PUCRS | ESCOLA DE CIÊNCIAS DA SAÚDE

Modelos de rede em psicopatologia e comorbidade

GRUPO DE PESQUISA

AVALIAÇÃO EM BEM-ESTAR E SAÚDE MENTAL

MELHOR PÓS-GRADUAÇÃO DO BRASIL
AVALIAÇÃO QUADRIENAL DA CAPES

PSICOLOGIA
Nota 6
Excelência Internacional

Prof. Dr. Wagner de Lara Machado

PPG Psicologia

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- Psicólogo (ULBRA)
- Mestre e Doutor em Psicologia (UFRGS)
- Estágio de Pós-doutorado (UFRGS)
- Professor do PPG Psicologia da PUCRS (Nota 6 CAPES)
- Grupo de pesquisa:

Avaliação em Bem-estar e Saúde Mental (ABES)


scale
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study
validation
personality
assessment
mental
brazilian
health
short
markers
questionnaire
model
analysis
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sample
school
stress
factorial
sexual
teachers
version
regulatory
form
adolescents
assessing
psychological
related
perceived
temperament
relationship
organizational
adaptation
diversity
development
prosocial
people
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justice
undergraduate
depression
responsiveness
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criterion
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gender
teaching
correlates
making
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big
group
metamemory
trait
mediators
anxiety
child
confirmatory
suicide
behaviors
teacher
convergent
dimensionality
interactions
neuropsychological
principal
engagement
socioeconomic
evidences
evidence
stigma
construct
adulthood
factor
theory
models
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experience
prejudice
young
structure
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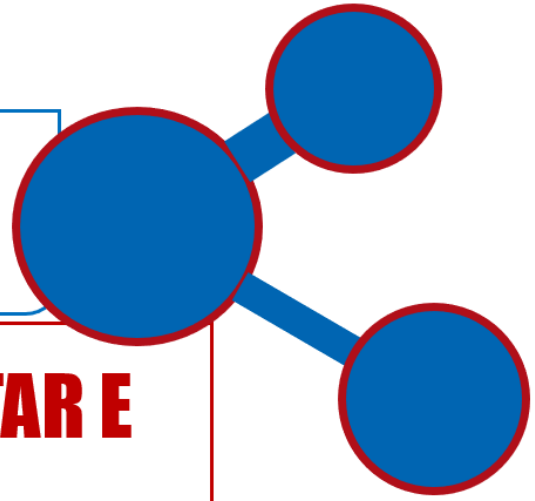
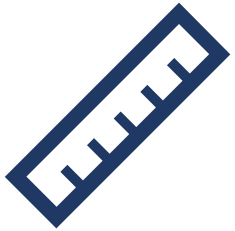
processes

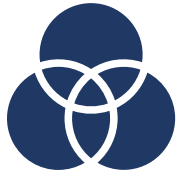
GRUPO DE PESQUISA

AVALIAÇÃO EM BEM-ESTAR E SAÚDE MENTAL





Construção e validade de medidas



Preditores e correlatos

Métodos inovadores

GRUPO DE PESQUISA

AVALIAÇÃO EM BEM-ESTAR E SAÚDE MENTAL

Carla Adriana da Silva Villwock

- ✓ Doutoranda
- ✓ Áreas de interesse:
  - ✓ Psicologia Clínica
  - ✓ Psicologia da Saúde
  - ✓ Psicopatologia
  - ✓ Comportamento Suicida e Automutilação
  - ✓ Intervenções Psicoterápicas

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  - ✓ Saúde mental
  - ✓ Psicopatologia
  - ✓ Felicidade e bem-estar
  - ✓ Atividade física

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- ✓ Áreas de interesse:
  - ✓ RS e metanálises
  - ✓ Coping
  - ✓ Estigma
  - ✓ Suicídio
  - ✓ Intervenções Tecnológicas
  - ✓ Jogos Eletrônicos e Reserva Cognitiva
  - ✓ E-health e M-health
  - ✓ Machine e deep learning

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- ✓ Áreas de interesse:
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  - ✓ Comportamento suicida
  - ✓ Validação de instrumentos

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Juliana N. Weide

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- ✓ Áreas de interesse:
  - ✓ Psicologia da Saúde
  - ✓ Psicologia Hospitalar
  - ✓ Psico-oncologia
  - ✓ Corregulação emocional e comportamental

GRUPO DE PESQUISA

AVALIAÇÃO EM BEM-ESTAR E SAÚDE MENTAL

Rafaela Cassol da Cunha

- ✓ Mestranda
- ✓ Áreas de interesse:
  - ✓ Psicologia da Saúde
  - ✓ Avaliação e intervenção hospitalar
  - ✓ Doenças crônicas (DPOC)
  - ✓ Cuidados paliativos
  - ✓ Bem-estar

