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Why extraversion is not enough: the mediating role of initial peer network centrality linking personality to long-term academic performance

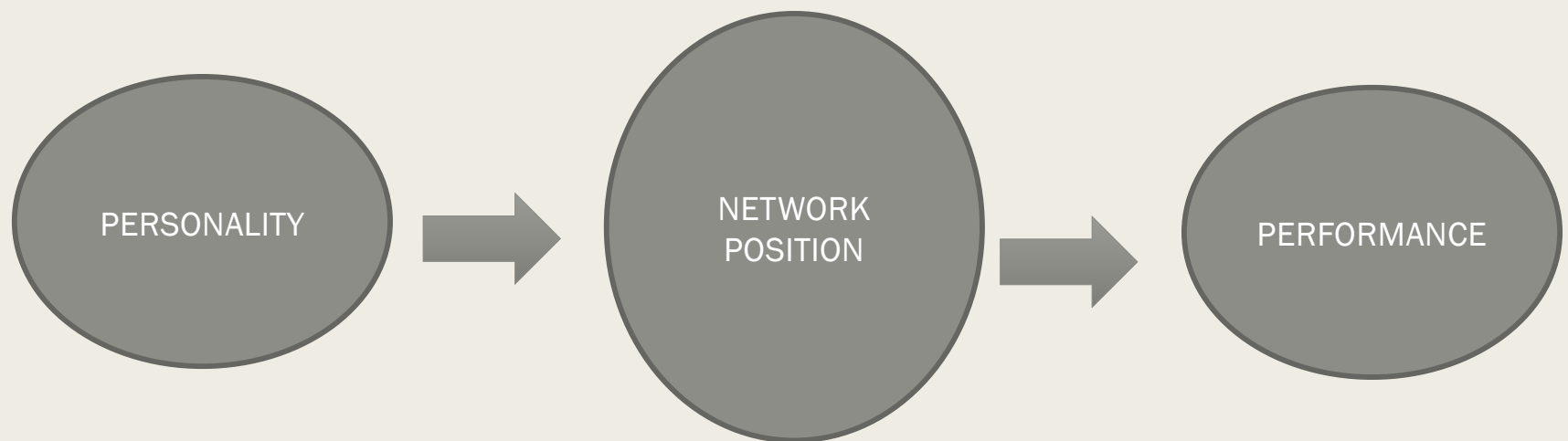
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Research question:

- Does network structure mediate the relationship between PERSONALITY TRAITS and performance?



Extraversion refers to the extent to which people are outgoing, active, gregarious, assertive, energetic, enthusiastic, and cheerful in their outlook (McCrae and John 1992).

Theoretical background

SOCIAL CAPITAL THEORY

specific positions within a social network -> access to resources (support, sponsorship, information)

1. developmental network relationships are critical for career development (Cummings and Higgins 2006)
2. highly extroverted people perform better (e.g., Ng et al. 2005)
3. extraverts are more central and have larger networks (Pollet et al. 2011).
4. In the organizational setting, personality partially predict performance (i.e., job performance and career success) through network position (Fang et al. 2015).



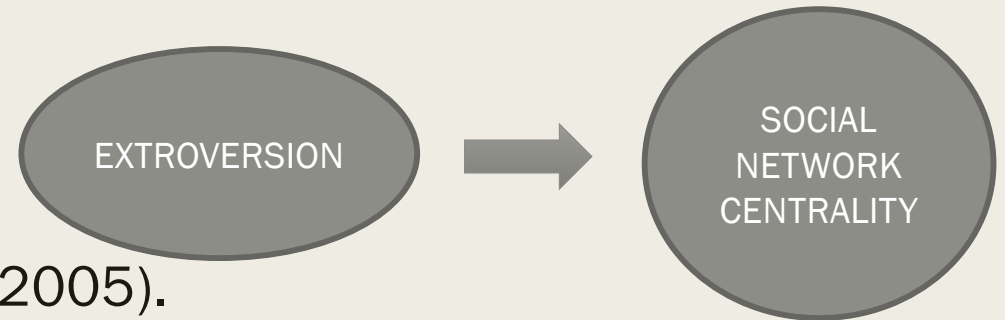
OCEAN



Extroversion

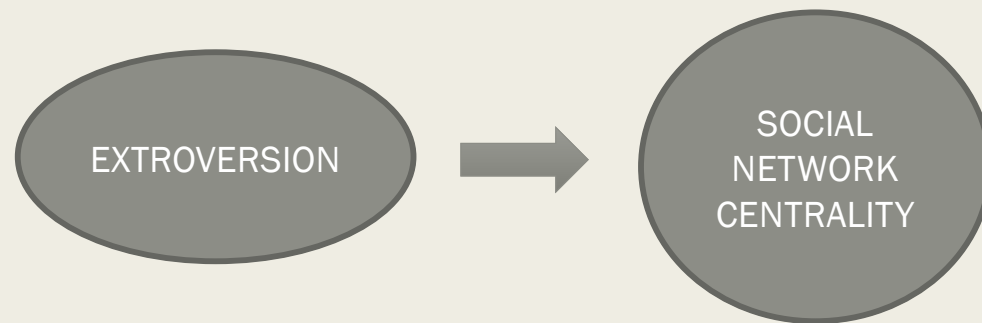
Highly extroverted people

- perform better (e.g., Ng et al. 2005).
- are more central in the network
- have larger networks (see Landis 2015, for a review)
- are proactive in seeking such ntw ties and welcoming new interactions (Dougherty et al. 2008).
- are outgoing, active, energetic, and gregarious (McCrae & John 1992).
- attract social attention and enjoy being the object of such attention, which promotes the initial formation of relationships (Ashton et al. 2002; Shipilov et al. 2014).

