Yet another scenario for the origins of language

Sergio Balari*
Departament de Filologia Catalana
Universitat Autònoma de Barcelona
Sergi.Balari@uab.es

Only in rare occasions dare linguists express their opinions about the origins of language beyond the safe (and often marginal) space of footnotes. This is somewhat surprising, since, in the past ten years or so, the topic of language origins has been the focus of the attention of many philosophers, psychologists, biologists, anthropologists, and so on. But not very many linguists. It is even more surprising to the extent that linguistics is, among all these disciplines, the one for which language is the central object of scientific research.

I don't think this is the appropriate place to speculate about the reasons that make linguists avoid the topic, but, being myself a linguist, I believe that it is important that I start saying something about what linguists have in mind when they talk about language.

To give a rough answer to this question, I could say that linguists, at least those working within the generative tradition, usually are thinking of a structure, or collection thereof, that resides in the mind/brain. Many linguists would also attach the adjective 'innate' to that, but I will refrain from doing it, since, after thinking about that for some years, I have come to the conclusion that I don't know what linguists mean when they use the word 'innate'.[1] My problems with the word 'innate' (apart from the experience reported in footnote 1) come from the fact that most linguists appear to be committed to some sort of Cartesian innatism, but reworded using the modern vocabulary of genetics.

*This paper grew out of a lecture I delivered at the Course on Evolution, Language and Knowledge, organized by the Universidad Internacional Menéndez y Pelayo in Barcelona on July 13 2001. I wish to thank the organizers Jaume Bertranpetit, Cristina Junyent and Ignacio Morgado for giving me the opportunity to participate in this course. The session of which my talk was part, was centered on the discussion of T Deacon's ideas about language origins as presented in his 1997 book *The Symbolic species*. I wish to thank Prof Deacon's comments and suggestions, which helped me very much in reshaping and clarifying my ideas about the role of heterochrony in development. Very special thanks to Raquel Fernández, who read the text of my lecture and whose constant and challenging 'I don't understand that' made me strive for finding a clearest way to express my intuitions. Of course, any remaining errors and misinterpretations are of my own exclusive responsibility. This work was partially supported by the Generalitat de Catalunya through the CIRIT grant 1999SGR/00113 to the Grup de Gramàtica Teòrica and by the Spanish Ministerio de Ciencia y Tecnología through the project grant TIC2000-1681-C02-02.

[1] This feeling started during a discussion on the topic with a fellow linguist who, in the end, told me that Chomsky is not an innatist. After that episode, just like those people that fall into religious crises and start doubting abut the existence of God, I have grown an irresistible tendency to doubt about the existence of Chomsky. Whether he (or she) exists or not is to a certain extent irrelevant to what I want to do here, so I will continue to use the word 'Chomsky' as a cover term to refer to some (prototypical and possibly non-existent) generative linguist.

Thus, phrases like 'genetic endowment' are not rare in the writings of some linguists when referring to human linguistic capacities, as if the idea were that most of our linguistic knowledge is in fact coded in our genes. I'll come back to that later, but, in my opinion, this is an extremely naive view, especially when one discovers how cautious biologists are when they use the very same terms.[2] Again, this is probably not the place to initiate a debate about innatism, but I believe that some comment was necessary, especially given some of the things I will say presently.

Another important thing to note about linguists' attitudes towards language is that they are very fond of thinking that it is something very special; even that it is precisely language what makes us human. I believe they (we?) are wrong, but let me go on a bit before I try to tell you why. This belief makes linguists—when thinking about the origins of language (when they do, which is not very often, as I already noted)—look for some specific, unique, feature of human language that makes it so special and, then, they try to explain how this particular feature may have emerged in the history of our species. Again, I think this is the wrong strategy, but I still need to expand a bit before I am able to construct an argument against this view.

