Lights and Shadows in the Evolution of Language

by Evelina Leivada & Ana M. Suárez

James Hurford's *Language in the Light of Evolution* two-volume project aims to bring together an up-to-date account of the synthesis of language in the light of evolution, going from meaningful mental representations, widespread in the animal kingdom, to the emergence of the first words and their grammatical combination. The then upcoming successor of volume I alongside with its contents is already sketched out in the preface of the first volume. The two parts are organized to cover different aspects of human language and its precursors, although the length of the second volume makes some degree of overlap unavoidable. Volume I deals with the content of meaning (i.e. semantics) and its interpersonal use (i.e. pragmatics), while volume II focuses on core notions of grammar and discusses the ins and outs of the evolution of language in a three-step travel: a first shared lexicon, a two-word stage, and grammaticalization procedures. Albeit their different objects of study, the two volumes complement each other and are unified under an evolutionary approach. It is worth mentioning for the sake of completeness that the duology could be a trilogy as Hurford notes in the preface of the volume II. Having covered the origins of meaning in volume I and the origins of grammar in volume II, the origins of speech (i.e. phonetics and phonology) should be addressed next. However, as Hurford notes, such accounts exist in the literature; among the most recent ones is Fitch (2010).

Starting off with *The Origins of Meaning*, the standard gradualist (neo-)Darwinian perspective through which Hurford approaches the topic of language origins is made explicit from the beginning. This contrasts with the relative lack of clarity when it comes to the linguistic framework against which the discussion unfolds — contrary to what happens in volume II, where Minimalism together with other frameworks (e.g., Construction Grammar, Formal Language Theory) is often put under (at times, comparative) scrutiny. Hurford frequently refers to

Tomasello's and Call's work in volume I; a fact that led to the claim that his linguistic stance is probably cognitivist (Edwardes 2009: 191). The Minimalist Program is not brought into the discussion up until chapter 8, and when this happens, the passage from pre-Minimalism days (before Chomsky 1995) to what Hurford refers to as the "current Chomskyan position […] that the only possibly distinctive property of the human language faculty in the narrow sense (i.e. not shared with either animal communication or with human non-linguistic cognition) is recursion" (p. 285) is mentioned only in passing.[1]

In the first part of volume I, Hurford presents the elements that comprise animal thought of the world when thought and perception was yet untrimmed by the need to communicate as humans do. Special emphasis is laid on defining concepts, also in terms of an evolutionary continuum: Proto-concepts were succeeded by pre-linguistic concepts which were followed by linguistic concepts (p. 12). Hurford's understanding of the term 'concept' is partly in line with Fodor's (1998) treatment of concepts as indicating subparts of states of mind. It is argued that Fodor sets five conditions for having concepts and Hurford embraces viewing concepts as (i) mental particulars, (ii) categories, (iii) compositional, and (iv) often learned. He claims that he parts company with Fodor only on the fifth requirement: (v) that concepts are public; "they're the sorts of things that lots of people can, and do, *share*" (Fodor 1998: 28). This deviance on the fifth condition is the result of Hurford talking about animal, pre-linguistic concepts that exist before communicative and social needs arise, whereas Fodor describes human, post-linguistic concepts. However there is some (yet not well known) degree of difference between what is ascribed to Fodor and what Fodor has really claimed. Therefore, Fodor and Hurford part company in point (iv) already, since Fodor does not assume concepts to be learned.

The first volume is a very welcome contribution in that it brings together various experimental findings that pertain to the evolution of animal (i.e. pre-linguistic) cognition. It surveys many aspects of non-human cognitive functions in a range of primates, but also other (marine) mammals and birds. It also touches upon a recently-evolved domain of cognition that has been argued to be unique to humans (Tulving 1999): episodic memory. Hurford rightly juxtaposes the argument for episodic memory being a uniquely human trait to experimental findings coming from a variety of (food-storing) species such as squirrels, American scrub jays, honeybees, and great apes. The conclusion he draws is that there is evidence from experiments with animal food-storing and neurophysiological studies of rat dreaming, for assuming a kind of episodic memory in non-humans that is less domain-general than the one humans have, but still one that could be viewed as a seed from which the human capacity evolved (p. 83).[2]

---

[1] Notice here that this is not the then current Chomskyan position (it is, in fact, Hauser *et al.*'s 2002) to the extent that Fitch *et al.* (2005), to whom Hurford makes no reference in the first volume, are more perspicuous than Hauser *et al.* on the possibility that the contents of the faculty of language in the narrow sense (FLN) are subject to empirical determination and FLN might turn out to be empty, resulting in a claim that only "language as a whole is unique to our species" (Fitch *et al.* 2005: 181).

