status as important factors in language origins is in itself not implausible. But in order to explain the distinguishing features of language, selection for content must be part of the scenario. The proposal of Miller (2000), discussed by L&B at the end of section 5, goes in the right direction: "Language put minds on public display, where sexual choice could see them clearly" (Miller 2000, p. 357, quoted in L&B). Related ideas are proposed by Dessalles (2000), in which status is gained through public speech containing *relevant information*, thus placing selective pressure squarely on the ability to provide content. L&B do refer to the work of Dessalles, but by focusing too much on form rather than content, they leave a gaping hole in their argumentation.

L&B do attempt to motivate the primacy of vocal abilities over grammar in their scenario, by arguing that it makes more sense for speech to evolve before syntax than vice versa. This is not self-evident, for several reasons. First, grammar is not just "syntax" but *patterned content*, which has been emphasized for decades by functional and cognitive linguists (e.g., Langacker 1987). But L&B don't even refer to this healthy tradition and mistakenly seem to equate "linguistics" with Chomskyan linguistics. From the cognitive perspective, it is completely possible that manual gestures and bodily mimesis provided the basis for propositional structure (Armstrong et al. 1995; Corballis 2002; Donald 1991; Zlatev et al. 2005), a possibility that L&B shunt aside in a footnote. And even if speech were the original modality, coevolution between speech capacity and grammar should not be discounted.

In brief, by separating vocal abilities from content and grammar, the scenario of L&B is hardly a scenario for *language* origins anymore. The aspects of language that are uniquely human remain unexplained.

And why not chimps? In the case of specifically human adaptations like language, it is not enough to present an evolutionary scenario showing how useful language would be for our apelike ancestors. The question that needs to be answered is not just why our ancestors evolved language, but also why chimps did not, even though we share a fairly recent common ancestor. It must be shown that language was useful and adaptive specifically for proto-humans *and not* for proto-chimpanzees. Many language-origin scenarios fail this test (Bickerton 2002; Gärdenfors 2004; Johansson 2005).

Using vocalizations strategically in the context of parental-care elicitation is hardly unique for humans – many birds and mammals, including primates, do so. Given that human childhood as defined by L&B is the result of earlier weaning, that is, a *decrease* in parental care allowing diverting resources from the current child to its future siblings, it is not clear how this can function as a selection pressure for human toddlers to be *better* at eliciting care than their chimp cousins, who still manage to get breast-fed at that age.

In the vocal competition among adolescents, impressiveness and attention-holding are important factors. As noted by L&B in the beginning of section 5, the same factors are important in establishing status also among nonhuman primates. Again, it is not at all obvious why this led to language among proto-humans but not proto-chimps, despite both being subject to similar selection pressures in similar contexts.

Similarly, at the end of section 9.1, L&B claim that for young hominids "even a small amount of vocal-verbal behavior would have facilitated warnings and instruction," but they do not explain why the same mechanisms would not apply to proto-chimps.

Still, we do believe that buried in L&B's account there is the germ that may save them from the "why not apes?" test. It is spelled out in section 13: "bipedalism is . . . a key event . . . for this . . . produced, in time, pelvic narrowing. Remodeling of the birth canal caused a shift of skull and brain development into the postnatal period, increasing the degree and duration of infant helplessness" (target article, sect. 13, para. 2). This together with the need of bipedal mothers to *carry* their young, would have led to the need for more *cooperation* rather than competition between mothers and infants, and to an increase in the quality of dyadic interactions in the form of mutual gaze, mutual imitation, and proto-conversations (Falk 2004). These are species-typical characteristics of human beings laid down in the first nine months of life, and serving as the basis for the development of joint attention and pointing in the second year (Hobson 2002; Tomasello et al. 2005), which are milestones of infancy bootstrapping into language – of which L&B say nothing.

Conclusion. L&B's basic proposal that there may be connections between these two uniquely human features, language and life history, is interesting and worth pursuing further. But more care should be taken in designing selection scenarios, so that the proposed selection pressures actually work in the right direction, towards the development of the "socially shared symbolic system" (Nelson & Shaw 2002) – that is, language – in the human lineage only.

The evolution of childhood as a by-product?

