

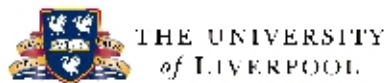
Phoning Home:

Keeping in Touch in Social Networks

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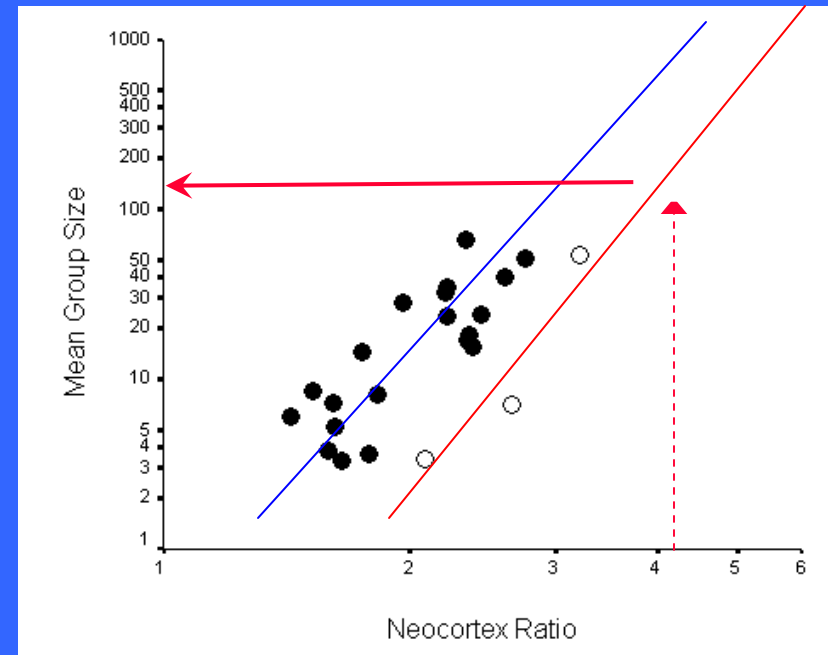


The Social Brain Hypothesis

Primates have big brains because they live in a complex social world

- Predicted group size for humans is ~150

[Dunbar's Number]



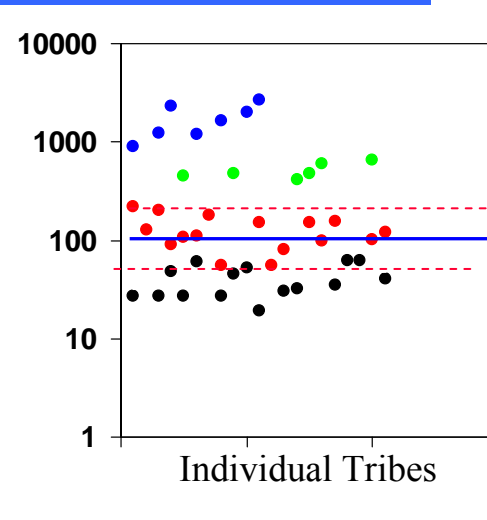
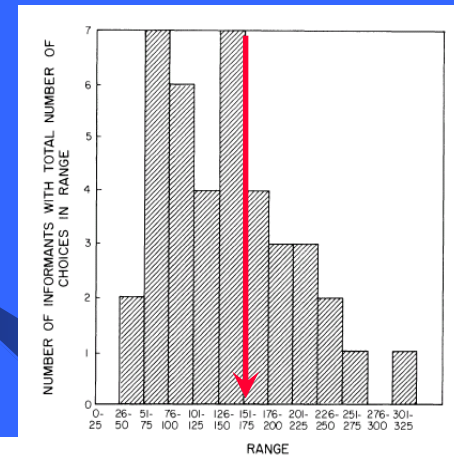
Human Social Networks

These all have mean sizes of 100-200

Neolithic villages 6500 BC	150-200
military units (company) (N=10)	180
* Hutterite communities (N=51)	107
Nebraska Amish parishes (N=8)	113
business organisation	<200
ideal church congregations	<200
Doomsday Book villages	150
C18th English villages	160
* GoreTex Inc's structure	150
Research sub-disciplines (N=13)	100-200
Small world experiments (N=2)	134
Hunter-Gatherer communities	148
Xmas card networks	154

“Reverse” Small World Experiments

Killworth et al (1984)

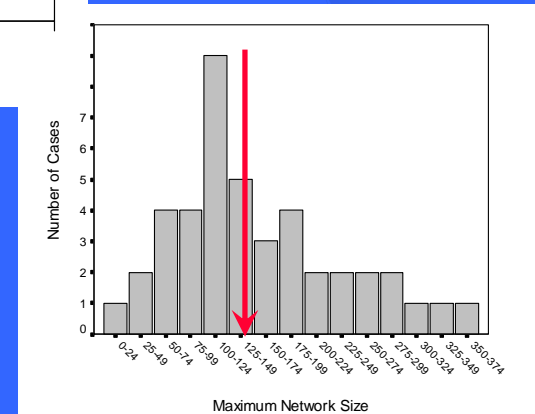


Hunter-Gatherer Societies

Dunbar (1993)

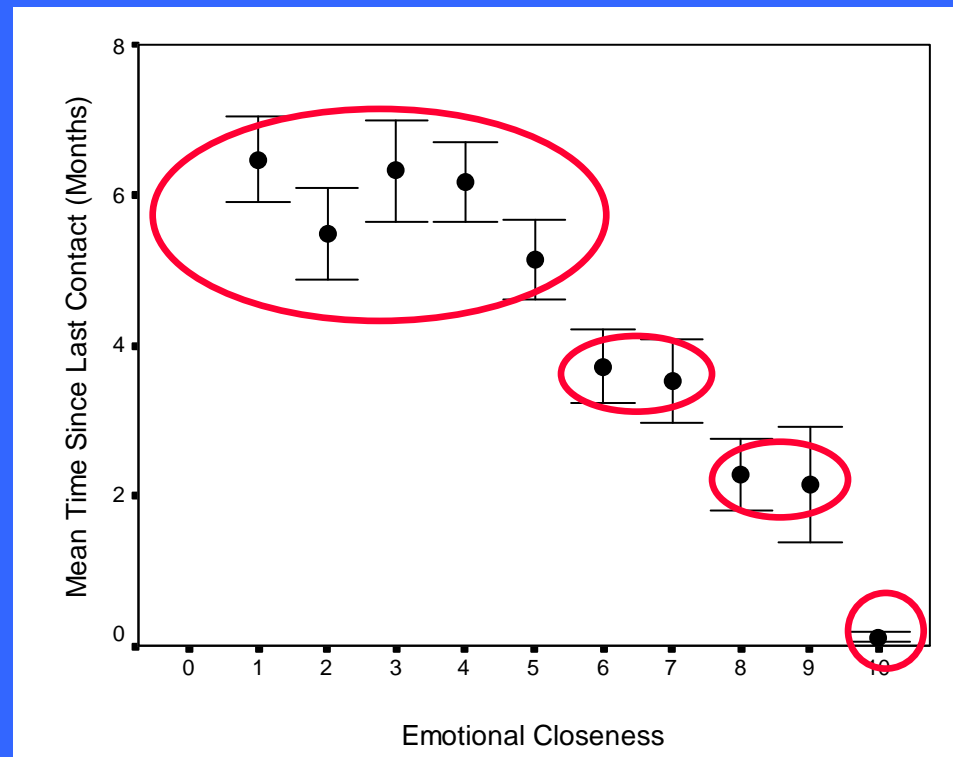
Xmas Card Networks

Hill & Dunbar (2003)