GRUPO DE PESQUISA

AVALIAÇÃO EM BEM-ESTAR E SAÚDE MENTAL

Gustavo Rafael Marchionatti Broch – IC

- ✓ Áreas de interesse:
  - ✓ Suicídio
  - ✓ Desenvolvimento
  - ✓ Inteligência Artificial e M-health

Luciana Villa Verde Castilhos – IC

- ✓ Áreas de interesse:
  - ✓ Psicologia da Saúde e Hospitalar
  - ✓ Psico-oncologia
  - ✓ Cuidados paliativos

GRUPO DE PESQUISA

AVALIAÇÃO EM BEM-ESTAR E SAÚDE MENTAL

Bernard Paz – IC

- ✓ Áreas de interesse:
  - ✓ Suicídio
  - ✓ Correlatos sociais do sofrimento psicológico

Gabriel Paz – IC

- ✓ Áreas de interesse:
  - ✓ Suicídio
  - ✓ Correlatos sociais do sofrimento psicológico

GRUPO DE PESQUISA

AVALIAÇÃO EM BEM-ESTAR E SAÚDE MENTAL

Monique Cristielle S. da Silva – IC

- ✓ Áreas de interesse:
  - ✓ Esquiotipia positiva
  - ✓ Saúde mental

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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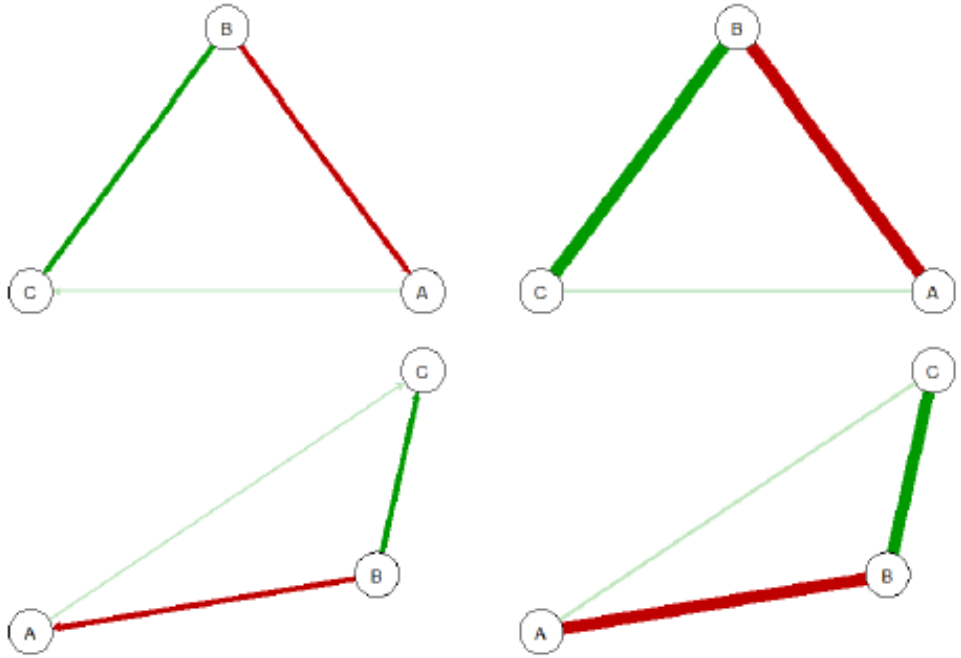


Figura 5. Redes ponderadas, direcionais e não-direcionais, sem (acima) e com (abaixo) o emprego do algoritmo de posicionamento.

