TOCHI paper:

Modelling what friendship patterns of Facebook reveal about personality and social capital

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Community Imaging Group
Studying communities through their use of technology

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UNIVERSITY of OULU
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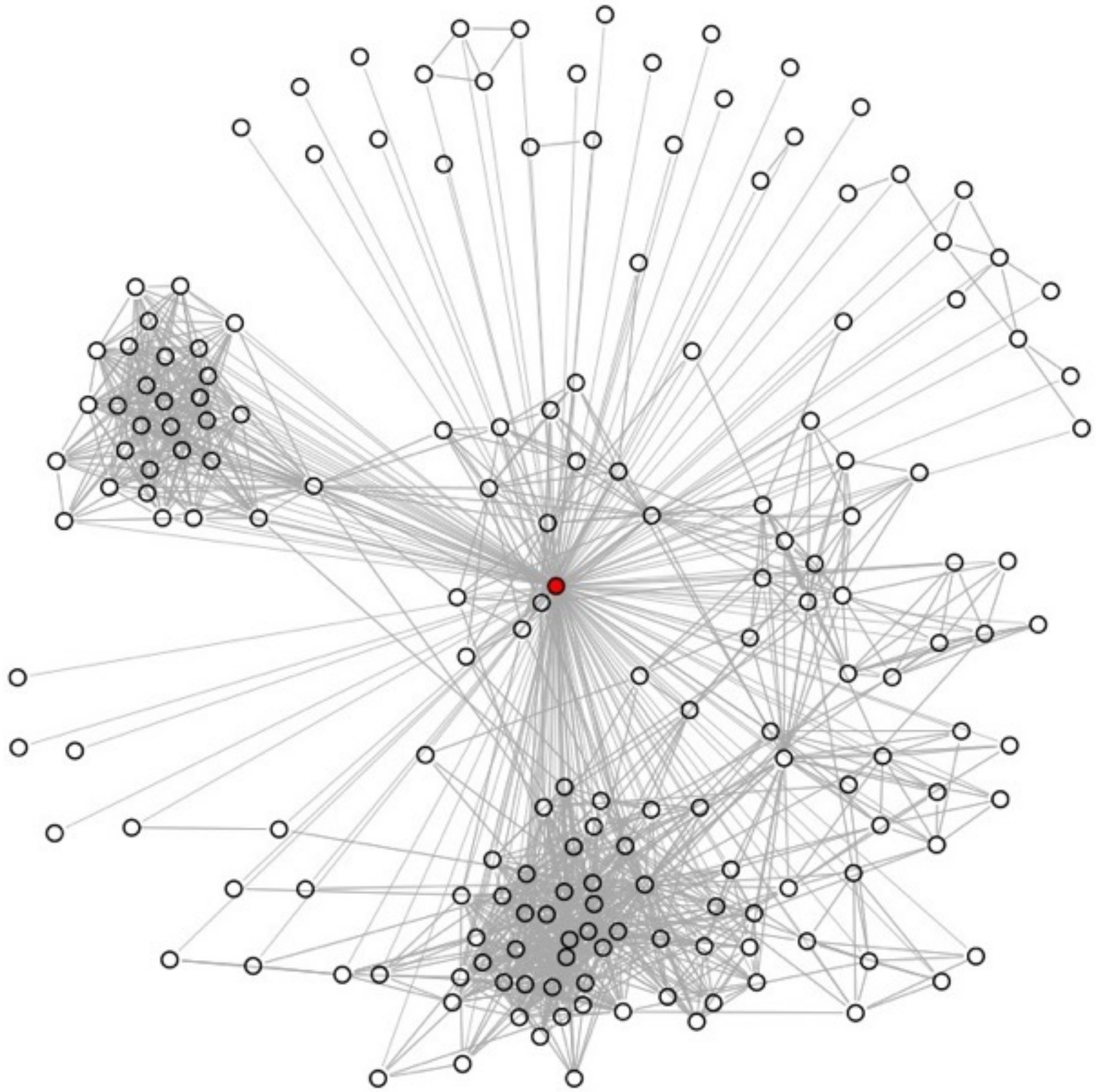


