The Evolution of Human Sociality

Lectures in Cognitive Semiotics, ENS, Paris 2012

Lecture 3

Jordan Zlatev

Department of Linguistics
Centre for Cognitive Semiotics (CCS)
Lund University

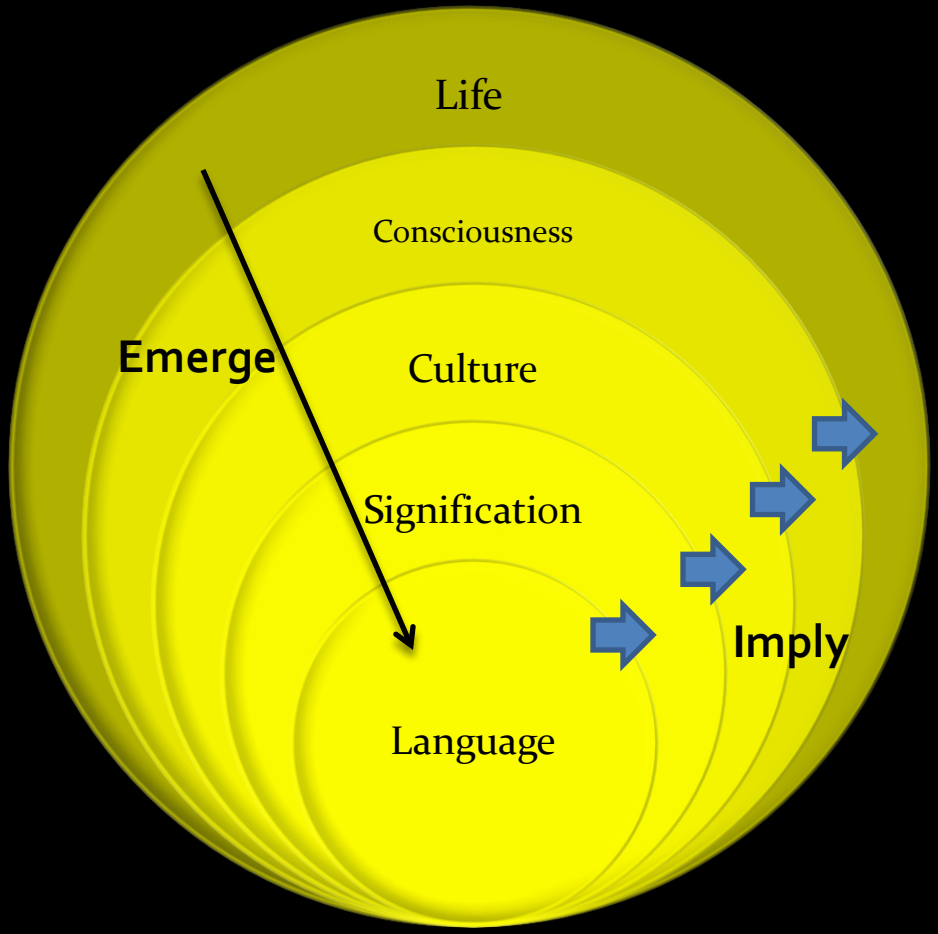
Preamble

- Conceptual issues are epistemologically prior to empirical issues - though not immune to them.

- The answer to the question: “What is culture/language?” is prior to the question: “How did culture/language evolve?” (though not immune to it).

- The main reason why theories of language origins vary enormously, is due to the fact that researchers, explicitly or not, depart from different conceptual assumptions on what language is.

The Ladder of Meaning



(Preliminary) definitions

- Consciousness: initially, a "minimal self" pre-reflectively experiencing (some element) of its (life)world
- Culture: socially transmitted knowledge (attitudes, values, beliefs etc.) influencing behavior
- Sign: an expression "doubly differentiated" from its content, for one or (typically) more subjects
- Language: a norm-governed (but not determined) system for the production of non-arbitrary, but conventional (socially shared) signs