Linguists' favorite candidate for bearing the crown of 'the unique feature of human language' is syntax. Once you have syntax, so the argument goes, the rest comes for free (or almost).[3] I also have problems with this argument. Not because I think syntax is not important, but because I'm not sure it is *so* important. In fact, as I have just said, and paradoxical as it may seem, I suspect that looking at language seeking the magic feature that makes it exceptional is not the best way to construct a plausible scenario for its origins. In this sense, for example, Deacon's theory is not different: it just picks a different magic feature, namely symbolic reference.

Now, if we don't have to look at language to explain its origins, where do we have to look at? My (short) answer is this: children. The long one starts with the following quote from a book published in 1977 by S J Gould and entitled *Ontogeny and Phylogeny*:

> Humans and chimps are almost identical in structural genes, yet differ markedly in form and behavior. This paradox can be resolved by invoking a small genetic difference with profound effects—alterations in the regulatory system that slow down the general rate of development in humans. Heterochronic changes are regulatory changes; they require only an alteration in the timing of features already present.

Could it be the case that the key to the origins of language was in some heterochronic change affecting the developmental patterns in humans? I think it could, and in the remaining paragraphs I'll try to sketch an argument in that direction.

For the last fifty years, contemporary linguistic theory has evolved under the perplexity provoked but what is traditionally known as the Logical Problem of

[2] This is particularly true in the case of developmental biologists; see Oyama (1985), plus the foreword by R Lewontin to this second edition, and Griffiths & Gray (1994), for discussion. See also Elman *et al* (1996).

[3] Perhaps Derek Bickerton is the clearest representative of this position (Bickerton 1990); See also Bickerton (1998) and Berwick (1998).

Language Acquisition, as formulated by Chomsky in several of his writings. His argument is, roughly, as follows:

1. A language is a system of an enormous complexity;

2. Human infants acquire their first language from a set of imperfect stimuli and in a very brief period of time;

3. The only possible way to reconcile both facts is to assume that language acquisition is not a process whereby a series of rules are learned but, rather, a process whereby a set of pre-existing principles is activated and a collection of parameters is fixed that determine what is the final shape of every principle.

As pointed out, for example, by Deacon (1997) this argument begs the question, as it explicates some fact by explaining it away: everything is foreseen by UG, the child only has to discover those little details that are characteristic of the particular language she is acquiring.

Moreover, I'm afraid it is based on two rather unwarranted assumptions:

a) Human language is a system of an enormous complexity.

b) Human infants acquire language very fast.

As for a), I believe, with Deacon, that this assumption is completely void of content. Complex relative to what? As we know from evolutionary biology, it is very hard, if not impossible, to determine a measure of complexity, since there are no absolute patterns that we can take as a point of reference.[4] Complexity can only be relative, defined by comparison with other systems with a similar or identical function. Again, complex relative to what? Other animal communication systems? Other cognitive skills acquired by humans? With this, I don't want to deny that human language possesses some inherent complexity if we compare it with other systems of animal communication, for example. It is almost a truism that human language is much richer than the system of alarm calls of vervet monkeys, but note, however, that Chomsky has always denied that communication is one of the primary functions of human language. Thus, being coherent with this idea, the complexity of human language should not be assessed taking other systems of animal communication as a reference. And this takes us to the next point.

As for b), then, an idea that goes back, at least, to J G von Herder, I'm afraid it is a flagrant case of anthropocentrism: how fast our children learn! Look! We are capable or learning even the most complicated things and we even do it very fast! But, perhaps, things are not as obvious as it seems at first sight. Perhaps we learn complex things because we have the time for doing it: there is no other species on Earth with such a long ontogeny as the human species. And, even in this case, things are not so clear and many difficult questions arise in this connection: do human children learn their system of communication faster than chimps learn theirs? Do human infants learn language faster than they do learn other cognitive skills? It's hard to say. Compare language with motor control, for example: a three year old kid is not that bad at communicating,

[4] On the issue of complexity in biology see, for example, Bonner (1988)

although is incapable of producing a number of complex constructions; on the other hand, she can walk and run, but she is still rather clumsy at walking down a staircase, for example. Does this tell us anything about the speed with which some particular skill is acquired?[5] Perhaps language is as complex as it can be, given our cognitive abilities and, in particular, our capacity for learning that goes beyond anything seen in the animal world.