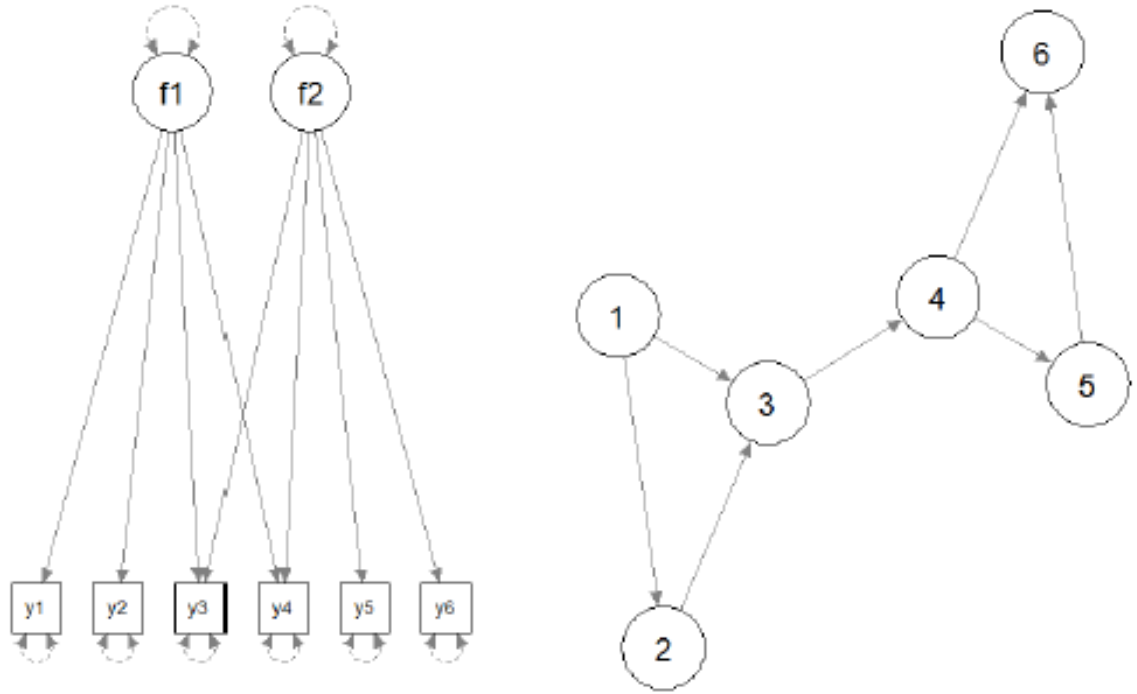


Figura 13. Modelo de traço latente (esquerda) e de rede (direita) da comorbidade.

Positive Mental Health Scale: Validation of the *Mental Health Continuum – Short Form*

Wagner de Lara Machado – Pontifícia Universidade Católica de Campinas, Campinas, São Paulo, Brasil
Denise Ruschel Bandeira – Universidade Federal do Rio Grande do Sul, Porto Alegre, Brasil

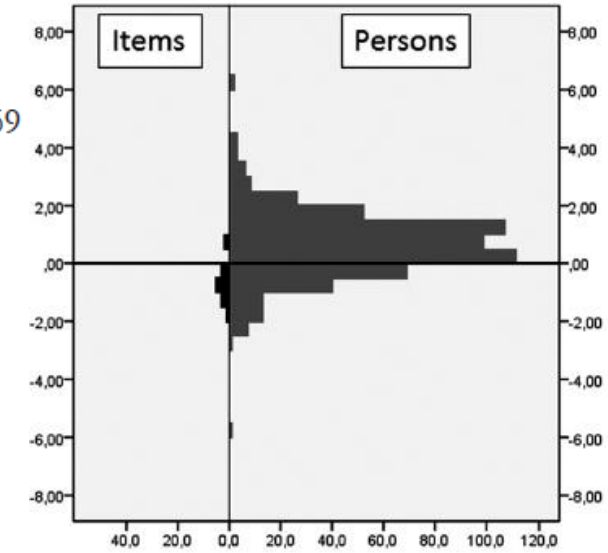


Figure 1. Map of items and persons. The vertical axis indicates the scale in *logits*. The distribution was obtained by fixing the contrary measure so the mean would be equal to zero.

Table 2
Item Factor Loadings and Reliability Measures of the MHC-SF in the Bifactor Model

Item (summarized content)	Factor loading			
	General factor	EWB	SWB	PWB
1 – Happy	.70	.65		
2 – Interested	.78	.32		
3 – Satisfied	.78	.36		
4 – Contribute to society	.69		.07	
5 – Belong to community	.67		.23	
6 – Society is becoming a better place	.62		.63	
7 – People are good	.62		.41	
8 – Way society works makes sense	.57		.56	
9 – Likes own personality	.79			.21
10 – Manages responsibility well	.70			.19
11 – Relationships with others	.72			.24
12 – Grow and become a better person	.62			.39
13 – Confident to express own ideas	.68			.52
14 – Life has direction or meaning	.83			.12
Average extracted variance	.49	.22	.19	.10
Composite reliability	.93	.43	.47	.34

Note. EWB = emotional well-being, SWB = social well-being, PWB = psychological well-being.

