experience in an episode of thought. Else it is a form of 'personal' memory, which comprises facts

<sup>12</sup> A few years after Collins & Quillian (1969), Collins & Loftus (1975) introduced a revised network model exhibiting a range of different 'links' such as 'IS', 'CAN' and 'CANNOT', viewed as independent of the categories themselves. An interesting possibility, however, is that a better name for the exact 'links' required would simply be 'grammar'.

about me of the sort that other persons can know, too (Renoult *et al.* 2012). In contrast, I *know* what ‘dog’ means, and that dogs are mammals or bark, whether or not I happen to use this word on a particular occasion, or whether or not I am engaged in a particular episode of conscious thought about dogs. Moreover, that knowledge is widely shared.

We might put this difference by saying that episodic memory is by its nature *indexical*, whereas semantic memory remains purely *conceptual*. Since the former involves an event specified for its time and place and in relation to the first-person experiencing self, while semantic memory is crucially impersonal and generic, the two kinds of memory are necessarily expressed in a grammar of a different kind, even if the same lexical concepts are involved. The former will involve indexical reference, referential specificity, reference to an event specified for time and place, and grammatical Person distinctions as relevant for a first Person perspective. The latter will be grammatically much simpler.

This difference in grammar could be an accident – a fact merely at the level of the external ‘expression’ of the memories in question. Yet it is not clear why it should be. If episodic memory involves a psychological process of ‘scene construction’ (Hassabis & Maguire 2007), in particular, a generative system is required that provides for the relevant constructional principles, can apply them productively, and capture the right distinctions. Why should grammar *not* be considered in this regard, when key distinctions involved *are* grammatical and referential rather than merely conceptual in nature? If it is not, another system is needed that will provide for the exact same distinctions at the level of non-linguistic ‘thought’. It is not clear which system this might be, and whether it would not have to re-state grammatical distinctions.

The considerations applying to memory apply to thought as such. We retrieve our concept DOG for much of our dog-related activities, like planning to buy a dog, avoiding one seen in the distance while running in the park, recalling playing with one yesterday, or regretting that we will never own one. Yet in any such mental episode this concept is retrieved along with others, and the relations between them will be different across such episodes. A system is needed that can specify these distinctions as fine-grained as is required, and construct representations of the relevant scenes, desires, or thoughts. Grammar is such a system, and as such it comes for free. It is clearly one way – and perhaps the only empirically known way – in which concepts *can* be systematically combined creatively and so as to generate an infinity of possible thoughts about either possible or actual worlds and situations. Again, since language is clearly not only there to talk or communicate, it makes sense that we would use such a system for purposes of thought and memory as well.

## 5. Reference from Grammar

To summarize so far, grammar is invisible yet powerful in establishing relations between words. These relations seem quite unique and are not of a generic ‘associative’ kind. They go with phenomena such as reference and truth that associative principles do not entail. All this could be an accident, and all the

meaning there is could have always existed, independently of language. But this becomes unlikely when non-linguistic substitutes for linguistic notions of meaning – e.g., ‘concept’, ‘memory’, ‘propositions’ – do not capture the right distinctions, short of re-stating the grammatical ones that exactly fit the bill.

I will call the specific kind of meaning that goes with grammatical organization *grammatical meaning* in what follows. With grammar, we can refer and predicate, and the result is propositional truth. Along with truth comes another distinctive human privilege: the making of mistakes.<sup>13</sup> That is, a guarantee for real-world content, which is still there in the case of perception (if we ignore hallucinations), is lifted, and we almost never know for sure whether what we say is true is indeed true: With propositional truth, correctness is not anymore a matter of what we know, nor of what others know, but of how the world is. Adding a grammatical system to a system of concepts does not then result in more concepts, but instead something entirely different: a capacity for using a resource of stored concepts (semantic memory) for a new purpose, namely referentiality, which does not exist in the same form in animals (Fitch 2010). That is:

- (1) a. WRONG EQUATION: concepts + grammar = more concepts  
 b. RIGHT EQUATION: concept + grammar = reference

As grammatical complexity unfolds, reference gets specified in a more fine-grained way, and a system of *formal-ontological distinctions* arises in terms of which kinds of objects are being referred to: In particular, referents can formally be substances, objects, events, propositions, and facts, depending on which grammatical complexity is involved. So grammar maps concepts onto referents with a formal ontology, and referents are not new concepts. If the world is nothing other than the totality of facts (Wittgenstein 1922), and facts as a particular formal ontology of reference arise with grammar, grammar gives us a sense of ‘the world’ or of what there is.

That reference is an instance of grammatical meaning appears independently empirically correct: My lexical knowledge of what DOG means cannot distinguish between the dog I saw yesterday, this dog I see as opposed to that one, some dogs walking through the streets, all dogs, dog-meat, or the species ‘dog’. Referential distinctions of this nature are a kind of meaning that words can in principle not encode. Reference is an instance of grammatical meaning in this sense. No word, as such, and not even any complex word (compound), can be used to *refer* to particular objects or events in the world as placed in space, time, and discourse, and in relation to our own personal

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<sup>13</sup> All animals can respond to stimuli *non-adaptively*, which at times will cause death. But death does not prove falsehood, as history documents. Nor does it show that a creature will be capable of making mistakes. It is also not clear whether having a notion of truth can count as adaptive. A notion of mistake has been applied to perception as well in some philosophical accounts, yet perception unlike language is stimulus-controlled: We cannot will ourselves into perceiving the face of the person behind us, without turning our heads; and if we perceive it as a face, we cannot will ourselves to perceive it as a car. By contrast, we make decisions on what to believe and assert.

experience or self.<sup>14</sup> The point can be made in very simple terms: ‘dog’ is a lexical item; ‘the dog’ is not. The former cannot refer; the latter can (in the right grammatical context).

In any act of reference, then, grammar gets involved imposing specific constraints. Thus at the nominal level, grammar requires a decision as to whether the reference to an object is abstract/generic, indefinite/quantificational, definite, rigid, deictic, or personal. At the sentence-level, every assertion requires a specification of grammatical Tense (finiteness), which has the effect that referential specificity for an event referred to is obtained. Thus in *John is sleeping*, the present tense marking on ‘is’ is used to locate an event of John sleeping relative to the act of speech: The event is indexically *co-located* with that act, as and when it takes place, and captured as ongoing, outlasting the speech act.

Every such act is further constrained to provide ‘new information’, expanding our knowledge beyond memory, and to anchor its content in the context of the utterance and with respect to the epistemic state of the subject. The act is also conscious as and when it takes place, where such consciousness is inherently first-personal: It would not be enough to know it for a fact that *Peter* (which is grammatically ‘third Person’) is talking, if I am Peter, and talk. What I have to know is that *I* (the grammatical ‘first’ Person) am talking, here and now, making this or that claim about the world, to this or that other (grammatically ‘second’) person. It is from the *lack* of such knowledge—the breakdown of the deictic frame—that we predict the occurrence of the ‘nuclear symptoms’ of schizophrenia: one’s thoughts heard as spoken out loud, or inserted by an outside force (Crow 2008, 2012).

