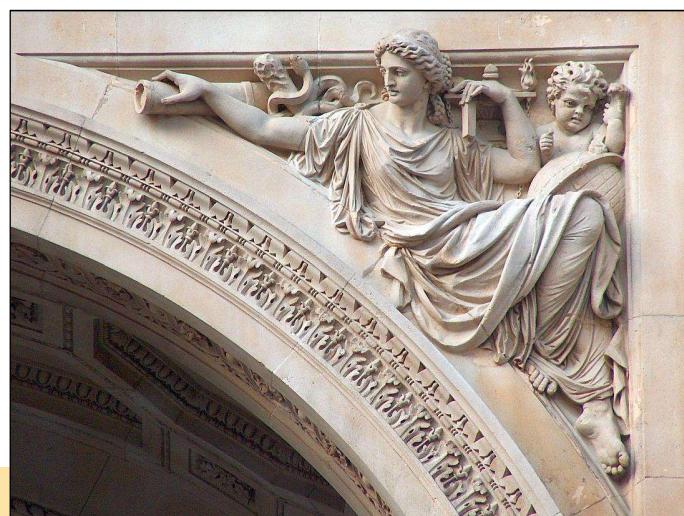


[Symbolic] culture and adaptation



Adaptations, exaptations and
“Spandrels”

Defining “Adaptations”

Buss et al. (1988)

An **adaptation** may be defined as an inherited and reliably developing characteristic that came into existence as a feature of a species through natural selection because it helped to directly or indirectly facilitate reproduction during the period of its evolution.

Adaptations tend to be typical of most or all members of a species

Adaptations are (...) by definition inherited, although (...) developmental context plays a critical role in the emergence and activation of adaptations.

Refining the definition of the “**Environment of Evolutionary Adaptedness**”

There is no single EEA that can be localized at a particular point in time and space. The EEA will differ for each adaptation and is best described as a statistical aggregate of selection pressures over a particular period of time that are responsible for the emergence of an adaptation.

Constraints on Optimal Design

Evolutionary time lags

Costs

Local optima

Lack of available genetic variation

Necessity of coordination with other mechanisms

Outcomes of the evolutionary process:

Adaptations, By-products, and Random Effects

S. J. Gould (1991):

criticisms on “adaptacionism” of sociobiological approaches

X

J. Alcock: “Adaptationism” as an heuristic approach

Adaptations, exaptations, and spandrels

Buss et al. (1988)

Gould's definitions of **Exaptation**

1. "*a feature, now useful to an organism, that did not arise as an adaptation for its present role, but was subsequently co-opted for its current function*"
2. "*features that now enhance fitness, but were not built by natural selection for their current role*"

... X by-products without function (but Gould inconsistent...)

Exaptations



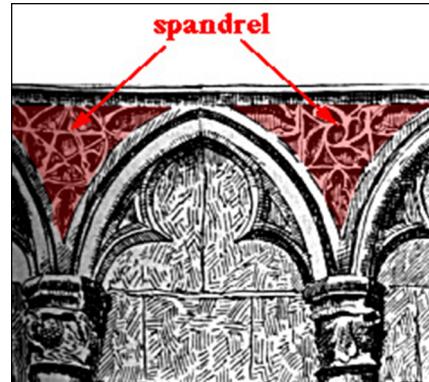
Ex: dinosaurs' and birds' feathers

Exaptations

“Co-opted Adaptations” (Buss et al 1988): features that evolved by selection for one function are co-opted for another function.

X

“Co-opted Spandrels” (Gould 1991): characteristics that did not arise as adaptations - but owe their origin to side consequences of other features.



Co-opted X USELESS* spandrels

(* “functional” sense: fitness-enhancing)

Gould (1991): Human encephalization and cultural “spandrels” or by-products: are exaptations (and useless spandrels) more important than adaptations to Evolutionary Psychology?

Evaluating Evidence of Psychological Adaptation: How Do We Know One When We See One?

Schmitt & Pilcher 2004

The adaptationist program (Mayr 1983)

For some psychologists, identifying all the psychological adaptations that make up human nature—the adaptationist program of humanity—is what evolutionary psychology should be all about (ref. to Buss, Haselton, Shackelford, Bleske, & Wakefield, 1998; Tooby & Cosmides, 1992).

How do evolutionary scientists identify adaptations?

Williams (1966): “only when an attribute shows evidence of special design for the purpose of increasing fitness should one consider an attribute to be an adaptation”.

X

Difficulty in demonstrating *fitness* increase and *special “design”*

Evaluating Evidence of Psychological Adaptation: How Do We Know One When We See One?

Schmitt & Pilcher 2004

Where to look for psychological adaptations:

Inclusive-fitness theory (Hamilton, 1964)

→ familial helping adaptations.

Reciprocal-altruism theory (Trivers, 1971)

→ adaptations for human friendship and coalition formation.

Life-history theory (e.g., Hill & Hurtado, 1996):

→ adaptations that cause people to expend effort on different types of relationships over the course of their lives.

[ex (non-psychological): The “**Grandmother Hypothesis**” see Lecture 9 (ontogeny)]

Evaluating Evidence of Psychological Adaptation: How Do We Know One When We See One?

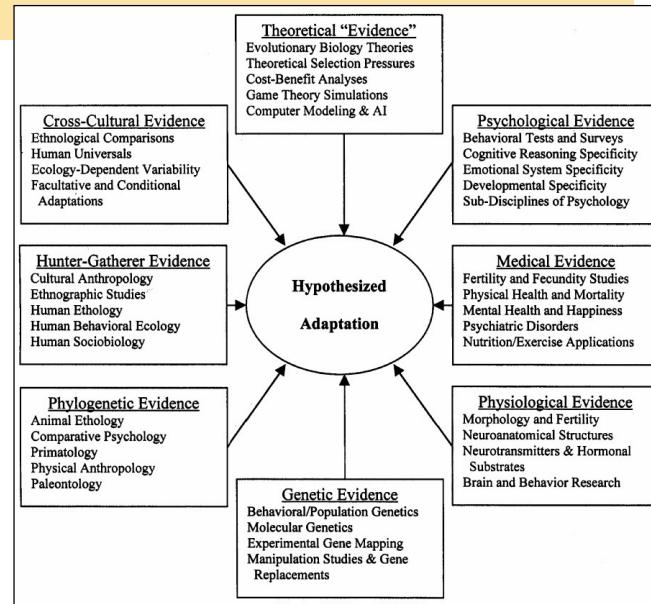
Schmitt & Pilcher 2004

- Human psychological adaptations will LIKELY display a substantial amount of **functionality**. They will aid people in their survival and lead to more successful reproduction.
- Human adaptations will display **domain-specific modularity** (Pinker, 1997); no one mental adaptation will solve all tasks of the human mind (Buss, 1999).
- Adaptations are expected to be **universal**, in that all people everywhere share the same basic human nature. At the same time, adaptations are expected to be **interactive**, in that it takes exposure to certain environments for them to become activated.
- Adaptations will also be **complex**, usually because they have been created from previous adaptations from earlier in the species' phylogenetic history (i.e., they are **exaptations**).
- Adaptations are expected to be **efficient** or **economical**.