Intimacy, Frequency and Trust

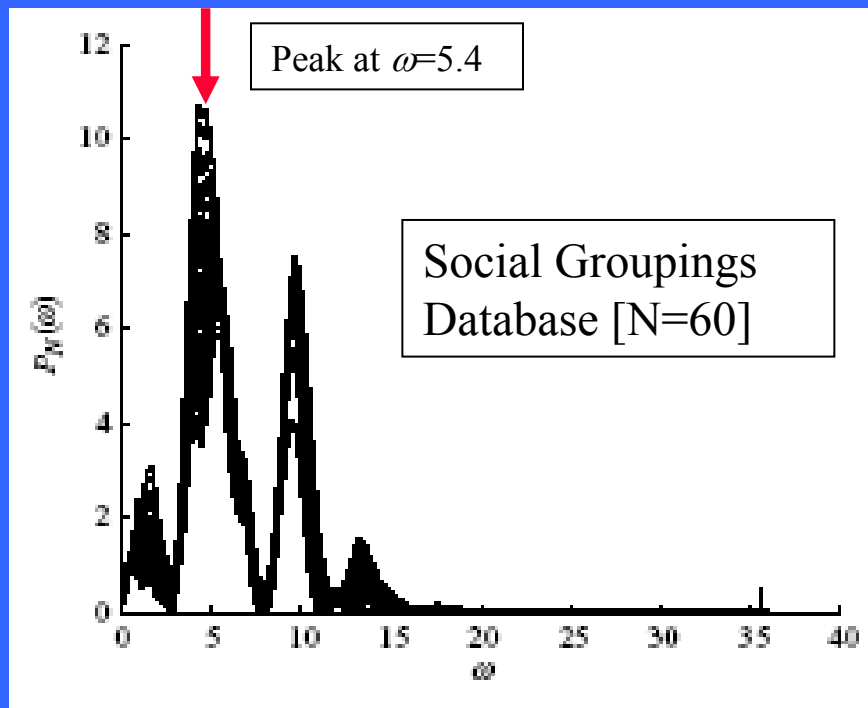
- Relationship between frequency of contact and intimacy
- Trust and obligation seem to be important



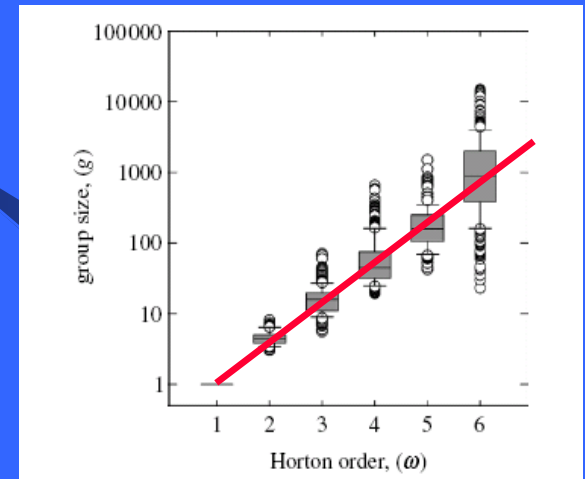
Hill & Dunbar (2003)

The Fractal Periodicity of Human Group Sizes

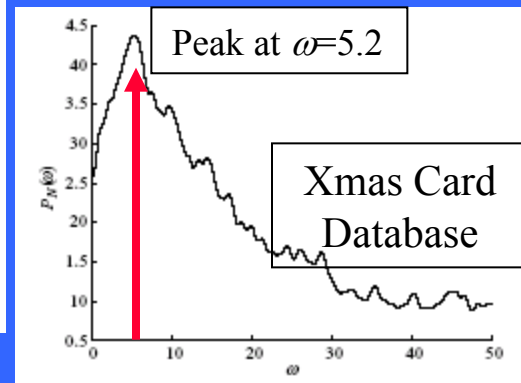
Horton Order Analysis of Hunter-Gatherer Group Sizes



$$\begin{aligned} \text{Scaling ratio} &= \exp(2\pi/\omega) \\ &= 3.2 \text{ and } 3.3 \end{aligned}$$



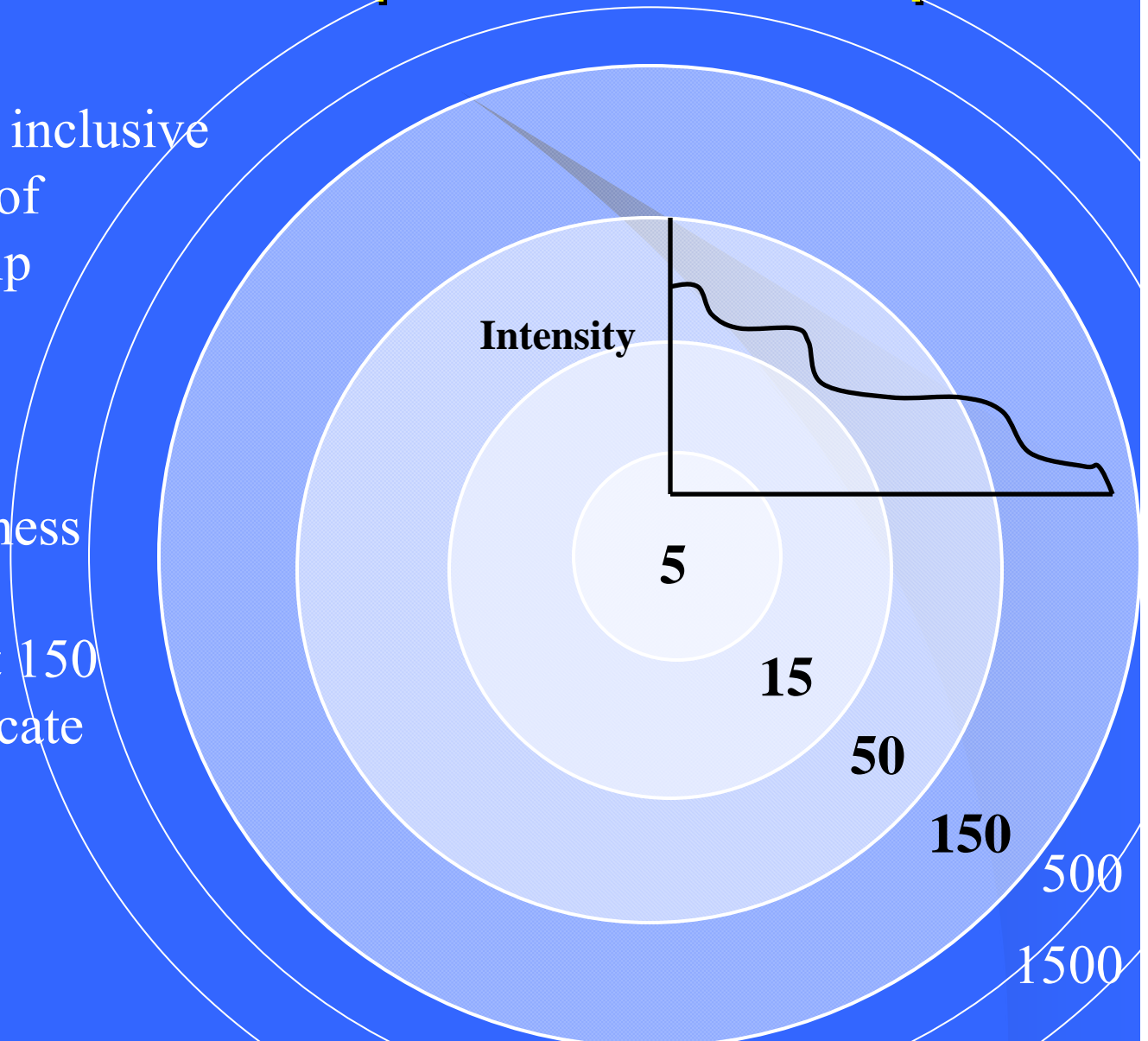
Hamilton et al (2007)