Peter Kappeler

Department of Sociobiology/Anthropology, University of Göttingen, 37073 Göttingen, Germany.

pkappel@gwdg.de **http://www.soziobio.uni-goettingen.de/**

Abstract: The proposition that selective advantages of linguistic skills have contributed to shifts in ontogenetic landmarks of human life histories in early *Homo sapiens* is weakened by neglecting alternative mechanisms of life history evolution. Moreover, arguments about biological continuity through sweeping comparisons with nonhuman primates do not support various assumptions of this scenario.

The evolutionary scenario concerning the interaction between life history and language evolution developed by Locke & Bogin (L&B) suffers from two weaknesses. First, while L&B's focus on early stages of the life history cycle is new and laudable, they fail to recognize the possibility that shifts in the relative duration of early life history landmarks can also be brought about by selection on fitness-relevant traits or events later in life. Selection on a delay in the age of first reproduction is the best-studied example in this context (Promislow & Harvey 1990). It is therefore not necessarily the case that "Selection for vocal ability, and, ultimately, for language would thus have worked reciprocally to extend childhood" (sect. 2.4 of the target article). Developmental and evolutionary processes are not clearly separated in their life history model. It is therefore at least equally plausible that age of first reproduction has been delayed further in *Homo sapiens*, compared to *Pan*, *Australopithecus*, and other species of *Homo*, for adaptive reasons unrelated to language, and that the extra time that became available for juveniles was subsequently used to develop more refined linguistic skills. Alternatively, linguistic skills acquired early in life may have offset some of the costs of delayed maturity. The hypothesis that these skills were rewarded later in life through mate choice, as originally proposed by Miller (2000), is convincingly elaborated by the authors. However, these benefits accrue primarily to males, whereas life history evolution acts primarily on females (Stearns 1976) – a discrepancy also not addressed by the authors' life history model.

Second, when discussing various aspects of language development, the authors use several primate examples in an attempt to support their arguments. However, some of these examples consist of sweeping generalizations across species, sexes, and age classes that provide weak analogies, at best, to support claims about human uniqueness or biological continuity. The fact that a behavior pattern exists "in primates" does not logically imply that early humans behaved the same way. There is too much variability in behavior among the hundreds of species of

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living primates for such generalizing claims, and we know very little about relevant behavioral attributes in extinct primates (Plavcan & van Schaik 1997). The parental selection hypothesis (sect. 3.2), for example, supposes that infant stress vocalizations invite neglect and abuse "in primates generally." Whether the majority of the more than 300 living primate species will exhibit the same response remains to be studied, but in the few primate species where mother-infant interactions have been studied in any detail, this is not the case (Gouzoules & Gouzoules 2002). Generalizations in the opposite direction are equally unhelpful. For example, the assertion that "apes and monkeys do not vocalize as often as humans" (sect. 3) can be refuted with examples of dozens of primate species that permanently utter vocalizations. Humans are therefore not unique in this respect. Thus, although this article presents some interesting new approaches to the discussion of the origins of language, I doubt that it will be the final word on this topic.

Apes, humans, and M. C. Escher: Uniqueness and continuity in the evolution of language

Barbara J. King

Department of Anthropology, College of William and Mary, Williamsburg, VA 23187.

bjking@wm.edu

http://www.councilhd.ca/announce/announce.htm

Abstract: Ontogeny, specifically the role of language in the human family now and in prehistory, is central to Locke & Bogin's (L&B's) thesis in a compelling way. The unique life-history stages of childhood and adolescence, however, must be interpreted not only against an exceptionally "high quality" human infancy but also in light of the evolution of co-constructed, emotionally based communication in ape, hominid, and human infancy.

Locke & Bogin (L&B) bring together convincing data on primate life-history stages with informed speculation about the evolution of language. I limit my comments to the relationship between the evolution of language and the infancy life-stage.

Central to that part of L&B's argument are the following assertions:

1. Few recent proposals about the evolution of language have given a primary role to matters of ontogeny.

2. In humans, the life-history stages of childhood and adolescence are added to the three stages – infancy, juvenility, and adulthood – found in other social mammals.

3. Compared to other primates, the quality of human infancy is enhanced by greater social stimulation of offspring by their parents. L&B's parental selection hypothesis suggests that infants who were better at vocal engagement with their parents secured greater care and, in turn, learned more complex phonetic patterns. Then, with the advent of uniquely human childhood, and in the context of the family, new opportunities arose that drove the evolution of language via "negotiation of more structured and complex forms of vocalization" (sect. 9).