Evaluating Evidence of Psychological Adaptation: How Do We Know One When We See One?

Schmitt & Pilcher 2004

Using
distinct
sources of
evidence



Evaluating Evidence of Psychological Adaptation: How Do We Know One When We See One?

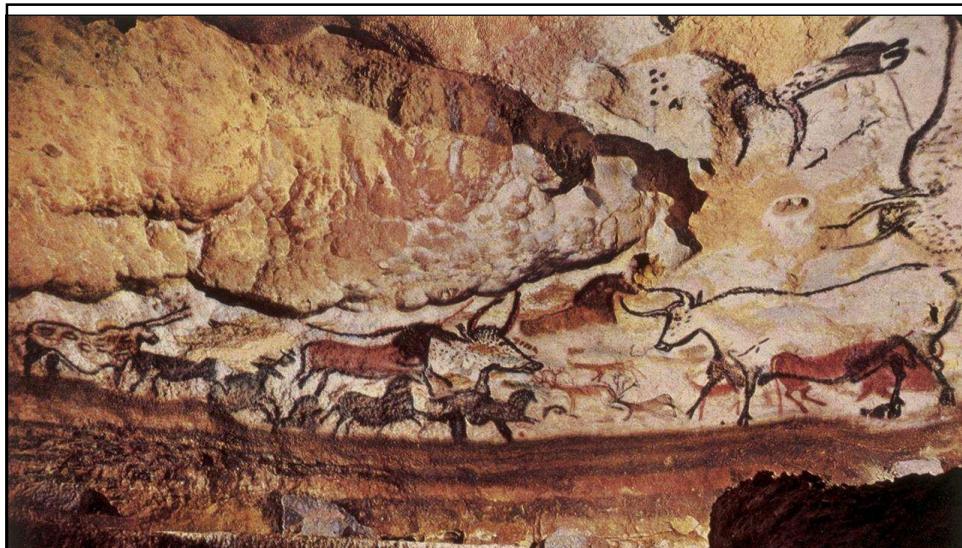
Schmitt & Pilcher 2004

Pregnancy sickness ✓ ✓ ✓

Incest avoidance ✓ ✓ ✓

Men's short-term desire for sexual variety ✓ ✓

Easily learned fear of snakes ✓ ✓



Evolutionary approaches to Symbolic culture

The evolution of cultural capacities (cf. Psych. Evol.)

The human capacity for culture is not a single adaptation, but a set of interrelated adaptations that may have evolved under different selection pressures to fulfill different biological functions (Miller 1999, Tooby & Cosmides 1992)

Human capacities for language, art, music, and ideology may be distinct mental modules that evolved at different times, develop according to different life histories, operate according to different psychological principles and contribute in different ways to biological fitness. Culture is not a side-effect of big brains, general-purpose learning abilities or general intelligence (Pinker 1997)

Cultural evolution: costly behaviors and fitness benefits

“Natural selection” models: survival enhancement

X

“Sexual selection” models: reproduction enhancement

(...not mutually exclusive, of course!)

Human cultural evolution: Archaeological / paleoanthropological evidence

Primates:

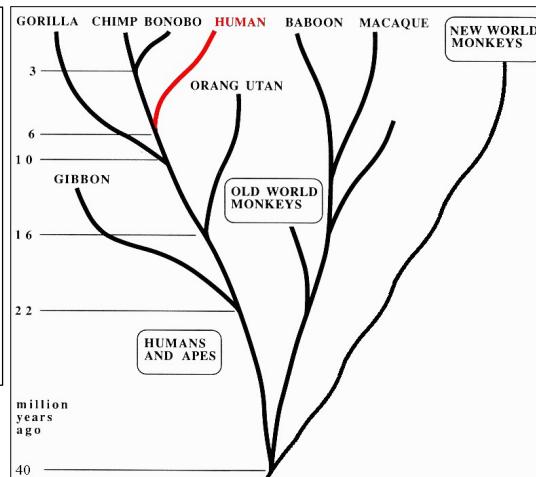
Suborder Strepsirrhini
(non-tarsier prosimians)

Suborder Haplorhini

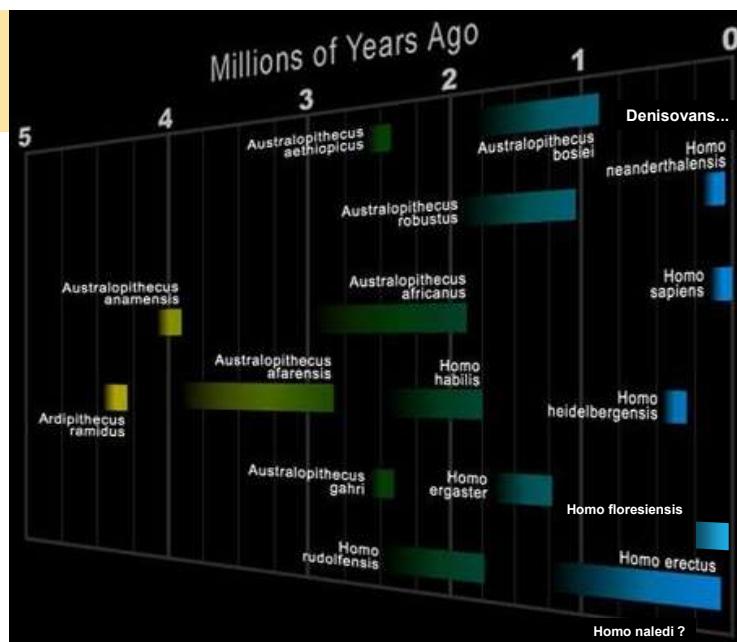
Infraorder Tarsiiformes
(tarsiers)

Infraorder Simiiformes
(monkeys, including apes)

Simiiformes phylogeny



Hominin time line



Oldest known hominin tools: 3.3 My
(Harmand et al 2015)

Lomekwi 3 culture:
West Turkana, Kenya

Australopithecines...?

Oldowan culture:
2.5 - 1.5 My
(Lower Paleolithic)

Rift valley:
Homo habilis
Australopithecus robustus?

