GRUPO DE PESQUISA
AVALIAÇÃO EM BEM-ESTAR E SAÚDE MENTAL

Redes Frequentistas

Prof. Dr. Wagner de Lara Machado
Escola de Ciências da Saúde – PPG Psicologia

Análise de rede aplicada à psicometria e a avaliação psicológica

Wagner de Lara Machado

Pontifícia Universidade Católica de Campinas

João Ricardo Nickenig Vissoci

Faculdade Ingá e Duke University

Sacha Epskamp

Universiteit van Amsterdam

Sacha Epskamp
Assistant Professor in Psychological Methods and Psychometrics at the University of Amsterdam

João Vissoci
Pesquisador na divisão de Emergency Medicine do departamento de Cirurgia, e na divisão Duke Global Neurosurgery and Neuroscience (DGNN) do departamento de Neurocirurgia, na Duke University

(vii)
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qgraph(E3)
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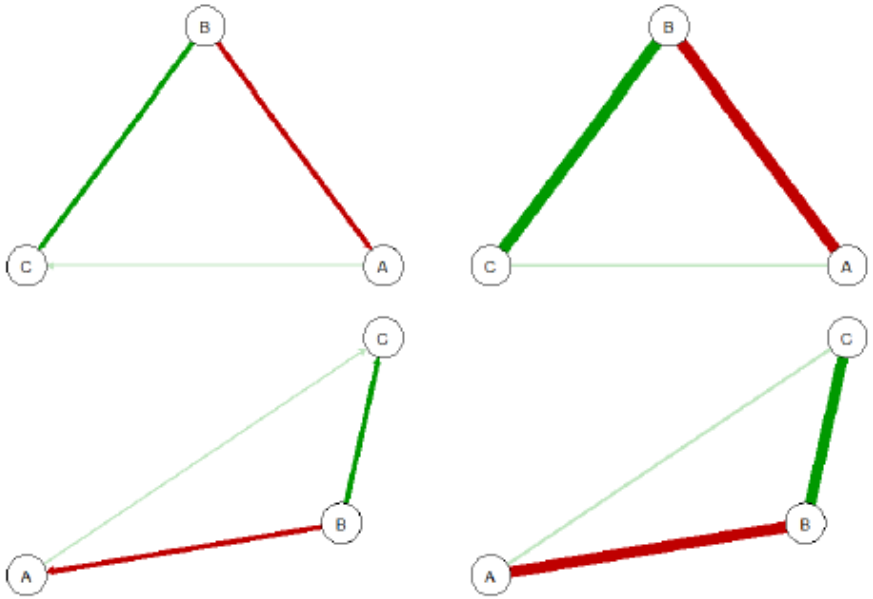

Figura 5. Redes ponderadas, direcionais e não-direcionais, sem (acima) e com (abaixo) o emprego do algoritmo de posicionamento.

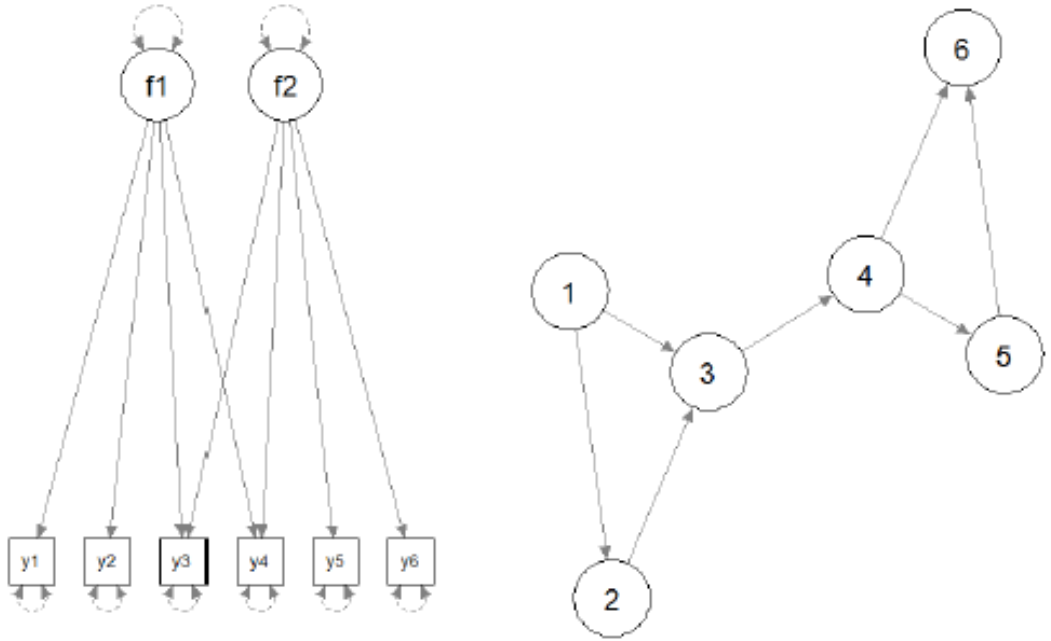

Figura 13. Modelo de traço latente (esquerda) e de rede (direita) da comorbidade.

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- Selecione o curso_redes: https://github.com/wagnerLM/curso_redes
- Abra seu RStudio
- Baixe no curso_redes, o script em: https://github.com/wagnerLM/curso_redes/blob/master/link_script_curso_redes
- Abra o arquivo de script via o RStudio

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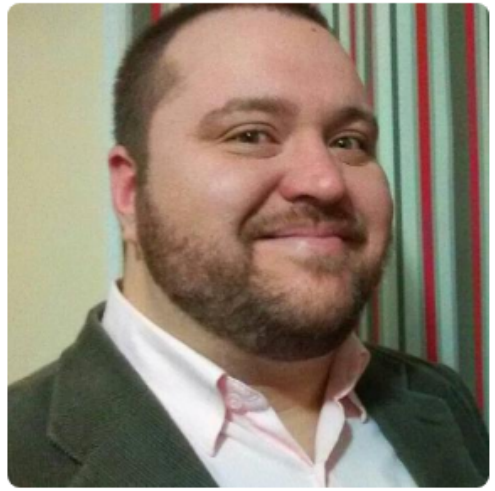

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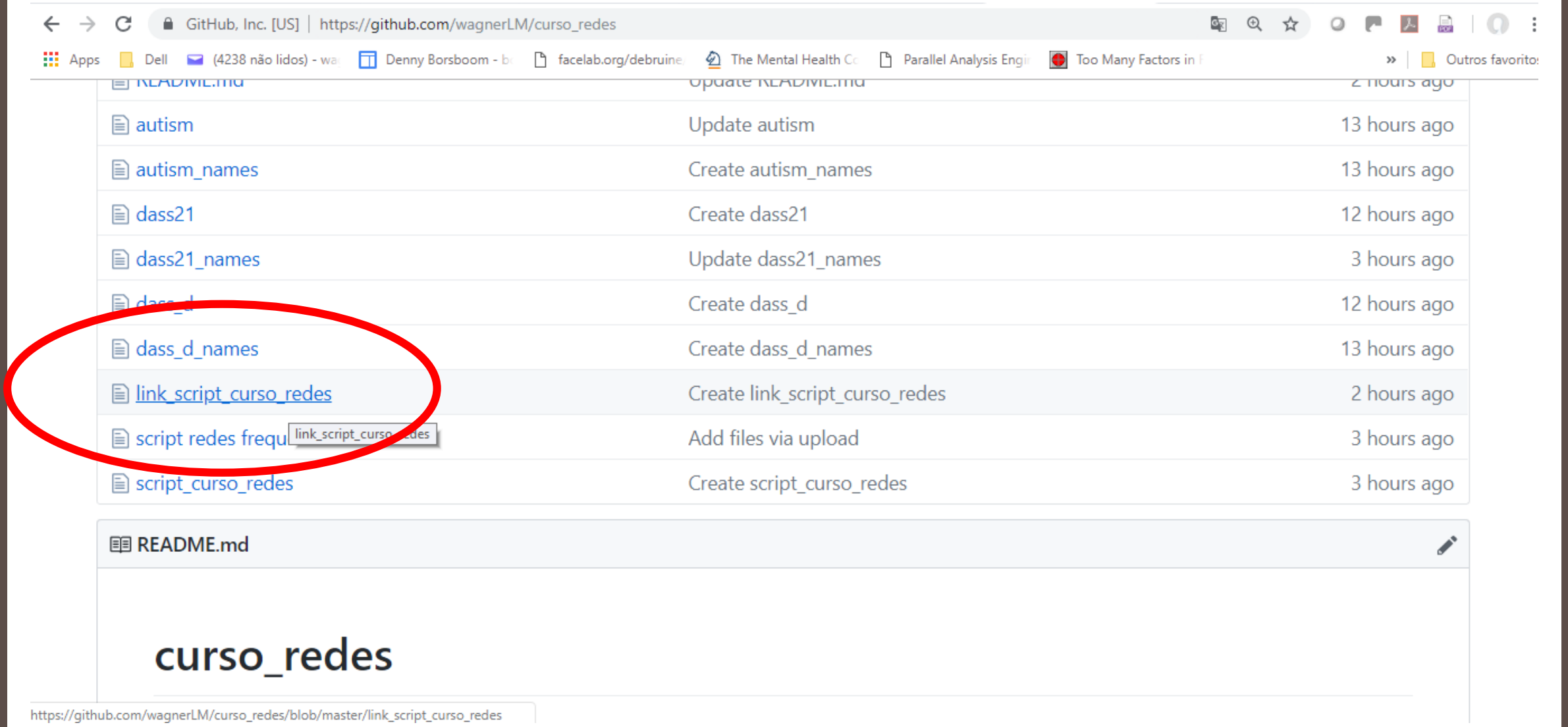
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autism
Update autism
13 hours ago
autism_names
Create autism_names
13 hours ago
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12 hours ago
dass21_names
Update dass21_names
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Create link_script_curso_redes
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script redes frequ
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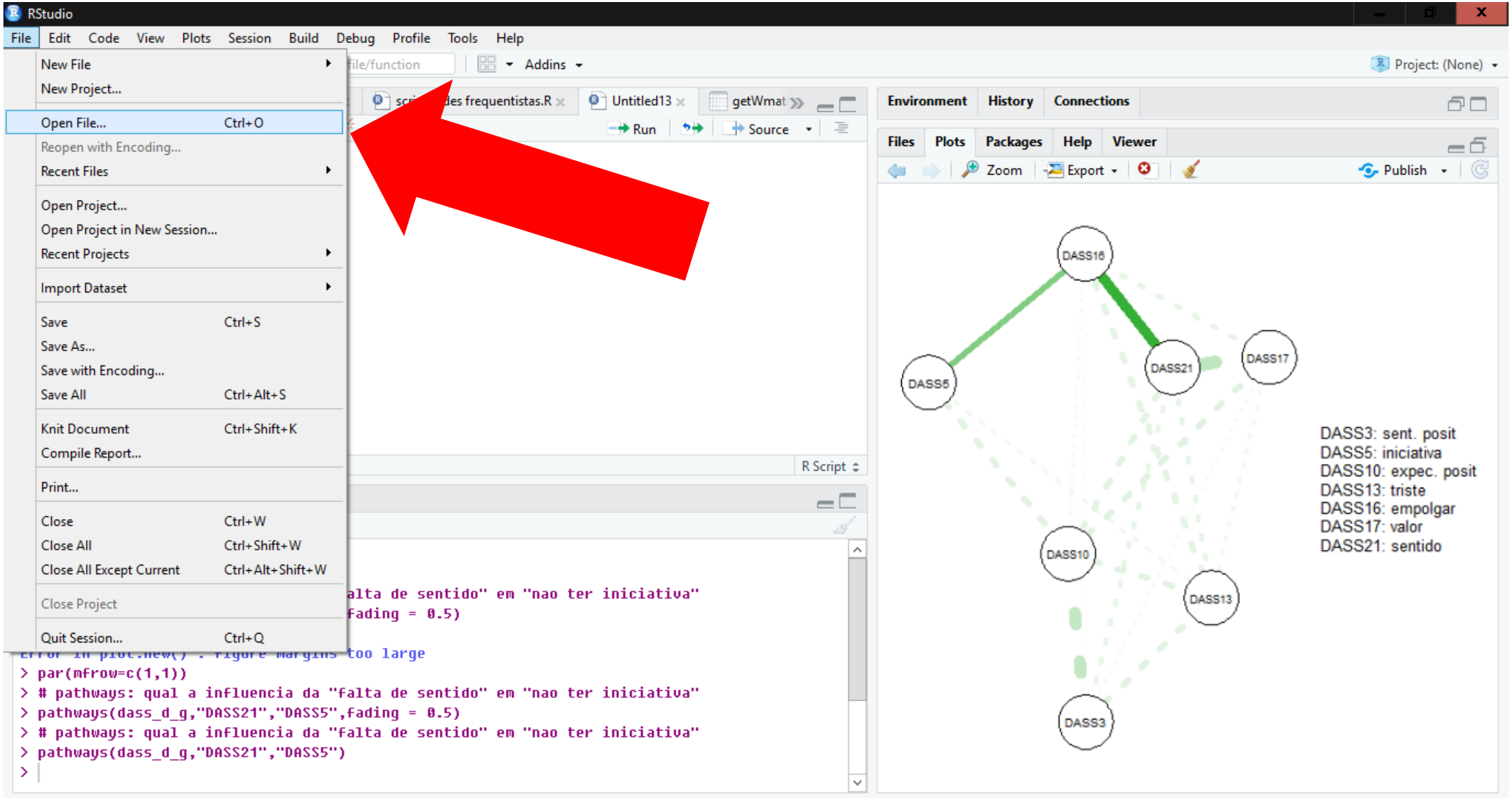
Add files via upload
3 hours ago
script_curso_redes
Create script_curso_redes
3 hours ago
README.md
curso_redes
https://github.com/wagnerLM/curso_redes/blob/master/link_script_curso_redes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Save All Ctrl+Alt+S
Knit Document Ctrl+Shift+K
Compile Report...
Print...
Close Ctrl+W
Close All Ctrl+Shift+W
Close All Except Current Ctrl+Alt+Shift+W
Close Project
Quit Session... Ctrl+Q
Addins
Project: (None)
Untitled13
getWmat
Run
Source
R Script
> par(mfrow=c(1,1))
> # pathways: qual a influencia da "falta de sentido" em "nao ter iniciativa"
> pathways(dass_d_g,"DASS21","DASS5",fading = 0.5)
> # pathways: qual a influencia da "falta de sentido" em "nao ter iniciativa"
> pathways(dass_d_g,"DASS21","DASS5")
Environment History Connections
Files Plots Packages Help Viewer
Zoom Export Publish
DASS16
DASS5
DASS21
DASS17
DASS10
DASS13
DASS3
DASS3: sent. posit
DASS5: iniciativa
DASS10: expec. posit
DASS13: triste
DASS16: empolgar
DASS17: valor
DASS21: sentido

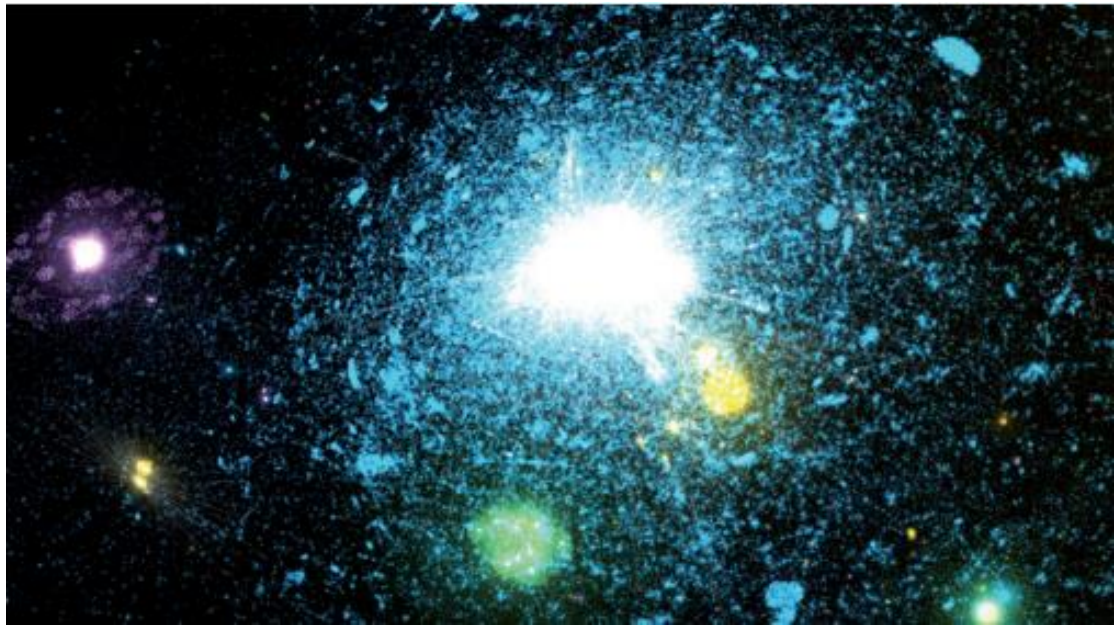
“Reductionism, as a paradigm, is expired, and complexity, as a field, is tired. Data-based mathematical models of complex systems are offering a fresh perspective, rapidly developing into a new discipline: network science.”

NATURE PHYSICS | COMMENTARY

The network takeover

Albert-László Barabási

Nature Physics **8**, 14–16 (2012) | doi:10.1038/nphys2188
Published online 22 December 2011



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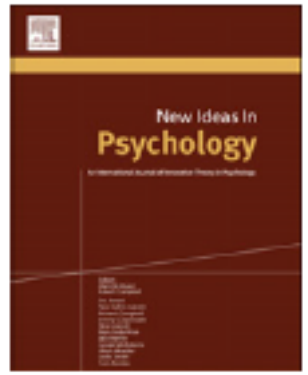
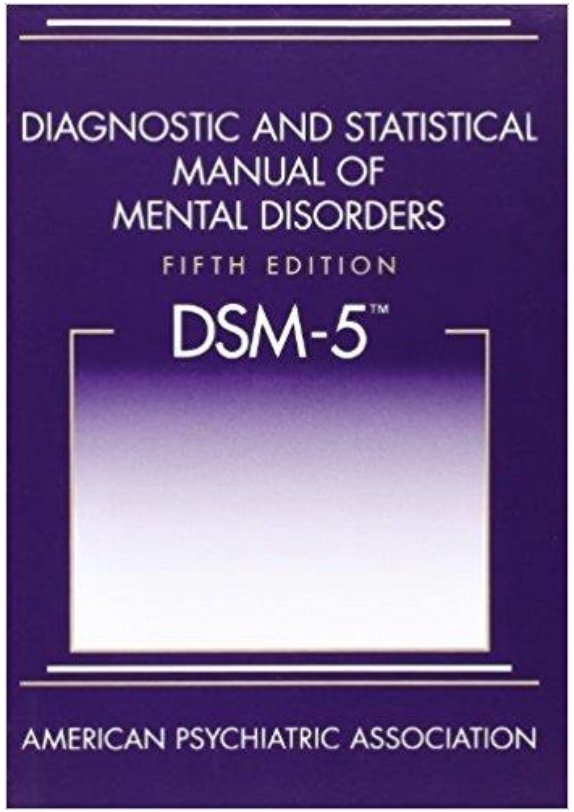


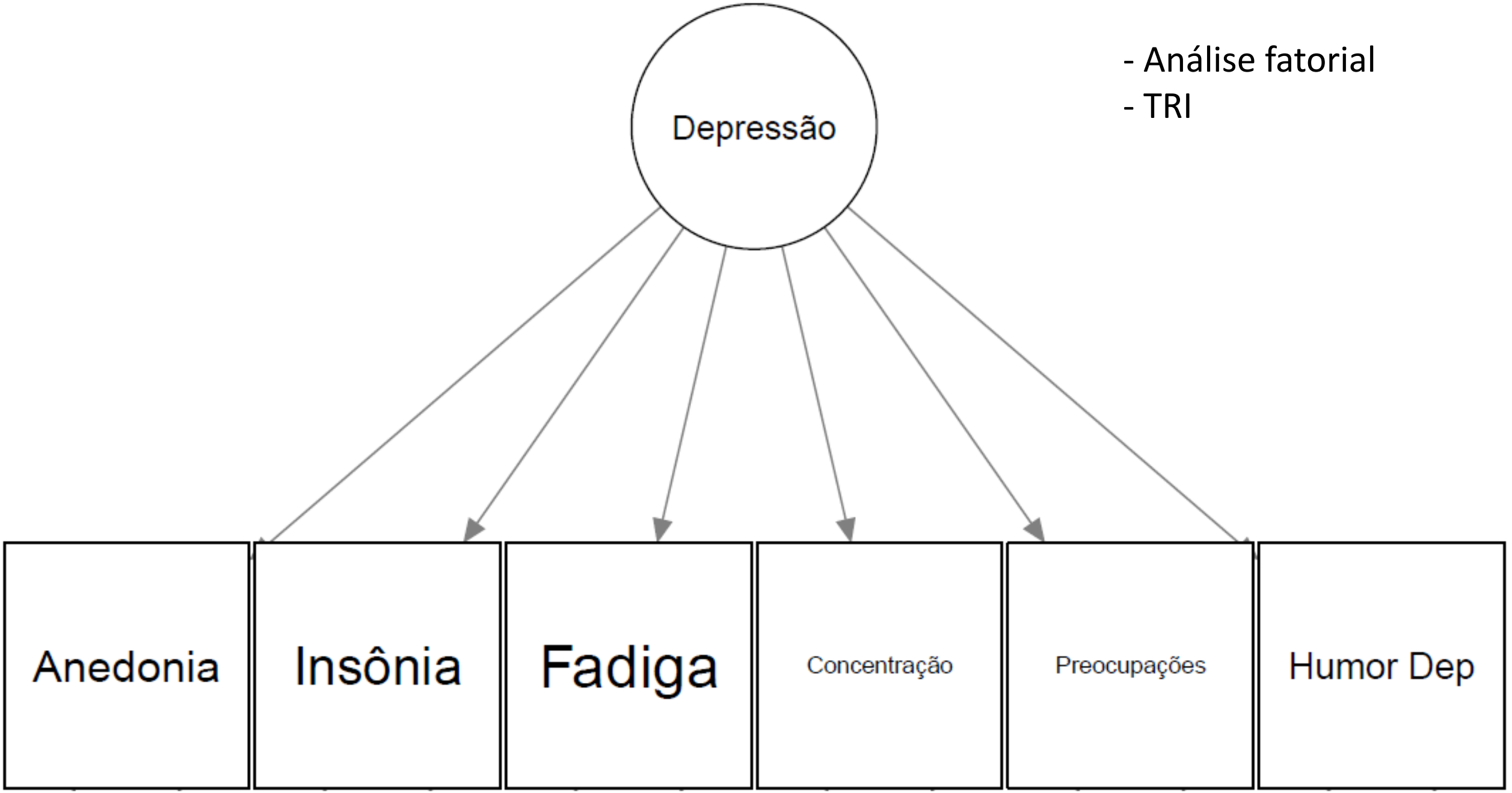
Deconstructing the construct: A network perspective on psychological phenomena

Verena D. Schmittmann, Angélique O.J. Cramer, Lourens J. Waldorp, Sacha Epskamp, Rogier A. Kievit, Denny Borsboom*

Avaliação em saúde mental: traços latentes e redes

- **Transtorno depressivo maior**:
  - Humor deprimido
  - Diminuição do interesse ou prazer
  - Perda ou ganho significativo de peso
  - Insônia ou hipersonia
  - Agitação ou retardo psicomotor
  - Fadiga ou perda de energia
  - Sentimentos de inutilidade ou culpa
  - Capacidade diminuída para pensar ou se concentrar
  - Pensamentos recorrentes de morte





- Análise fatorial
- TRI

Psychological Assessment

1040-3590/16/$12.00 http://dx.doi.org/10.1037/pas0000275

Measuring Depression Over Time . . . or not? Lack of Unidimensionality and Longitudinal Measurement Invariance in Four Common Rating Scales of Depression

Eiko I. Fried
University of Leuven

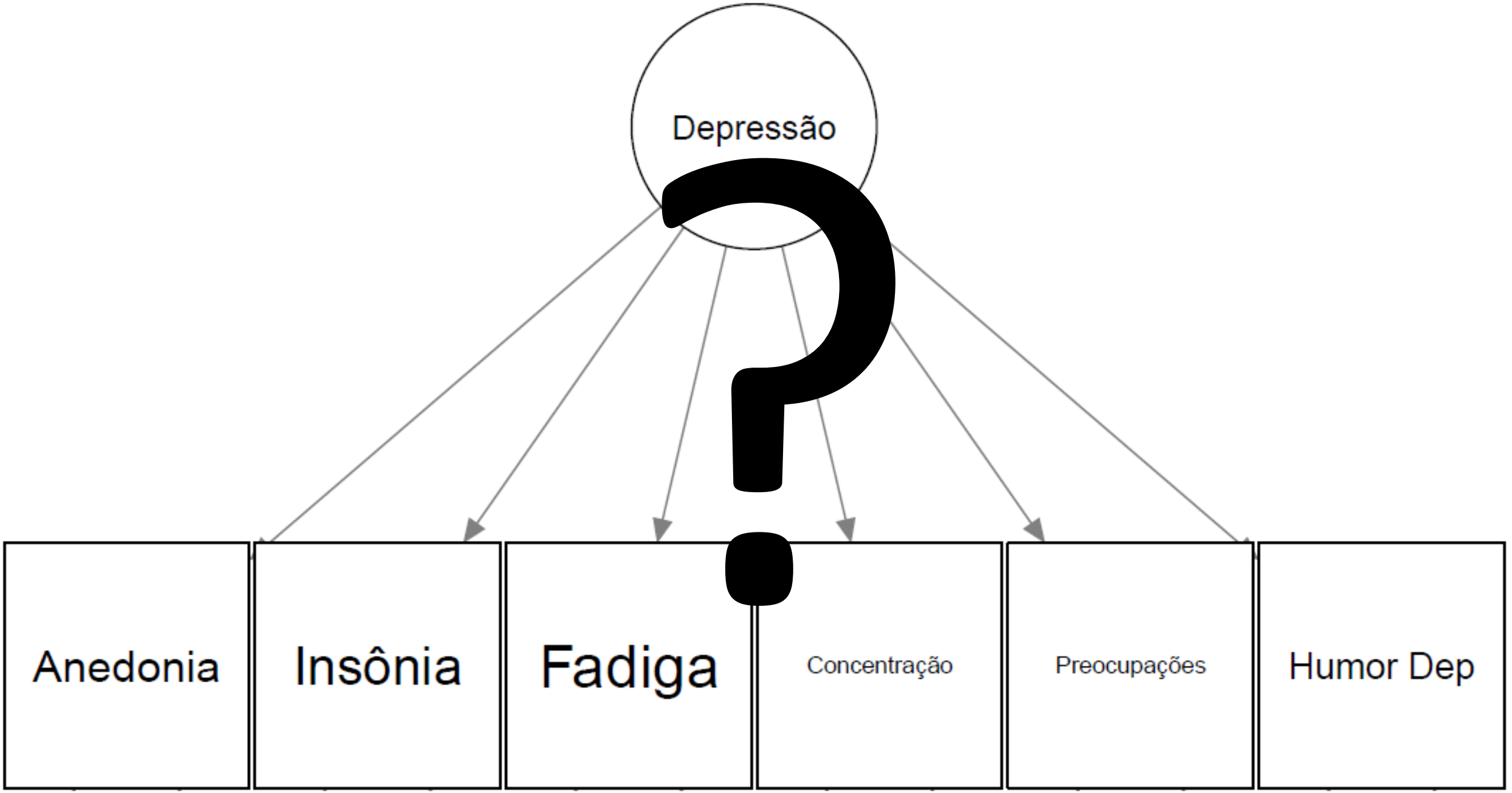
Claudia D. van Borkulo
University of Groningen and University of Amsterdam

