

language as the “product of successive ontogenies” (p. 10; also see Studdert-Kennedy 2005).

19. This process, once termed “niche picking” by Scarr and McCartney (1983), has recently been treated in some detail by Odling-Smee et al. (2003), who rightly regard “niche construction” as a vastly underplayed process in the history of evolutionary thinking. A brief but interesting discussion of niche construction is available in Dawkins (2004), who distinguishes this kind of engineered and adaptive alteration, which is encompassed by his extended phenotype theory, from the less Darwinian processes of “niche change.”

Open Peer Commentary

Invoking narrative transmission in oral societies

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Abstract: The ethnographic description of story-telling and narrative transmission of cultural facts is an aspect of Locke & Bogin’s (L&B’s) article that should be amplified. Innate shared gene patrimony is biased by the kinship structure of particular societies and interacts with the transmission of narratives. Trance experiences are another interesting aspect of verbal and agonistic “performances.”

Language acquisition in both its innate and social aspects must affect the oral transmission of culture within traditional societies. The rules of transmission are certainly a matter for multidisciplinary investigation. Ethnology and the specific description of story-telling including performance style and context constitute only one level of approach to the narrative transmission of cultural facts (Degh 1995). Ethnology, however, is uniquely important as an avenue to the complex syntax that articulates human society on both synchronic and diachronic scales.

Essentially, kin groups across cultures strive to reproduce their knowledge across generations, particularly favoring their peers of the same generation. Ethnologists concentrate on recurrent cultural practices, with the supporting genetic relatedness of kind groups less salient to them. In any case, selection on raw vocal ability, improving widely variant types of spoken communication within the kin group in the very early stages of human history (see sect. 3.5 of the target article), seems logically possible, but can hardly be documented.

Kinship structures inform the mechanisms of cultural transmission. Natural kinship is accompanied in practically every society by cultural kinship (previously called fictive kinship). Conceptually put, natural and cultural kinship may lead to two complementary genealogies, with memory-carriers only partially overlapping in each group. Thus, an important patrimony exists that is not “individually” genetic, but “communitarily” genetic. To insiders following the oral prescriptions of a given society, often the personal aspect of information transmission is very secondary. To the ethnologist, the interesting question is not about the origin of oral transmission, or about its evolutionary trajectory, but about its content and mechanisms, easily searched for in present-day field realities. Ethnographic description must complement evolutionary hypotheses regarding oral cultural transmission. Present-day cultures with primarily oral methods of transmission have never stopped generating transmission

content and are far from the static models that the target article suggests (sect. 4).

Ethnographic evidence is richest in the following categories of cultural transmission: kinship – the transgenerational division of goods, both material (e.g., dowry, inheritance) and spiritual (e.g., descent and widely-accepted institutions such as god-parenting; Rivers 1907); narratives from belief-tales to fairy-tales; and ceremonies – including a wide variety of life-cycle or year-cycle ceremonies. All of these kinds of transmission are observed not only in the case of oral societies, but also in urban and literate ones.

A great deal of attention is focused in ethnology on the relation invoked in sections 4.1 and 4.2, between verbal and agonistic performance, and power. Contests of brilliant performers in story-telling and oral narrative transmission show only one aspect of cultural transmission. Another aspect is trance, which is linked to the special qualities of precious individuals within the community – another widespread form of power.

Locke & Bogin’s (L&B’s) article concentrates principally on individuals consciously manipulating technical ability for power. No less powerful, “ordinary” members of oral societies often achieve high status using transformed linguistic proficiency in altered states of consciousness. I have in mind the many techniques of trance, be it ecstatic trance (whose exemplar model is the classical shaman; Eliade 1951; Humphrey 1996), or induced trance (trances without presumed journeying to other worlds; De Martino 1961). Both types of trances share exquisite performances, complete with assistants/interpreters of often parallel “languages.” The audience is prepared, and the performance must fit the expectancies of the community in the form of local myths or legends. For the individuals performing in a trance state, the ability to significantly change their state of consciousness *accompanies* their linguistic proficiency; it does not originate in such proficiency. The stories of first-hand trance experience surely reinvest local narrative patrimony, after necessarily following its trends in shaping the trance/ecstasy experience.

Language use, not language, is what develops in childhood and adolescence

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Abstract: That both language and novel life-history stages are unique to humans is an interesting datum. But failure to distinguish between language and language use results in an exaggeration of the language acquisition period, which in turn vitiates claims that new developmental stages were causative factors in language evolution.

Locke & Bogin’s (L&B’s) unusually long target article has provided an unusually thorough account of how the life cycle of humans differs from those of other primates. Instead of a solution to the puzzle of how and why language evolved, however, we are left with additional mysteries: how and why childhood and adolescence evolved. Furthermore, L&B fail to make a convincing case that any causal connection exists between novel developmental stages and language evolution.

What selected for childhood? L&B’s best suggestion is that it enabled mothers to shorten the interval between childbirths, hence to have more offspring. But since this is desirable for any species, why did childhood evolve in one primate alone? L&B have no answer. When they come to adolescence, what the authors propose does not merely fail to support their claims, it works against them. They characterize adolescence as a period for young individuals to rehearse adult economic, social, and sexual behaviors before being burdened with reproductive chores. Why would such behaviors need rehearsal unless they were noticeably more complex than behaviors of

other species? What could have made them more complex if not the long pre-existence of a language and a complex culture built on it? This suggests that language drove life-cycle changes, rather than the reverse.