~1.8 My:
Homo erectus
H. ergaster

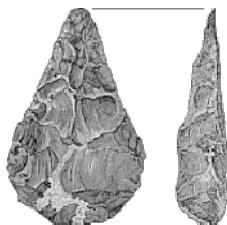


Mousterian culture
300 ky - 35 ky (Middle Paleolithic)

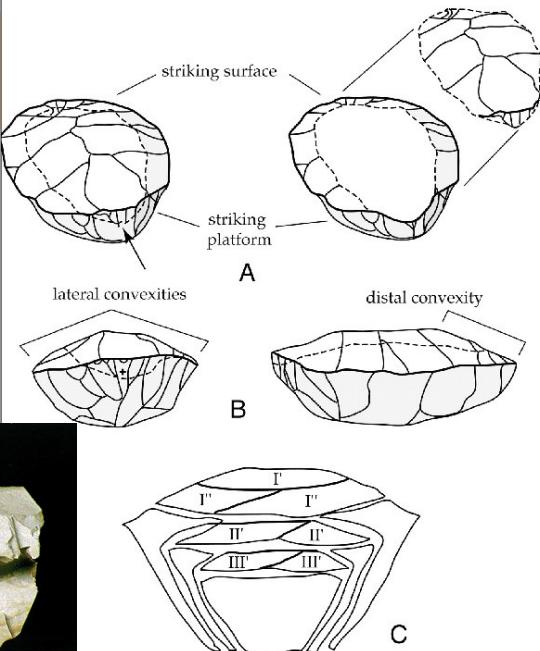
Homo neanderthalensis
Archaic *Homo sapiens*
Anatomically modern *H. sapiens*

Composite tools
Origins of speech


Hand axe


prepared core

Levallois technique



The diagram illustrates the Levallois technique through three stages:

- A:** Shows a prepared core with a "striking surface" and "striking platform". Labels also indicate "lateral convexities" and "distal convexity".
- B:** Shows a flake being struck from the core.
- C:** Shows a series of flakes being struck from the core, with labels indicating multiple "I", "II", and "III" stages of flaking.

African “Paleolithic” (ESA/MSA/LSA)

Blombos cave (120 ky - .3 ky)
Anat. modern *H. sapiens*

MSA ~ 75 ky

Bifacial points Scrapers

MSA - M2 1 cm

Upper Paleolithic traditions
Aurignacian (40 ky - 16 ky)

Anatomically modern *H. sapiens*

chisels, points, bevels (stone/bone), scrappers, knives, pendants (ivory)

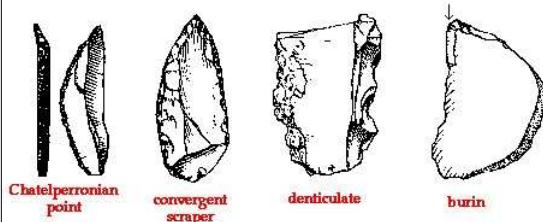
strangled' blade end scraper Aurignacian blade

oval section
split based A1
round section
lozenge shaped solid based A3
single bevel A5

Venus of Willendorf

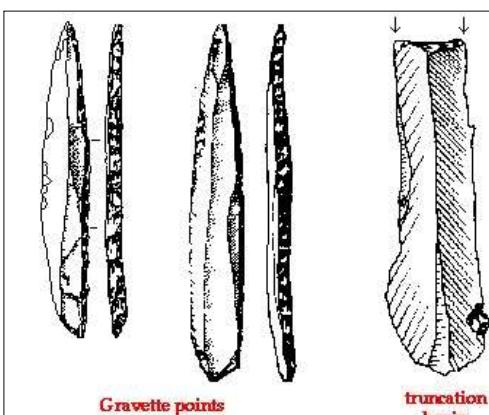
Upper Paleolithic traditions Chatelperronian (35 ky - 27 ky)

H. neanderthalensis



Upper Paleolithic traditions Gravettian (28 ky - 22 ky)

Anatomically modern *H. sapiens*

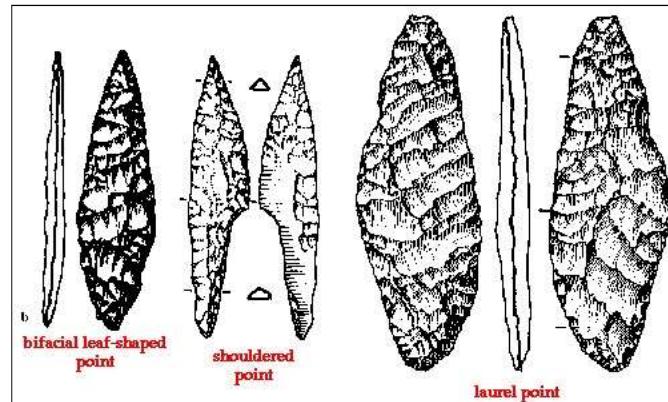


Burins (France, ca. 29,000–22,000 BP)

Diversification of points and blades, ivory beads, figurines

Upper Paleolithic traditions Solutrean (21 ky - 19 ky)

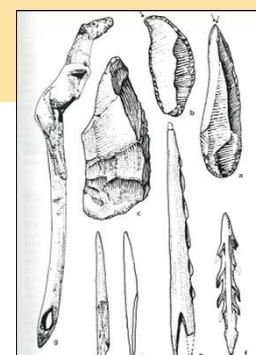
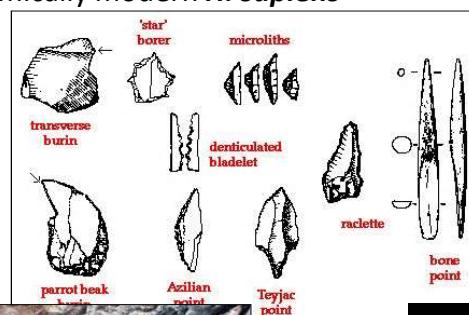
Anatomically modern *H. sapiens*



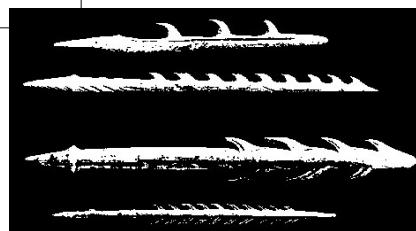
Bifacial leaf-shaped blades, high-precision finishing

Upper Paleolithic traditions Madalegnian (18 ky - 10 ky)

Anatomically modern *H. sapiens*



Lascaux cave
(17 ky)



Mesolithic: diffusion of microlites



Neolithic (9/4 ky):

domestication of animals



agriculture

first cities (Jericho: 10.000 AC)



ceramics

polished stone tools



Copper Age

Bronze Age

Iron Age...

