CHILDHOOD RETRIEVED

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Levinson & Holler's first layer in the phylogeny of the human communication system, marked by pointing, displacement and vocalization, was the result of the evolutionary pressure that cooperative breeding exerted on hominin communities.

> *Le génie n'est que l'enfance retrouvée à volonté*. Charles Baudelaire.

1. Context

Levinson & Holler (L&H) have recently proposed a layered model of the phylogeny of the human multi-modal sequential communication system (2014). An indication of the heuristic value of this model is that it is amenable to incremental adjustments, as I will attempt to show here.

In describing the first layer in language's emergence, L&H wrote: "Once an interactional system of gesture (including pointing) is combined with some capacity for iconic representation, itself a natural affordance of gesture, a system emerges that allows for communication about events happening elsewhere or in the past or future (Hockett's design feature of 'displacement'). … likely accompanied by simple vocalizations." (p. 4).

L&H do not specify the evolutionary process that could have accounted for this development. I submit that the evolutionary pressure was provided by cooperative breeding, which requires alloparents to enter in communicative interactions with infants in their care, widening the use of pointing interactions to dyads beyond mother/infant and spreading the use of pointing to the whole community. This development would, in turn, favor the elaboration of pointing as a communicative device, as well as the resort to the use of flexible vocal communication. In concluding, I argue that 'displacement' was likely achieved in the genus *Homo* by 1.7mya. L&H's bibliography is extensive and I have previously dealt with the subject (Naccache, 2012; Najem, Touma & Naccache, 2012; Naccache, 2014), so here I will just note the most recent references.

2. Cooperative breeding, alloparenting and 'Childhood'

There is a developing consensus that the hominins who lived in climatically unpredictable savanna-woodlands habitats departed from great ape competitive behavior and increasingly relied on cooperation (L&H, 2014). This behavioral divergence was so momentous that it has been said that “human culture is early human cooperation writ large” (Tomasello, 2014, p. 82).

Hominins started cooperating on many levels. The one of interest here is that they became *cooperative breeders* (Hrdy, 2012). A key ingredient of cooperative breeding is the need for alloparents to take care of the altricial infants. It is common practice today to estimate that if a potentiality is available to “our great ape cousins” it would have been available to our common ancestor (L&H, 2014). Based on the evidence we now have for chimpanzees, both in captivity, with an unaffiliated female adult who engaged in parenting the female infant of dizygotic twins as much as the mother (Kishimoto, 2014), and in the wild, with a case of allomothering by the mother’s sister that helped a severely disabled newborn to survive for 23 months (Matsumoto et al., 2015; see also Hobaiter et al. 2014), alloparenting was potentially available to early hominins.

Cooperative breeding among hominin led to the emergence of the life-history stage of ‘Childhood,’ a stage covering the years between weaning and permanent dentition, or from ~2.5 to 6 years-old, during which the weaned infant is not yet able to fend for herself but depends on alloparental care and provisioning for survival. The Childhood life-history stage only occurs in the genus *Homo*. Alloparents can be siblings of the infant or the mother or non-affiliated community members. They all lack the mother’s biological bond with her infant, yet they all need to communicate with the “Child” in their care.

3. Childhood and pointing

The debate about pointing in *Pan* is still ongoing and fraught with difficulties (see L&H), and I will avoid it except to point to a recent paper showing that “apes do communicate distally” (Leavens et al. 2015). Chimpanzee infants rarely point when interacting with their mothers, although cases have been reported involving “extension of the arm and fingers toward a desirable but unavailable object (…), directed to a spatially distinct potential helper (the mother chimpanzee), accompanied by gaze alternation between the recipient and object” (Hobaiter et al., 2013, p. 85), but, interestingly, they would more readily gesture and point when requesting “parenting from adults other than their mothers” (Kishimoto et al., 2014). Therefore, pointing would have been available to hominin infants in the care of alloparents.

