Human Nature and Grammar

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1. Introduction

Seeing human nature through the prism of grammar may seem rather unusual.[1] I will argue that this is a symptom for a *problem* – in both discussions of human nature and grammar: Neither the theory of grammar has properly placed its subject matter within the context of an inquiry into human nature and speciation, nor have discussions of human nature properly assessed the significance of grammar.[2]

In philosophy, the standard setting for such discussions in the last decades has been the philosophy of biology, where the search for a human nature is placed in the context of a discussion of 'sex and death'[3]: the vagaries of genetic reproduction under the ruthless regime of changing environments and natural selection. Discussions characteristically begin from a doubt as to whether human nature can be real – given an even more basic doubt, in a Neo-Darwinian context, of whether species are. If these reduce to mere variants, it is of their essence to change and for genetic and phenotypic variation among their members to exist, which is in turn a reflection of historical contingencies and the selection processes they trigger. Hull[4] concludes that if human nature denotes something real, it cannot be grounded in biology. Even if there *were* universally distributed traits in *Homo sapiens*, which he argues there aren't, it must be 'largely a matter of evolutionary happenstance'[5] which as

[1] Though see T. Roeper, *The Prism of Grammar* (Cambridge, MA: MIT Press, 2009).

[2] For exceptions to this generalization, apart from Roeper ibid., see W. Hinzen, *Mind Design and Minimal Syntax*, (Oxford: Oxford University Press, 2006) and N. Mukherji, *The Primacy of Grammar* (Cambridge, MA: MIT Press, 2010).

[3] K. Sterelny and P. E. Griffiths, 1999. *Sex and Death* (Chicago: University of Chicago Press, 1999).

[4] D. Hull, 'On Human Nature'. In Hull and Ruse (eds.) *The Philosophy of Biology* (Oxford: Oxford University Press, 1998).

[5] Ibid. 385.

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such can't have the metaphysical, ethical and epistemological significance that philosophers have taken human nature to have.

Another denial of human nature comes from the 'blank slate' conception of the human mind in the sense of Pinker,[6] which amounts to a rejection of 'innateness', a notion to which human nature has been closely linked in recent discussions. According to this conception and the radical empiricist tradition more generally, classically represented by Skinner,[7] biology has left the structure and contents of our minds largely unshaped. Internalist determinants are neglected in favour of external ones. In the limit, there is no relevant biological basis to the human mind at all. According to Rorty,[8] our minds are being left to the shaping influences of culture and historical-cultural contingency. Innateness is also often argued to be an inherently confused notion and not to fit with what has been called the 'interactionist consensus'[9] – the view that all traits arise from an interplay of genetic inheritance, ecological and epigenetic resources in a developing system.[10]

One can thus arrive at a rejection of human nature on various paths – Neo-Darwinian, empiricist, pragmatist or relativist. Whatever route we take, human nature comes out as historical, contingent, and variable. An innate 'Universal Grammar' (UG) is frequently denied on similar grounds, like the ubiquity of linguistic variation and the character of language as a socio-cultural construction, for which there is no linguistically specific biological basis.[11]

Where the notion of human nature has prominently survived in recent years, it is in the specific context of the evolutionary psychologist's take on the Neo-Darwinian synthesis. Here the claim is that our minds largely consist of dedicated functional 'modules' that are hardwired into the human brain as task-specific evolutionary

[6] S. Pinker, *The Blank Slate: The Modern Denial of Human Nature* (Harmondsworth: Penguin, 2003).

[7] B. F. Skinner, *Verbal Behavior* (New York: Appletonn-Century-Crofts, 1957).

[8] R. Rorty, 'The Priority of Democracy Over Philosophy. In A. R. Malachowski, (ed.) *Reading Rorty* (Oxford: Blackwell, 1990).

[9] K. Sterelny and P. E. Griffiths, 1999. *Sex and Death*, op. cit.

[10] P. E. Griffiths and E. Machery, 'Innateness, Canalisation and "Biologizing the Mind', *Philosophical Psychology* **21** (2008), 395–412.

[11] N. Evans, and J. Levinson, 'The Myth of Language Universals: Language Diversity and its Importance for Cognitive Science', *Behavioral and Brain Sciences* **32** (2009), 429–492; M. Christiansen, and N. Chater 'Language as Shaped by the Brain', *Behavioral and Brain Sciences* **31** (2008), 489–558; M. Tomasello, *Constructing a Language*. (Cambridge, MA: Harvard University Press, 2005).

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adaptations.[12] According to Pinker's[13] classical conception of the generative program in linguistics, grammar is one of these modules. But because it consists of arbitrary formal rules on this conception, its significance for human nature, general cognition, and human reason is unclear. In fact, the consistency of such a module with Darwinian evolutionary principles is often denied.[14]

As things stand, neither textbooks such as Sterelny and Griffiths[15] nor anthologies such as Hull and Ruse[16] or Rosenberg and Arp[17] thematize either human language or grammar in any essential way, despite a long tradition of biolinguistic inquiry in which a notion of human nature has been a central topic.[18] The philosophy of mind, similarly, remains focused on issues such as phenomenal experience, consciousness, and the Self, giving grammar no systematic status. Against this state of art I will here make a case that (Universal) grammar (UG) is (at least a crucial part) of the answer to the problem of human nature, and vice versa. In short, grammar is the essential science that needs to illuminate human nature, and human nature in turn is the central issue that needs to illuminate the theory of grammar. Neither the notions of innateness nor of essence or of modularity will centrally enter into this conception.

Section 2 makes two claims: firstly, the rejection of human nature in the paradigms mentioned above is ultimately based on what Chomsky[19] has called 'methodological dualism': it treats the study of human nature as different from the study of other aspects of nature. Given that such dualism is unjustifiable under naturalistic premises, the rejection in question is so as well. Secondly, such methodological dualism is notably absent in the early modern project of a

[12] S. Pinker, *How the Mind Works*. (New York: Norton, 1997).
[13] S. Pinker, *The Language Instinct* (Harmondsworth: Penguin, 1994).
[14] For example, Christiansen and Chater, op. cit.
[15] Op. cit.
[16] D. Hull and M. Ruse, (eds.) *The Philosophy of Biology* (Oxford: Oxford University Press,1998).
[17] A. Rosenberg, and R. Arp, *Philosophy of Biology* (Oxford: Wiley-Blackwell, 2010).
[18] N. Chomsky, *Aspects of the Theory of Syntax* (Cambridge, MA: MIT Press, 1965); N. Chomsky, *Cartesian Linguistics*, Third edition, ed. J. McGilvray (Cambridge: Cambridge University Press, 1966/2009); E. Lenneberg, *Biological Foundations of Language*, (New York: John Wiley & Sons, 1967); M. Piattelli-Palmarini, J. Uriagereka, and P. Salaburu 2009. *Of minds and language*. Oxford: Oxford University Press.
[19] N. Chomsky, *New Horizons in the Study of Language and Mind*. (Cambridge: Cambridge University Press, 2000).

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'natural philosophy', in which the notion of human nature was a central concept: the early modern naturalists used a uniform notion of naturalistic inquiry and engaged in no essentialist speculations. In Section 3 I argue that human nature needs to be illuminated through the theory of grammar, which arguably has identified a real singularity in nature. Nonetheless, as Section 4 argues, the uniform methodological naturalism propagated by Chomsky nonetheless falls short of an important dimension of the study of grammar, which precisely illuminates its epistemological and philosophical significance. Section 5 identifies this dimension as grammatical mediated forms of deictic reference, which I argue are a defining feature of the human mind, and around which grammar is organized. Section 6 summarizes the argument.

2. Methodological Dualism and the Rejection of Human Nature

The argument I want to consider in this section is that human nature is obsolete because, if it exists, it must be grounded in biology, and biology does not vindicate any such thing. Hence a human nature does not exist. This argument is carried out in the spirit of naturalism: we cannot ground human nature metaphysically, the idea is, so we have to do it on the basis of the results of science. But the traditional notion of human nature comes with pretensions to universality and essentiality, and biology, at least, bears no such thing out. This stance coheres with a vision of biology on which, as Mayr puts it, 'laws and experiments have no significant place in biology'[20], its methodology being that of 'historical reconstruction' and the testing of 'competing historical narratives'. In that case, biology has a special status among the sciences, and species including *Homo sapiens* cannot be studied in the same way as other objects of nature. They are essentially historical objects. The naturalistic stance then naturally entails that we need to apply a methodology to *Homo sapiens* that we would not apply to other aspects of physical nature. The methodology will be that of studying the contingent adaptive history of the hominid lineage.

