WEAK AND STRONG TIES
DUNBAR'S THEORY

Granovetter 1973

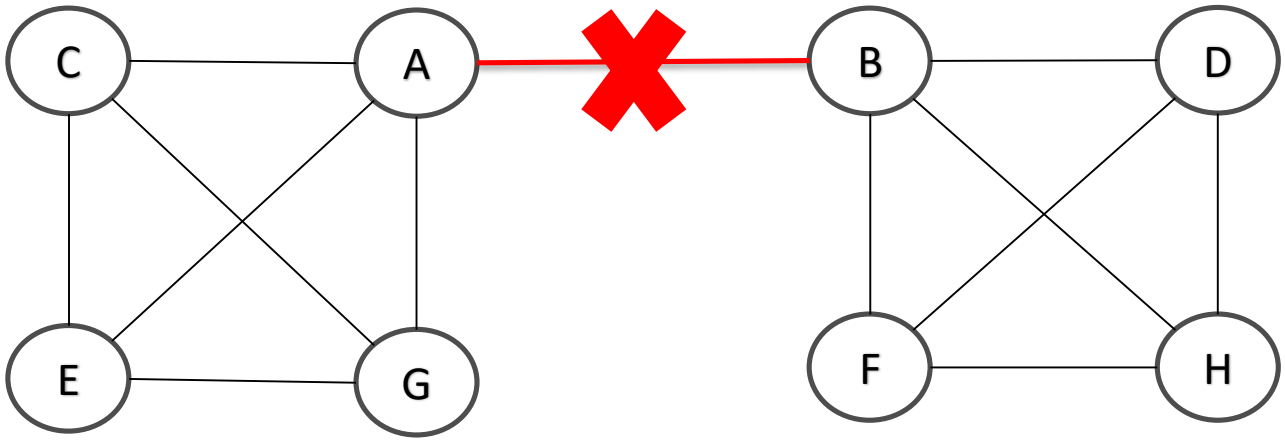
- ”It is the distant acquaintances who are actually to thank for crucial information leading to your new job, rather than your close friends!”
- Mark Granovetter (born October 20, 1943): an American sociologist and professor at Stanford University.
- 1969: submitted his paper to the American Sociological Review—rejected!
- 1972, submitted a shortened version to the American Journal of Sociology—published in 1973 (Granovetter, 1973).
- According to Current Contents, by 1986, the Weak Ties paper had become a citation classic, being one of the most cited papers in sociology

Granovetter

- Granovetter interviewed people about how they discovered their jobs
- Most people did so through personal contacts, often described as acquaintances and not close friends
- Basic intuition: close friends are part of triad closures and would know what you know and would know others who would know what you know