Now let's turn Chomsky's argument upside down:

- Human infants go through (as compared with other mammals, particularly, baby chimps or gorillas) an extraordinary long period during which learning processes have an important cognitive weight. I think there are important questions to be answered in this connection, *inter alia*: what are the neurological correlates of what is known as 'critical period'? Does the brain withdraw cognitive resources at the end of this period to deploy them in other areas? Is this an ontogenetic trait, signalling the beginning of the adult phase? Is there any connection with that and the fact that the brain looses plasticity as it grows older?

- Thanks to this cognitive bonus, human infants, unlike baby chimps, for example, are capable of developing a much richer (and complex) system of communication. Note that the key difference lies not on the innate capacities of humans and chimps but, rather, on the fact that some difference in the developmental patterns followed by humans gives them an enormous advantage with respect to learning capacities. Human languages, then, are not more or less complex, but just as complex as they can be, given the cognitive capacities of children.

I think this is an argument against UG, as conceived of by Chomsky, but not against the fact that language (i.e., grammar) is mentally represented, nor against the possibility that there exist more or less specialized mechanisms for the processing of semiotic stimuli (a very general term with which I want to designate any stimulus that is perceived by a nervous system as an object susceptible of being decoded, that is, as a vehicle of content). In this sense, this is not a skill exclusive of humans—animals minds appear to be perfectly capable of decoding messages,[6] as communication seems to be a quasi-inevitable behavior for living organisms—as evidenced, for example, by computer simulations within the fields of *synthetic ethology* and *artificial life* (MacLennan 1992, Werner and Dyer 1992).

Now, given that I am putting a lot of emphasis in some kind of developmental change, I will try to pin down a bit this idea. As it is clear form the quote by Gould above, this author has in mind a very specific type of heterochrony, namely what could be called *juvenilization* (also referred to as *paedomorphosis*). In fact, Gould explicitly states that from this putative event in the history of humankind a retardation in general rate of growth ensued. Thus, if development has been slowed down, juvenile traits are preserved until later stages in the life history of some organism (in this case, learning capacities). According to this view, then, human development would be a form of *neoteny*, one of

[5] This is all very impressionistic, but I cannot go into the details here. For a thorough assessment of these and other issues, the reader is referred to Thelen & Smith (1994)

[6] See Griffin (1992) and Hauser (1996) for a general assessment of the communicative skills of animals and Tomasello & Call (1997) for a review of these, and other, skills in primates.

the three possible scenarios giving rise to juvenilization along with *progenesis* (early termination of growth) and *postdisplacement* (late initiation of growth). As pointed out by McKinney (2000) there is a serious problem with this interpretation of development in humans, however. Apparently, Gould is mixing two different things in his characterization of neoteny, namely rate of growth and timing, that is, one thing is the rate at which some organism develops per some predefined unit of time and another different thing is the span along which some global developmental event occurs. Thus, for example, if the development of the nervous system in some organism takes longer than in some other organism within the same taxon, this may have radically different consequences depending on whether the rate of growth has also been changed or not. Thus, if the developmental event has been extended *and* the rate of growth has been reduced, then neoteny will ensue, since juvenile traits will be kept for longer periods of time (or will appear later in development). If, however, the time span of the developmental event is extended but there is no change in the rate of growth, then we will have some form of *overdevelopment*, since the organism will see its developmental event proceed for a longer period of time but *at the same rate of growth*. In this case, the organism may go well beyond than other organisms go within the same taxon. Now, this is exactly what seems to have happened with the human brain. To use the words of McKinney (2000, p. 28–29): "By extending growth in each stage without reducing the rate of growth per stage, humans grow to a large body size and have larger brains. This also causes 'overdeveloped' cognitive capacities."[7]

Turning now to the consequences of overdevelopment in the nervous system, it seems that the following three features should be expected (assuming, by the way, that heterochronies rarely affect whole organisms but only parts of them, giving thus rise to dissociated patterns of development):