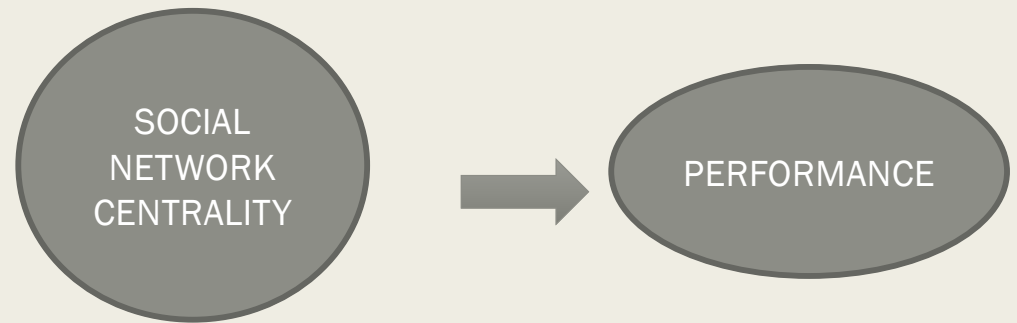


Hypothesis 1

Extraversion positively impacts social network centrality



NTW CENTRALITY

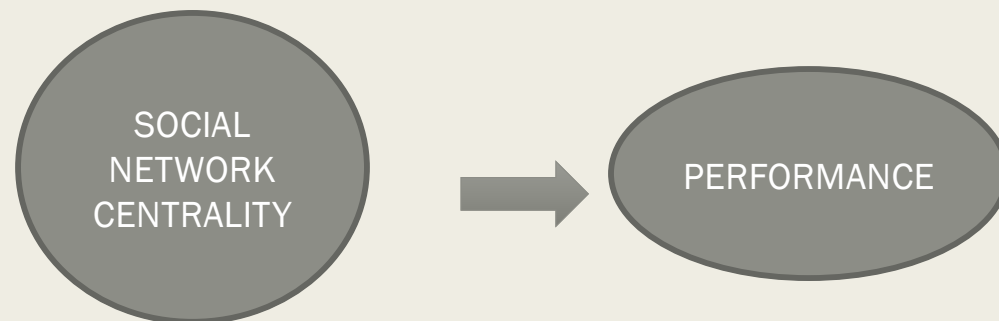


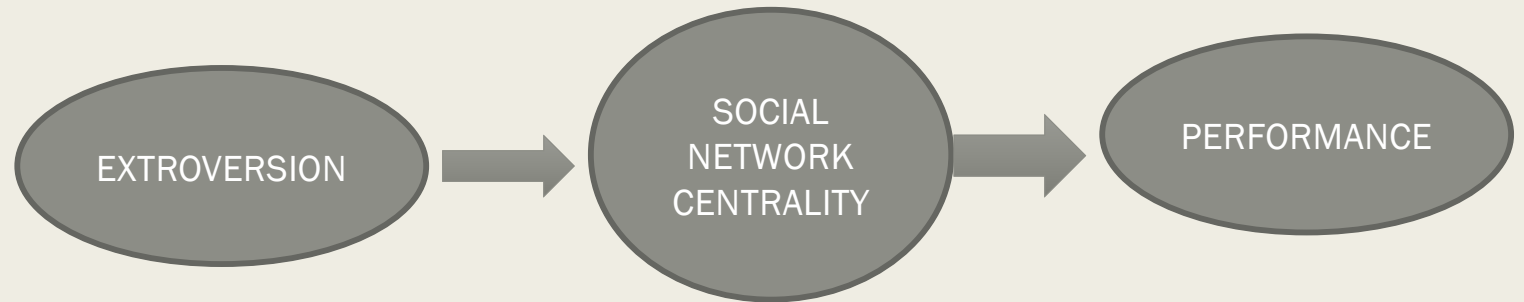
Social network theory emphasizes that individuals occupying central positions within the network outperform their less central counterparts because their network provides access to (non-redundant) information and other resources (e.g., social support; for reviews, see Burt et al. 2013; Kilduff and Brass 2010).

central students in (emergent) social networks (e.g., friendship, communication) get better grades due to their superior access to information, knowledge, and social support (e.g., Baldwin et al. 1997; Cho et al. 2007; Gašević et al. 2013; Hommes et al. 2012; Rizzuto et al. 2009; Smith and Peterson 2007).

Hypothesis 2

Social network centrality positively impacts academic performance.