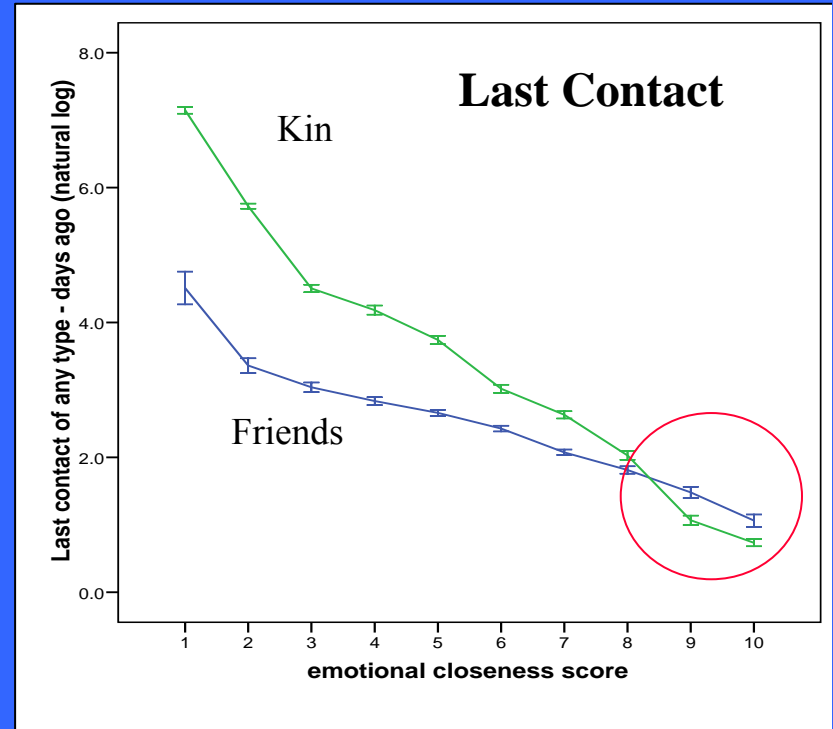
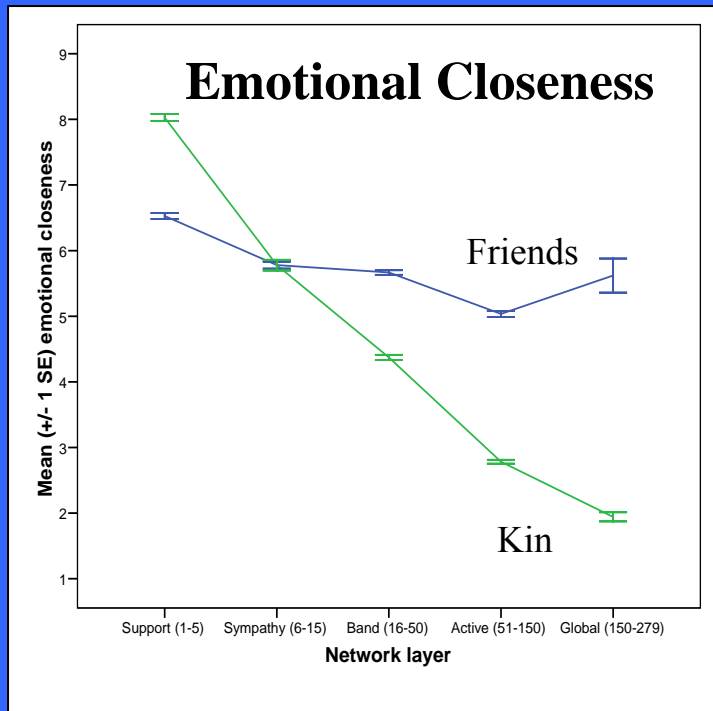
Zhou, Sornette, Hill & Dunbar (2005)

The Circles of Acquaintanceship

- A hierarchically inclusive series of levels of acquaintanceship
- Levels reflect familiarity and emotional closeness
- The boundary at 150 seems to demarcate personalised relationships