A mere 12,000 years separate the first bow and arrow from the International Space Station (Ambrose 2001)



“Material culture” and adaptivity

Hunting
Gathering
Food processing
Agriculture
Pastoralism
(and associated technologies)

...



Evident adaptive consequences
Implicit underlying cognitive adaptations
But... what about *symbolic* culture?

Symbolic culture

Adaptations, exaptations,
or functionless by-products?



Neanderthal artists

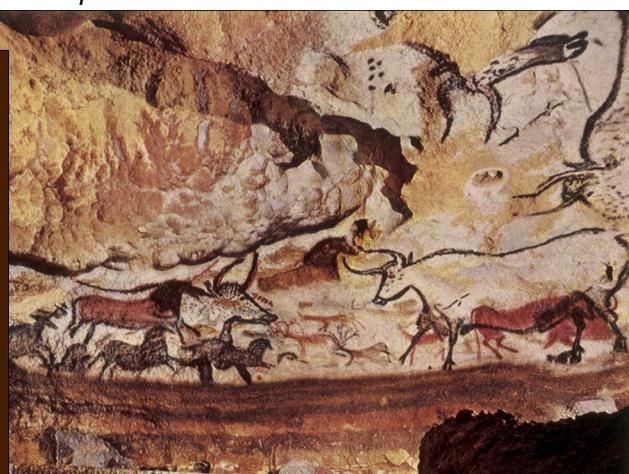
"cave art emerged in Iberia substantially earlier than previously thought. Uranium-thorium (U-Th) dates on carbonate crusts overlying paintings provide minimum ages for a red linear motif in La Pasiega (Cantabria), a hand stencil in Maltravieso (Extremadura), and red-painted speleothems in Ardales (Andalucía). Collectively, these results show that cave art in Iberia is older than 64.8 thousand years (ka). This cave art is the earliest dated so far and predates, by at least 20 ka, the arrival of modern humans in Europe, which implies Neandertal authorship"

Hoffmann et al 2018



Upper Paleolithic Aurignacian tradition (40 ka - 16 ka BP)

Anatomically modern *H. sapiens*



Lascaux cave (France)

Venus of Willendorf (Austria)

African “Paleolithic” (ESA/MSA/LSA)
Blombos cave, SA (120 ka - .3 ka BP)

Middle Stone Age (~ 75 ka BP)

Red ochre

Evolutionary approaches to human symbolic culture

Dunbar, Knight & Power 1999
Invading the “citadel” of social anthropology: the domain of “cultural constructs”
Evolutionary Anthropology (~HBE)
X Evolutionary Psychology :
Differences x common interests : behavioral decisions in contexts in common with other species (foraging, mate choice, parental investment...):
Fitness consequences (past or present...)
EP: “Universals” based in evolved psychological adaptations
HBE: Optimal behavioral strategies according to ecological context
Neither focused the evolutionary history of human symbolic systems: language, rituals, myths, gender ideologies...
Royal Society (1965): “Ritualization and Behavior in Animals and Man”
Univ. of London (1994): “Ritual and the Origins of Culture”
(social + evolutionary anthropologists)

R. Dunbar: The evolution of language

How language evolved?

Hypothetic precursors:

Gestural communication?

Primates' gestures, "Aimed throwing" and brain lateralization, sign language

Primates' vocal communication:

"Functional referentiality": vervet monkeys' alarm calls (Cheney & Seyfarth 1990)

A "jump" in the acquisition of semantic information OR song-like transition?

Group cohesion and "choruses" in non-human primates' vocalizations

Prosody and "motherese" (Fernald 1992: "the message is in the melody, not the lyrics")

When speech evolved?

Homo erectus (1,5 - 2 Ma)? [pair bonding]

Archaic *Homo sapiens* (.5 Ma)? [spinal chord changes ~ breath control]

Upper Paleolithic (50 ma)? [radical technological changes]

R. Dunbar: The evolution of language

Why language evolved?
(FUNCTION)

"Conventional" theories: communication of environmental information

[*"There are bison down by the lake now"*]

or instruction

X

Chat about social matters

X silent hunt,
instruction by demonstration...

Lack of correlation between encefalization and technological development (Wynn 88)
Children: readiness for learning

(speaking X reading/writing)

Social function, of course, but... which?

Average Groups Size X Neocortex ratio in primates
(Dunbar 1992).

[Modern humans' group size projected from reg. line]

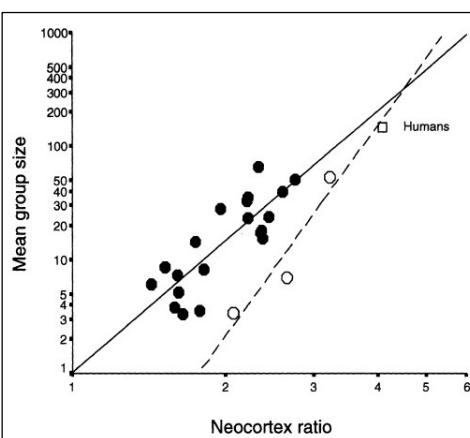


Figure 1 Mean social group size for individual primate taxa (principally, one species per genus) plotted against relative neocortex volume (indexed as neocortex volume divided by the volume of the rest of the brain). Simian (solid symbols) and hominoid (open symbols) taxa are shown separately. The datapoint for humans is that obtained by Dunbar (1992a). With a logged axis, neocortex ratio is mathematically identical to the more commonly used residuals of logged variables (except that the baseline is taken to be the value of the individual taxon's brain component rather than the scaled average value for the Order or other higher taxonomic grouping). Reproduced with permission from Barrett et al. (2002).

R. Dunbar: The evolution of language

"Dunbar's Number":
What could the "150" value
(obtained by regression) mean?

Humans:
stable group (limit):
~ 150 people

- acquaintances in address books
- societies without police
- tribal temporary camp sizes...

(Dunbar 1993)

Predicted size of social groups
in hominin populations using
the regression equation for
group size as a function of
neocortical ratio (cf. Fig.1)

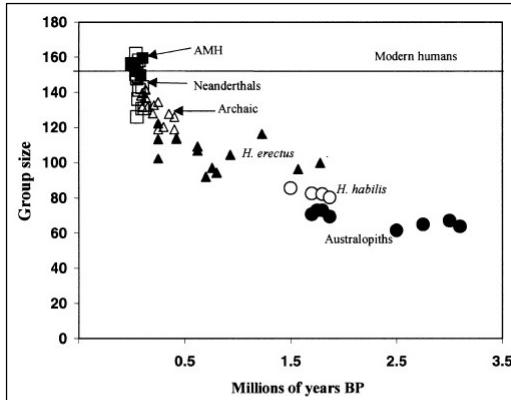


Figure 2 Social group size predicted for individual hominid populations using the regression equation for group size on neocortex ratio for hominoids (including modern humans) shown in Figure 1. The horizontal line represents the value of ~150 predicted for (and found in) modern human populations (see Dunbar 1993). Individual populations are defined as all the crania found within 50,000-year time bands at an individual site; a mean cranial volume for that population is then determined from the values for individual crania within that population. Cranial volume is used to estimate neocortex ratio using the regression equations given by Aiello & Dunbar (1993). Data from Aiello & Dunbar (1993).