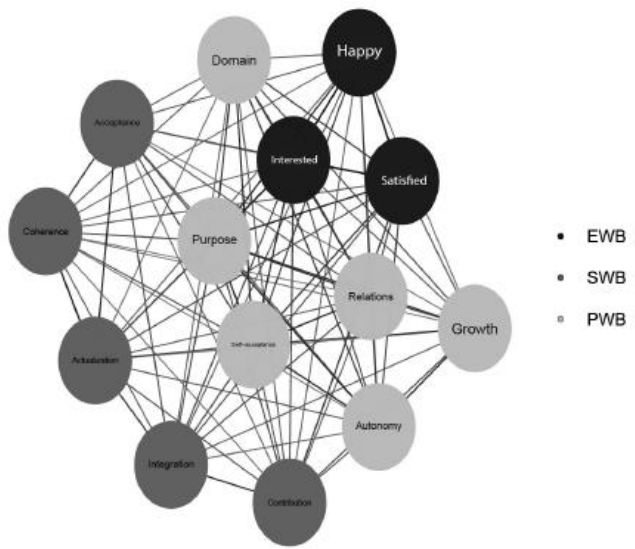
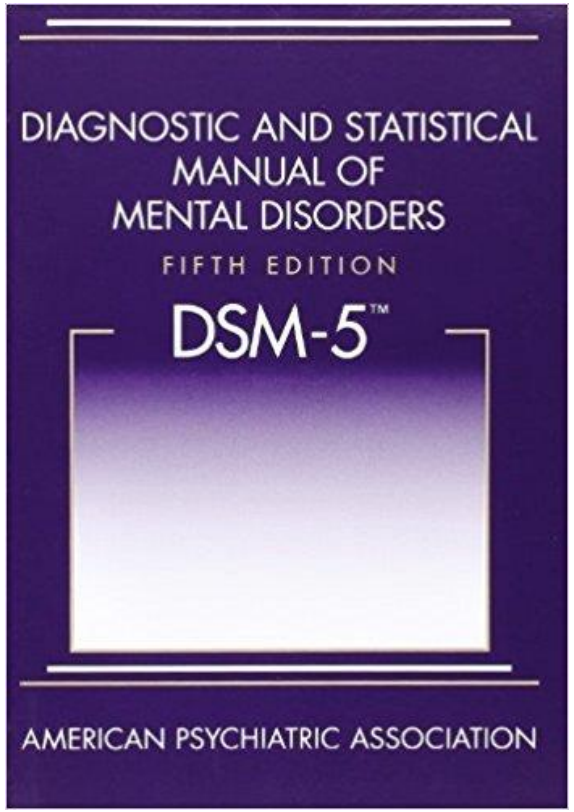
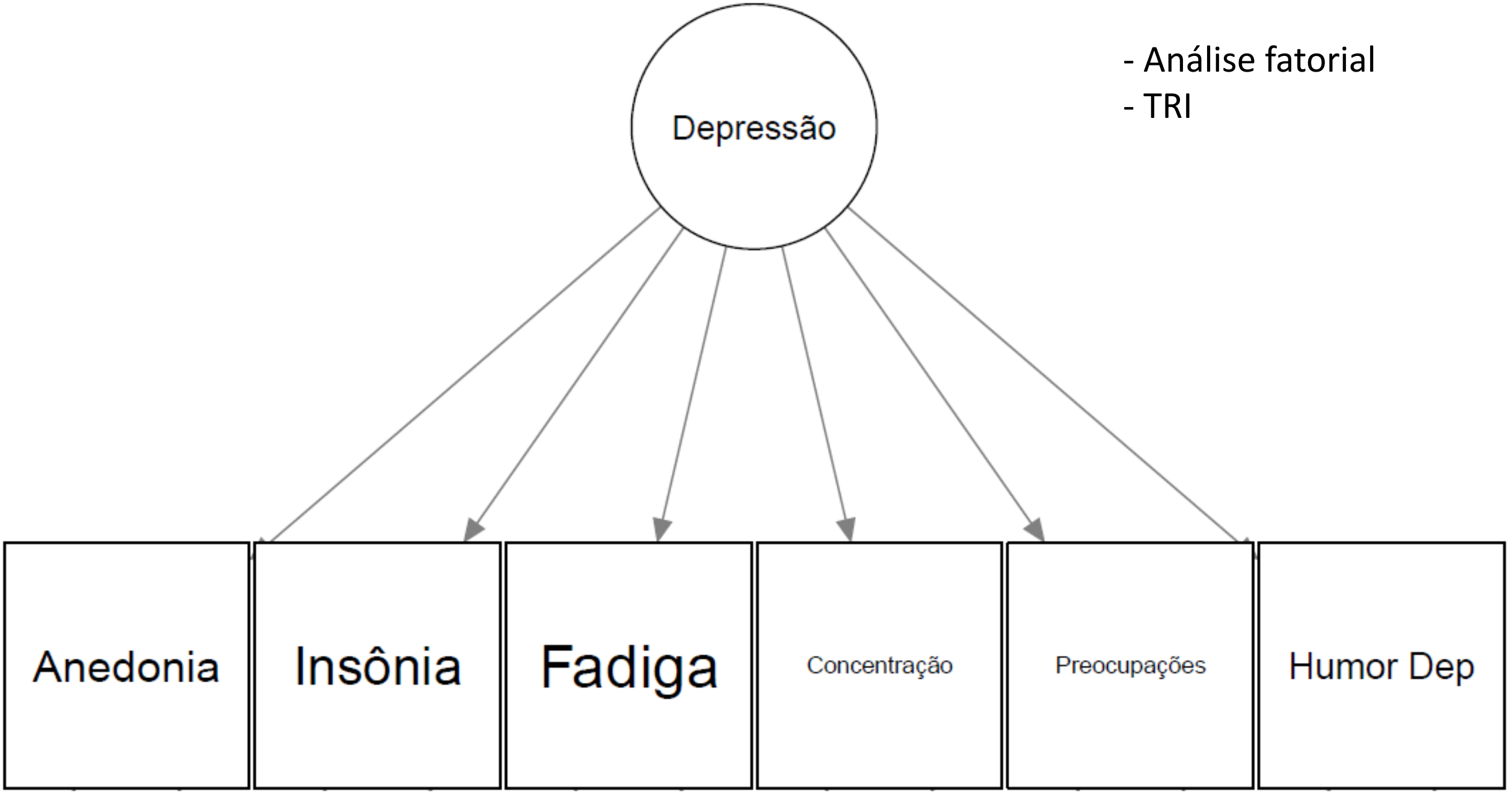