The argument for how cooperative breeding would have spread pointing in the community and consolidated its use of is as follows. First, the children, i.e., infants in the care of alloparents, lacking the emotional “organic” communication link they had with their mother, would turn to gesturing and pointing to communicate with alloparents (Kishimoto et al., 2014). Secondly, the fact that the children would in turn become alloparents would lead to two important developments: although still *Pan*-like and restricted to the near-by, pointing interactions would be practiced by the whole community; and the age barriers to communicative interactions that hold among *Pan* would come down, helping interactions to spread to the whole community. Thirdly, with pointing practiced by the increasingly cooperative community, its deictic and referential aspects would come under mounting evolutionary pressure to be refined and developed, including the control of flexible and voluntary facial expressions, postures, actions, gestures, gazes and vocalizations associated with it.

4. Childhood and adaptive vocalization

For example, the need of alloparents and children for efficient communication would have exerted a pressure to add to pointing the less proximity-constrained vocal modality, especially since alloparents would not be biologically compelled to keep the child within sight, as is the case with *Pan*'s mothers.

It has long been assumed that our ancestor's vocal modality, though richly textured, was fixed. Now, recent and most exciting observations of *Pan* in the wild indicate the potential for multimodal communication and adaptive vocalization: A study of chimpanzees' 'laugh faces' provided "the first empirical evidence that a nonhuman primate species may produce facial expressions independently from closely associated vocalizations" (Davilla-Ross et al., 2015). A study of male bonobos' acoustically distinct vocalizations, the 'contest hoots', has "demonstrated that primate vocal behaviour, despite considerable acoustic inertia can be contextually flexible, socially directed, and deployed as part of context-specific, multi-modal combinations" (Genty et al., 2014). And finally, an acoustic analyses of the 'peep' calls of wild bonobos suggests that they "are produced in flexible ways in response to a range of different behavioural contexts of varying affective valence" (Clay et al. 2015).

Therefore, the potential for engaging in flexible, emotionally-charged vocal communication would have been available to our hominin ancestors. The limitations of pointing in communicative interactions between alloparents and children would have kept an evolutionary pressure to extend its range and add to it the increasingly flexible use of vocalization. Since the communicative context between alloparents and children would be emotionally positive, it would avoid constraining "the physical mechanics of vocal production," and would facilitate the recourse to flexible vocalization, as implied by the proposal that "in the course of language evolution, functional flexibility may first have occurred in positive and neutral contexts" (Clay et al., 2015, p. 11). Given evolutionary time, this led in our lineage to "the increasing reliance on the vocal channel" (L&H, 2014, p. 4), and this over the full range of emotions.

5. Timing

Barry Bogin had suggested that "*H. habilis* … may have had a short childhood stage of growth" (1999, p. 187). However, the consensus has been more conservative, and most researchers estimate that cooperative breeding and childhood arose with *H. erectus*, ca. 1.8 Mya (see references in Vaesen, 2011, and Naccache, 2012). But the issue is not resolved, and it has recently been noted that "human-like patterns of infant:mother mass {ratio} first evolved in the Pliocene genus *Australopithecus*. These surprising results help reconstruct the paleobiology of *Australopithecus* as a primarily terrestrial hominid *perhaps with more shared parental care* than what is found in modern great apes" (DeSilva, 2011, p. 1026, emphasis added).

Given that the processes referred to here are evolutionary ones, it is reasonable to think that they would have been protracted and may well have already started among the Australopithecine makers of the earliest stone tools, 3.3 Mya (Harmand et al., 2015). One paleo-anatomical indication for such an early start is provided by the suggestion of Quam et al. that the "early hominin auditory pattern may have facilitated an increased emphasis on short-range vocal communication in open habitats" (2015, p. 9), a development that fits in well with the need of savannah dwelling hominin cooperative breeders for an increased reliance on vocal communication.

It now remains to propose a date for when this evolutionary process would have reached the point at which 'displacement' (together with 'productivity,' another of Hockett's design features of language), would have been integrated into the communication system of our ancestors, leaving it just short of 'duality of patterning' to be fully linguistic (see Naccache, 2012). Based on the results of an experimental investigation of today's lithic tools makers that implied that "teaching or proto-language may have been pre-requisites for the appearance of Acheulean technology" (Morgan et al., 2015; see also Högberg & Gärdenfors 2015), we propose a terminus *ante quem* of 1.7 Mya for when the hominin communication system included the linguistic feature of 'displacement.'

Accordingly, L&H's "Hypothetical layers of communicative competencies as they evolved" should be modified to include the appearance of 'voluntary vocal utterances' under *Homo erectus/ergaster* at 1.7 Mya.

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