Semantic differences within and between languages

consciousness, awareness, sentience, mind, thought, cognition

cognition < consciousness (awareness, sentience, mind) < thought

medvetande, sinne, kognition, tänkande

kognition < sinne, medvetande < tänkande

мысль, сознание, знание

мысль, мышление < (со)знание OR (со)знание < мысль, мышление

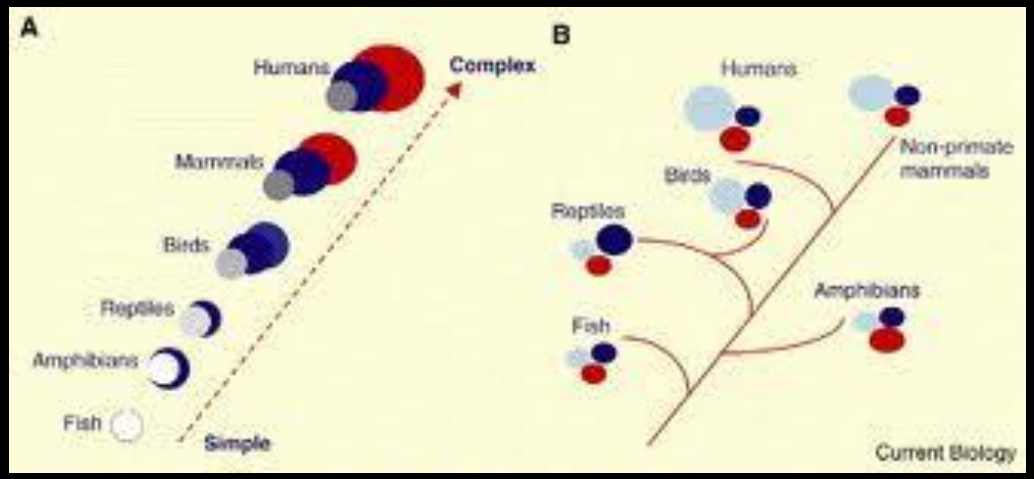
connaissance, conscience, esprit… ?

“Evolution”

1. any process of formation or growth; development: *the evolution of a language; the evolution of the airplane.*
2. a product of such development; something evolved: *The exploration of space is the evolution of decades of research.*
3. *Biology*. change in the gene pool of a population from generation to generation by such processes as mutation, natural selection, and genetic drift.
4. a process of gradual, peaceful, progressive change or development, as in social or economic structure or institutions.

dictionary.com

Can we bring the two together?



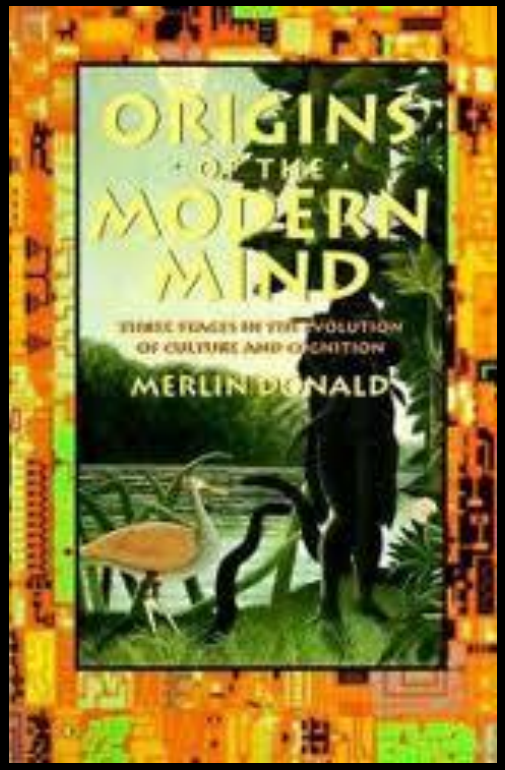
Yes, if we combine:

a) Darwinian models that are not "genocentric"

b) Marco-evolutionary ("progressivist") models that are consistent with Darwinian logic

(a) Donald's theory of the evolution of human culture and language

Stage	Species/period	Novel forms of representation	Manifest change	Cognitive governance
EPISODIC	primate	complex episodic event-perceptions	improved self-awareness and event-sensitivity	episodic and reactive; limited voluntary expressive morphology
MIMETIC (1st transition)	early hominids, peaking in *H. erectus;* 4M-0.4 Mya	nonverbal action-modelling	revolution in skill, gesture (including vocal), nonverbal communication, shared attention	mimetic; increased variability of custom, cultural "archetypes"
MYTHIC (2nd transition)	sapient humans, peaking in *H. sapiens sapiens;* 0.5 Mya - present	linguistic modelling	high-speed phonology, oral language, oral social record	lexical invention, narrative thought, mythic framework of governance
THEORETIC (3rd transition)	recent sapient cultures	extensive external symbolization, both verbal and nonverbal	formalisms, large scale theoretic artifacts and massive external memory storage	institutionalized paradigmatic thought and invention



(b) Cultural Darwinism

"The logic of natural selection applies to culturally transmitted variation every bit as much as it applies to genetic variation. For natural selection on culture to occur,

- people must vary because they have acquired different beliefs or values through social learning, [variation]
- this variation must affect people's behavior that affect the probability that they transmit their beliefs to others [inheritance] , and
- the total number of culture variants that can exist in the population must be limited in some way" [selection]