Figure 2. Network of positive mental health indicators. The covariance structure indicates that the MHC-SF items are strongly associated with the others, resulting in a dense component. The items in the emotional (EWB), social (SWB) and psychological (PWB) well-being subscales exhibit moderate to strong crossed associations. Purpose in life and self-acceptance are the central nodes of the system, meaning that they are more strongly associated with the remainder of the items. The stronger line represents the correlation between "happy" and "satisfied" ($r_{1\text{-}3}$ = .78); the fainter line represents the correlation between "relations" and "coherence" ($r_{8\text{-}11}$ = .35).

Avaliação em saúde mental: traços latentes e redes

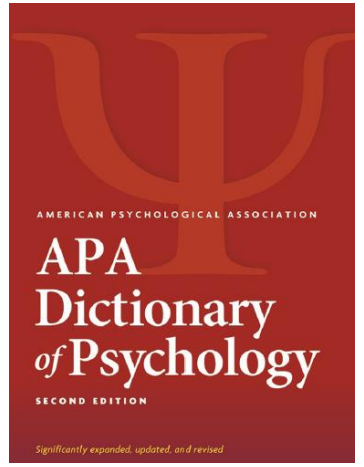
- **Transtorno depressivo maior**:
  - Humor deprimido
  - Diminuição do interesse ou prazer
  - Perda ou ganho significativo de peso
  - Insônia ou hipersonia
  - Agitação ou retardo psicomotor
  - Fadiga ou perda de energia
  - Sentimentos de inutilidade ou culpa
  - Capacidade diminuída para pensar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





- Análise fatorial
- TRI

Depressão: variável latente



- **latent variable:** a *theoretical entity or construct* that is used to explain one or more manifest variables. *Latent variables cannot be directly observed or measured* but rather are approximated through various *measures presumed to assess part of the given construct*. […] Participants' responses could then be analyzed to *identify patterns of interrelationships from which the values of the latent variable of* […] *are inferred*. Also called **latent construct**; **latent factor**. See also factor analysis; structural equation modeling.

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

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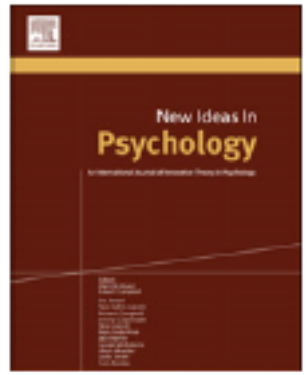
journal homepage: www.elsevier.com/locate/newideapsych



