**teorema**
Vol. XXX/3, 2011, pp. 149-154
ISSN: 0210-1602
[BIBLID 0210-1602 (2011) 30:3; pp. 149-154]

# The Descent of Meaning: Three Partially Converging Views

Ana M. Suárez and Cedric Boeckx

*The Origins of Meaning: Language in the Light of Evolution*, by JAMES R. HURFORD, OXFORD, OXFORD UNIVERSITY PRESS, 2007, pp. 352, £ 32.00.

*The Origin of Concepts*, by SUSAN CAREY, NEW YORK AND OXFORD, OXFORD UNIVERSITY PRESS, 2009, pp. 608, £ 32.50.

*Origins of Objectivity*, by TYLER BURGE, OXFORD, OXFORD UNIVERSITY PRESS, 2010, pp. 656, £75, pb. £ 25.00.

It was to be expected, indeed it was virtually inevitable: the grand celebrations surrounding the 200th anniversary of Darwin's birth and the 150th anniversary of the publication of the *Origin of Species* in 2010 saw the release of several books examining the possible roots of human language. In this note we review three such works, *The Origins of Meaning* [Hurford (2007)], *The Origin of Concepts* [Carey (2009)], and *Origins of Objectivity* [Burge (2010)], the three of which have the word 'origin' in the title, and draw some conclusions regarding the prospects of this kind of inquiry.

Though written from different perspectives, the three books under review focus on the cognitive origins of (mostly semantic) aspects of language, and adhere to Darwin's central thesis regarding human psychology (/cognitive biology): "there is no fundamental difference between man and the higher mammals in their mental faculties" [Darwin (1871), p. 35]. The three books provide good reasons to believe that any difference between the human and non-human mind is just a matter of 'degree', not of kind; and they all share the purpose of shedding light on what the (primitive) mental faculties might be that we inherited from other animals via evolutionary descent and that today constitute the basis of our mental life. They also have a common problem, which we touch on at the end.

The backdrop that the three books share is straightforward: we can only believe in the existence of cognitive primitives (*meaning*, *concepts*, *objectivity*)

and productively study them if we really accept a natural evolutionary approach to them. As T. Dobzhansky once famously put it, "nothing in biology makes sense except in the light of evolution". This premise – Darwin's lesson – forces us to recognize that animals have rich mental lifes, even if they do not talk about it. Experimental evidence with animals is one of the core strategies of these investigations. Trials are tested on infants as well, who show similar behaviour regarding the elementary tools that enter into cognitive faculties. As an example, Hurford depicts some experiments showing that non-human creatures possess semantic universals such as 'oppositeness', 'sameness', when trained in reversal learning tasks: i.e., an animal is first trained to associate one stimulus with a reward, and another stimulus with lack of reward. The animal has to unlearn the old association, and learn just the opposite one; if the animal is able to quickly reverse its associations, it appears to be that it has some kind of (abstract) concept of 'oppositeness'.

Similarly, Carey focuses on the behaviour of infants, applying mostly techniques of violation-of-expectancy and looking-time methods, in order to explain, for instance, *concepts* such as 'object permanence'; in these trials, two-month infants look longer to the unexpected result when a unique ball is hidden behind an ocluder and when this it is raised, two balls – instead of one – appear.

Burge provides a more philosophical perspective, but he too pays serious attention to experimental evidence, something that remains quite rare in philosophical circles focusing on language.

Although belonging to different disciplines (linguistics, psychology and philosophy), these three works provide superb examples of interdisciplinarity. Hurford in particular seeks to build bridges between well-established mental representations in humans and those found in non-linguistic creatures. In so doing he proposes interesting connections between ventral and dorsal pathways of neural systems and phrase structure,[1] as well as suggesting episodic memory and global attention as the precursors of syntax (/sequencing) and argument structure (/tracking participants and categorizing scenes), respectively. This comparative research dovetails well with Hauser, Chomsky and Fitch's (2002) explicit proposal of facilitating, by identifying points of contact and agreement between the fields, an interdisciplinary dialogue in order to shed light on the origin of human language.