R. Dunbar: The evolution of language

Primates: **time invested in grooming - a limiting factor?**
(Hominids: up to 20% daily time)

150 people → + 43% of daily time

Size of a conversation group
(~ 4 individuals, X **grooming diadic**) allows keeping the activity within 20% (30%) and reach up to ~150 people.

Communicative shortcomings of language
(compensated by):
emotion and "prosodic cues",
non-verbal communication

Time requirements for grooming x social group size in primates

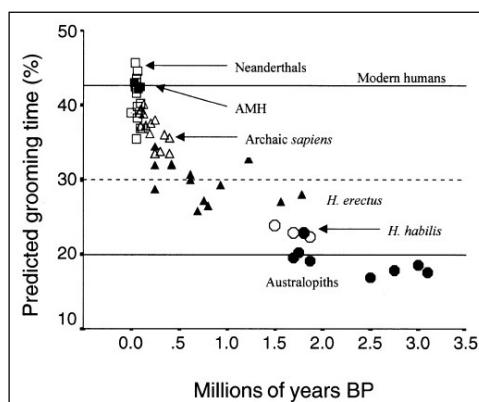


Figure 3 Hominid grooming time requirements plotted against time. Grooming time is determined by interpolating the values for group size shown in Figure 2 into the regression equation for grooming time versus group size obtained from Old World monkeys and apes. The solid horizontal lines represent the maximum grooming time observed in any wild primate group (~20%) and the time investment that would be required to service relationships in modern human groups of ~150 if this was done by social grooming alone (~43%); the dashed line represents the putative threshold at ~30% of time, beyond which group size could not have increased without a method of social bonding that used time more efficiently (i.e., language). Reproduced with permission from Barrett et al. (2002).

The evolution of language

When speech evolved (cont.)?

Aiello & Dunbar (1993): three phases:

- “Vocal grooming” (*H. erectus*)
- Purely social content (Archaic *H. sapiens*)
- Symbolic language (Modern *H. sapiens*)
the Upper Paleolithic “revolution”

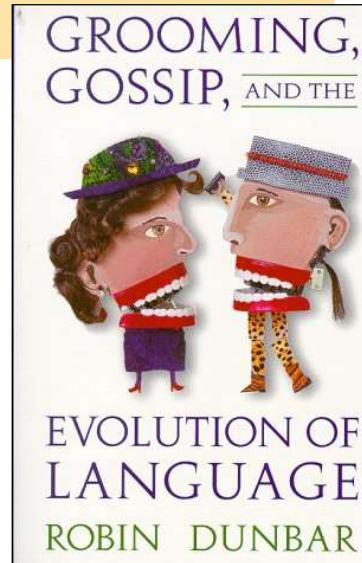
Why “purely social content” first?

Group size: adaptive value of indirect social information

Subjects of everyday conversation

Entertainment media

Press and bookstore highlights...



Content bias: reputations & the adaptive value of **gossip** Dunbar (1998)

R. Dunbar: The evolution of language

The social functions of language:

if just for *bonding*, why syntax / symbolic communication...?

The Social Gossip Hypothesis

First bonding, then reputations and control of free-riders

The Social Contract Hypothesis

Formation of marital unities (polygamous or monogamous) and their "risks":
verbal contracts and symbolism
(communicating feelings, intentions, compromises e prohibitions)
But without large social groups, such unions would not exist
(marital bonds in contemporary hunters-gatherers are fluid...)
Other animals manage it without symbolic communication

The Scheherazade Effect

Miller: sexual selection and the *Handicap Principle*
(honest signaling of genetic quality)

Narratives as sexual *displays*

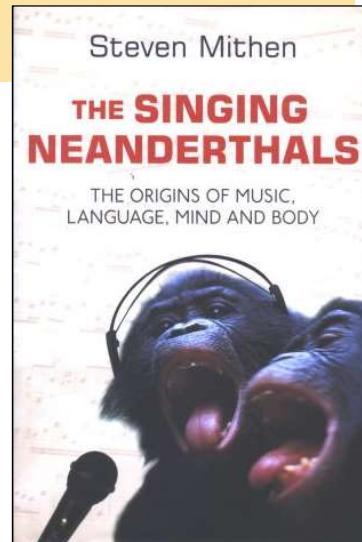
Strengthening group membership; dialects as group markers

The evolution of music

S. Pinker: "eye candy"
 (recent by-product or "spandrel"
 of speech prosody)

X

Darwin / Dunbar / Mithen
 Common history with language



Brown, Huron: evolutionary musicology

Intragroup sexual displays
 Intergroup cohesion/synchronization displays

The evolution of music

Possible palaeolithic Neanderthal flute
 (Slovenia, ~43Kyo).
 hyoid bones similar in Neanderthals, *H. heidelbergensis* and modern *H. sapiens*



T. Geissmann (2000): "Singing" in monogamous non-human primates
 (some lemurs, tarsiers, titi monkeys and gibbons)

Steven Mithen: symbolic culture as cognitive “spandrels”

Cognitive Archaeology, Evolutionary Psychology, and Cultural Transmission,
with Particular Reference to Religious Ideas (1997)

Explicitly cognitive approach: the behaviour of individuals, of groups, the character of their material culture, and the long term patterns of culture change we see in the archaeological record, arise from the **short term decisions of individuals**. Some of them, perhaps only a small subset, are made consciously and with intent.

Flawed "Darwinian" approaches: group selection and cultural selectionism. It is the individual cognitive processes which have been moulded by natural selection, not behaviour itself, let alone material culture.

EP: importance of the idea of **cognitive modularity** (but criticism of simplistic def. of EEA). Modules and "natural history intelligence": foraging decisions that increase reproductive success (testing models against the archaeological record).

"Modern" problems for which there are no mental modules require more conscious awareness (less efficient solving; ex: language x math). Some things are much easier to learn than others...

Steven Mithen: symbolic culture as cognitive “spandrels”

Cognitive Archaeology, Evolutionary Psychology, and Cultural Transmission,
with Particular Reference to Religious Ideas (1997)

Early human mind (archaic *H. sapiens*, *H. neanderthalensis*, *H. erectus*): **isolated modules** for dealing with the social world, the natural world, with the manufacture and use of tools.