But as Hinzen[21] points out, there is an alternative to this conception within biology itself, as is clear from an anti-Darwinian

[20] E. Mayr, 'Darwin's Influence on Modern Thought', *Scientific American* (July 2000), 80.

[21] W. Hinzen, *Mind Design and Minimalist Syntax*, op. cit.

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developmentalist undercurrent ever since the Darwinian revolution began. It assumed a more uniform notion of causal explanation even in the living realm and retained a focus on laws, as in the generic developmental laws of von Baer and Haeckel in the early and middle 19th century, or the earlier 19th century tradition of 'rational morphology'.[22] This tradition was centered on the question of the origin of order and form more than the vagaries of natural selection, which it does not see as a genuine source of evolutionary novelty, anticipating similar claims today.[23] In fact, all we need to counter the attack from historicity in the study of human nature is to follow Darwin himself in stressing that there are *two* (partially independent) laws of evolution: 'Unity of Type, and the Conditions of Existence.'[24] While the latter law is natural selection (and would eventually dominate the other in Darwin's own overall functionalist rather than structuralist vision[25], the former refers to *generative principles* that underlie the striking commonalities of structure and form found across wide ranges of animal phyla, quite independently of the habits of life involved.[26] As Darwin marveled, addressing the subject of 'Morphology':

> What can be more curious than that the hand of a man, formed for grasping, that of a mole for digging, the leg of the horse, the paddle of the porpoise, and the wing of the bat, should all constructed on the same pattern, and should include the same bones in the same relative proportions.[27]

The pre-Darwinian vision of organic forms as immutable natural forms or types that are not necessarily different in kind from inorganic ones and built into the general order of nature does not conflict

[22] S. J. Gould, *The Structure of Evolutionary Theory* (Cambridge, MA: Harvard University Press, 2002), ch. 4.

[23] S. A. Newman, and G. B. Müller, G. B. 1999. 'Morphological Evolution: Epigenetic Mechanisms'. In *Embryonic Encyclopedia of Life Sciences*. (London: Nature Publishing Group, 1999). Available at: http://www.els.net; G. Webster and B. Goodwin, *Form and Transformation: Generative and Relational Principles in Biology* (Cambridge: Cambridge University Press, 1996).

[24] C. Darwin, *On the Origin of Species by Means of Natural Selection* (Harmondsworth: Penguin, 1859/1968), 206.

[25] Gould, op. cit, ch. 4.

[26] R. Amundson, 'Two Concepts of Constraint', *Philosophy of Science* **61** (1994), 556–78; R. Amundson, 'Typology reconsidered', *Biology and Philosophy* **13** (1998) 153–77.

[27] Op. cit., 434.

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with an adaptationist outlook: clearly, the afunctional givens of physical law will necessarily *interact* with the conditions of historical circumstance. But we don't expect the latter to greatly distort the canalizing influence of physical law. Nor is this perspective in any way foreign to contemporary biology. As revitalized today within the Evo-Devo paradigm, the developmentalist tradition puts stress on 'physicochemical, topological, and biomechanical factors, as well as generic, stochastic and self-organizational properties of developing tissues' in development, viewed as factors independent of, though cooperating with, natural selection.[28] As Denton *et al*., put it:

> when deploying matter into complex structures in the subcellular realm the cell must necessarily make extensive use of natural forms (…) which like atoms or crystals self-organize under the direction of natural law into what are essentially 'pre-Darwinian' afunctional abstract molecular architectures in which adaptations are trivial secondary modifications of what are evidently primary givens of physics.[29]

In this way, some have seen Theodosius Dobzhansky's famous dictum that 'in biology, nothing makes sense except in the light of evolution' to stand on its ear: 'Evolution, it turns out, makes no sense except in the light of biology – developmental biology, to be precise'.[30]

Surveying this anti-Darwinian undercurrent in Hinzen[31] and its continuation today,[32] I argued that the tradition of Universal

[28] S. A. Newman, and G. B. Müller, G. B. 1999. 'Morphological Evolution: Epigenetic Mechanisms', op. cit., note 23; W. Arthur, 'The Emerging Conceptual Framework of Evolutionary Development Biology', *Nature* **415** (14 Feb. 2002), 757–64.

[29] M. J. Denton, P. K. Dearden, and S. J. Sowerby, 'Physical Law *Not Natural Selection* as the Major Determinant of Biological Complexity in the Subcellular Realm: New Support for the pre-Darwinian Conception of Evolution by Natural Law, *BioSystems* **71** (2003), 297–303. See also M. J. Denton, 'Laws of Form Revisited', *Nature* **410** (22 March 2001), 417.

[30] E. Pennisi, 'Evo-Devo Enthusiasts Get Down to Details', *Science* **298** (2002), 953–5.

[31] W. Hinzen, *Mind Design and Minimal Syntax*, op.cit., ch. 3. Also see: W. Hinzen, 'Spencerism and the Causal Theory of Reference' *Biology and Philosophy* **21** (2006), 71–94; and W. Hinzen, 'The Philosophical Significance of Universal Grammar', (*University of Durham*, Ms., 2011).

[32] See, for example: M. Pigliucci, and G.B. Müller (eds.) 2010. *Evolution: The Extended Synthesis* (Cambridge, MA: MIT Press, 2010); A. Wagner, *The Origins of Evolutionary Innovations* (Oxford: Oxford

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Grammar (UG) in the sense of Chomsky[33] could be construed in very similar terms, as an instance of the 'Unity of Type' applied to human linguistic diversity. It reflects an attempt to make language accessible as an object of scientific inquiry, regarding it as governed by universal natural laws, hence as rational in some way rather than arbitrary. Language becomes, as Chomsky[34] puts it, 'a real object of the natural world'. With language being so isolated in the biological world, exhibited in the human species alone, we would expect it to pose a formidable new challenge to biology – which it is the hope of the field of the field of biolinguistics to address – rather than to be merely answerable to particular established conceptions of what biology is supposed to be.

I will not return to this case here, but rather point out in what way it answers the challenge to human nature based on biology above. We will now say that this challenge consists in the imposition of a particular methodological constraint on the study of *Homo sapiens*: historical narrative is to be the appropriate method, which obviously is not applied to physical phenomena of other sorts. Whatever 'nature' humans come out to have, in that case, it is bound to come out as historically contingent and variable. But the imposition of this constraint is unwarranted. It applies a double standard in the study of nature, an instance of 'methodological dualism' in Chomsky's sense.

Such dualism is objectionable. While there can be no objection to applying different methodologies to the study of different objects, we cannot *start* from a certain metaphysical conception of what an object is like or how it is to be explained. We cannot, for example, as Descartes did, *start* from a conception of what a 'body' is and how its motions are to be explained, and on this basis rule out a priori scientific theories on which the world doesn't work that way. There cannot be, within naturalistic inquiry, an injunction against using

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University Press 2011); E. H. Davidson, and D. H. Erwin 2006. 'Gene Regulatory Networks and the Evolution of Animal Body Plans', *Science* **311** (10 February 2006), 796–800; M. Y. Sherman, 'Universal Genome in the Origin of Metazoa: Thoughts About Evolution', *Cell Cycle* **6** (2007), 1873–1877; and A. Bejan and J. H. Marden. 'Unifying Constructal Theory for Scale Effects in Running, Swimming and Flying', *The Journal of Experimental Biology* **209** (2006), 238–248.

[33] N. Chomsky, *Aspects of the Theory of Syntax* (Cambridge, MA: MIT Press, 1965).

[34] N. Chomsky, *The Minimalist Program* (Cambridge, MA: MIT Press, 1995), 11.

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any particular methodology: for such inquiry is to be judged by its fruits, and furthermore, only the inquiry itself will determine the ontology of the domain. To say that the human is historical and cultural and no methods from non-historical sciences can be applied to its study is to place a roadblock in the path of naturalistic inquiry. If an essentialist definition of 'biology' as a historical science is used to constrain such inquiry, the opponent of human nature thus falls prey to his own essentialist critique. It can of course turn out not to be fruitful to study language or the human mind 'as a natural object', in the sense above. But this is another matter and needs to be shown on other grounds.