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*

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New Ideas in Psychology

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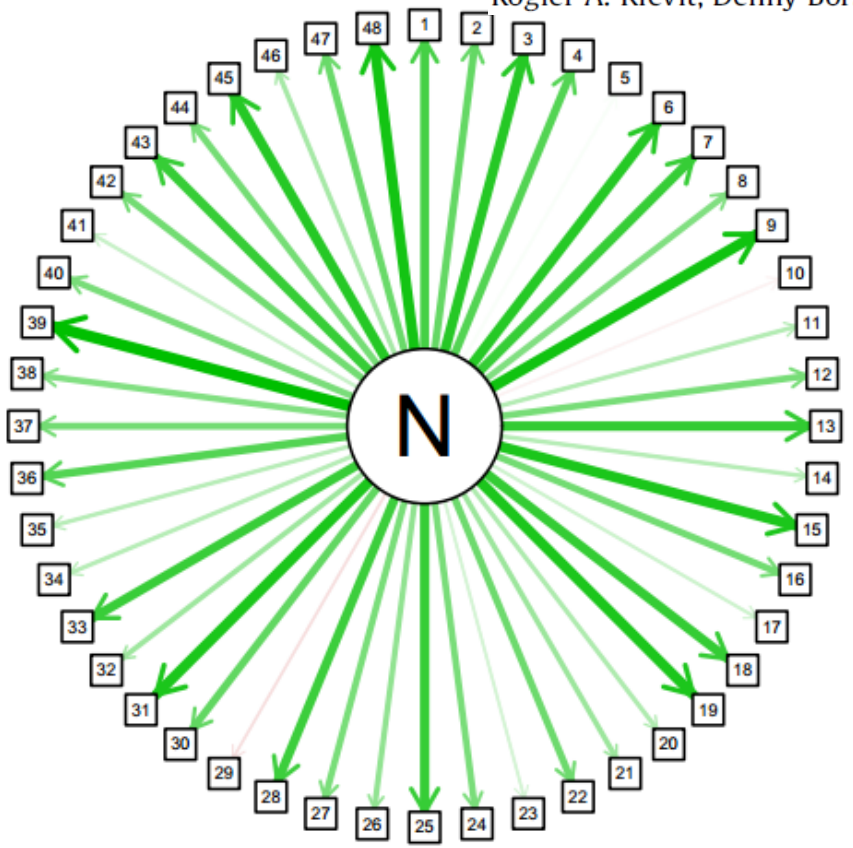
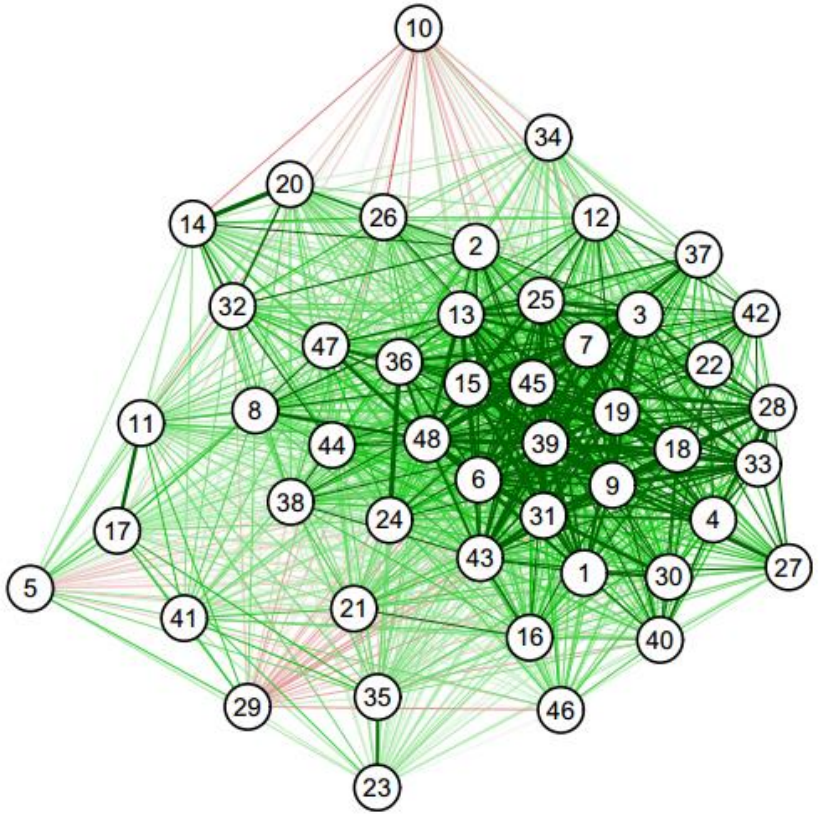
Deconstructing the construct: A network perspective on psychological phenomena

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





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

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*

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*).

JOURNAL OF CLINICAL PSYCHOLOGY, Vol. 64(9), 1089–1108 (2008)

Published online in Wiley InterScience (www.interscience.wiley.com). DOI: 10.1002/jclp.20503