The timing of these changes remains highly problematic. Virtually all the evidence comes from teeth. How the owners of those teeth were organized, their modes of subsistence, the environments and ecologies they shared – all these and more remain blank; as in too many works on human evolution, there is very little human evolution.

But the major weakness of L&B's article lies in their treatment of language. They seize upon the distinction by Hauser et al. (2002) between a broad and a narrow faculty of language, and misinterpret this as licensing the subsuming of structural and pragmatic elements under a single umbrella. They would have done better to focus on an earlier distinction of Chomsky's between I-language and E-language (Chomsky 1980). I(nternal)-language is the knowledge of language stored in the individual's brain; E(xternal)-language is the sum total of language use in a linguistic community. The first may (and probably must) have a biological foundation; the second is clearly cultural. If evolution is a biological process, as generally assumed, any inquiry into language evolution should address the first rather than the second. As a minimum, any such study should clearly distinguish between the language faculty itself and the uses to which it is put. Nobody would dream of confusing other things with the uses of those things (e.g., cars with driving, or forks with eating), yet this elementary error occurs repeatedly in work on language evolution.

Jokes, language games, gossip, oratory, extended narrative, and the like are clearly features of language use, whereas phonology, syntax, morphology, and lexicon are components of what is used in the execution of these things. Only by lumping these two sets together can L&B sustain their thesis that language acquisition lasts from infancy to adulthood.

L&B overestimate the time it takes for the structural elements to come on line. Stephen Crain and others (e.g., Crain 1991; Crain & Thornton 1998) have shown by ingenious experiments that most if not all aspects of grammar appear by the end of infancy (if not before; Crain has pointed out that such experiments don't work with children under 36 months). Of course, older children and adolescents use a richer vocabulary and longer and more complex sentences. But this results from interactions between an already-established faculty of language and the demands placed upon it by different facets of normal development. Life experience ensures that older children and adolescents have more to talk about; intellectual growth enables them to deploy their full Piagetian deck of reasoning powers; socialization obliges them to use their linguistic skills in a wide variety of contexts, each demanding its own particular, culturally determined genres, styles and idioms. The "important aspects of language" that L&B in their Abstract see as requiring "the whole of modern ontogeny" are, without exception, not aspects of language at all, but rather aspects of language use. Consequently their whole case is seriously weakened.

Meanwhile, serious questions remain. What led one species, but no other, to break out of the mold of animal communication systems that have proved perfectly adequate for every other species that has ever existed? L&B line up the usual suspects – kin selection, sexual selection, social selection – providing no account about how these have operated on a vast array of species without any remotely similar consequences. How, when, and why did the prerequisites for even a protolanguage – symbolism, predication, displacement – emerge? Was there a protolanguage, and if so what was it like, how did it develop into language? Where did syntax come from, was it adapted from something else? If so, what? If not, where do we go from there? It is such highly specific developments in language evolution that have to be accounted for, not just some amorphous something called "language."

Is it an odd and interesting fact that the only species with language and the only species with childhood and adolescence is the same species? Of course. Could there be a connection somewhere? Possibly. But L&B have not yet showed us one.

The role of developmental immaturity and plasticity in evolution

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Abstract: Aspects of cognitive immaturity may serve both to adapt children to their immediate environment and to prepare them for future ones. Language may have evolved in children's groups in the context of play. Developmental plasticity provides variability upon which natural selection operates, and such plasticity, that likely played an important role in the evolution of language, characterizes human children today.

Locke & Bogin (L&B) should be congratulated for focusing attention on the role that childhood may have played in the evolution of language. Their theorizing is consistent with that of scholars dating back to the nineteenth century and continuing today who postulated a significant role of ontogeny in phylogeny (e.g., Baldwin 1896; de Beer 1951/1958; Garstang 1922; Gottlieb 2002; West-Eberhard 2003). From this perspective, evolution is best viewed not as a succession of changes in adult form or function but as a succession of ontogenies.

Natural selection has surely had as great an impact (or even a greater impact) early in ontogeny as it has had in adulthood. Adaptive characteristics in the adult phenotype do not emerge fully formed, but must develop. Most evolutionary psychologists and anthropologists merely give lip service to selective pressures during pre-reproductive periods of the lifespan in shaping social and cognitive abilities that prove adaptive in adulthood. L&B's account of the evolution of language provides a refreshing contrast and should serve as a model for subsequent theorizing and experimentation on the evolution of language and other abilities that serve an adaptive function in adulthood.

A flexible cognitive system is required for language and the symbolic representation underlying it to evolve. The slow-developing human brain, with its increased volume relative to our hominid ancestors, afforded the plasticity necessary for the emergence of these advanced skills. It is children's brains and minds that are the most plastic and responsive to environmental modifications. Moreover, aspects of young children's immature cognitions may be especially adapted to acquiring information pertinent to the niche of childhood (*ontogenetic adaptations*; see Bjorklund 1997), and may also serve to prepare children for life as adults (*deferred adaptations*; Hernández Blasi & Bjorklund 2003). Examples of such information or skills fostered by immature cognition that have both immediate and deferred benefits include social relations developed during play and language.

Although L&B's account of how language emerges in family interactions during childhood is intriguing, an alternative account is that children invented language in play groups with their peers (in addition to perfecting it in adolescent groups). Combining words in novel, playful ways may have led not only to the invention of words, but to early syntax. In this way, language develops not only within a family, but within a larger social group. Members of these groups will continue to interact throughout childhood and as adults, and will later use their common language to communicate with their offspring. This provides a better context for development and cross-generational transmission of a language than does the family.

Children's ability to invent language is seen when they convert *pidgins* into *creoles* in the course of one generation (Bickerton