

# EVOLUTION OF THE LANGUAGE-READY BRAIN: WARFARE OR ‘MOTHER TONGUES’?

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For language to evolve, group-level normativity, cooperation and mutual understanding must have intensified beyond the range of variation permitted by non-human primate social life. Although this general assumption is broadly shared, recent theoretical models to explain the necessary group-level cooperation have clustered around two poles. At one extreme, theorists have traditionally invoked inter-group conflict including warfare. At the other, scholars have invoked grandmothering and coalitionary alliances between females to share the burdens of childcare. These competing approaches make divergent predictions testable in the light of recently available evidence from population genetics.

## 1. Introduction: two competing models

This paper is not directly about the evolutionary emergence of language, but follows a strand of thinking in EVOLANG over two decades addressing social factors constraining the process. Precedents in this respect include Terrence Deacon's (1997) concept of pair-bonding through ritual contracts; Jean-Louis Dessalles' (1998) focus on relevance in connection with hominin politics; Robin Dunbar's (2003) 'gossip and grooming' hypothesis; Tecumseh Fitch's ideas about kin selection and mother tongues (2004) and Klaus Zuberbühler's (2012) suggestion of a link between human infant babbling and cooperative breeding.

Behind these debates, evolutionary psychologists Michael Tomasello and Sarah Hrdy have been influential background figures. In her *Mothers and Others* (2009), Hrdy draws on Tomasello's careful work differentiating great ape mind-reading capacities from the joint attention, egocentric perspective reversal and intersubjectivity characteristic of human social cognition from an early age. But whereas Hrdy views alloparenting as decisive in generating mutual understanding and a language-ready brain, Tomasello et al. (2012) give priority to (1) foraging and (2) intergroup conflict or warfare. In their two-stage model for the emergence of language, these authors marginalise Hrdy's cooperative

breeding scenario as relevant only their to Stage One – foraging imperatives giving rise to shared intentionality with rudimentary symbols. Neither foraging nor reproductive imperatives, they say, suffice to explain the crucial progression to Stage Two – the emergence of community-wide norms with collective intentionality. For syntactically complex language to evolve, according to these authors (2012: 674), ‘the entire social group needed to work together interdependently in order to compete with other social groups, leading to such things as group-created conventions, norms, and institutions.’ The only factor powerful enough to generate the required interdependence, mutual understanding and within-group solidarity, they insist, would have been group selection driven by territorial conflict and associated external threat.

This divergence between Hrdy and Tomasello fits into a broader picture of two theoretical camps, one stressing childcare, the other stressing male alliances for hunting, warfare and/or defence. While EVOLANG has had a historic tendency to go against the grain in focusing on childcare and reproductive strategies (e.g. Fitch 2004; Power 2014), among evolutionary theorists this has been a minority position.

## **2. The warfare model**

With few exceptions, primatologists speculating on human origins have argued that because humans are great apes, it follows that hunter-gatherers, like their great ape relatives, must always have been male-philopatric. Palaeolithic archaeologists and evolutionary theorists have frequently followed this tendency among primatologists to emphasise the centrality of male kin-bonding to key developments in human evolution. Linked with this have been assumptions about paternity certainty, fights over women, leadership hierarchies, aggression, territorialism – and warfare between neighbouring bands. Key figures here (broadly converging but without necessarily agreeing on all points) have been Alexander (1987), Bowles (2009), Chapais (2008), Foley and Gamble (2009), Gavrilets (2012) and Wrangham and Peterson (1997).

## **3. Mothers and others**

According to the strikingly different (and arguably more gender-aware) perspective of Hrdy (2009; see also Burkart et al. 2014), the transition from the psychology of bipedal apes to ‘emotional modernity’ in genus *Homo* involved significantly raised reproductive costs which could be met only by sharing burdens, progressively collectivising childcare. Mothers enlisted the help of their mothers and also their own children together with sisters and other relatives (including eventually males) in a process which profoundly transformed all

aspects of human psychology, social structure and communication. Mothers, their babies and other carers would interact, probing and testing to see whether sufficient trust could be established between them, these interactions fostering the development of two-way mind-reading, joint attention and intersubjectivity. The evolution of our distinctively human ‘cooperative eyes’ and language-ready brain begins here.

The alloparenting model provides supportive context for Fitch’s ‘mother tongues’ hypothesis, particularly where pathways of allocare by juveniles or older siblings are stressed (Kramer and Otárola-Castillo 2015). Mothers and their older offspring come under selection pressure for more intense cooperation over longer periods of life-history, leading to increasingly stable extended sibling networks. If we take it that in the period before farming, males tended to be nomadic rather than attached to place, a picture emerges in which, having found a bride, a young man might temporarily visit her among affines while regularly returning ‘home’, movement between nearby camps enabling each to retain childhood links with mother, sisters and other natal kin. Where this pattern prevails, bonds of trust between siblings of opposite sex may be retained and regularly serviced throughout adult life, enhancing the stability of kin-based strategies of co-operative communication along lines consistent with Fitch’s (2004) ‘mother tongues’ language evolution model.