Psychometric Perspectives on Diagnostic Systems

Denny Borsboom
University of Amsterdam

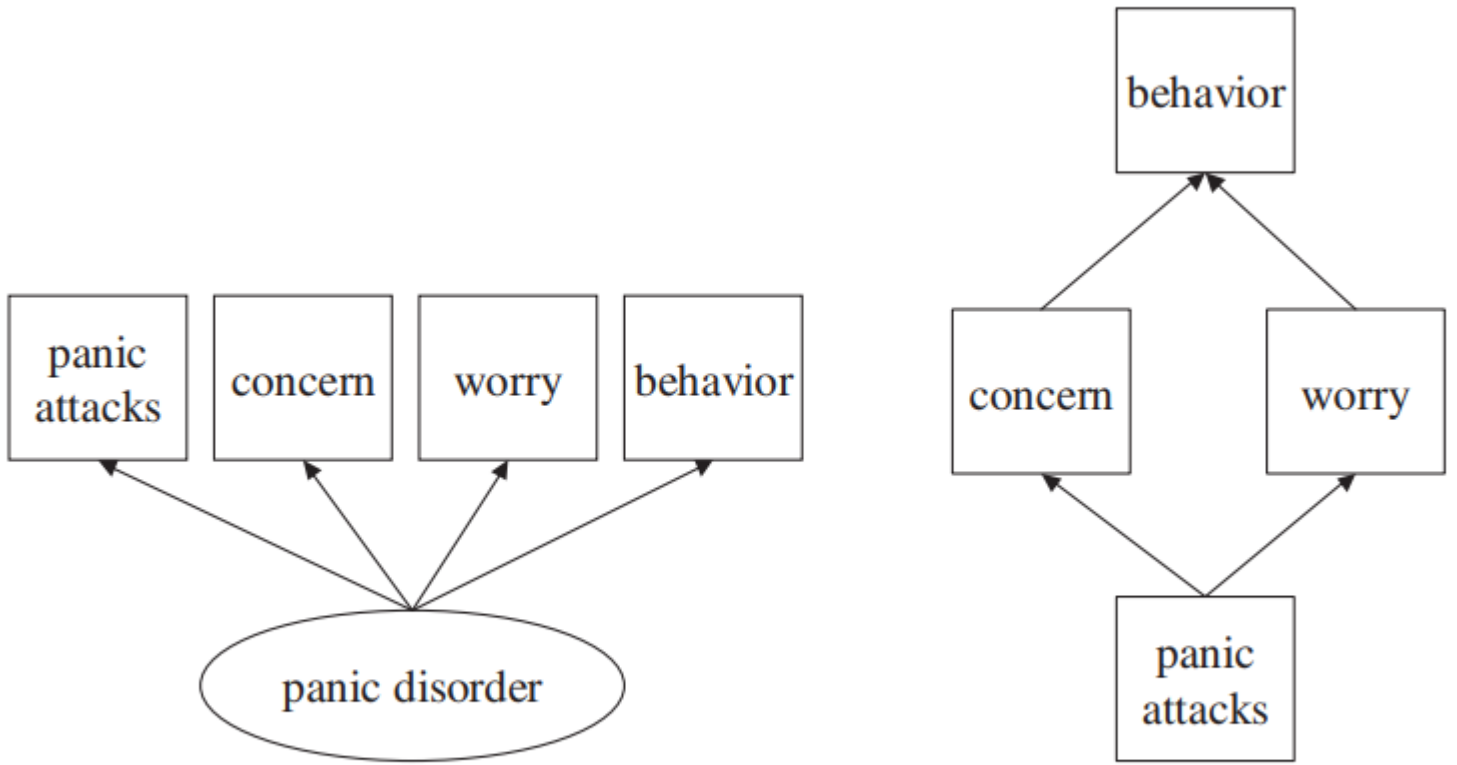
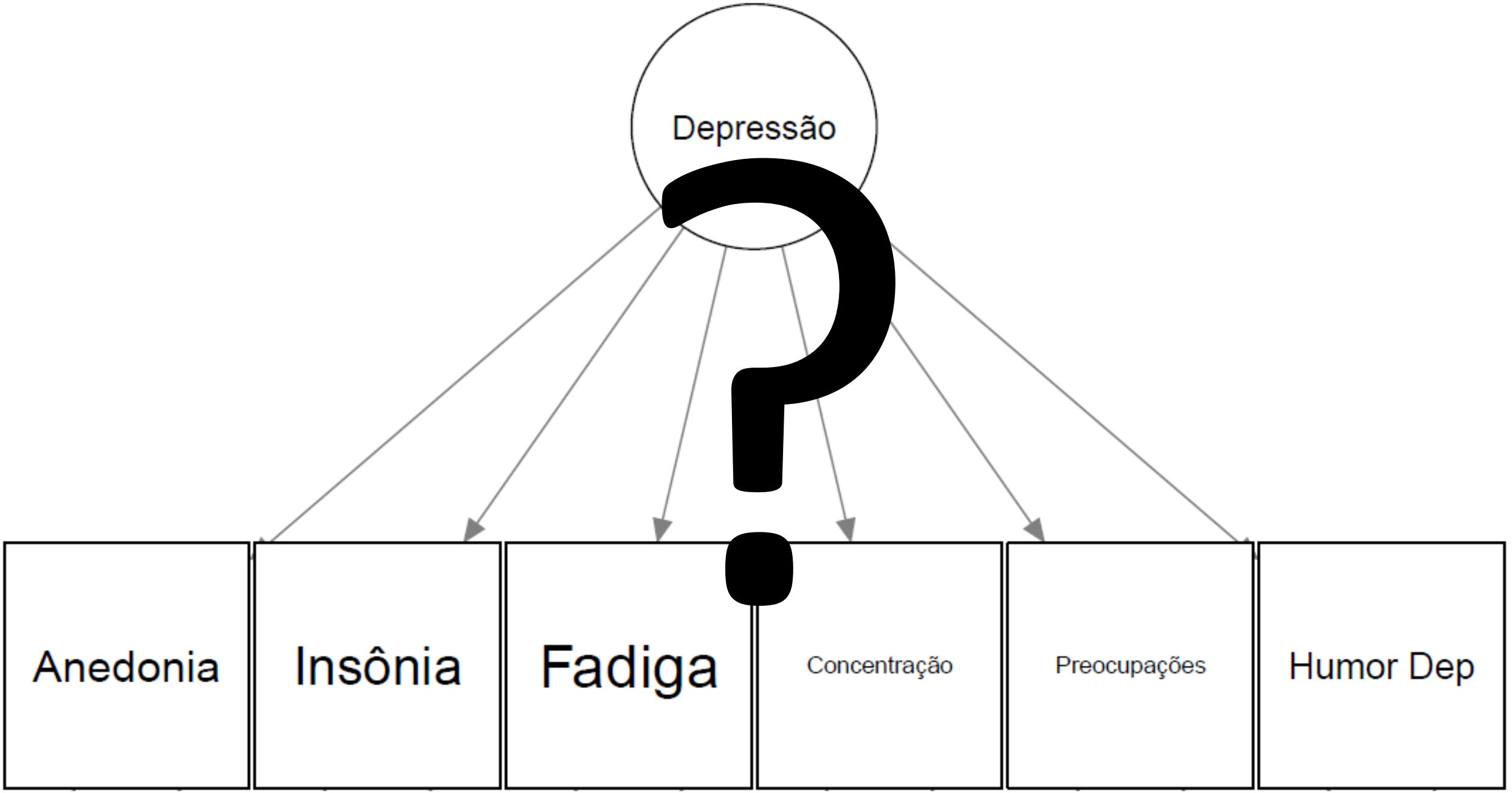