Sacha Epskamp
University of Amsterdam

Robert A. Schoevers
University of Groningen

Francis Tuerlinckx
University of Leuven

Denny Borsboom
University of Amsterdam


Depressão
Anedonia
Insônia
Fadiga
Concentração
Preocupações
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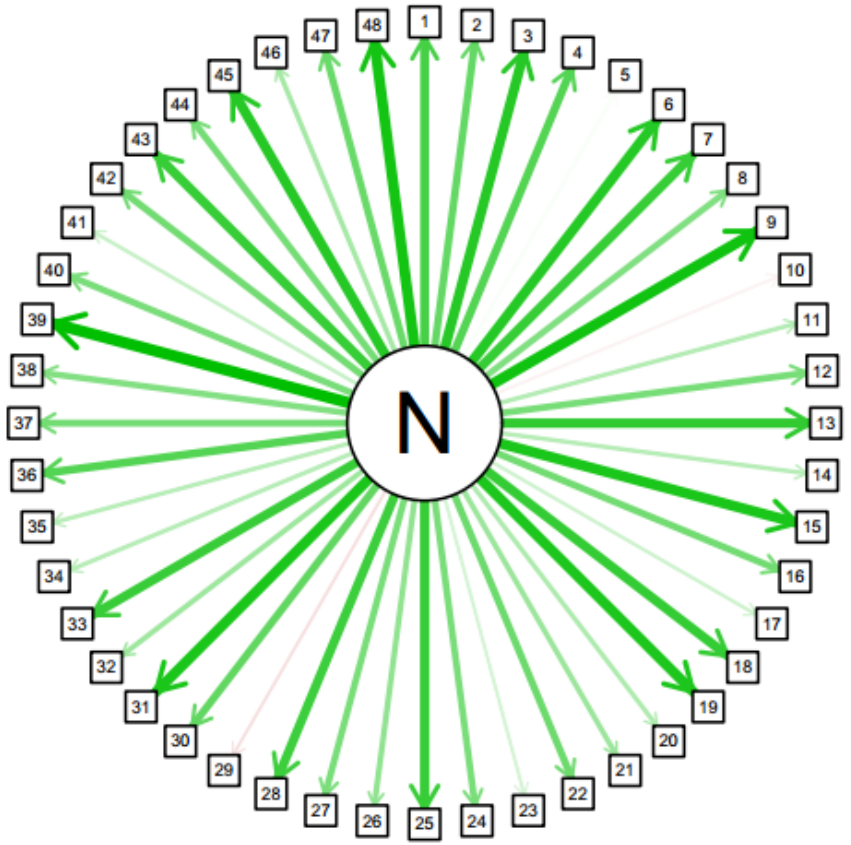
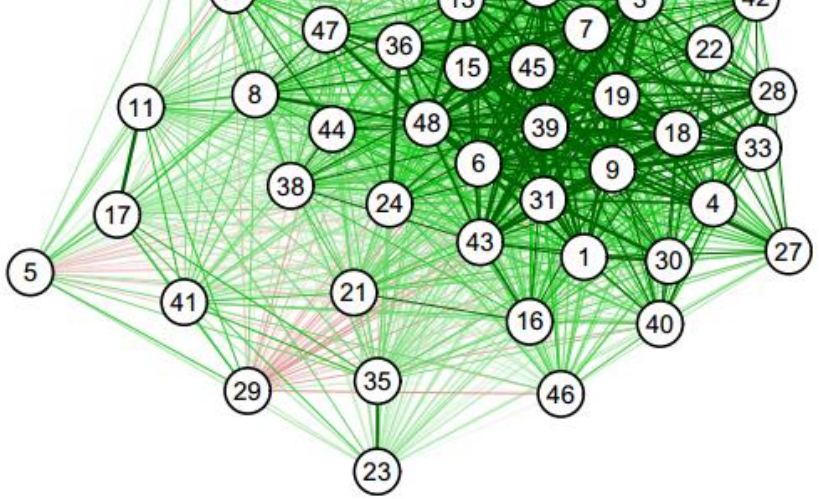
Deconstructing the construct: A network perspective on psychological phenomena

Verena D. Schmittmann, Angélique O.J. Cramer, Lourens J. Waldorp, Sacha Epskamp, Rogier A. Kievit, Denny Borsboom*

Department of Psychology, University of Amsterdam, Roetersstraat 15, 1018 WB Amsterdam, The Netherlands





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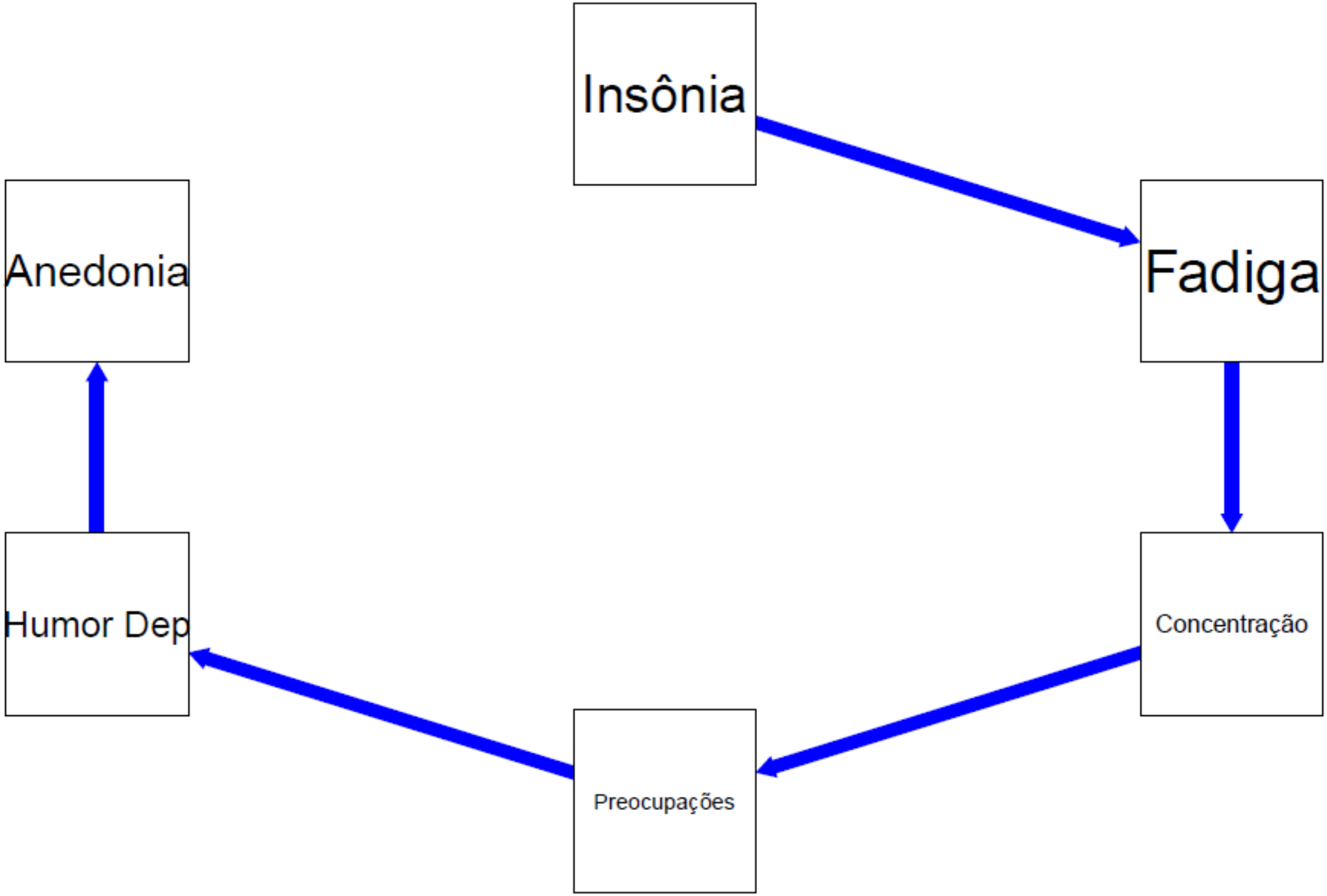
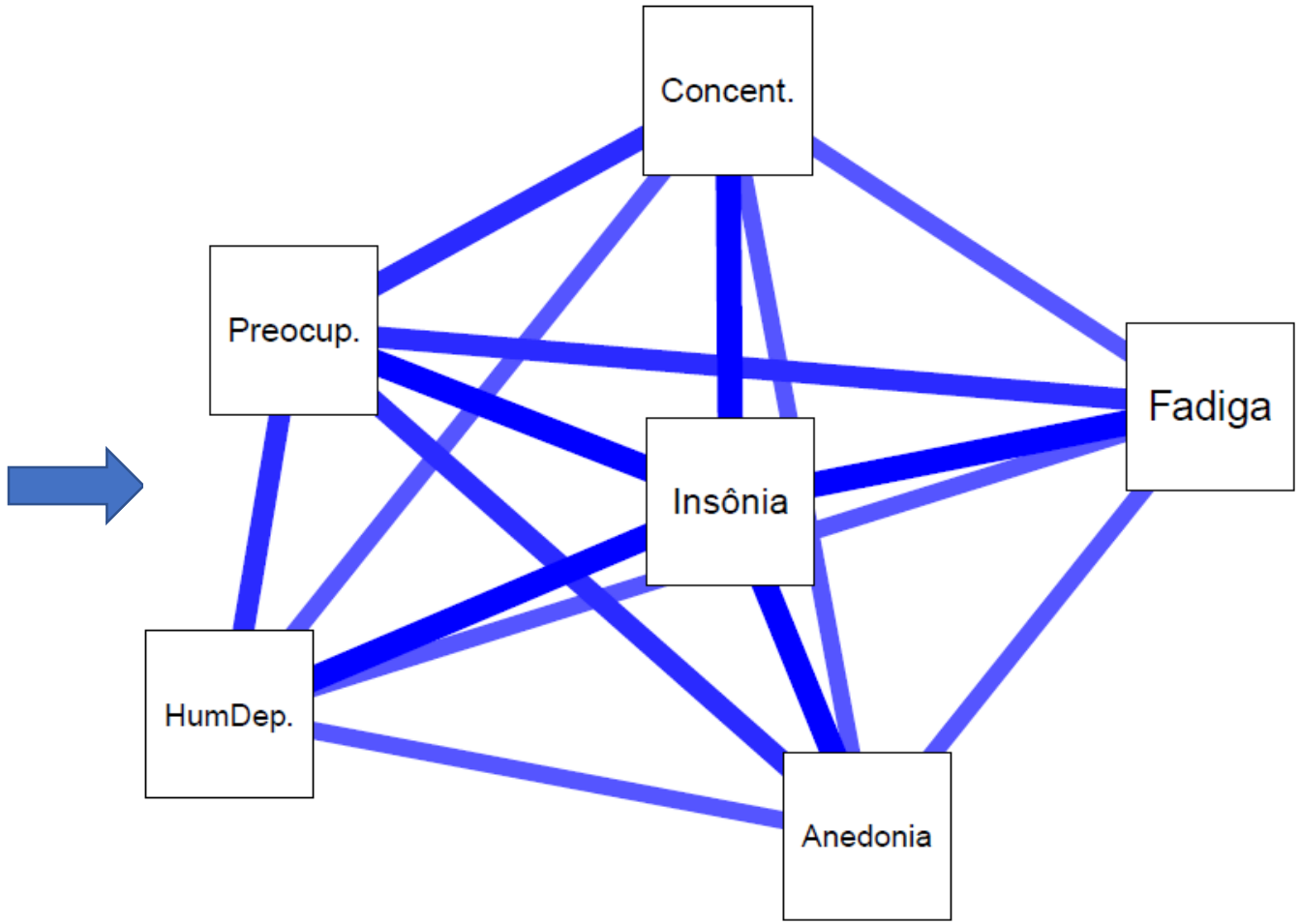
Department of Psychology, University of Amsterdam, Roetersstraat 15, 1018 WB Amsterdam, The Netherlands

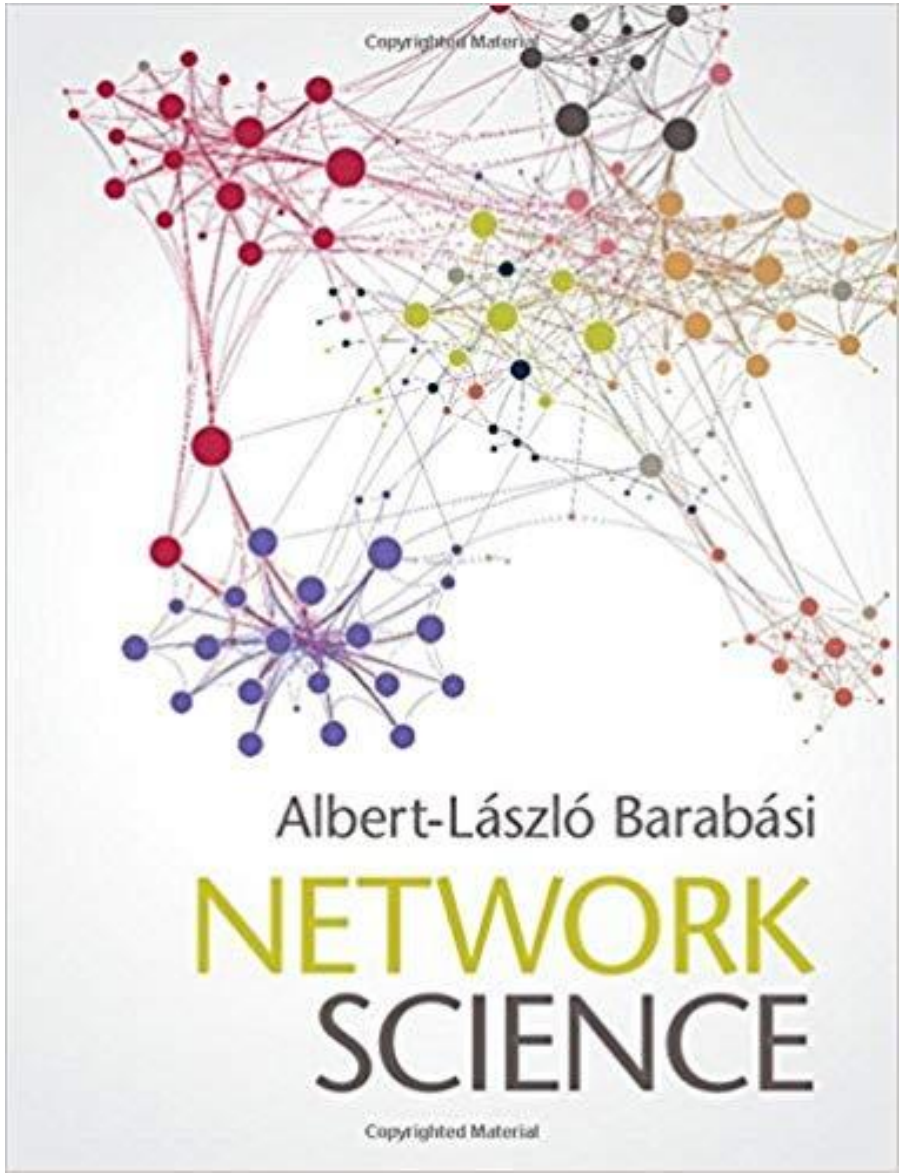
Fig. 6. The best fitting confirmative time series model of the following five constituents of depression: tiredness; concentration difficulties (*concentration*); self-content; sad mood; pleasure in current activity (*activity*).


Insônia
Fadiga
Concentração
Preocupações
Humor Dep
Anedonia

Depressão: **estrutura e dinâmica de um sistema**

	Insônia	Fadiga	Concent.	Preocup.	HumDep.	Anedonia
Insônia	1.0	0.6	0.6	0.6	0.6	0.6
Fadiga	0.6	1.0	0.4	0.5	0.4	0.4
Concent.	0.6	0.4	1.0	0.5	0.4	0.4
Preocup.	0.6	0.5	0.5	1.0	0.5	0.5
HumDep.	0.6	0.4	0.4	0.5	1.0	0.4
Anedonia	0.6	0.4	0.4	0.5	0.4	1.0

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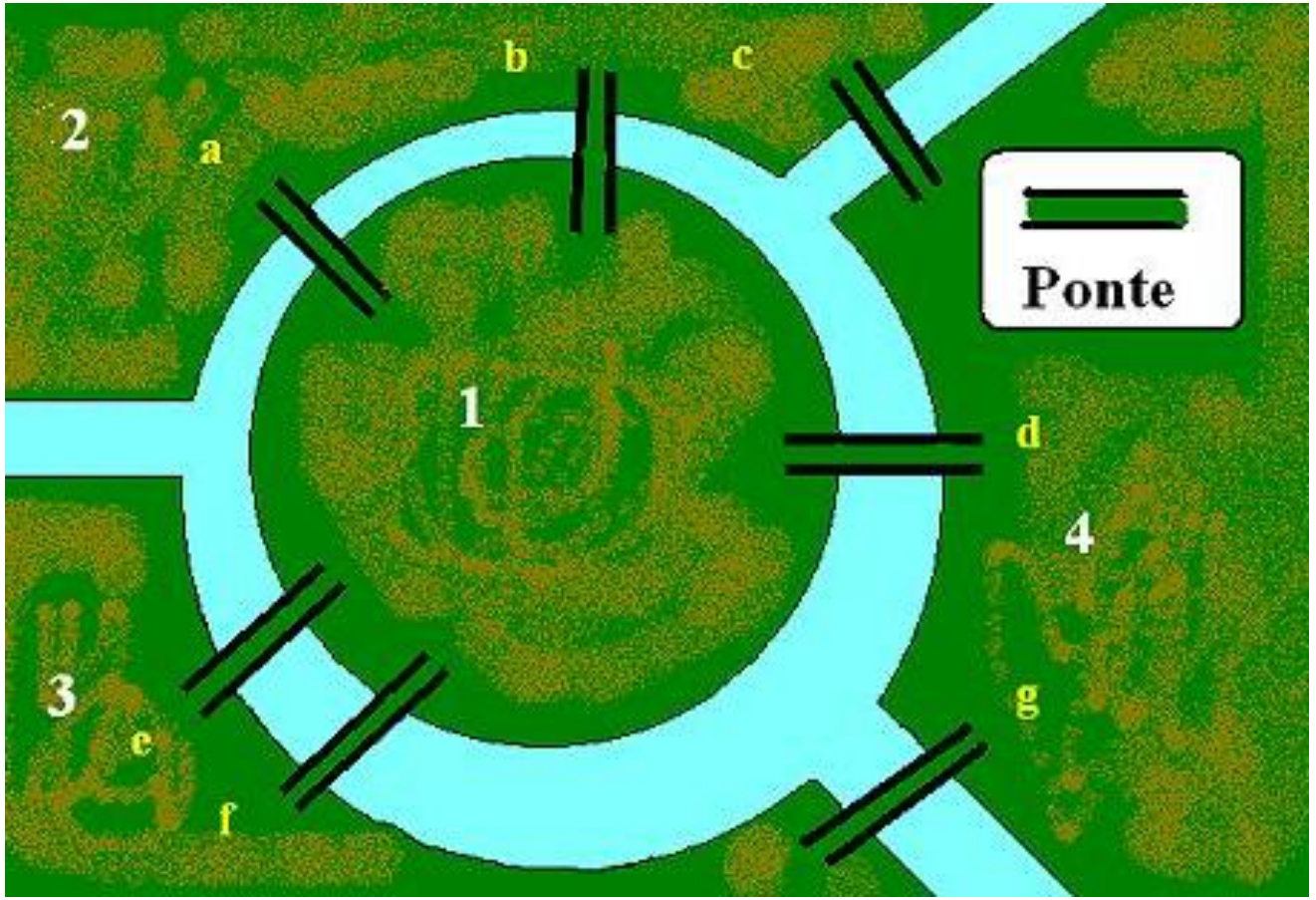
Teoria dos grafos

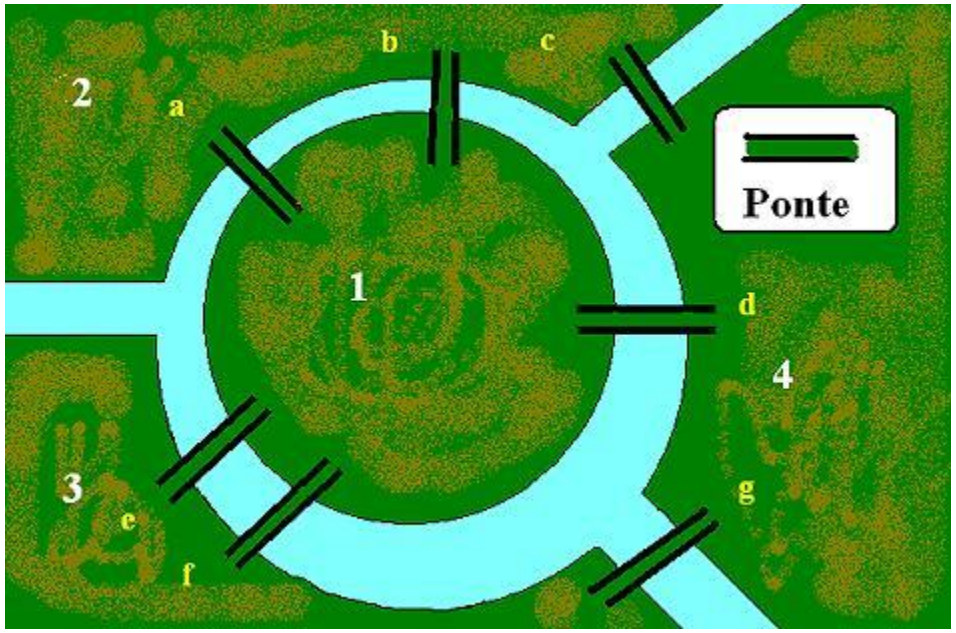
- O problema das pontes de Königsberg
- Discutia-se nas ruas da cidade a possibilidade de atravessar todas as pontes sem repetir nenhuma

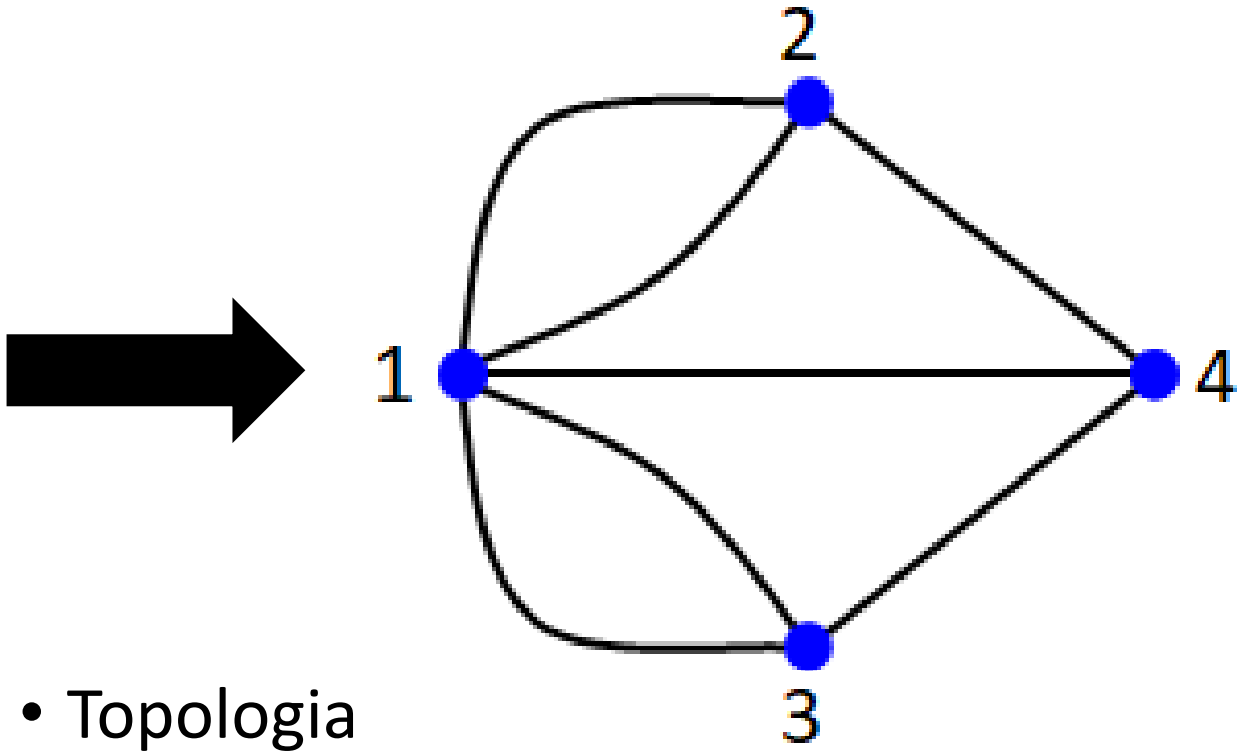


https://pt.wikipedia.org/wiki/Sete_pontes_de_K%C3%B6nigsberg

Teoria dos grafos

- Havia uma lenda popular sobre a possibilidade de resolução, quando Leonhard Euler , em 1736, provou que não existia caminho que possibilitasse tais restrições.





- Topologia

O que é uma rede?

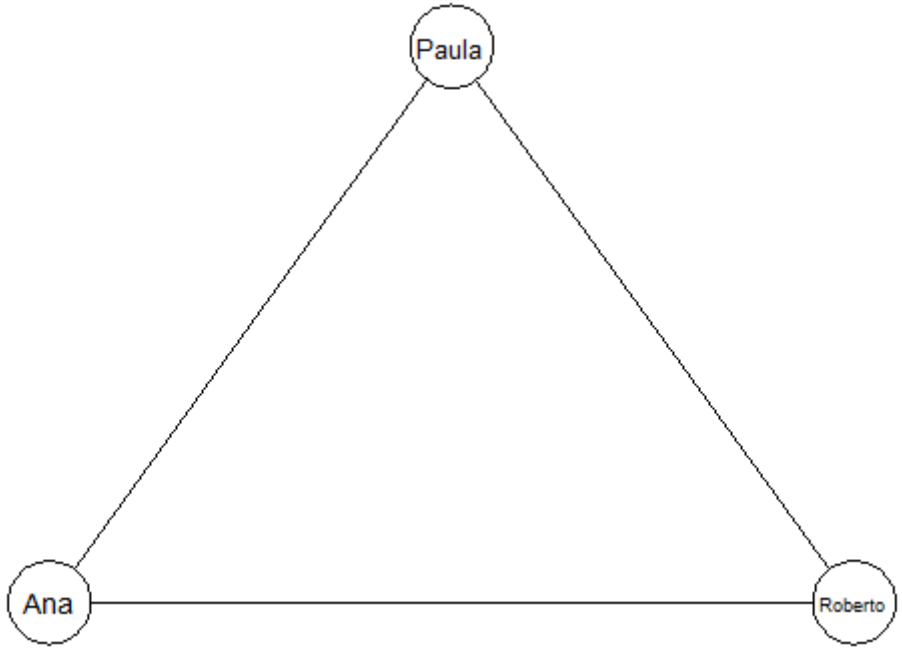
- Vértices (nodos) e arestas (linhas)
- Nodos representam variáveis
- As linhas representam a relação entre os nodos

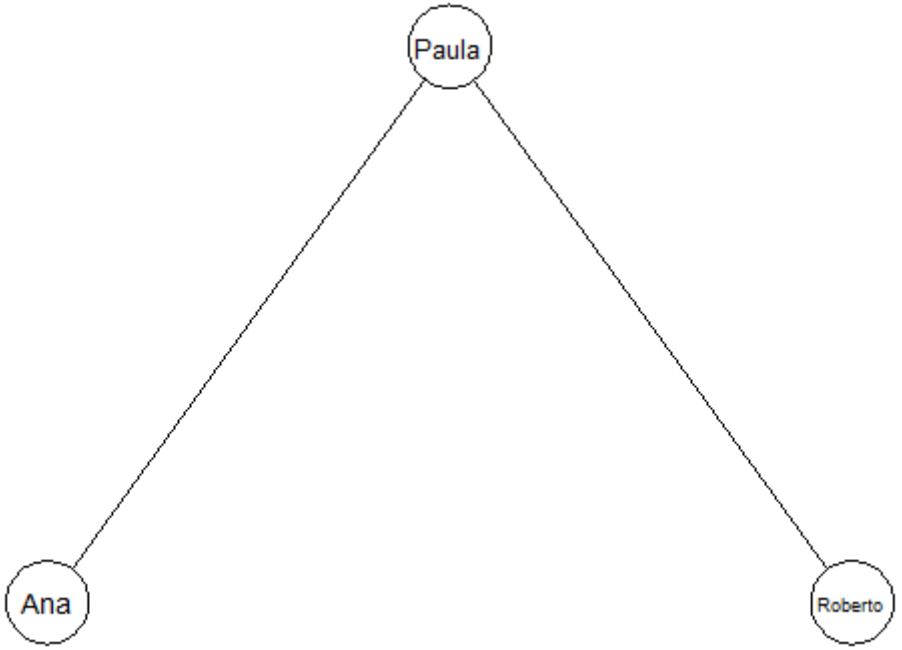
Amizades

	Paula	Roberto	Ana
Paula	0	1	1
Roberto	1	0	0
Ana	1	0	0

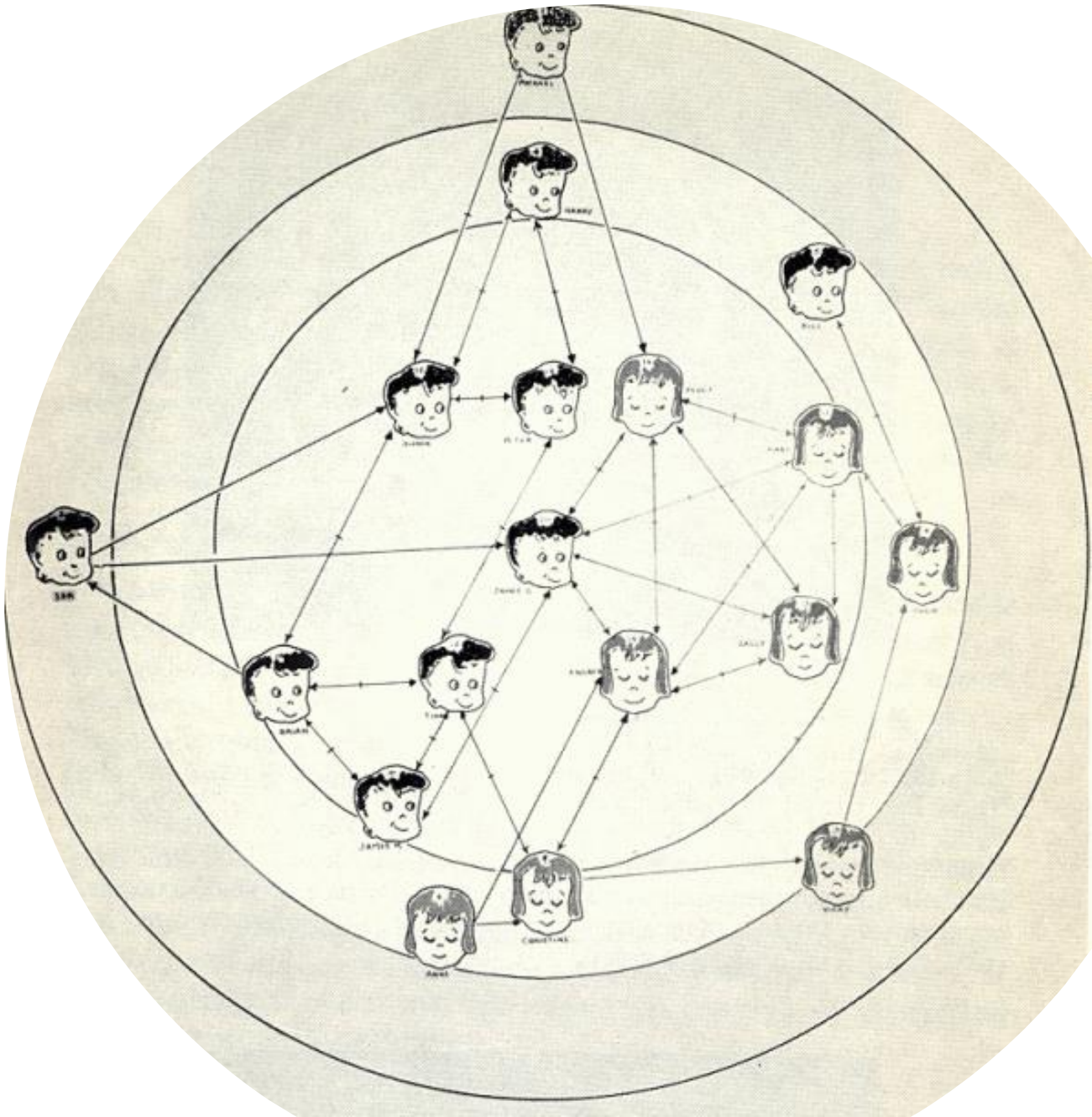
Cenário 1: Paula, Ana e Roberto são amigos