The first instance of reference in this sense is index-finger declarative pointing occurring universally in humans around the first birthday, often accompanied by verbalizations of the first words. In the course of the next one and a half years in development, and crucially in both the signed and spoken modalities (Pettito 1987), such units start being fully grammaticalized: The same kind of deictic reference can now proceed in the absence of non-linguistic gestures in the visual modality and any particular stimulus processed online as the word is used, as in an act of reference to ‘the dog I saw yesterday’.

In units of referentiality like this, deictic reference comes from four things: (i) the intuitively ‘meaningless’ word ‘the’, the *determiner* (D); (ii) a lexical *description* that, in the context of the utterance, will typically involve a (complex) concept uniquely true of one particular relevant dog in the context of speech; (iii) the *grammar* creating a unit consisting of the determiner plus the description, and connecting it with the rest of the structure, and (iv) a *time* and *location* in which the speech act takes place, which sets up a particular space for deictic reference, in which objects fall under descriptions from the speaker’s and hearer’s perspectives.

(iii) is required, since to answer the question of whether a given phrase is

<sup>14</sup> Thus a compound like ‘dog hater’ only applies generically to people hating dogs, but not to a particular episode of a particular person hating a particular dog. We can utter ‘dog’ and this may pick out a particular dog, but only when the utterance is accompanied by a deictic gesture—of the sort we find in infants in the one-word stage around the first birthday. It is the word together with the gesture that yields a unit of reference in that case.

referential or else a mere predicate we have to look at its grammar, and nothing else will tell. Thus, for example, in *I wished her husband wasn't her husband* (from Lycan 2008), the exact same phrase 'her husband' is referential in its first occurrence, where it is the grammatical subject, and predicative in its second, where it is the predicate. The sentence says that I wish that a certain person I refer to under the description 'her husband', does not fall under this description. Reference in the case of a structure like D+NP thus does not come from the lexical content involved in the description (in the NP), nor even from a definite determiner like 'the', but from the determiner and the NP co-occurring as a single unit of grammatical organization, in the right grammatical relations, in a speech context.<sup>15</sup>

With grammar, then, a human-specific *deictic frame* is set up: a logical space in which we can think and act rationally. In this frame, nominal phrases serve to place a given concept in space, verbs to place it in time, clauses to place it in discourse—all in relation to the speaker's first-personal self, the center of the deictic space. Before grammar, a defined relation to the world is not there. Reference in a human-specific sense is in this way an evolutionary riddle and a profound explanatory *problem*. It is not the *solution* to the problem of meaning, as a term like 'the referential theory of meaning' (Lycan 2008) suggests. Reference is what *poses* the problem, and grammar is its answer.

The point can be made in a different way. The core meaning of the term 'semantic' is 'relations to the world'. But a semantics in this general sense is carried by myriad cognitive or even non-cognitive systems, including mental representations that we find in navigating insects (Gallistel 1998), the perceptual systems of pre-linguistic infants (Carey 2008), the functionally referential alarm calls of monkeys or chicken (Hauser 1996), and the percepts of the material qualities of objects as studied in vision science (Mausfeld 2011). *Ipsa facto*, such a generic notion of 'semantic' will neither predict nor illuminate the specific intentional ways of referring to the world that we find in our species. Nor will any appeal to 'causal' theories of reference (Devitt & Sterelny 1987) help in explaining our species-specific deictic frame: An infant and pet kitten may be exposed to the exact same causal relations, yet only one of them will start to intentionally refer, on a biologically timed course.

## 6. The Hierarchy of Referentiality

In translations of natural language into the idiom of philosophical logic, nominals are regarded as either referential or not. The 'non-referential' expres-

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<sup>15</sup> This is to make the point in terms of determiners, which exist in English but not in other languages with other lexical resources to indicate grammatical functions. Nonetheless, all languages appear to be able to enact the same forms of grammatical reference, and the absence of lexical determiners in a language like Chinese *supports* the point that the relevant mechanism is grammatical (see Cheng & Sybesma 1999, and subsequent discussion including Wu & Bodomo 2009). Even in English, the case of proper names moving to D when they are used referentially (Longobardi 1994) shows that referentiality is partially independent of lexical resources such as particular kind of determiners. For further typological considerations, see also Longobardi (2001), and see further sections 11–12.

sions are equated with ‘general’ or ‘quantificational’ ones, while the ‘referential’ ones are said to be ‘singular’. Empirical complications ensue immediately, however: Linguistic reality does not allow for such a categorical divide. Thus the divide makes it hard to see—as a debate raging for more than century since Russell (1905) illustrates—how to classify a definite description like ‘the murderer’, which has no quantifier in it grammatically, is nonetheless not used *referentially* in the way that a proper name is, yet clearly *can* be used by speakers to refer to a particular person, as in ‘The murderer entered’. In a similar way, there is no proper name in the assertion ‘Dogs bite’, and yet the speaker seems to be referring generically to dogs; and a person saying ‘I saw dogs’ is referring to an indefinite number of dogs that he saw. In short, it appears that reference in language can take a number of different forms. More specifically, we observe that:

- (i) These forms are ordered in a *hierarchy* to be defined below;
- (ii) specific forms of *grammatical complexity* correspond to each layer of the hierarchy;
- (iii) grammatical complexity *increases* as we move from the beginnings of referentiality to its maximal forms; and
- (iv) none of them are ever found *outside* of a grammatically structured system, or are lexical.

Consider a simple progression like the following, which has nothing to do with a change in the *conceptual content* of the lexical item *dog*, but instead solely with different *ways in which it can be embedded in the deictic space* that the speaker shares with the hearer:

- (2) I ate **dog** < I ate **dogs** < I ate **a dog** < I ate **the dog** < I ate **this dog**

In the first example, the lexeme DOG is morphologically maximally simple and the determiner phrase of which it is a part lacks an overt determiner and can only have a *mass* reading involving a quantifier (cf. ‘I ate some dog-meat’). With number marking added, as in the second example, we now refer to *individualized* specimens of the dog kind, though only *generically*. With the determiner ‘a’ added (‘weak’ in the sense of Milsark 1977), we can descriptively refer to something or other that falls under the description ‘dog’, but we also obtain the option of indefinite *specificity*. With the (‘strong’) determiner ‘the’, we obtain *definiteness*. With a deictic element added, as in ‘this’ (=the+here), we obtain *indexicality*.

We therefore move from a maximally indefinite to a maximally definite form of reference, as grammatical complexity of the determiner phrase increases. This process finds an end when the deictic stage is reached and referential specificity is maximal: At this stage, the speaker could perhaps add further deictics outside of this phrase, or descriptions that act as adjuncts, but a redundancy effect now arises (*I ate this dog here; I ate this dog here and now; I ate this brown dog right here and now that you selected*, etc.). So we have reached the end of the process of fixating reference that nominals can subservise. In line with that, the further we go up on the scale of increasing referential strength, the less easily do

the nominals in question lend themselves to predicative uses: 'a dog' is a perfect and unmarked sentential predicate, as in *He is a dog*; the same is even more true for empty determiners, as in *I saw dogs*; but already 'the dog' becomes marked as such a predicate, as in *He is the dog*, where we are starting to get the intuition that 'the dog' is referential. If we finally come to *He is this dog*, we see the predicative option essentially disappearing. Insofar as we are moving here from 'cannot be referential' to 'must be referential' we can speak of a 'hierarchy of reference' in the nominal domain.