[2] However, human episodic memory, although better than the one observed in other species, can be proven fairly poor. Hurford cites the case of eyewitness testimony (Wells & Olson 2003); more recent experiments suggest that poor performance might be attributed to episodic memory undergoing a reconsolidation process after recalling an event (Chan *et al.* 2009).

Discussing proto-propositions, Hurford argues against a drastic jump in the course of evolution and contrasts his view that animals are capable of having a proposition-like cognition with Dummett's (1993) view that animals show proto-thought but are not in a position to entertain propositions. Discussing numerical limits on the size of propositions (an issue re-introduced in volume II), Chomsky's distinction between competence and performance is introduced and an argument is made for memory limitations on the size of simple propositions being consistent with the generative stance that a predicate could potentially take an unlimited number of arguments. In this context, the limit of maximum four arguments per predicate is viewed as a matter of performance, since "U[niversal] G[rammar] imposes no constraint on the number of arguments a predicate may take" (p. 90). However first, performance-imposed restrictions are not necessarily UG-derived constraints and second, the 'maximum four arguments per predicate' constraint is not absolute. Consider (1), for example:

(1) X hit y with z at place p and time t.

In the second part of the first book, the focus is on communication which translates into interactions between animals of the same species, since when animals communicate with animals belonging to different species (e.g., the example of a shepherd whistling commands to a sheepdog that Hurford lists), this communication is not reciprocal in the sense that even if there is a response, this will be in a different code. Communicative acts in the systems of various primates are brought together in Hurford's review of a broad amount of literature in animal communication research which does justice to most current findings that primatology and biology report. Of course, evolution of such devices only makes sense if animals are biologically disposed to share information with their peers by communicating it to each other. The origins of this need to communicate are sketched out in relation to the phenomenon of niche-construction in biology — a correlation more developed in the last part of the second volume — which is argued to have facilitated rapid changes that in turn gave rise to new domains of social interaction and co-operation. The answer Hurford gives to the crucial question of why such a principle came to exist boils down to the aspect of the Darwinian theory that emphasizes the importance of selected traits being of some benefit to the individuals that make use of them. Hurford concludes the second part of this first volume by admitting that no single theory (such as Kin Selection or Sexual Selection) can on its own "adequately explain the unique human characteristic of freely giving information in such structurally complex ways as we do every day with language" (p. 333).

Maintaining the perspective on the "no fundamental difference" (Darwin 1871: 35) between non-humans' and humans' mental life, Hurford deals in *The Origins of Grammar* with the core components of language and the consequences of its breakthrough in communicating thoughts, putting in parallel alike communicative traits between both genera. Within the domain of what he calls pre-grammar, where he meticulously describes the disposition of rhythmic patterns in animal songs, he does not go past some cognitive factors, such as memory limitations constraining communication. He presents several striking

constants in the messages of other species, which resemble constraints one observes in human language: parallel chaffinch song has a median of seven apparent 'phrases'; bird songs are roughly the same length as typical spoken human sentences, between one and ten seconds. If humans also possess a limit on the *selected* arguments a predicate can take ('the magical number 4') — a fact to which he gave, probably for the first time in (bio)linguistic research, a psychological explanation (i.e. 'subitization', similar in monkeys and humans) — these computational limitations, Hurford argues, should not be bypassed in the acquisition and development of language; that is, they should not be regarded as a matter of performance, according to generative thinking, but comprised — from the very beginning — into what Chomsky (1965 *et seq.*) called 'competence'. Departing, thus, from the mainstream generative view, Hurford introduces the term 'competence-plus' with which he spans grammatical specifications (what *competence* stands for) and numerical constraints (the *plus*) into one: "[N]o organism learns or acquires competence immune from the quantitative constraints of its body" (p. 56); "the interaction happens not after competence has been formed, but while competence is being formed" (p. 247).[3] According to his view, the mechanisms constraining language processing are central to the human language faculty (UG+), and, accordingly, the human language faculty should not keep being considered "unaffected by such grammatically irrelevant conditions as memory limitations" (Chomsky 1965: 3) anymore. A different question is whether this *re*-orientation (the *plus*) on such linguistic presupposition (*competence*) will be included at some point in future linguistic research — and how so.