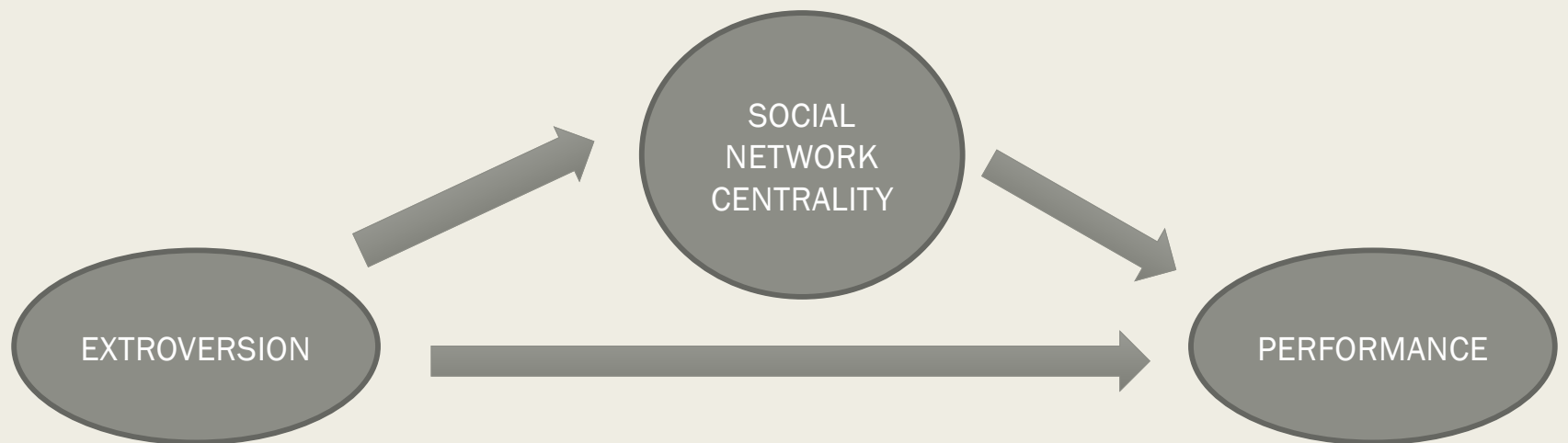
MEDIATION

In a recent meta-analysis, network position (i.e., indegree centrality) partially mediated the effects of various personality traits on job performance (Fang et al. 2015).

More on this later....

Hypothesis 3

Social network centrality mediates the impact of extraversion on academic performance.



Field of application: UNDERGROUDATE STUDENTS

Rammstedt, B., & John, O. P. (2007).
Measuring personality in one minute or
less: A 10-item short version of the Big Five
Inventory in English and German. *Journal of
research in Personality*, 41(1), 203-212.

Appendix A. Big Five Inventory-10 (BFI-10)

English version.

Instruction: How well do the following statements describe your personality?

I see myself as someone who ...	Disagree strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree strongly
... is reserved	(1)	(2)	(3)	(4)	(5)
... is generally trusting	(1)	(2)	(3)	(4)	(5)
... tends to be lazy	(1)	(2)	(3)	(4)	(5)
... is relaxed, handles stress well	(1)	(2)	(3)	(4)	(5)
... has few artistic interests	(1)	(2)	(3)	(4)	(5)
... is outgoing, sociable	(1)	(2)	(3)	(4)	(5)
... tends to find fault with others	(1)	(2)	(3)	(4)	(5)
... does a thorough job	(1)	(2)	(3)	(4)	(5)
... gets nervous easily	(1)	(2)	(3)	(4)	(5)
... has an active imagination	(1)	(2)	(3)	(4)	(5)

German version.

Instruction: Inwieweit treffen die folgenden Aussagen auf Sie zu?

Ich...	trifft überhaupt nicht zu	trifft eher nicht zu	weder noch	eher zutreffend	trifft voll und ganz zu
...bin eher zurückhaltend, reserviert.	(1)	(2)	(3)	(4)	(5)
...schenke anderen leicht Vertrauen, glaube an das Gute im Menschen.	(1)	(2)	(3)	(4)	(5)
...bin bequem, neige zur Faulheit.	(1)	(2)	(3)	(4)	(5)
...bin entspannt, lasse mich durch Stress nicht aus der Ruhe bringen.	(1)	(2)	(3)	(4)	(5)
...habe nur wenig künstlerisches Interesse.	(1)	(2)	(3)	(4)	(5)
...gehe aus mir heraus, bin gesellig.	(1)	(2)	(3)	(4)	(5)
... neige dazu, andere zu kritisieren.	(1)	(2)	(3)	(4)	(5)
...erledige Aufgaben gründlich.	(1)	(2)	(3)	(4)	(5)
...werde leicht nervös und unsicher.	(1)	(2)	(3)	(4)	(5)
...habe eine aktive Vorstellungskraft, bin phantasievoll.	(1)	(2)	(3)	(4)	(5)

Scoring the BFI-10 scales:

Extraversion: 1R, 6; Agreeableness: 2, 7R; Conscientiousness: 3R, 8; Neuroticism: 4R, 9;
Openness: 5R; 10 (R = item is reversed-scored).

Optional additional Agreeableness item (true-scored):

English version	(1)	(2)	(3)	(4)	(5)
...is considerate and kind to almost everyone.	(1)	(2)	(3)	(4)	(5)
German version					
...bin rücksichtsvoll zu anderen, einfühlsam.	(1)	(2)	(3)	(4)	(5)

Academic performance: grade point averages

GPA= mean of grades cumulated over weighted study modules,
resulting in the final degree

Network definition: developmental peer networks

i.e., fellow students

RATIONALE: the most influential social networks consists of fellow students because peers provide psychosocial support within friendships, give each other relevant information and advice, and exchange knowledge when merging together within learning or project groups (see also Rodkin and Ryan [2012](#)).

In the early stage of career development (i.e., at university), peer relationships play a particularly important developmental role (Murphy and Kram 2010) because students have no classic supervisors, co-workers, or subordinates yet.