(Richerson & Boyd 2005: 76)

Overview of today's lecture

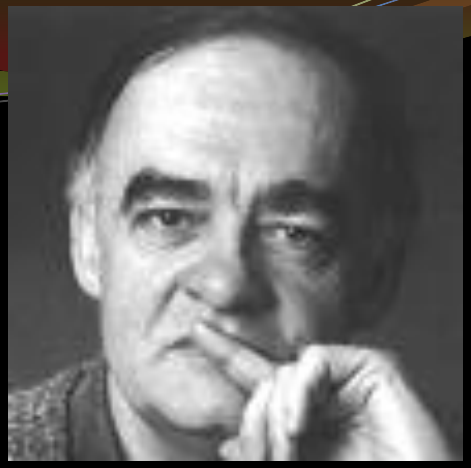
1. Donald's theory of human cognitive macro-evolution (Donald 1991, 2001): how can it be combined with Darwinian (micro)evolution?
2. Three key features of human "ultrasociality": intersubjectvity, morality and language – how could they (co)evolve? Multi-level selection!
3. Comparing four current theories of the evolution of human sociality
4. A composite account
5. Conclusions

Zlatev, J. (in press). The co-evolution of intersubjectivity, morality and language. In K. Knight, J. Lewis, & D. Dor (Eds). *The Social Origins of Language*. Oxford: Oxford University Press.

1. Donald's theory and bodily mimesis

Is it consistent with Darwinian evolution?

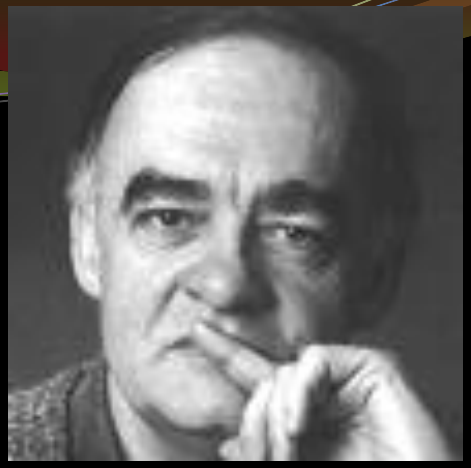
(Bodily) mimesis



"Mimetic skills or mimesis rests on the ability to produce conscious, self-initiated, representational acts that are intentional but not linguistic."
(Donald 1991: 168)

"The important properties of individual mimetic acts include intentionality, generativity, communicativity, reference, autocuing, and the ability to model an unlimited number of objects."
(Donald 1991: 171)

(Bodily) mimesis



"Mimesis is really about acting. It manifests in pantomime, imitation, gesturing, shared attention, ritualized behaviors, and many games. It is also the basis of skill rehearsal, in which a previous act is mimed, over and over, to improve it." (Donald 2001: 240)

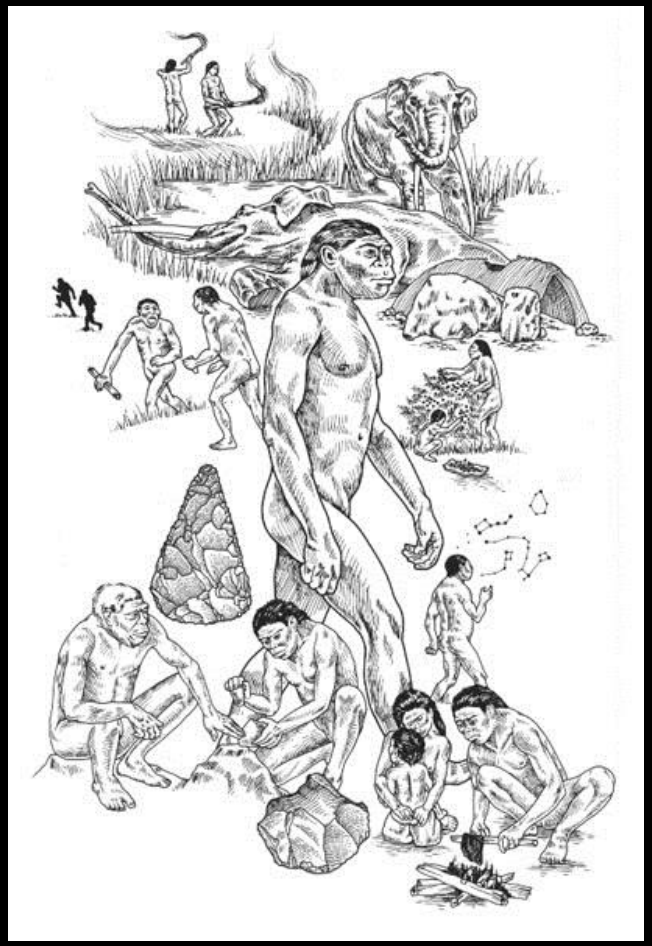
"Mimesis served as a mode of cultural expression and solidified a group mentality, creating a cultural style that can still be recognized as typically human." (Donald 2001: 261)