Motivation

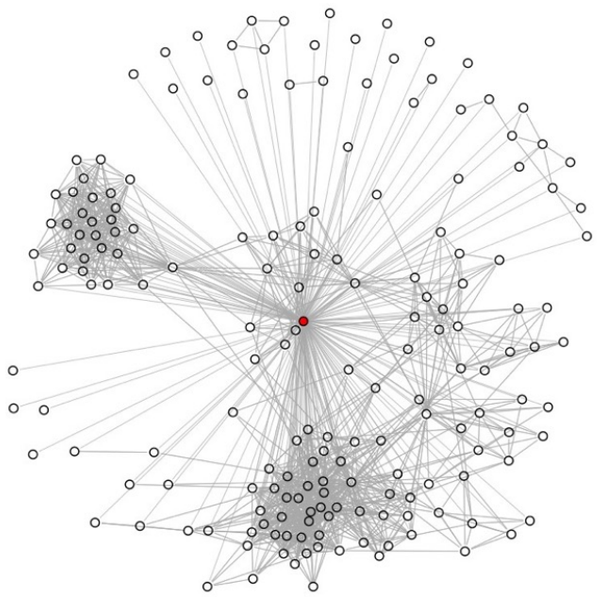
- What can social network **structure** tell us about users and their social capital?
- How can HCI systematically draw on social network analysis methods & theory?

Benefits of social media

Previous work

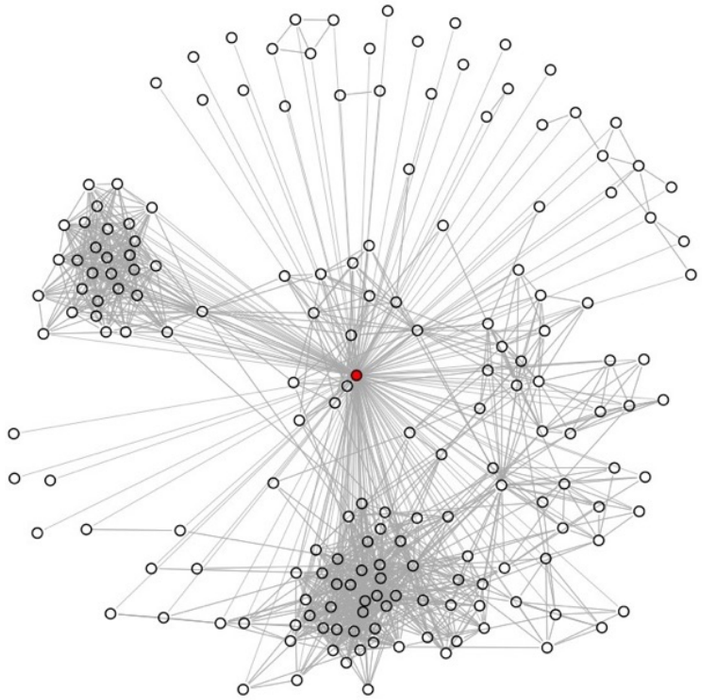
- Social Capital
  - Use of online social networking (i.e. the daily length of use) enhances one's social capital (i.e. Ellison, Steinfield, & Lampe, 2007; Steinfield, Ellison, & Lampe, 2008)
  - **vs.**
  - Time spent on Facebook has no significant relationship with bridging, bonding social capital or loneliness (Burke, Marlow, & Lento, 2010)
- Unbundling personality
  - Facebook users tend to have lower levels of conscientiousness, and it is negatively correlated with time spent on Facebook per day (Ryan & Xenos, 2011)
  - **vs.**
  - Conscientiousness is not a significant factor of Facebook usage (Ross et al., 2009), and is positively associated with greater social capital (Khodadady & Zabihi, 2011).
- Unbundling features
  - users with lower social communication skills experience higher social capital through content consumption
  - **vs.**
  - content consumption has no effect on those with higher communication skills (Burke et al, 2011)

Unbundling network structure

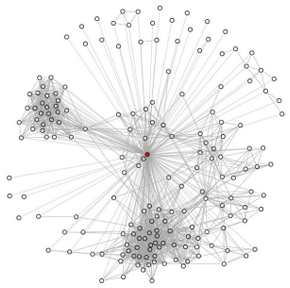


Network structure as a lens

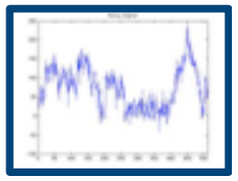
- Network structure as a lens for investigation
  - Previous work has either focused on predicting personality traits (e.g. Staiano et al, 2012; Wehrli, 2008), or
  - Predicting the tie strength between two individuals (Gilbert & Karahalios, 2009).