The cultural transformation between 100K to 50K years BP (modern *H. sapiens*) is characterized by the **integration of these "intelligences"**: **cognitive fluidity** leading to changes in language and consciousness.

Adaptive benefits:

technical + natural history knowledge = better tools, more efficient hunting, gathering and food processing;

technical + social intelligence: artifacts mediating social interactions > new means to manipulate other individuals.

Steven Mithen: symbolic culture as cognitive “spandrels”

Cognitive Archaeology, Evolutionary Psychology, and Cultural Transmission, with Particular Reference to Religious Ideas (1997)

But other consequences of the “cognitive fluidity” have no clear adaptive value:
 Religious ideas (and art): useless “spandrels”, **by-products of cognitive fluidity**:
 Mixing technical and social intelligence produced **inert objects endowed with feelings and intentions**;
 Mixing human and animal representations produced **supernatural beings**.

Since there are no “dedicated” modules for such kinds of thinking, **religious ideas are harder to transmit**: the transmission depend on their **connections to domains of intuitive knowledge** (so the supernatural beings are “**omnipotent**”, but also have “**feelings**” and “**desires**” [Pascal Boyer])

Some **cultural means to enhance the transmission of religious ideas** are specially important for archaeologists (because they leave **evidence in the archaeological record**): **ritual** (repetition etc) and **material culture** (religion and visual symbols): transform religious ideas into material form so we can perform operations beyond the capacity of the mind.

R. Dunbar: The evolution of ToM and religion

ToM and reconciliation of “conflicting” beliefs?

Religion and 4th-level intentionality:

“I have to **believe** that you **suppose** that there are supernatural beings who can be made to **understand** that you and I **desire** that things should happen in a particular way” (Dunbar 2003)

extrapolations from regression equation relating achievable level of intentionality x frontal lobe size in living primates

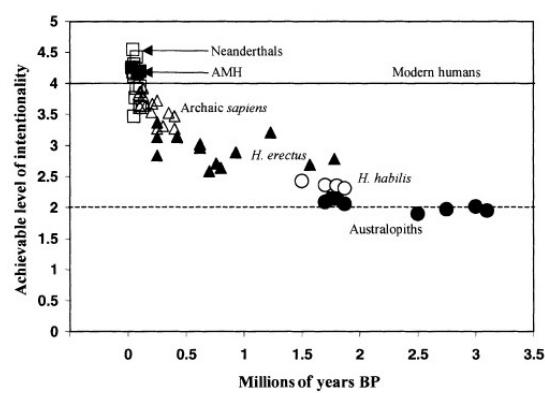
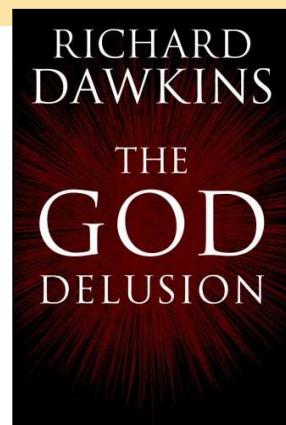
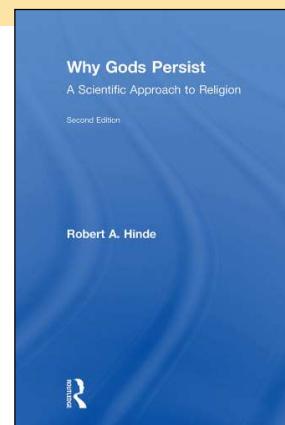


Figure 4 Achievable level of intentionality (or advanced theory of mind) for individual hominid populations, plotted against time. The horizontal lines demarcate level 2 (minimal theory of mind, representing the absolute upper limit for nonhuman primates) and level 4 (the level characteristic of normal human adults and the minimum level required for religion). Frontal lobe volume for fossil hominids is estimated from cranial volume using the regression equation for modern anthropoid primates; these are then interpolated into the regression equation relating achievable level of intentionality versus frontal lobe size in living catarrhines given by Dunbar (2003).

Evolutionary approaches to religion



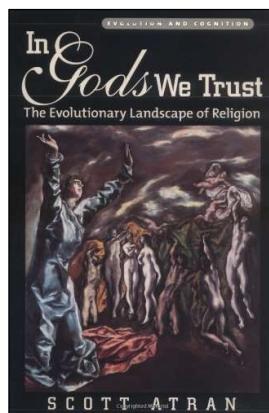
Dawkins 2008



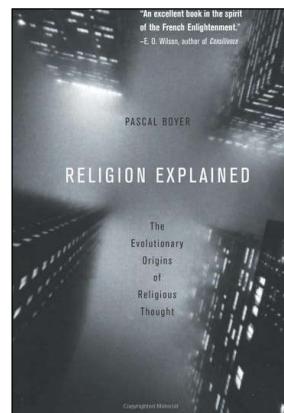
Hinde 1999/2009

"Spandrel" → exaptation x maladaptive byproduct

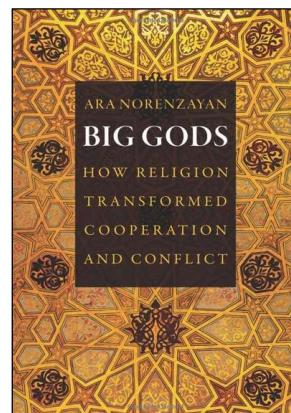
Evolutionary approaches to religion



Atran 2002



Boyer 2007



Norenzayan 2013

Evolutionary approaches to religion

Religion: adaptation (mechanisms) X Adaptivity (fitness)?

Psychological (sensorial/motivational/emotional) **mechanisms**

Cognitive inference systems



Faces/voices recognition and **pareidoly**

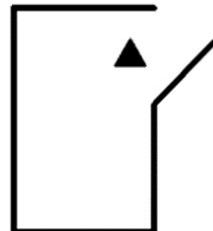
Predators & prey: detection of causal agents

Pareidoly



Evolutionary approaches to religion

Agency,
physical and
social causality



Heider & Simmel 1994

Evolutionary approaches to religion

Religion and **adaptivity**

Ritual and group identity (← ingroup/outgroup predispositions)

Rituals, taboos and costly signalling

Sosis & Bressler 2003: Cooperation and commune longevity: constraints and ritual requirements that 83 19th-century U.S. communes imposed on their members: **Costly requirements and religiosity interact to promote cooperation?**

Henrich 2009: cultural learners can both avoid being manipulated by their models (those they are inclined to learn from) and more accurately assess their belief commitment by attending to **displays or actions by the model that would seem costly to the model** if he held beliefs different from those he expresses verbally.

Henrich & al 2010: Markets, Religion, Community Size, and the Evolution of Fairness and Punishment: **modern prosociality is not solely the product of an innate psychology, but also reflects norms and institutions that have emerged over the course of human history.**

Adaptive explanations for art, ritual and religion?