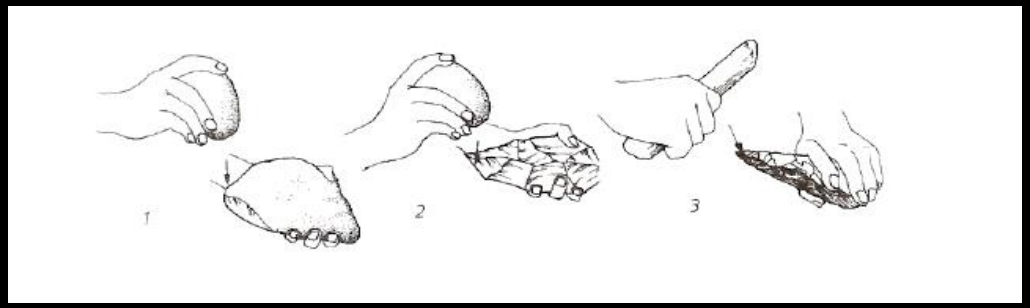
Stage	Species/period	Novel forms of representation	Manifest change	Cognitive governance
EPISODIC	primate	complex episodic event-perceptions	improved self-awareness and event-sensitivity	episodic and reactive; limited voluntary expressive morphology
MIMETIC (1st transition)	early hominids, peaking in *H. erectus;* 4M-0.4 Mya	nonverbal action-modelling	revolution in skill, gesture (including vocal), nonverbal communication, shared attention	mimetic; increased variability of custom, cultural "archetypes"
MYTHIC (2nd transition)	sapient humans, peaking in *H. sapiens sapiens;* 0.5 Mya - present	linguistic modelling	high-speed phonology, oral language, oral social record	lexical invention, narrative thought, mythic framework of governance
THEORETIC (3rd transition)	recent sapient cultures	extensive external symbolization, both verbal and nonverbal	formalisms, large scale theoretic artifacts and massive external memory storage	institutionalized paradigmatic thought and invention

(Donald 2007: 218)

Functions of bodily mimesis

- Imitation and teaching: for cultural learning
- Practice: for the rehearsal of skills
- Imagination: for planning action sequences and for imitation play
- Pantomime and gesture: for displaced communication
- "Group mentality": for intersubjectivity and cultural evolution





Evidence: Archeology

Features of *Homo ergaster/erectus* (1,800,000-15,000 YA)

- Double increase in body and brain size compared to *austalopithecines*
- Stable bipedalism, endurance running (hunting, scouting)
- Achulean technology, requiring considerable skill practice and pedagogy
- Migration all over Euroasia
- Fire (at least 400,000 YA)
- Possibly lacking a fossilizing marker that is still plausibly connected with speech - an extended thoracic canal, for controlling breathing (MacLarnon & Hewitt 1999, 2004)

Evidence: Primatology

"…striking differences between humans and great apes stand firm in eight out of nine of these domains" (Vaesen 2012: 203)

* Hand-eye coordination
- Body schema plasticity
* Causal reasoning
* Functional representation (e.g. canonical functions)
* Executive control (e.g. inhibition, forethought…)
* Social learning (e.g. imitation)
* Teaching
* Social intelligence (e.g. "theory of mind")
* Language

Bodily mimesis

"… no individual cognitive trait can be singled out as the key trait differentiating humans from other animals." (Vaesen 2012: 203)

BEHAVIORAL AND BRAIN SCIENCES (2012) 35, 203–262

Problems

1. But chimpanzees (and perhaps other species) also make tools and have (simple) cultures: why do the latter not lead to cumulative cultural evolution and language?
   Human "ultrasociality" (Tomasello 1999; Richerson & Boyd 2005)

2. What evolutionary model can account for the evolution of "ultrasociality"?

2. Human ultrasociality

Can it be explained by Darwinian evolutionary logic?