Such double standards have been notably *absent* in how the study of human nature was conceived in the early days of modern science. The Enlightenment project of a 'Science of Man' was, as Tomaselli[35] summarizes, 'very broadly speaking, expected to provide a description of the nature and extent of human cognitive capacities, of the way the mind works, as well as afford an understanding of the processes by which human beings come to be the way they are, the manner by which they acquire their character and individuality, their tastes, desires and ends'. Hume's wording is often telling: '[M]an is a being, whom we know by experience, (…) and whose projects and inclinations have a certain connexion and coherence, according to the laws which nature has established for the government of such a creature.'[36] What these laws are is a subject matter of naturalistic inquiry.

It is particularly anachronistic to shoulder Hume's *Treatise of Human Nature* (1739–40) with a notion of human nature that is essentialist in character. The Science of Man was part of Galilean science, in which essences had long disappeared. The message of the *Saggiatore* (1623) had been that the task of science is to bring nature into a mathematical form, not to dig deeper into the 'true natures' of things and their ultimate rationales. This amounts to denouncing certain 'why'-questions. Post-Newtonian science would further abandon certain 'how'-questions as well, including the ideal of mechanical explanation. While Descartes had still upheld that ideal – final causes and occult forces were expelled from physical nature – by the end of the very century in which the 'mechanical

[35] S. Tomaselli, S. 1995. 'Human Nature'. In J. Yolton *et al*. (eds.), *The Blackwell Companion to the Enlightenment*. (Oxford: Blackwell, 1995), 229.

[36] D. Hume, *An Enquiry Concerning Human Understanding*, ed. L. A. Selby-Bigge, 3rd edn. rev. by P. H. Nidditch (Oxford: Clarendon Press, 1975), section XI:144).

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philosophy' was born, those non-mechanical forces of 'attraction and repulsion' were back on the scene.

The natural philosophers of the day seem to have largely acquiesced to this unexpected situation, and I will illustrate this briefly with Locke and Hume. Locke contended that although the mechanical philosophy had been shown wrong, it was nonetheless also clear, insofar as our understanding goes, that 'bodies can act on one another only through contact, since it is impossible for us to comprehend that a body can act on what it does not touch; for this would mean that it could cause an effect where it is not'.[37] Therefore, Newton's 'gravitation from matter to matter', though working in a way 'incomprehensible' to us, proves that God could do something that could neither be derived from our conception of body nor explained through our knowledge of matter. But if 'our comprehension is no measure for the power of God' and gravitation had proved mysterious yet natural, why couldn't God have superadded a faculty of thinking to matter as well?[38] After all, matter had ceased to be wholly 'material', as Leibniz notes.[39] Thus, if one were to continue to defend the Cartesian dualism of two substances, it had become pointless to insist on the 'immateriality' of the mental substance. The mind-body problem, therefore, becomes unformulable in its original form, as was widely concluded in the sciences of the day, particularly by Priestley.[40]

Hume articulates a skepticism not unlike Locke's: 'the powers and forces, by which [the course of nature] is governed, be wholly unknown to us'. We 'are ignorant (…) of the manner in which bodies operate on each other: Their force or energy is entirely incomprehensible.'[41] We are equally 'ignorant of the manner or force by which a mind, even the supreme mind, operates either on itself or on the body.'[42] It is a small surprise, then, to find that the 'Science of Man' was to be strictly *non*-metaphysical in character. Its only foundation could be careful 'experience and observation', and its

[37] Quoted in G. Leibniz, *Neue Abhandlungen über den menschlichen Verstand*. (Hamburg: Meiner, 1704/1996), 18, 23.

[38] J. W. Yolton, *Thinking Matter: Materialism in 18th-Century Britain* (Minneapolis: University of Minnesota Press, 1983).

[39] Op.cit, 20.

[40] N. Chomsky, *New Horizons in the Study of Language and Mind*, op. cit., 112–3.

[41] D. Hume, *An Enquiry Concerning Human Understanding*, ed. L. A. Selby-Bigge, 3rd edn. rev. by P. H. Nidditch (Oxford: Clarendon Press, 1975), section V, part II, §44, 54.

[42] Ibid., section VII, part I, §57, 72.

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objective to further knowledge was no more ambitious than that of 'natural philosophy': philosophy as an integral part of the sciences of the day.[43] The Science of Man thus did not aim at essences, its inability to 'explain ultimate principles' being a defect it shared with 'all the sciences'. The *anti*-foundationalism of the enterprise seems important and striking.[44]

There is, then, in early modern philosophy, a philosophical framework in place for the naturalistic study of human nature, which we find unaffected by the essentialism that mars the enterprise according to its contemporary critics. Naturalistic inquiry into human nature as conceived in this way will simply yield whatever results it may. Hume is now widely considered to be wrong in his conclusion that the laws governing our mind are the 'laws of association' applying to contiguous 'ideas',[45] showing that his science of human nature makes falsifiable empirical claims, but not that significant generalizations are not possible. In this light we might compare the widely entertained claim today that 'there is no human nature' to the claim, ahead of inquiry, that there are no general laws of animal locomotion, or that all we can do is catalogue diversity and construct adaptive histories in regards to the various ways in which animals have come to walk, fly, or swim. As it turns out, in this particular and striking case, there *are* laws and substantive generalizations to be had, across very different 'habits of life' and 'conditions of existence.'[46]

One could be *skeptical* about the science of human nature, in short, but this does not vitiate the enterprise. Many Enlightenment thinkers shared such skepticism, fearing that man might in the end turn out to be 'the plaything of time and historical circumstances.'[47] Thus, M. le Roi, in his *Encyclopédie* entry for 'Homme (morale)' (1765), despaired that man defied definition, and that human motivations were too diverse to fall into a pattern that would allow theoretical study. But such overwhelming human diversity was regarded as an essentially frustrating fact that appeared to render a certain theoretical project fruitless or unfeasible. It wouldn't render it illegitimate. It

[43] D. Hume, *A Treatise of Human Nature*, ed. L. A. Selby-Bigge, 2nd edn. (Oxford: Clarendon, 1978), xvii.

[44] See W. Hinzen, Mind Design and *Minimalist Syntqx*, op. cit., part 1.

[45] See, for example, S. Carey, *The Origins of Concepts* (Oxford: Oxford University Press, 2009).

[46] A. Bejan and J. H. Marden. 'Unifying Constructal Theory for Scale Effects in Running, Swimming and Flying', *The Journal of Experimental Biology* 209 (2006), 238–248.

[47] S. Tomaselli, 'Human Nature', op. cit, 232.

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did not point to another theory, based on some kind of new and historical conception of human nature, but to a theoretical defeat.[48]

As things stand, we are in the same situation today as was M. de Roi: we still do not know whether his particular skepticism is justified, which is the question that the current paradigm of 'Universal Moral Grammar' targets.[49] To conclude, ahead of such inquiry into our nature, that human nature is arbitrary rather than rational in some way and subject to substantive generalizations is to remain wedded to a metaphysical and essentialist conception of human nature that naturalistic inquiry of its nature does not support.

3. Grammar As Science and As Carving Nature At Its Joints

What then *are* relevant generalizations in the case of human nature, and from which specific science will they come? Relevant generalizations will not come from aspects of human beings that are not sapiens-specific and hence will not inform us about human nature specifically. It so happens, however, that while a UG in the distinctive sense of Pinker[50] is widely denied today, particularly in linguistic typology, it is *not* controversial that grammar is universal in human populations, pathologies aside. No human population without a grammatically structured linguistic medium of communication operative at a population level has ever been found. Cultural and technological innovations moreover, including writing, appear to leave our basic grammatical ability largely unaffected, allowing us to characterize all language families on the globe in essentially the same terms.[51] Assuming the current consensus in regards to the singularity of our species as originating in the same Sub-Saharan African population, and the dispersion of that species up to Australia until around 40,000 years ago, we may further assume that the language faculty

[48] W. Hinzen, *Minimalist Syntax*, op.cit., 10.

[49] J. Mikhail, *Elements of Moral Cognition: Rawls' Linguistic Analogy and the Cognitive Science of Moral and Legal Judgment* (Cambridge: Cambridge University Press, 2010).

[50] S. Pinker, *The Language Instinct*, op. cit.

[51] This generalization is crucially consistent with claims such as D.L. Everett's ('Cultural Constraints on Grammar and Cognition in Pirahã: Another Look at the Design Features of Human Language', *Current Anthropology* 46 (2005) 621–46), to the effect that some languages have some grammatical constructions that do not exhibit formal properties that the same constructions exhibit in other languages.