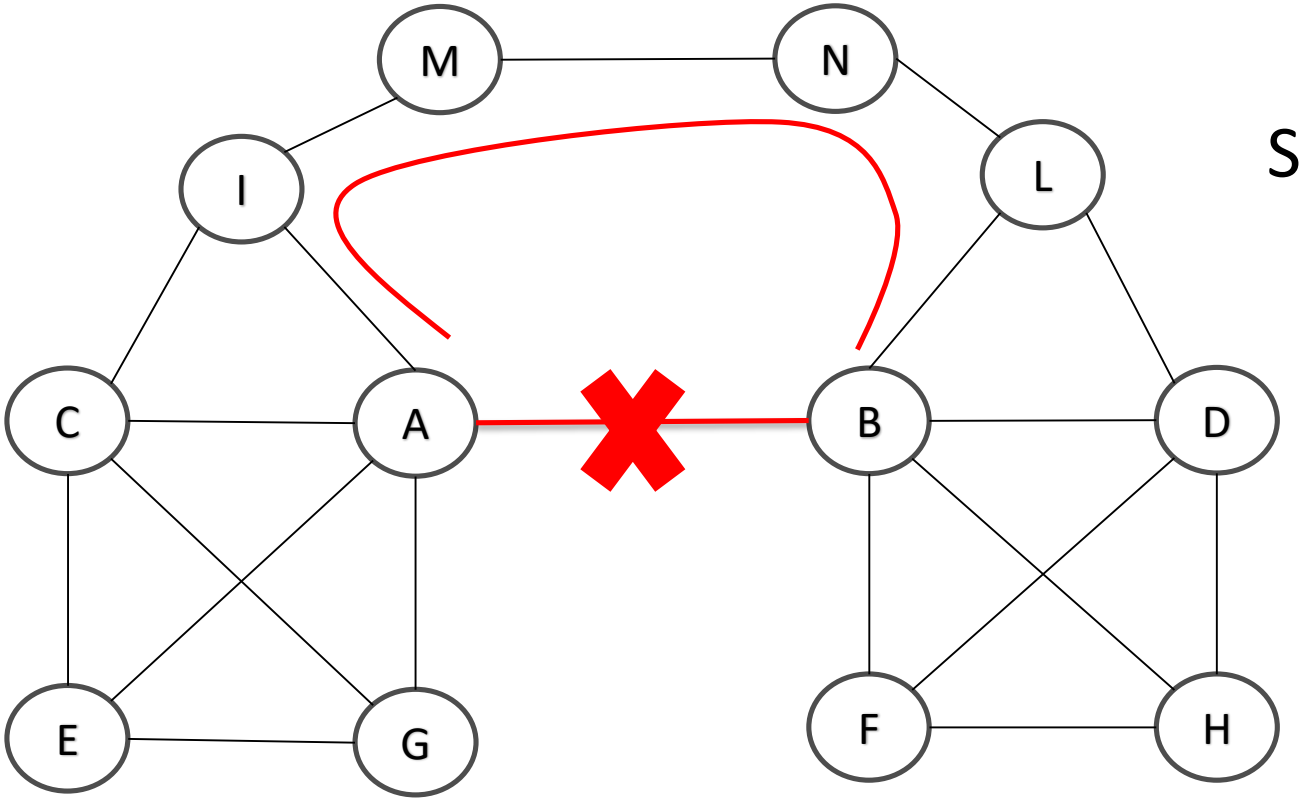
Bridge

Edge between A and B is a bridge if, when deleted, it would make A and B lie in 2 different components



Local bridge

An edge is a local bridge if its endpoints have no friends in common – If deleting the edge would increase the distance of the endpoints to a value more than 2.



Span:5

Local bridge

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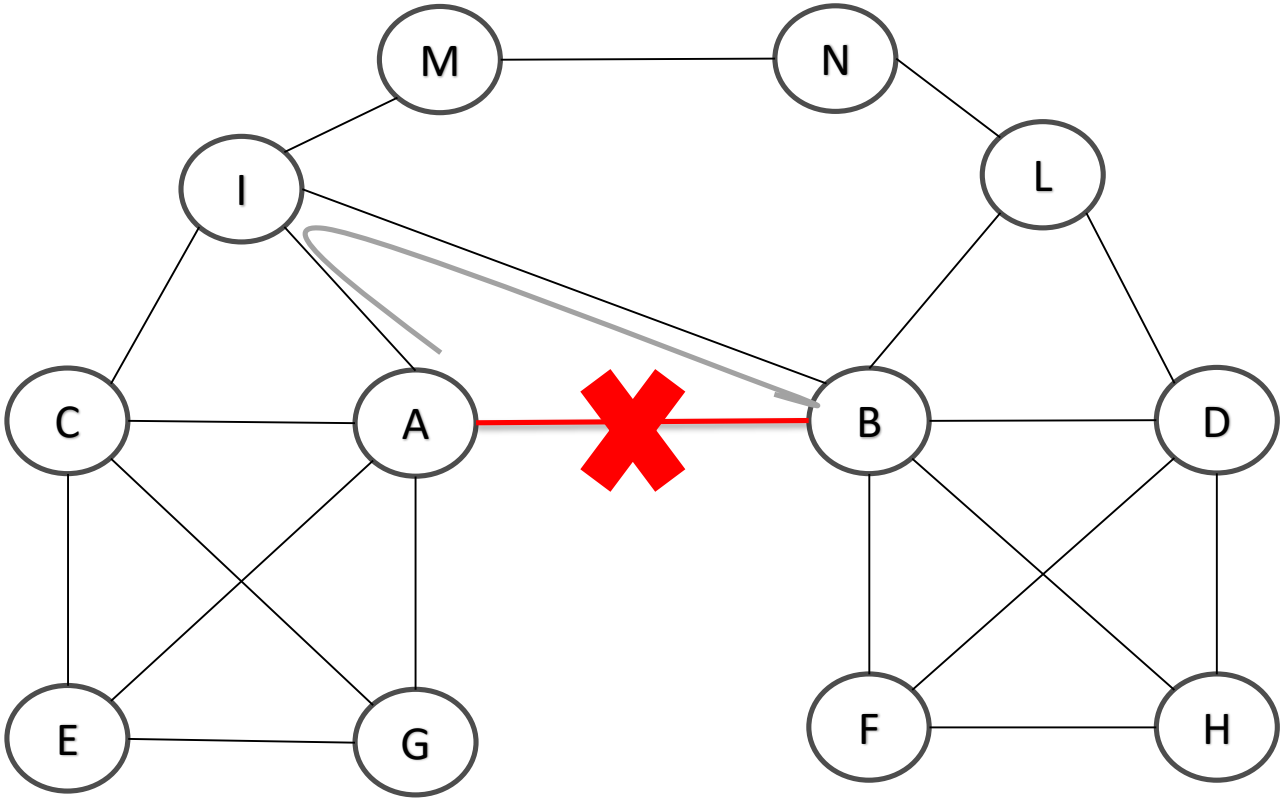