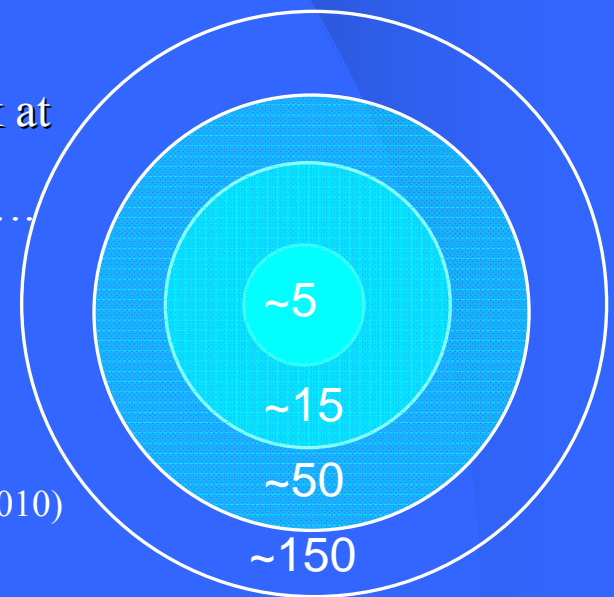


Networks Are NOT Homogenous



Kinship is robust....
Friends we have to work at

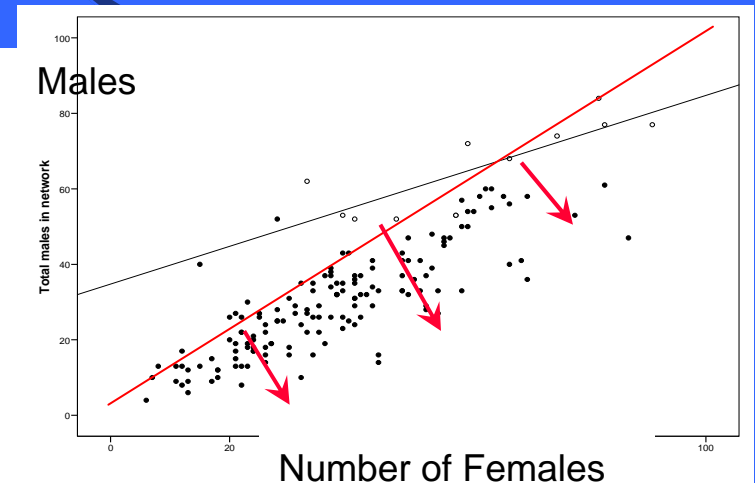
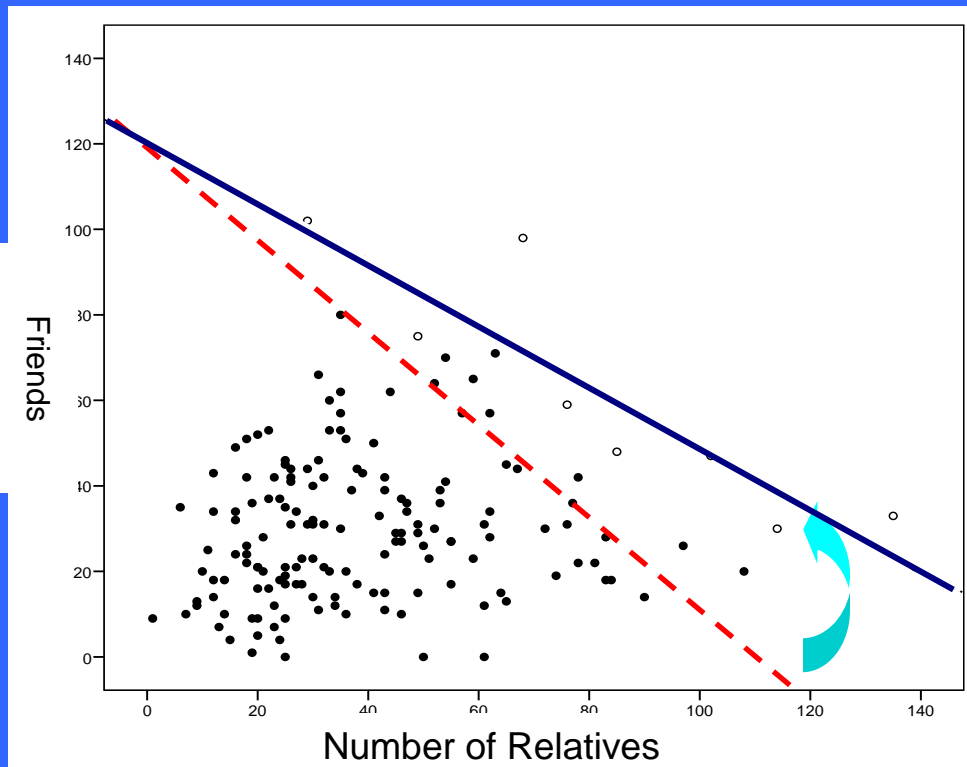
Friendships are fragile....
....Kinship is robust
[We put up with them even though we don't particularly like them]



Roberts & Dunbar (2010)

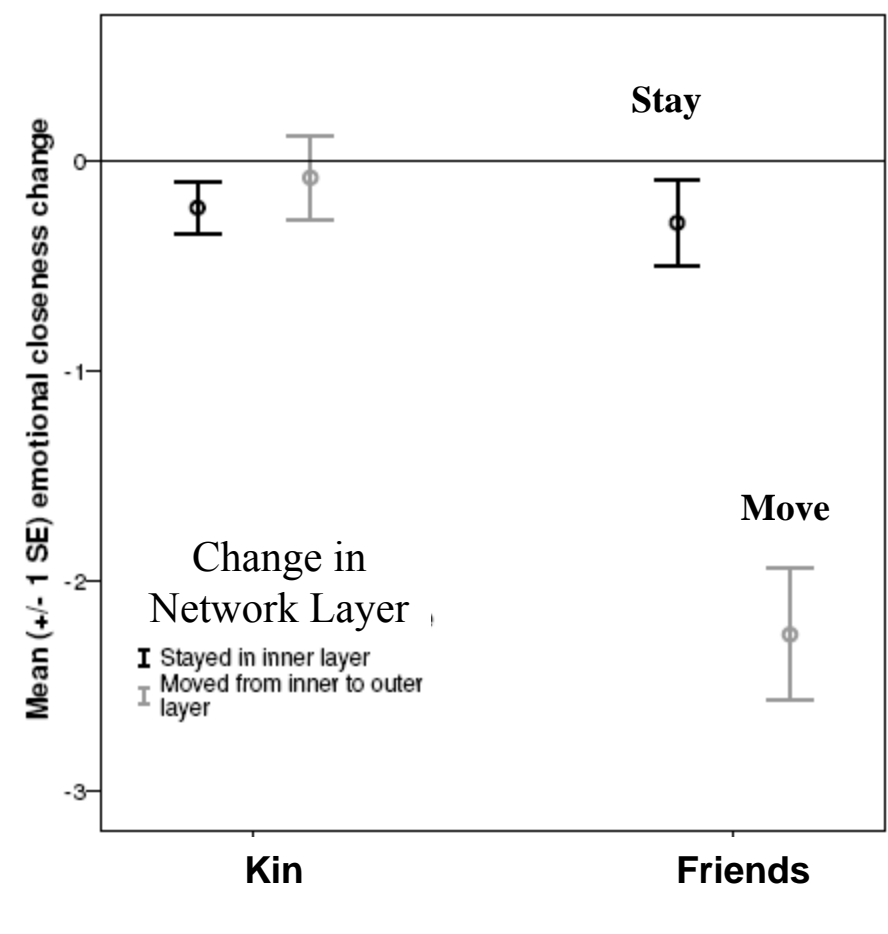
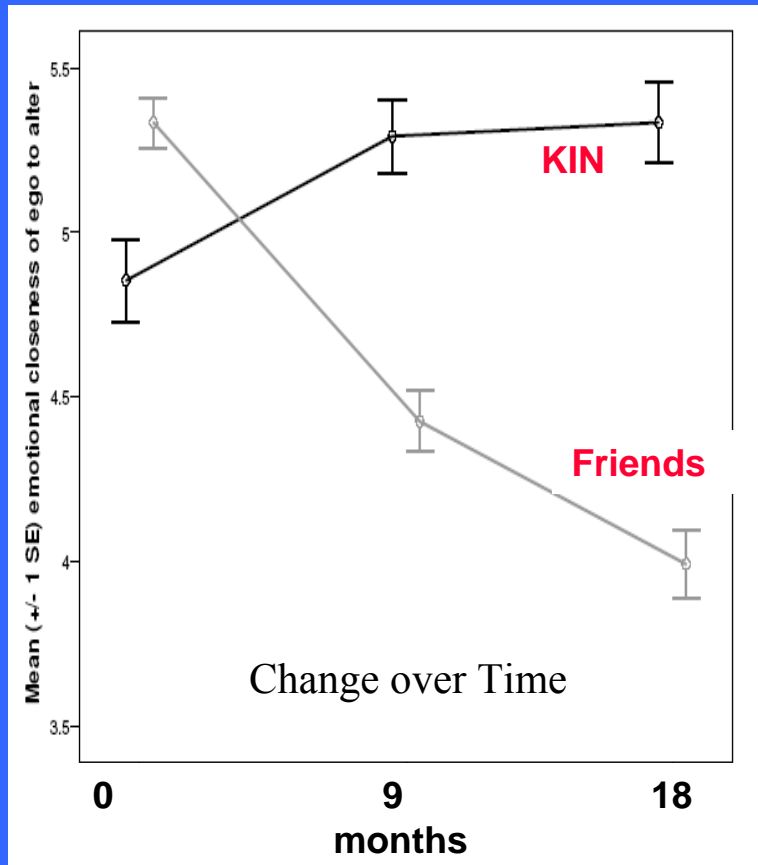
Structural Biases in Networks