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had essentially genetically fixated at a species level by that time, and that it has not been subject to relevant change since.[52,53]

At the same time, there is strong evidence for the essential *absence* of meaningful grammar in non-human communication systems, crucially including the communications of the so-called 'language-trained' apes, which Tomasello[54] argues 'contain basically no relational or grammatical structuring of any kind'. It is a striking feature also of animal communication in the wild that the primitive elements of relevant call systems (present e.g. in monkeys but notably absent in the other great apes) make up a rigid and finite list, failing to combine in a meaningful way. Moreover, they appear to be largely indexical in character and to depend on the 'online' processing of a perceptual stimulus, the repeated occurrence of which they track for adaptive reasons.[55] The use of words is generally not indexical in this sense.[56] We systematically use words symbolically, as a reflection of 'offline' thinking in which the referent of the word is not present, words always have a grammatical category, and they tend to appear in the context of other words.

[52] T. J. Crow (ed.), *The Speciation of Modern Homo Sapiens* (Oxford: Oxford University Press, 2004).

[53] D. Dediu and D.L. Ladd ('Linguistic Tone is Related to the Population Frequency of the Adaptive Haplogroups of Two Brain Size Genes, ASPM and Microcephalin', *PNAS* 104 (2007), 10944–10949) present interesting evidence for a causal connection between genetic and linguistic diversity in regards to the acquisition of tonal contrasts in a language, suggesting some on-going gene-language co-evolution. Insofar as this co-evolution affects the phonological externalization of language rather than its syntax or semantics, it is perhaps quite expected, and it certainly does not disturb what has been called the 'psychic unity of mankind'.

[54] M. Tomasello, *The Origins of Human Communication* (Cambridge, MA: MIT Press, 2008), 249.

[55] See K. Zuberbühler ('Linguistic Prerequisites in the Primate Lineage. In M. Tallerman (ed.), *Language Origins* (Oxford: Oxford University Press, 2005)) for a discussion and careful qualifications of the claim that Campbell monkeys can process a combinatorial rule. Given relevant doubts even about the analogy between the relevant call and human words (D. Bickerton, *Adam's Tongue* (New York: Hill and Wang, 2009)), talk of a rule of 'modification' is tenuous. Semantic compositionality seems a long a way off.

[56] Interestingly, not even in the case of so-called 'indexicals' such as 'here', 'I', or 'now'. 'I', in particular, need not refer to the speaker, and 'here' need not refer to the place of utterance (P. Schlenker, 'A Plea for Monsters', *Linguistics and Philosophy* 26 (2003), 29–120).

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If grammar is universal in the species at a population level and at the same time marks a fundamental discontinuity with other species, it may well be a key to our problem. Moreover, it tells us that the relevant science telling us about human nature is not going to be biology but the science of grammar, which is not integrated with biology yet. Experiments on linguistic processing at the level of the brain, in particular, depend on a sound linguistic framework within which results are meaningfully interpretable.[57] This broad conclusion conflicts with the pre-theoretical view that grammar simply isn't a science but rather a social-normative convention which is arbitrary in character. A science of grammar, on the other hand, *has* been one of the first and longest-standing human speculative endeavours, even though the relevant history is somewhat scattered and the endeavour got re-started and re-invented several times. Grammar was conceived as a science in Classical India beginning around 2,500 years ago;[58] in the High Middle Ages in 13th century Europe;[59] in the Port Royal tradition in the 17th century;[60] and in Chomsky's uptake of this last tradition in the wake of the 'second' cognitive revolution in the 1950s.[61] Larson's *Grammar as Science*[62] is a notable contemporary introduction to grammatical theory written as an exercise in scientific theory construction.

If one doubts the science of grammar's successes and achievements or indeed its status as a science, we should, given the principles of naturalistic inquiry suggested above, resist making this verdict on the basis of some conceptual, metaphysical or a priori conception of what grammar *is*. Again, the character and ontology of a field of inquiry is only determined in the course of that inquiry. Rejecting grammar as a science and as the essential path to empirical generalizations and insights into human nature and specificity is no less an

[57] A. Moro, *The Boundaries of Babel* (Cambridge, MA: MIT Press, 2010); W. Hinzen and D. Poeppel, 'Semantics Between Cognitive Neuroscience and Linguistic Theory', *Journal of Cognitive Processes* (in press).

[58] B. K. Matilal, The Word and the World: India's Contribution to the Study of Language (Oxford: Oxford University Press, 1991).

[59] M. Covington, *Syntactic Theory in the High Middle Ages: Modistic Models of Sentence Structure* (Cambridge: Cambridge University Press, 2009).

[60] A. Arnauld and E. Lancelot, *Grammaire Générale et Raisonnée de Port-Royal*. (Paris, 1660/1966).

[61] N. Chomsky, *Aspects of the Theory of Syntax*, op. cit.

[62] R. K. Larson, *Grammar as Science*. (Cambridge, MA: MIT Press, 2010).

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instance of methodological dualism. Arguably, biology is no more fundamental as a science in regards to grammatical generalizations than physics was in relation to chemical ones in 19th century chemistry.[63] It is grammar, not biology, which, as of now, needs to yield the relevant generalizations, whatever we take the ultimate metaphysical nature of grammar to be. Whatever we choose as the subject matter of naturalistic inquiry, it has to be studied in its own terms and with whatever methodologies it requires.

In the rest of this section I would like to explore a different road, however, on which to see grammar not only as a science but indeed as 'carving nature at its joints': i.e., as isolating a real joint of nature, giving the human mind a proper place in the physical world. A recognizably modern human culture is essentially present in the Aurignacian revolution in Europe around 43–35,000 years ago, where, in a relatively sudden way, the archaeological record begins to show us evidence of symbolic representation, delicate engravings on bone and stone plaques, painted images, implements made of soft materials (bone, antler), needles, song and dance, music on bone flutes, fish hooks and net sinkers, serious hunting with darts, spears, bows, and arrows, and long-distance trade.[64] Perhaps the most crucial element of this sequence of innovative and essentially modern behaviours is symbolic representation as required for language. That element can arguably be backdated to around 70–80,000 years, given evidence especially from South-African findings.[65] This brings us closer to the origins of the speciation of modern *Homo sapiens* itself.[66] The apparent absence of symbolic representation before this time entails the absence of language in either the Neanderthal and the African precursors of *sapiens*, and would explain the sharply contrasting cultures (or lack of cultures) that we find in these species.[67]

[63] W.H. Brock, *The Fontana History of Chemistry* (London: Fontana, 1992).

[64] P. Mellars, 'The Impossible Coincidence: A Single-Species Model for the Origins of Modern Human Behavior in Europe', *Evol. Anthropo* **14** (2005), 12–276; R. Klein and B. Edgar, *The Dawn of Human Culture*, (New York: John Wiley and Sons, 2002).

[65] C. S. Henshilwood, 'Modern Humans and Symbolic Behaviour: Evidence from Blombos Cave, South Africa'. In G. Blundell (ed.) *Origins* (Cape Town: Double Storey, 2006).

[66] T. J. Crow (ed.), *The Speciation of Modern Homo Sapiens*, op. cit.

[67] This is not to say that Neanderthal did not *vocalize*, which is a different issue (for some evidence and discussion in regards to the FOXP2 gene see R. E. Green, *et al*. ('A Draft Sequence of the Neandertal Genome',

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With still some tens of thousands of years to go between the speciation of modern *Homo sapiens* between 200,000 and 150,000 years ago and the early African findings, moreover, it is a natural conclusion that this curious time lag, before we see novel cognitive abilities emerging as reflected in a very different culture, is explained by the need (and the initial lack) of a relevant external trigger: most plausibly, language.[68] Even apart from that, the terms describing the novel cognitive abilities often appear as linguistic categories in disguise. Thus the creativity in combining symbolic expressions itself is what grammar centrally represents. Grammatical structuring in a symbolic medium based on words correlates with a mode of thought that has unique features and entails the capacity to construct symbolic worlds and share them in a culture. In contradistinction to this perspective, Tomasello[69] argues that the key to the evolution of human linguistic communication is shared intentionality crucially viewed as non-linguistic and as based on the essential 'skill' of 'recursive mindreading'. A genetic change thus made us recursive mindreaders, and a more complex grammar was then needed to express it. Yet, where other minds are represented as thinking some particular thought, this would seem to require these representations to have certain inherent structural properties – like the occurrence of an (unendorsed or unasserted) proposition within another proposition, as in *[He believes [I am here]]* – which seem uniquely mapped from grammatical configurations instantiating the relevant recursions, however these are then pronounced. Moreover, evidence for higher-order intentionality in non-grammatical creatures is hard to come by, and there is considerable evidence of its absence.[70] If so, the radical restructuring of thought that we need to posit would not pre-date grammar. It is grammar.