L&B's emphasis on parent-infant engagement in the context of the family is a welcome addition to a swelling cache of theoretical formulations that – contra the first statement above – place ontogeny front and center when reconstructing the evolution of language from nonhuman primate communication. Humans communicate across the generations not as encoders and decoders of information using syntax and semantics but as emotionally attuned creatures who create meaning together as they go about their daily lives. An emphasis on the evolution of this emotional engagement (Greenspan & Shanker 2004; Mithen 2005) is crucial as scholars across the disciplines apply themselves with renewed excitement to experimental and theoretical work on the evolution of language (Fitch 2005). Crucially, it argues against a current vogue to "fraction[ate] language into multiple interacting components" (Fitch 2005, p. 216). "Fractionating" means looking at speech, syntax, and semantics as discrete systems in order to trace their evolutionary roots separately. Some insights do emerge from this approach, but real progress requires that "mechanisms" of language be considered in the context of the ontogeny of meaning-making – that is, in a context that situates the origins of language in parent-child caregiver practices.

Some progress has been made already. Startlingly, L&B construct their parental selection hypothesis without reference to ontogeny-focused scenarios by Borchert and Zihlman (1990), Falk (2004), Parker (2000), or Savage-Rumbaugh (1994). Collectively these formulations support a view of *Homo* infants as supremely vulnerable, owing to the coupling of bipedalism and big brains. More importantly, they indicate that L&B's claims for human uniqueness (statements two and three above) are best supported by a firm grasp of the continuity in development of meaning-making in apes and humans. This simultaneous embracing of human uniqueness, on the one hand, and of continuity with our closest living relatives, on the other, is no paradox. Rather, it is reminiscent of Escher's famous drawing in which a hard look transforms fish-in-the-water to birds-in-the-sky. Look one way at the evolution of language and what comes into focus is human uniqueness; look another and you will see ape-human continuity.

For wild and captive apes, emotional engagement of infants with their mothers, siblings, and other social partners motivates, and even more so enables, the expression of certain (though not all) communicational skills. Writing together and separately (Fogel et al. 2006; Greenspan & Shanker 2004; King 2004; King, in press; Shanker & King 2002), Stuart Shanker and I have laid out a series of ideas about the evolution of affective meaning-making that are grounded in data from apes and children. We argue that the "vocal-verbal" advances highlighted by L&B (see, e.g., sect. 3.2) evolve from the multimodal communication of primates already highly skilled, from infancy onwards, at participating in mutually constructive meaning-making. Our understanding of meaning-making involves not the conduit-like transfer of information from sender to receiver in linear fashion, but rather the mutual transformation in the actions, and perhaps the thoughts and moods, of two partners in the contexts of ever-changing interactions (see also Reddy 1993). Posture, gesture, and facial expressions are central here, as well as vocal behavior.

To say that after the second birthday, "infants develop a suite of cognitive traits that will enable language to be used at a basal level of creativity and efficiency" (sect. 2.2) is, then, awkward shorthand at best. It is not cognitive traits alone that enable increasingly proficient language usage, but also the emotional engagement of infants with their caretakers; this back-and-forth communication, playful and loving in some cultures, serious and less explicitly affective in others, unlocks and indeed helps to create the infant's abilities. What *Homo sapiens* parents and infants do together, they have evolved to do together; vocal-verbal behavior increases in importance while remaining part of a communication system that is multimodal.

The "greater handling required by the human infant" as a result of the shift from quadrupedalism to bipedalism does produce "more intense social stimulation during a period in which the brain grows at a compensatorily rapid rate" (sect. 2.1). Secondarily, altricial human babies are appreciably different than ape babies; brain-growth pattern are distinct in the *Homo* lineage. Yet the parental social stimulation of infants in hominids and *Homo sapiens* evolved from a strong foundation of emotional engagement present in our ape ancestors. The linguistic accomplishments in later life stages in *Homo sapiens* flow from the powerful dynamic foundation set in infancy, and, indeed, should vary with the emotional signature of that parent-infant interaction. Testable predictions at both the phylogenetic and

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