At the end of this progression, the grammatical process of increasing complexity essentially stops: More than embedding a lexical description in deictic space we cannot do in the case of lexical nominals; we have nailed down our exact object of reference. At no point in the progression did adding grammatical complexity co-vary with any *other* function than, broadly speaking, reference, or the conceptual content of the word 'dog' changed. What changed instead is what we have called the formal ontology of reference: whether DOG comes out as a *mass*, a set of non-specific individual *instances* of a kind, one *particular* individual, a *part* of an individual, etc. This formal ontology is moreover not assorted. Instead, the small number of distinct formal types are ordered by inclusion relations: Individual reference presupposes a substance/mass, specific individuality requires individuality, deixis requires definiteness, etc.

An analogous progression towards increased referential specificity as grammatical complexity is built up can be seen in the domain of clauses. In *She seems to be a man*, there is an embedded, non-finite and non-tensed clause (as seen from the impossibility of specifying its independent tense, as in *\*She seems to be a man tomorrow*). Next such clauses can become tensed, as in *She wants to become a man (tomorrow)*, and they then can become finite, in which case they also project their own subject in addition to an expletive one at the matrix level, as in *It seems she is a man*, or with two full-blown subjects, as in *We think she is a man*. Yet no finite embedded clauses can ever occur as an assertion, or denote the truth. For an assertion of truth to occur, we require a matrix (non-dependent) clause, as in *She is a man*. Once such a clause is configured grammatically, truth is denoted, and the grammatical process again essentially stops: More cannot be done in clausal grammar. No more extensional form of reference can be reached. In English we can add a tag, negotiating the truth value assigned with the hearer: *John blew his nose, didn't he?* Or we can add a qualification, as in so-called 'sifting': *John blew his nose, I believe*. But neither process is recursive: *\*John blew his nose, didn't he did he?* or *\*John blew his nose, I believe, he claims*. Moreover, neither process changes the propositional meaning, or what was asserted.

Truth is thus the maximally *extensional* form of reference that is possible in grammar. If Superman is Clark Kent, it doesn't matter whether we know it, or how he is described: If it is a fact that one is the other, it is a fact no matter what we know or don't know. No embedded clause ever reaches extensionality in this maximal sense (including factive clauses, which retain an intermediate degree of intensionality; Sheehan & Hinzen 2011). Only (whole) sentences carry truth values, which are reached only at the root of the tree, at the end of the grammatical process.

These observations in the domains of reference (nominals) and truth

(sentences) reinforce and differentiate the picture that there are two kinds of meaning: One is lexical/conceptual, presumably ultimately based on perception and sensory-motor processing, though also supra-modal, and as such constituting semantic memory; another is grammatical, which adds nothing to lexical content, is about reference, predication, and truth instead, and an expression of our personal creativity in changing and updating a body of shared knowledge. The latter kind of meaning is the content of grammar and involves a progression indexed by grammatical complexity.

## 7. Rational Grammar

Could reference be the most *foundational* grammatical concept? Are there core processes of grammar *unrelated* to its apparent involvement in the task of configuring acts of reference, or that do not relate to linguistically specific forms of meaning at all? If yes, this would support the ‘autonomy’ of grammar and question its inherent role in the constitution of a particular cognitive type. Yet we cannot as much as stick two words together without creating a grammatical relation that has consequences for reference. We can write on a shopping list: ‘bread, juice, butter, beer’, and each of these will then refer separately, to a different item each. If we change the grammar from that of a list to that of a compound, as in ‘dog food’, the consequences for reference are different: ‘dog food’ is used not for referring, in sequence, first to dog and then to food, but uniquely to refer to food, namely food for a dog; it is not used to refer to a dog, perhaps a dog for fetching food, which ‘food dog’ would refer to. The reason is that compounds are, in grammatical terms, ‘headed’, unlike lists. But headedness, in the sense just seen, translates into reference: It is not a merely formal notion. Headedness again disregards statistical facts: ‘dog art’, unlike ‘art dog’, is a kind of art, not a kind of dog, no matter how rarely or often dogs are involved in art.

With reference, we also get its opposite, predicativity, accounting for the basic structure of a sentence, consisting of a subject, which is referential in one of the above ways, and another term, which functions as the ‘predicate’. Two referential terms cannot make a sentence. With predicates, we also obtain adjuncts, which are modifiers to already given referents. Referents combined with predicates yield propositional claims, hence truth values, which are for the clausal case what objects are in the case of referential nominals. On the way there, we obtain reference to events with verbs applying to arguments, as in *kill Bill*, where *Bill* plays the thematic role of ‘Patient’. Events necessarily have a participant as an inherent part: *thematic structure*. With grammatical (and finite) tense, as occurring in a full sentence where *Bill* is the sentential object and something else is the grammatical subject, we obtain reference to a *specific* event and a truth value, as in *She has killed Bill*. In that case, there will moreover ipso facto be an event and a state, the latter an inherent part of the former: that she has killed Bill, and that Bill is dead. Without arguments playing thematic roles, and without grammatical relations such as finiteness requiring the further articulation of thematic structure into subjects and objects, there will be no cognizing of facts in this sense, and no

reference to events or states. The relations in question are marked by the so-called 'structural' Cases in grammar (Nominative and Accusative), which find an interpretation in (grammatical) semantics for this very reason.<sup>16</sup>

If everything in grammar sub-serves this goal of reaching the truth value (the establishment of facts that, once asserted, can be de-indexicalized and re-enter semantic memory as truths about the world), it makes sense to rationalize grammar in these terms. In turn, we will regard propositional cognition as grammatical in nature: As grammatical structures are built up, a formal ontology falls into place, which begins from objects, proceeds to events and ends with propositions, which, in the case of matrix declaratives, are true or false. This ontology is what rational thought requires. A grammaticalized world is thus a *rational* one, which exhibits a structure and system of formal distinctions that cannot be found in perception.

## 8. Compositionality?

Grammar, apart from yielding referents rather than new concepts, also never quite *combines* concepts, and it is not obvious that this ever happens outside of grammar, either.<sup>17</sup> Thus, in grammar we may combine 'dog' with 'the', the latter of which is intuitively not a concept (but the expression of a grammatical function, namely reference), and then 'kill' with 'the dog'. But then, 'kill' is not combined grammatically with 'dog', *directly*: a determiner intervenes.<sup>18</sup> Nor does 'she' combine directly with 'kill the dog'. 'She' rather combines with something conceptually meaningless and grammatical first, namely finite Tense, as marked morphologically on the verb or through an auxiliary, but it does not combine with the lexical verb as such. It appears as if concepts have to be lexicalized *and* grammaticalized *first*, before they can combine productively and enter into structures with propositional meanings. What enters this combinatorics as a 'part' is never a pure lexical concept like DOG to start with, but a *part of speech*: a noun, verb, etc.; it is a *noun*, or category N, not DOG, that 'the' combines with.<sup>19</sup>

Even in the case of compounds (like 'dog food'), grammar never combines concepts directly, but a *head* is combined with a *modifier*, which are also particular *parts of speech*. Both are *lexicalized* through a concept, but these concepts only

<sup>16</sup> See further Hinzen & Sheehan (2013: Ch. 6), and Hinzen (2014). Evidence in favour of the common view, that structural Case *is* strictly uninterpretable, would be evidence against (or limit) the present program, as it would identify a crucial dimension of grammar apparently irrelevant to meaning.