Among the computational primitives widespread in the animal kingdom, there is agreement on many things, perhaps most clearly on those concerning numerical representations. There are two evolutionarily ancient and independent systems over which languageless creatures (non human animals/human babies) seem to operate: i) one in which number is encoded by an analog magnitude proportional to the number of objects displayed (the *analog magnitude* system, [Carey (2009), p. 118]); ii) another which includes a symbol for each individual, but whose capacity is limited to four items in adults, three in babies (the *parallel individuation* system [Carey (2009), p. 137], also better

known as *subitizing* [Kaufman (1949)]). The former consists of explicit symbols of approximate values of sets: the symbol for 3 (———) contains the symbol for 2 (——); it is available at least by 7 months of age; and it abstracts away from properties of individuals. The latter, by contrast, is not estimative; it includes a symbol for each individual in the set; and it tracks not only particulars but also their attributes [Burge (2010), p. 490]. Its primitive limit of about four is found in non human animals (monkeys, dogs) too. The same results are shown in the visual cognition field. As has been reported by Pylyshyn (2000), people can successfully keep track of a maximum of four separate objects in a given scene. Pylyshyn hypothesizes that the mind has available a very small number of 'indexes'; these indexes do not point to the locations of objects but to the objects themselves. This limitation on how many objects can be actively attended to when taking in a visual scene is, thus, very ancient.

There exist some disagreements in these three works – though at times one gets the impression that this may just be a matter of terminology – about the different levels and properties of pre-linguistic representational content: *sensation*, *perception*, and *conceptual representation*. Sensory and perceptual representations are joined, almost collapsed, in Carey's work, where they are considered the first level of cognitive representation, often both referred to as 'input analyzers'. By contrast, Burge insists on a distinction between perception and sensory registration:[2] anatomical specializations for sensing *trigger* computations without representation; they are not perceptual representations, they just carry information. On the other hand, perceptual states are formed from 'proximal stimulation' by sensory systems – the latter precede the former –, and determine which kind of content they will acquire ("representational contents represent only attributes (...) as a result of processes that begin with sensory states that are sensitive to a specific causal medium" [Burge (2010), p. 101]).

The upper border of perception – i.e., conceptual content – is further subdivided in Carey's work: it consists of *core cognition* and *knowledge* systems. Some difficulties arise when dealing with the properties of the former – as Carey acknowledges [p. 458] –, specifically regarding the modular character of the process, which does not seem to be invariable for every computation: "the *output* of the innate perceptual input analyzer – as with all perceptual modules – is part of a central system"; "some of the representations that articulate core cognition are *not* conceptual – those that are within module and encapsulated" [Carey (2009), pp. 95, 96, original emphasis]. The fact is that the sensation that one gets when rereading Carey's distinction might be that what is at stake when discriminating between modular/non modular processes is not a matter of neurological concern, but an issue of our human ability to define representations in perceptual primitives: if those cannot be defined in such a way, they cannot be modular.[3]

Regardless of the specific number of pre-linguistic cognitive levels, we think that the three works under review strongly indicate, if only implicitly, that human language placed a major role in breaking the bounds of modularity. Specifically, language is able to combine information from various modules (core cognition systems) that in other animals appear to be firmly isolated. For instance, the two modes described above of numerical representation (analog magnitude and parallel individuation) do not spontaneously combine in animals' or young infants' minds, as experiments suggest. Following Spelke (2003), other animals may represent 'individuals' and 'sets,' but seem to be unable to spontaneously form representations of 'sets of individuals': "natural language therefore can serve as a medium for forming representations that transcend the limits of domain-specific, core knowledge systems" [Spelke (2003), p. 296]. What is missing in other species is our unique ability to represent large numerosities precisely; core systems cannot achieve this. Genuinely arithmetical capacities – such as *counting* – emerged only after the advent of language.

It is as if language took the ability (which other animals display) of integrating various sensory inputs to the next level: synthesizing the inputs of various conceptual modules. Hurford shows how animal brains are excellent integrators of 'multisensory convergence', creating so-called 'Convergence Zones'. Language, it seems to us, appears to be a higher-order convergence zone.

But even if this is the right interpretation of the experimental evidence currently available, it remains to be understood what this means in 'mechanistic', non-metaphorical terms. Unfortunately, the three books we focus on here are largely silent on this central issue. Carey, in particular, appeals throughout her book to the notion of 'bootstrapping' to capture the discontinuity between human thought and animal thought, but bootstrapping remains a metaphor. As Carey herself acknowledges, "to 'bootstrap' means, literally, to pull oneself up by one's own bootstraps – something that is clearly impossible" [Carey (2009), p. 20].