Triangle →not a local bridge

Strong triadic closure

Links between nodes have different “value”:

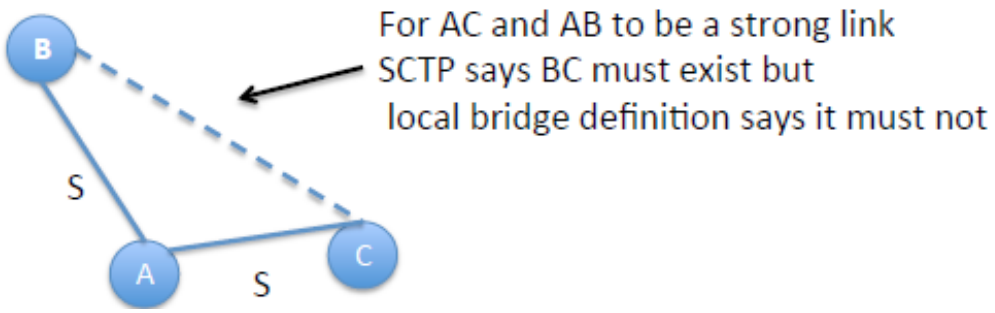
strong and weak ties

E.g: Friendship vs acquaintances

Strong Triadic Closure Property (Granovetter):
If a node A has two strong links (to B and C) then a link (strong or weak) must exist between B and C.

Local bridge and weak ties

If node A satisfies the STCP and is involved in at least two strong ties, then any local bridge it is involved in must be a weak tie.