I want to argue, then, that becoming human is reflected in a novel creativity and variability that hominid culture now comes to exhibit, with grammar-based symbolic articulation as a basis and as an external sign linked to some internal underlying system of thought that is

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Science **328** (2010), 710–722); S. Mithen, *The Singing Neanderthals* (London:Phoenix, 2006).

[68] I. Tattersall, 'A Putative Role for Language in the Origin of Human Consciousness'. In R. Larson *et al*. (eds.), *The Evolution of Human Language* (Cambridge: Cambridge University Press, 2010).

[69] M. Tomasello, *The Origins of Human Communication*, op. cit., 321.

[70] W. T. Fitch, *Language Evolution* (Cambridge: Cambridge University Press, 2010), section 4.11.

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expressed in it. Not only are there symbolic rather than merely indexical units now, but they can be string together with other symbols grammatically, yielding an endless array of new meanings in systematic ways, which the external environment only weakly controls. No such ability for generating new meanings productively is attested in bird song, despite its formal complexity, as it is not a system of symbolic reference in the same sense as language is.[71] It is also missing in musical cognition, which the Neanderthals may have had.[72] The emergence of a system of grammatical meaning in the hominid mind is thus a crucial dividing line, and reference is its crucial aspect.

Let us now go a step further and say, with Mukherji,[73] that a cognitive system is 'computational-representational' if it satisfies three essential criteria: it is symbolically articulated; it is unbounded, exhibiting discrete infinity or recursion; and it is only weakly controlled externally, making its operations largely stimulus-free. Mukherji argues that only a narrow set of systems satisfies these criteria apart from language, namely logic, arithmetic, and music. From these, both logic and arithmetic likely depend on language. As for music, it arguably not only exhibits recursion but also an internal organization into tones and melodies allowing for a notion of 'musical meaning' relevantly analogous to the notion of 'grammatical meaning' above, even if music is clearly not *referential* in the way that language is. As Bickerton[74] points out, systems sharing such crucial and unique properties could not plausibly each have had separate evolutionary histories. Let us therefore assume that they had a common origin in the human speciation event itself: Mukherji[75] calls them the 'hominid set'. Further evidence supporting this conclusion comes from the 'Musilanguage'-Hypothesis: the view, on one version of it, that the exact same computational system that is posited to underlie human language in recent Minimalist syntax[76] also underlies musical processing,[77] with the only difference between the two systems arising from the primitive elements that are combined.

[71] P. Marler, 2000. 'Origins of Music and Speech'. In N. Wallin, B. Merker, and S. Brown, (eds.), *The Origins of Music*, (Cambridge, MA: MIT Press, 2000).

[72] S. Mithen, *The Singing Neanderthals*, op. cit.

[73] N. Mukherji, *The Primacy of Grammar*,op.cit.

[74] D. Bickerton, *Adam's Tongue*, op. cit.

[75] N. Mukherji, *The Primacy of Grammar*, op. cit., 189.

[76] N. Chomsky, *The Minimalist Program*,op.cit.

[77] J. Katz, and D. Pesetsky 'The Recursive Syntax and Prosody of Tonal Music' (Ms., MIT, 2009).

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In the wake of the cognitive revolution we are accustomed to characterize such systems *computationally*, where we crucially not only mean by this that a computational model can be applied in studying them, but that the organism in question genuinely *performs* such computations. The distinction is needed since virtually any device, from stomachs to particle systems in physics to crystals to eco-systems can be *modeled* computationally, i.e. as a function from particular inputs to outputs. Theories characterizing the genesis of grammatical meanings computationally are therefore meant to apply to what the human brain actually does, in a way that theories modeling behaviour computationally *need* not do: indeed, using techniques such as electroencephalography (EEG) or magnetoencephalography (MEG) we can *see* the human brain performing such computations on a millisecond per millisecond basis. By contrast, we don't want to say that physical particles and eco-systems compute the differential equations that describe their behaviour.

We could, of course, decide that generative grammar as a theory of such computations in the brain should not be interpreted realistically either. This would be in a similar sense as when many prominent 19th century chemists maintained that their theories and generalizations should not be interpreted realistically, providing mere computing devices instead.[78] But it would be equally questionable, and it would be out of tune with actual linguistic practice, where a robust realist interpretation of theoretical generalizations is generally assumed today.

I will therefore assume that the scope of 'computational-representational' theories of mind is narrower than it might have been. Birdsong, as noted above, is not a reasonable instance, and similar doubts arise in many other cases of cognitive performance in non-human animals that have been described computationally, from insect navigation to the caching behaviour of scrub jays. Gallistel[79] makes a strong case on the basis of such abilities that the computational system characterized in linguistic theory is *not* a novelty arising with language. But with 'computational-representational' construed as above, the issue is open again, and doubts in fact arise from the very beginning. For example, are the primitive units of such non-human systems, which often causally co-vary with environmental

[78] W.H. Brock, *The Fontana History of Chemistry*, op. cit.

[79] C. R. Gallistel, 'The Foundational Abstractions'. In M. Piattelli-Palmarini, J. Uriagereka, and P. Salaburu (eds.), *Of Minds and Language*. (Oxford: Oxford University Press, 2009).

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variables, really like human concepts in the sense of the meanings that are expressed in symbols that are words? There also appears to be no analogue of grammatical meaning here in the sense above, an analogue of which arguably does exist in music, as noted.

What matters for present purposes is that if these doubts are justified, the range of computational systems in nature, as characterized by computational-representational theories of mind, is narrower than a general caution about the term 'computation' itself suggests. In essence it will be *confined* to the 'hominid set', as Mukherji[80] conjectures, which will thereby be established as a real joint of nature that is distinct and isolated from everything else. Here, and only here, will we have the relevant *independent* evidence – lacking in ants, bees, and jays (let alone particles and crystals) – that the relevant computations do indeed take place in the devices that are modeled by means of them. For there is, in this instance, a symbolic *culture* in which the creative use of the relevant computational abilities is externally attested. As Descartes[81] argued, symbolic expression in words is the best possible evidence for the presence of thought in an organism, for 'all men, the most stupid and the most foolish, those even deprived of the organs of speech, make use of signs' to express their thoughts, while non-human animals don't.

In summary, I have argued in this section that grammar is to be the science within which we need to place inquiries into the human, and that, as of now, no other science will do, taking the notion of human nature out of what I do not think is (as of now) its natural home: biology. Moreover, it appears that the theory of grammar, in isolating a specific computational system claimed to be instantiated in human brains, has isolated a system that is literally found nowhere else in nature except there, where it causes the sweep of cultural innovation that has marked out a modern human culture against all others ever since.

4. Language as a Natural and As a Rational Object

In Section 2 I suggested that methodological naturalism is an appropriate attitude from which to explore the notion of human nature today, that it has been practiced, with good results, in early modern 'natural philosophy', and that the rejection of human nature in the 20th century reflects a methodological dualism in regards to the

[80] N. Mukherji, *The Primacy of Grammar*, op. cit., ch. 7.
[81] R. Descartes, *Discours de la Méthode* (Paris: Vrin, 1637/1984).

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study of human nature, which naturalistic inquiry by its nature does not support. In Section 3 I have further argued that grammar is the essential key to the mystery of the 'human revolution' around 40,000 years ago, and that it should be regarded as a science interpreted realistically and in fact as isolating and targeting a joint of nature, defining our species and perhaps explaining its origins.[82] Notably, adaptationist considerations have not entered into how we arrived at these conclusions. Indeed the conclusion challenges such considerations, for the hominid set is a clear *discontinuity* in nature requiring a substantive account of speciation, for which traditional assumptions of gradualism and reproductive isolation provide no keys in this instance.[83]

In the remainder of this paper I will argue the following point. Although the attitude of methodological naturalism championed by Chomsky[84] is an essential step towards re-instigating the notion of human nature as a subject matter of scientific inquiry and as a central concept of philosophy, Chomsky's specific *take* on the study of 'language as a natural object'[85] has left its role in the genesis of our mind too underspecified in order for it to play the role in evolution that I am claiming it did. I will contend that more can be said in how exactly grammar is the motor behind the human revolution, and what it is about it that got things moving in human terms. It is in this regard that I think the theory of grammar should become more constrained by considerations of human speciation, rather than merely the other way round.