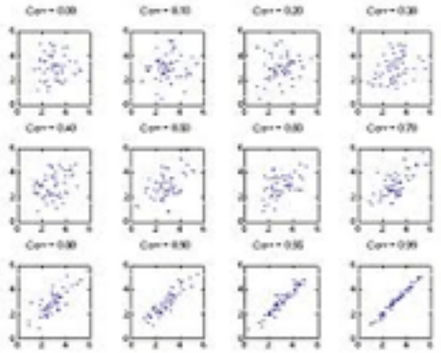
Method



Capture social network (Instrumentation)

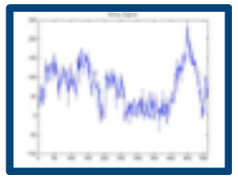


Calculate metrics



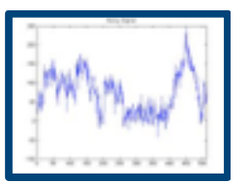
Establish effects

Capture personality vector (Questionnaire)



Calculate metrics

Capture social capital (Questionnaire)

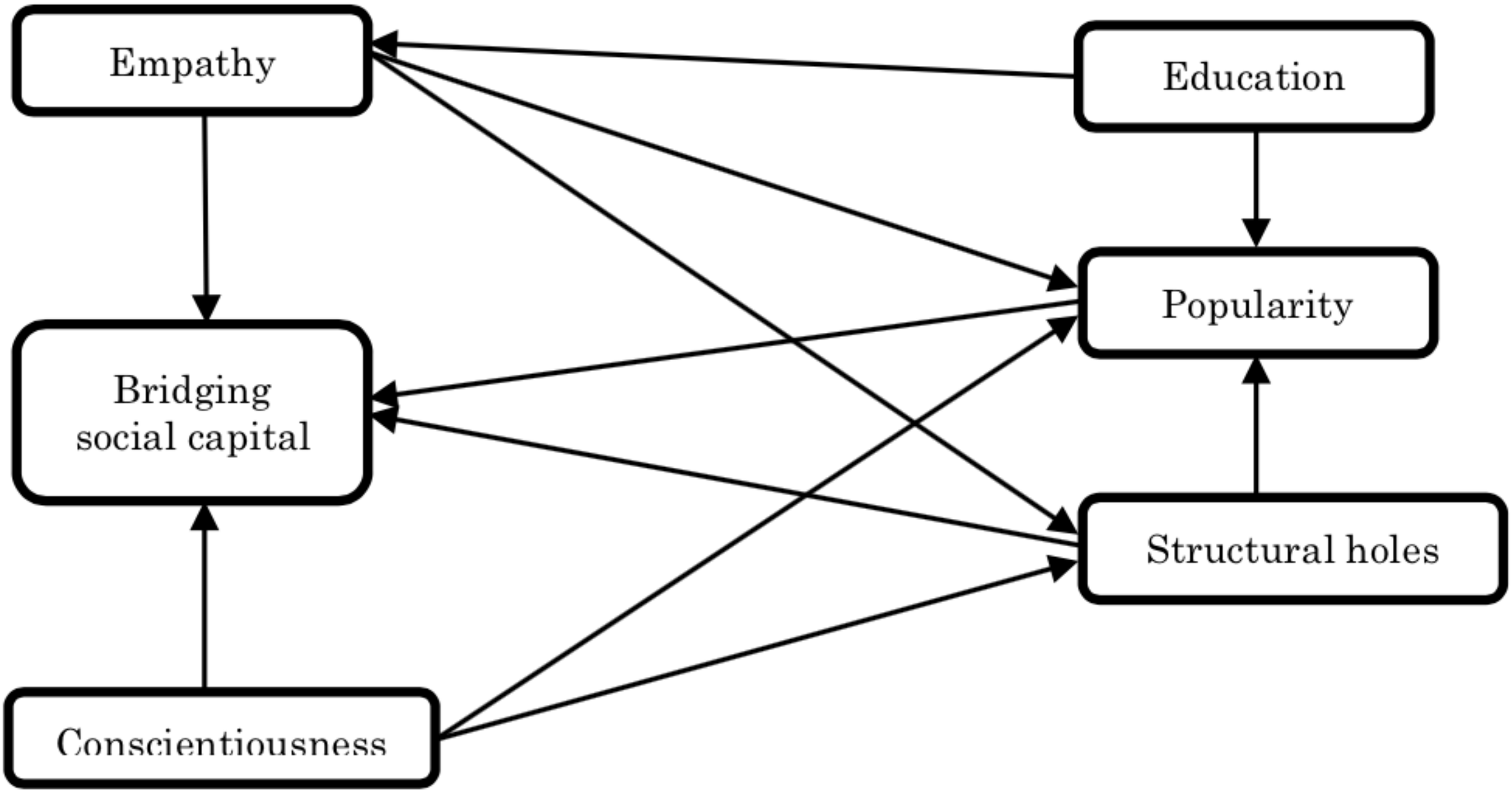


Calculate metrics

Metrics

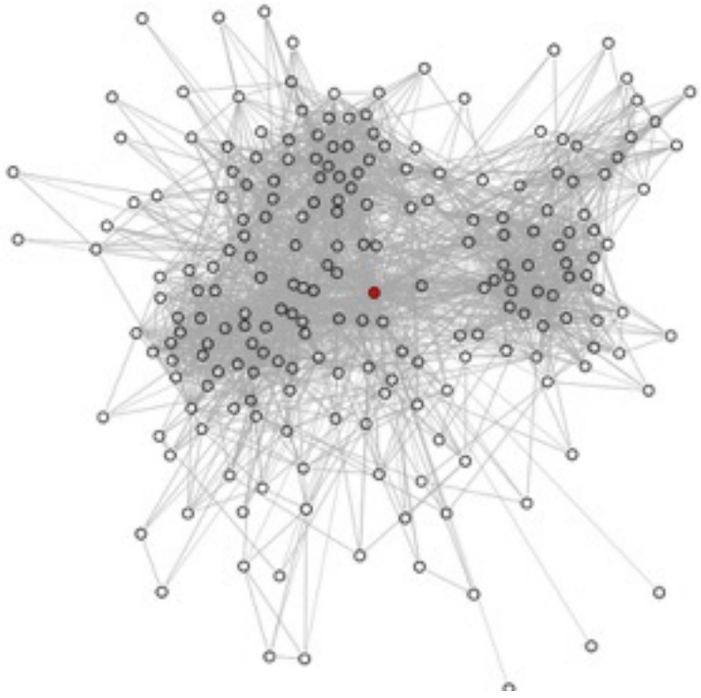
- Personality
  - empathy (Loewen et al., 2009)
  - conscientiousness (Rammstedt & John, 2007)
- Sosial capital
  - bridging social capital (Williams, 2006)
- Network structure
  - online popularity and structural holes (Coltman et al. 2008)
    - We use degree centrality (Freeman, 1979) to directly measure online popularity, as degree centrality has been closely associated with the importance of an actor in their network, prestige and popularity (Faust and Wasserman, 1992).
    - Structural holes are quantified through the betweenness centrality metrics. Betweenness centrality captures the relative importance of an ego in the quick transmission of information within the ego network. Proposed by Freeman (1977),