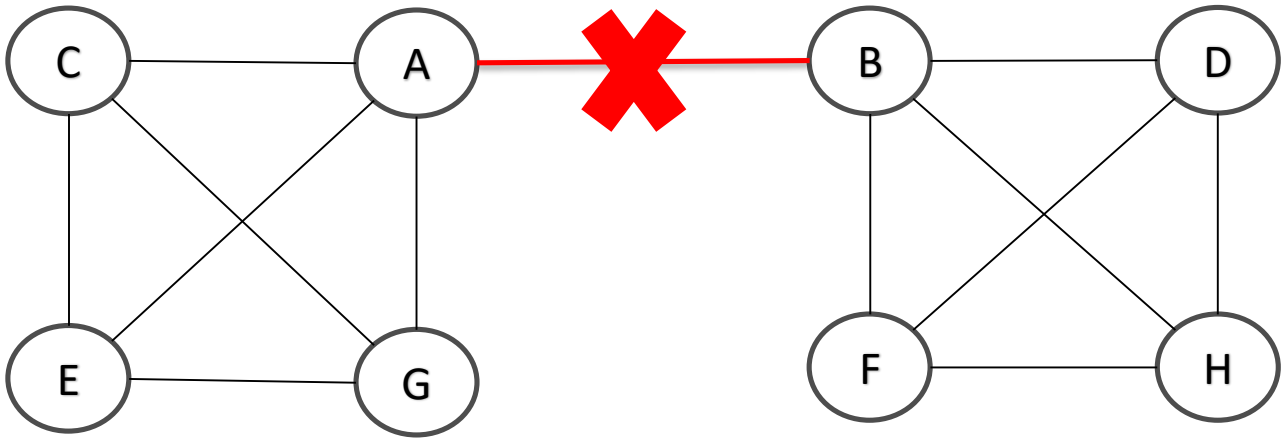


(Proof by contradiction)
(assuming STCP)
If there are enough strong ties in the network then local bridges must be weak ties

Almost local bridge

Neighborhood overlap:

$$O(A,B) = \frac{n(A) \cap n(B)}{n(A) \cup n(B)}$$



O(A,B)=0

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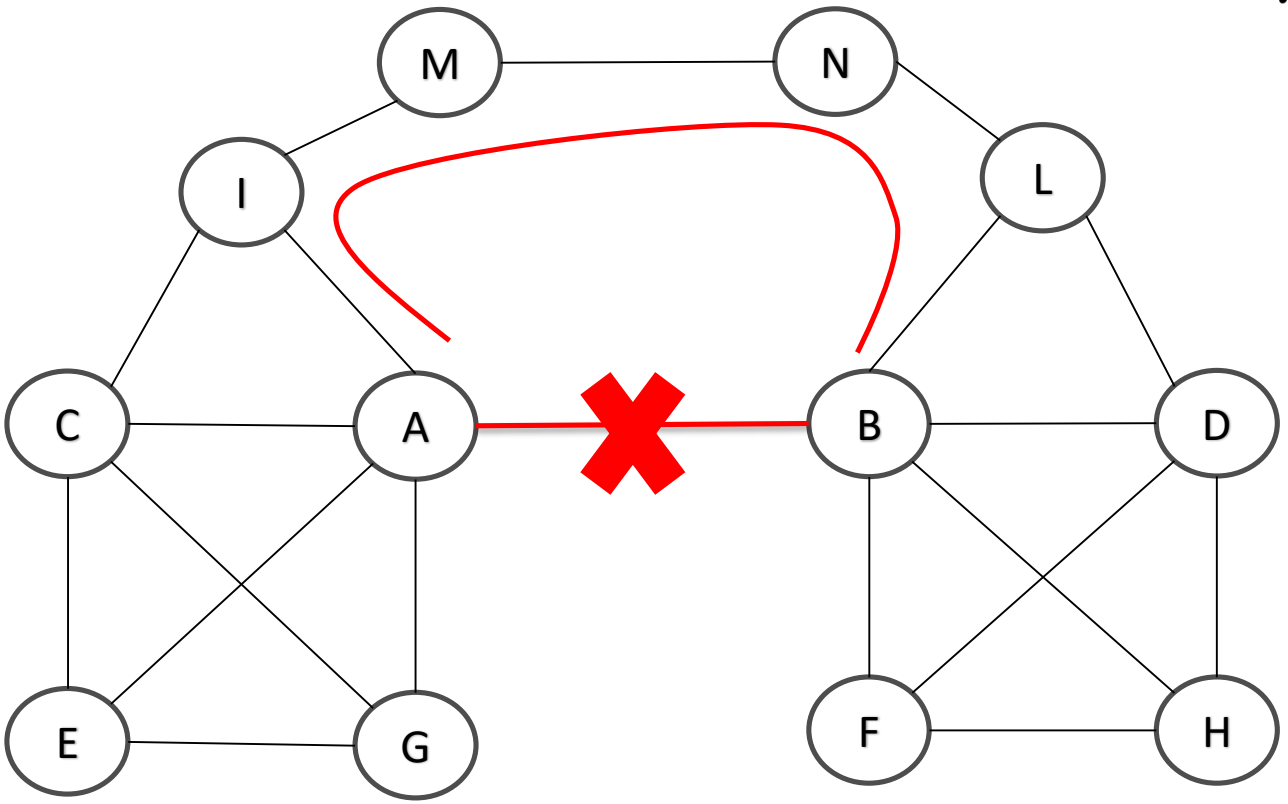