Cenário 2: Paula é amiga de Ana, Paula é amiga de Roberto, Ana e Roberto não são amigos

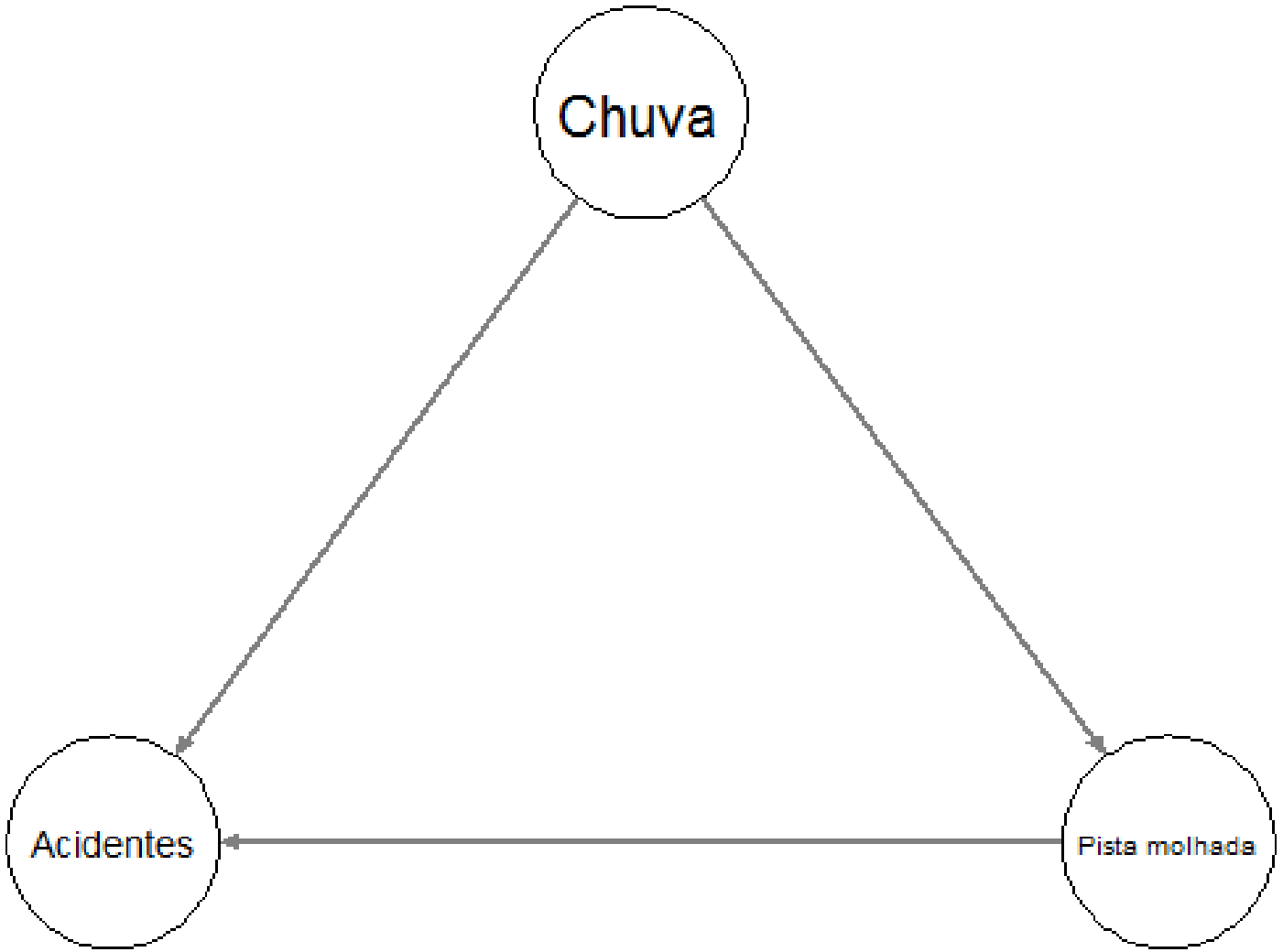




Jacob Moreno
Sociograma



Redes causais
ou
probabilísticas

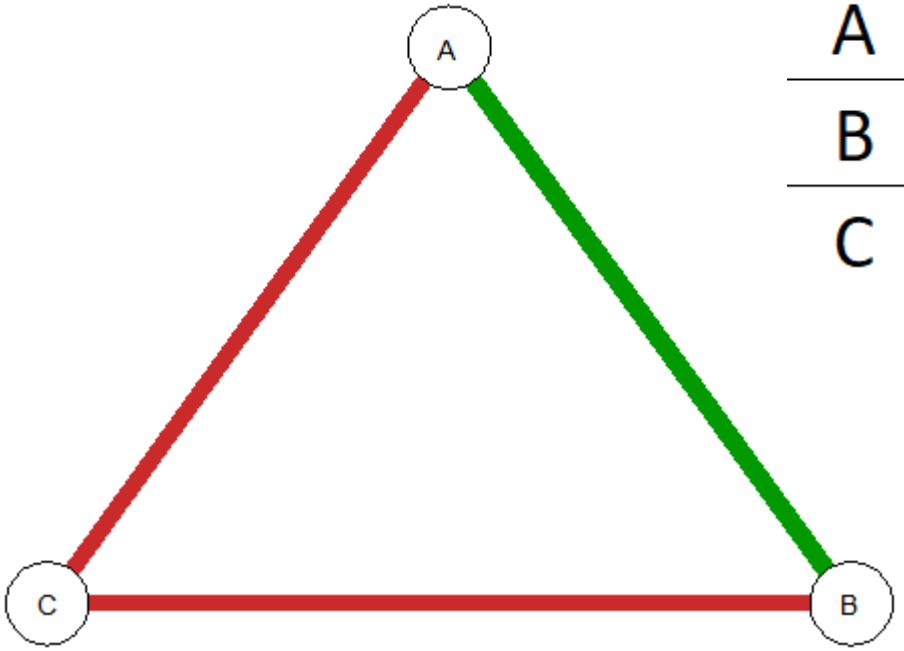


Bayesian networks -> Direct Acyclic Graphs

Medidas de associação entre variáveis

- Relação entre bem-estar (A), suporte social (B) e depressão (C)

	A	B	C
A	1		
B	0,6	1	
C	-0,5	-0,5	1



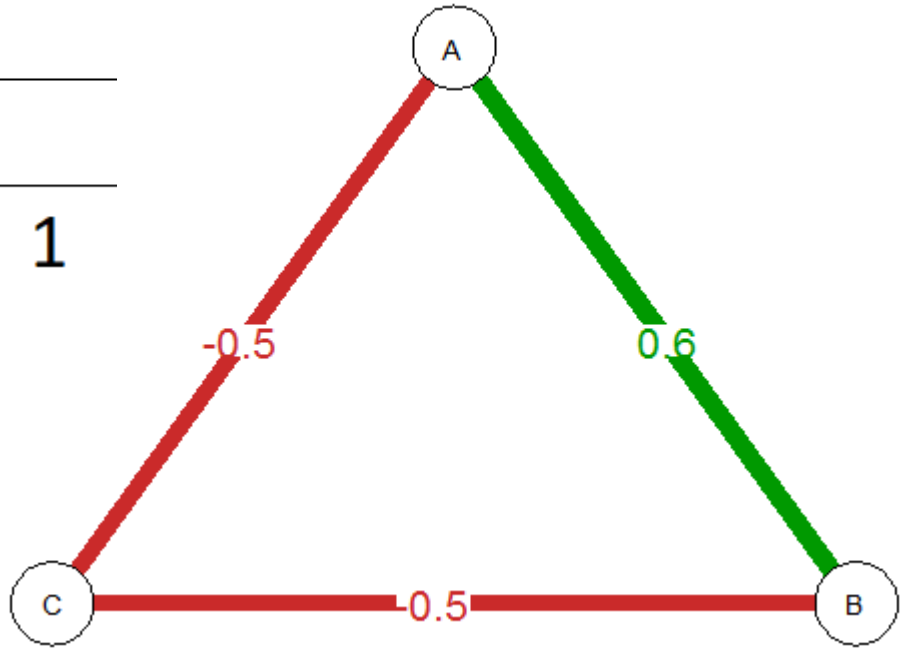
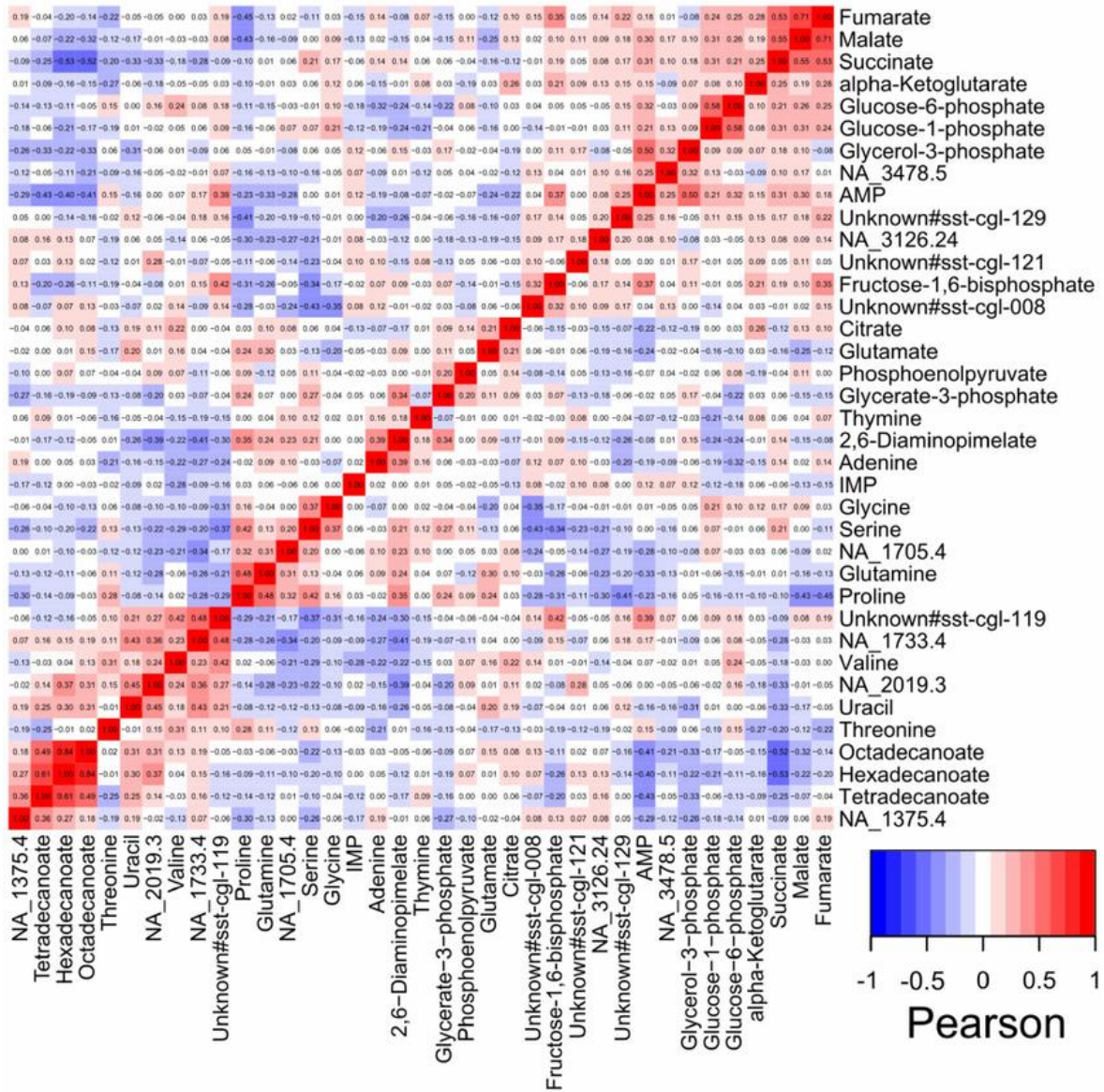
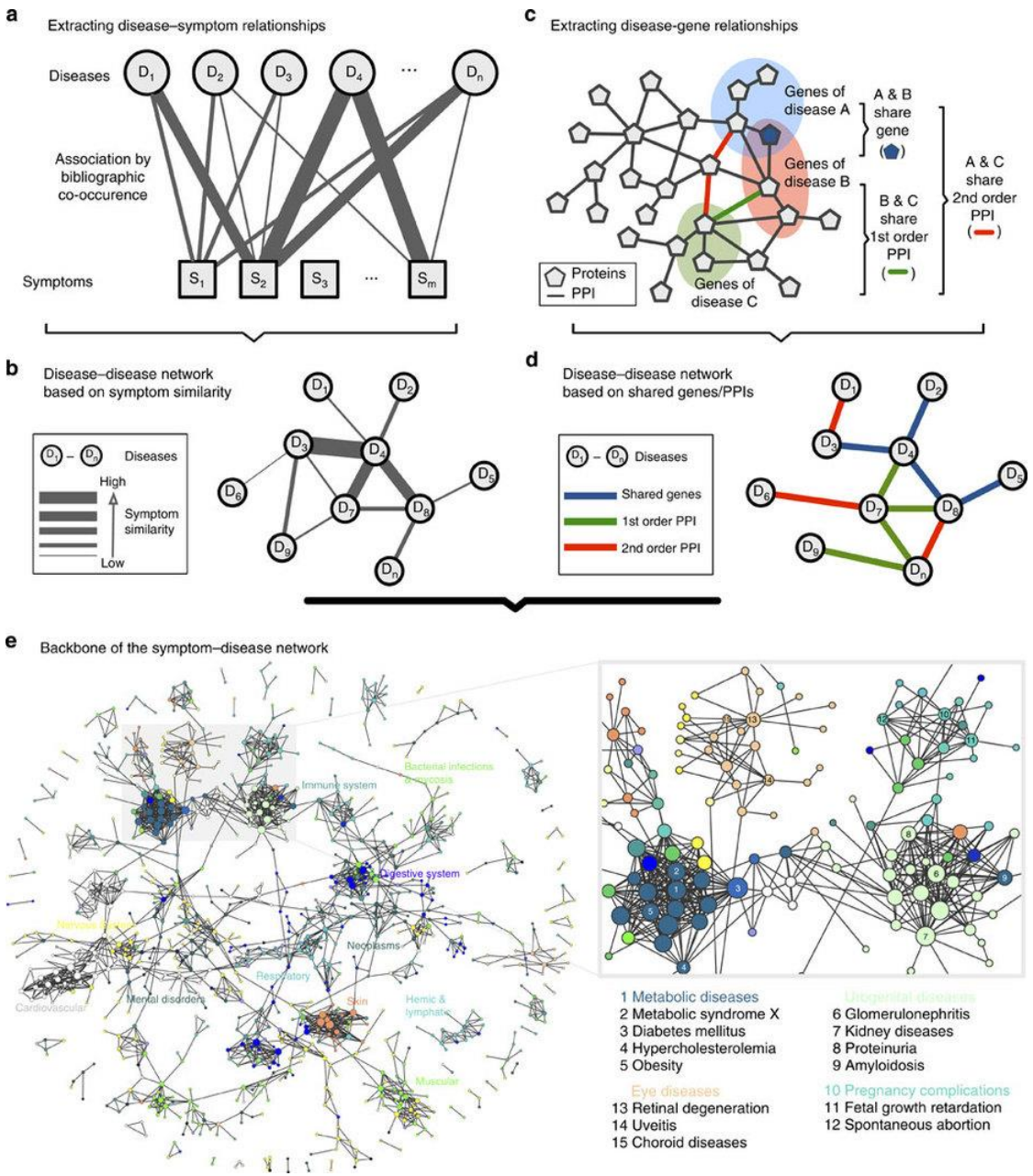


Table 2 Means, standard deviation and Pearson correlation matrix for continuous variables (n = 228)

	M	SD	1	2	3	4	5	6	7	8	9	10	11
1. Age	22.75	4.81	—										
2. Extroversion	3.26	.42	.03	(.80)									
3. Emotional stability	2.77	.57	.04	-.04	(.90)								
4. Agreeableness	3.56	.34	.05	.19[a]	.13[b]	(.74)							
5. Conscientiousness	3.40	.40	.10	.42[a]	.02	.12	(.80)						
6. Openness	3.44	.39	.16[b]	.43[a]	.15[b]	.28[a]	.24[a]	(.76)					
7. EA	3.27	.77	-.13	.06	-.43[a]	.11	-.05	.05	(.89)				
8. EC	3.12	.67	.16[b]	.36[a]	.18[a]	.18[a]	.20[a]	.40[a]	.13[b]	(.84)			
9. ER	3.23	.78	.06	.32[a]	.35[a]	.28[a]	.16[b]	.32[a]	-.04	.30[a]	(.83)		
10. Trust in leader T1	2.91	.85	-.18[a]	.09	.09	.15[b]	-.01	-.06	.17[b]	.13	.11	(.74)	
11. Trust in leader T2	2.90	.83	-.21[a]	.05	.03	.08	.07	-.16[b]	.19[a]	.02	.06	.59[a]	(.82)

EA: emotional attention; EC: emotional clarity; ER: emotional repair; T1: work session 1; T2: work session 2.
[a] $p < .05$.
[b] $p < .01$.
Cronbach's alphas are shown in the diagonal.





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Article

Human symptoms–disease network

XueZhong Zhou, Jörg Menche, Albert-László Barabási & Amitabh Sharma

Nature Communications **5**,
Article number: 4212 (2014)
doi:10.1038/ncomms5212

Received: 07 November 2013
Accepted: 27 May 2014
Published online: 26 June 2014

We extracted ***7,109,429*** (about 35.5% in over twenty million records) PubMed bibliographic records with one or more disease/symptom terms in the MeSH metadata field (see Methods), yielding a total of 4,442 disease terms and 322 symptom terms

nature neuroscience

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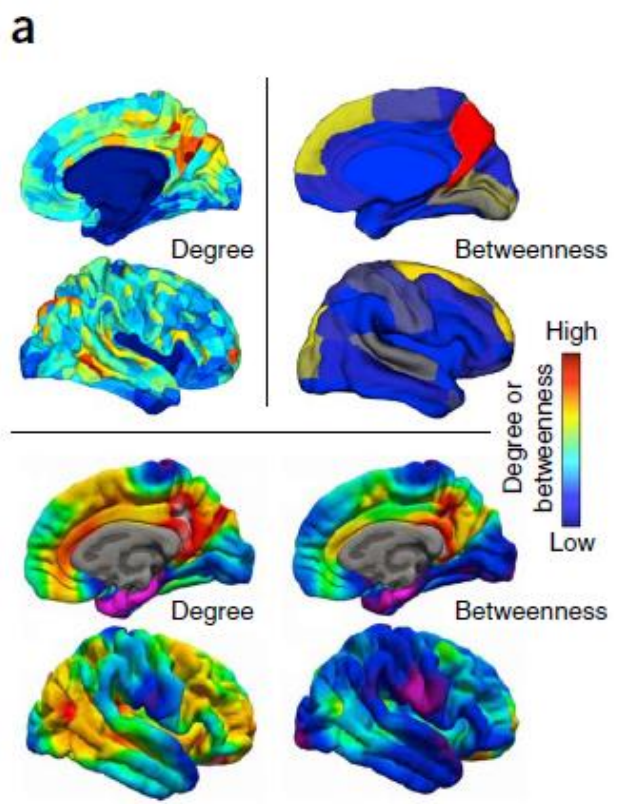
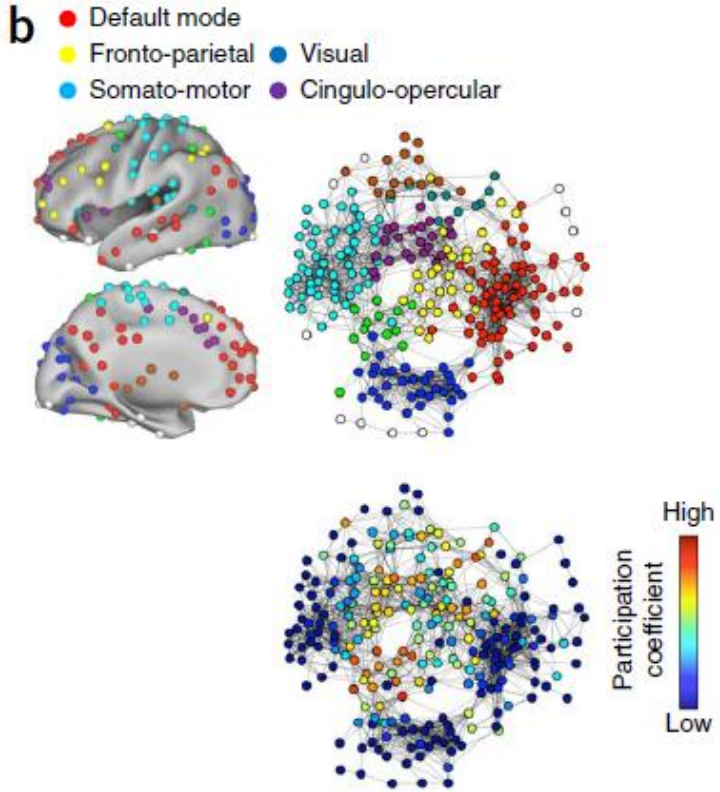
Contributions and challenges for network models in cognitive neuroscience

Olaf Sporns

Nature Neuroscience **17**, 652–660 (2014) | doi:10.1038/nn.3690

Received 06 October 2013 | Accepted 03 March 2014 | Published online 30 March 2014





The dynamical structure of political corruption networks

Haroldo V. Ribeiro,[1,*] Luiz G. A. Alves,[2]
Alvaro F. Martins,[1] Ervin K. Lenzi,[3] and Matjaž Perc[4,5,6,†]

[1] *Departamento de Física, Universidade Estadual de Maringá, Maringá, PR 87020-900, Brazil*

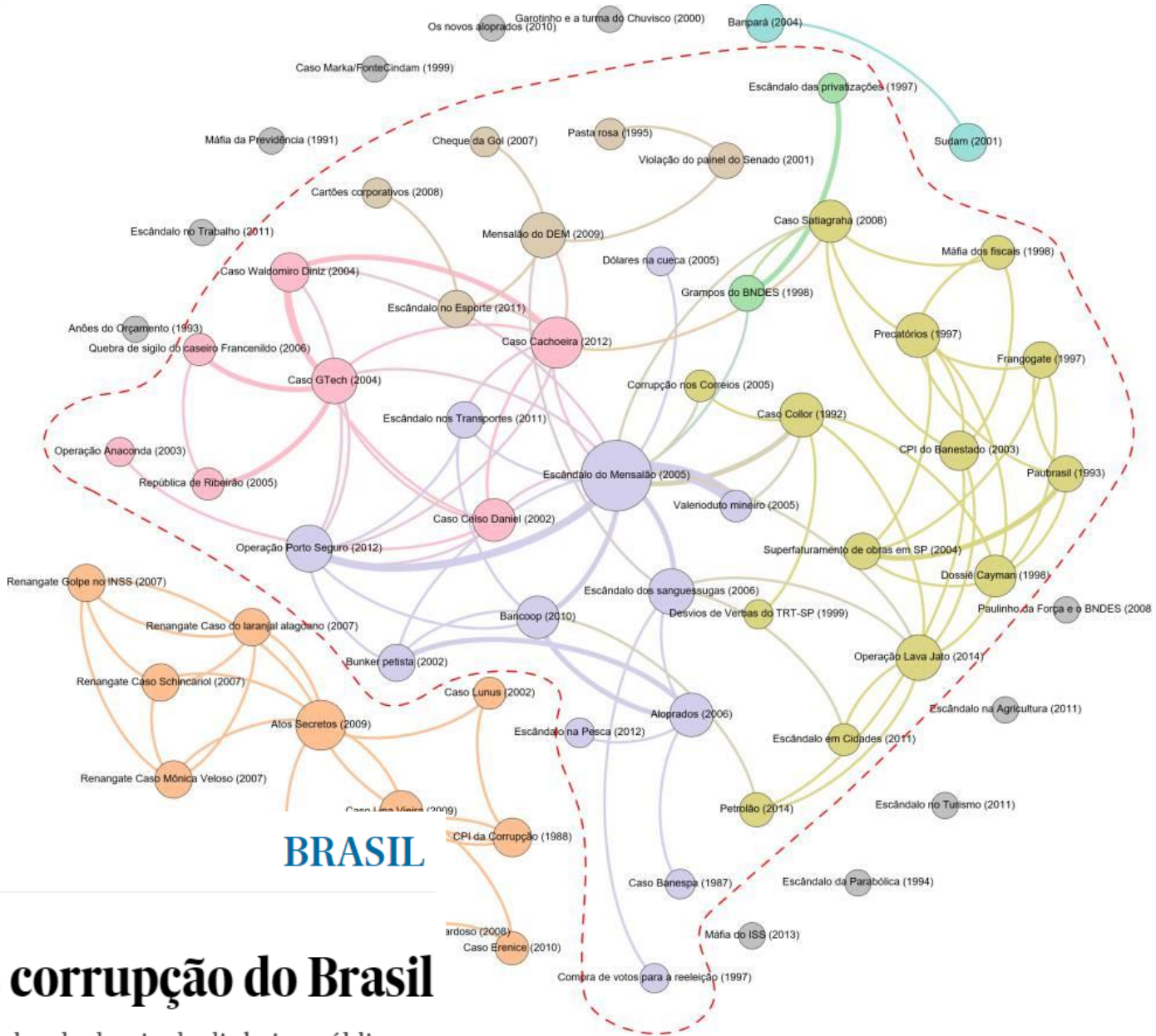
[2] *Institute of Mathematics and Computer Science, University of São Paulo, São Carlos, SP 13566-590, Brazil*

[3] *Departamento de Física, Universidade Estadual de Ponta Grossa, Ponta Grossa, PR 84030-900, Brazil*

[4] *Faculty of Natural Sciences and Mathematics, University of Maribor, Koroška cesta 160, SI-2000 Maribor, Slovenia*

[5] *CAMTP – Center for Applied Mathematics and Theoretical Physics, University of Maribor, Mladinska 3, SI-2000 Maribor, Slovenia*

[6] *Complexity Science Hub, Josefstädterstraße 39, A-1080 Vienna, Austria*



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CORRUPÇÃO ›

Por trás do verdadeiro mecanismo de corrupção do Brasil

Pesquisadores mapeiam as redes de relacionamento entre os escândalos de desvio de dinheiro público que assolaram o Brasil após a redemocratização

30

Network Psychometrics

Sacha Epskamp, Gunter Maris, Lourens J. Waldorp, and Denny Borsboom

Introduction

"In fact, statistical field theory may have even more to offer. It always struck me that there appears to be a close connection between the basic expressions underlying item-response theory and the solutions of elementary lattice fields in statistical physics. For instance, there is almost a one-to-one formal correspondence of the solution of the Ising model (a lattice with nearest neighbor interaction between binary-valued sites; e.g., Kindermann & Snell (1980), Chapter 1) and the Rasch model Fischer