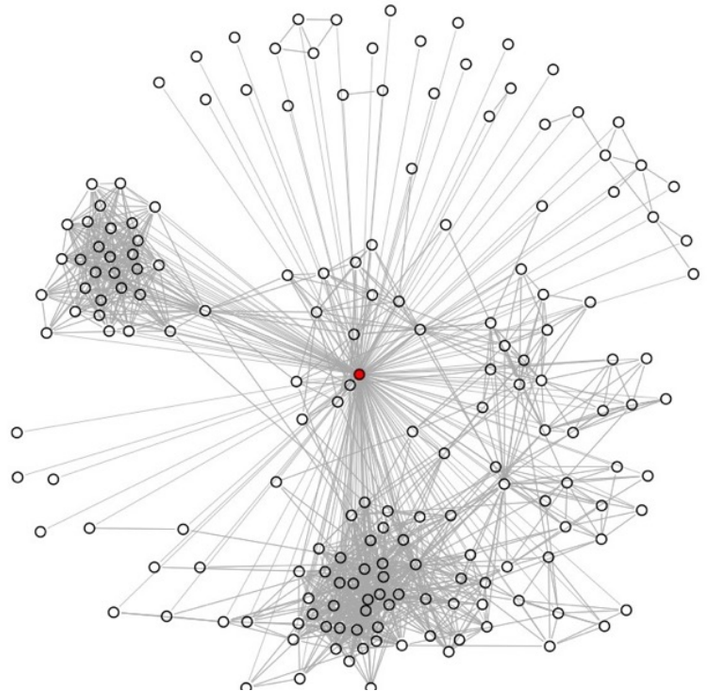
Theoretical approach

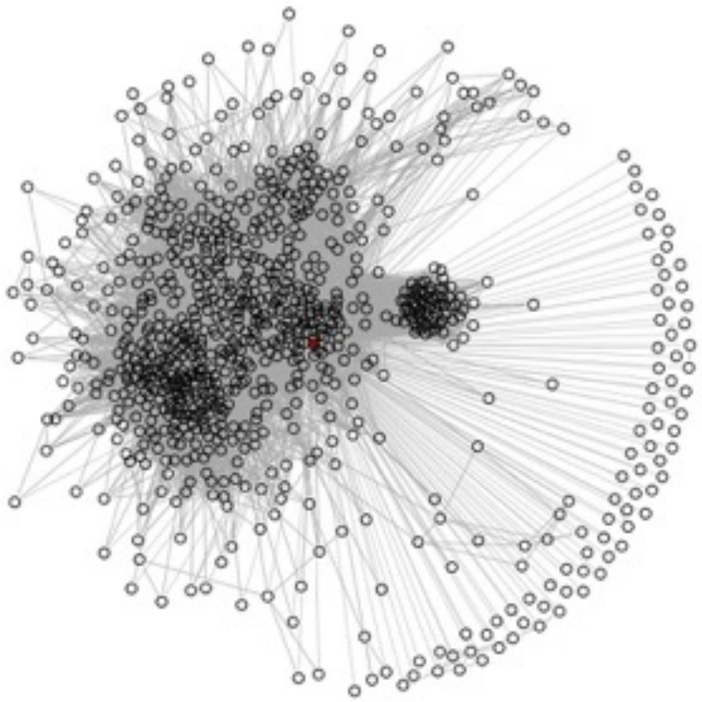


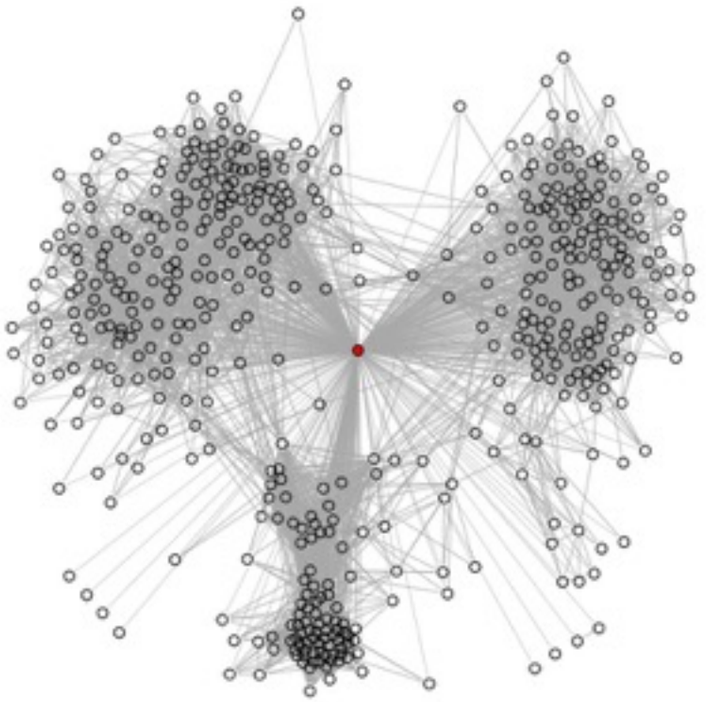
Results

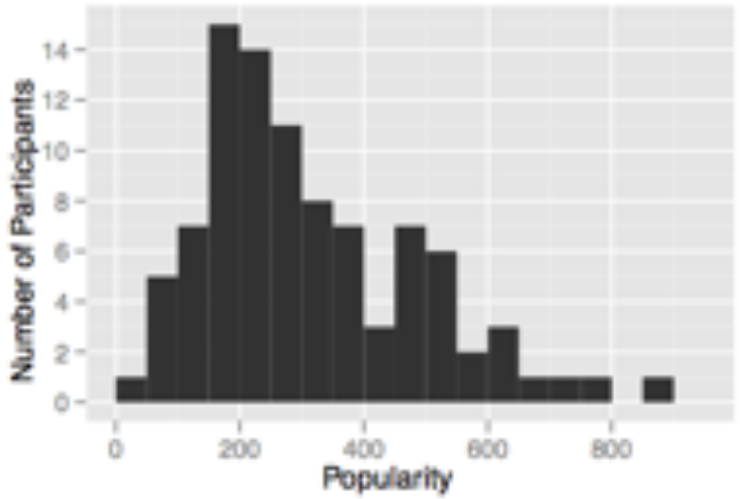
- 93 volunteers (57 male; average age=28.2, SD=5.1)
- The participants had on average 314.6 friends (SD=172.0, max=875, min=50)
  - our analysis considered our 93 participants and their more than 29000 friends.