<sup>17</sup> That 'concepts compose' is one of the prime axioms of research on 'concepts' in philosophy such as Fodor (1998). On this view, there are simple ('atomic') and complex (structured) concepts. But it is actually not clear what the evidence is for a combinatorics that applies to 'concepts' (rather than parts of speech or phrases) and produces new such 'concepts', when the actual evidence for a productive conceptual combinatorics governed by non-statistical principles comes from *grammatical* relations in which we see concepts appear.

<sup>18</sup> A covert one in the case of 'eat dog', as an anonymous reviewer notes.

<sup>19</sup> Evidence that even part-of-speech distinctions are not lexical but already reflections of grammatical functions, comes from the fact that grammar can overrule any lexical part-of-speech specifications (as in *manning a flight*, *topping the agenda*, etc.). See Levelt *et al.* (1999) and Vigliocco *et al.* (2011) for psycholinguistic and neurolinguistic evidence.

combine in virtue of their grammatical roles and part-of-speech status. These grammatical meanings are not *determined* by the lexical contents involved, as the fact shows that in ‘food dog’, the same lexical contents are involved, but the referentiality facts are the reverse. Lexical meanings are powerless to determine their grammatical functioning. One might be tempted to think that adjectives like *bald* will necessarily denote properties, not objects: They *must* be predicative. But they, too, need not; cf. *The bald tend to be sexy* or *Baldness is sexy*.

How then could grammatical meaning be reconstructed by ‘composing’ lexical meanings in a ‘semantic component’, regarded as separate from grammar itself? The student of philosophical logic is taught that the meaning of *John sleeps* is ‘composed’ from John, who is said to be the meaning of ‘John’, and the property of sleeping, which is said to be what ‘sleeps’ denotes. But how do we know that these are the right mappings? Plainly, from *understanding the grammatical structure of the sentence*, which turns ‘John’ into a referential expression (which it need not be in grammatically different contexts, such as *No John is proud of his name*, where ‘John’ refers to a property, namely being called ‘John’), and ‘sleeps’ into the sentential predicate. Hence the mapping to the semantic values in question does not explain our grammatical understanding: It depends on it.

What, moreover, is a ‘property’? Davidson (2005) argues that a characterization of the notion of ‘property’ that is logically independent of the notion of ‘predicate’ has never been provided. It does not help to interpret ‘sleeps’ as a mathematical function either: the function mapping John onto the proposition that John sleeps. For the compositional emergence of this proposition was what we were promised to obtain. It does not cash out this promise to hear that, in order to obtain this proposition, the sentential predicate has to be mapped onto a function that has been defined to yield this very proposition, when applied to John (Davidson 1967). Nor does it help to define ‘sleeps’ as the set of sleeping things. For the definition of this set will have to exploit our understanding of the predicate ‘sleeps’.

With a notion of grammatical meaning missing, the only way for sentential meanings to arise from word meanings *is* for us to ‘compose’ the word meanings. This is a lexicalist model for solving the problem that sentential meaning poses. But as we just saw, grammatical meanings arise from the grammatical roles that words play: their roles as subjects or predicates, heads or modifiers, arguments or adjuncts. No word plays any of these roles lexically. Hence grammatical meanings cannot be composed from lexical meanings. Not only are lexical meanings never strictly composed, but compositionality of lexical meanings is not the solution to the existence of grammatical meanings. Grammar is this solution. Grammar is *foundational* for the human cognitive mind in this sense.

## 9. Grammar and Species

As I have presented it, studying language formally in abstraction from its role in thought and use is a methodological choice: It is not to study form as an object of nature. There is no ‘form’ in nature in addition to ‘content’, and a theory is needed to connect them. Nonetheless, in practice, generative grammar has not

merely posited principles of language described formally, but formal principles: principles that don't in any way *appear* to illuminate the rational structure of thought or of meaning, and in this sense appear arbitrary. At best, they are instances of natural law, including the economy principles that Minimalism has moved to the forefront of inquiry. The present framework suggests a partially different inquiry: to rationalize the principles of grammar by regarding them as the principles of a rational cognitive type that is part of a speciation event in the genus *Homo* (Crow 2002, Stringer 2011, Tattersall 2008, Hinzen & Sheehan 2013: Ch. 7). That perspective cannot be pursued through the study of the 'principles' and 'parameters' of cross-linguistic variation (Chomsky 1981, Newmeyer 2005), since even if these were finally understood, the same question would arise: What is the cognitive function of grammar? It is difficult to address this question by comparing speakers of French and Japanese, or any other language, since these represent the same cognitive type. But it *can* potentially be studied by comparing cognitive phenotypes *within* our species, which may differ in their specifications for UG (Crow 2008).

In this regard the view that the genetics of language is the genetics of *sapiens*-specific thought predicts that different cognitive phenotypes within our species should co-vary with particular, identifiable linguistic profiles, i.e. linguistic phenotypes. Formal thought disorder in schizophrenia, which is diagnosed as a language abnormality (McKenna & Oh 2005), is a case in point. The cognitive changes involved should map onto grammatical changes in a systematic fashion, which should stand in a meaningful relationship to the changes in the cognitive phenotype that we observe, illuminating symptoms. In turn, where our mind remains rational, but language is produced only with difficulty, as in agrammatical aphasia, the profile of the changes should be different (see further Hinzen & Sheehan 2013: Ch. 8).

## 10. The Rise of the LOT

Nothing prevents us to take a metaphysical stance and think of formal distinctions in the ontology of reference as written into the very fabric of the universe, independently of language. But positing such a metaphysical ontology and formalizing it won't explain its existence in a particular cognitive type. The present framework claims that grammar does explain, for free, why thought takes place in a deictic space that exhibits such an ontology. By hypothesis, grammatical distinctions co-vary with the formal ontological ones and can be rationalized in these terms. By contrast, there is no non-linguistic and specifically no non-grammatical evidence for such a formal ontological structure. A cat does not refer to things in the same way as we do, and it does not distinguish in a systematic fashion between reference to facts and propositions, properties and states, or situations and events. Distinctions in the formal ontology of semantics are not distinctions at the level of the physics of perception of the external world either. *Mary smiles* and *Mary's smile* can be uttered in the exact same external circumstance, yet in the first case I will have said something true or false, and referred to an event as co-located with the act of speech and as ongoing with respect to it. In

the second case, I will only have referred to what is formally an object – a difference in formal ontology.