Psychological Medicine, Page 1 of 11. © Cambridge University Press 2014
doi:10.1017/S0033291714001809

ORIGINAL ARTICLE

Revealing the dynamic network structure of the Beck Depression Inventory-II

L. F. Bringmann[1]*, L. H. J. M. Lemmens[2], M. J. H. Huibers[2,3], D. Borsboom[4] and F. Tuerlinckx[1]

[1] *Faculty of Psychology and Educational Sciences, University of Leuven, Leuven, Belgium*
[2] *Department of Clinical Psychological Science, Maastricht University, Maastricht, The Netherlands*
[3] *Department of Clinical Psychology, VU University of Amsterdam, Amsterdam, The Netherlands*
[4] *Department of Psychology, University of Amsterdam, Amsterdam, The Netherlands*

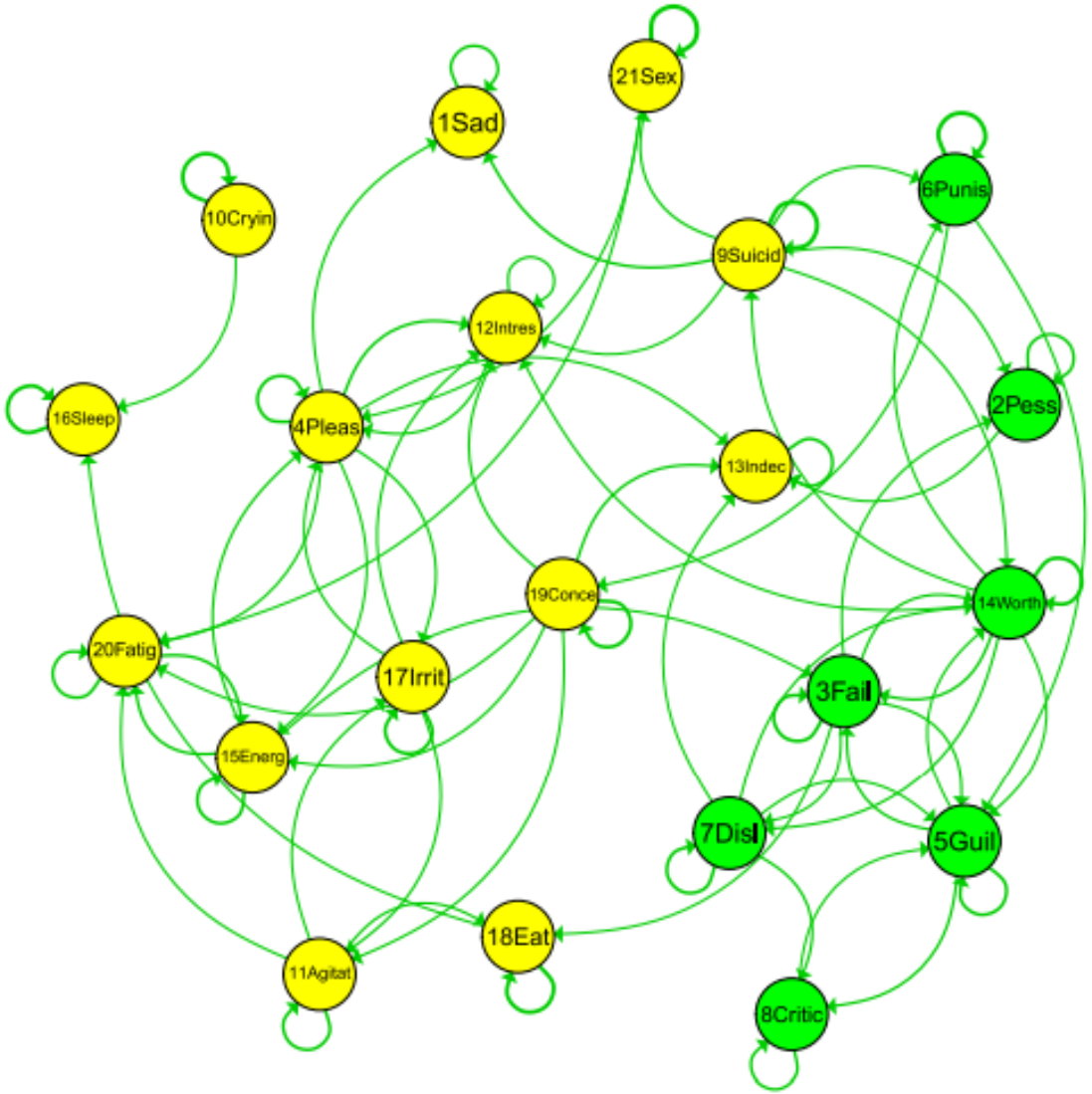

Fig. 3. Community structure of the BDI-II network with the two clusters indicated by two different colours.

Psicopatologia de rede

SPECIAL ARTICLE

A network theory of mental disorders

Denny Borsboom

Department of Psychology, University of Amsterdam, Amsterdam 1018 XA, The Netherlands

In recent years, the network approach to psychopathology has been advanced as an alternative way of conceptualizing mental disorders. In this approach, mental disorders arise from direct interactions between symptoms. Although the network approach has led to many novel methodologies and substantive applications, it has not yet been fully articulated as a scientific theory of mental disorders. The present paper aims to develop such a theory, by postulating a limited set of theoretical principles regarding the structure and dynamics of symptom networks. At the heart of the theory lies the notion that symptoms of psychopathology are causally connected through myriads of biological, psychological and societal mechanisms. If these causal relations are sufficiently strong, symptoms can generate a level of feedback that renders them self-sustaining. In this case, the network can get stuck in a disorder state. The network theory holds that this is a general feature of mental disorders, which can therefore be understood as alternative stable states of strongly connected symptom networks. This idea naturally leads to a comprehensive model of psychopathology, encompassing a common explanatory model for mental disorders, as well as novel definitions of associated concepts such as mental health, resilience, vulnerability and liability. In addition, the network theory has direct implications for how to understand diagnosis and treatment, and suggests a clear agenda for future research in psychiatry and associated disciplines.

Key words: Psychopathology, network approach, mental disorders, symptom networks, mental health, resilience, vulnerability, diagnosis, treatment

(World Psychiatry 2017;16:5–13)

International Journal of Methods in Psychiatric Research
Int. J. Methods Psychiatr. Res. (2016)
Published online in Wiley Online Library
(wileyonlinelibrary.com) **DOI:** 10.1002/mpr.1503

Mapping the manuals of madness: Comparing the ICD-10 and DSM-IV-TR using a network approach

PIA TIO,[1] SACHA EPSKAMP,[1] ARJEN NOORDHOF[2] & DENNY BORSBOOM[1]

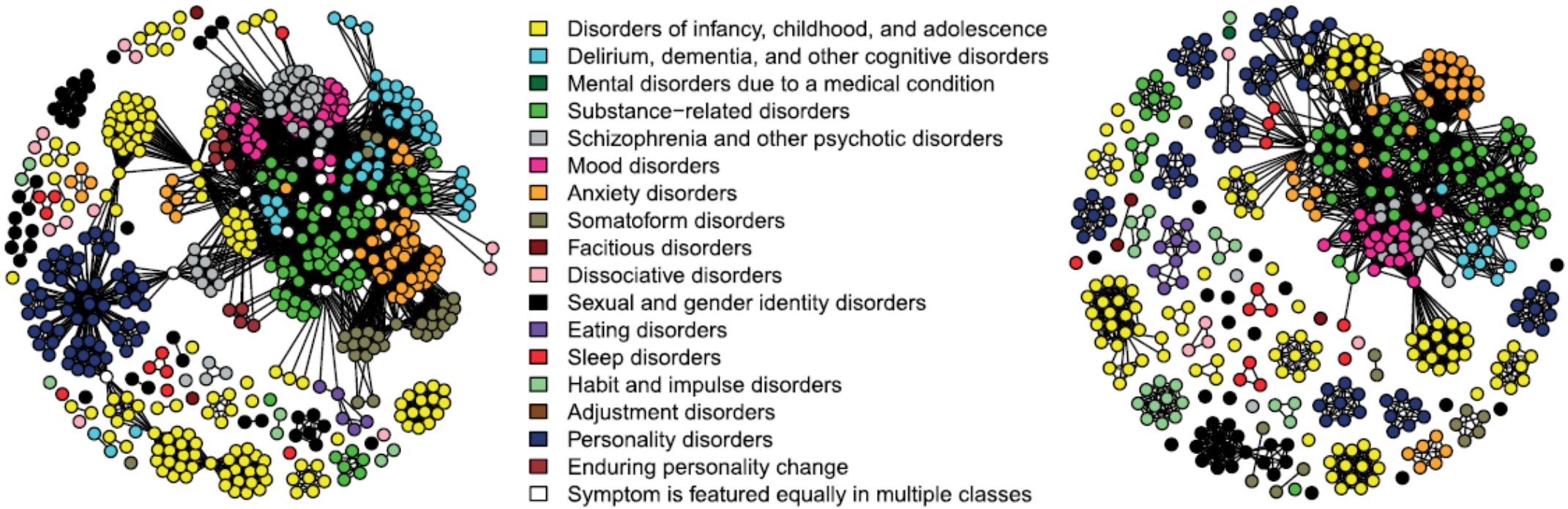

Table 2. Top 10 criteria with the highest degree for ICD-10 and DSM-IV-TR network

	ICD-10	DSM-IV-TR
1	Insomnia[1]	Insomnia[1]
2	Irritability[1]	Psychomotor agitation
3	Apathy	Psychomotor retardation[1]
4	Difficulty in concentrating[1]	Depressed
5	Nausea	Accelerated heart rate
6	Emotional liability	Distractibility
7	Sweating[1]	Irritability[1]
8	Chest pain	Anxiety and Hypersomnia
9	Restless sleep	Sweating[1] and Weight loss
10	Psychomotor retardation[1]	Difficulty in concentrating[1] and Hallucinations/illusions

[1]Criteria that occur in the top 10 of both networks. Places 8 through 10 in the DSM-IV-TR hold multiple symptoms.

Análise de rede

- Técnica de aprendizado de máquina (machine learning)
- Dar sentido a dados complexos
- Representação gráfica para integração e leitura mais “intuitiva” dos dados

Exemplos “hands on” (mão na massa)

- Personalidade
- Depressão
- DASS-21 (depressão, ansiedade e estresse) – comorbidade
- Predição – tratamento de autismo e qualidade de vida

Porquê usar a linguagem r?

- Capacidades gráficas muito sofisticadas e melhores que muitos softwares
- Linguagem de programação que possibilita o desenvolvimento de novas ferramentas
- Comunidade de usuários muito ativa e participativa

stackoverflow

GitHub

Personality Project

Quick-R
powered by DataCamp

DataCamp

Software R

- R Project

- John Chambers
- Software livre, colaborativo
- Possui um repositório CRAN
- Bibliotecas e pacotes (códigos e algoritmos)
- 100% FREE!!!

https://www.r-project.org/

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The R Project for Statistical Computing

Getting Started

R is a free software environment for statistical computing and graphics. It compiles and runs on a wide variety of UNIX platforms, Windows and MacOS. To **download R**, please choose your preferred CRAN mirror.

If you have questions about R like how to download and install the software, or what the license terms are, please read our answers to frequently asked questions before you send an email.

News

- **R version 3.5.1 (Feather Spray)** has been released on 2018-07-02.
- The R Foundation has been awarded the Personality/Organization of the year 2018 award by the professional association of German market and social researchers.
- **R version 3.5.0 (Joy in Playing)** has been released on 2018-04-23.

News via Twitter

The R Foundation Retweeted

Peter Dalgaard
@pdalgd
#rstats 3.5.1 "Feather Spray" is released (source version)

Getting Started

- É o sistema básico – feito de forma colaborativa – Possui funções básicas que podem ser combinadas em pacotes mais avançados

- R Studio – Uma interface mais amigável para o uso do R. Permite análise, escrita (tem gente que escreve a tese por aqui), e publicações.

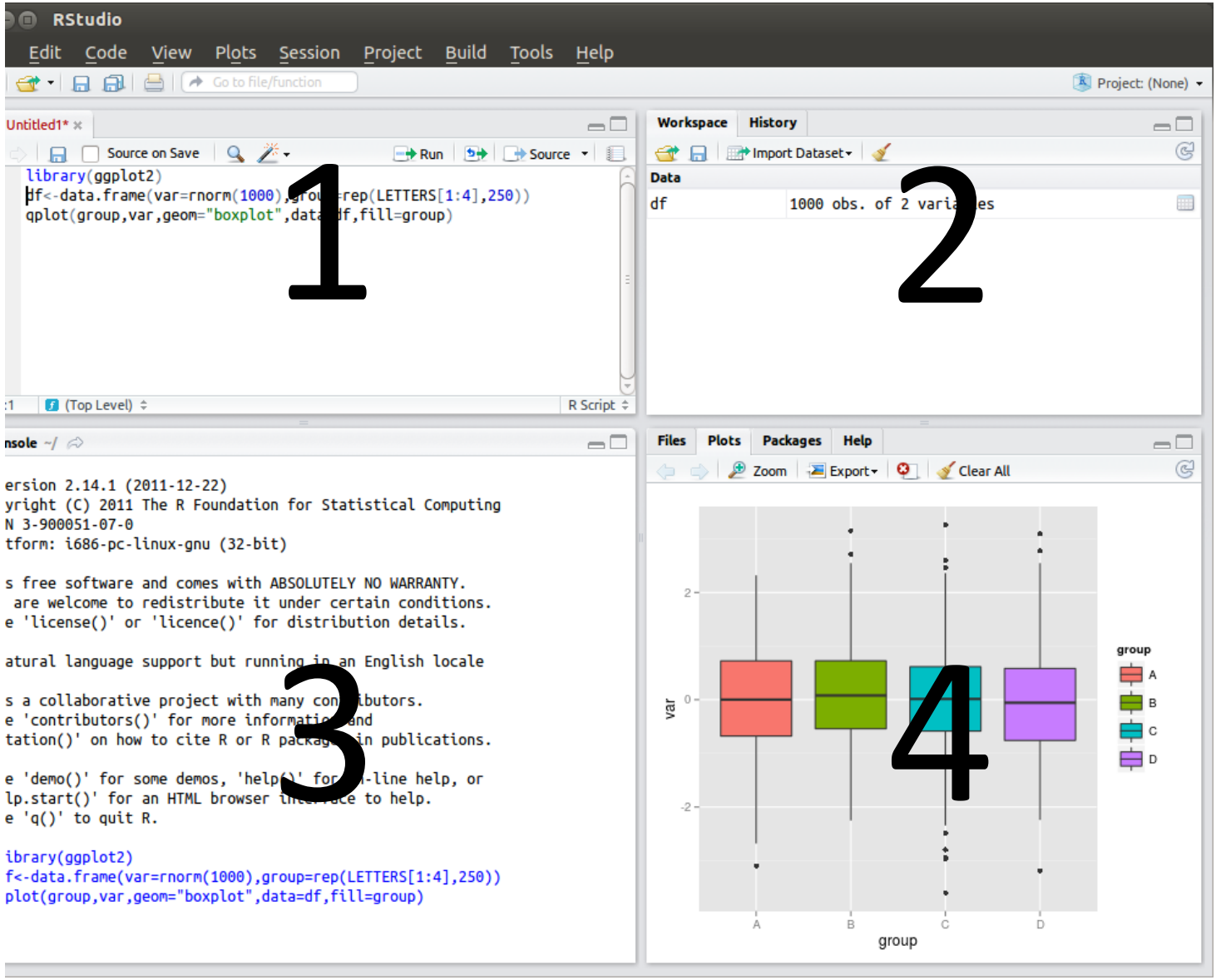
RStudio

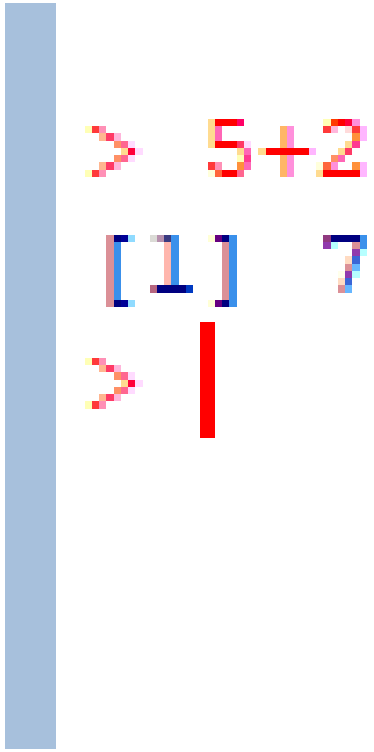
1 – script ou comandos; visualização de bancos de dados ou texto

2 – repositório de objetos e funções

3 – log de atividade

4 – gráficos e documentação




> 5+2
[1] 7
>

```
> 2*2
[1] 4
> 2^2
[1] 4
>
```

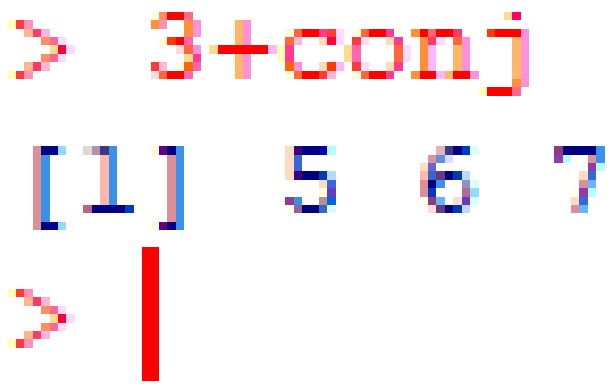
Criar objetos

```
> conj<-c(2,3,4)
> conj
[1] 2 3 4
>
```

Aplicar funções à objetos

```
> mean(conj)
[1] 3
> 
```

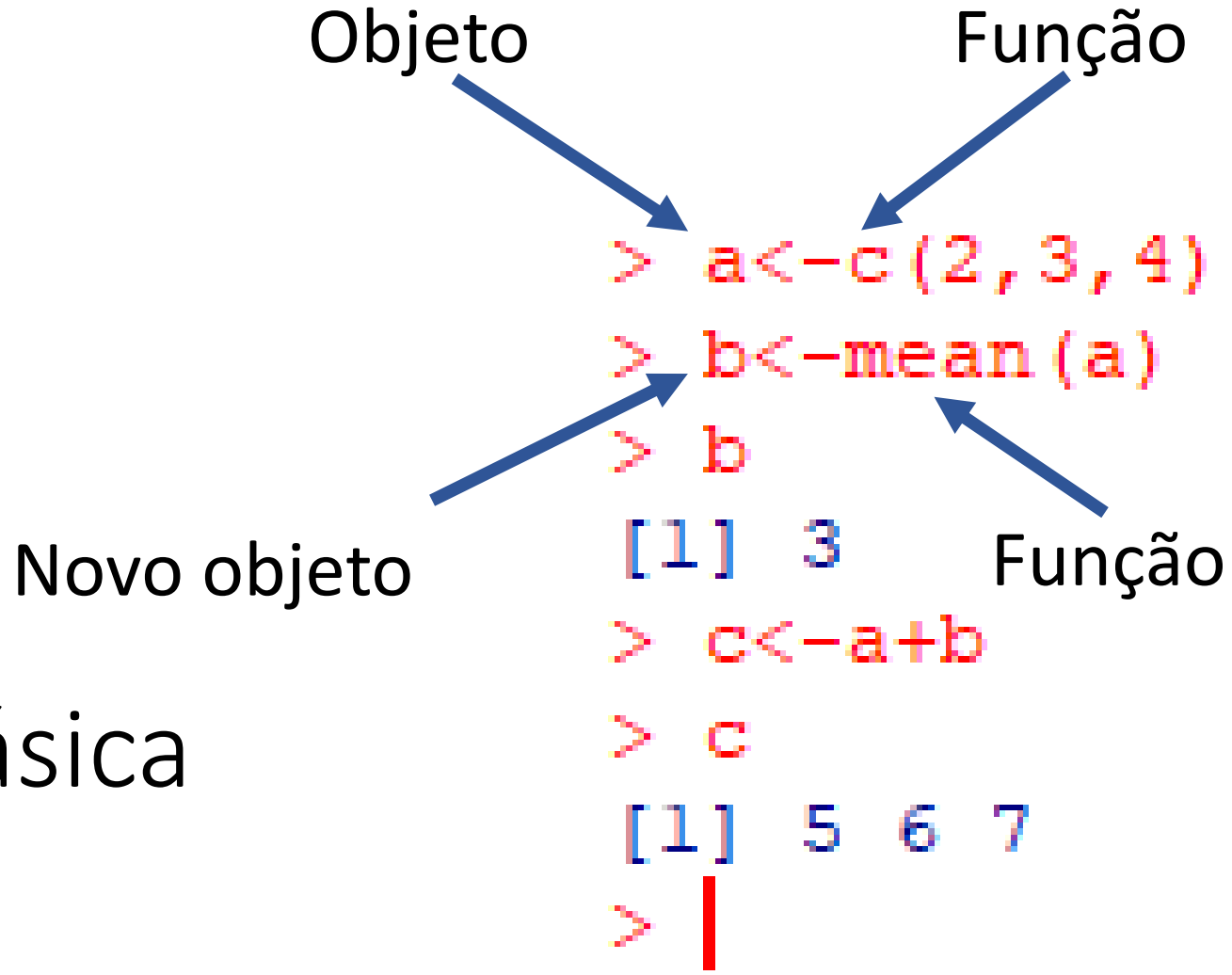
Usar objetos em novas operações



Usar objetos para criar novos objetos

```
> conj2<-3+conj
> conj2
[1] 5 6 7
> 
```

Estrutura básica



a <- f(x, y, z...)

Em que:

a é um novo objeto

<- indica “=“

f é uma função

x é um objeto original

y, z ... são argumentos complementares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{swirl}
Learn R, in R.
swirl teaches you R programming and data science
interactively, at your own pace, and right in the R
console!

Instalando e ativando pacotes

```
install.packages("swirl")
library(swirl)
```

Personalidade

Behav Genet (2014) 44:591–604
DOI 10.1007/s10519-013-9625-7

ORIGINAL RESEARCH

The Big Five Personality Traits: Psychological Entities or Statistical Constructs?

Sanja Franić · Denny Borsboom · Conor V. Dolan · Dorret I. Boomsma

European Journal of Personality, *Eur. J. Pers.* **26**: 414–431 (2012)
Published online in Wiley Online Library (wileyonlinelibrary.com) **DOI**: 10.1002/per.1866

Dimensions of Normal Personality as Networks in Search of Equilibrium: You Can't Like Parties if You Don't Like People

ANGÉLIQUE O. J. CRAMER[1]*, SOPHIE VAN DER SLUIS[1,2], ARJEN NOORDHOF[1], MARIEKE WICHERS[3], NICOLE GESCHWIND[3,4], STEVEN H. AGGEN[5,6], KENNETH S. KENDLER[5,6] and DENNY BORSBOOM[1]

[1]*Department of Psychology, University of Amsterdam, The Netherlands*
[2]*Complex Trait Genetics, Department of Functional Genomics and Department Clinical Genetics, Center for Neurogenomics and Cognitive Research (CNCR), FALW-VUA, Neuroscience Campus Amsterdam, VU University Medical Center (VUmc), The Netherlands*
[3]*European Graduate School for Neuroscience, SEARCH, Department of Psychiatry and Psychology, Maastricht University Medical Centre, The Netherlands*
[4]*Research Group on Health Psychology, Centre for the Psychology of Learning and Experimental Psychopathology, University of Leuven, Belgium*
[5]*Virginia Institute for Psychiatric and Behavioral Genetics, USA*
[6]*Department of Psychiatry, Virginia Commonwealth University, USA*

European Journal of Personality, *Eur. J. Pers.* **26**: 451–459 (2012)
Published online in Wiley Online Library (wileyonlinelibrary.com) **DOI**: 10.1002/per.1879

Author's Response

Measurable Like Temperature or Mereological Like Flocking? On the Nature of Personality Traits

ANGÉLIQUE O. J. CRAMER[1]*, SOPHIE VAN DER SLUIS[1,2], ARJEN NOORDHOF[1], MARIEKE WICHERS[3], NICOLE GESCHWIND[3,4], STEVEN H. AGGEN[5,6], KENNETH S. KENDLER[5,6] and DENNY BORSBOOM[1]

[1]*Department of Psychology, University of Amsterdam, The Netherlands*
[2]*Complex Trait Genetics, Department Functional Genomics & Dept. Clinical Genetics, Center for Neurogenomics and Cognitive Research (CNCR), FALW-VUA, Neuroscience Campus Amsterdam, VU University Medical Center (VUmc), The Netherlands*
[3]*European Graduate School for Neuroscience, SEARCH, Department of Psychiatry and Psychology, Maastricht University Medical Centre, The Netherlands*
[4]*Research Group on Health Psychology, Centre for the Psychology of Learning and Experimental Psychopathology, University of Leuven, Belgium*
[5]*Virginia Institute for Psychiatric and Behavioral Genetics, USA*
[6]*Department of Psychiatry, Virginia Commonwealth University, USA*

Contents lists available at ScienceDirect

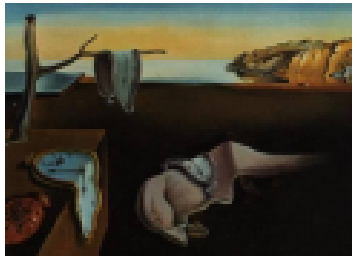
Journal of Research in Personality

journal homepage: www.elsevier.com/locate/jrp

State of the aRt personality research: A tutorial on network analysis of personality data in R

Giulio Costantini [a,*,1], Sacha Epskamp [b,1], Denny Borsboom [b], Marco Perugini [a], René Mõttus [c,d], Lourens J. Waldorp [b], Angélique O.J. Cramer [b]

[a] *Department of Psychology, University of Milan-Bicocca, Piazza dell'Ateneo Nuovo 1 (U6), 20126 Milan, Italy*
[b] *Department of Psychological Methods, University of Amsterdam, Weesperplein 4, 1018 XA Amsterdam, The Netherlands*
[c] *Department of Psychology, University of Edinburgh, George Square 7, EH8 9JZ Edinburgh, Scotland, UK*
[d] *Department of Psychology, University of Tartu, Näituse 2, 50409 Tartu, Estonia*