Generative grammar in the 20th century is born, of course, in a 'rationalist' spirit, as an instance of 'Cartesian linguistics' in the sense of Chomsky[86] and Arnauld and Lancelot.[87] Yet, it is actually quite unclear, in the way that grammar has factually come to be studied, what it is about it that is 'rational'. Chomsky, of course, has convinced many that grammar is a system of 'knowledge' (rather than, say, a mere skill or convention) that has a systematic and deductive structure to it that can only partially be acquired

[82] T. J. Crow, 'The "Big Bang" Theory of the Origin of Psychosis and the Faculty of Language', *Schizophrenia Research* **102** (2008), 31–52.

[83] T. J. Crow (ed.), *The Speciation of Modern Homo Sapiens*, op.cit.

[84] N. Chomsky, *New Horizons in the Study of Language and Mind*,op. cit.

[85] Cf. Ibid., ch. 5.

[86] N. Chomsky, *Cartesian Lingusitics*, op. cit.

[87] A. Arnauld and E. Lancelot, *Grammaire Générale et Raisonnée de Port-Royal*, op.cit.

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from perceptual data. From this we obtain a case for an 'innate language organ'. Yet, at least until the advent of linguistic Minimalism in syntactic theory in the 1990s,[88] if not beyond, this module was by and large described as a purely 'formal' system in the spirit of the 'autonomy of grammar', leaving a separate discipline of 'semantics' in charge of matters of 'content'. In one sense, the previous section supports such autonomy in strong and novel terms: the grammaticalization of the hominid brain goes along with the evolution of a new cognitive mode that is *sui generis*. Yet there is another and more traditional sense of autonomy, invoking the formal 'arbitrariness' of grammar: the lack of a functional or semantic motivation for its basic formal rules and elements.[89]

It is precisely that arbitrariness and formality that is plausibly to be blamed for the relative lack of interest in the theory of syntax in the philosophy of language, and the fact that grammar is not taught in philosophy departments. If meaning is the essential philosophical issue and syntax (or 'form') does not speak to it by the lights of the generative grammarians themselves, why bother? In fairness, it must be said that the cross-linguistic generalizations that the Government and Binding framework in generative linguistics unearthed[90] really *did* seem arbitrary rather than reflecting any principles of rationality, semantics, or logic. In contrast to phonological rules, which are grounded in phonetics, and semantic rules, which were meant to be grounded in the nature of some non-linguistic system of thought and else our relation to the world, constraints on syntactic well-formedness just didn't seem to make any deeper sense. In short, although linguists should not blamed for pursuing syntax independently. But, the fact remains that as grammar became autonomous, semantics and philosophical logic became autonomous as well, developing their own primitives (e.g., semantic types, possible worlds, etc.) and combinatorial operations (e.g., function application, abstraction, etc.), conceived as being independent from those of grammar.

[88] N. Chomsky, *The Minimalist Program*, op.cit.

[89] As re-stated in a recent editorial of the journal *Lingua*, the autonomy of grammar consists in the following claim: 'phonological and semantic rules can refer to syntactic information, but syntactic rules cannot refer to phonological or semantic information' (J. Rooryck, N. Smith, A. Liptak, and D. Blakemore (eds.). 'Editorial Introduction to Special Issue on Evans and Levinson's "The Myth of Language Universals"', *Lingua* **120**, 2655).

[90] L. Haegeman, *Introduction to Government and Binding Theory* (Oxford: Blackwell, 1994).

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This mutual autonomy prevails today and is reflected in textbooks in the philosophy of language, where meaning is primarily discussed in relation to *words* rather than grammar, and even more specifically in relation to words that are *names*, which seem to exhibit no inherent grammatical structure at all. This then raises a question about the meaning of *sentences*, which do not seem to be names. The principle of compositionality has been the traditional answer: quite simply, sentence meanings arise by 'composing' the meanings of words (or, in practice, by assigning some words a 'function' that maps the meanings of some words to that of the sentences whose meaning one wanted to explain). The relevant operations of composition, crucially, are *semantic* operations. In this sense, grammatical relations and operations essentially never enter into the genesis of linguistic meaning.

In syntax, in turn, semantics is not only not regarded as conditioning the grammar, but Chomsky[91] argues that the basic semantic notion of reference does not apply to natural language, making semantic theory, insofar as it is based on this notion, empirically empty. But no alternative theory of meaning is suggested, nor is there a principled account of what 'grammatical meaning' *is*, i.e. of how grammar, once it intrudes into the human brain in evolution or development, *affects* the organization of meaning. Indeed, one could view the Minimalist Program[92] as effectively pursuing the *opposite* research program: to keep syntax maximally minimal, generic, and free of meaning, reducing it in essence to the maximally simple combinatorial operation Merge, which can be applied to *any* discretely infinite system.[93]

Syntax so described is clearly not linguistically specific, however. Linguistic specificity is rather said to come from how this core generative system is embedded in two 'interface systems', namely sensory-motor systems (S-M) on the one side and 'conceptual-intentional' (C-I) systems on the other, with the latter regarded as primary over the former.[94] The C-I systems are taken to pre-date language in evolution and to condition the outputs of the narrow syntactic

[91] N. Chomsky, *New Horizons in the Study of Language and Mind*, op. cit.

[92] N. Chomsky, *The Minimalist Program*, op. cit.

[93] C. Boeckx, *Bare Syntax* (Oxford: Oxford University Press, 2008).

[94] N. Chomsky, 'Approaching UG from Below'. In U. Sauerland and H.-M. Gärtner, (eds.) *Interfaces + Recursion = Language? Chomsky's Minimalism and the view from syntax-semantics*, (Berlin, New York: Mouton de Gruyter, 2008).

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component through usability constraints. C-I is thus already there when recursion and grammar arrive. So they are not explained. And as recursion is described, it is unclear – and there is no account, except for commonly appealing to compositionality – of how grammatical meaning arises from whatever meanings or concepts are available pre-grammatically. In fact, there still *is* no real theory of grammatical meaning to be had: a principled idea of how the organization of meaning changes, when grammar intrudes. Perhaps the hope even is that it *doesn't* change.

Yet, linguistic specificity can hardly come from systems that are non-linguistically specific by definition.[95] Moreover, it seems implausible, in light of the substantive cognitive impoverishment we find in Neanderthals or chimpanzees, to suppose that the emergence of grammar will not systematically *affect* what meanings exist or what thoughts a creature can think, and hence substantially *re-organize* the C-I systems. It may even bring them into *place*, as Davidson[96] and Bickerton[97] argue. Indeed, the absence even of *concepts* in the non-human animal mind – given the need to keep these terminologically distinct from *classifications* and *categorizations* based on perceptual feature grouping – is a possibility that we cannot neglect. For any semantic entities that are inherently complex and structured, such as propositionally structured thoughts, this conclusion grows stronger, and it will be supported by evidence that non-human primates do not think propositionally.[98] While this evidence is controversial we can hardly claim that the chimpanzee thinks *all* the complex thoughts we think – refers to abstractions, ponders the truth, the causes of his being, etc. – while only a tragic sensory-motor deficit keeps him from speaking out loud. The deficit, no doubt – and no less than in the Neanderthal or *Homo Heidelbergensis* – is a cognitive (at least) *as much as* a sensory-motor one. So there must be a cut-off point where pre-linguistic meaning – whatever it may be, possibly only instinctually driven and perceptually based *categorization* – ceases and grammatical meaning begins. But the problem is that we simply do

[95] W. Hinzen, 'Minimalism'. In T. Fernando and R. Kempson, (eds.) *Handbook of Philosophy of Linguistics* (Elsevier, in press).

[96] D. Davidson, 'Rational Animals', *Dialectica* **36** (1982) 317–327.

[97] D. Bickerton, *Adam's Tongue*, op.cit.

[98] H. Terrace, 'Metacognition and the Evolution of Language', in H. Terrace and P. Metcalfe (eds.), *The Missing Link in Cognition* (Oxford: Oxford University Press, 2005); D. C. Penn, K. J. Holyoak, and D. J. Povinelli, 'Darwin's Mistake: Explaining the Discontinuity Between Human and Nonhuman Minds', *Behavioral and Brain Sciences* **31** (2008), 109–130.