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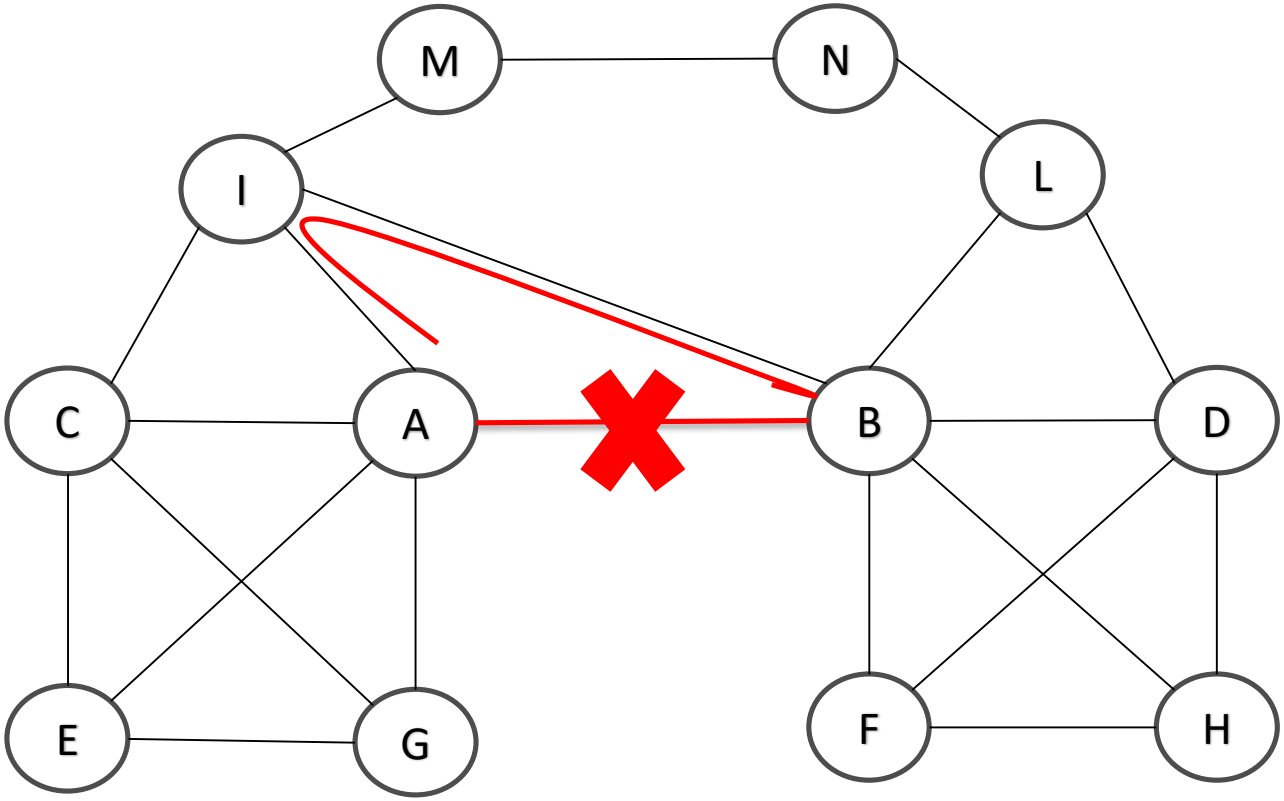


O(A,B)=1/9

Strong and weak ties in real networks

Mobile communication networks:

Structure and tie strengths in mobile communication networks
JP Onnela, J Saramäki, J Hyvönen, G Szabó, D Lazer, K Kaski, J Kertész, A-L Barabási
Proceedings of the National Academy of Sciences 104 (18), 7332, 2007

Facebook:

Cameron Marlow
http://overstated.net/2009/03/09/maintained-relationships-on-facebook

Twitter:

Huberman, Bernardo A. and Romero, Daniel M. and Wu, Fang, Social Networks that Matter: Twitter Under the Microscope (December 5, 2008). Available at SSRN: https://ssrn.com/abstract=1313405 or http://dx.doi.org/10.2139/ssrn.1313405

Facebook

Random sample of users over the course of 30 days.