Journal of Statistical Software

May 2012, Volume 48, Issue 4. *http://www.jstatsoft.org/*

qgraph: Network Visualizations of Relationships in Psychometric Data

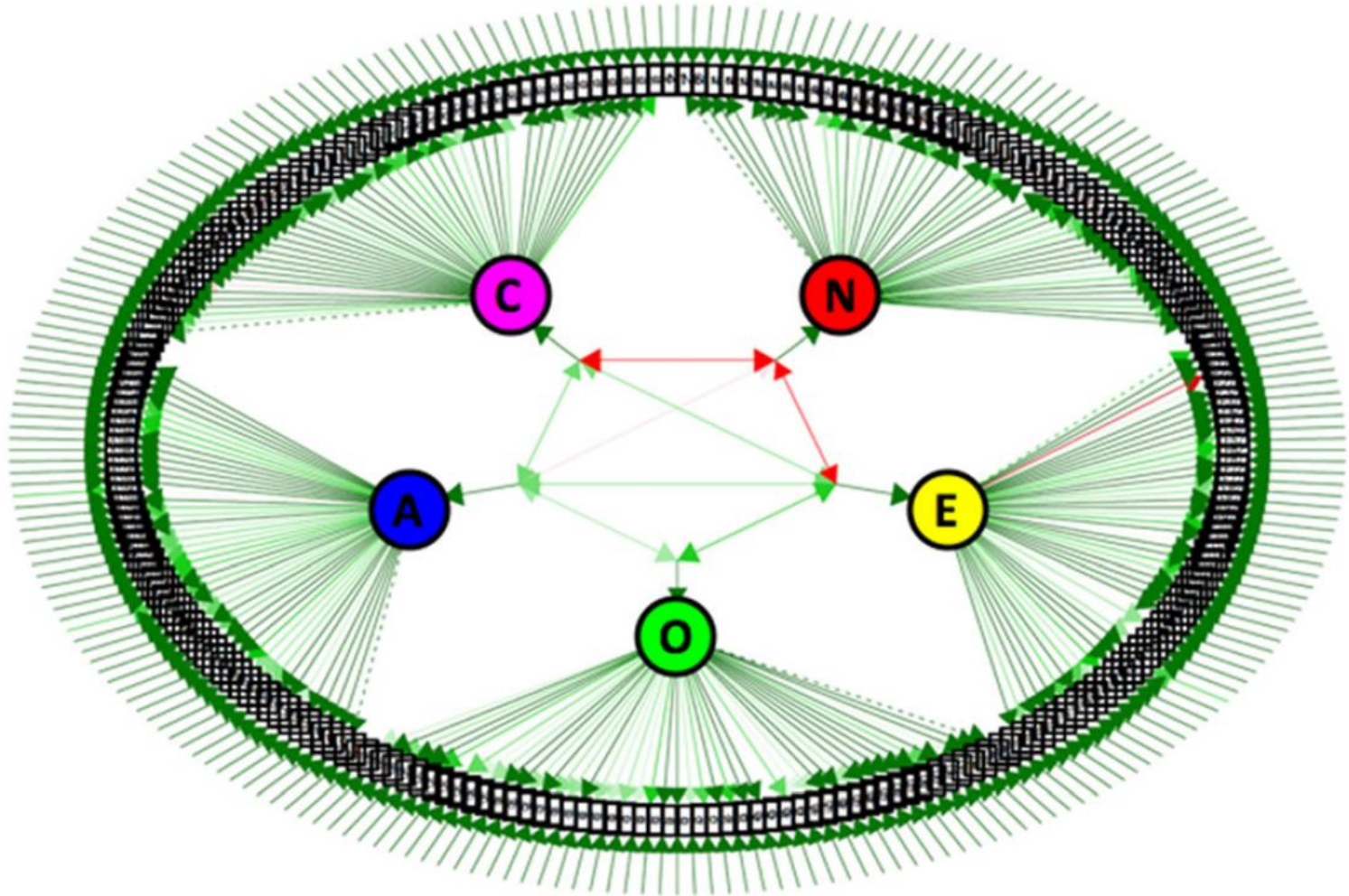
Sacha Epskamp
University of Amsterdam

Angélique O. J. Cramer
University of Amsterdam

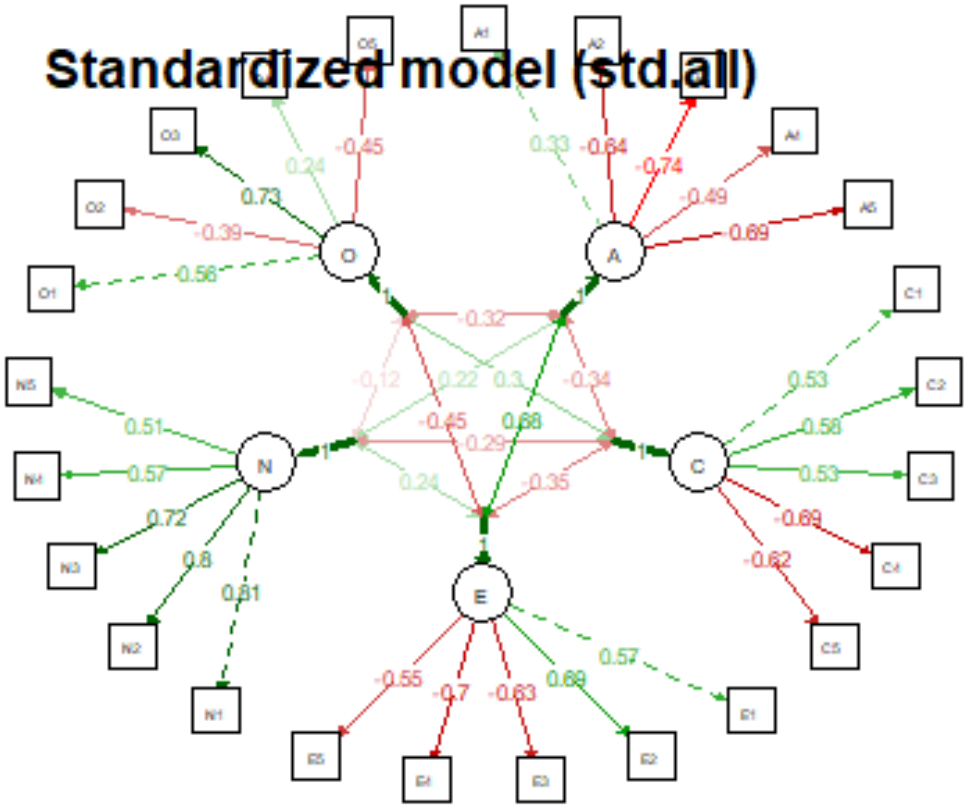
Lourens J. Waldorp
University of Amsterdam

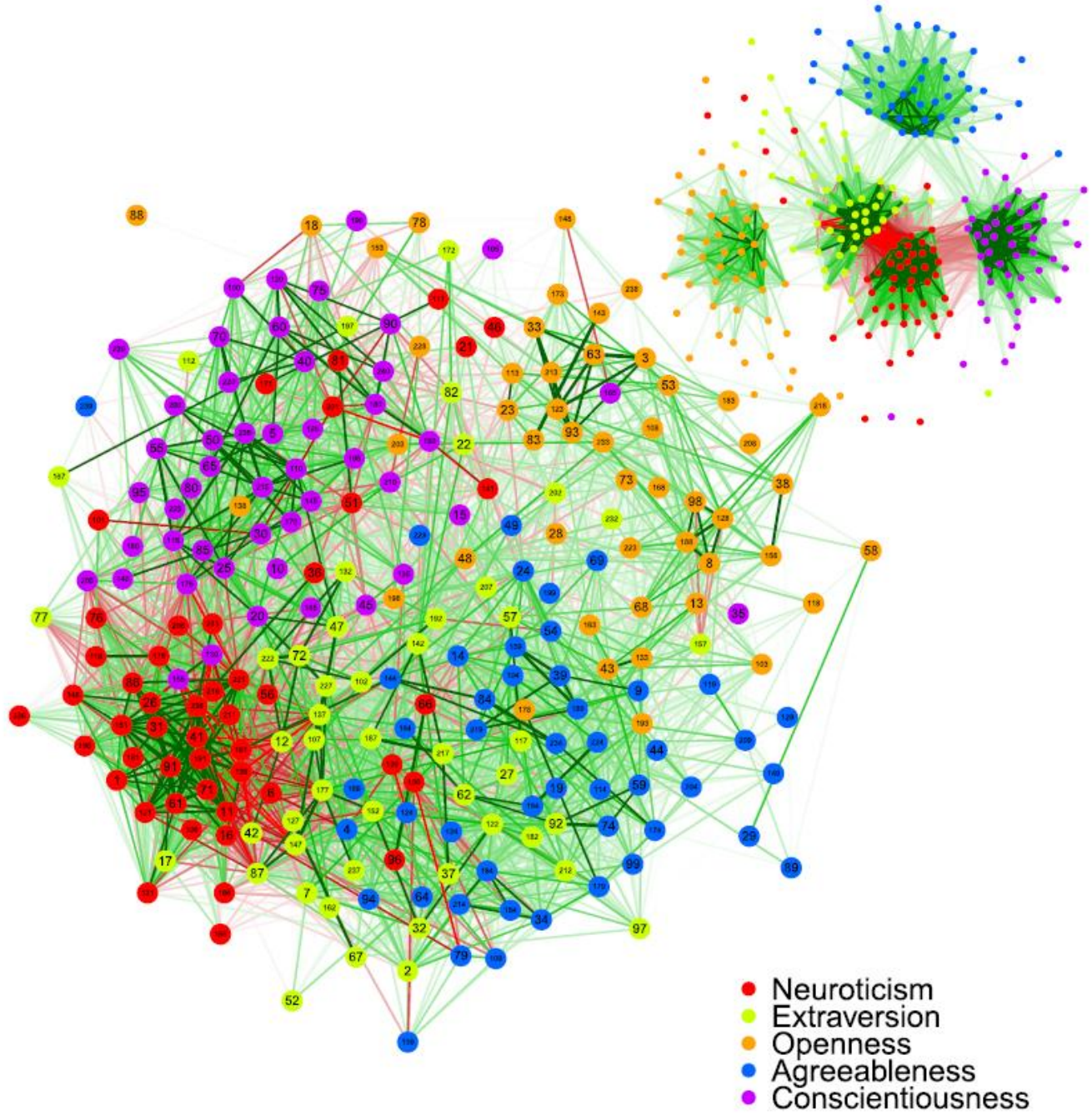
Verena D. Schmittmann
University of Amsterdam

Denny Borsboom
University of Amsterdam

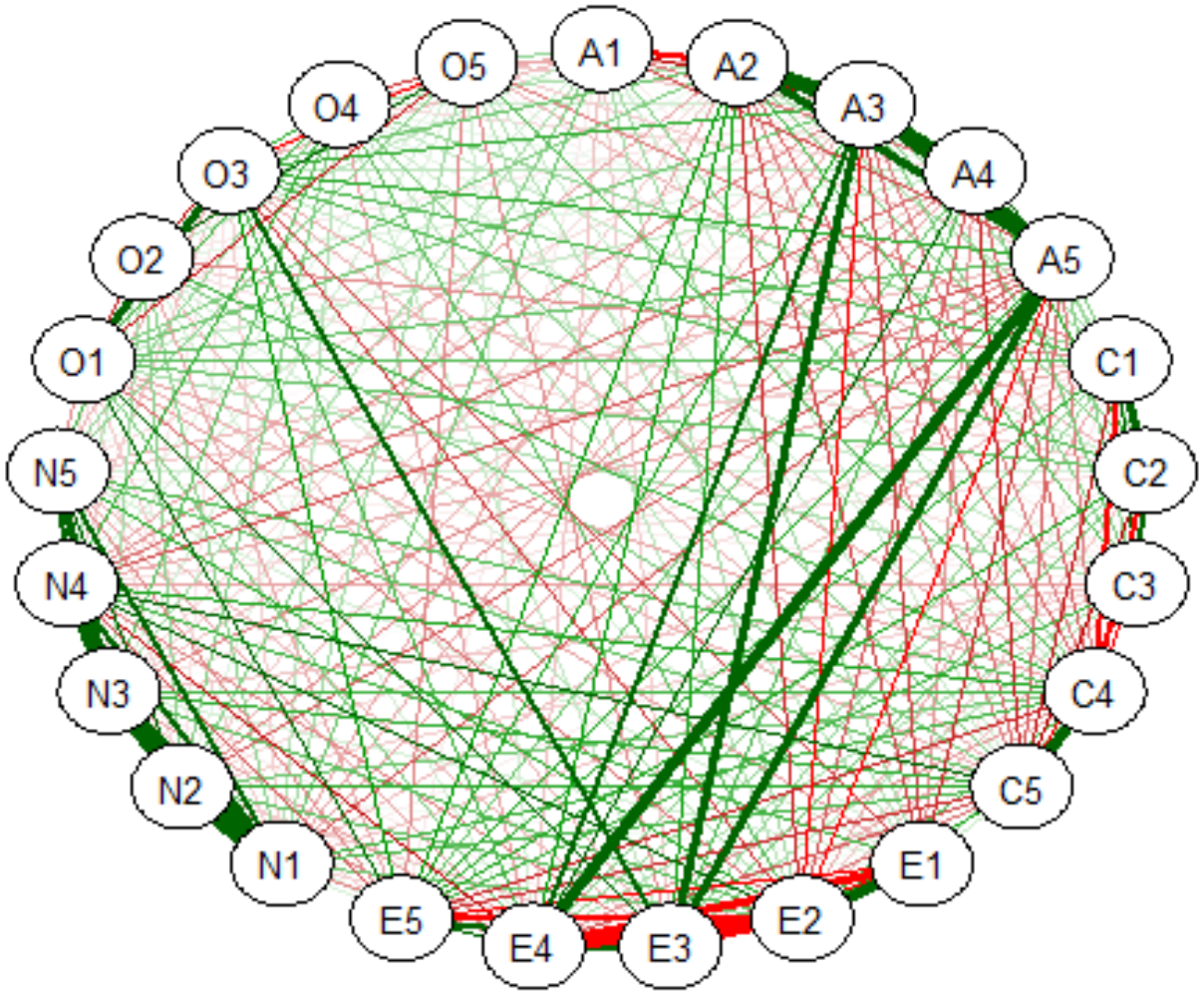

C
N
A
E
O

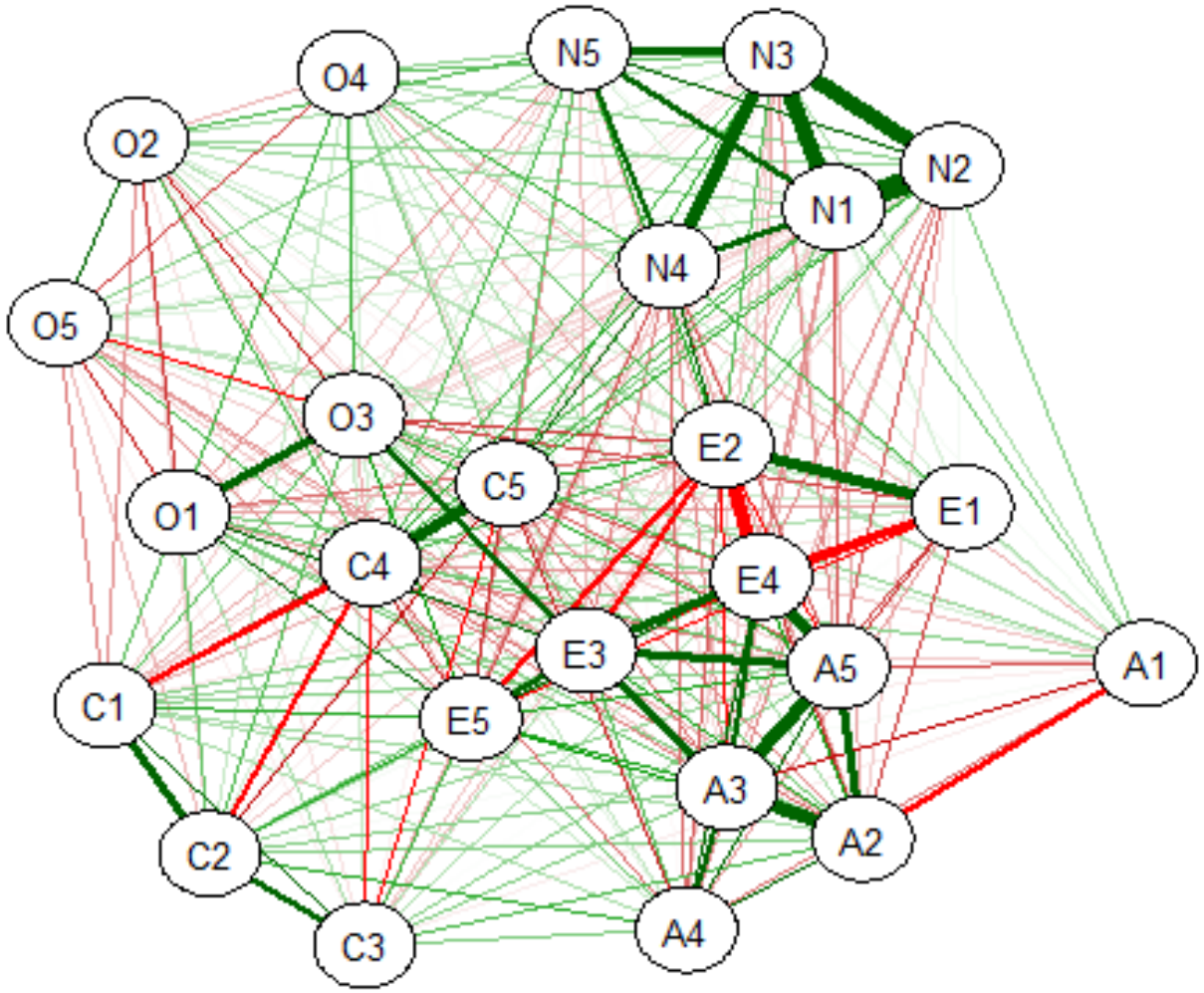
CFA

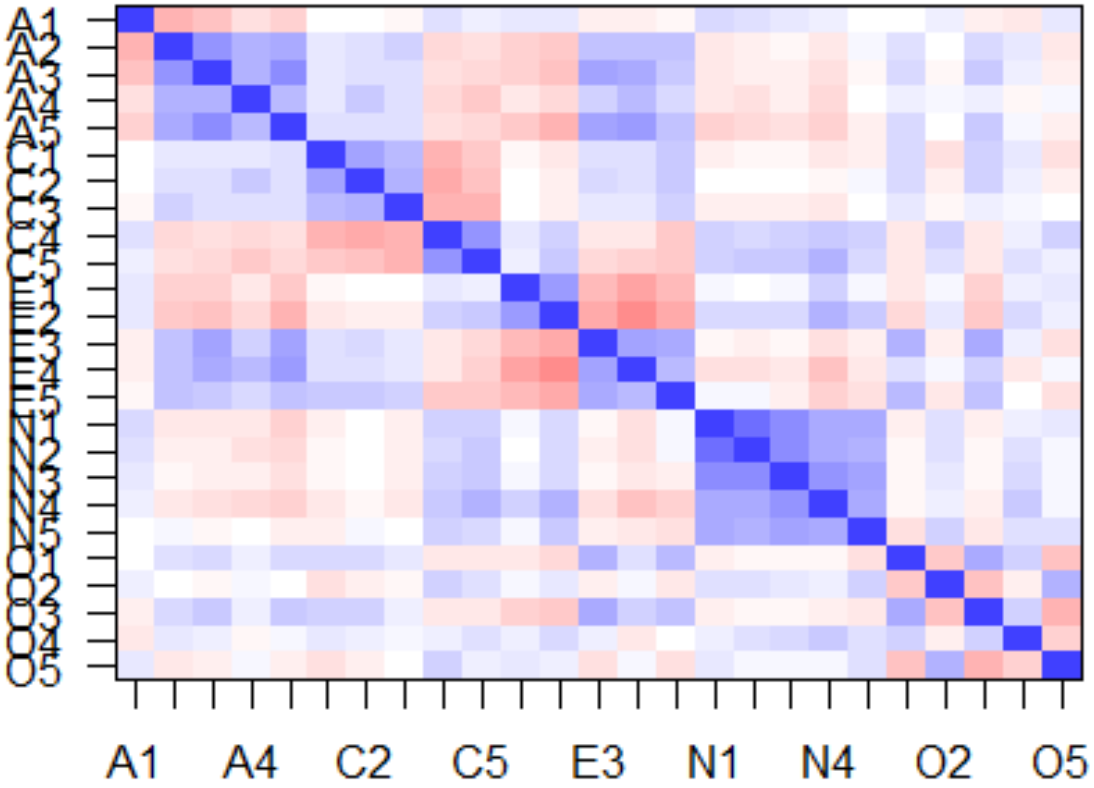

Standardized model (std.all)
O
A
N
C
E
O1
O2
O3
O5
A1
A2
A3
A4
A5
N1
N2
N3
N4
N5
C1
C2
C3
C4
C5
E1
E2
E3
E4
E5
0.73
-0.39
-0.56
0.24
-0.45
0.33
-0.64
-0.74
-0.49
0.69
0.51
-0.57
0.72
0.8
0.81
0.53
0.58
0.53
-0.69
-0.62
0.57
-0.55
-0.7
-0.63
0.69
-0.32
-0.12
0.22
0.3
-0.34
-0.45
0.68
0.29
0.24
-0.35


Neuroticism
Extraversion
Openness
Agreeableness
Conscientiousness

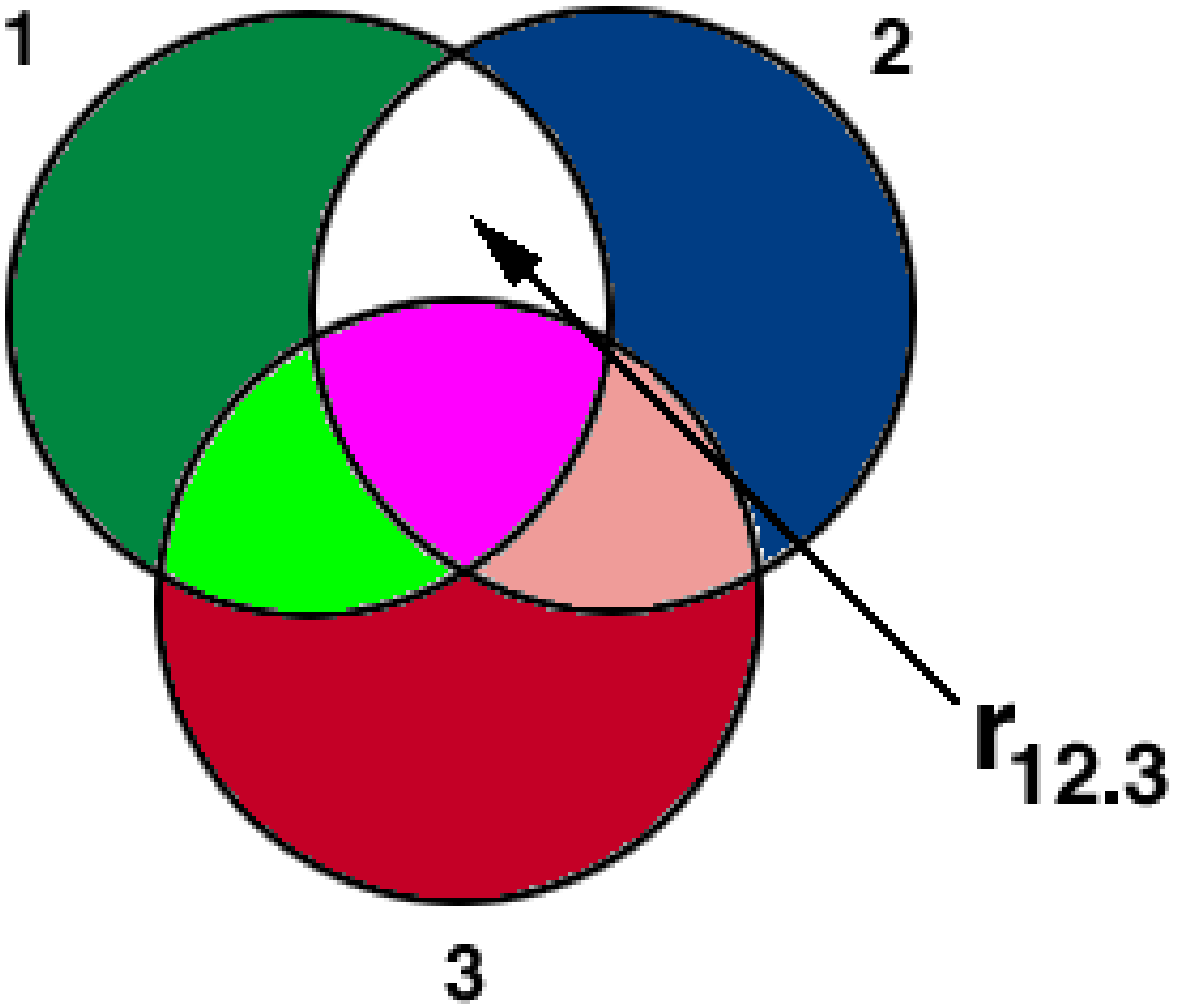
Para o RStudio!!!

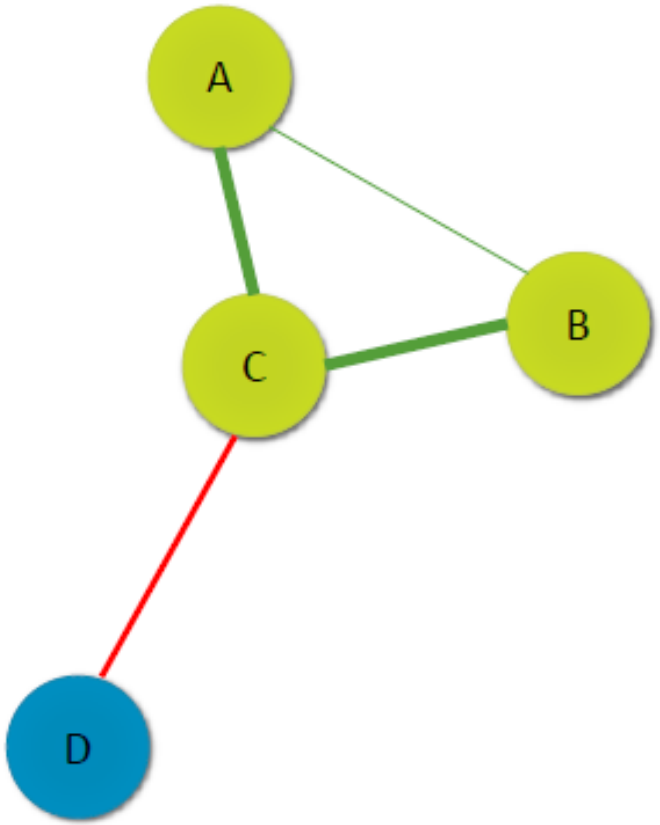

A1
A2
A3
A4
A5
C1
C2
C3
C4
C5
E1
E2
E3
E4
E5
N1
N2
N3
N4
N5
O1
O2
O3
O4
O5


N5
N3
O4
O2
N2
N1
N4
O5
O3
E2
C5
E1
O1
C4
E4
E3
A5
A1
C1
E5
A3
A2
C2
A4
C3


A1
A4
C2
C5
E3
N1
N4
O2
O5

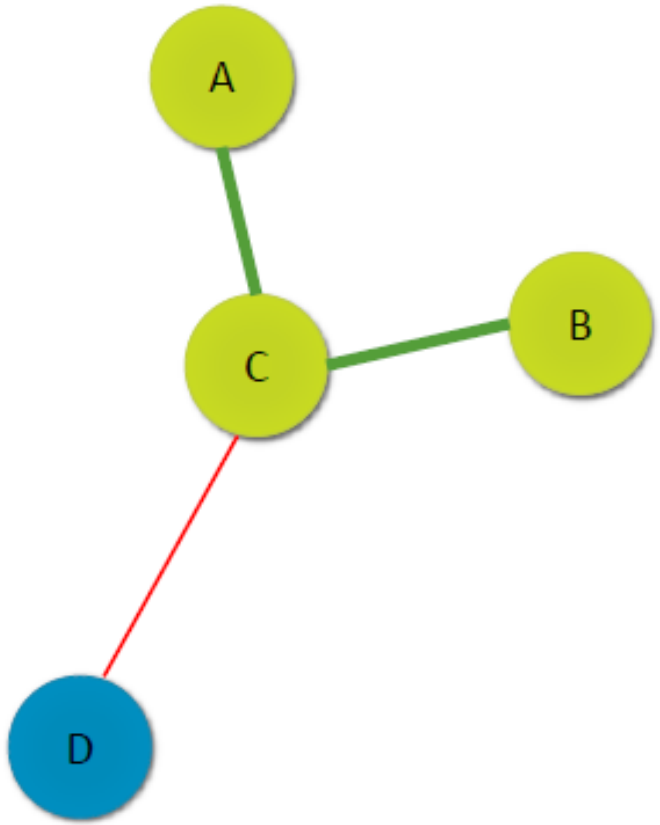
Correlação parcial



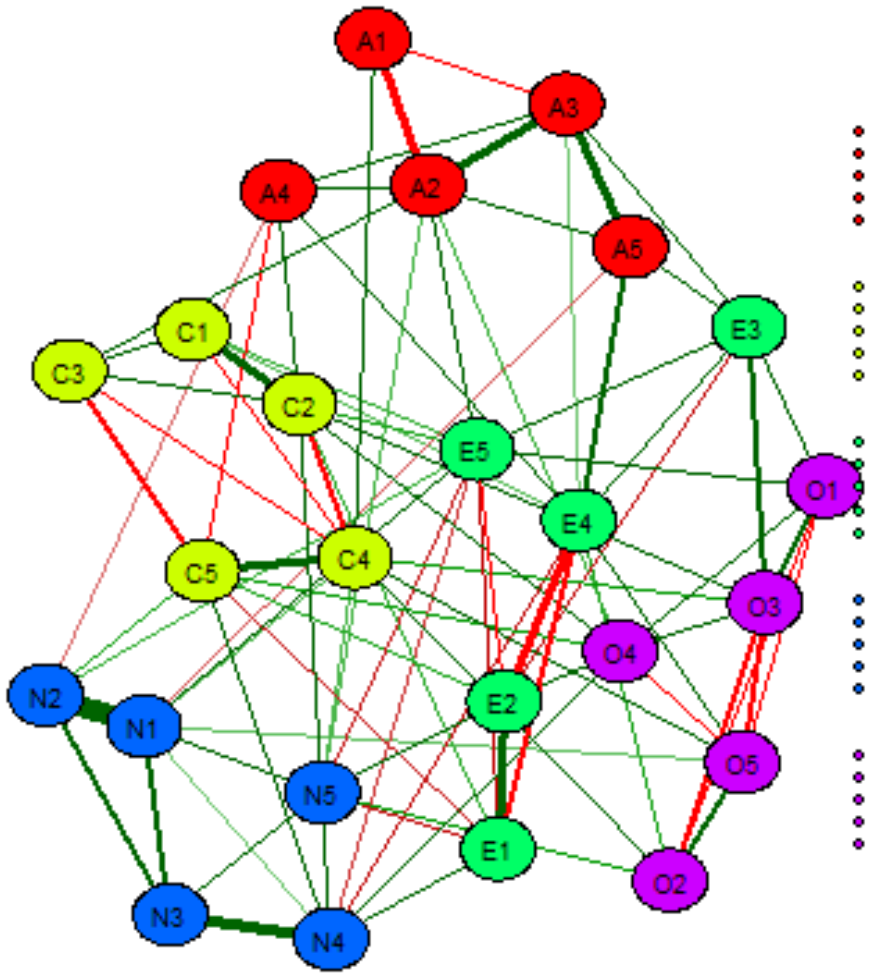


Algoritmo GeLASSO

Rede esparsa, na qual os valores de baixa magnitude são fixados em zero



Friedman, Hastie & Tibshirani (2008)



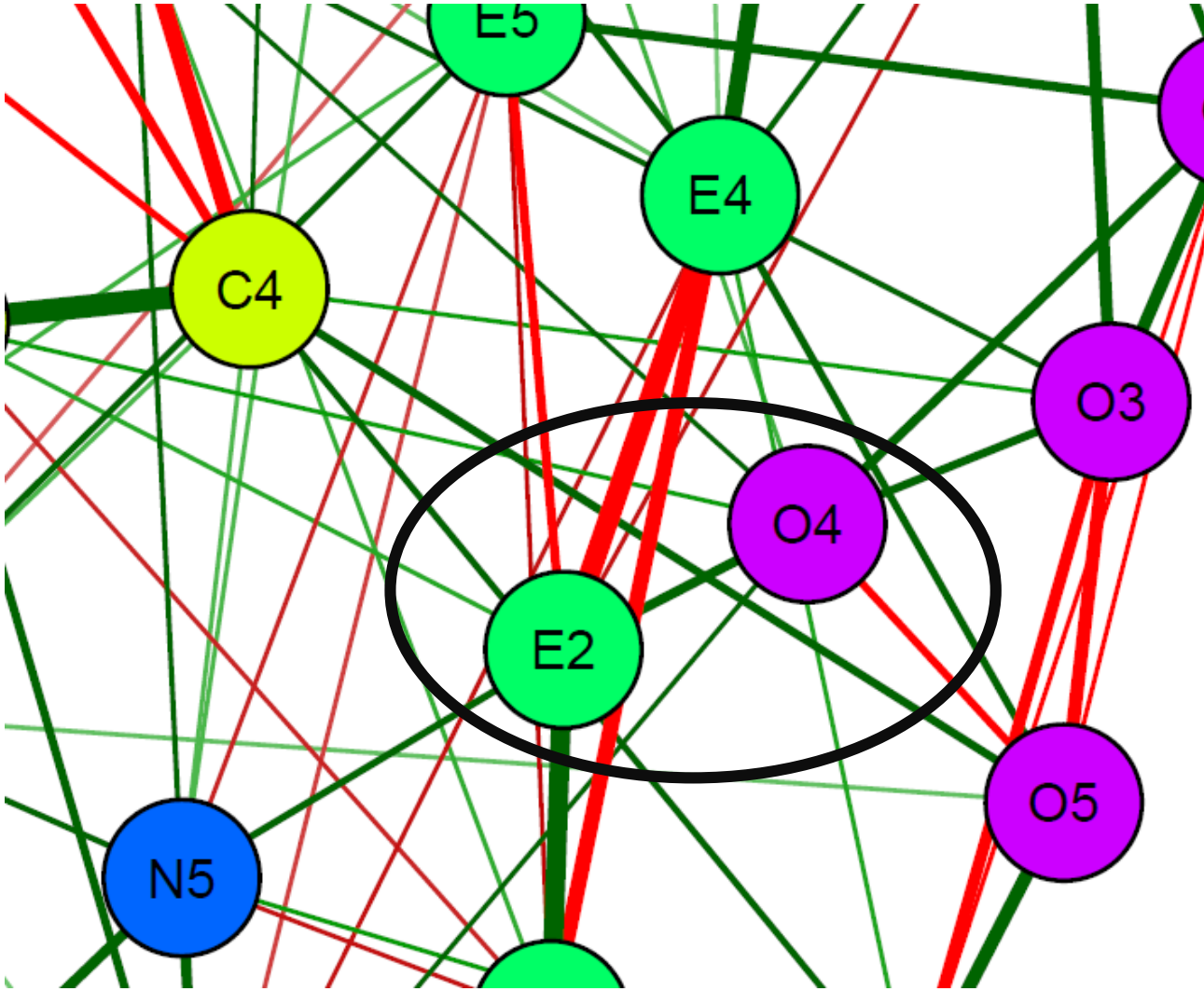
A
- A1: Am indifferent to the feelings of others.
- A2: Inquire about others' well-being.
- A3: Know how to comfort others.
- A4: Love children.
- A5: Make people feel at ease.