In line with the idea that grammar and a particular kind of content are inseparable, it is impossible to produce a grammatical expression that is meaningless and that does not exhibit the formal ontology in question. *Colourless green ideas sleep furiously*, while often misinterpreted as evidence to the contrary, is a case in point: It has rational uses.<sup>20</sup> Grammar cannot play the role of deriving the formal ontology of thought or explain why there is one, if it is a formal system only. In that case, distinctions at the level of content will lead an independent life. Theories of meaning and content will not invoke grammar, and will tend to look for such factors as belief, causality, social cognition, or mental representation instead. Indeed it is the formal nature of the study of grammar in the 20<sup>th</sup> century that has led philosophers to conclude the philosophical insignificance of generative grammar.<sup>21</sup> Linguistics was meant to be formal because it was meant to be scientific and naturalistic – yet if it is merely formal, it cannot address philosophical questions about content, suggesting continuing a long tradition of language-neglect in philosophy.<sup>22</sup>

With the idea of ‘arbitrary’ principles of grammar firmly enshrined since the 1970s, it is also clear why it is natural for philosophers to conclude that ‘thought’ has to have its independent ‘language’: the Language of Thought (LOT) (Fodor 2008). Positing a LOT is particularly motivated if we see the kind of thought that it characterizes widely distributed in non-linguistic species (or pre-linguistic humans). In line with that, Fodor & Pylyshyn (1988: 28) wrote: ‘that infraverbal cognition is pretty generally systematic seems, in short, to be about as secure as any empirical premise in this area can be’. All cognitive organisms, in short, verbal or not, think in much the same way. They are symbol-users (not externally, but in their LOT) and their ‘mental representations’ have a systematic and compositional semantics. In fact, though, it is ‘about as secure as any empirical premise can be’ that chimpanzees, say, do *not* think like us, and that it is merely the tragic lack of an expressive module that prevents them from telling us. If they did think like us, our current practices in treating them would be ethically indefensible, and should be switched for our treatment of agrammatical aphasics, whose thoughts we take to be rational and different from those of a chimpanzee, while the tool is broken that would normally convey them.<sup>23</sup>

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<sup>20</sup> As in this famous poem: “It can only be the thought of verdure to come, which prompts us in the autumn to buy these dormant white lumps of vegetable matter covered by a brown papery skin, and lovingly to plant them and care for them. It is a marvel to me that under this cover they are labouring unseen at such a rate within to give us the sudden awesome beauty of spring flowering bulbs. While winter reigns the earth reposes but these colourless green ideas sleep furiously.” (C. M. Street)

<sup>21</sup> Davidson (2004: 132–133) in particular rejects the philosophical significance of generative linguistic theory *because* of its stated aim to be a naturalistic science, and such a science is only possible for ‘syntax’, which he takes to be meaningless by standard definition.

<sup>22</sup> From Frege to Russell, to Carnap, and to Quine, language had barely been regarded as more than a poor translation of logical form – that is, logic seen through the distorting lenses of a conventional system of ‘signs’.

<sup>23</sup> Tomasello (2008) agrees on a principled difference between a modern human and chimpanzee cognitive infrastructure but takes grammar to be an epiphenomenon of a non-linguistically specific adaptation for ‘culture’. Yet a *linguistic* culture is intended here. What

With grammar characterized in the present terms, the distinction between a grammatical and a thinking being becomes incoherent: To structure one's thinking grammatically *is* to embed it into a triangular deictic space, with each corner of the triangle corresponding to a grammatical Person. This is what it *means* to think. There is nothing left for a LOT to accomplish and claims about the structure of the LOT, insofar as they are empirical ones, will be ones about grammar.

## 11. Person, Grammar, and the Self

Lexical items or concepts as units of semantic memory are impersonal—no person can claim ownership of any lexical concept, and they are given to us as infants in the form of an already existing and shared classificatory scheme for human experience. Reference by contrast is only enacted on particular occasions of language use, in a deictic space in which a grammatical first person refers *for* a grammatically second person *to* an object (the grammatical 3<sup>rd</sup> or non-Person), which is independent of both the pointer and the hearer, as well as the signal.<sup>24</sup> All of human reference is *triangular* in this sense, with the grammatical 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> persons labeling the corners of the triangle. A creature inhabiting this deictic frame is a *rational* one according to Davidson (2004), and this triangular infrastructure of rationality is the structure of thought itself: Nothing has to be added to it to qualify as such. A form of thought that didn't share its basic structure, moreover, wouldn't be thought in the same sense. We can share a deictic frame with our pet dog, but it is a frame of a different kind, whose baseline is not language.

Grammar, in setting up a novel deictic space, may therefore be well placed to address another problem: Human thought is not explained before we have explained how and why it is *personal*. We consider ourselves and other members of our species persons, but not the members of any other species, with non-language using humans such as fetuses or comatose patients as an unclear intermediate case. How come that we language users are persons and non-language users are not? Once again, the correlation between persons and language could be accidental—but then why should it be?

If we address the question of what persons are metaphysically, discussions of the nature of the self usually begin from a view ascribed to Descartes, according to which selves are simple, immaterial substances. A second possibility

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drives the evolution of language is said to be *expressive needs*, communicative intentions of the kind that we have, but chimpanzees lack grammar of the sort that we see in human languages. Evidence for this view would be that the *kind* of communicative intentions that we see expressed in language can exist without language. Apart from that, a drive to communicate and an ability and motivation to share intentions neither predict nor explain a thinking ability in the present sense. Before we communicate propositionally, we need a mind that can think propositionally.

<sup>24</sup> Crucially, the second person can be the speaker himself, as in self-talk, in which it is critical that the two persons are grammatically distinct: A person standing in front of a mirror says 'I hate you!', not 'I hate me!' (see Holmberg 2010). This shows that the non-grammatical notion of 'self-reference' does not capture the right distinctions: One can refer to the exact same person in the grammatical 1<sup>st</sup>, 2<sup>nd</sup>, or 3<sup>rd</sup> Person. The grammatical distinctions are needed.

is then taken to be that we are indeed such a substance, but that we *also* have physical properties: Selves are immaterial substances, but they have bodies (Lowe 2008). A third is an alternative famously proposed by Hume, that qua selves we are simply bundles of ideas: Each of us is ‘a bundle or collection of different perceptions, which succeed each other with an inconceivable rapidity, and are in a perpetual flux and movement’ (Hume 1737/1888: 252). A fourth is that we are our bodies. A fifth is that we are computer programs, hence abstract objects, which can be ‘multiply realized’. A sixth is that we simply don’t exist: There are no selves (see Olson 2007 for an overview). It is again remarkable that in each and every of these proposals language simply does not seem to matter to our existence as selves. It is as if language was irrelevant to having the kind of self that we do and was merely a way of *talking* about it. In the cognitive neuroscience of the self, too (e.g., Kircher & David 2003), traditional notions from philosophical epistemology and phenomenology (‘subject’ and ‘object’, ‘self’ and ‘other’, ‘subjective experience’, ‘first person perspective’, ‘meaning’, etc.) prevail and are used in non-linguistic senses. The ‘first-person perspective’ (Zahavi 2006, Lowe 2008) is stressed in its importance, yet the Cartesian assumption appears to be that such a ‘perspective’ is somehow available independently of language, through introspection—despite the fact that ‘first person’ is a *grammatical* distinction: The notion ‘first person’ cannot here have a *non-grammatical* sense, as in ‘the first person entering the room’.