#### **4. New evidence from genetics**

Ground-breaking new research by population geneticists may help us to decide between these competing models. The work depends on the familiar fact that mitochondrial DNA is transmitted through females, Y chromosome DNA through males. Matrilocal residence, where traditionally practiced over successive generations, yields a tight local clustering of mtDNA lineages while Y chromosome sequences are dispersed. Conversely, patrilocal residence yields localised Y chromosome lineages while dispersing corresponding sequences of mtDNA. The significant finding is that the former pattern characterises African hunter gatherers, the latter pastoralists and farmers (see references below). This constitutes suggestive evidence that over the millennia, females in the major hunter-gatherer regions of sub-Saharan Africa have opted to reside postmaritally with maternal kin, male kin moving from their birthplace to reside with in-laws. With the transition to farming the reverse pattern comes to prevail: matrilocality is overridden and patrilocality becomes the norm.

To scholars interested in narrowing down the specific social conditions likely to have been responsible for the emergence of language, these findings are significant. We now have several robust studies by independent scholars

cumulatively confirming an African hunter-gatherer matrilocal bias. For Central African (Pygmy) populations, see Verdu and Austerlitz (2015) and also Destro-Bisol et al. (2004). For Southern African (Khoisan) hunter-gatherers, see Schlebusch (2010). Wood et al. (2005) suggest that the pattern noted is pan-African. An earlier global study by Hammer et al. (2001) suggests that the pattern may apply cross-culturally.

Although these findings are in one sense new, they confirm on the basis of twenty-first century methods a pattern long familiar to anthropologists working among immediate return hunter-gatherers. Among the Hadza of Tanzania, it is unusual for an adult woman to be living apart from her mother during the early years of her married life. Woodburn (1968), Blurton-Jones et al. (2005) and Wood and Marlowe (2011) all concur in stating that postmarital residence is flexible but with a matrilocal bias. Much the same applies to the once-numerous southern African Khoisan hunter-gatherer populations (Lee 1979; Marshall 1959, 1976). Studies by hunter-gatherer specialists across the world indicate that the traditional concept of a patrilocal band, once a staple of social evolutionary theorising, has in fact no applicability to the nomadic hunter-gatherer lifestyle (Alvarez 2004; Marlowe 2004).

The new findings from African hunter-gatherer population genetics suggest that the matrilocal bias found among extant populations is not an outlier or product of recent marginalisation but represents a default for humans across the continent prior to the emergence of farming. Residence among these assertively egalitarian immediate-return hunter-gatherers is almost always matrilocal during the crucial early years of a first child's life, when the mother is most in need of help. Even where a woman subsequently chooses to reside patrilocally, she is likely to retain close links with mother, either because distances are not great or because an older woman will choose to live with a child-burdened daughter in order to help in a grandmothering role.

## **5. What is the relevance to EVOLANG?**

All this has implications for the study of human social and cognitive evolution and therefore for the origins of language. Although the time-depth of the genetic studies remains relatively shallow – reaching back at most a few thousand years – the results cast doubt on the assumption that the intense cooperation necessary for the evolution of language must have emerged as an adaptation for warfare. We may agree with Wrangham and others that territorial conflict is practised by chimpanzees, frequently in the form of a male gang from one group cornering and severely assaulting a lone individual from another. But since these primate relatives of ours lack either group-level normativity or language, we in

EVOLANG surely need to assume not primatological continuity but the emergence of something new. In light of the new genetic evidence, a shift from male to female philopatry (in anthropological terms, from patrilocal to broadly matriloca residence) must have been part of the novel package. The picture shifts from territorialism and warfare to something much closer to what is actually found among extant immediate-return hunter-gatherers – high levels of trust between neighbouring bands, in-laws constantly visiting one another across permeable or non-existent boundaries, substantial gender equality, an absence of leaders – and community relations in which playful, good-humoured forms of social pressure limit the disruptive consequences of interpersonal conflict.

These findings help explain why a language-ready brain evolved among our own ancestors but in no other lineage of great apes. Male philopatry means that a female chimpanzee must leave her natal group on reaching sexual maturity and move to where she has no female relatives to support her. Infanticide risks being high, no chimpanzee mother would dare to leave her baby alone with another carer – she would fear for its safety. This restriction actively hinders mothers from producing offspring with large, slow-maturing and correspondingly costly brains. Note also that it is not possible for an older female to support her adult daughter's reproduction if that daughter has been forced to relocate and raise her offspring in a neighbouring group's territory. The greater the geographical distance, the harder it is for a grandmother to forage for her daughter or protect her grandchildren from hunger or harassment. Because great apes are condemned to being single mothers, selection pressures have in their case discriminated against burdensome offspring with larger brains; in this sense, male philopatry imposes what has been termed a 'gray ceiling' (Isler and van Schaik 2012) – preventing brain size from exceeding a certain limit.