Instead, peers represent the largest pool of possible developmental relationships

NETWORK CONSTRUCTION

cohort of bachelor psychology students at a German public university

participants were asked to select fellow students from an exhaustive name list.

“choose students (a) “with whom they are friends,” (b) “from whom they would seek advice,” and (c) “with whom they would like to work together.”

combined the three networks into a single developmental peer network.

-> relationship tie is present if specified in either of the single networks.

Network Boundaries

TEMPORAL BOUNDARIES: a longitudinal design with three data waves, taking students' entire undergraduate life into account.

NETWORK key element under investigation

indegree centrality

->the extent to which a person is nominated by others as an affiliate (Freeman 1978; Wasserman and Faust 1994).

Indegree centrality was assessed by summing up all ingoing ties per person using the SNA package implemented in R (Butts 2016).

FINAL SAMPLE

47 students participated in all three data waves.

14.9% male, 85.1% female),

AGE M 21.72; SD = 5.6, range = 18–47 years

RESULTS

Table 1 Means, standard deviations, ranges, and intercorrelations of used measures ($N = 47$)

Measure	Mean	SD	Range	1	2	3	4
1 Extraversion T1	3.49	.79	1.75–4.75	(.81)	.35*	.50**	–.40**
2 Agreeableness T1	3.35	.76	1.75–4.75		(.67)	.15	–.13
3 Indegree centrality T2	7.70	3.97	1–18			–	–.44**
4 Academic performance (GPA) T3	1.62	.40	1.10–3.00				–

Two-tailed Pearson's correlations. Internal consistencies (Cronbach's alpha) appear on the diagonal

* $p < .05$

** $p < .01$

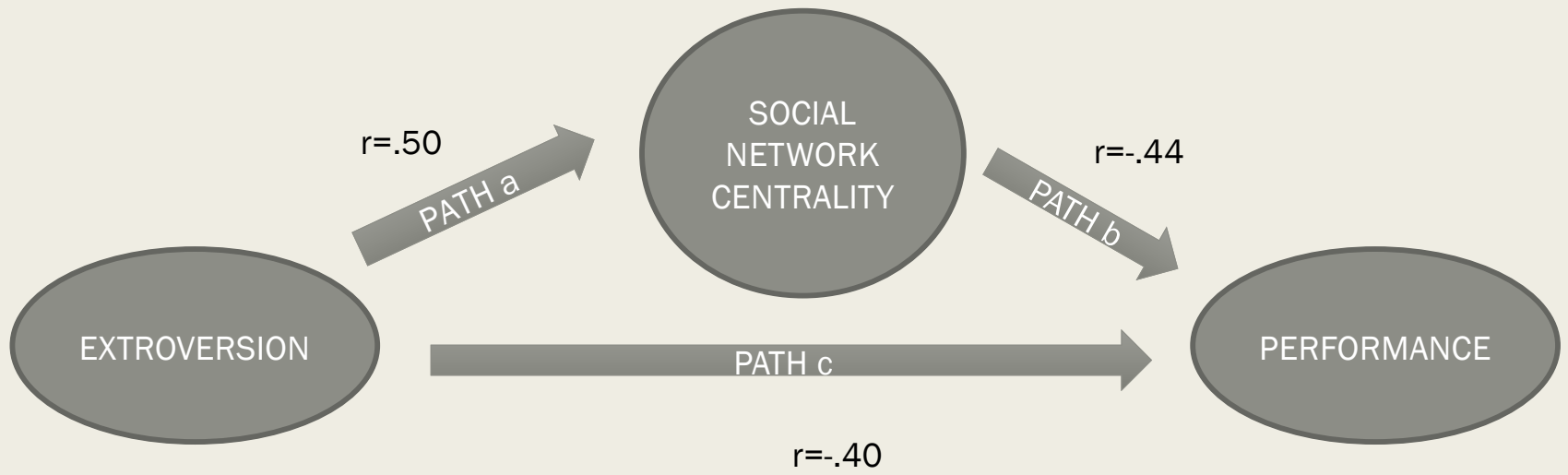


Table 2 Mediation model coefficients (hypotheses 1-3, $N=47$)

Path		Estimate	S.E.	<i>t</i> -value	CI limits
<i>a</i>	Extraversion → indegree centrality HYP 1	2.51***	.65	3.86	(1.20, 3.81)
<i>b</i>	Indegree centrality → performance HYP 2	-.03*	.02	-2.10	(-.06, -.01)
<i>c'</i>	Extraversion → performance (direct effect) HYP 3	-.12	.08	-1.57	(-.27, .03)
<i>c</i>	Extraversion → indegree centrality → performance (total effect)	-.20**	.07	-2.91	(-.34, -.06)

Unstandardized estimates are reported. CI limits = lower and upper 95% confidence interval

* $p < .05$

** $p < .01$

*** $p < .001$

NOTE: PERFORMANCE: LOW VALUE= HIGH VOTES!!!

students' popularity (i.e., indegree centrality) in their peer network at the very end of the introductory course mediated the relationship between their extraversion (without agreeableness as a moderating variable) and their performance (i.e., GPA) at the end of the entire degree program.

-> 2 students who differ from each other in one unit on extraversion differ in (-).08 units on their GPA

MAIN LIMIT

the cohort is characterized by a relative small cohort size and an unequal gender distribution even though this is representative for psychology study programs. Therefore, generalizations to other study programs should be made with caution.