Females' Networks



- Kin are given preference in the network [individuals from large families have fewer friends]
- Strong same-sex preferences

Stable Family, Fragile Friends



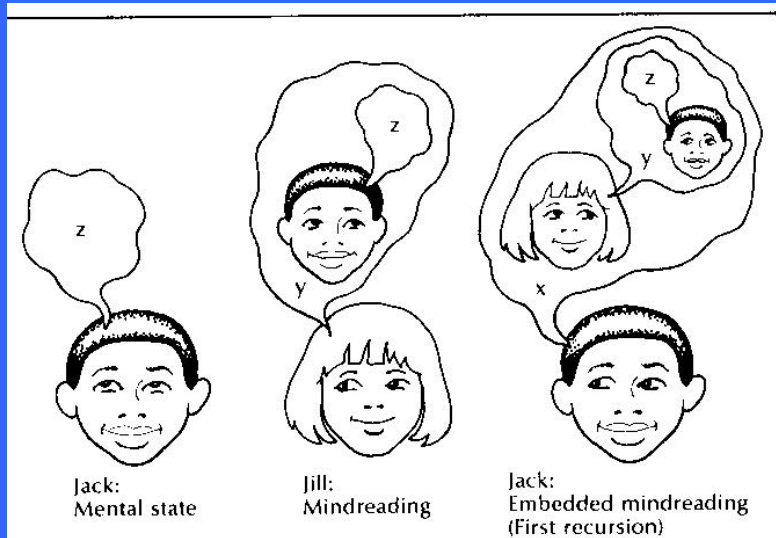
How Bonding Works

Bonding is a dual-process mechanism

- An emotionally intense component
[= grooming]
- A cognitive component
[= cognition → brain size]



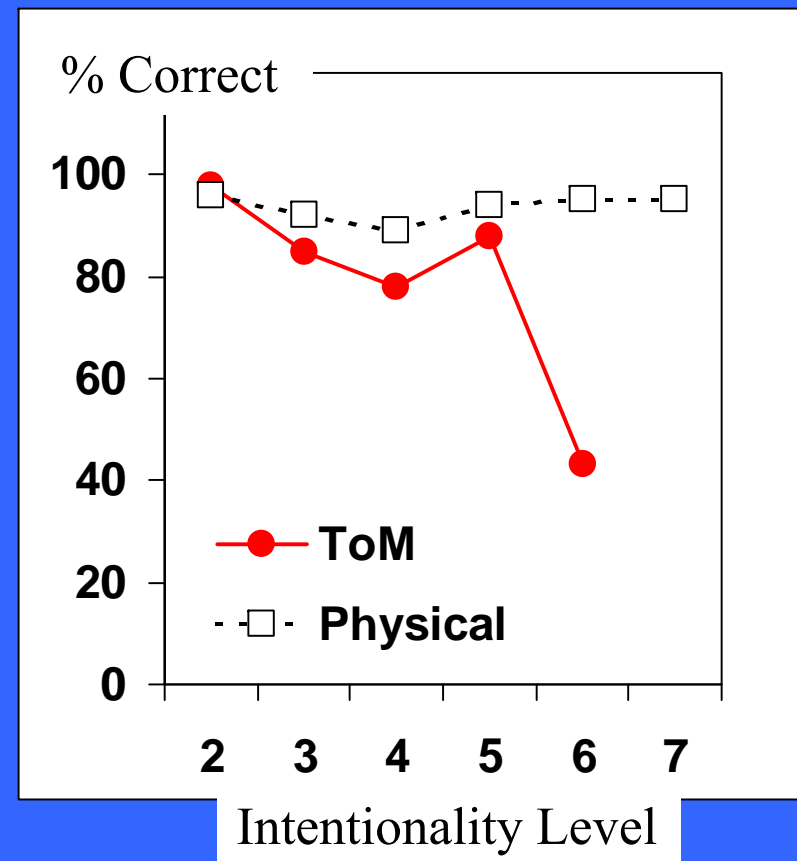
The Limits to Intentionality...



A natural limit at 5th order
intentionality:

“I intend that you believe that Fred
understands that we want him to be
willing to [do something]...”

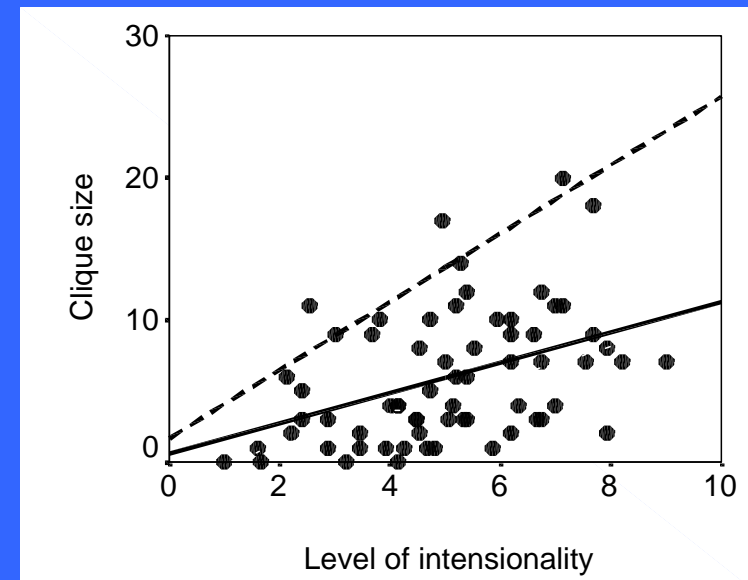
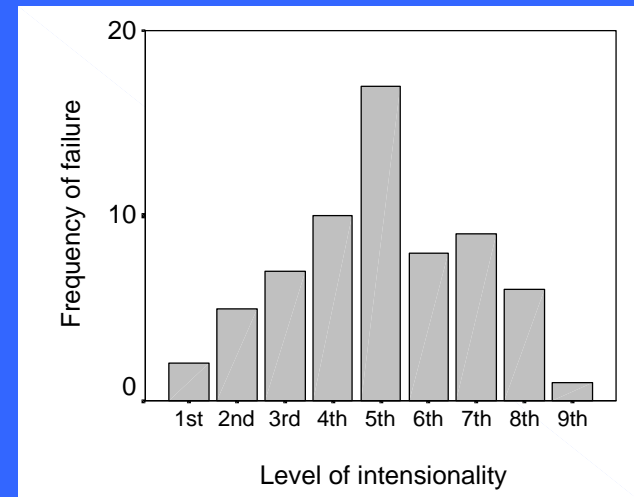
[level 5]



Kinderman, Dunbar & Bentall (1998)

Cognitive Limits to Sociality?