Human ultrasociality…

Human beings share to an unprecedented degree:

1. food and care for infants and children, unique among the Great Apes (Hrdy 2009)
2. hard-won resources with everyone in the group (Weissner 2002)
3. intentions and commitments to joint actions (Tomasello 2008)
4. linguistic norms and their use for honest communication (Clark 1995)
5. moral norms and religious beliefs

… is paradoxical for "genocentrism"

- "… a fundamental evolutionary principle: costly group-beneficial behavior cannot evolve unless the benefits of group-beneficial behavior flow non-randomly to the genes that give rise to the behavior" (Richerson & Boyd 2005: 198)
  - Kin-selection (Hamilton 1964): can explain cooperation only in species that are very closely related, e.g. social insects such as bees
  - Reciprocity (Trivers 1971): can evolve in small groups, else vulnerable to free-riders
  - Reputations: imply fairly advanced memory systems and, unless "bystanders" are present: communication
  - Retribution: "second-order free-riders", requires group-wide norms (= morality)

An additional problem

"The problem is that the three Rs can stabilize *any* behaviour. If everybody agrees that individuals must do *X*, and punish those who do not do *X*, then *X* will be evolutionarily stable as long as the costs of being punished exceed the costs of doing *X*. It is irrelevant whether *X* benefits the group or is socially destructive. It will pay to do *X*. Thus, the three Rs can explain how cooperative behaviours like participating in group defense can be favoured by evolution, but they can also explain anything else."

(Boyd & Richerson 2009: 3283)

The paradox can be resolved by

- Multi-Level Selection (MLS) theory (Sober & Wilson 1998, 2008): selection occurs on the levels of genes, cells, organisms and groups, with complex trade-offs and "arms-races"

- Cultural group selection (Richerson & Boyd 2005), a special case of MLS, with focus on cultural evolution, and gene-culture co-evolution

The four steps in the co-evolutionary model

1. Advanced social learning made cumulative cultural evolution possible, and increased heritable variation between groups.
2. The "three Rs" stabilize different kinds of social behaviors, leading to pronounced differences between groups.
3. Competition between groups would favor those with higher cooperative tendencies.
4. Selection within these most successful groups "favoured genes that gave rise to new, more pro-social motives. Moral systems enforced by systems of sanctions and rewards increased the reproductive success of individuals who functioned well in such environments, and this in turn led to the evolution of other regarding motives like empathy and social emotions like shame" (Boyd & Richerson 2009: 3281-82).

But…

- What led to "advanced social learning" (imitation, teaching) in the first place?
- "an ability to communicate with displacement is critical because such communities must continuously track everyone's behavior and group members are often dispersed" (Boehm 2000: 156): a "proto-language" would be necessary for "the three Rs" (to stabilize differences)
- Evidence for cumulative cultural evolution is fairly recent (ca. 200,000 YA), while evidence for human-specific culture is much older
- An account in which the co-evolution of intersubjectvity, morality and language is needed!

3. Four such current co-evolutionary theories

A comparison and evaluation

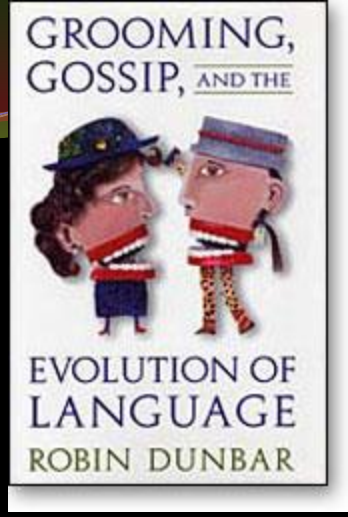
On the evolution of human (ultra)sociality

1. Dunbar (1996): *Vocal grooming* (as main mechanism of social bonding)
2. Deacon (1997): *Sex contract* (regulating sex in multi-male/female groups)
3. Tomasello (2008): *Shared intentionality and Pro-social motivation* (for joint action and cooperative communication)
4. Hrdy (2009): Alloparenting or "cooperative breeding" (altering interpersonal relations, especially with respect to children)

Criteria

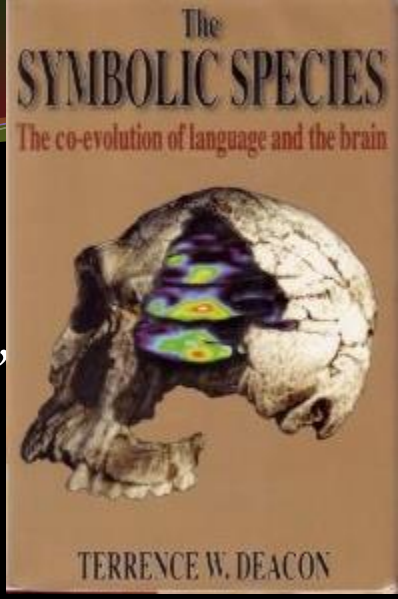
1. WHY: A (plausible) explanation of why "ultrasociality" evolved in the *Homo* genus - rather than the Great Apes (or any other social species)?
2. HOW: By what kind of evolution: individual, group, multi-level?
3. WHEN: Consistent with anatomical changes (bipedalism, reduced canines, reduced sexual dimorphism…) attested by the archeological record?
4. ANTHRO: Consistent with anthropological evidence from present hunter-gatherer societies?
5. DEVO: Consistent with developmental evidence, concerning infant intersubjectivity and attachment?