C
- C1: Am exacting in my work.
- C2: Continue until everything is perfect.
- C3: Do things according to a plan.
- C4: Do things in a half-way manner.
- C5: Waste my time.

E
- E1: Don't talk a lot.
- E2: Find it difficult to approach others.
- E3: Know how to captivate people.
- E4: Make friends easily.
- E5: Take charge.

N
- N1: Get angry easily.
- N2: Get irritated easily.
- N3: Have frequent mood swings.
- N4: Often feel blue.
- N5: Panic easily.

O
- O1: Am full of ideas.
- O2: Avoid difficult reading material.
- O3: Carry the conversation to a higher level.
- O4: Spend time reflecting on things.
- O5: Will not probe deeply into a subject.



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E2: Find it difficult to approach others.
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E4: Make friends easily.
E5: Take charge.

N

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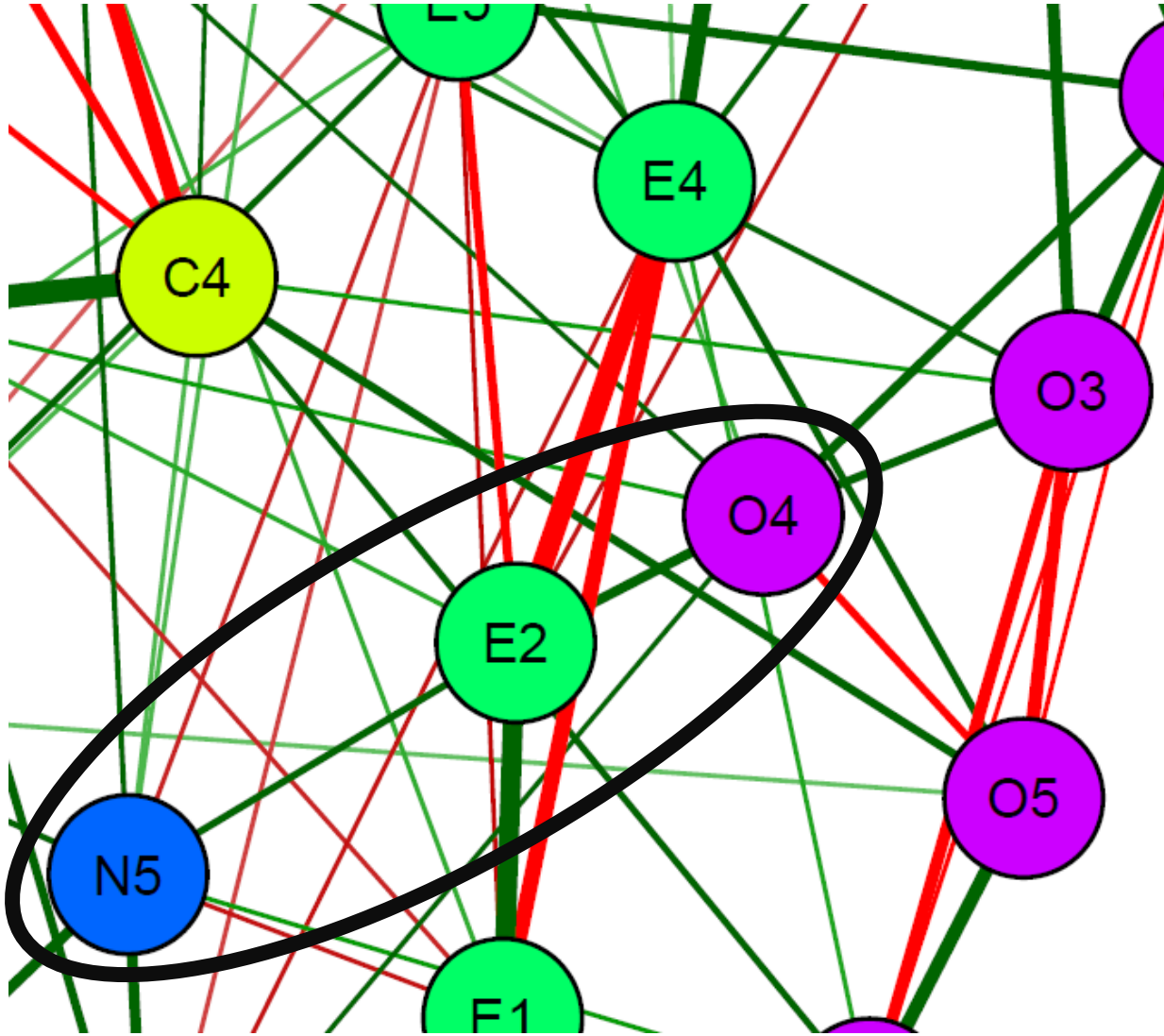

- E2: Find it difficult to approach others.
- E3: Know how to captivate people.
- E4: Make friends easily.
- E5: Take charge.

N

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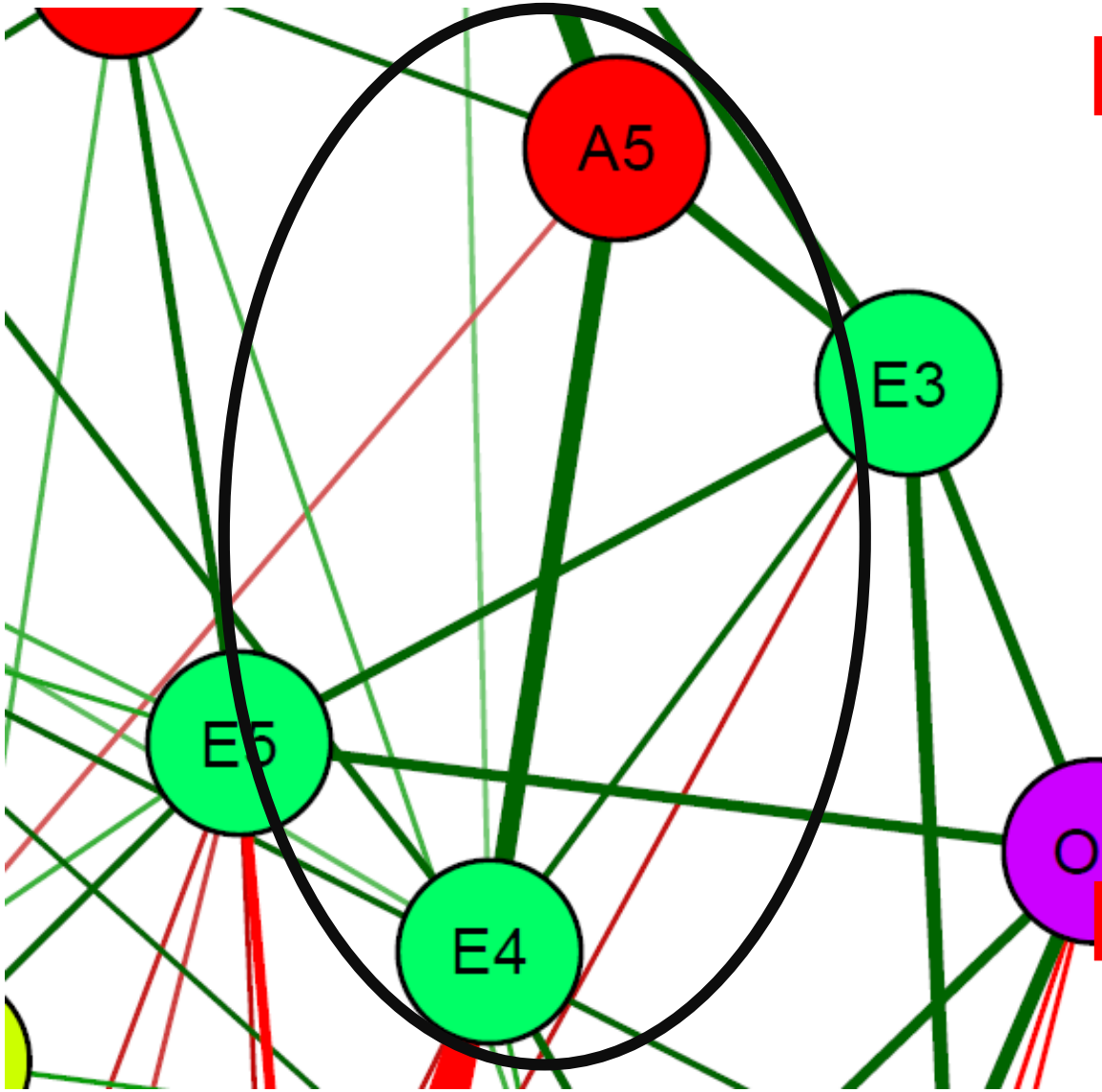

- A4: Love children.
- A5: Make people feel at ease.

C

- C1: Am exacting in my work.
- C2: Continue until everything is perfect.
- C3: Do things according to a plan.
- C4: Do things in a half−way manner.
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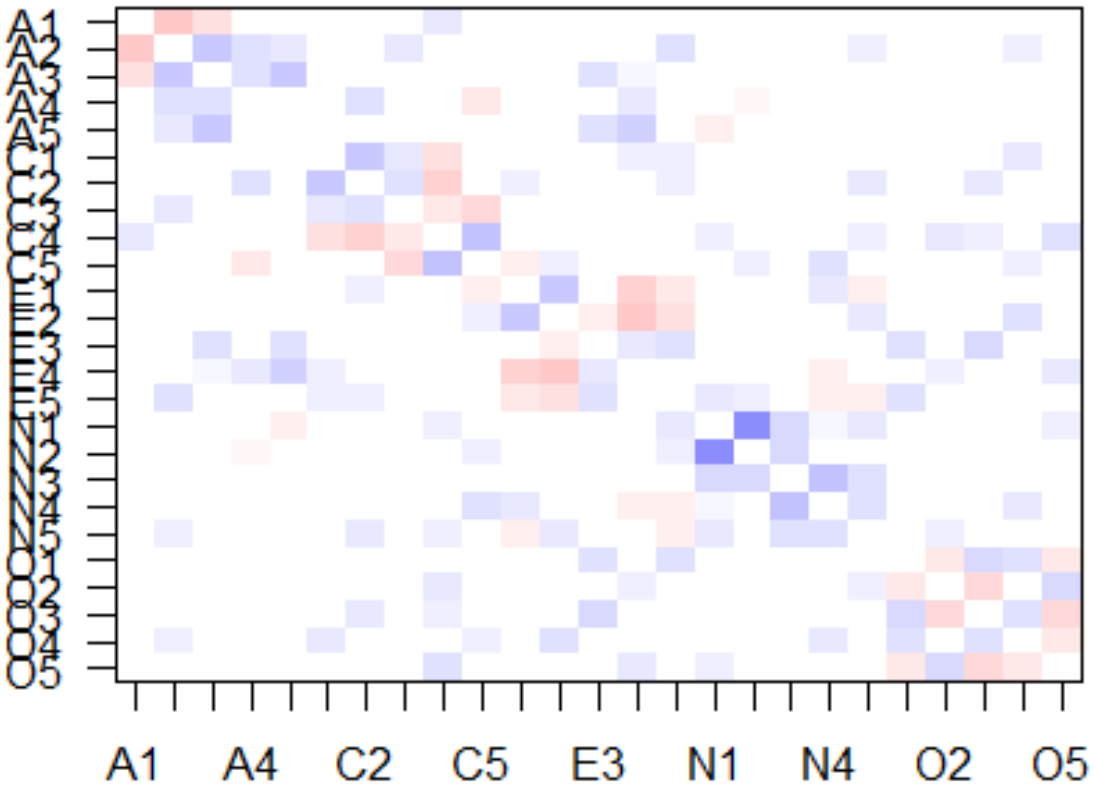
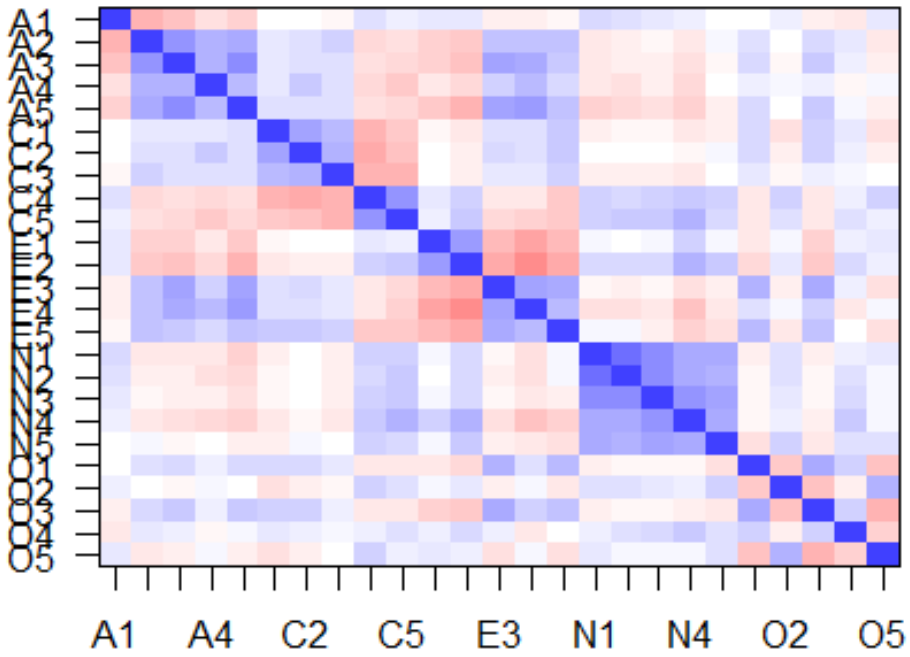
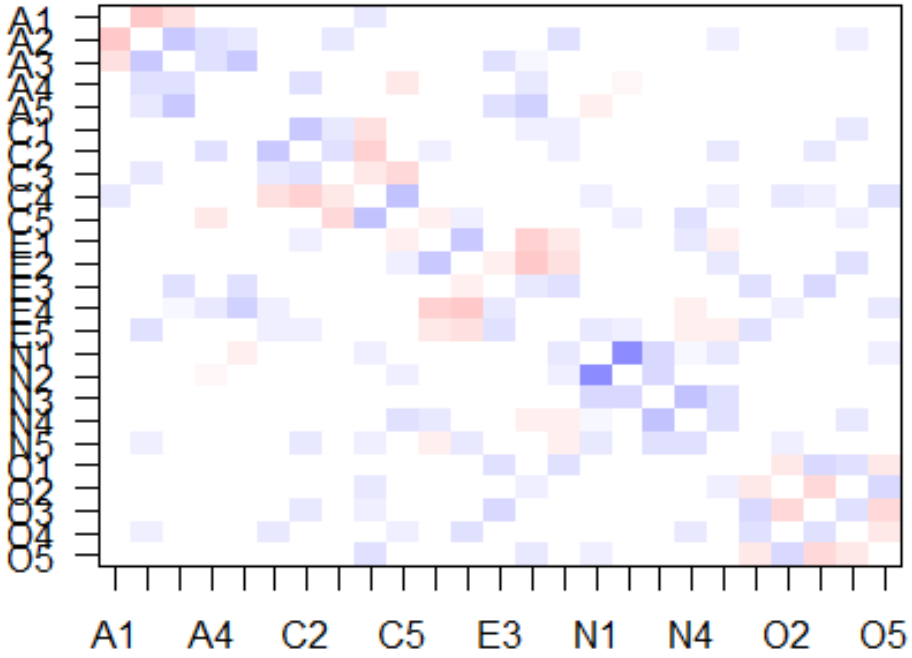

A1
A4
C2
C5
E3
N1
N4
O2
O5

Diferença entre correlações bivariadas e parciais





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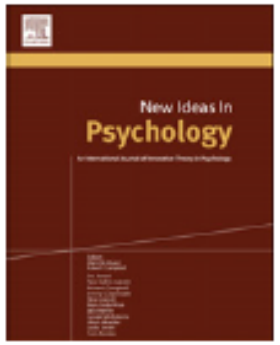


Deconstructing the construct: A network perspective on psychological phenomena

Verena D. Schmittmann, Angélique O.J. Cramer, Lourens J. Waldorp, Sacha Epskamp, Rogier A. Kievit, Denny Borsboom*

Psychometric Perspectives on Diagnostic Systems

Denny Borsboom
University of Amsterdam

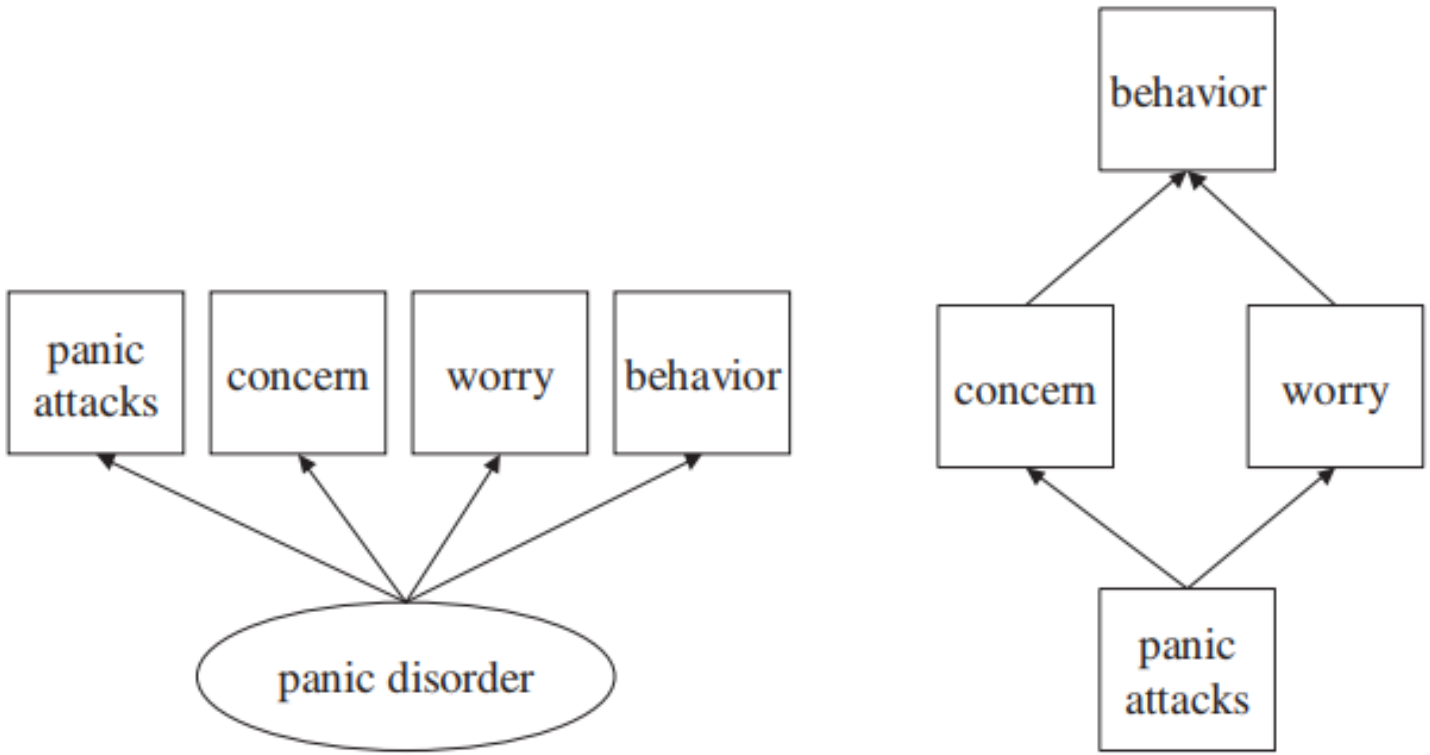
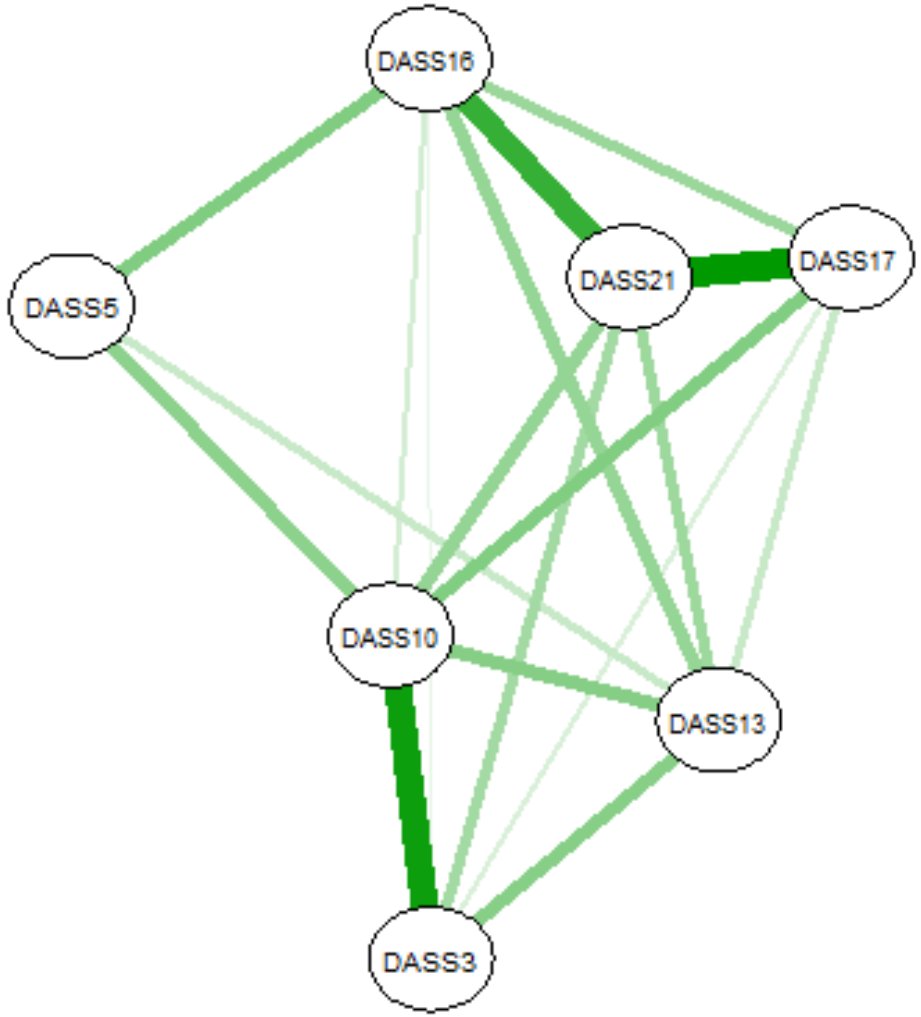
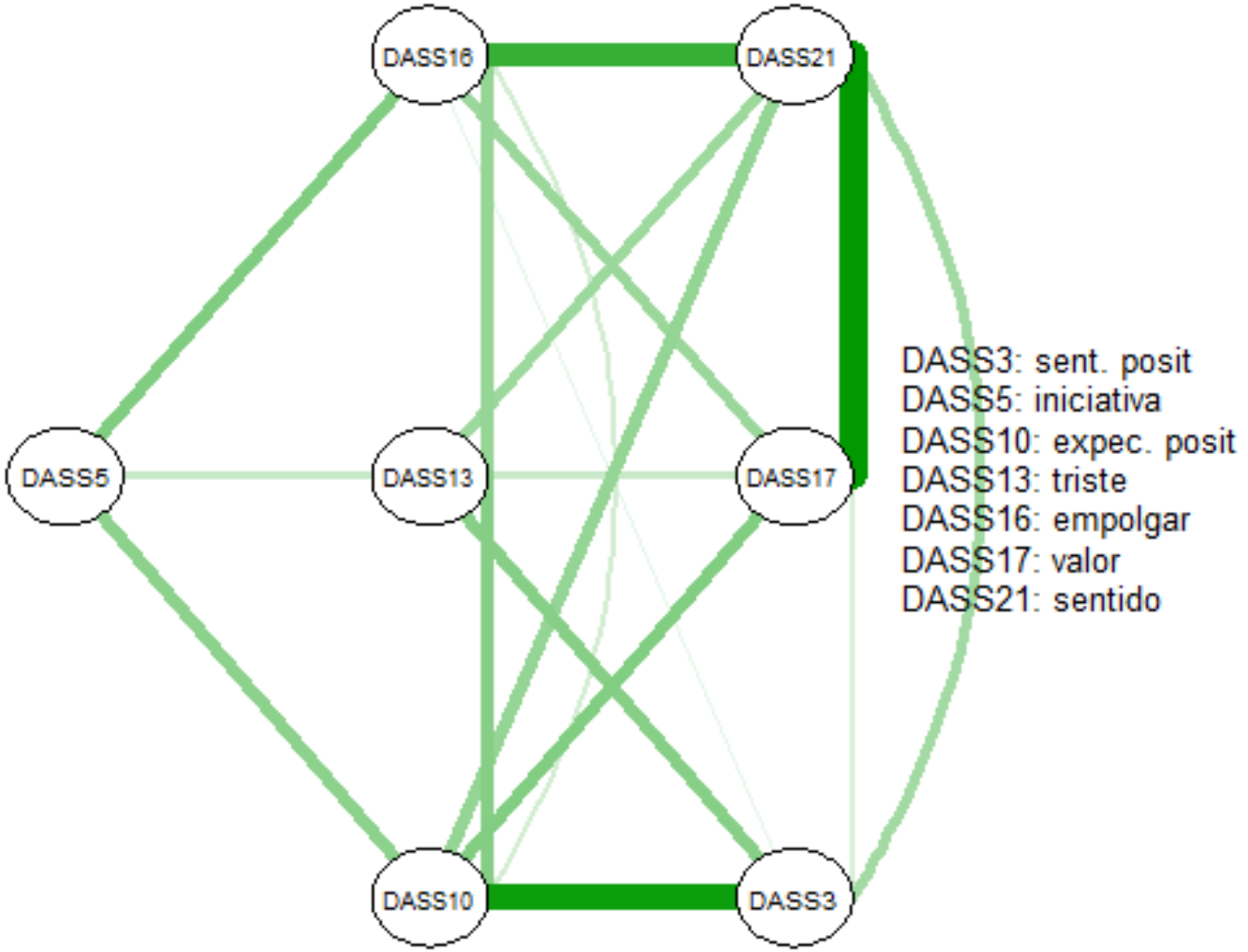


Figure 1. The left panel shows the relation between panic disorder and its symptoms from a latent variable modeling point of view. The right panel shows a representation of these symptoms as a causal system.