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Integrating Personality and Social Networks: A Meta-Analysis of Personality, Network Position, and Work Outcomes in Organizations

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How Does Personality Relate to Network Position?

- indegree centrality : the number of incoming ties an individual receives from others
- Brokerage: the extent to which an individual is connected to people or clusters of people who are not connected (BETWEEN CENTRALITY/STRUCTURAL HOLES)



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Self-monitoring

From Wikipedia, the free encyclopedia

This article is about the theory. For recording of one's own activities, see [Quantified Self](#).

Self-monitoring is a concept introduced during the 1970s by [Mark Snyder](#), that shows how much people monitor their self-presentations, expressive behavior, and nonverbal [affective displays](#).^[1] Human beings generally differ in substantial ways in their abilities and desires to engage in expressive controls (see [dramaturgy](#)).^[2] It is defined as a [personality trait](#) that refers to an ability to regulate behavior to accommodate social situations. People concerned with their expressive self-presentation (see [impression management](#)) tend to closely monitor their audience in order to ensure appropriate or desired public appearances.^[3] Self-monitors try to understand how individuals and groups will perceive their actions. Some [personality types](#) commonly act spontaneously (low self-monitors) and others are more apt to purposely control and consciously adjust their behavior (high self-monitors).^[4] Recent studies suggest that a distinction should be made between acquisitive and protective self-monitoring due to their different interactions with metatraits.^[5] This differentiates the motive behind self-monitoring behaviours: for the purpose of acquiring appraisal from others (acquisitive) or protecting oneself from social disapproval (protective).

How Does Personality Relate to Network Position?

■ SELF-MONITORING

- > high monitors regulate and control how they present themselves in social settings and interpersonal relationships
- > generate affective states and behaviors appropriate to specific situations

How Does Personality Relate to Network Position?

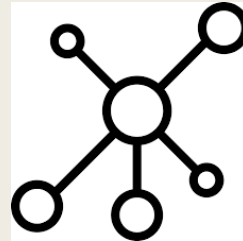
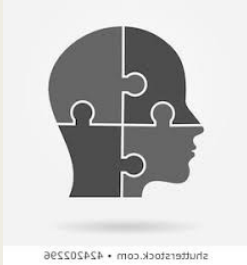
HIGH SELF- MONITORING people

recipients of incoming friendship ties (Sasovova et al. 2010)