1. Vocal grooming



1. Unusually large groups for primates, impossible to manage without increased brain size and "vocal grooming". But why? "Environmental pressures"… Why not others (e.g. gelada baboons)?
2. Individual-level selection: but what are "optimal group sizes"?
3. 500,000 – 200,000 YA: "late" (Dunbar 2009)
   But early adaptations: from *Ardipithecus ramidus* to *Homo erectus*?
4. Groups of ≈ 150 (the "Dunbar number")
   But contested for hunter-gatherers: smaller for "bands", larger for "tribes", and speech communities.
5. No special focus on development.

2. Sex contract ("marriage")



1. Transition to (partial) monogamy in result to "evolutionary bottleneck": (a) multi-male/female groups, (b) immature infants with large brains, dependent on maternal care and (c) paternal provisioning.
   A possible scenario for the evolution of morality or perhaps "love" (Fisher 1992)
2. Groups with sex-based division of labor outcompeted others => Group selection
3. "Early" (4 MYA): to allow a long process of "brain-language co-evolution": but no evidence for so early (proto)language
4. Distribution of food is not limited to the "nuclear families": a fairly modern concept; human fathers vary enormously in their commitment to progeny.
5. Division of labor etc. concern only adults, no special role for infants.

3. Shared intentionality

1. Shared ("we") intentionality (joint actions) evolved (a) "in the context of mutualistic collaborative activities" (Tomasello 2008: 170) + (b) "at some late point to invoke processes of social identification and conformity to account for the sharing motive" (ibid : 171)
   => Only "in principle" explanation…
2. "Mutualism" + "cultural group selection" (?)
3. "Late" (?) Why these two steps?
4. Anecdotal
5. Attesting informative, cooperative impulses in children (compared to chimpanzees), prior to language - but are these due to the "former" or "later" adaptation?

4. Alloparenting: WHY?

- Alloparenting primates like marmosets and tamarins are "unusually altruistic, displaying a curiously human impulse to give" (ibid: 96).
- In all Great Apes, mothers are (nearly always) the only ones to hold and nurse infants: fear of infanticide and kidnapping.
- "…an unprecedented convergence – the evolution of cooperative breeding in a primate already possessing the cognitive capacities … typical of all Great Apes" (ibid: 280)
- Allowing fast rates of reproduction despite large, slowly maturing and "costly" babies.

4. Alloparenting: HOW?

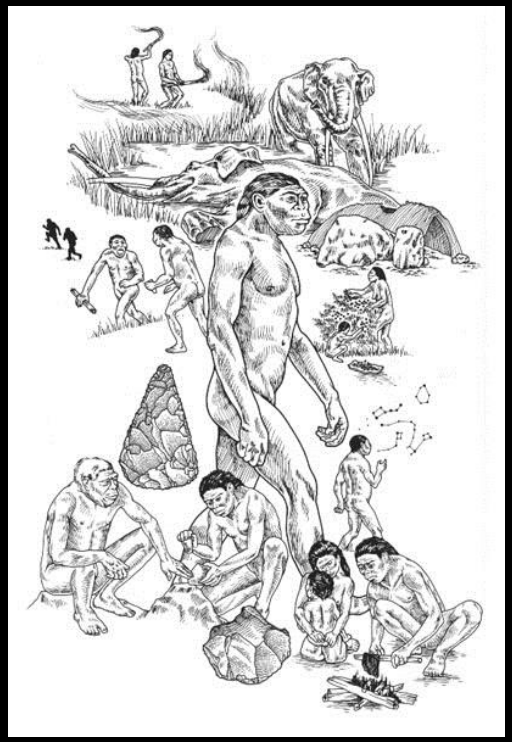
- Natural selection on mothers, "others" and children:

  "Mothers can overshoot their capacities to provide, and fathers can vary, because both sexes evolved in a highly fluid system where alloparents often provided the compensatory assistance" (: 167)

  … self-reinforcing evolutionary process of parents and alloparents who are more sensitive to infantile signals and babies who are better at emitting them (: 220)

- Group selection (implied): groups that adopted alloparenting reproduced disproportionally compared to those who did not.