The very fact that we speak of a ‘first-person perspective’ indicates that the notion of a perspective as such is insufficient to capture the required distinction: Grammar has to be added. Zahavi (2006: 27–29) stresses that self-awareness involved in conscious states cannot be construed along ‘subject-object’ lines, yet it is the grammar of self-reference that precisely tells us how this is the case: The grammar of 3<sup>rd</sup>-person object reference (‘the/my self’, ‘my body/brain’) is different from that of 1<sup>st</sup>-person reference (‘I’; Bianchi 2006, Martín & Hinzen 2014). The grammatical distinction is essential: We would worry about an English-speaking child who never referred to itself in the grammatical 1<sup>st</sup> person. As the cases of abnormal cognition in schizophrenia and in autism both indicate (see, e.g., Rochester & Martin 1979, Hobson *et al.* 2010, respectively), pronouns, which paradigmatically incorporate grammatical Person distinctions, are a particular locus of vulnerability in these disorders, indicating a connection between disturbances of selfhood and grammar.

Independently of this connection, pronouns *are* highly grammatical creatures in the sense that person systems that they incorporate interact with inherently grammatical organizational principles, such as structural Case. It is significant, moreover, that the personal pronouns are grammatically the most complex, coming still on top of the hierarchy of reference above (Martín & Hinzen 2014). At the beginning of this hierarchy, we saw nominal arguments without overt determiners fixing reference merely via their descriptive lexical content (e.g., *I’d like to have **dog*** or *I like **dogs***). Nominal arguments with the strong determiner ‘the’ will normally be definite-referential, except when special operators are involved that compromise such referentiality, such as ‘occasional’ in *The **occasional dog** passed by*, where no particular dog is referenced. If we expand ‘the’ into ‘this’ by adding a deictic element, referentiality becomes an ab-

solute requirement (*\*this occasional dog passed by*). By the time we have reached demonstrative reference (*I like this dog*), reference succeeds with a pronominal on its own without any support from the lexical nominal: *I like this/him/her/it* vs. *\*I like the*. Extending this progression into the personal (1<sup>st</sup> and 2<sup>nd</sup> person) pronouns, we find these deprived of Gender (and arguably Number) specifications, which makes them even poorer in terms of lexical content: *I like you*.

While 3<sup>rd</sup> person pronouns still allow modifying relative clauses, moreover, the personal pronouns don't; cf. *He who enters through this door will be shot* vs. *\*You who enter(s) through this door will be shot*. There is a further progression from the 2<sup>nd</sup> Person to the 1<sup>st</sup> Person in that the former, at least in the plural, *can* co-occur with a lexical nominal, as in *You linguists are crazy people*, and at a stretch even in the singular (*You linguist will never get this*), the 1<sup>st</sup> Person is completely unmodifiable: *\*I linguist like my job*.<sup>25</sup> Finally, while 3<sup>rd</sup> person pronouns can paradigmatically be bound, losing their referential independence or force, as in *John thinks he is smart*, 1<sup>st</sup> person pronouns cannot be.<sup>26</sup>

We thus see a progression from readings that are maximally non-specific and descriptive to readings that are maximally specific and non-descriptive, with quantificational/indefinite, definite referential, and deictic forms in the middle, again ordered with respect to one another. This is mirrored in the grammatical complexity of the grammatical argument we see, which goes from obligatorily absent or optional determiners to obligatory ones, until the complement becomes optional, and finally the complement becomes obligatorily absent, as with personal pronouns. Put differently, reference goes from being maximally co-mediated lexically to being maximally mediated grammatically – until all lexical content is lost in the case of 'I' and the referent is not described at all: the case coming closest to what Russell called a 'logically proper name'. We may summarize this hierarchy as follows, where a star within a bracket indicates obligatory deletion and a star outside of a bracket obligatory presence of the material in the bracket:

(3) (\*the) \*(NP) < \*(a) \*(NP) < \*(the) \*(NP) < \*(this) (NP) < \*(he) (\*NP) < you < I

Personal forms of reference, and especially reference in the 1<sup>st</sup> Person are therefore a maximally *grammatical phenomenon*. It is not a long step from here to argue that, given that, by a wide agreement, selves are identified in the grammatically 1<sup>st</sup> Person, selves are *also* individuated grammatically. Knowing oneself under a description, including one's own proper name, is not enough to know that one is identical to that person, in the sense that one would know: 'I am that person'. In this sense, descriptive forms of reference in the 3<sup>rd</sup> person ('that person', 'Rudolf Lingens', etc.), do not substitute for forms of reference in the 1<sup>st</sup>

<sup>25</sup> As Michelle Sheehan (p.c.) notes, the Person Case Constraint and systems of inverse agreement also illustrate that the 1<sup>st</sup> person can be seen to be less 'object-like' than the 2<sup>nd</sup> person. Even in English, '?She lent me you' is much better than '\*She lent you me'.

<sup>26</sup> Where they *appear* to be bound, the person features are often not interpreted, as the fact of the substitutability of 'his' for 'my' shows in the following: *I am the only one around here who takes care of my/his children* (example from B. Partee).

person (cf. Perry 1993). If the use of the 1<sup>st</sup> person in ascribing a property to oneself is both necessary and sufficient for the relevant form of self-knowledge to exist, the argument that there are no selves without the grammar of Person would be complete.<sup>27</sup>

## 12. Topological Mapping

The above account entails that the forms of reference can be mapped from the grammatical configurations involved: No extra-grammatical principles are required. Longobardi (1994) provided crucial evidence that this applies as well to a case that *prima facie* seems to contradict the account: that of proper names. At least in languages like English, proper names *are* paradigmatically used definite-referentially, yet a determiner is obligatorily *absent* in such uses. As we noted, where proper names are used referentially, this is never a lexical fact, since all proper names can also be used predicatively, as noted. Yet, it still *prima facie* contradicts the above hierarchy, in that a (strong) determiner should not be absent in a referential interpretation. In this regard Longobardi raised a fundamental question: Where a proper name is used referentially (without a determiner), is it grammatically in the position of D or of N, within the scheme [D[N]]?

Cross-linguistic evidence supports the former answer: The proper name, first generated in N, *moves* to the D position in the uses in question. In line with this proposal, where, in English, the determiner is present and movement is blocked, a *descriptive* reading is derived, as in *the early Russell* or *the Russell of 1905*, which refers not to Russell directly, but one particular kind (or stage) of Russell. This proposal, further corroborated in Longobardi (2001, 2005, 2008), has two striking implications that are of foundational significance (Hinzen 2007): First, it has long since been noted in the philosophical literature that proper names, while their referents can of course be associated with all sorts of descriptive properties (John is the mayor, he is handsome, etc.), are nonetheless standardly used in such a way that none of these descriptive properties are crucial to the identity of the referent. Thus, if it turns that John isn't the mayor, in fact, or he is ugly, the name 'John' doesn't change its reference; it will refer to the exact same person.