Para o RStudio!!!



DASS3: sent. posit
DASS5: iniciativa
DASS10: expec. posit
DASS13: triste
DASS16: empolgar
DASS17: valor
DASS21: sentido


DASS16
DASS21
DASS5
DASS13
DASS17
DASS10
DASS3
DASS3: sent. posit
DASS5: iniciativa
DASS10: expec. posit
DASS13: triste
DASS16: empolgar
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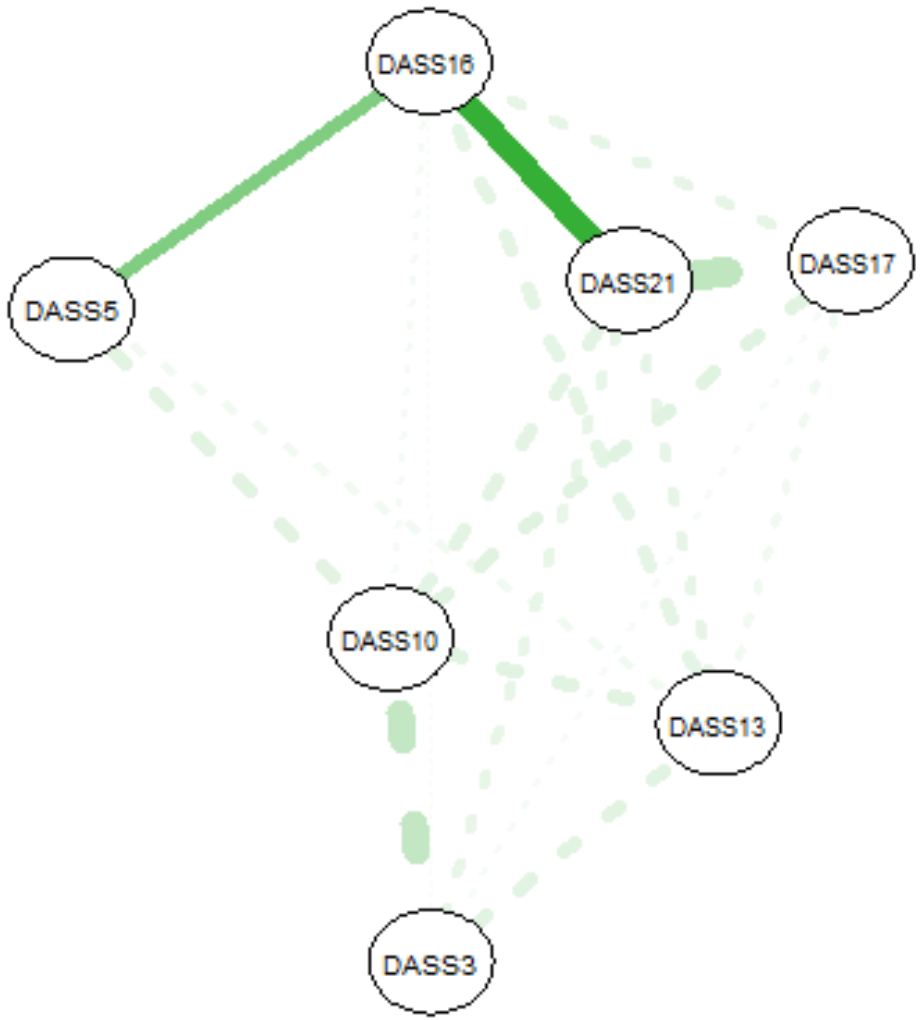
DASS21: sentido



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DASS17: valor
DASS21: sentido

DASS-21

BEHAVIORAL AND BRAIN SCIENCES (2010) **33**, 137–193
doi:10.1017/S0140525X09991567

Comorbidity: A network perspective

Angélique O. J. Cramer
Department of Psychology, University of Amsterdam, 1018 WB Amsterdam, The Netherlands
A.O.J.Cramer@uva.nl
www.aojcramer.com

Lourens J. Waldorp
Department of Psychology, University of Amsterdam, 1018 WB Amsterdam, The Netherlands
L.J.Waldorp@uva.nl
http://users.fmg.uva.nl/lwaldorp

Han L. J. van der Maas
Department of Psychology, University of Amsterdam, 1018 WB Amsterdam, The Netherlands
H.L.J.vanderMaas@uva.nl
http://users.fmg.uva.nl/hvandermaas/

Denny Borsboom
Department of Psychology, University of Amsterdam, 1018 WB Amsterdam, The Netherlands
D.Borsboom@uva.nl
http://sites.google.com/site/borsboomdenny/dennyborsboom

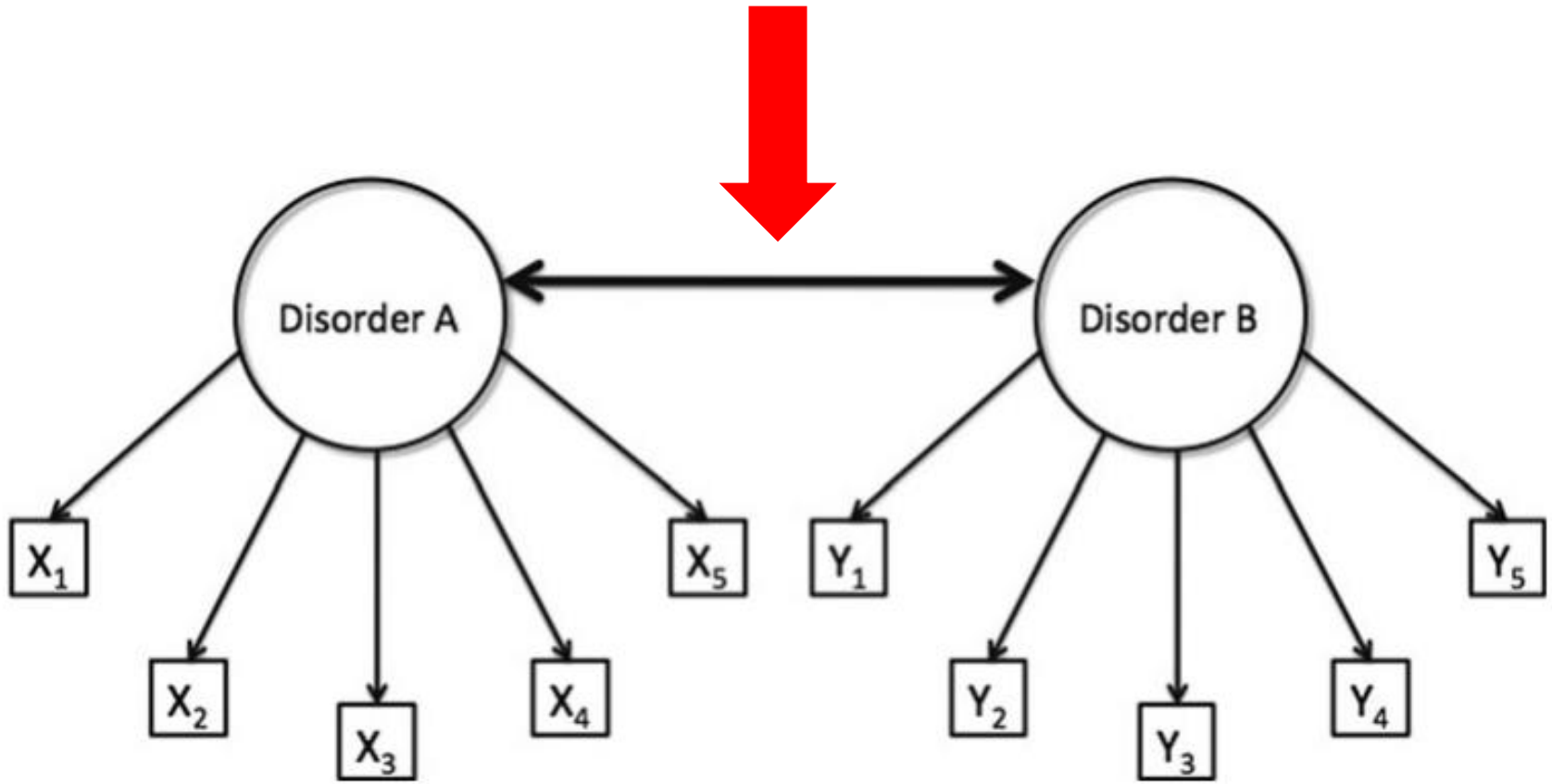
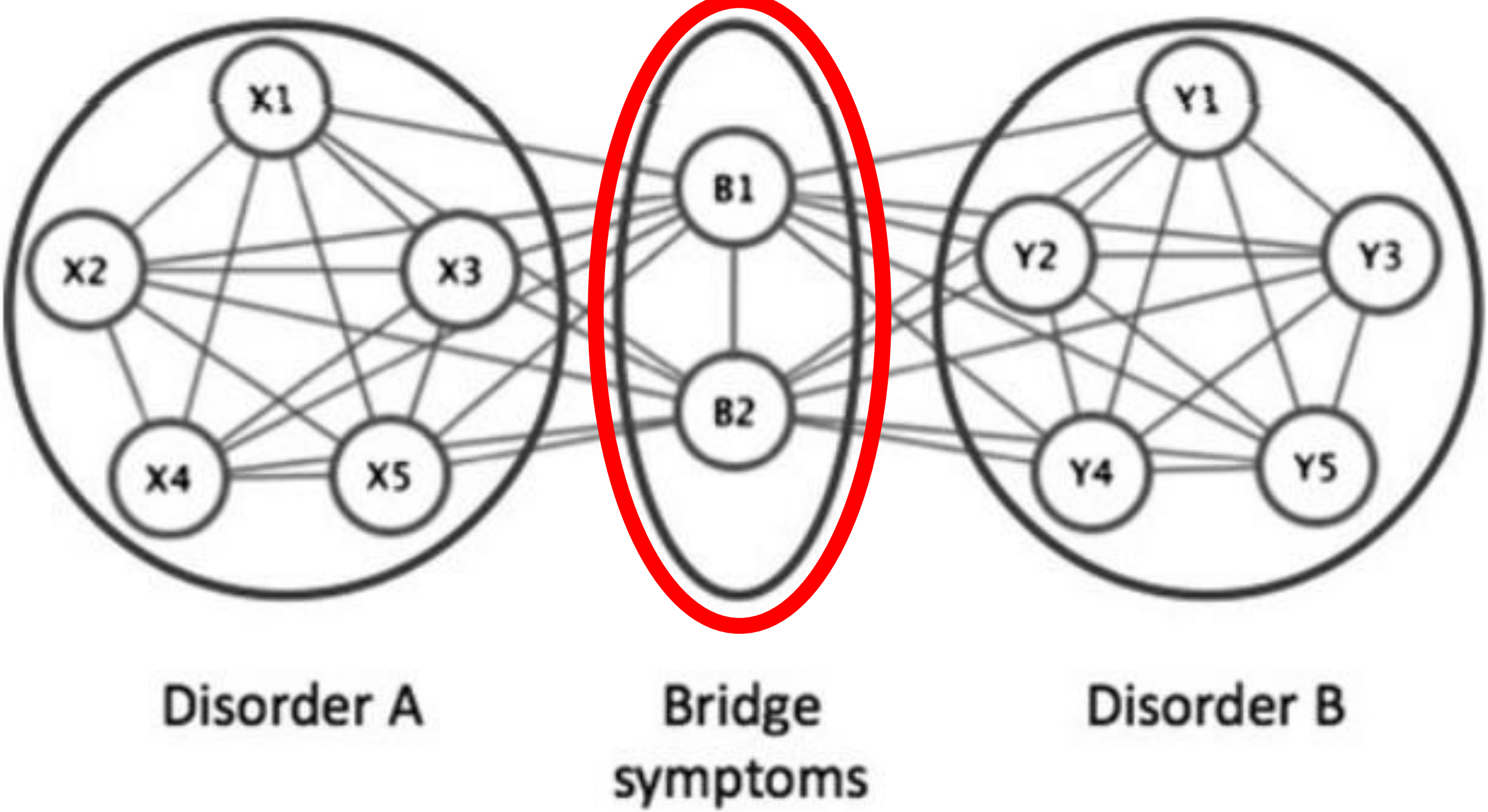
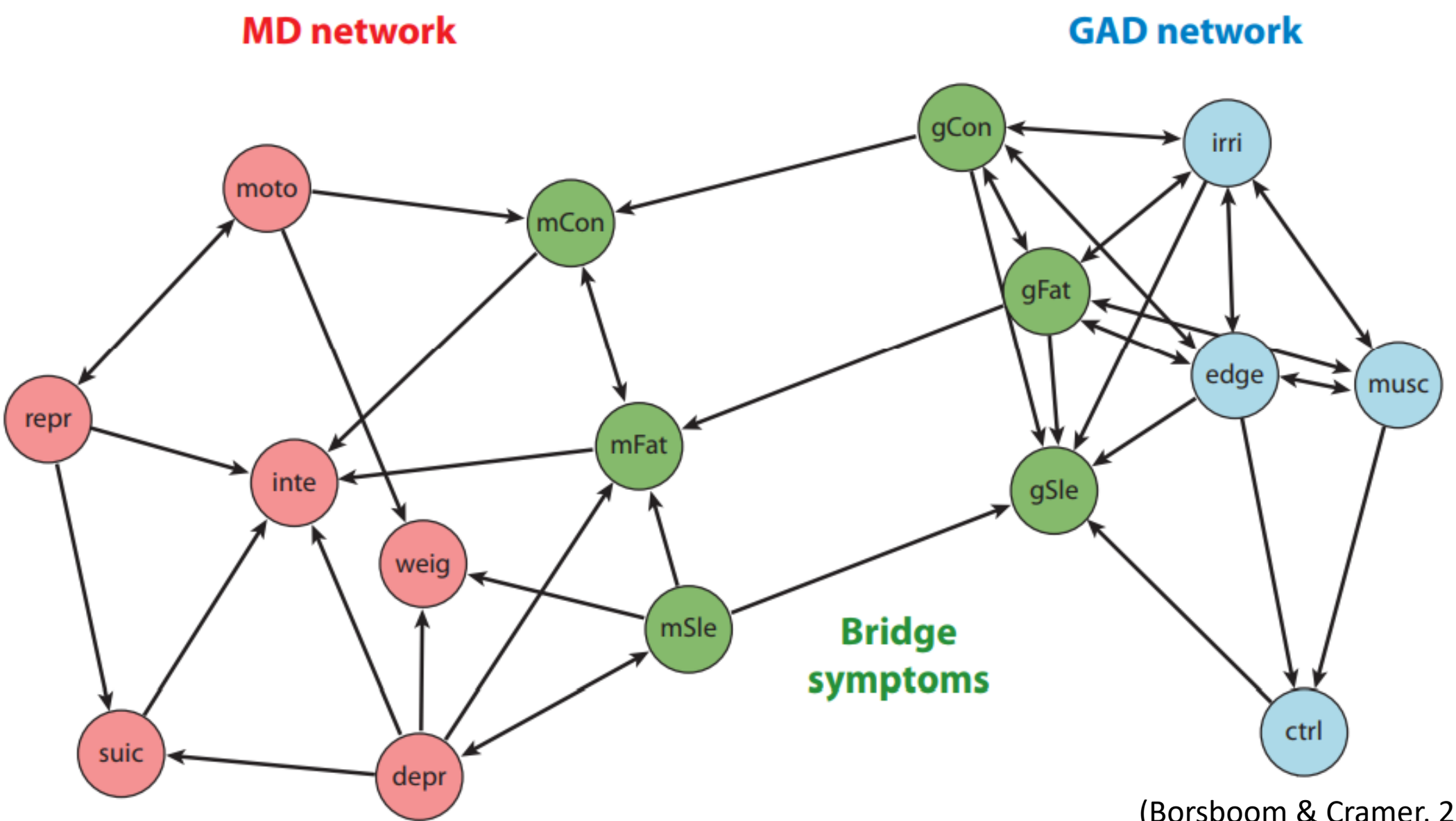
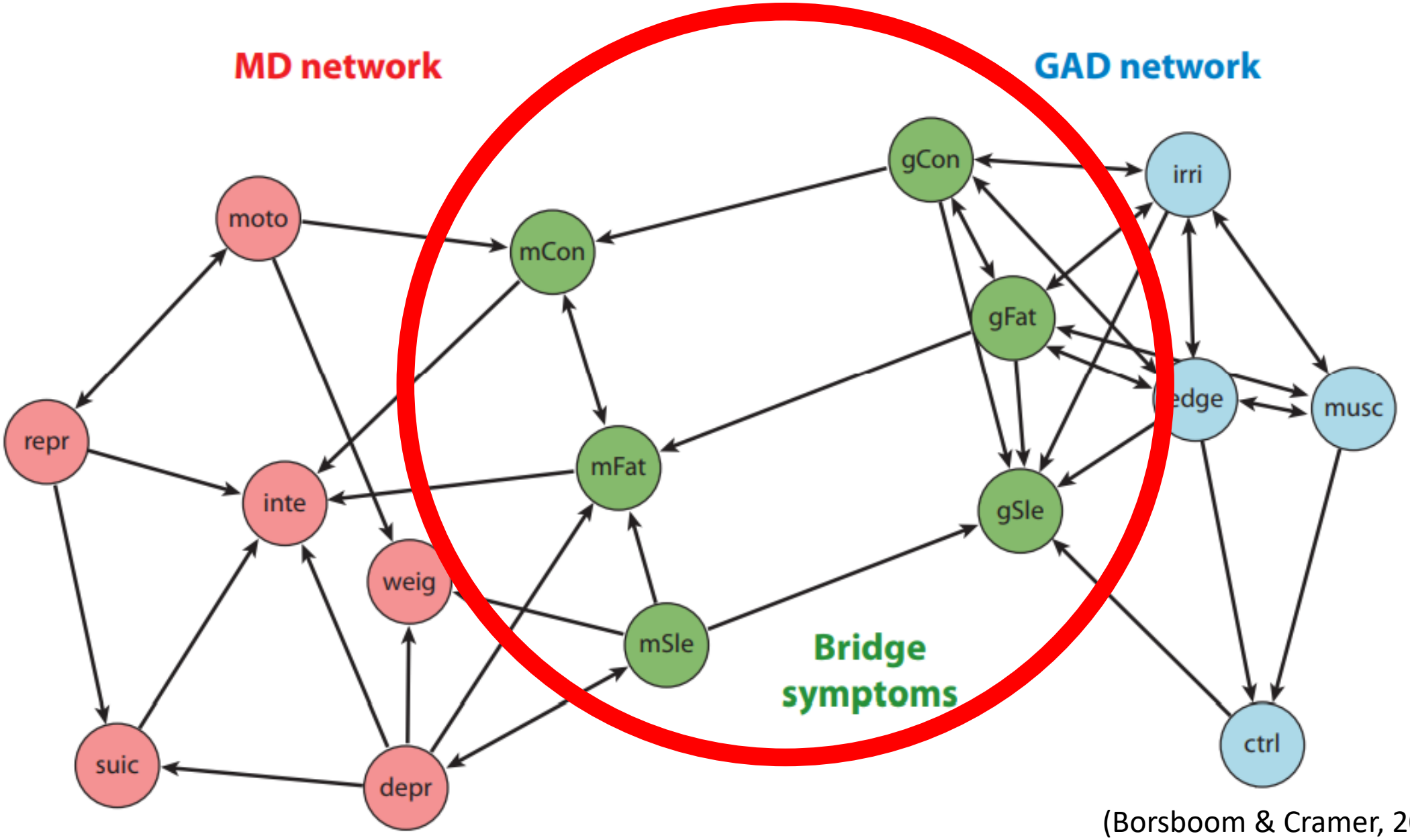


Figure 1. A model of comorbidity between disorders A and B, under the standard assumptions of latent variable modeling. The *circles* represent the disorders (i.e., latent variables) and the *rectangles* represent the observable core symptoms of those disorders (i.e., $X_1 - X_5$ for disorder A, and $Y_1 - Y_5$ for disorder B). In this model, comorbidity is viewed as a correlation between the latent variables, visualized by the *thick bidirectional edge* between disorders A and B.

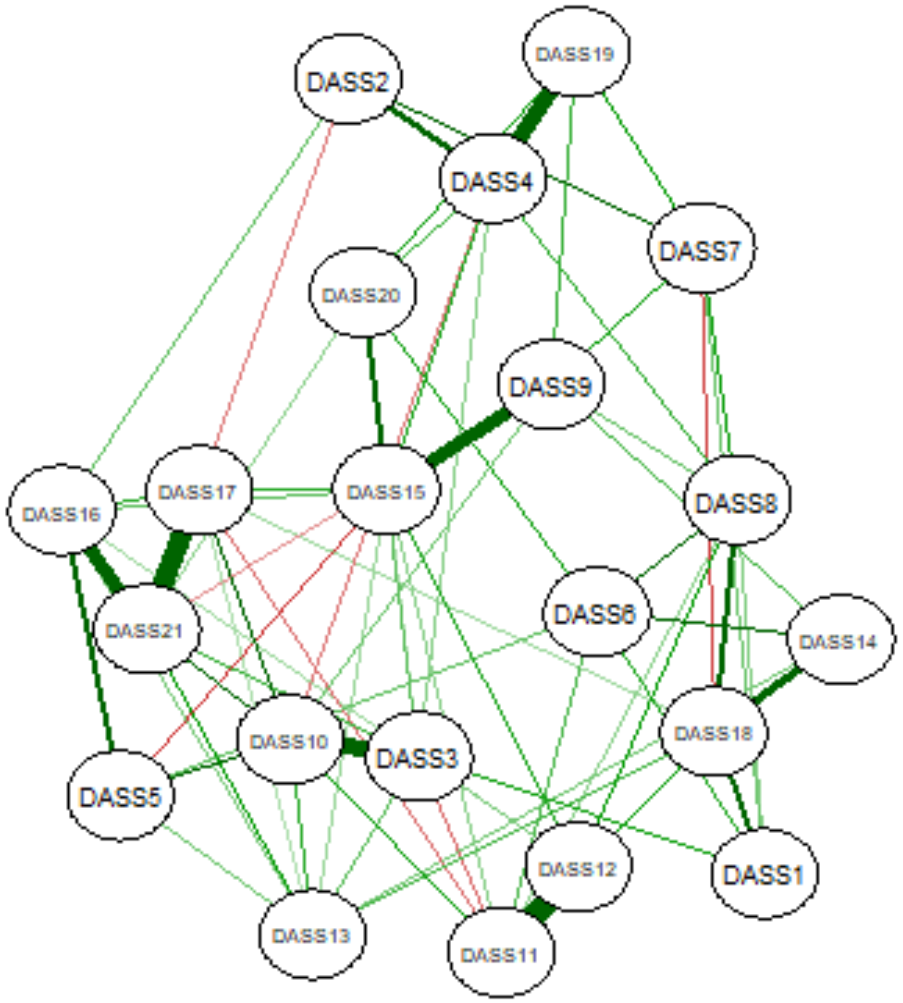

X1
X2
X3
X4
X5
B1
B2
Y1
Y2
Y3
Y4
Y5
Disorder A
Bridge symptoms
Disorder B



(Borsboom & Cramer, 2013)

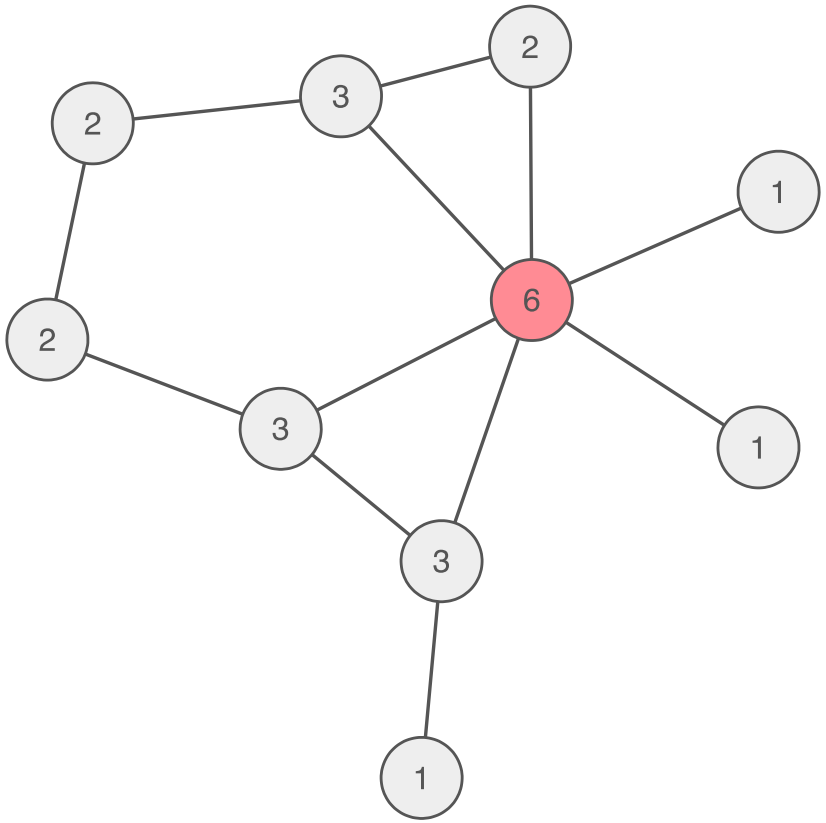


(Borsboom & Cramer, 2013)



DASS1: acalmar
DASS2: boca seca
DASS3: sent. posit
DASS4: respirar
DASS5: iniciativa
DASS6: reac. exager
DASS7: tremores
DASS8: nervoso(a)
DASS9: preoc panico
DASS10: expec. posit
DASS11: agitado(a)
DASS12: relaxar
DASS13: triste
DASS14: paciencia
DASS15: panico
DASS16: empolgar
DASS17: valor
DASS18: irritado(a)
DASS19: batidas
DASS20: assustado(a)
DASS21: sentido

Centralidade

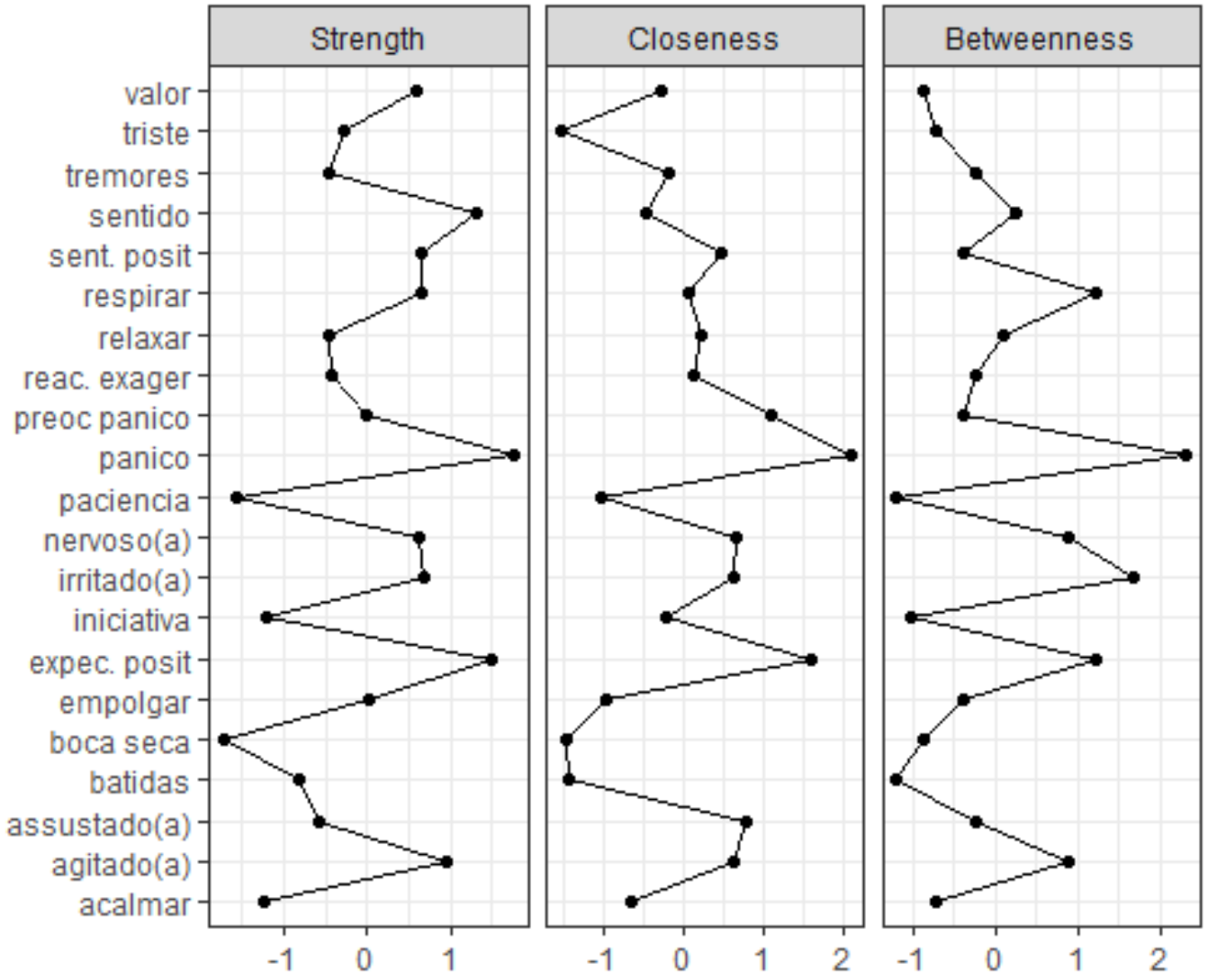


Opsahl, T., Agneessens, F., & Skvoretz, J. (2010). Node centrality in weighted networks: Generalizing degree and shortest paths. *Social Networks*, *23*, 245-251.