1. High brain/body ratio
2. More neural complexity
3. More neocortex and prefrontal cortex

Let us comment them in turn. As for 1, in humans this appears to be a consequence of faster brain growth during an extended fetal phase, while keeping a more or less stable (relative to other primates) rate of body growth. This, in itself, is not particularly meaningful, since, as has often been emphasized, a bigger brain is not necessarily a more powerful one. Powerful brains need to be big, but this increase in size needs to be complemented with something else. This takes us to point 2. Human brains are big, but they are also more complex, due to this extended phase of fetal growth during which many more neurons are produced and, as a consequence, many more connections are established among neurons. Thus, to the extent that interconnection is a reliable measure of complexity (as it seems it is), a human brain shows more interconnections than any other primate

[7] As Deacon (2000) notes, however, the scenario of primate and human evolution may be much more complex than that, and may not even be amenable to a description in terms of heterochrony. The kinds of changes that Deacon suggests in his paper, however, are also developmental changes of a quite general nature that, if my interpretation is correct, would have similar, if not identical, consequences to what would result from overdevelopment as described in the text.

brain and can, therefore, be considered more complex. Finally, as a consequence of an extended development, those areas of the brain that are generated later are allowed to grow larger, as it is the case with the human neocortex. If, as is often observed (e.g., McKinney (2000), Gibson (1993), Calvin (1993), also Calvin (1996), among many others), it is some kind of 'general-purpose integrator', its increase in size and complexity should have the effect of increasing the capacity to process more information of all kinds.

Do all these features have some more or less direct translation to the cognitive domain? It seems that they do and, as comparative data on cognitive development show (see McKinney (2000) and Langer (2000), and Parker & McKinney (1999) for a comprehensive review), this could be summarized in the following phrase: "... a prolonged learning stage with no reduction in the rate of development (e.g., learning), which ultimately produces an 'overdeveloped' adult." (McKinney 2000, p. 32).

With all these tools at hand, let me, then, depict what seems to be a plausible scenario for the evolution of language: we have a species of primate characterized by overdevelopment in brain structures. This is, quite likely, explainable in classical adaptive terms or as a direct consequence of other adaptations (e.g., bipedalism, advancement of birth, etc...). Our species possesses some system of communication that is culturally transmitted, that is, juveniles learn it from their parents (as in vervet monkeys, for example) and need some time before having full control of the system. Assume that children possess some capacity for introducing innovation, especially at the phonetic level, that will increase as the vocal tract evolves towards its current L-shaped structure in modern humans and the span of time for brain development becomes longer and longer. As described, this scenario, perhaps requires that some capacity for combining meaningless phonetic particles already exists (as suggested, for example, by Studdert-Kennedy (1998)). I won't speculate here about the chronology of these changes but I think the evolutionary scenario is clear (and compatible with a non-catastrophic interpretation of the evolution of human behavioral traits; see McBrearty & Brooks (2000), for example): from a primeval communication system, typical of those found in other species of apes, the progressive delay in the appearance of the critical period would have permitted hominid infants to progressively introduce innovative elements into the system. The complexity of the system would have increased as it was transmitted from generation to generation. Everything, without a UG, just some universal predisposition to decode messages.

I believe that this scenario can answer a question that has been posed sometimes: if our ancestors possessed a system of communication that worked, why did it evolve? Why they did not keep it as it was? (I think this is a variety of Deacon's (1997) question: why there are no simple languages?) Well, just for the same reason why our children don't speak exactly as we speak, because language, in essence, evolved through cultural transmission, not by genetic means. (In this sense, it is an emergent property, or, at least, some of its basic features are.)

In the scenario I have just depicted, language evolves from an ancestral system of communication, but this view has problems in accommodating one of Deacon's arguments for his own theory: language seems to sit on top of this ancestral system, which in modern humans is preserved as the collection of gestures and sounds that fall under the cover term of 'non-verbal communication'.