Termed 'rigidity' by Kripke (1972), this important empirical observation finds a natural explanation in Longobardi's account: While all proper names have lexical descriptive content (the least we know about John is that he is called 'John'), they have no other lexical specifications. Even their single lexical-descriptive specification (being called 'John'), however, is not expected to determine reference when the nominal moves from the N to the D position: Properties serving to identify the referent are specified in the N-position, the complement of the determiner. Where they are gone, no identifying conditions are expected to

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<sup>27</sup> See Martín & Hinzen (2014) for evidence for the premise: Control constructions, in particular, like *John expects PRO to get a medal*, do not enforce the relevant *de se* readings, which require a 1<sup>st</sup> Person subject.

co-determine the identity of the referent, and rigidity follows (Hinzen 2007).

The second consequence is that reference is *never* lexically determined—even in the case of proper names it depends on N-to-D movement, and like in all of the other forms of reference we have encountered above, the form of referentiality that we obtain depends, in Longobardi's terms, on the 'topology' of the phrase in which they appear. It depends on facts like whether the determiner position is empty, or whether the N-position is empty, or whether both are filled, and co-determine the act of reference.

Sheehan & Hinzen (2011), modifying Longobardi's mapping principles for nominal slightly, expanding them to 3<sup>rd</sup> person pronouns and implementing them in an architecture based on the 'phases' of Chomsky (2001, 2007), argue that the exact same consequence holds in the clausal case. Frege, suggesting that clauses are so-called 'derived proper names', argued that clauses, too, can be referential expressions, and matrix declarative clauses in particular refer to truth values, which are their object-like referents. Sheehan & Hinzen show how this intuition can be naturalized on a grammatical path: Truth-asserting clauses involve V-to-C movement (movement of the verb to the clausal edge) either overtly or covertly, the exact clausal equivalent of nominals that have moved to D. Their account is argued to also explain why, in a language like English, if we are to make an assertion (claim a truth value), the complementizer 'that' must be exactly as absent as the determiner 'the' must be in the nominal case when we are to refer to an object:

- (4) a. \*the Russell  
 b. \*that Russell is a philosopher<sup>28</sup>

The reason is that for the truth-denoting reading to be derived, the verb must move to the position of the complementizer, which means that the latter cannot also be present. For empirical evidence for overt/covert V-to-C movement in a range of languages, the clausal equivalent of N-to-D movement, see Sheehan & Hinzen 2011, Hinzen & Sheehan 2013: Ch. 4).

This account reinforces Longobardi's point that reference is regulated *topologically* (and hence grammatically) rather than lexically, for the way it comes about is even independent of the lexical category (noun or verb) involved. This suggests a generalisation of the D+NP scheme above to that of a general unit of referentiality in grammar, of the form <edge, interior>, with a broad division of function: <reference, description>; the edge involves reference-regulating elements like determiners in the nominal case and complementizers in the clausal case, while the interior involves the lexical description of the referent that such units can be used to refer to.

As for embedded clauses, they can be either fact or proposition-referring (factive or non-factive). Canonically factive clauses, in particular, represent the case of a referential in an embedded position, where the complementizer is obligatorily present exactly as 'the' is in the case of nominals, if the reading is to

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<sup>28</sup> The reading that 'that' is a demonstrative determiner here (as in 'that Russell-chap annoyed me') is not intended and irrelevant.

be definite:

- (5) a. \*(the) man  
b. I resent \*(that) John left.

In canonically intensional (proposition-denoting) embedded clauses, by contrast, where the proposition is not yet evaluated for truth or falsehood, the complementizer tends to be optional:

- (6) a. I saw (some) men.  
b. I believe (that) John left.

The proposal also features intermediate phenomena such as ‘slifted’ clauses, as in *Russell is a philosopher, I believe*, where the fronted clause is genuinely asserted, and the complementizer is obligatorily absent, as predicted, and where a canonically factive verbs cannot be employed, given that factive clause, on this account, are not asserted (truth-referring), but fact-referential:

- (7) a. (\*That) Russell is a philosopher, I believe.  
b. \*Russell is a philosopher, I resent.

Not only object-reference is regulated topologically, then, but truth, fact, and proposition-reference as well. If so, the entire formal ontology of semantics falls into place as grammatical complexity is built up, unit by unit, with each corresponding to a Chomskyan ‘phase’ of the derivation. The formal ontology of meaning co-varies with grammar, not with non-grammatical factors, and hence this formal ontology is indeed an aspect of grammatical meaning in our sense.

### 13. Truth

No account of thought can be that: an account of thought, without it being an account of the *content* of thought. This is how the term, as an object of study, has been traditionally defined: As Frege put it, ‘I call a thought something for which the question of truth arises’ (Frege 1918–19/1956: 292). Intrinsically associated with any thought in the present sense there is a condition under which it is true. If I utter ‘John left’, then, if John left, the sentence is automatically true. We therefore cannot here claim to naturalize thought (or derive our cognitive phenotype) from its grammatical nature, if the connection between the grammaticalization of our brain and truth in the traditional philosophical sense has not been made intelligible. How *can* an account that only talks about grammar also capture what is most characteristic and most mysterious about thought, namely its being true or false?

However, as this challenge is posed, it *presupposes* that truth is a semantic notion, and I have argued that, like reference and for the same reason, it is a grammatical one instead. However, let it be the case that truth indeed is a grammatical concept: Truth-bearing entities uniquely arise in specific grammatical patterns, and there is no other known process that leads to them. It may still

seem unclear, then, how ‘truth’ could still mean *truth*, i.e. the notion that it has meant in thousands of years of philosophical tradition in the West, where truth has been taken to be a ‘semantic’ or indeed metaphysical notion. Have we simply re-defined a concept?

The reason that we haven’t relates to the persistent failure, in the same thousands of years, to explicate the notion of truth in any terms that do not presuppose it and to tell, in substantive terms, what truth actually is. Compare the case of our notion of ‘water’. Here we can tell, in substantive and indeed scientific terms, what water is: H<sub>2</sub>O, it so happens. So-called ‘deflationists’ in the philosophy of truth have made it one of the axioms of their position that *no* such substantive account is possible in the case of truth: It lacks such a kind of content. But this is exactly what we *expect* if truth is a grammatical notion. As stated initially, grammar in general exactly *lacks* the kind of content that the deflationist claims truth lacks.

In this sense, Un-Cartesian Linguistics explains and vindicates deflationism. Deflationists have nonetheless given an account of truth, avoiding any substantivist specifications of its content. This account is that all we need to know, in order to know what truth means, is how the notion is used (Horwich 2010); and in particular, that it will be the case for any sentence not itself containing the lexical truth-predicate, like ‘John left’, that the following holds:

(8) ‘John left’ is true if and only if John left.

Some prefer a slightly different version, which we will not need to distinguish here:

(9) That John left is true if and only if John left.

These equivalences are indubitably true: They capture a crucial fact about the English sentence ‘John left’. Generalizing, we obtain the Equivalence Schema (ES); for any sentence S not containing itself the lexical truth predicate:

(10) ES: ‘S’ is true iff S  
That S is true iff S.