When it comes to the comparative issue of cognitive differences, the conviction with which in *The Origins of Meaning* non-human animals were endowed with concepts seems now diminished in *The Origins of Grammar* by an important factor: the enhancement of Thought. Hurford acknowledges that "those who deny that animals can have full concepts do have a point […]. There *is* a difference between pre-linguistic concepts, or proto-concepts, such as I have *freely postulated* in the earlier book, and fully-fledged human concepts" (p. 154, emphasis ours). The genuine 'feedback loop' which enriches in tandem language and thought proves to be a crucial reason for the terminological distinction. Hurford alludes to Sapir's (1921) and Bickerton's (2009) claims on the reciprocity between the 'instrument' and the 'product' or the 'species' and the 'niche' respectively in order to show that this view of the Language–Thought relationship can receive support by observing the parallels it has in other domains.

But what did exactly enable this very reciprocal relation? Hurford depicts some coherent scenarios on the matter. The public labeling of mental representations — our 'first shared lexicon' — was probably started up, according to his exercise of retrospection, by a three-step process: First, a hominin should have produced a random noise attempting to convey some idea; second, some hearer guessed from the context what idea was meant; and third, the random noise became arbitrarily associated with that idea. Subsequently, by a combination of

---

[3] Physical patterns/laws even precede living beings' nature, as it is put forward in Burge's theory of perceptual representation (2010: 521): "the rhythms of the environment are encoded in an organism's physical rhythms. Objective intunement precedes objective representation".

social ingredients, such as trust and cooperation, humans became to realize meaningful signals were advantageous, and a voluntary control over their use increased too. It is in this way that Hurford conceives Deacon's (2010) concept of *symbolic niche* as a point of no return towards our current complex languages. Nevertheless, there still is 'something' missing at a deeper level, which must have favored this new habitat: If we assume that only humans make use of a symbolic (triadic) communication and a developed thought, there must be an important *mental* transition between core cognitive levels,[4] a transition that did not occur in other animals which are also inhabitants of niches.[5]

Of course, this terminological issue has something to do with Hurford's adscription to the gradual continuity in syntactic evolution particularly, and in general animal cognition. He defends the continuum path from the 'one-word stage' to our current state of complex syntax, in the same way as he promoted in volume I the graduality of meaning in our wide animal kingdom. While pleading the case for an 'evolutionary journey', left-hemisphere specialization for auditory attention to conspecific calls links monkeys and humans in a thread of continuous evolution; by contrast, the same cannot be said regarding continuity from primate calls to words, where facts go against a straightforward continuity: "[T]here is no inconsistency in arguing for (1) continuity in production of simple calls and auditory attention to the calls of conspecifics, and (2) discontinuity in vocal learning and in production of complex signals" (p. 111). However, the underlying mechanisms which triggered both processes were essential for human spoken languages to develop; what is more, appealing to the lowest common denominator — i.e. 'voicing' — would include not only primates, but all mammals (Tallerman 2011: 486).

Once the symbolic niche was settled, speech began to evolve. Going through several sections about common properties of languages, anthropology, particularities in syntax, and genotype changes, Hurford reaches a primitive linguistic stage where units had "an internal coherence distinguishing them from any kind of looser discourse-level organization. At its simplest, this coherence is marked by pauses at the boundaries of the units" (p. 608). In Bickerton's view of protolanguage, many two-word utterances at that stage should have contained words denoting actions and objects, although non-syntactically determined. Hurford explains this phenomenon in pragmatic terms, namely, the bipartite organization responds to a distinction between 'constant' (what you are talking about: topic) and 'changing' (new information: comment); moreover, if a single word is not enough to identify the topic, another object-denoting word may be placed together (and will eventually become an adjective, if grammaticalized).

---

[4]   This alludes to cognitive levels such as perception, conceptual spaces, propositional thought, (core) knowledge, etc., which imply computation and mental representations. If there was a significant change, one might legitimately wonder from where to where exactly this transition took place. Moreover, if non-human animals possess all the mentioned representational 'stages' in a primitive (/proto-)way, what is the nature of the spark that made humans, but no other animals, evolve in particular way, given that non-human animals form their own niches as well?