That is, language is not an extension of some ancient system of communication, but rather a truly novel, more powerful, system that has relegated the original system to a secondary role. I think this is a plausible suggestion, so I accept the weakness of my previous argument and, as a consequence, I propose an alternative: language evolved from social cognition. The idea that language may have evolved from a specialized cognitive module, dedicated to keep track of social relations and interactions is not new[8] and has the advantage of overcoming the problem I just mentioned plus a few others. Space reasons prevent me from elaborating further, but let me stick to the following phrase (adapted from a paper by Robert Worden) as a motto: *The internal representation of language meaning in the brain may derive from the primate representation of social situations.*

Whatever the original source, once the laws of genetic inheritance transformed our children into language creators because of their extended development, these laws lost most power over the system, and the principles of linguistic change took over. As is well known from the extensive literature on grammaticalization, these principles are perfectly capable of creating complex structures, like tense and agreement markers, embedded clauses, etc. of the kind we find in modern languages.[9]

These are ideas are necessarily rough and sketchy, but I believe that the general picture is clear: as Marx and Engels wrote in their book *The German Ideology*, language was born because of our need to communicate, and, I would add, thanks to the our children's rebelliousness when they learn to speak.

References

Berwick, Robert C. 1998. Language evolution and the Minimalist Program: the origins of syntax. In *Approaches to the Evolution of Language. Social and Cognitve Bases*, ed. James R. Hurford, Michael Studdert-Kennedy, and Chris Knight. 320–340. Cambridge: Cambridge University Press.

Bickerton, Derek. 1990. *Language & Species.* Chicago, IL: The University of Chicago Press.

Bickerton, Derek. 1998. Catastrophic evolution: the case for a single step from protolanguage to full human language. In *Approaches to the Evolution of Language. Social and Cognitve Bases*, ed. James R. Hurford, Michael Studdert-Kennedy, and Chris Knight. 341–358. Cambridge: Cambridge University Press.

Bonner, John Tyler. 1988. *The Evolution of Complexity.* Princeton, NJ: Princeton University Press.

Calvin, William H. 1993. The unitary hypothesis: a common neural circuitry for novel manipulations, language, plan-ahead, and throwing? In *Tools, Language and Cognition in Human Evolution*, ed. Kathleen R. Gibson and Tim Ingold. 230–250. Cambridge: Cambridge University Press.

[8] see, for example, Donald (1991, 1998), Dunbar (1996, 1998), Worden (1998), among many others; even, some suggestions in Bickerton (1998) seem to pint in that direction

[9] See Hopper & Trauggott (1993) for an overview and Heine *et al* (1991) for some interesting case studies.

Calvin, William H. 1996. *The Cerebral Code.* Cambridge, MA: The MIT Press.

Deacon, Terrence W. 1997. *The Symbolic Species. The co-evolution of language and the brain.* New York: W. W. Norton.

Deacon, Terrence W. 2000. Heterochrony in brain evolution: Cellular versus morphological analyses. In *Biology, Brains, and Behavior. The Evolution of Human Development*, ed. Sue Taylor Parker, Jonas Langer, and Michael L. McKinney. 41–88. Santa Fe, NM and Oxford: SAR Press/James Currey.

Donald, Merlin. 1991. *Origins of the Modern Mind. Three Stages in the Evolution of Culture and Cognition.* Cambridge, MA: Harvard University Press.

Donald, Merlin. 1998. Mimesis and the Executive Suite: missing links in language evolution. In *Approaches to the Evolution of Language. Social and Cognitve Bases*, ed. James R. Hurford, Michael Studdert-Kennedy, and Chris Knight. 44–67. Cambridge: Cambridge University Press.

Dunbar, Robin I. M. 1996. *Grooming, Gossip, and the Evolution of Language.* Cambridge, MA: Harvard University Press.

Dunbar, Robin I. M. 1998. Theory of mind and the evolution of language. In *Approaches to the Evolution of Language. Social and Cognitve Bases*, ed. James R. Hurford, Michael Studdert-Kennedy, and Chris Knight. 92–110. Cambridge: Cambridge University Press.