But *why* does ES hold, and why are the above sentences so indubitably true? Again we can now answer: *Because* truth is a grammatical concept. For what ES shows is that in the two assertions flanking the equivalence sign ‘iff’, one contains the lexical concept of truth, while the other does not. Yet they are equivalent. Hence the lexical truth predicate is not required to assert a truth. This we know independently: ‘John left’ is, if asserted, asserted to be *true*—and nothing else: It is not asserted to be likely, to be desirable, or to be believed, which are all logically possible but not grammatically possible options. This makes sense if truth is a grammatical concept, but belief or likelihood are not. Neither for belief nor for likelihood do equivalences like ES exist, in which these lexical semantic predicates are present on one side and absent on the other.

In fact, using the lexical truth predicate is felicitous only if an act of assertion has been configured *before*, in a purely grammatical way: We can assert

(re-confirm) *It's true that John left*, only if it was already asserted before that *John left*. Moreover, as already noted in passing, the addition of 'it's true' changes nothing in the content of the assertion of 'John left', or in that it was asserted: The grammatical process is already at its outer limits. In sum, while grammatical notions *can* be lexicalized—the words 'truth', 'reference', 'proposition', or 'identity' being examples—their lexical meaning is not where their secrets lie.

The ES thus again suggests what the Un-Cartesian program independently maintains: that truth is a grammatical notion. ES holds because the right hand side of the equivalence has the exact grammar to express truth configurationally or grammatically, while the left hand side does so additionally lexically. If truth as a concept cannot be grounded in any more fundamental notion, and ES is our key to what it means, and ES merely points us again to its grammatical nature, we cannot hope to illuminate truth in a way that goes *beyond* illuminating grammar. Grammar takes us to the limits of our conceptual scheme, and we cannot dig deeper. Beginning from sentence contents—propositions—we can move to evaluating these as true, and then we obtain what we call 'facts'. But nothing is more fundamental in our metaphysical scheme than facts: While a proposition evaluated as true is a fact, and facts in a sense are what makes propositions true, we cannot in turn ask what grounds a fact, or what makes a fact a fact. More fundamental than facts, things don't get.

The limits of grammar are the limits of thought in this sense. Thought begins from where there are concepts distinct from percepts. Unlike percepts, concepts are not stimulus-controlled, and they can be activated in the absence of online sensory processing of a stimulus for them, unlike percepts, except in the case of hallucinations. Precisely for that reason, the question of reference arises for concepts, but not for percepts. As we perceive, we do not also refer, and need not do so. For the same reason, with concepts, intensionality effects systematically arise. The object of reference does not prescribe how we describe it. For any referent, there is an infinite number of concepts under which it falls. Therefore, two concepts can be chosen to be the descriptors of an object of reference by different speakers, and it may not be clear to them that they are referring, under these descriptions, to the same object: an intensionality effect. The same can arise in a single speaker, like Lois Lane, who does not recognize that Clark Kent is Superman.

Intensionality effects are thus evidence that thought is indeed involved: Reference takes place under descriptions whose lexical contents are provided by concepts. The effects in question are the footprints of the concepts involved. But they crucially also show that concepts, where involved in an act of reference, *are* indeed connected to external referents, of which they are true in an objective manner. It is *because* two concepts can objectively co-refer to the same thing that we may use one without realizing that the other identifies the same thing. Without there being something like 'applying to the same thing' (objectively), there is no intensionality. Two concepts are 'different' with *respect* to a referent, which they both identify.

Concepts, reference, grammar, and intensionality, are all *correlative* in this sense. Objectivity and truth are *factored into* our use of concepts. No person applying a concept can fail to know that concepts can *fail* to apply: That applying

them to an object can be *false*, dependent on what the world is like, and not on what is believed or thought. To know that, a person needs to have a concept of world, and of truth, and of belief – distinguishing ‘I think’ from ‘he thinks’ and ‘it is true’. Such knowledge, the Un-Cartesian hypothesis maintains, depends on grammar, and it does not affect the *concepts* to which it applies when it is generated in a grammatical process. These merely internally anchor the system of thought that we come to use as grammar comes to be at our disposal.

#### 14. Conclusions

Grammar has been a domain of scientific inquiry for millennia, starting in Ancient India from the very onset of the scientific tradition in the Eastern world. In the most recent episode of universal grammar research, ‘syntax’ has been one particular choice of a theoretical abstraction with which to study this domain. The lenses with which we look at a domain, however, do not determine its ontological nature. In light of the explanatory task of telling where our system of thought, to the extent that it is *sapiens*-specific, comes from, the option should be explored that grammar is the path along which such a system can arise.

On this view, the grammaticalization of the *hominin* brain brought a new mode of thought into place. This is an empirical hypothesis refutable in at least two ways: (i) grammar might simply not be productively re-describable as a system governing how a thinking creature behaves; (ii) thought of the relevant kind and language might dissociate in our species or across species. With regards to (ii), this research program seeks to establish systematic links between specific linguistic profiles involving either lexical or grammatical changes, on the one hand, and particular changes in our cognitive phenotype, on the other (Hinzen & Sheehan 2013: Ch. 8, Hinzen & Schroeder 2014). As regards (i), the claim is that the organization of grammar systematically reflects the organization of *sapiens*-specific thought insofar as it is intentionally referential, with the formal ontology of thought arising as grammatical complexity is built.

It is not clear, in that case, what, when we are done with our description of the workings of grammar, is still left for a LOT to accomplish. Nor is there evidence that a system of thought of the same nature is available in a ‘semantic component’ that is architecturally separable from the grammatical process in which particular forms of grammatical meaning arise, and in particular the formal ontology of reference that is built up in it step by step. Formal-ontological distinctions do not appear to be independent features of the external world to which we use grammar to refer: They are distinctions arising at the level of how we decide to refer to the world, choosing both a concept and a way of carving out the formal ontology of reference. Formal-ontological distinctions like that between an object or an event, or an event and a proposition, do not track what aspects of our experience or the external world are independently given. Nothing ‘semantic’ determines this choice, either: It is a grammatical choice, existing where grammar does, availing us of a number of discrete ways of referring to the world. Qua persons, we are also endowed with a first-person perspective, but correlatively with that, a notion of the second person and the ‘third’ person as

well, or the objective world as such. If form and content, or syntax and semantics, are separated architecturally, then the question of the existence of grammatical meaning that we have raised is begged: It won't exist.

Un-Cartesian linguistics makes the claim that nothing else than grammatical organization is similarly well placed to explain the remarkable transition that has transformed the hominin mind when, after six million years of evolutionary experimentation with the genus *Homo*, our species suddenly appeared, changing the surface of the earth globally and in a remarkably short time. The same perspective may shed new linguistic light on a number of cognitive disorders in this species; as of now, the Un-Cartesian claim is that the organization of grammar systematically *reflects* the organization of a *sapiens*-specific mode of cognition. If so, this is to return a role to language that it has lost, but that could inspire philosophy as much as it could inspire linguistics, neurology, and psychiatry.

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