Religion: contagious non-adaptive “memes” or...

Group cohesion?

Etnicity markers?

Enforcement of social norms?

Group-level explanations require individual-level evidence of fitness enhancement to be valid evolutionary explanations (Neodarwinian sense)...

(X [cultural] group selection)

... but there is another – strictly Darwinian - possibility...

Symbolic culture and sexual selection



Sexual selection for cultural displays

(G. Miller 1999)

C. Darwin (1871). *The Descent of Man and Selection in Relation to Sex*
 Survival x reproduction: importance of selecting/attracting good partners.
 Females usually “choosier”
 - but sexual selection not necessarily depends/produces sex differences.

Culture:
 transmission of technological knowledge and group-benefiting traditions
 X **displays to attract sexual partners.**

The “**Cultural Courtship Model**”:

Sexual selection through mate choice as a major force in shaping the inherited capacities for behaviors such as language, art, and music. These behaviors function mainly as courtship displays to attract sexual partners and show many of the same design features shared by courtship displays in other species.

Sexual selection for cultural displays

(G. Miller 1999)



A. Zahavi: “**The Handicap Principle**”:

Only costly signals (that cannot be faked) are evolutionarily stable indicators of the producer's quality (easy to distinguish from traits selected for survival: they impair survival chances).

“Runaway selection” (Fisher 1930) of traits AND preferences.

Cultural evolution through sexual selection DOES NOT imply sexual motivations underlying cultural behaviors!

Sexual selection does not care whether myths are true (x natural selection...)

Sexual selection “hijacks” any natural selection pressures

(avoiding mates whose offspring would have poor chances against current natural selection pressures)

Sexual selection for cultural displays (G. Miller 1999)

"human culture does not make much sense as a set of survival adaptations shaped by natural selection"
(x sexual selection)

Comparing cultural production by gender and age:

huge gender bias,
similar age trends

(~homicide, cf. Daly & Wilson...)

Jazz albums

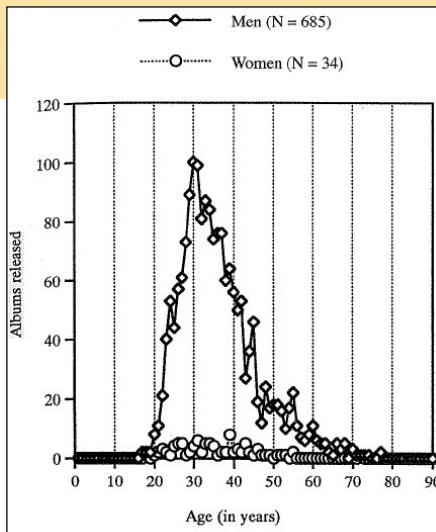


Fig. 5.1 Jazz albums: output of jazz albums as a function of age and sex of the principal musician/composer, reflecting a random sample of 1,892 albums by 719 musicians from Carr, Fairweather and Priestly (1988). The data points represent how many jazz albums (as an absolute frequency) were released by musicians of a particular age (displayed along the x-axis, from age 0 to age 90) and sex (with rhomboids representing men and circles representing women). The sample consists of full-length LP records released between the 1940s and 1980s in the US or Britain.

Sexual selection for cultural displays (G. Miller 1999)

A sexually dimorphic motivational system?

A different courtship model could emphasize differences in display channels...

Equal capacity for cultural production, but different strategies/ tendency to broadcast production.

Female display x harassment risk?

Modern paintings

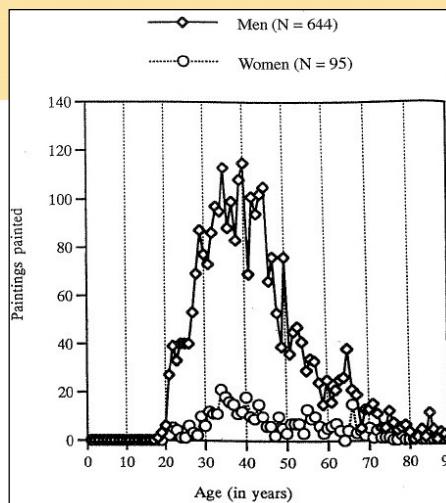


Fig. 5.2 Modern paintings: output of modern paintings as a function of age and sex of the painter, reflecting an exhaustive sample of 3,274 paintings by 739 artists from The Tate Gallery Collections (1984). The data points represent how many paintings (as an absolute frequency) were produced by artists of a particular age (displayed along the x-axis, from age 0 to age 90) and sex (with rhomboids representing men and circles representing women). The sample is the exhaustive set of every datable painting owned by the Tate Gallery, London, as of 1984, where the artist's last name began with A through K, and where the artist's sex could be determined by first name. The sample includes mostly twentieth century British paintings.

Sexual selection for cultural displays (G. Miller 1999)

Sexual selection: explanations based on survival benefits / group benefits do not explain these patterns.

Consequence of patriarchy?

But why is it sensible to explain similar profiles in other species (ex birdsong)?

[alternatives...]

Published books

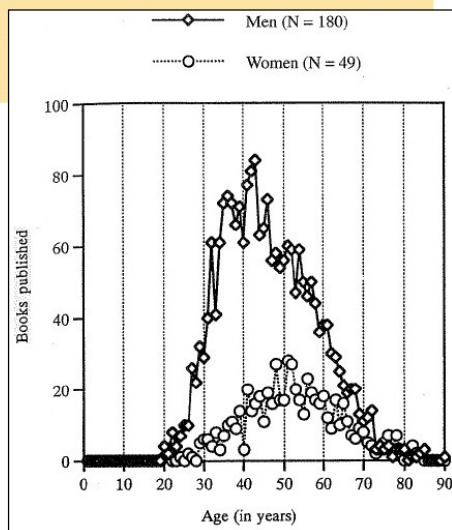


Fig. 5.3 Books: output of books as a function of age and sex of the writer, reflecting a random sample of 2,837 books by 229 writers from The Writers Directory (1992). The data points represent how many books (as an absolute frequency) were produced by writers of a particular age (displayed along the x-axis, from age 0 to age 90) and sex (with rhomboids representing men and circles representing women). The sample includes twentieth century English-language works of both fiction and non-fiction, spanning all genres; most of the writers were British or American.