Centralidade

- Força (strength): soma modular ponderada das arestas de um nodo
- Proximidade (closeness): distância dos vértices adjacentes (inverso da associação)
- Conectividade (betweenness): vezes pelas quais o vértice é a menor distância entre outros dois vértices

Opsahl, T., Agneessens, F., & Skvoretz, J. (2010). Node centrality in weighted networks: Generalizing degree and shortest paths. *Social Networks*, *23*, 245-251.


Strength
Closeness
Betweenness
valor
triste
tremores
sentido
sent. posit
respirar
relaxar
reac. exager
preoc panico
panico
paciencia
nervoso(a)
irritado(a)
iniciativa
expec. posit
empolgar
boca seca
batidas
assustado(a)
agitado(a)
acalmar
-1
0
1
2

Expected Influence

- Influência esperada: soma das arestas dos nodos adjacentes em primeiro e segundo graus

Published in final edited form as:

J Abnorm Psychol. 2016 August ; 125(6): 747–757. doi:10.1037/abn0000181.

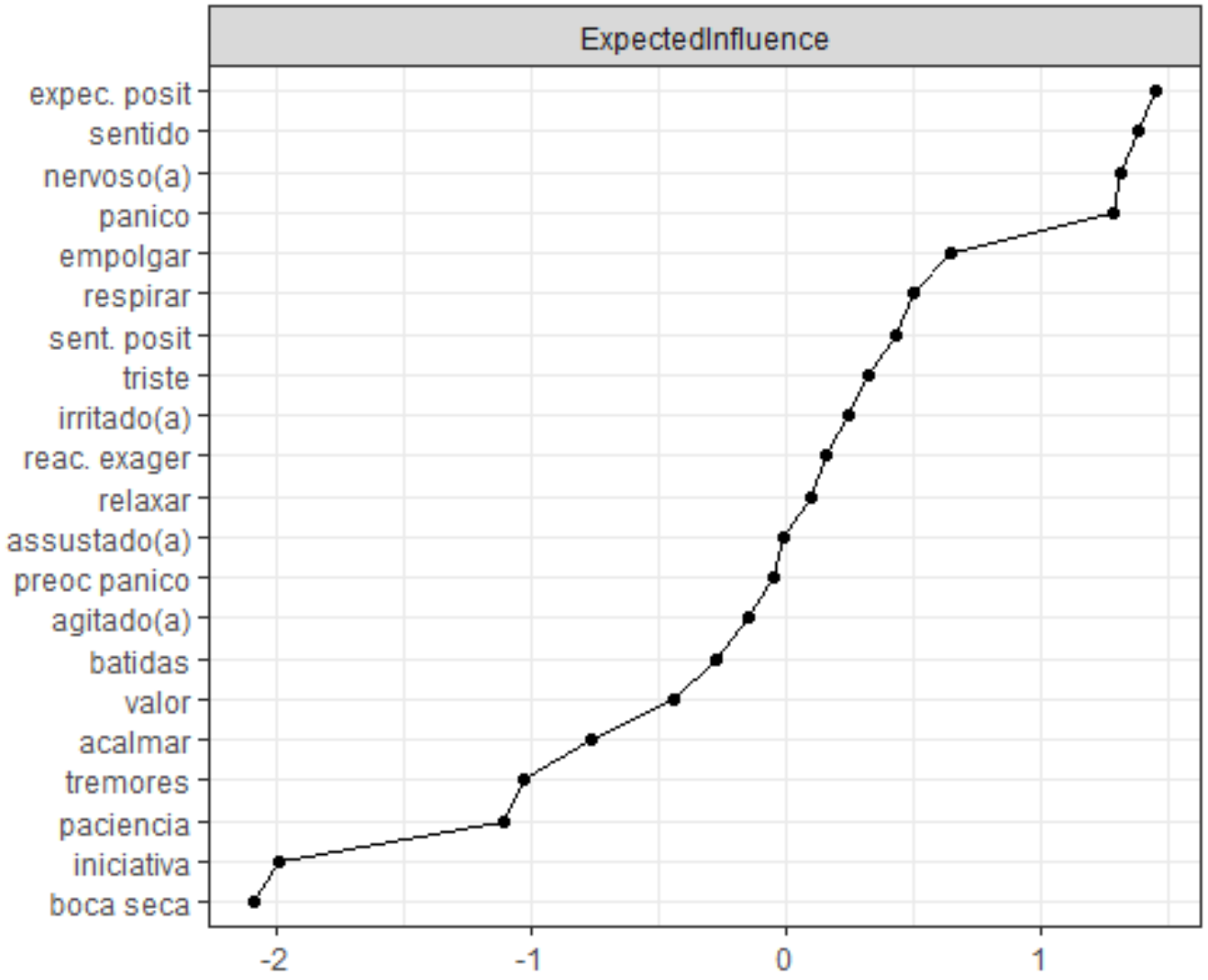
Identifying Highly Influential Nodes in the Complicated Grief Network

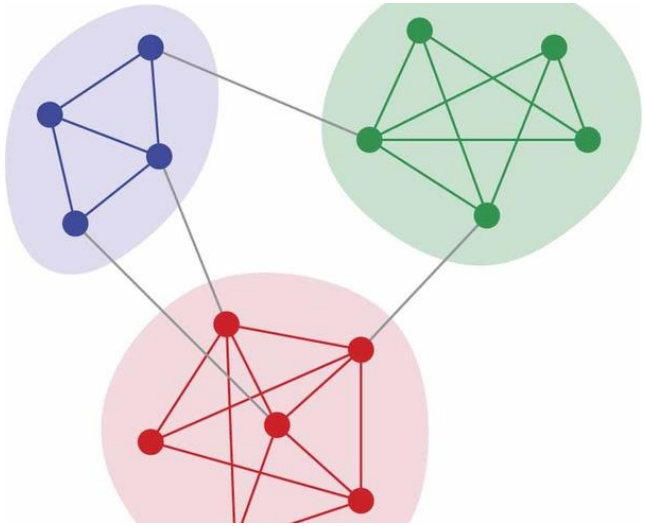
Donald J. Robinaugh[1,2], **Alexander J. Millner**[3], and **Richard J. McNally**[3]

[1]Massachusetts General Hospital, Department of Psychiatry

[2]Harvard Medical School

[3]Department of Psychology, Harvard University


ExpectedInfluence
expec. posit
sentido
nervoso(a)
panico
empolgar
respirar
sent. posit
triste
irritado(a)
reac. exager
relaxar
assustado(a)
preoc panico
agitado(a)
batidas
valor
acalmar
tremores
paciencia
iniciativa
boca seca
-2
-1
0
1



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Article | OPEN

A Comparative Analysis of Community Detection Algorithms on Artificial Networks

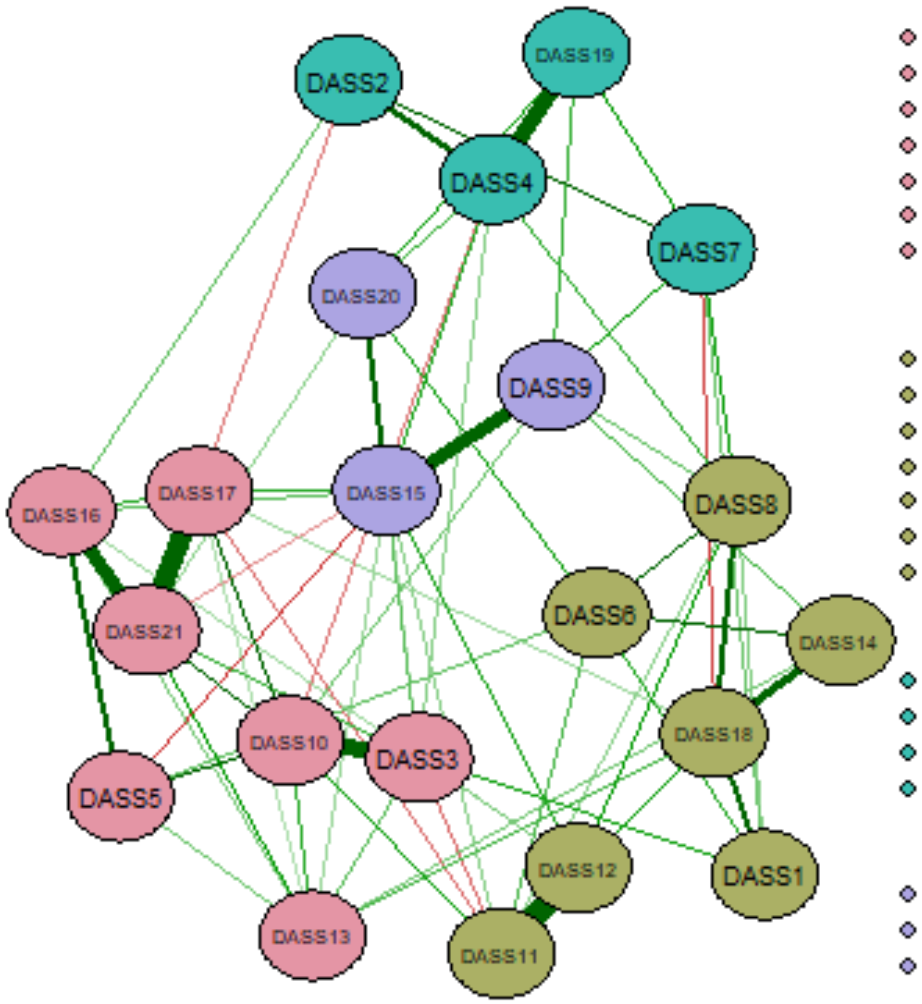
Zhao Yang, René Algesheimer & Claudio J. Tessone

Scientific Reports **6**, Article number: 30750 (2016)
doi:10.1038/srep30750

Received: 31 March 2016
Accepted: 07 July 2016
Published online: 01 August 2016

Análise de comunidades

- Existem subgrupos de variáveis ou observações na rede?
- Três métodos mais populares:
- Waltrap – parte de passos aleatórios e vai decompondo o conjunto em N-1 comunidades, calculando a distância das arestas entre e dentre comunidades
- Spinglass – baseado também em um modelo do ferromagnetismo (Potts), baseado na ideia de “spin state” e fluxo de energia
- **Multinível** – decomposição e permutação dos vértices até encontrar a solução que otimiza a modularidade (divisão em módulos ou grupos)



1
- DASS3: sent. posit
- DASS5: iniciativa
- DASS10: expec. posit
- DASS13: triste
- DASS16: empolgar
- DASS17: valor
- DASS21: sentido

2
- DASS1: acalmar
- DASS6: reac. exager
- DASS8: nervoso(a)
- DASS11: agitado(a)
- DASS12: relaxar
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- DASS18: irritado(a)

3
- DASS2: boca seca
- DASS4: respirar
- DASS7: tremores
- DASS19: batidas

4
- DASS9: preoc panico
- DASS15: panico
- DASS20: assustado(a)

Predição
exemplo com pacientes do espectro autista

Original Article

Autism
1–12

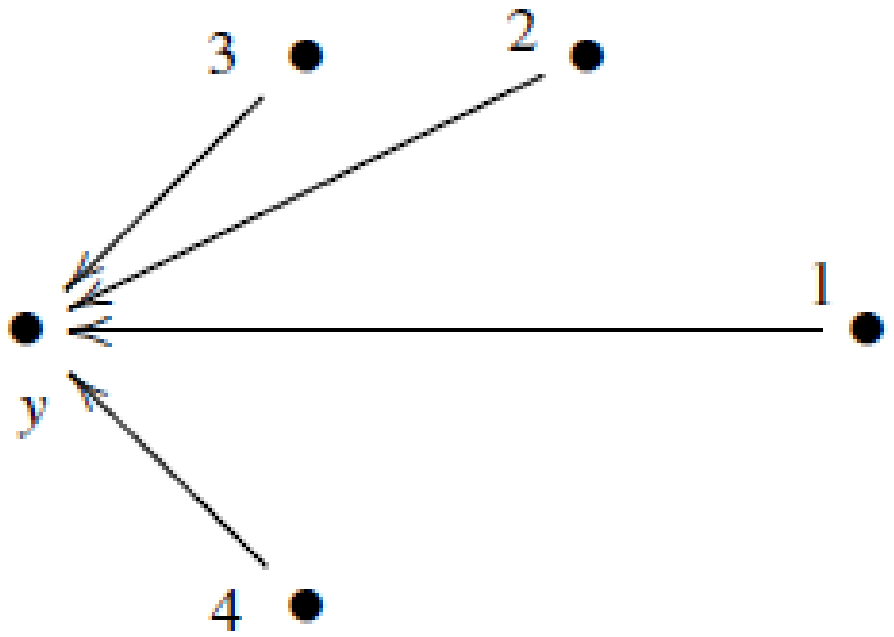
DOI: 10.1177/1362361316660309
aut.sagepub.com
SAGE

Multicausal systems ask for multicausal approaches: A network perspective on subjective well-being in individuals with autism spectrum disorder

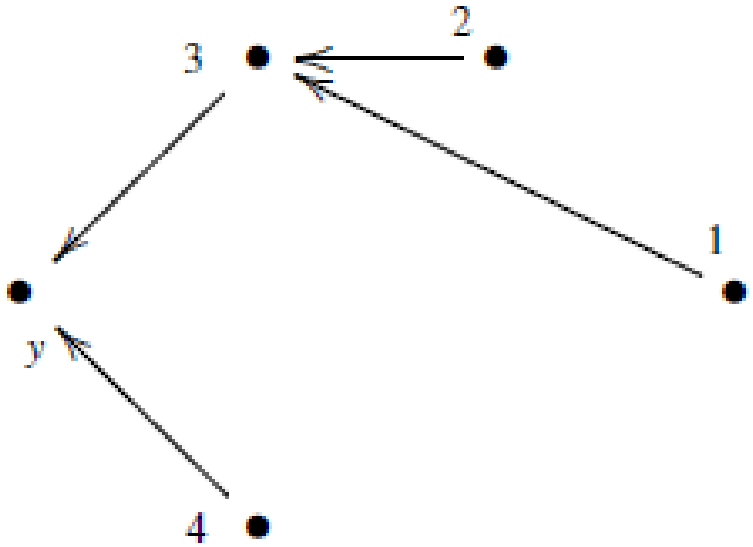
Marie K Deserno[1,2], Denny Borsboom[2], Sander Begeer[3] and Hilde M Geurts[1,2]

Modelos preditivos

- Modelo de regressão comum



(Epskamp, 2013)


3
2
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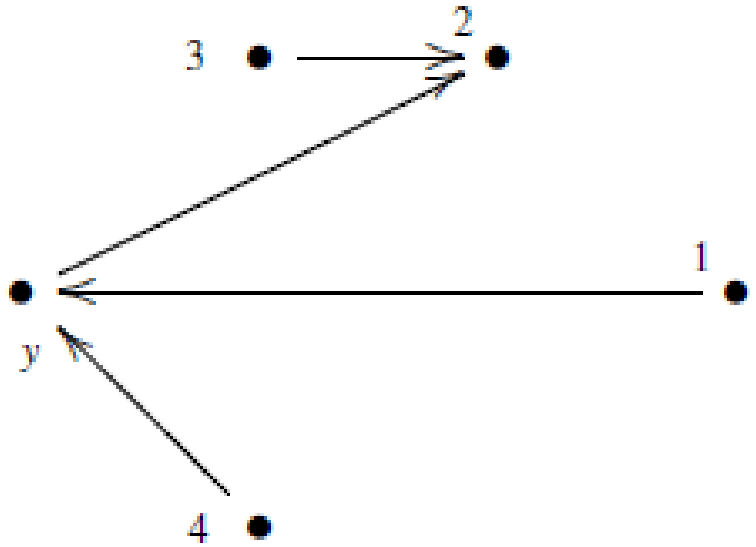
4

?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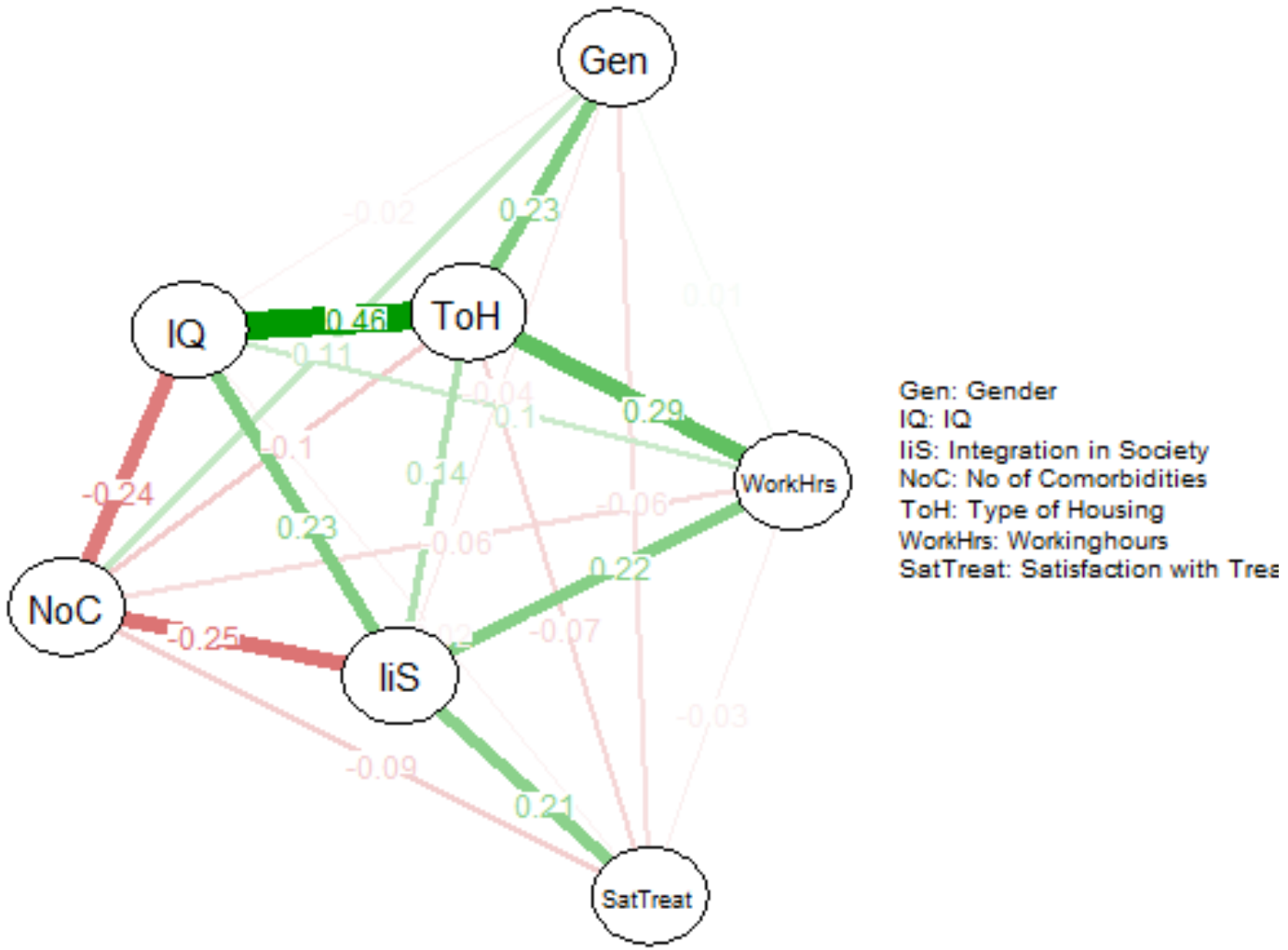
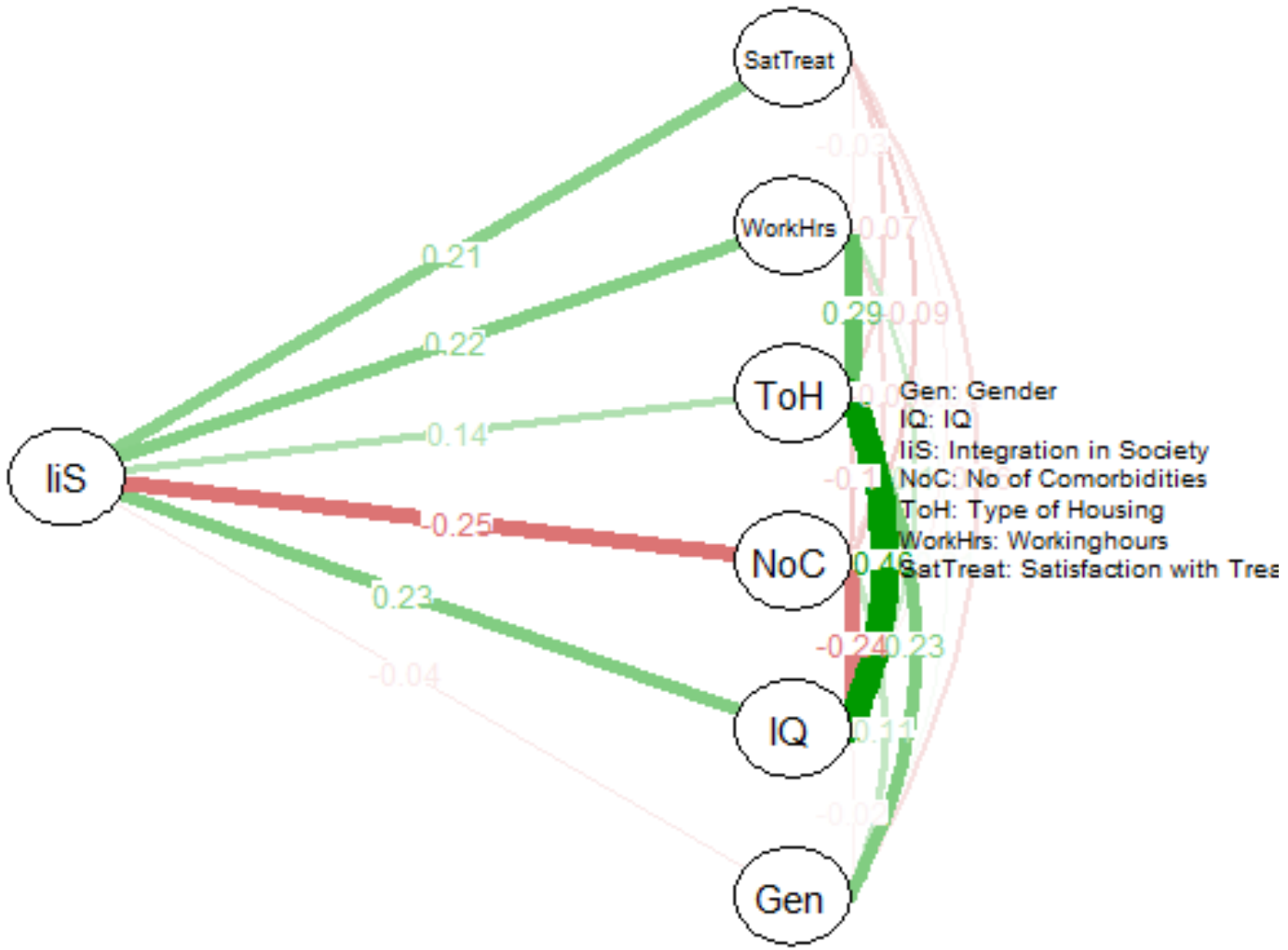

Gen
IQ
ToH
WorkHrs
NoC
IiS
SatTreat
-0.02
0.23
0.46
0.01
-0.11
-0.04
0.1
0.29
-0.1
0.14
-0.24
-0.06
0.23
-0.06
0.22
-0.25
-0.07
-0.03
-0.09
0.21
Gen: Gender
IQ: IQ
IiS: Integration in Society
NoC: No of Comorbidities
ToH: Type of Housing
WorkHrs: Workinghours
SatTreat: Satisfaction with Trea


SatTreat
WorkHrs
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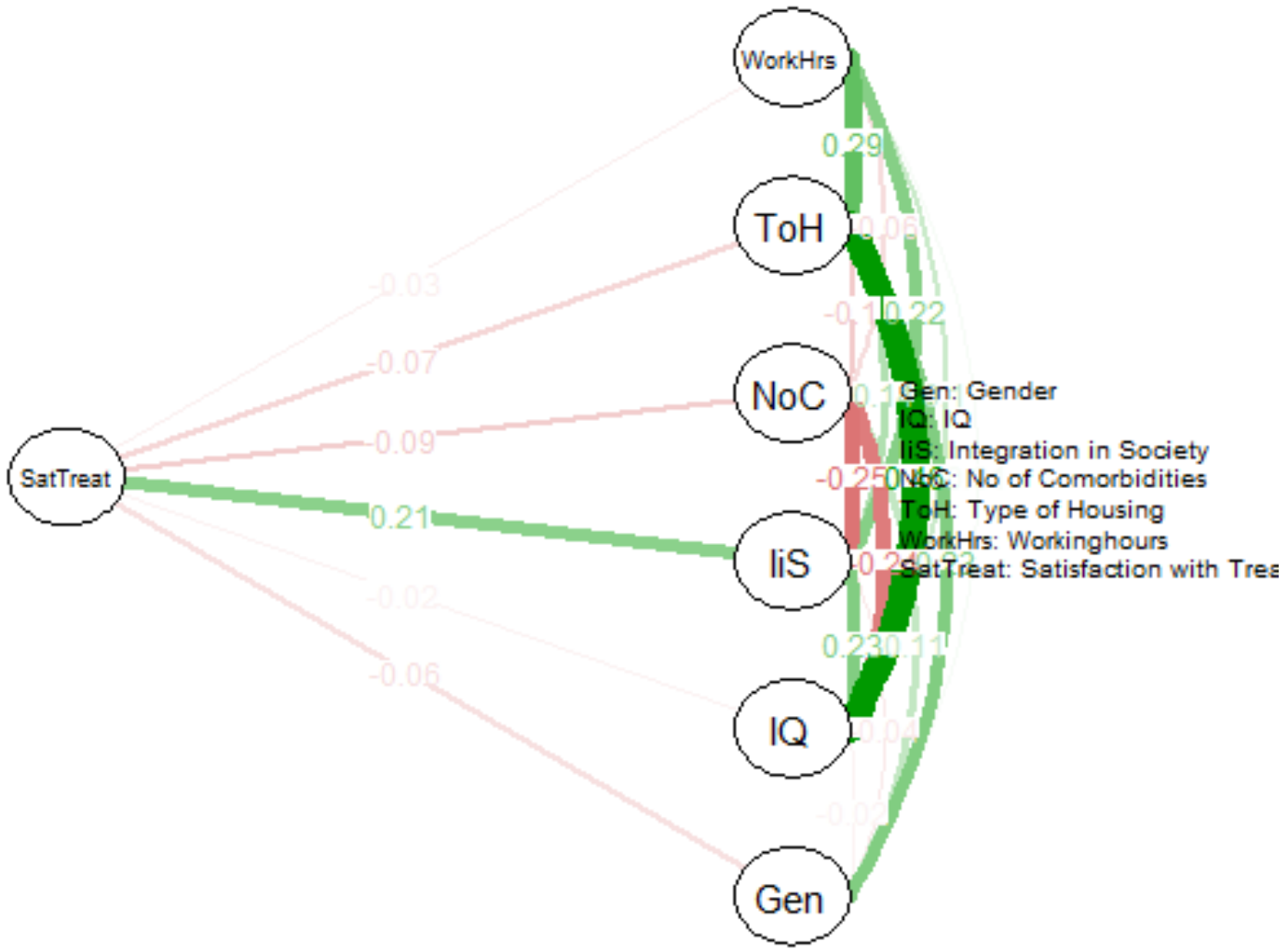
WorkHrs
ToH
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IiS
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0.29
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0.23
Gen: Gender
IQ: IQ
IiS: Integration in Society
NoC: No of Comorbidities
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Outros tópicos em análise de rede

- Modelos de dados dicotômicos (0,1)
- Modelos de moderação
- Séries temporais
- N = 1 networks
- Modelos multiníveis

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wagner.machado@pucrs.br