4. Alloparenting: WHEN?



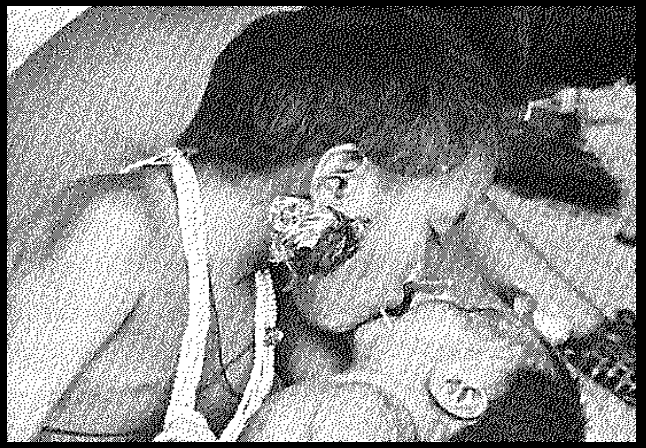
Early – at least with *Homo erectus* 1.8 MYA: changes in diet, division of labor, "grandmothers"…

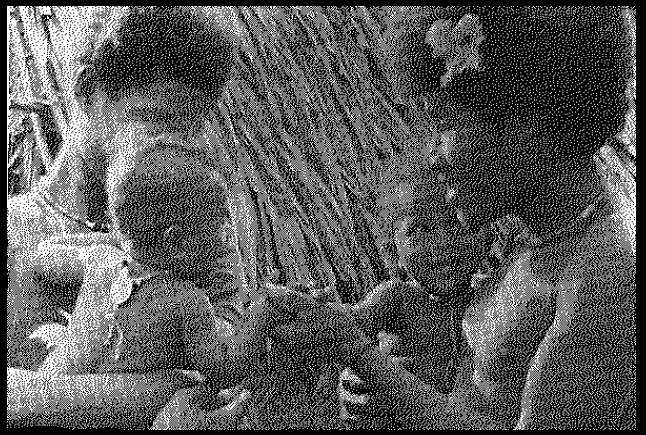
Or even earlier:

4.4 MYA: *Ardipithecus ramidus* ("Ardi"): Partial bipedalism, reduced male canine teeth; co-evolutionary bodily changes leading to more immature infants, prolonged childhood, stronger need for care

4. Alloparenting: ANTHRO, DEVO

- In hunter-gather societies (e.g. Himba, Yanomamo, Aka, !Kung), care is shared between mothers and alloparents – and sometimes, fathers.
- Children adapted for intersubjectivity with multiple care-givers: increased understanding of perspective and self-awareness
  - "…the infant has far more incentive to monitor his mother's whereabouts and to maintain visual and vocal contact with her, as well as far more motivation to pay attention to her state of mind and to the willingness of others who might be available to care for him when his mother disinclines." (: 114)





4. Alloparenting: Summary

"Without doubt, highly complex co-evolutionary processes were involved in the evolution of expanded lifespans, prolonged childhoods, and bigger brains. What I want to stress here, however, is that cooperative breeding was the pre-existing condition that permitted the evolution of these traits in the hominin line. Creatures may not need big brains to evolve cooperative breeding, but hominins needed shared care and provisioning to evolve big brains. Cooperative breeding needed to come first." (Hrdy 2009: 277)

Comparing the four theories

	Dunbar	Deacon	Tomasello	Hrdy
(1) WHY	"Ecological pressures" (?)	"Evolutionary bottleneck"	-	"Winning strategy"
(2) HOW	Individual-level selection (?)	Group Selection	Mutualism + Cultural Group Selection (?)	Multiple-level section
(3) WHEN	Late (?)	Early (language?)	Early + Late (?)	Early
(4) ANTHRO	Dunbar's number (?)	Universal monogamy (?)	-	Alloparenting
(5) DEVO	-	-	Parent-Child	Mother-Community-Child

(?) signifies: "problematic"

Conclusion of the comparison

- Deacon and Dunbar are in some ways complementary: early non-vocal "symbolic reference", later vocal "gossip", but both too much role for language
- Tomasello and Hrdy are also complementary, with Hrdy provding the missing answers: early (group) selection based on alloparenting, and (much) later on Richerson-Boyd style "gene-culture co-evolution"
- All four theories (even Dunbar) imply group selection, and for traits that could be transmitted culturally (e.g. "marriage"): cultural group selection
- All four theories provide possible pieces for an account of the social evolution of language