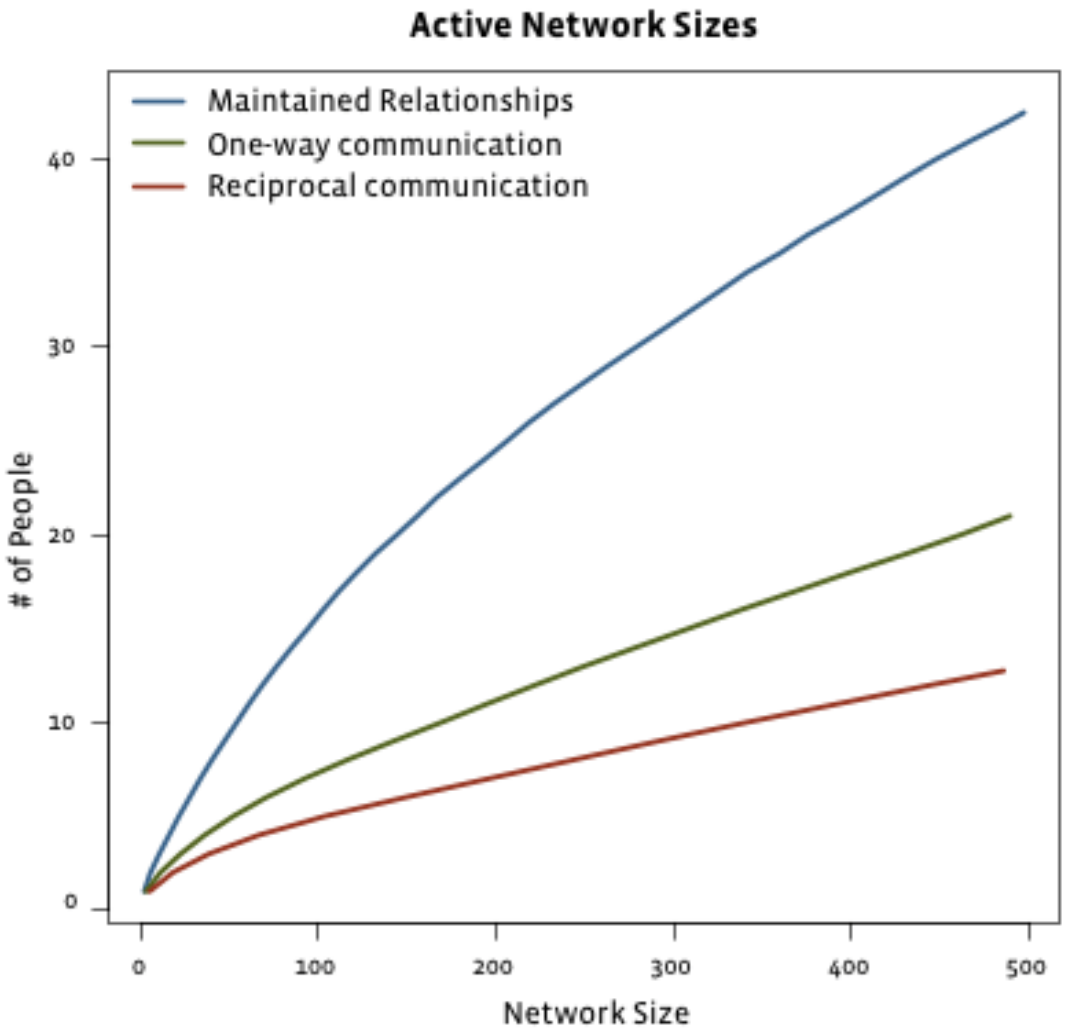
- **All Friends:** the largest representation of a person's network is the set of all people they have verified as friends.
- **Reciprocal Communication:** as a measure of a sort of core network, we counted the number of people with whom a person had had reciprocal communications, or an active exchange of information between two parties.
- **One-way Communication:** the total set of people with whom a person has communicated.
- **Maintained Relationships:** to measure engagement, we took the set of people for whom a user had clicked on a News Feed story or visited their profile more than twice.