[5]   By way of illustration: "If we do not rule by fiat that the term *concept* be reserved only for linguistic creatures such as adult humans, the categories in terms of which an animal segregates its experiences can reasonably be called *proto-concepts* at least" (Hurford 2011: 371).

In an insightful link in volume I, Hurford puts forward the connection between the ventral and dorsal neural pathways, and predicate–argument structure respectively (a connection already suggested by Jackendoff & Landau 1992: 121–123). In a nutshell, the dorsal pathway ('where-stream') is said to identify the location of an object; the ventral pathway ('what-stream') gives all the properties necessary to identify it. External objects delivered by the dorsal stream are given individual variables (x, y, z); categorical judgments about objects' properties are delivered by the ventral stream and considered predicates (red, *cat*, *Mary*). Additionally, two types of psychological attention take part in this process: global attention delivers one-place judgments about the whole scene, while local attention delivers one-place judgments about the objects within each scene; the two processes, global and local, operate in parallel. The notation Hurford proposes follows that of the Discourse Representation Theory (Kamp & Reyle 1993) regarding the use of boxes; he depicts each one containing the conflated information of both the dorsal and the ventral stream through the two attentional processes; e.g., FLY-SMALL (local attention), or FLY FLY-SMALL (global and local). However, the public arrangement of this bipartite information is not developed any further in neuroanatomical terms but in linguistic ones and the neural streams make way for pragmatic distinctions. Despite this, recent parallel research indirectly underpin this interdisciplinary enterprise of Hurford's, whose importance lies in the appealing connection between neuroanatomy, cognition, and language. The set of linkages that the Complex Systems Theory proposes allows envisaging a primitive mechanism of this word-word coherent association; as Solé (2005: 289) argues, "two words will be linked if they share at least one object of reference". Similarly, in the field of semantics, Pietroski (to appear) advocates that phrasal meanings are instructions for how to build concepts; in his view, for instance, the lexical expression *brown cow* assembles the concepts BROWN and COW to form the monadic concept BROWN-COW (i.e. no brown cows can be thought as not being cows). Solé's and Pietroski's associations seem to resemble Hurford's neural linkage, and their two-word/concept conjunction susceptible of being originally identified by the dorsal pathway (which would be tracking one object, assigned a variable x), and categorized twice by the ventral pathway — according to his view. In this sense, the external shape may be somehow mirroring the internal one, or following similar (neurological) principles; a subtle issue, that Hurford has preferred not to go into in volume II.

In an overall assessment and comparison of both volumes, the first one deals with issues on the evolution of communication in a somewhat clearer manner than the second one deals with aspects of grammar again in the light of evolution. This could be partly due to the size of the second volume — which at times makes it hard to retain the kind of thematic continuity that one enjoys throughout the first volume — and partly due to the fact that the first volume is more succinct in placing the discussion of whatever notions unwoven in the appropriate (i.e. as informative as possible) perspective through forming fruitful connections with a broad amount of literature from primatology, neuroscience, philosophy, and linguistics.

The second volume is slightly lacking in this respect; consider, for instance, the argument about non-compositionality in complex signs in animal communi-

cation: Hurford correctly points out that the syntax of these sequences is not semantically compositional, however this claim should ideally be connected to *pre*-existing related claims (e.g., Mirolli & Nolfi 2010, Byrd & Mintz 2010) that one finds in the literature on this topic. Another reason that the first volume is more coherent and overall making a more significant contribution is that the content of this volume (i.e. the evolution of semantics and pragmatics) offers fertile ground for identifying parallels of (sub-aspects of) key functions of human cognition in the cognitive systems of other species, therefore it nicely supports an argument against a drastic, single-step advancement in the course of evolution. On the contrary, the subject matter of the second volume is the evolution of grammar. Once the point of inquiry shifts from semantics and pragmatics to syntax, the task of finding the relevant parallels in other species that would allude to the gradual character of evolution becomes more burdensome because it is precisely in this level of linguistic analysis that humans differ greatly from other species (take, for instance, the ability to — compositionally and hierarchically — combine lexicalized concepts into larger sequences).

The aforementioned concerns notwithstanding, Hurford's duology provides in its totality one of the broadest syntheses of a variety of topics in the area of the evolution of communication and grammar in humans. As such, this work is of great interest especially to those who wish to acquire a background in biolinguistics that is truly interdisciplinarily informed by recent developments in many interfacing fields.