4. A composite account

In brief, to be continued in Lecture 4

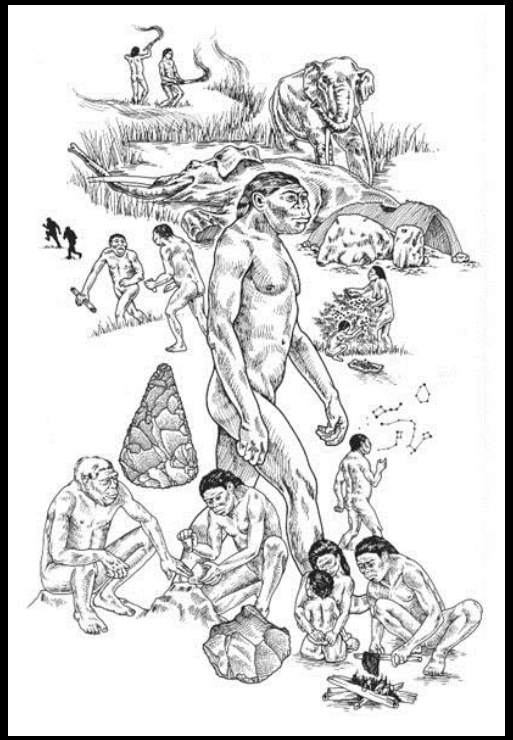
1. Alloparenting: 4-1.8 MYA

- If "alloparenting came first" as argued by Hrdy (2009), then it can be hypothesized to have begun even *before* the major changes that happened with *Homo erectus*.

- It may even have been one of the crucial factors that led to them, perhaps even contributing to the establishment of habitual bipedalism.

2. Sex contract and morality (1.8-0.5 MYA)

- Deacon's "sex contract" and the co-evolution of morality and "symbolic reference" could be linked to *Homo erectus*: with larger, more coherent and technologically advanced social groups, needed for e.g. long-distance migration.



3. Vocalization, multimodal communication (0.5-0.1 MYA)

- Non-symbolic vocalization would at first have had mostly affiliative functions (Dunbar 2009), but could have with time been "reinterpreted" symbolically, given the tight synchronization of multimodal, hand-mouth, communication (Brown 2012).

- Cumulative cultural evolution, leading to pronounced cultural differences and cultural group selection, first evidenced around that time. Protolanguage a pre-requiste?

4. Speech (0.1 – 0.0 MYA)

- Symbolic vocalizations would naturally have set selection pressures for anatomical changes leading to enhanced vocal control.

- Thus, the origin of multi-modal language can be linked to *Homo heidelbergensis,* and speech with simple grammars: with early *Homo sapiens*.

- Complex culture-specific grammars emerging through processes of (only) cultural evolution

5. Conclusions

Multi-level selection

- "Mainstream" models of evolution based only on individual-level and gene-level selection are insufficient, and in order to account for the possibility of human-scale sharing of care, values and information, i.e. of intersubjectivity, morality and language, requires models of multi-level selection, including (cultural) group selection.

- This conclusion is further bolstered by the fact that four of the most influential theories "on the market" explicitly or implicitly presuppose such a model.

Complementarity

- The four theories (Dunbar, Deacon, Tomasello, Hrdy) are to some extent complementary, rather than in contradiction – especially if interpreted somewhat "revisionistically" as here proposed.

Co-evolution

- Intersubectivity (in an alloparenting context) spearheaded the way, followed by morality and language which evolved co-temporally, in spirals of increasing complexity.
- However, this linear ordering cannot be strictly maintained, since as morality and language spread culturally, they "increased the reproductive success of individuals who functioned well in such environments, and this in turn led to the evolution of other regarding motives like empathy and social emotions like shame". (Boyd & Richerson 2009: 3281-82)
- Also: increasing the reproductive success of competent communicators!

… but distinct

- Even if intersubjectivity, morality and language co-evolved, it is possible to disentangle them, and to envision a society with “high” prescriptive morality, but in which “regarding motives like empathy and social emotions like shame” are not selected for, but rather the contrary.

- Hrdy (2009) alarmingly suggests that current Western societies might be of this type: increasingly individualist, consumption-oriented, and alienated, thus moving further and further away from the conditions necessary both for the evolution of intersubjectivity, and for its development in each successive generation.

Empathy could devolve

- "If empathy and understanding develop under particular rearing conditions, and if an ever-increasing proportion of the species fails to encounter those conditions but nevertheless survives to reproduce, it won't matter how valuable the underpinnings for collaboration were in the past. Compassion and the quest for emotional connection will fade away as surely as sight in cave-dwelling fish." (Hrdy 2009: 293)

Implications

- Negative: evolution, including gene-culture coevolution does not necessarily lead to “progress”, but also to maladaptation and degeneration.

- Positive: if we understand the complex dynamics of biology and culture better, we could perhaps deal with cultural maladapations, and strive for more humane societies…

Merci de votre attention!