→ indegree centrality

segregate their contacts from each other

→ brokerage



SELF-MONITORING

INDEGREE CENTRALITY

PERFORMANCE

BIG FIVE

BROKERAGE

EXPRESSIVE
NTW

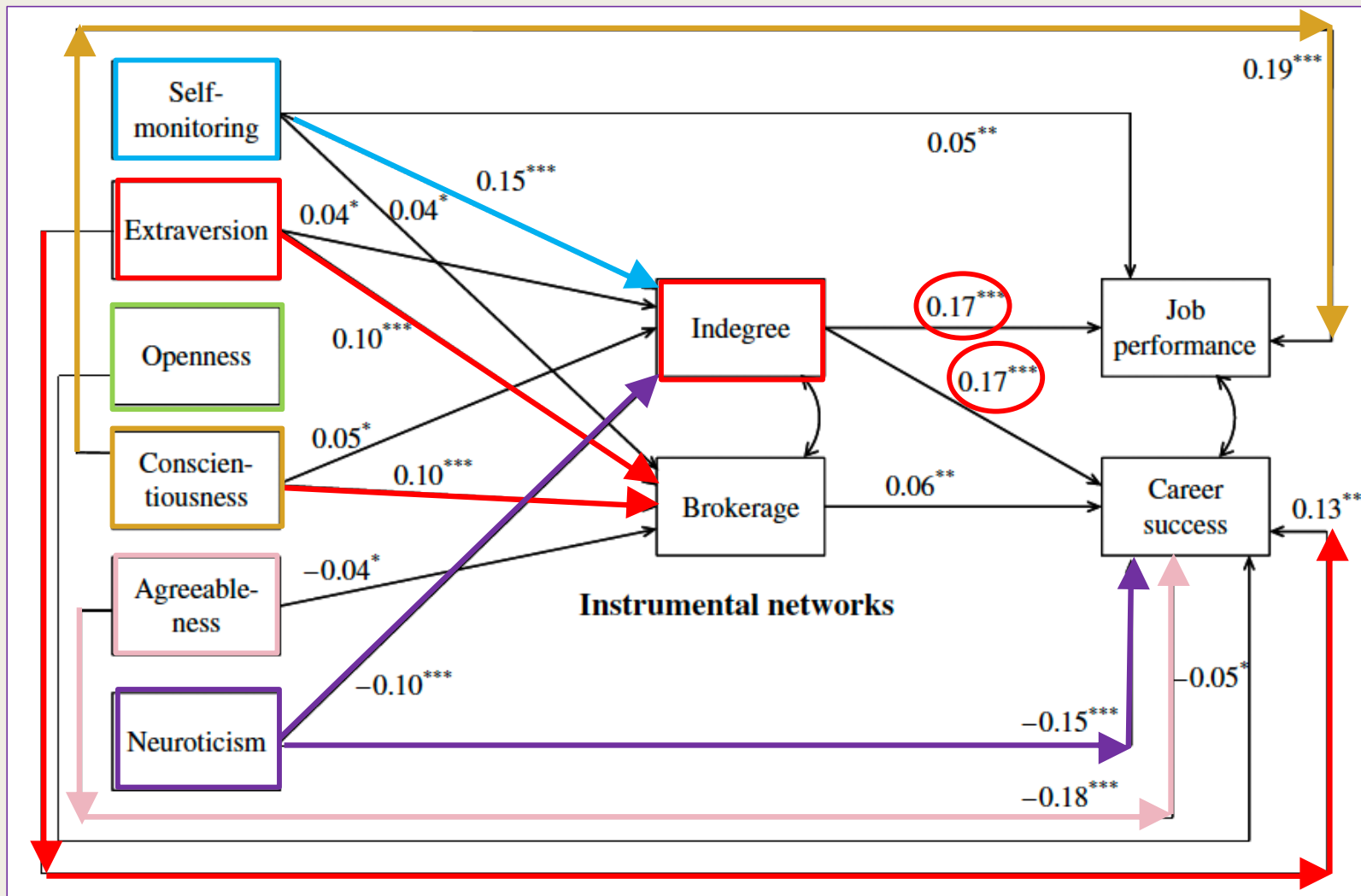
INSTRUMENTAL
NTW

Meta-analysis

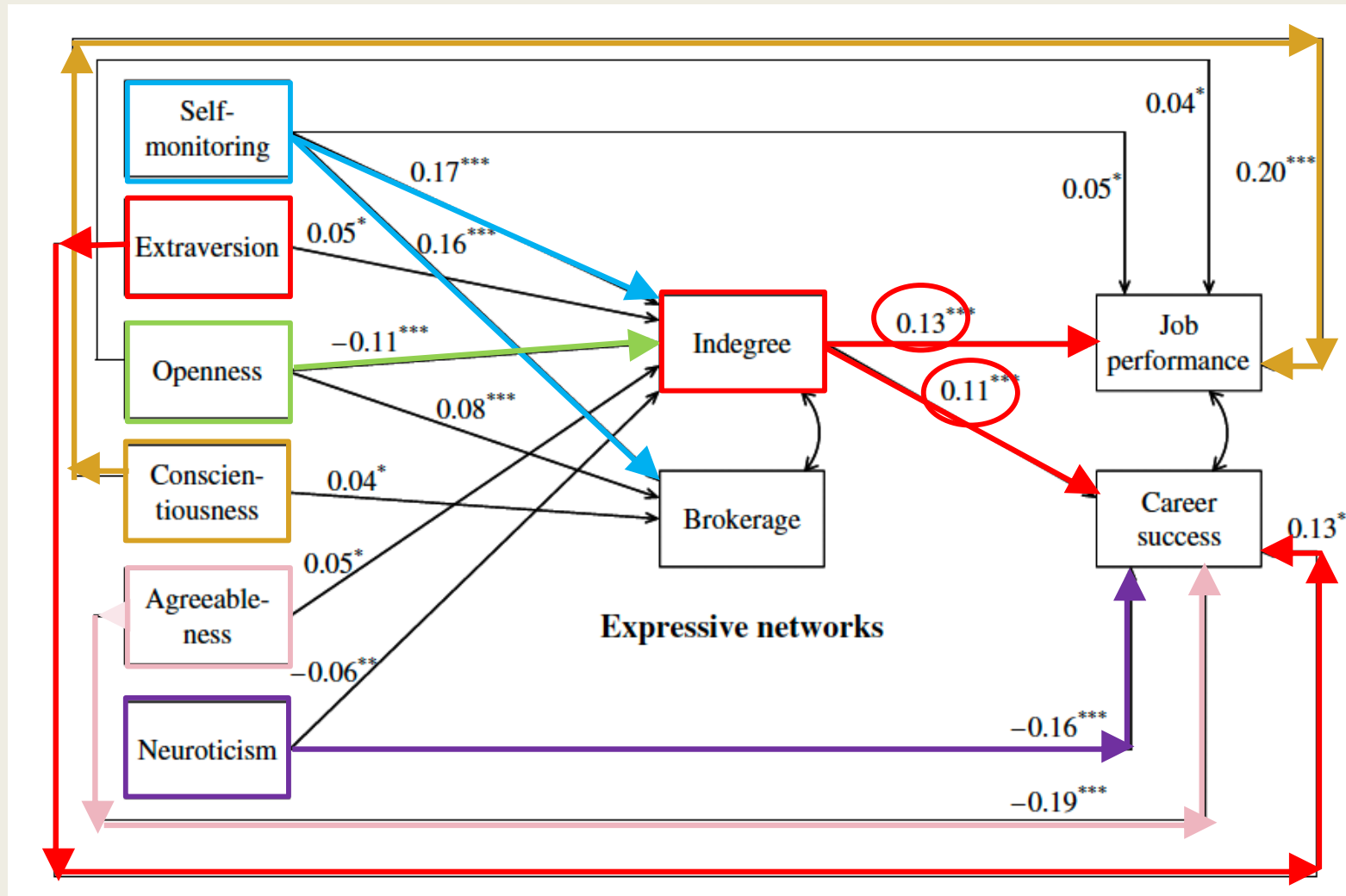
- 138 independent samples
- MS identifies through PsychInfo, ABI/Inform, Web of Science

- KEYWORDS:
 - *PERSONALITY*: “personality” “traits” “individual differences,” “self-monitoring,” “five-factor model traits,” “Big Five,” “extraversion,” “agreeableness,” “conscientiousness,” “neuroticism,” “openness to experience”
 - *NETWORK*: “centrality,” “degree,” “indegree,” “brokerage,” “betweenness,” “constraint” «social network»
 - *PERFORMANCE*: “job performance,” “task performance,” “in-role performance,” “achievement,” “career success,” “promotion,” “compensation,” “bonus,” “salary”