References

Bickerton, Derek. 2009. *Adam's Tongue: How Humans Made Language, How Language Made Humans*. New York: Hill and Wang.

Burge, Tyler. 2010. *Origins of Objectivity*. Oxford: Oxford University Press.

Byrd, Dani & Toben H. Mintz. 2010. *Discovering Speech, Words, and Mind*. Malden, MA: Wiley-Blackwell.

Chan, Jason C. K., Ayanna K. Thomas & John B. Bulevich. 2009. Recalling a witnessed event increases eyewitness suggestibility: The reversed testing effect. *Psychological Science* 20, 66–73.

Chomsky, Noam. 1965. *Aspects of the Theory of Syntax*. Cambridge, MA: MIT Press.

Chomsky, Noam. 1995. *The Minimalist Program*. Cambridge, MA: MIT Press.

Darwin, Charles. 1871 [1981]. *The Descent of Man*. Princeton, NJ: Princeton University Press.

Deacon, Terrence W. 2010. On the human: Rethinking the natural selection of human language. *On the Human*. [Online forum provided by the National Humanities Center at http://onthehuman.org/2010/02/on-the-human-rethinking-the-natural-selection-of-human-language.]

Dummett, Michael E. A. 1993. *The Origins of Analytical Philosophy*. London: Duckworth.

Edwardes, Martin. 2009. A Darwinian approach to meaning. *Journal of Evolutionary Psychology* 7, 191–194.

Fitch, W. Tecumseh. 2010. *The Evolution of Language*. Cambridge: Cambridge University Press.

Fitch, W. Tecumseh, Marc D. Hauser & Noam Chomsky. 2005. The evolution of the language faculty: Clarifications and implications. *Cognition* 97, 179–210.

Fodor, Jerry A. 1998. *Concepts: Where Cognitive Science Went Wrong*. Oxford: Clarendon Press.

Hauser, Marc D., Noam Chomsky & W. Tecumseh Fitch. 2002. The faculty of language: What is it, who has it, and how did it evolve? *Science* 298, 1569–1579.

Hurford, James R. 2011. The origins of meaning. In Maggie Tallerman & Kathleen R. Gibson (eds.), *The Oxford Handbook of Language Evolution*, 370–381. Oxford: Oxford University Press.

Jackendoff, Ray & Barbara Landau. 1992. Spatial language and spatial cognition. In Ray Jackendoff, *Languages of the Mind*, 99–124. Cambridge, MA: MIT Press.

Kamp, Hans & Uwe Reyle. 1993. *From Discourse to Logic: Introduction to Model-theoretic Semantics of Natural Language, Formal Logic and Discourse Representation Theory*. Dordrecht: Kluwer.

Mirolli, Marco & Stefano Nolfi. 2010. Evolving communication in embodied agents: Theory, methods, and evaluation. In Stefano Nolfi & Marco Mirolli (eds.), *Evolution of Communication and Language in Embodied Agents*, 105–122. Berlin: Springer.

Pietroski, Paul M. To appear. *Semantics without Truth Values*. Oxford: Oxford University Press.

Sapir, Edward. 1921. *Language: An Introduction to the Study of Speech*. New York: Harcourt, Brace & Co.

Solé, Ricard. 2005. Syntax for free? *Nature* 434, 289.

Tallerman, Maggie. 2011. Protolanguage. In Maggie Tallerman & Kathleen R. Gibson (eds.), *The Oxford Handbook of Language Evolution*, 479–491. Oxford: Oxford University Press.

Tulving, Endel. 1999. Episodic vs semantic memory. In Robert A. Wilson & Frank C. Keil (eds.), *The MIT Encyclopedia of the Cognitive Sciences*, 278–280. Cambridge, MA: MIT Press.

Wells, Garry L. & Elizabeth A. Olson. 2003. Eyewitness testimony. *Annual Review of Psychology* 54, 277–295.

Evelina Leivada   *Ana M. Suárez*
Universitat de Barcelona   *Universidad Autónoma de Madrid*
Department of Linguistics   *Department of Linguistics*
Gran Via de les Corts Catalanes, 585   *Francisco Tomás y Valiente, 1*
08007 Barcelona   *28049 Madrid*
Spain   *Spain*
evelina@biolinguistics.eu   *am.suarez@uam.es*