Source:

Cameron Marlow

http://overstated.net/2009/03/09/maintained-relationships-on-facebook

Facebook



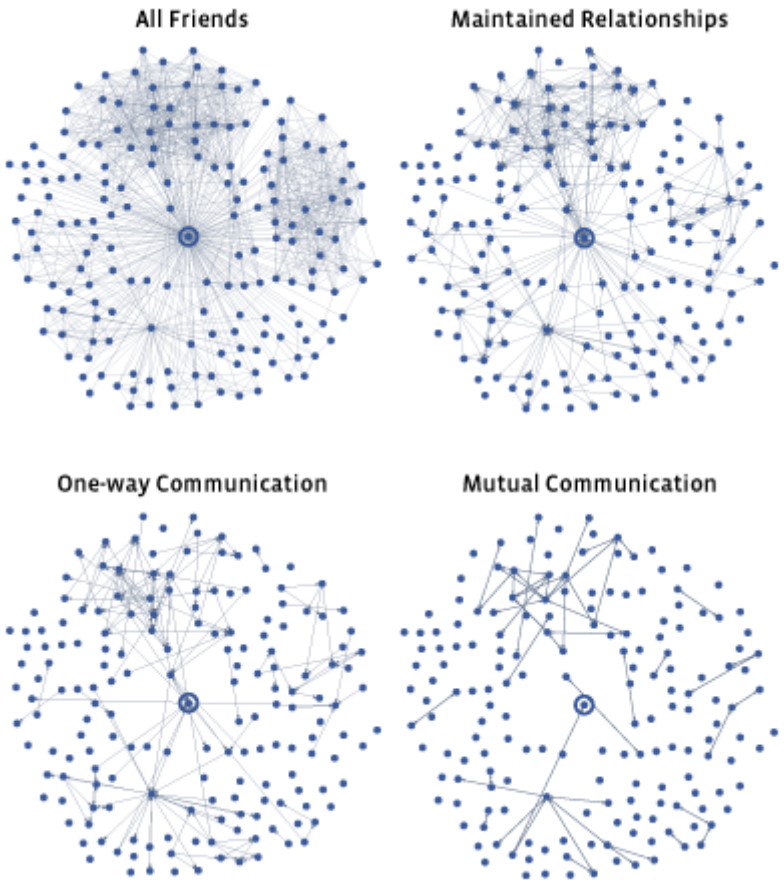
The stark contrast between reciprocal and passive networks shows the effect of technologies such as News Feed. If these people were required to talk on the phone to each other, we might see something like the reciprocal network, where everyone is connected to a small number of individuals. Moving to an environment where everyone is passively engaged with each other, some event, such as a new baby or engagement can propagate very quickly through this highly connected network.

Source:

Cameron Marlow

http://overstated.net/2009/03/09/maintained-relationships-on-facebook

Facebook: a personal network



Source:

Cameron Marlow

http://overstated.net/2009/03/09/maintained-relationships-on-facebook

Sources

Networks, Crowds, and Markets: Reasoning About a Highly Connected World
David Easley e Jon Kleinberg
Cambridge University Press, 2010

Structure and tie strengths in mobile communication networks
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Dunbar's theory

- Social brain hypothesis: natural social network sizes may have a characteristic size in humans.
- This is determined in part by cognitive constraints and in part by the time costs of servicing relationships.
- Online social networking offers the potential to break through the glass ceiling imposed by at least the second of these, potentially enabling us to maintain much larger social networks.
- Data show that the size and range of online egocentric social networks, indexed as the number of Facebook friends, is similar to that of offline face-to-face networks.

Sources

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Mobile phone calls:
Giovanna Miritello; Esteban Moro; Rubén Lara; Rocío Martínez-López; John Belchamber; Sam G.B. Roberts; Robin I.M. Dunbar. "Time as a limited resource: Communication strategy in mobile phone networks". doi:10.1016/j.socnet.2013.01.003.