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not have a conception of grammar that would speak to this question: of how we became rational, capable of generating meanings of a radically different kind.

As Leiss[99] argues, this predicament is rooted in the rationalism of generative grammar itself. For the grammarians of Port Royal, rational thought was essentially a given. It is structured by logic, and grammar is 'rational grammar' insofar as it *reflects* the logical structure of thought. Hence grammar is not *generative* of thought, but only *expressive* of it. Ipso facto, we lack a genuine (empirical, naturalistic) *theory* of thought, a theory of how it arises and why it takes the specific human format that it does. If language is merely a suitable device for *expressing* it, it won't provide the needed explanation. On the contrary, thought is today widely used to explain language. In order for language to serve its function of expressing thought, the idea is, it has to be of a certain kind. Therefore it exhibits the format it does.[100] Tomasello's approach is particularly telling in this regard (as we saw above), as is Christiansen and Chater's,[101] who point out:

> A standard assumption is that thought is largely prior to, and independent of, linguistic communication. Accordingly, fundamental properties of language, such as compositionality, function-argument structure, quantification, aspect, and modality, may arise from the structure of the thoughts language is required to express.

This stance however merely shifts the burden of explanation. The thought system that Christiansen and Chater appeal to is too linguistic in character to play the explanatory role that is here required of it. Essentially the entire semantic structure that is specifically expressed in human language sentences is presupposed, and regarded as something that is available prior to – and hence may explain – the evolution of the system that happens to come with the relevant meanings. There is no reason to deny that non-human animals have mental representations that can track environmental features and enter computations, in the 'broad' sense above. But these mental representations are not autonomously manipulable, they are surely not Nouns and Verbs, or subjects and predicates, and hence they are also not the kind of constituents that we need in order to obtain a propositional meaning. No

[99] E. Leiss, *Sprachphilosophie*. (Berlin:De Gruyter, 2009).

[100] R. Jackendoff, *Foundations of Language*, op. cit.; M. Tomasello, *The Origins of Human Communication*, op. cit.

[101] M. Christiansen, and N. Chater 2008 'Language as Shaped by the Brain', op. cit., 501.

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such meanings, to my knowledge, have been found in species communicating non-linguistically, and Davidson[102] gives a conceptual argument that they will not be: thinking propositionally requires a concept of intersubjective truth – an inkling that what we are thinking, if it has the right format, is true or false in some objective sense. But where this concept of truth would come from if not from sharing a language, is unclear. Indeed we see that where language is used but not shared, as in schizophrenia, the sense of truth is disturbed as well.

There is a motivation, therefore, for pursing the research program of systematically looking at grammar as a device for obtaining the very propositional forms of reference in question, as exhibited in any act of human (rational) language use. But this, as noted, is exactly not, it at first appears, what generative linguistic theory, which has expelled the notion of reference from the scope of its theorizing, can help us with: it has been characterized by an 'internalist' move that regards meaning, to the extent that it is addressed in this approach, as generated internal to the organism and as separate from the realm of reference and truth.[103] Coherent with this, Chomsky's line of thought in regards to language evolution in recent years has been that language first evolved internally, as a 'language of thought'. Only then the organism gradually adapted its articulatory system to the task of expressing this internal language and the meanings it generates. The way in which the syntactic system interfaces with thought is thus primary, while sensory-motor externalization is secondary, given externalization no constitutive role in the genesis of thought. Reference, however, including propositional forms of reference, is intuitively a 'public'-language phenomenon: we use *public* language symbols to reference an object for an interlocutor, and there is no reference in this sense in the privacy of our own minds. There is a question, therefore, how syntax as conceived in the internalist tradition will illuminate notions such as reference and truth.

A coherent reaction to this problem has been to precisely *eliminate* these notions from semantic theory, leaving them to the interaction of grammar post-grammatical cognitive systems.[104] In the concrete

[102] D. Davidson, 'Rational Animals',op. cit.

[103] W.Hinzen, *Mind Design and Minimal Syntax*, op. cit.; W. Hinzen, *An Essay on Naming and Truth* (Oxford: Oxford University Press, 2007).

[104] P. Pietroski, 'Meaning Before Truth'. In G. Peter and G. Preyer (eds.), *Contextualism in Philosophy*, (Oxford: Oxford University Press, 2005).

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formalization of Pietroski,[105] semantic theory specifically consists in a recursive and compositional specification of how predicates conjoin, where the meanings of such predicates are pre-linguistic 'concepts'. By conjoining predicates we get ever more restricted meanings, i.e. a situation that is described in ever more detail: a killing, say, that is done with pleasure, in the morning, by Tom, with a knife, etc. As Pietroski shows, we also get an account of quantification, and inference. But we will not get the kind of expression that we use in an act of singular reference, or in asserting something. We may have reasons to believe, however, that what *gives* us a sense of objectivity and truth *is* grammar, and that nothing else is known to give us that. In that case, the revolution that the intrusion of grammar into the hominid brain induced is undersold by an internalist stance in semantics. I will outline an argument that the grammar *is* an arbiter of reference in the final section.

For now we may summarize the situation as follows. Modern linguistic theory has followed a rationalist intuition: thought is universal and somehow just there ('innate', perhaps), with its rationality characterized by logic. Grammar, therefore, can only be 'rational' by aligning with logic. To the extent that it does not, it is an expressive tool that is simply deficient and arbitrary. This basic intuition gave rise to the 'rational grammars' of the 17th and 18th centuries. It came into disrepute in the early 19th century, however, when linguists aligned their discipline with psychology instead. The terms 'sentence' and 'judgement' could in this period be used virtually interchangeably.[106] By the end of the 19th century, on the other hand, *anti-psychologism* in logic as propagated by Bolzano, Frege, and Husserl had become increasingly established, giving rise to the logical analysis of the forms of judgement, irrespective of how human grammar happened to pattern cross-linguistically, which had become the main subject matter of linguistic theory. Half a century later, Chomsky would revive rationalist linguistics. Unlike early 19th century linguists, he did propagate a Universal Grammar. However, he not only strongly resisted the equation of the science of language and the science of thought – first articulated with remarkable clarity by Friedrich Max Mueller (1887/1909) – but he turned grammar into an autonomous 'module' consisting of functionally arbitrary and formally characterized algebraic rules.

[105] P. Pietroski, P. 2011.'Minimal Semantic Instructions'. In C. Boeckx (ed.). *The Oxford Handbook of Linguistic Minimalism* (Oxford:Oxford University Press, 2011).

[106] G. Graffi, *200 years of syntax*. (Amsterdam: John Benjamins, 2001).

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This is the very conception that, as embedded in the evolutionary context of adaptationist biology by Pinker,[107] draws the scorn of those theorists today who want to link grammar meaningfully to human thought and psychology,[108] leading to the crisis of UG today.

In this way, the task of theory of thought has remained – no account of the fundamental shift in our mode of thought is available, which I argue here is linked to the intrusion of grammar and via this linked to the cause of human speciation itself. As things stand, no such theory is forthcoming from within the theory of grammar either. Quite the contrary, if we follow Chomsky's deepest speculations within what has been called the 'Strong Minimalist Thesis',[109] language may be like a crystal: built from structurally simple, few, and elegant principles, rooted in natural law. There is no intrinsic connection between the internal structure of this crystal and its rational use. As Chomsky has once put it, the computational system of language could be just what it is now, yet used for purposes of locomotion.[110] In this way, the spirit of autonomy has lived on, and the Minimalist Program has driven the rationalist research program to an unsuspected peak.

5. How Grammar Might be Rational

I have argued that while it is coherent to study language as a 'real object of the natural world', the *kind* of natural object it has come out to be will not allow us to perceive grammar and human rationality as inherently linked – leaving the origins of a humanly unique format of thought opaque. In this final section I briefly indicate, based on longer elaborations made elsewher,[111] how I think this link can be re-instituted, leading to a theory of grammar as identical with a humanly specific mode of thought. Let us begin by not taking issue with – i.e., simply accept – the idea that humans and many

[107] S. Pinker, *The Language Instinct*, op. cit.

[108] R. Jackendoff, *Foundations of language*. op. cit.; N. Evans, and J. Levinson, 'The Myth of Language Universals: Language Diversity and its Importance for Cognitive Science', op. cit.; M. Christiansen, and N. Chater 'Language as Shaped by the Brain', op. cit.; M. Tomasello, *The Origins of Human Communication*, op. cit.