Clearly, evolving human mothers found a way to break through those great ape encephalisation constraints. Brain size in genus *Homo* reached double that of previous hominins early in the Pleistocene, smashing that gray ceiling – indicating that cooperative breeding was already underway with *H. erectus*. This laid the foundation for the subsequent tripling of brain size in *H. heidelbergensis* and descendants. The secret of producing and caring for burdensome offspring with increasingly large (and by implication 'language-ready') brains was for mothers and daughters to stay together, if not always through strict matriloca residence, at least through sufficient residential flexibility for a mother to move to wherever her daughter chose to live.

## **6. Brideservice as the alternative to warfare**

Wherever hunter-gatherers still follow traditional ways, brideservice is the fundamental economic institution (Collier and Rosaldo 1981). Brideservice means that males do not attempt to kill rivals in neighbouring bands in order to carry off females. Instead, the strategy which proves evolutionarily stable is one in which groups of related males successfully defend their female kin, meanwhile compelling neighbouring males to earn any ongoing marital rights by visiting periodically and bringing home provisions. 'Women expect meat from lovers', as Collier and Rosaldo (1981: 314) put it, referring to 'brideservice societies' throughout the world. Groups of brothers, while ready at all times to return home to defend sisters, look elsewhere to supply meat to and thereby earn ongoing marital rights with unrelated brides in nearby locations where they are visitors and must therefore adopt correspondingly reversed roles.

Effective brideservice correlates broadly with matrilocal residence because the more distant a daughter is from her natal home, the more difficult it becomes for her kin to demand continuing services from their son-in-law. When a bride resides with the family of her spouse, her kin lack the control they might exert where a son-in-law is obliged to keep visiting them, providing game meat on pain of losing his sexual rights. In life-history terms, the longer the period of initial matrilocal residence, the greater the amount of brideservice which can be extracted and so the better-provisioned the mother and her baby. The connection with the evolution of large brains should by now be clear.

All this invites us to envisage an evolutionary scenario radically at odds with the currently favoured 'primitive warfare' model. Endlessly unresolved male-on-male conflict could not conceivably have increased provisioning support or safety for mothers and their vulnerable offspring. A dynamic in which male solidarity falls apart in the absence of external warfare provides no basis for the cultural 'ratchet effect' (Tomasello et al. 1993). Where warfare is endemic, cumulative cultural evolution is threatened because it depends on continuous victory and no foraging group can expect to win all the time. In this kind of situation, conflicts between neighbouring groups of males can find no resolution because neither side can afford to lose. It is quite different with gender conflict, because here, female coalitionary action can raise the costs of attempting dominance to the point where males have a genetic interest in 'losing' to females – that is, to successful mothers who are likely to be co-operatively nurturing their own and one another's offspring. This yields gender solidarity through essentially playful conflict between opposed gender camps – the pattern still characteristic of African immediate-return hunters and gatherers.

Gender strategies and issues of trust are all too often absent from current evolutionary models. By focusing on them when discussing the origins of language, we can begin to understand more precisely just how and why it was that large-brained *Homo sapiens* succeeded in making the breakthrough to an egalitarian political ethos of the kind necessary for linguistic cognition and communication to evolve.