Meta-Analytic Path Model for Personality, Instrumental Network Position, and Work Outcomes




Meta-Analytic Path Model for Personality, **Expressive** Network Position, and Work Outcomes



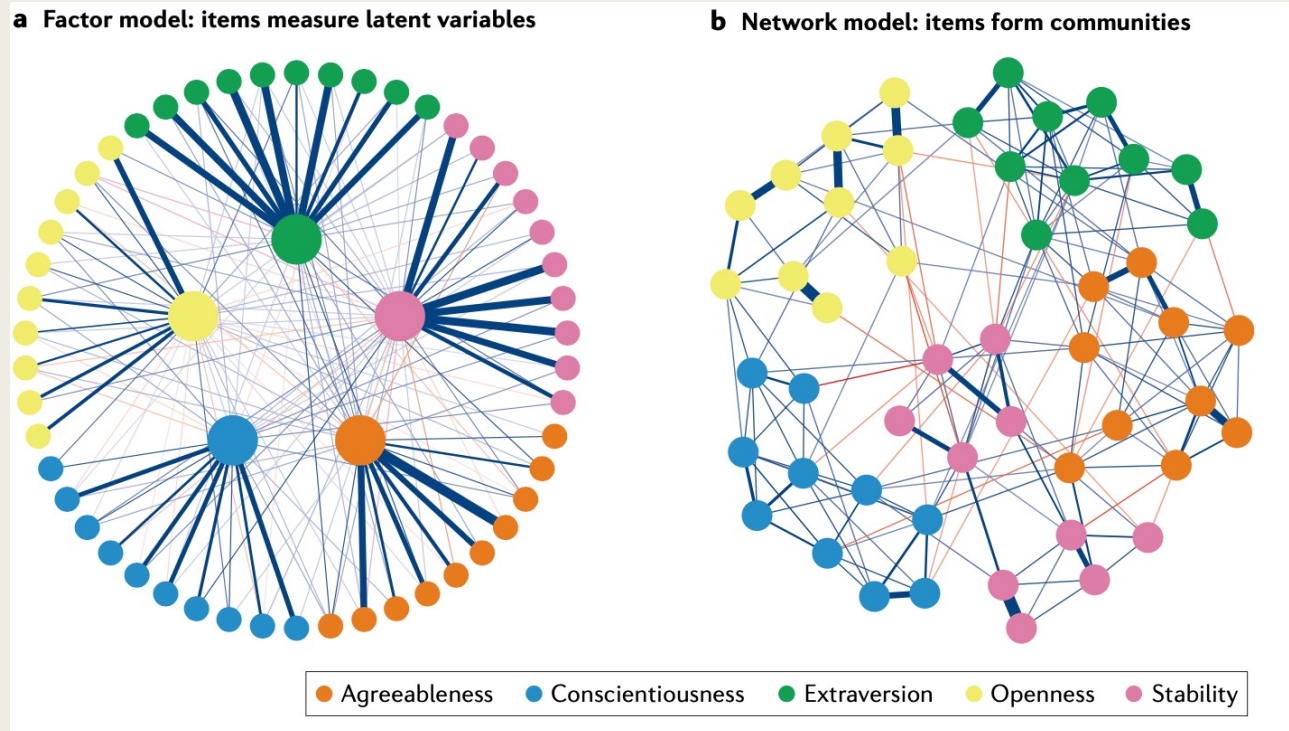
Primer | [Published: 19 August 2021](#)

Network analysis of multivariate data in psychological science

[Denny Borsboom](#) , [Marie K. Deserno](#), [Mijke Rhemtulla](#), [Sacha Epskamp](#), [Eiko I. Fried](#), [Richard J. McNally](#), [Donald J. Robinaugh](#), [Marco Perugini](#), [Jonas Dalege](#), [Giulio Costantini](#), [Adela-Maria Isvoranu](#), [Anna C. Wysocki](#), [Claudia D. van Borkulo](#), [Riet van Bork](#) & [Lourens J. Waldorp](#)