[109] W. Hinzen, *Mind Design and Minimal Syntax*, op. cit.

[110] N. Chomsky, *New Horizons in the Study of Language and Mind*, op. cit., 27.

[111] W. Hinzen, 'The Philosophical Significance of Universal Grammar', (*Ms*., University of Durham, 2011).

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non-human creatures share concepts. Crucially, then, these concepts cannot be the meanings of words. This is because every word has a formal syntactic category – it is a grammatical entity – and no concept has that. Since the grammatical category of a word systematically enters into its meaning, as we shall see shortly, it follows that whatever meanings concepts have will not exhaust the meanings of words. At this very junction, the question of which principled difference grammar makes to meaning can be usefully re-raised. For the difference between a word and a concept is the very difference between grammar and no grammar.

A crucial phenomenon to look at in this regard is category conversions in the many languages where these are possible, of which English is one. What is the difference in meaning between (1) and (2)?

(1) Mary's smile
(2) Mary smiles

In this example the two words *smile* and *smiles* access the same root concept in the human lexicon. Let us denote it, following philosophical convention, as the concept SMILE. Whatever it exactly means, we may assume it means something, and indeed the same thing in both expressions. In what way, then, do the two meanings of the two words also *differ* in meaning, given that they *do* so differ? The answer is that they differ in terms of the formal ontology they invoke, in the sense that in (1) it is a smile under an 'objectual' perspective that we refer to, while in (2) we do so under an 'eventive' perspective. One consequence of this is that, in the second case, what we are referring to is placed in time in relation to the point of speech (it is tensed), and that it is specified for Aspect (it is ongoing as the speech event takes place). Nothing like that happens in (1). Crucially, these differences in how we refer have nothing to do with 'semantic' reference. The external world doesn't determine whether we refer to it objectually or eventively. The situation of language use could be exactly the same, and yet we may use the nominal, or the verb. Nor does the *conceptual* system determine this, which as such cannot even make the relevant ontological distinction: for the distinction to become available, a decision on which word is chosen to express the concept has first to be made.

It wouldn't make sense, therefore, to explain the difference in the meaning of the two words in (1) and (2) by stipulating that they semantically refer to different objects: a certain object in the first, a certain event in the second. If we said that we would have to repeat the same stipulation for just about every conceptual root that can enter such conversions. The difference in question is not a difference

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in semantic reference, any more than it is one in conceptual content. It is a *grammatical* difference. Yet this doesn't mean it is meaningless. And therefore we need to find a different term to characterize it.

The term I have chosen is *deictic reference*. Deictic reference originates in pointing, which is not uniquely linguistic but sharply restricted when it is not: one cannot point to an event that happened yesterday with one's index finger, nor can one draw an interlocutor's attention to *the fact that p* or *p's being true*. Grammar is needed for all of these things, and in this sense, grammar is a *device of extended deixis*. It does not organize our *concepts* and the forms of 'semantic' reference they have (substantive lexical content), but it organizes the forms of deictic reference that are based on them.

This makes a common assumption stand on its head: grammar, on this common assumption, is there for *combining concepts*. If I am right, it essentially never does that. Combining the root concept SMILE with a verbalizing morpheme *v* to give us the verb *smiles* is not naturally described as combining two *concepts*. Quite the contrary, when we take a root out of the conceptual system, verbalize it, and then tense it, this does not reflect a process of combining concepts or predicates, but a process of progressively making a given concept *referentially more specific*, embedding it in time (and space): first it is specified to be ontologically an event, say, which as such is specified as extended in time and can then related to the speech event. Grammar, thus, describes a progression from concepts to acts of reference, not a mapping from concepts to concepts. No more descriptive or substantive conceptual content is added to a given concept when it becomes grammaticalized. What changes is not description but reference.

Once we look at grammar in this fashion – as a device for extensionalizing intensional (conceptual, predicative) information – we find the same phenomenon everywhere. Starting from a given concept, we can nominalise it and obtain, say, the word *wine*. By adding grammatical structure we can then expand to *bottles of wine*, then to *three bottles of wine*, then to *these three bottles of wine*. Then the expansion stops. With each step, nothing in the conceptual content or semantic reference of WINE changes. What changes is deictic reference, or the relating of a given predicative concept to a referent that falls under this concept, where the referent is always located at some distance to the deictic centre of the speaker: the Now, Here, and Self of speech. In the nominal case, only embedding or identifying a referent in *space* is an option, where the referent is deictically classified as being either first, second, or third person; in the verbal case, aspectual specification govern embedding in *time*; for embedding in *discourse*, a

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full clause is needed. With each addition of a functional element to a given conceptual root, (deictic) reference not only changes systematically, but reference becomes more specific and extensional. *These three bottles of wine* refers to three individual objects; *Three bottles of wine* refers to a set whose members are sets of bottles of wine with three members each; *Bottles of wine* refers to a larger set of which the previous is a (small) subset, yet all of whose members are bottles; *Wine* refers to a yet larger set which contains bottles and non-bottles alike.

Beyond characterizing grammatically mediated forms of reference broadly as deictic, we can more specifically distinguish three referential strategies: indefinite quantificational reference, as in *a man*; definite specific reference, as in definite descriptions such as *the man*; and 'rigid' or 'object' reference as in *Tom*. Sheehan and Hinzen[112] show, updating an account by Longobardi,[113] that the grammar is systematically sensitive to these three forms of reference and organizes them, and that the exact *same* three forms can be found in the case of the reference of clauses, yielding familiar distinctions among the ontology of the clause, as in referring to a mere *proposition*, to a *fact* (a proposition evaluated as true), or to a *truth*.

If so, and if the relevant grammatical generalizations hold cross-linguistically, grammar is the very mechanism behind the humanly specific forms of reference that there are, that are commonly assumed to be universal, and that describe the core elements of human rationality as philosophers have viewed them since antiquity. It does not give us concepts, but it allows us to put them to a referential use, in a communicative context in which both the concepts and the grammar are shared and the grammatical meanings encoded in the grammar can have some objectivity. In that case, there is nothing left for external and independent systems of 'thought' to explain, *beyond* supplying the concepts on which the grammatical engine feeds. Grammar is not now an arbitrary system or module, which is only contingently related to its use or to thought. It is the very basis of human rationality, and the cornerstone of our minds and nature.[114]

[112] W. Hinzen and M. Sheehan, 'Moving Towards the Edge', *Linguistic Analysis*, 2011(in press).

[113] G. Longobardi, G. 1994. 'Reference and Proper Names', *Linguistic Inquiry* **25** (1994), 609–665; G. Longobardi, 'Towards a Unified Grammar of Reference', *Zeitschrift für Sprachwissenschaft* **24** (2005), 5–44.

[114] The connection between the fragmentation of grammar and the breakdown of the deictic frame (and hence human reason) in Schizophrenia argued for by Crow (T. J. Crow, 'The "Big Bang" Theory

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6. Summary

Human nature has been standardly discarded on grounds of its inconsistency with biology, its epistemological dubiousness, and its putative metaphysical nature. Yet a methodological naturalism free of metaphysical prejudice should be allowed to be applied to the study of *Homo sapiens* as an object of nature as much as to any other object. Such a project has affinities with the efforts of early modern natural philosophers to pursue a Science of Man free of a metaphysical and scholastic heritage.

Unique and universal in humans is a grammatical way of structuralizing communicative signals. As this phenomenon has been subjected to naturalistic scrutiny, its features make it appear isolated in the biological world, yet as falling under one relatively well-defined natural type, a joint of nature. While this is in itself an interesting result, the generative program in linguistics has characterized its object of inquiry in a paradigmatically rationalist fashion that does not allow us to see its role in the genesis of human reason and our species itself. In that situation, a theory of the novel format of thought that supports the human revolution has escaped us, and a mechanism behind it is missing.

If am right, grammar is that mechanism, as grammar, accessing pre-human and pre-linguistic concepts, turns them into devices of reference in situations of communicative language use. Cross-linguistic research will need to reveal whether the basic forms of deictic reference in the sense above are indeed universal, and whether they are uniformly supported by the grammatical mechanisms in question.[115]

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of the Origin of Psychosis and the Faculty of Language', op. cit.) is a powerful further support for this conclusion, which came up during the Human Nature conference and which unfortunately I cannot go into here for reasons of space.

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