### 6.1. References

- Alexander, R. (1987). *The Biology of Moral Systems*. Hawthorne, N.Y.: Aldine.
- Alvarez, H. (2004). Residence groups among hunter-gatherers: a view of the claims and evidence for patrilocal bands. In B. Chapais & C. Berman (Eds.) *Kinship and Behavior in Primates*. New York: OUP, pp. 420-442.
- Blurton-Jones, N., Hawkes, K., O'Connell, J. F. (2005). Older Hadza men and women as helpers: residence data. In: Hewlett, B.S., Lamb, M.E. (Eds.) *Hunter-gatherer childhoods*. New Brunswick, NJ: Aldine, pp. 214-236.
- Bowles, S. (2009). Did warfare among ancestral hunter-gatherers affect the evolution of human social behaviors? *Science*, Vol. 324 (5) June 1293-1298.
- Burkart, J. M., Allon, O., Amici, F. et al., (2014). The evolutionary origin of human hyper-cooperation. *Nat. Commun.* 5, 4747.
- Chapais, B. 2008. *Primeval Kinship: How Pair Bonding Gave Birth to Human Society*. Cambridge, MA: Harvard University Press.
- Collier, J. F. & M. Z. Rosaldo (1981). Politics and gender in simple societies. In S. B. Ortner and H. Whitehead (Eds.), *Sexual Meanings. The cultural construction of gender and sexuality* (pp. 275-32). Cambridge: CUP. Deacon, T. (1997). *The symbolic species: The co-evolution of language and the human brain*. London: Penguin.
- Dessalles, J.-L. (2000). Language and hominid politics. In C. Knight, M. Studdert-Kennedy & J. R. Hurford (Eds.), *The Evolutionary emergence of language* (pp. 62-80). Cambridge: CUP.
- Destro-Bisoli G., Donati F., Coia V., Boschi I. et al., (2004). 'Variation of female and male lineages in sub-saharan populations: the importance of sociocultural factors.' *Mol. Biol. Evol.* 21: 1673-82.
- Dunbar, R. I. M. (1996). *Grooming, gossip and the evolution of language*. London: Faber & Faber.
- Fitch, W. T. (2004). Kin Selection and 'Mother Tongues': A Neglected Component in Language Evolution. In D. Kimbrough Oller & Ulrike Griebel (Eds.), *Evolution of Communication Systems: A Comparative Approach*, pp. 275-296. Cambridge, MA: MIT Press.
- Foley, R. & C. Gamble (2009). The ecology of social transitions in human evolution. *Philos Trans R Soc Lond B Biol Sci.* Nov 12, 2009; 364(1533): 3267-3279. doi: 10.1098/rstb.2009.0136.
- Gavrillets, S. (2012). Human origins and the transition from promiscuity to pair-bonding. *PNAS* June 19, vol. 109, no. 25, pp. 9923-9928.
- Hammer M.F., Karafet T.M., Redd A.J. et al. (2001). 'Hierarchical patterns of global human Y-chromosome diversity.' *Mol. Biol. Evol.* 18: 1189-203.
- Hrdy, S. B. (2009). *Mothers and others. The evolutionary origins of mutual understanding*. Cambridge, MA: Harvard University Press.

- Isler, K. & van Schaik, C.P. (2012). How our ancestors broke through the gray ceiling: Comparative evidence for cooperative breeding in early *Homo*. *Current Anthropology* 53, S6, Human biology and the origins of *Homo* (December): S453-S465
- Keeley, L. (1996). *War before civilization: the myth of the peaceful savage*. Oxford: OUP.
- Kramer, K. L. & E. Otárola-Castillo (2015). When mothers need others. Life history transitions associated with the evolution of cooperative breeding. *Journal of Human Evolution* 84:16-24.
- Lee, R. B. (1979). *The !Kung San. Men, women and work in a foraging society* (pp. 24-42). Cambridge: CUP.
- Marlowe, F. (2004). Marital residence among foragers. *Current Anthropology* 45: 277-283.
- Marshall, L. (1959). Marriage among !Kung Bushmen. *Africa* 29:335-365.
- Marshall, L. (1976). *The !Kung of Nyae Nyae*. Cambridge, MA: Harvard UP.
- Power, C. (2014). Female philopatry and egalitarianism as conditions for the emergence of intersubjectivity. In E. A. Cartmill, S. Roberts, H. Lyn and H. Cornish (Eds.), *The Evolution of Language. Proceedings of EVOLANG X*. World Scientific, pp. 252-259.
- Schlebusch, C. M. (2010). 'Genetic variation in Khoisan-speaking populations from southern Africa.' Dissertation, University of Witwatersrand.
- Tomasello, M., Kruger, A. & Ratner, H. 1993. Cultural learning. *Behavioural and Brain Sciences* 16 495-552.
- Tomasello, M., A. P. Melis, C. Tennie, E. Wyman and E. Herrman (2012). Two key steps in the evolution of human cooperation : The interdependence hypothesis. *Current Anthropology* 53(6): 673-692.
- Verdu, P. & F. Austerlitz, (2015). 'Post marital residence behaviours shape genetic variation in hunter-gatherer and agricultural populations from Central Africa.' *Hunter Gatherer Research*, 1:1.
- Wood, B. & F. Marlowe (2011) Dynamics of postmarital residence among the Hadza. *Human Nature* 22: 128-138.
- Wood, E.T., Stover D.A., Ehret C. et al., (2005). Contrasting patterns of Y chromosome and mtDNA variation in Africa: evidence for sex-biased demographic processes. *Eur. J. Hum. Genet.* 13: 867-76.
- Woodburn, J. (1968) Stability and flexibility in Hadza residential groups. In: Lee, R.B. and I. DeVore, (Eds.) *Man the Hunter* (pp. 103-110). Chicago: Aldine.
- Wrangham, R. & D. Peterson (1997). *Demonic Males: Apes and the Origins of Human Violence*. New York: Houghton Mifflin.
- Zuberbühler, K. (2012). Cooperative breeding and the evolution of vocal flexibility. In Tallerman, M. & K. Gibson (Eds.), *The Oxford handbook of language evolution* (pp. 7-81). Oxford: OUP.