A different application of NTW analyses to personality

- The network of personality -> the architecture



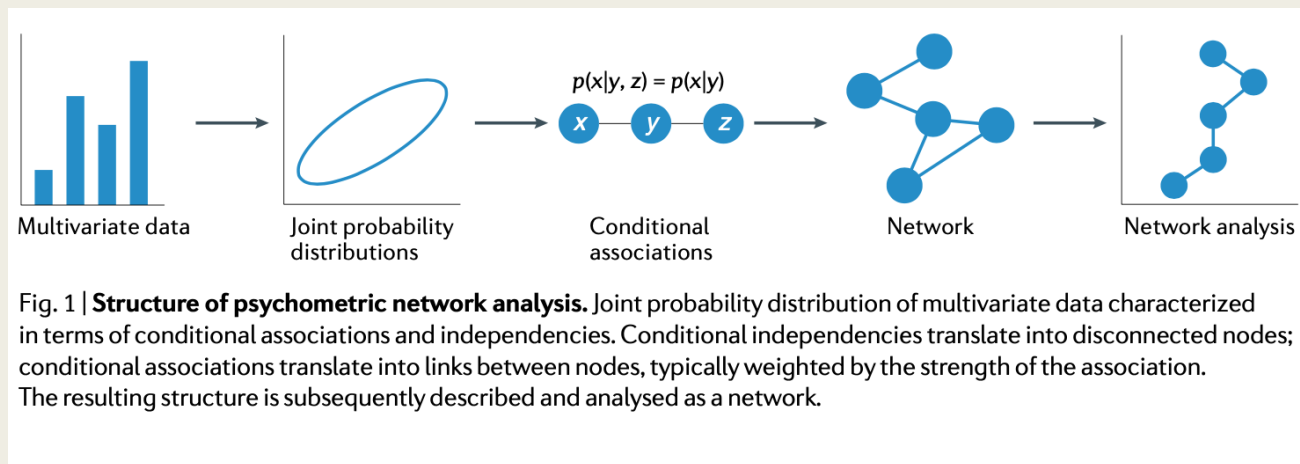
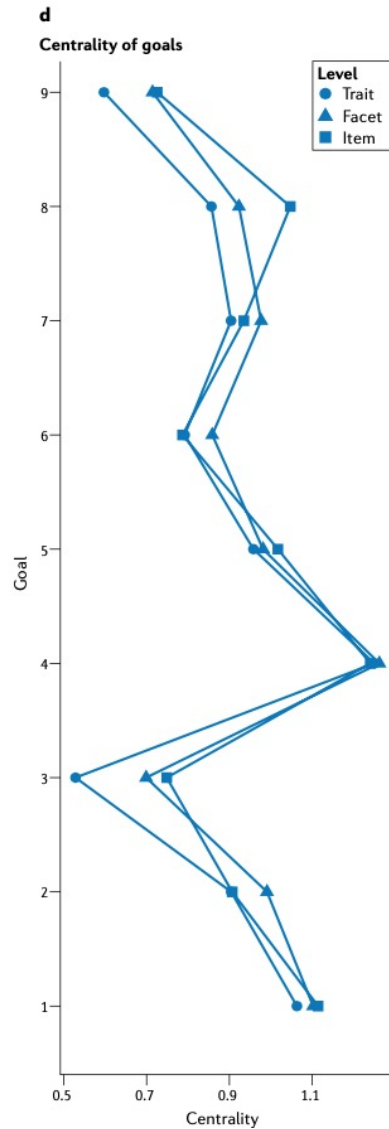
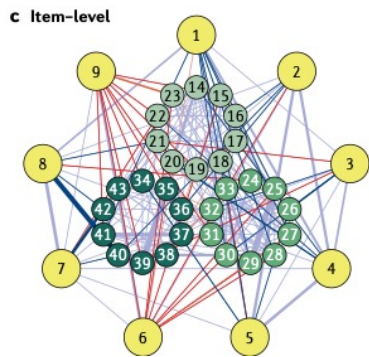
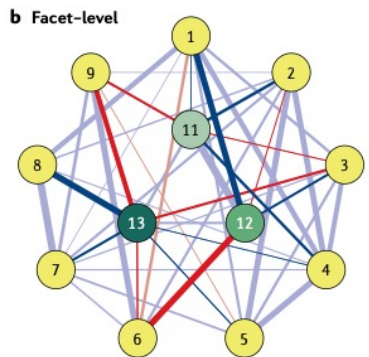
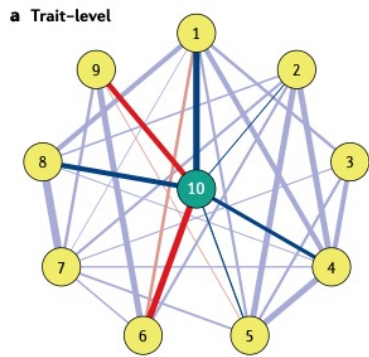


Fig. 1 | **Structure of psychometric network analysis.** Joint probability distribution of multivariate data characterized in terms of conditional associations and independencies. Conditional independencies translate into disconnected nodes; conditional associations translate into links between nodes, typically weighted by the strength of the association. The resulting structure is subsequently described and analysed as a network.



- Goals**
- 1: Accomplish something, observe a commitment (G13)
 - 2: Have control (G10)
 - 3: Personal realization (G11)
 - 4: Do something well, avoid mistakes (G12)
 - 5: Think, reflect (G25)
 - 6: Avoid or manage things you do not care about (G16)
 - 7: Be safe (G17)
 - 8: Comply with rules (G08)
 - 9: Do not think (G26)
- Trait**
- 10: Conscientiousness
- Facets**
- 11: Orderliness
 - 12: Industriousness
 - 13: Impulse-control
- Items**
- 14: Precise
 - 15: Imprecise*
 - 16: Ordered
 - 17: Disordered*
 - 18: Organized
 - 19: Disorganized*
 - 20: Careful
 - 21: Chaotic*
 - 22: Fussy
 - 23: Haphazard*
 - 24: Industrious
 - 25: Layabout*
 - 26: Effective
 - 27: Erratic*
 - 28: Diligent
 - 29: Unwilling*
 - 30: Hardworking
 - 31: Negligent*
 - 32: Tenacious
 - 33: Lazy*
 - 34: Reflective
 - 35: Instinctive*
 - 36: Controlled
 - 37: Reckless*
 - 38: Cautious
 - 39: Impulsive*
 - 40: Disciplined
 - 41: Profligate*
 - 42: Prudent
 - 43: Imprudent*

Coscientiousness & goals

Costantini's data