C. Knight 2010

The Origins of symbolic culture

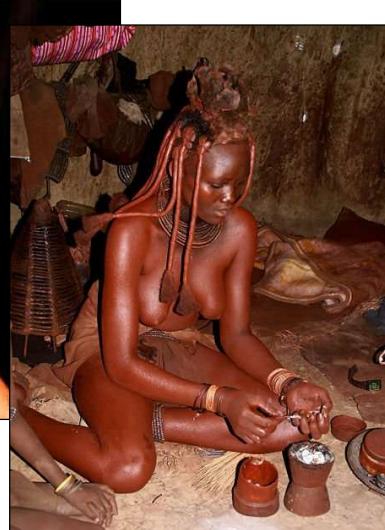
Hypotheses

- (1) based on behavioral ecology
- (2) focused on the emergence of symbolism
- (3) testable in the light of relevant archaeological data

Power's "Female Cosmetic Coalitions":



Sexual selection for cultural displays
Female coalitionary strategies: protoritual



"Sham menstruation hypothesis"
(C. Power and L. Aiello 1997)

Sexual selection for cultural displays
Female coalitionary strategies: protoritual

Camilla Power: "beauty magic": the origins of art

The high cost of human reproduction: female investment always high,
but male investment increases (provisioning, paternal care) →
Competition between women INCREASES
Competition between men DECREASES ("Social Monogamy")

Hidden estrus in human females, continuous receptivity: the only remaining sign of imminent fertility: **menstruation**.

Female that menstruated: a threat to pregnant/nursing females
AND harassment / kidnapping target

Female Cosmetic Coalitions preserve both menstruants and non-menstruants, not hiding, but mimicking the signal simultaneously: "**Sham menstruation**"

Cosmetic (proto)rituals

"Arms races" BETWEEN females' coalitions: signal enhancement, singing & dancing
Also negative signs for outgroup males (taboo states etc)

Sexual selection for cultural displays Female coalitionary strategies: protoritual

Watts (1999):

Southern Africa (limited evidence): transport of materials like seashells and high-quality pigments (increase as compared to raw lithic material) up to 200km (a seashell) older than 44K, perhaps since MSA2b (120-100K).

Red ochre: body paint or hide preservative?

Evidence against utilitarian hypothesis: preservative effect contested, threat of bacterial decay overestimated, choice for red color, evidence of ochre in hide is more recent...



Sexual selection for cultural displays Female coalitionary strategies: protoritual

Main prediction from the model: earliest evidence of ritual traditions in the archaeological record: **red pigments**.

Ethnohistorical evidence of cosmetic usage in African initiation and other ritual contexts

Power & Watts (1996): two-step process in the evolution of ritual: from opportunistic, context-dependent sham menstruation displays, to greater regularity, planning and organization – leading to **abundant use of ochre**.

The onset of this earliest ritual tradition would institutionalize an **economic division of labour and forms of cooperation between the sexes and between kin groups**.

Sexual selection for cultural displays Female coalitionary strategies: protoritual

“Sham menstruation”: **collective deception**

(X **individual deception** by nonhuman primates)

A vital step towards sustaining and sharing **imaginary constructs**, that is, establishing **symbolism**.

Male preference for cosmetically decorated women promoting an explosive spread of ritual traditions: **but why man prefer fake signs?**
Do rituals honestly advertise que quality/power of female coalitions?

“**The Gullible Ape**”: why not develop resistance to costly and deceitful memes? Is there an adaptative value for “make-believe”?

Paradox: how, after the sophisticated evolution of cheaters' detection, can be the institutionalization of “collective deception” that constitutes “symbolic culture”?

Sexual Dimorphism in European Upper Paleolithic Cave Art (Snow 2013)

Were the first artists mostly women?

Hand stencils: measurements from 32 stencils, including 16 from the cave of El Castillo in Spain, 6 from the caves of Gargas, and 5 from Pech Merle (France).



Other hypotheses on the evolution of symbolic culture (Knight 2010)

1. **Philip Chase** (1994): *Symbolism enforces co-operation between strangers.* Symbolic culture arose because its coercive rituals and associated belief systems provided the only mechanisms of punishment and reward capable of enforcing cooperation between strangers, in turn a prerequisite for the establishment of institutional facts.
2. **Richard Sosis** (2003): *Costly ritual enforces cooperation between strangers.* Religious communities are networks of 'strangers' held together by costly ritual.
3. **Merlin Donald** (2001): *Mimesis.* Symbolic culture became established as *Homo erectus* came under communicative pressure to exercise cognitive control over previously hard-to-fake, emotionally expressive body language. Mimetic culture took the form of learned, culturally transmitted, simulated versions of such body language, to express in public emotional and cognitive states.

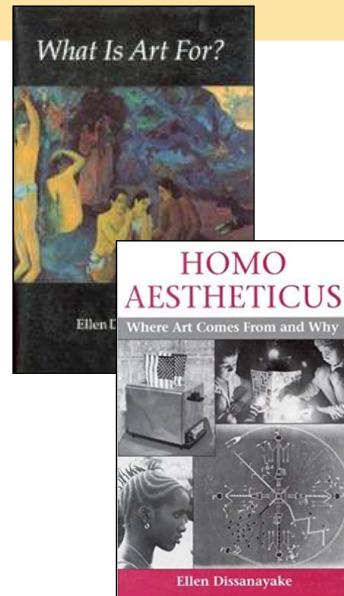
Other hypotheses on the evolution of symbolic culture (Knight 2010)

4. **Dan Sperber** (2005): *To qualify as symbolic, a signal must be false.* Linguistic utterances are symbolic to the extent that they are patent falsehoods serving as guides to communicative intentions. Metaphor, irony, sarcasm and humour illustrate the principle. Language began to evolve when humans started reciprocally faking in communicatively helpful ways.
5. **Roy Rappaport** (1999): *Words are cheap and unreliable. Costly, repetitive and invariant religious ritual is the antidote.* During the evolution of humanity, the crucial step was therefore the establishment of rituals capable of upholding the levels of trust necessary for linguistic communication to work.
6. **Jerome Lewis** (2009): *Hunting, mimicry and play.* Animals treat vocal signals as intrinsically reliable. Forest hunter-gatherers routinely exploit such gullibility, faking animal cries to lure their targets. When they subsequently recall a hunting episode, they act out the story drawing on the same sophisticated capacities for faking, mimicry and pantomime.

Other hypotheses on the evolution of symbolic culture (H Dissanayake 1990, 1995)

We can understand the arts ethologically by considering them as ways of **making important things and activities “special.”**

Art - along with play and ritual as human behaviors “make special.” **Making special is an inherited tendency as intrinsic to the human species as speech and tool making.** The arts evolved as means of **making socially important activities memorable and pleasurable**, and thus have been essential to human survival.



The place of culture in Evolution

- The place of culture in Evolutionary Psychology
- The place of culture in Ethology / in Primatology
- The place of culture in Evolutionary Biology

Next:



“Culture” in
non-human animals?
Cultural Primatology