Elman, Jeffrey L., Elizabeth A. Bates, Mark H. Johnson, Annette Karmiloff-Smith, Domenico Parisi, and Kim Plunkett. 1996. *Rethinking Innateness. A Connectionist Perspective on Development.* Neural Network Modeling and Connectionism, Vol. 10. Cambridge, MA: The MIT Press.

Gibson, Kathleen R. 1993. Tool use, language and social behavior in relationship to information processing capacities. In *Tools, Language and Cognition in Human Evolution*, ed. Kathleen R. Gibson and Tim Ingold. 251–269. Cambridge: Cambridge University Press.

Gould, Stephen Jay. 1977. *Ontogeny and Phylogeny.* Cambridge, MA: Harvard University Press.

Griffin, Donald R. 1992. *Animal Minds.* Chicago, IL: The University of Chicago Press.

Griffiths, Paul E., and Russell A. Gray. 1994. Developmental systems and evolutionary explanation. *Journal of Philosophy* 91:277–304.

Hauser, Marc D. 1996. *The Evolution of Communication.* Cambridge, MA: The MIT Press.

Heine, Bernd, Ulrike Claudi, and Friederike Hünnemeyer. 1991. *Grammaticalization. A Conceptual Framework.* Chicago, IL: The University of Chicago Press.

Hopper, Paul J., and Elizabeth Closs Trauggott. 1993. *Grammaticalization.* Cambridge Textbooks in Linguistics. Cambridge, MA: Cambridge University Press.

Langer, Jonas. 2000. The heterochronic evolution of primate cognitive development. In *Biology, Brains, and Behavior. The Evolution of Human Development*, ed. Sue Taylor Parker, Jonas Langer, and Michael L. McKinney. 215–236. Santa Fe, NM and Oxford: SAR Press/James Currey.

MacLennan, Bruce. 1992. Synthetic Ethology: an approach to the study of communication. In *Artificial Life II*, ed. Christopher G. Langton, Charles E. Taylor, J. Doyne Farmer, and Steen Rasmussen. 631–658. Reading, MA: Addison-Wesley.

McBrearty, Sally, and Alison S. Brooks. 2000. The evolution that wasn't: a new interpretation of the origin of modern human behavior. *Journal of Human Evolution* 39:453–563.

McKinney, Michael L. 2000. Evolving behavioral complexity by extending development. In *Biology, Brains, and Behavior. The Evolution of Human Development*, ed. Sue Taylor Parker, Jonas Langer, and Michael L. McKinney. 25–40. Santa Fe, NM and Oxford: SAR Press/James Currey.

Oyama, Susan. 1985. *The Ontogeny of information. Developmental systems and Evolution.* Durham, NC: Duke University Press. 2nd edition, 2000 edition.

Parker, Sue Taylor, and Michael L. McKinney. 1999. *Origins of Intelligence. The Evolution of Cognitive Development in Monkeys, Apes and Humans.* Baltimore, MD: The Johns Hopkins University Press.

Studdert-Kennedy, Michael. 1998. The particulate origins of language generativity: from syllable to gesture. In *Approaches to the Evolution of Language. Social and Cognitve Bases*, ed. James R. Hurford, Michael Studdert-Kennedy, and Chris Knight. 202–221. Cambridge: Cambridge University Press.

Thelen, Esther, and Linda B. Smith. 1994. *A Dynamic systems Approach to the Development of Cognition and Action.* Cambridge, MA: The MIT Press.

Tomasello, Michael, and Josep Call. 1997. *Primate Cognition.* Oxford: Oxford University Press.

Werner, Gregory M., and Michael G. Dyer. 1992. Evolution of communication in artificial organisms. In *Artificial Life II*, ed. Christopher G. Langton, Charles E. Taylor, J. Doyne Farmer, and Steen Rasmussen. 659–687. Reading, MA: Addison-Wesley.

Worden, Robert. 1998. The evolution of language from social intelligence. In *Approaches to the Evolution of Language. Social and Cognitve Bases*, ed. James R. Hurford, Michael Studdert-Kennedy, and Chris Knight. 148–166. Cambridge: Cambridge University Press.