Although the lack of clear, testable hypotheses regarding the 'great leap' that gave us our distinctive mental life is a major source of disappointment, valuable levels can be learned from works like those reviewed here. Perhaps the most valuable one from our (linguistic) perspective concerns the pursuit of a psychologically/biologically plausible theory of natural language semantics. We think that Burge, Carey and Hurford provide incontrovertible evidence that much of the substance of human semantics has very deep, very ancient roots. In sharp contrast to recent studies like Hinzen (2006), (2007), where the uniquely human syntactic component is said to provide the source of semantics (indeed, Hinzen basically equates syntax and semantics), we take it to the central message of the books under review that most of our semantics is deeply grounded in animal cognition, and that the task of a genuinely explanatory theory of meaning is to show how syntax took this rich

semantic background inherited from our ancestors and transformed it into a distinctive cognitive mode that many view as the defining characteristic of our species.

One hundred and forty years after the publication of *The Descent of Man* (1871), we think that Darwin would be pleased with this research program, although he may well wonder why it took us so long to get there.

*ICREA & Centre de Lingüística Teòrica*
*Universitat Autònoma de Barcelona*
*Departament de Filologia Catalana*
*Edifici B, Campus UAB*
*08193 Bellaterra (Barcelona), Spain*
*E-mail: Cedric.Boeckx@uab.cat*

*Universidad Autónoma de Madrid*
*Facultad de Filosofía y Letras*
*Dpto. Filología Española*
*c/ Francisco Tomás y Valiente, 1*
*28049 Cantoblanco (Madrid), Spain*
*E-mail: svafer@gmail.com*

## NOTES

[1] A connection already suggested by Jackendoff and Landau [Jackendoff (1992), pp. 121-23].

[2] See Burge (2010), p. 248, fn. 90, for an extensive review on Carey's sensory/perceptual systems.

[3] But they keep belonging to core cognition, which she had claimed to be (partially) 'modular' [p. 11]; it seems that avoiding a *two*-level initial system (sensation and perception) makes necessary to duplicate the next conceptual one (*core cognition* and *knowledge*), which still shares so crucial properties – modularity – with the previous one that makes one suspect they are perhaps just the same... Burge's fined-grained analysis – his neat distinction between sensory/perceptual systems – avoids from the start precisely this: all perceptual representations are encapsulated, no matter the content of their primitives. Central (/conceptual) mental states simply belong to higher-level cognitive systems (belief, language).

## REFERENCES

BURGE, T. (2010), *Origins of Objectivity*, Oxford, Clarendon Press.
CAREY, S. (2009), *The Origin of Concepts*, Oxford, Oxford University Press.
DARWIN, C. (1871), *The Descent of Man*, Princeton, Princeton University Press, 1981.

HAUSER, M., CHOMSKY, N. & FITCH, W.T. (2002), 'The Faculty of Language: What Is It, Who Has It, and How Did It Evolve?', *Science*, vol. 298, no. 22, pp. 1569-79.
HINZEN, W. (2006), *Mind Design and Minimal Syntax*, Oxford, Oxford University Press.
— (2007), *An Essay on Names and Truth*, Oxford, Oxford University Press.
HURFORD, J. (2007), *The Origins of Meaning*, Oxford, Oxford University Press.
JACKENDOFF, R. (1992), *Languages of the Mind*, Cambridge, Massachusetts, MIT Press.
KAUFMAN, E., et alii (1949), 'The Discrimination of Visual Number', *The American Journal of Psychology*, vol. 62, no. 4, pp. 498-525.
PYLYSHYN, Z. (2000), 'Situating Vision in the World', *Trends in Cognitive Sciences*, vol. 4, no. 5, pp. 197-207.
SPELKE, E. (2003), 'What Makes Us Smart? Core Knowledge and Natural Language', in Gentner, D. and Goldin-Meadow, S. (eds.), *Language in Mind*, Cambridge, Massachusetts, MIT Press, pp. 277-311.

RESUMEN

En este artículo se examinan tres estudios amplios y estrechamente relacionados provenientes de la lingüística, la filosofía y la psicología experimental que se centran en el origen de nuestra capacidad semántica. Las tres obras ofrecen amplias pruebas de la existencia de esta posibilidad en la mente de los animales, pero no dan un mecanismo de cómo esas mentes evolucionaron para convertirse en lo que son las nuestras.

PALABRAS CLAVE: *concepto, mente, módulo, semántica, evolución*.

ABSTRACT

In this paper we examine three extensive and closely related studies coming from linguistics, philosophy, and experimental psychology that look at the origin of our semantic ability. While the three works provide extensive evidence for grounding this ability in animals' minds, they fall short of providing a mechanism for how these minds evolved into ours.

KEYWORDS: *Concept, Mind, Module, Semantic, Evolution*.