- Achievable intentionality level indexed from stories
- 5th order seems to be the limit
- Intentionality correlates with clique size
- We now have two neuroimaging studies to support this

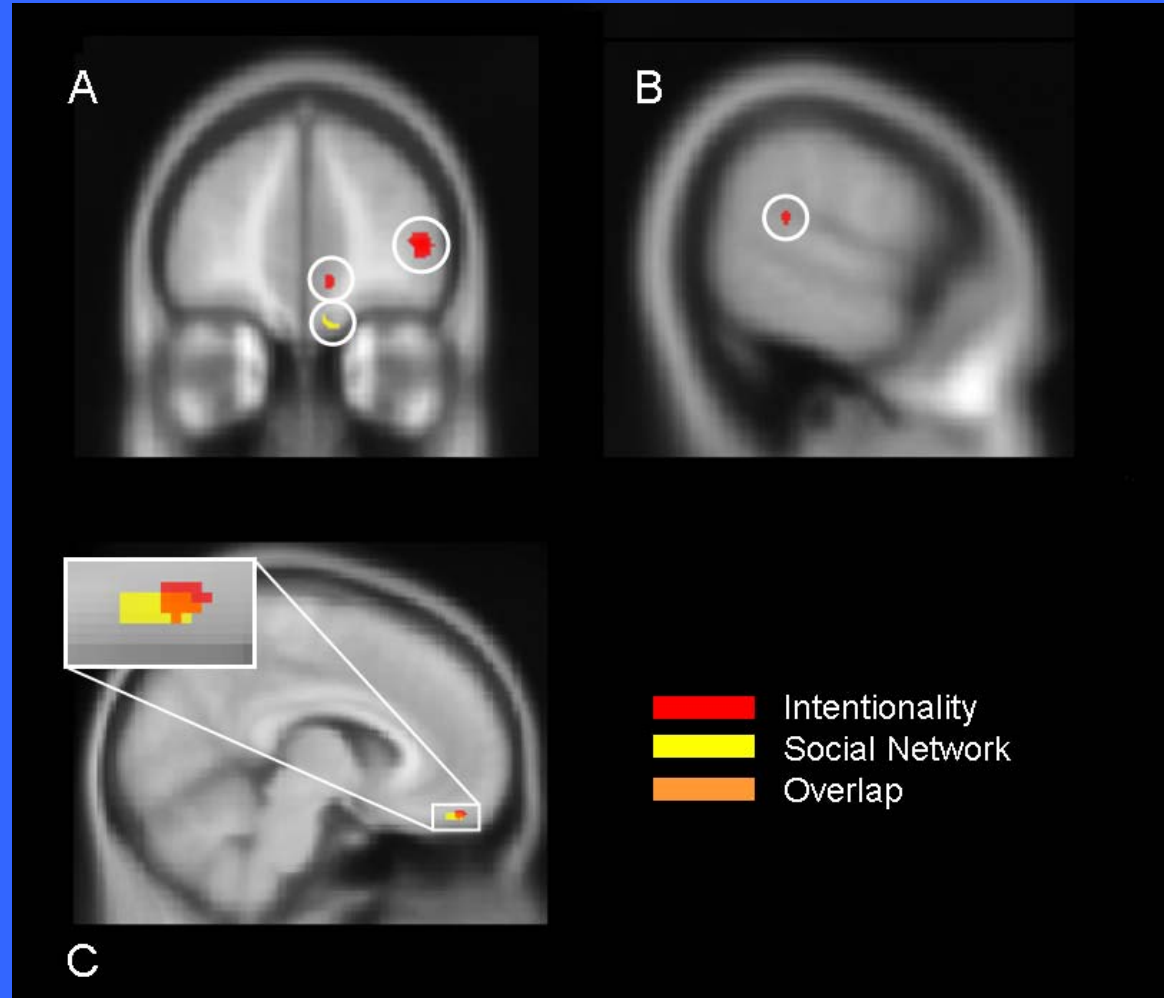


[Stiller & Dunbar 2007]

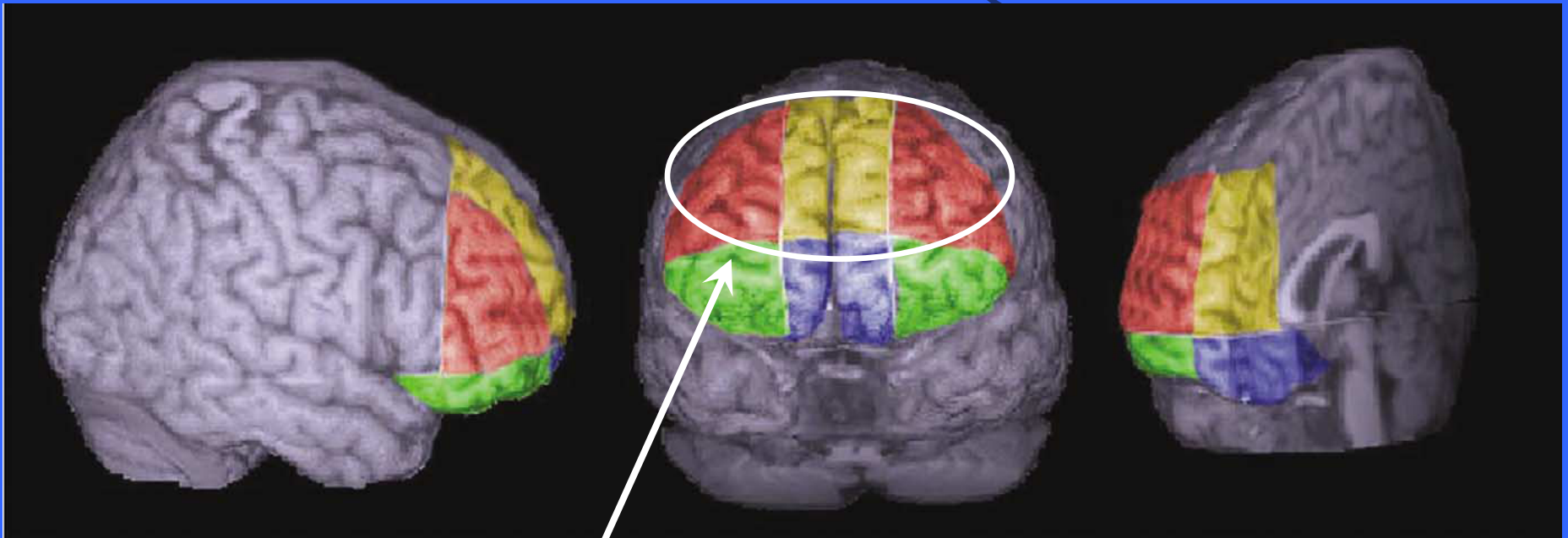
Firing up the Brain

Significant contrasts
[mentalsing > memory]
with a parametric effect of
intentionality level

- 4 core regions involved in
mentalsing:
- dorsal medial PFC
 - ventro-medial PFC
 - Rt frontal pole
 - temporal-parietal junction



How Many Friends Do You Have?



