Is Religion Adaptive?

Integrating cognition and function

Robin Dunbar

British Academy Centenary Project

Royal Holloway

Institute of Cognitive & Evolutionary Anthropology

University of Oxford
Two Evolutionary Questions about Religion

Nothing as costly as religion could possibly be a maladaptation or a mere by-product

- What does [did] religion do for us?
- Why did religion [apparently] evolve only in humans?
Four [Traditional] Functions for Religion

- gives coherence to a complex world [Freud]
- psychological wellbeing
- social bonding [Durkheim]
- enforces conformity [moral codes] [Marx]
Does Religion Benefit You?

Frequent claims that religion has no adaptive benefits at the individual level notwithstanding...

Compared to others, actively religious people:

- live longer
- are more content/happier
- are less stressed
- suffer fewer psychological problems
- recover faster from surgery

[Data from extensive sociological and epidemiological studies in past decade]

BUT, even if none of these was true....
The World of Multilevel Selection

- Multi-level social systems are common in mammals
- When sociality involves an implicit social contract....
  Fitness accrues at the level of the individual, but through benefits generated by the group
- It requires a more subtle understanding of fitness – Hamilton’s original concept [neighbour-modulated fitnesses]
- This is NOT group selection
Back To The Beginning....

• Social Brain Hypothesis
• An explanation for the evolution of large brains in primates
• Evidence: group size [and many aspects of “smart” behaviour] are a function of neocortex volume

Neocortex ratio = neocortex vol/rest of brain [i.e. “thinking” part of brain]

Dunbar 1992, 1998
Humans and the Social Brain

- Predicted group size for humans is ~150
  [Dunbar’s Number]

...BUT primate societies are very intimate
Human Social Groups

All these have mean sizes of 100-200

Neolithic villages 6500 BC 150-200
Modern armies (company) 180
Hutterite communities 107
‘Nebraska’ Amish parishes 113
business organisation <200
ideal church congregations <200
Doomsday Book villages 150
C18th English villages 160
GoreTex Inc’s structure 150
Research sub-disciplines 100-200

Small world experiments 134
Hunter-Gatherer communities 148
Xmas card networks 154

“Reverse” Small World Experiments


Hunter-Gatherer Societies

Dunbar (1993)

Xmas Card Networks

The Freerider Problem

- All primate societies are based on an implicit social contract [cooperation]
- All such systems are susceptible to freeriders
- Dispersed social systems are especially susceptible
- Punishment [*stick*] has attracted most attention...
- **BUT** it’s only as effective as the detection rate
- Voluntary commitment [*carrot*] is much more effective

Enquist & Leimar (1993)

Freeriders are not successful

T = 0%

Freeriders are more successful over a wide range of conditions

Nettle & Dunbar (1997)

Freeriders very quickly drive cooperators to extinction
The Twin Pincers of Primate Sociality

• The intensity of intimacy

• Mentalising [understanding other’s minds]
The Intensity of Intimacy

- Social bonding primate-style
- Intimacy influences trust and obligation
- Grooming increases with group size
- Grooming releases endorphins and creates an opiate “high”
Grooming Time in Humans?

- Grooming as the bonding agent in primates
- Grooming time is a linear function of group size

![Graph showing predicted vs. actual social time in humans](image)
Three Ways to Bridge the Gap?

- Religion and its rituals
- Singing and dancing
- Laughter, a cross-cultural trait shared with chimpanzees
Laughter... the Best Medicine?

Procedure:
pain test – video/activity – pain re-test

Ss were more generous to strangers (but not “friends”) after watching a comedy video

In a Public Good Game

P = 0.559  p < 0.001

Cooperation (in GBP)

Strangers
Acquaintances
Musical Endorphins

Musical performance facilitates endorphin release, but listening to music does not.

**Procedure:**
pain test – activity – pain re-test

Dunbar, Kaskatis, MacDonald & Barra (submitted)
An Opium for the Masses?

Religious practices are often well suited to stimulate endorphins.

Ecstatic states:
- make you relaxed
- enhance sense of communality

- Medieval flagellants
- Whirling dervish
- Stigmata of Padre Pio
So, why not get your kicks on your own?

....because creating a sense of “bondingness” [commitment to community and prosociality] requires doing it together [i.e. interacting]!
Synchrony Ramps up the Endorphins

Change in pain threshold before and after 45 mins rowing work-out on ergometers in the gym:

Alone vs in a virtual boat

Why Does Religion Have This Effect?

There are two likely mechanisms:

• direct influence of endorphins [endorphins seem to “tune” the immune system]

• sense of belonging and communality acting directly OR indirectly through support from network members

… being a member of a large kinship group reduces

(1) illness rates in children [Newcastle and Trinidad]

(2) death rates in adults [the Mayflower colonists in 1620 and the Donner Party of 1846]
Something about a transcendental dimension raises commitment to the project.

C19th US utopian cults
Religious cults last longer than secular ones

Sosis & Alcorta (2003)
The Ecology of Community Size

- Small communities in the Tropics, larger ones at higher latitudes
- Religion density and collectivism are a function of disease prevalence [aka latitude]

Nettle (1999)

Fincher & Thornhill (2008)

Fincher et al (2008)
Cults are a Small-Scale Phenomenon

- Foundation size for C19th US utopian cults
- Against expectation (scale-free effect from Zipf’s Law), N<30 is uncommon, and 150>N>400 is the most common

Dunbar & Sosis (in prep)
Is There an Optimal Cult Size?

- Very small and very large foundations don’t survive well
- Optimum size ~150
- For secular communes, optimal size may even be smaller (~50)

Dunbar & Sosis (in prep)
The Role of Social Cognition

- Intentionality as a reflexively hierarchical sequence of belief states
- ...that may be very costly in information processing terms

Stiller & Dunbar (2007)
Religion at the Limits of Cognition...?

- **Belief as a personal phenomenon**
  “I believe that God wants us to act with righteous intent”

- **Belief as a social phenomenon**
  “I intend that you believe that God wants us to act with righteous intent”

  .... BUT why should you care?

- **Belief as a communal phenomenon**:
  “I intend that you understand that we believe that God wants us to act with righteous intent”
Why is Religion Unique to Humans?

- If achievable level of intentionality really is determined by capacity of frontal lobe...
- ...only humans have sufficient capacity for 5th order

Dunbar (2003)
Can We Date the Origins of Religion?

- Maybe....

- If we can estimate frontal lobe volume from cranial capacity...

...then we can estimate achievable level of intentionality
Dating the Origins of Religion

• Sufficient frontal lobe volume appears very late
• ... not earlier than the appearance of Homo sapiens

[Don’t get too excited about the Neanderthals]
Conclusions

• Social contract societies risk collapse from freeriding unless mechanisms are in place to enforce social cohesion

• In primates, this involves both cognitive and psychopharmacological mechanisms

• Voluntary commitment [carrot] works better than punishment [stick]

• Religion and ritual seem to function in just these ways

• Religion is: a small scale phenomenon, very susceptible to fragmentation well designed to reinforce in-group/out-group effects [Durkheim was basically right]

• Other benefits are by-products

• Religion may be a very recent evolutionary phenomenon