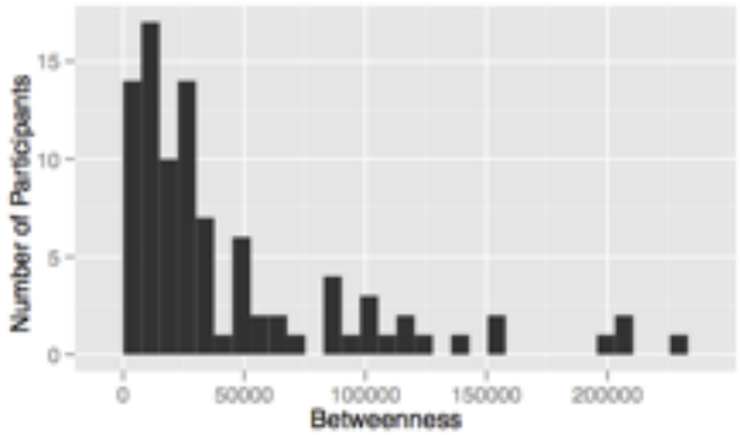




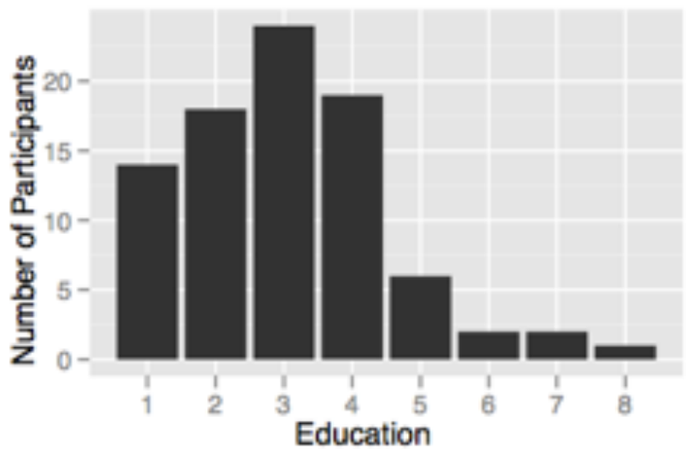




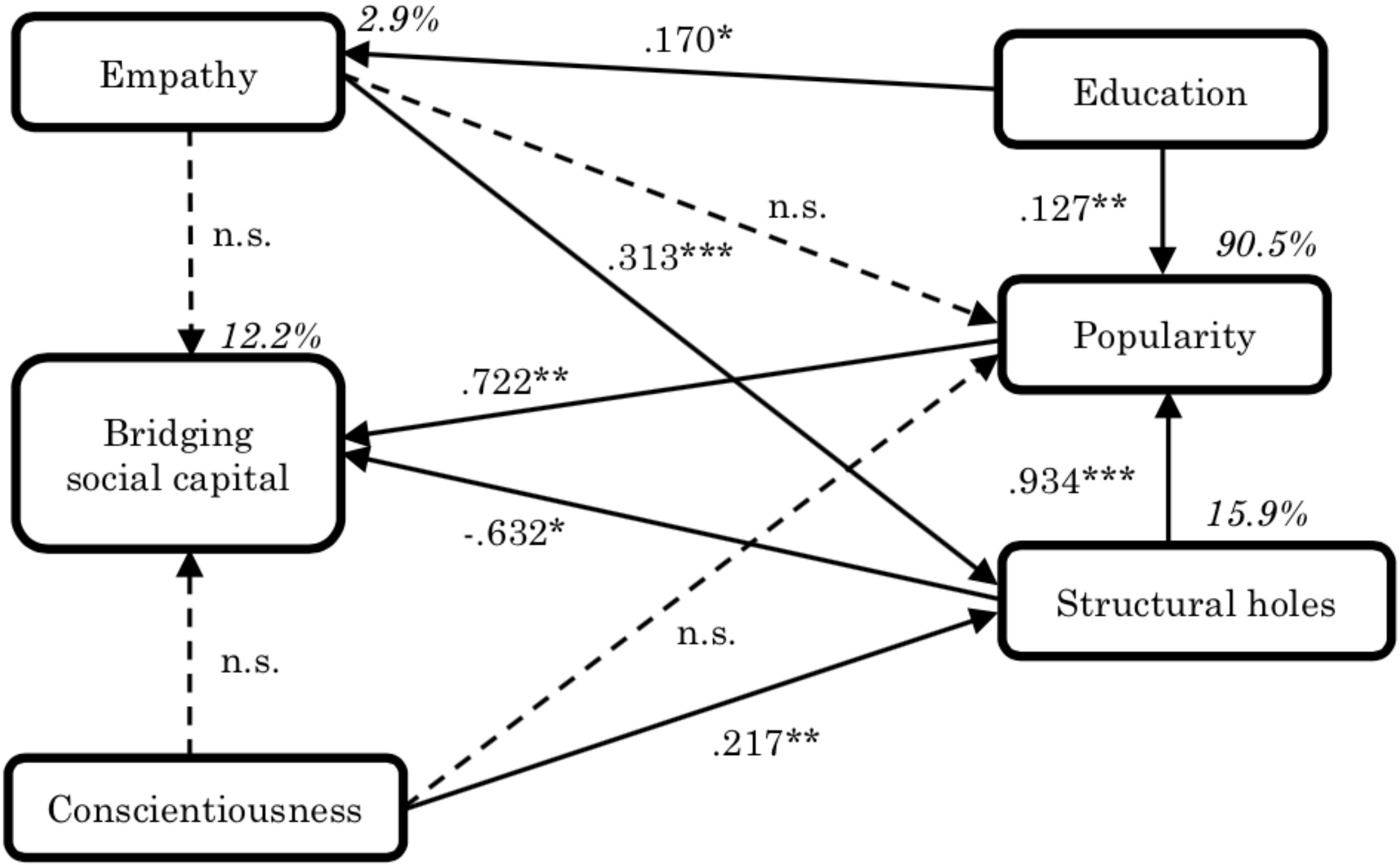
Popularity (Degree centrality)



Structural holes (betweenness)



Education (number of schools)


Empathy
2.9%
.170*
Education
n.s.
.127**
n.s.
.313***
90.5%
12.2%
Popularity
.722**
Bridging
social capital
.934***
15.9%
-.632*
Structural holes
n.s.
n.s.
.217**
Conscientiousness

	Direction	Path coefficient	Significance level	Validity
H1	Online structural holes —> online popularity	.934	p < .001	Supported
H2	Online structural holes —> bridging social capital	-.632	p < .01	Supported
H3	Online popularity —> bridging social capital	.722	p < .05	Supported
H4a	Empathy —> online popularity		n.s.	Not supported
H4b	Empathy —> bridging social capital		n.s.	Not supported
H4c	Empathy —> online structural holes	.313	p < .001	Supported
H5a	Conscientiousness —> online structural hole	.217	p < .01	Supported
H5b	Conscientiousness —> online popularity.		n.s.	Not supported
H5c	Conscientiousness —> bridging social capital		n.s.	Not supported
H6	Education —> empathy	0.170	p < .05	Supported
H7	Education —> online popularity	.127	p < .01	Supported

Findings

- Strong influence of network structure on social capital.
- Popular individuals are likely to obtain more bridging social capital.
- **However**:
- When an individual's circle is saturated with disjoint networks, bridging social capital will suffer.
  - e.g. when an individual repeatedly befriends contacts that are strangers to the individual's existing friendship circle