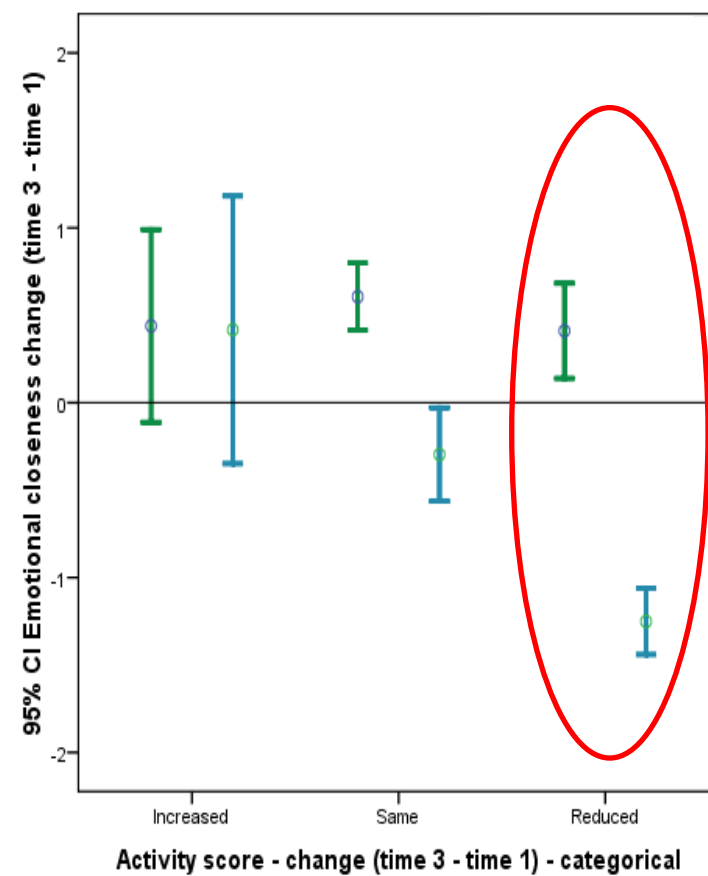
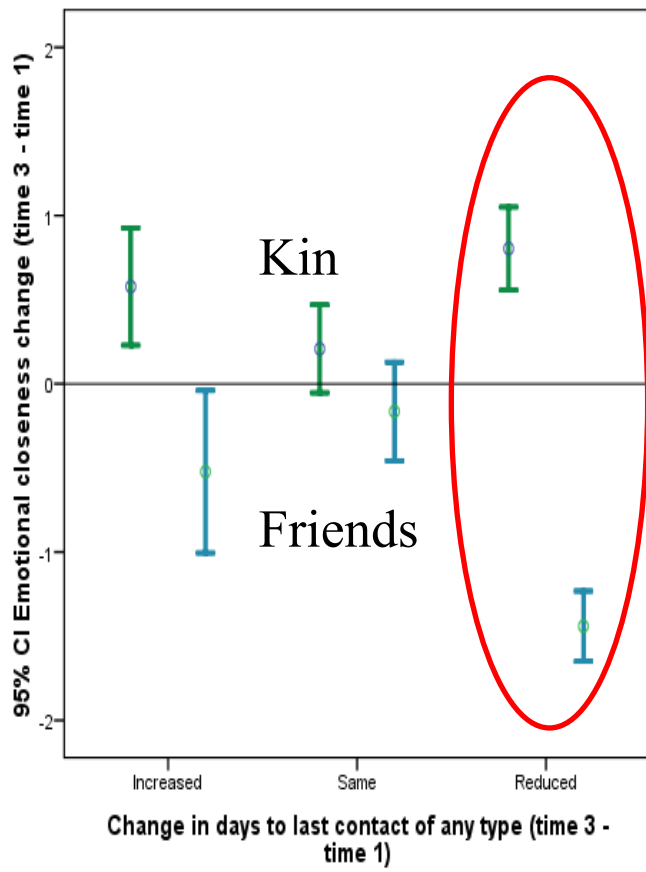
Powell, Lewis, Dunbar, Garcia-Finana & Roberts (in prep)

- A stereological analysis of gross volume
- Best predictor is Dorsal PFC volume

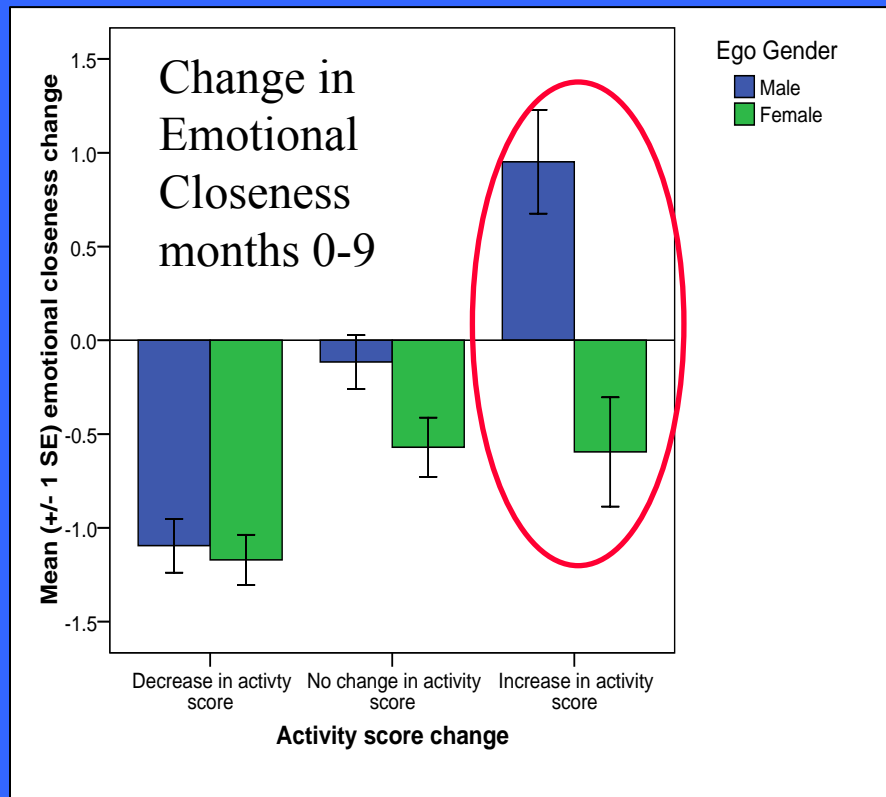
How to Prevent Decay

Change in contact frequency

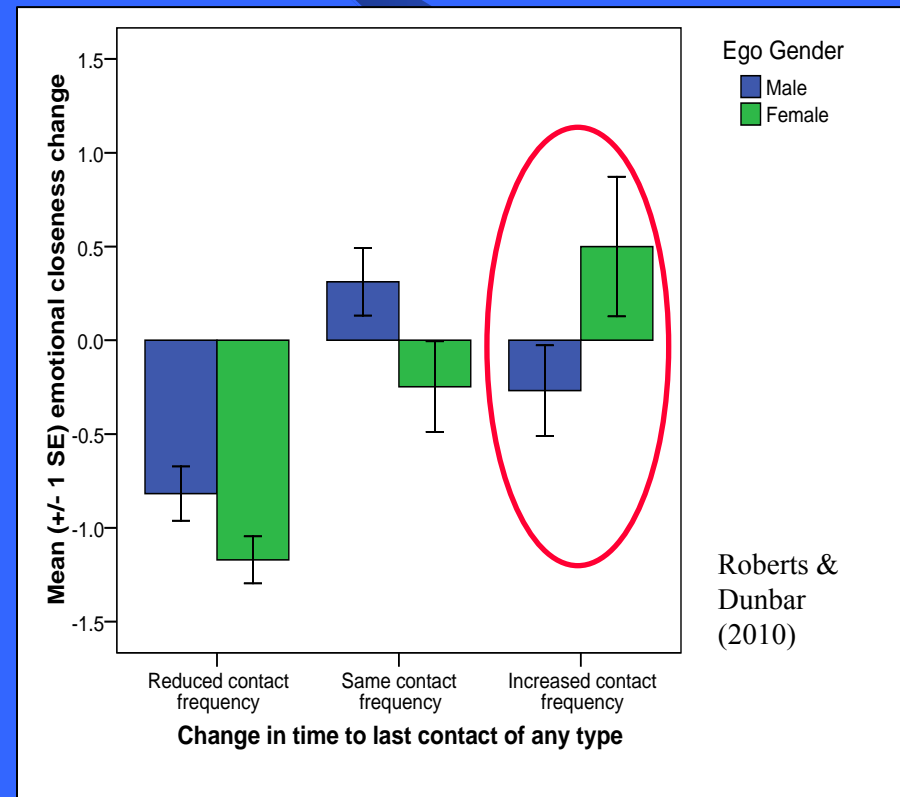
Change in activities done together



A Sex Difference in How Relationships are Serviced?



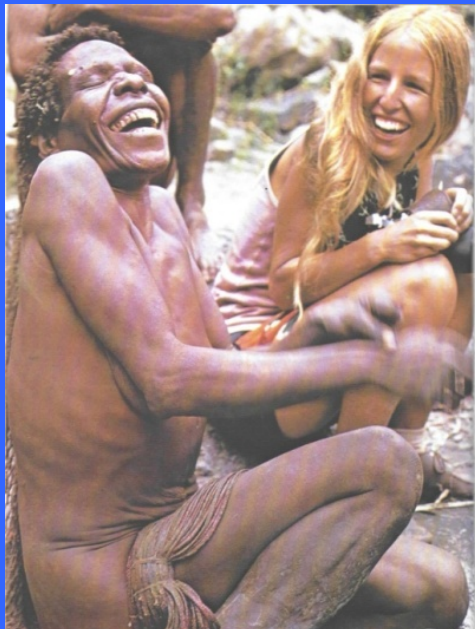
by change in activity score



by change in contact frequency

Is Physical Interaction Critical....?

- A touch is worth a thousand words....



We underestimate the importance of physical contact

Laughter as “touch at a distance”

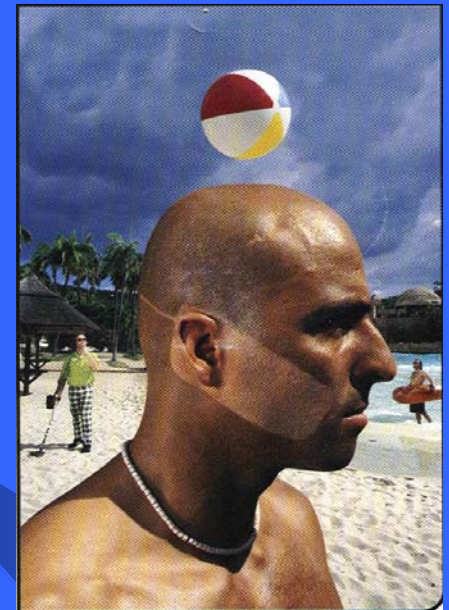
Lessons for Networking Technology?



- Constraint may be internal rather than technical

- Three key issues:

- Why do people want to contact each other?
- Are all contacts really equal?
- Can technology ever replace face-to-face interaction?



- Texting:
averaging 120 texts per day to just 2 people
- Technology:
may slow relationship decay rate, but be poor for creating new ones

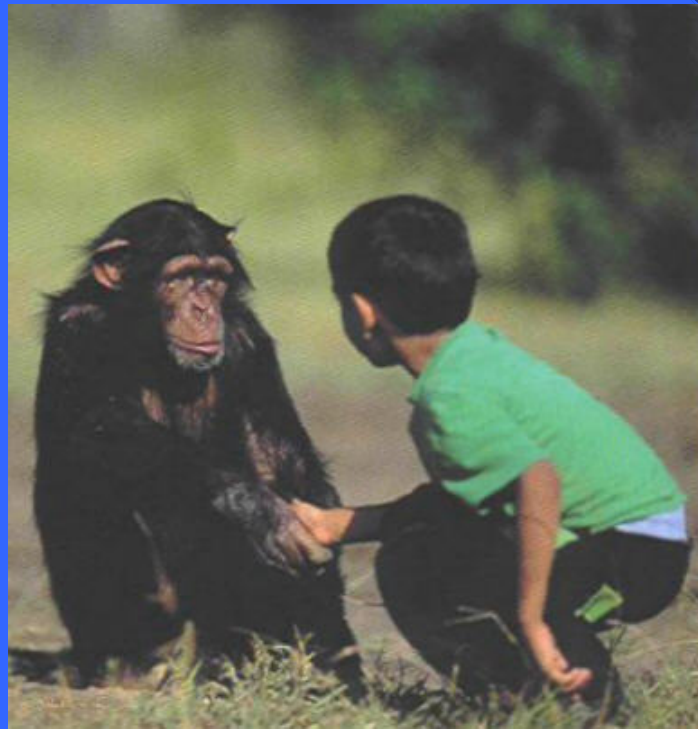


Conclusions

- There are cognitive constraints on sociality
- Human social groupings are structured in discrete layers
- Does Cognition or Time (or both) limit network size and structure?
- Implications for the structure of organisations?
- And....
 - will cognition limit electronic networks?
 - can technology help us to overcome this?

With Thanks to.....

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