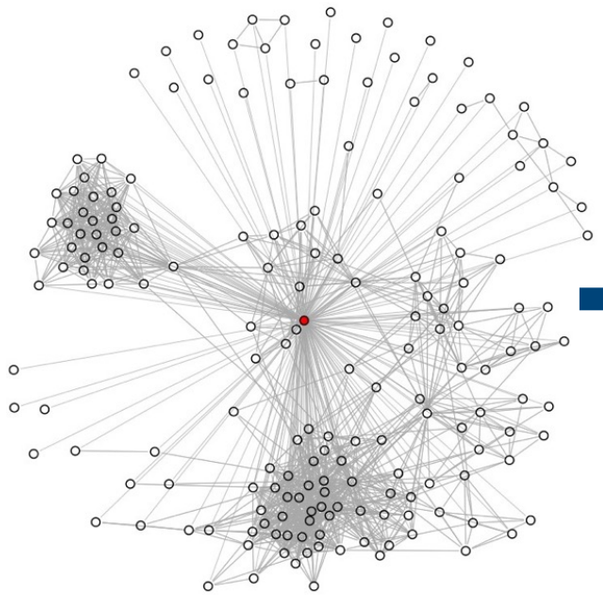
Discussion

- Befriending complete strangers is **not** an effective strategy to strengthen one's overall bridging social capital
- *Ceteris paribus*, what is a good strategy?

- Structural hole theory (Burt, Jannotta, & Mahoney, 1998; Burt, 1992) **would suggest a star network**:
  - a network where all friends are linked to the ego, but no two friends are directly linked to each other
  - this provides the ego maximum brokerage opportunities.
- Our results suggest that it is actually beneficial for the ego when some of their friends are in turn directly connected to each other too, thus **reducing the structural holes** in the ego network

Network structure as a mediator

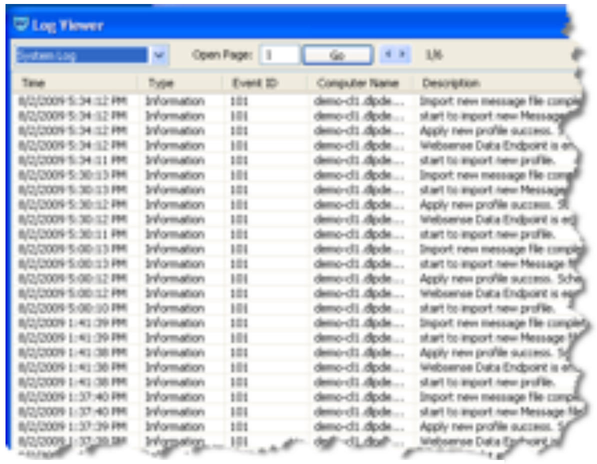
- This finding goes a long way to explain the inconsistent findings reported previously on how personality and social capital interact in the context of SNSs



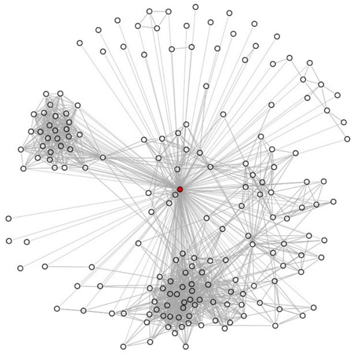
Testing

User data

User interface data

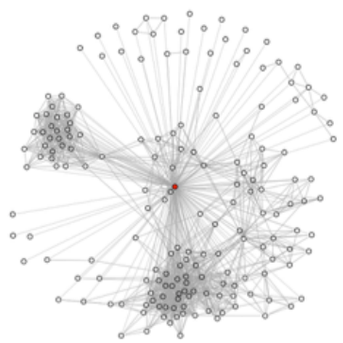


Network structure data



ANOVA
t-test
x^2

Network structure is stable



- It can be a reliable measure since users are unlikely moderate it explicitly.
- It is an aggregate measure
  - reflects the culmination of a user's behaviour up to that point.
- Day-to-day usage and metrics may fluctuate due to a number of factors (Andreassen et al., 2012)
  - free time, connectivity, and newly adopted responsibilities.

But why Network Science?

- Social network structure is important (present study!)
- Network science offers a solid and validated theoretical basis
- Aim to identify a new and improved metric for reflecting some aspect of humans' technology use

Thank you!

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