Figure 1. The left panel shows the relation between panic disorder and its symptoms from a latent variable modeling point of view. The right panel shows a representation of these symptoms as a causal system.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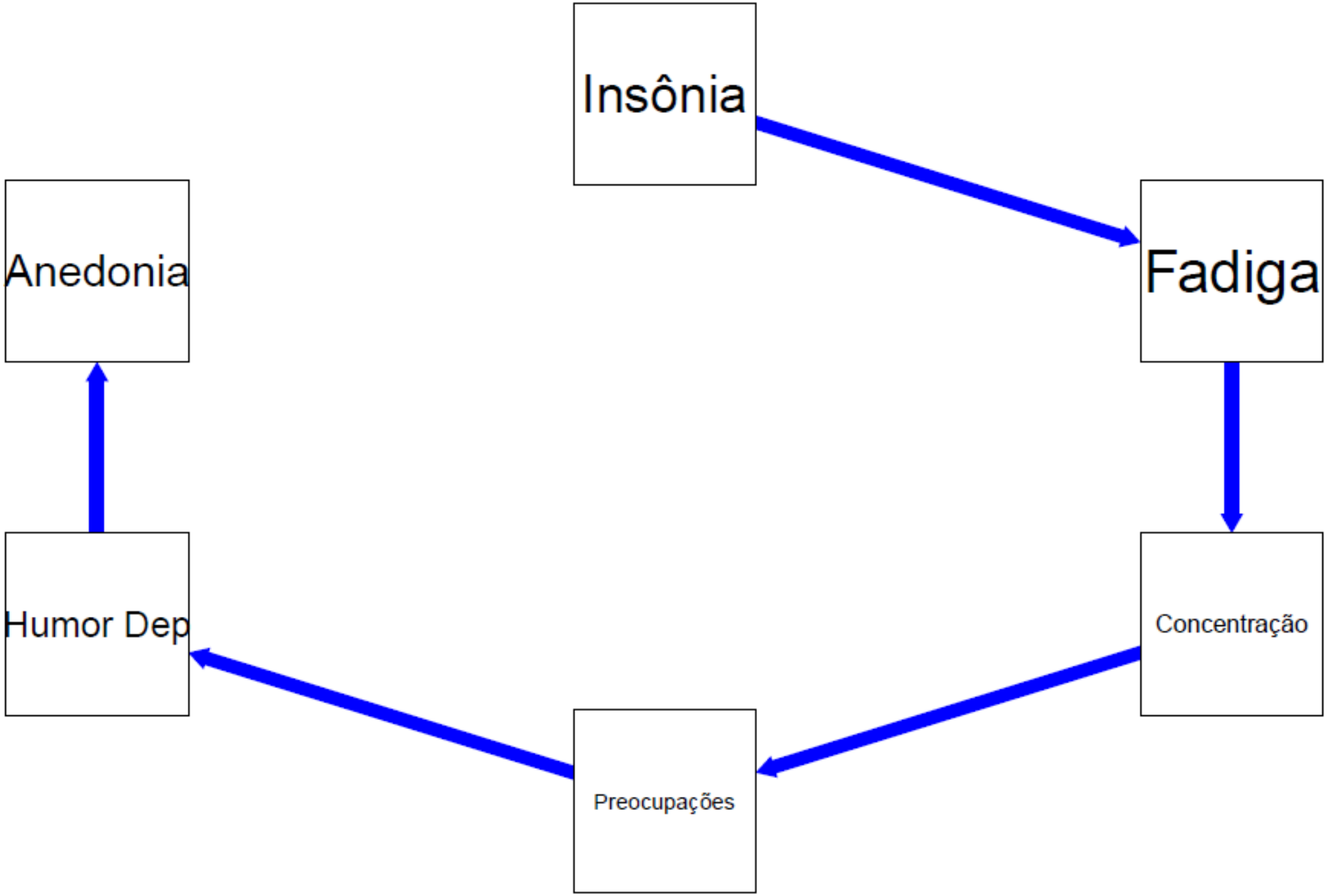
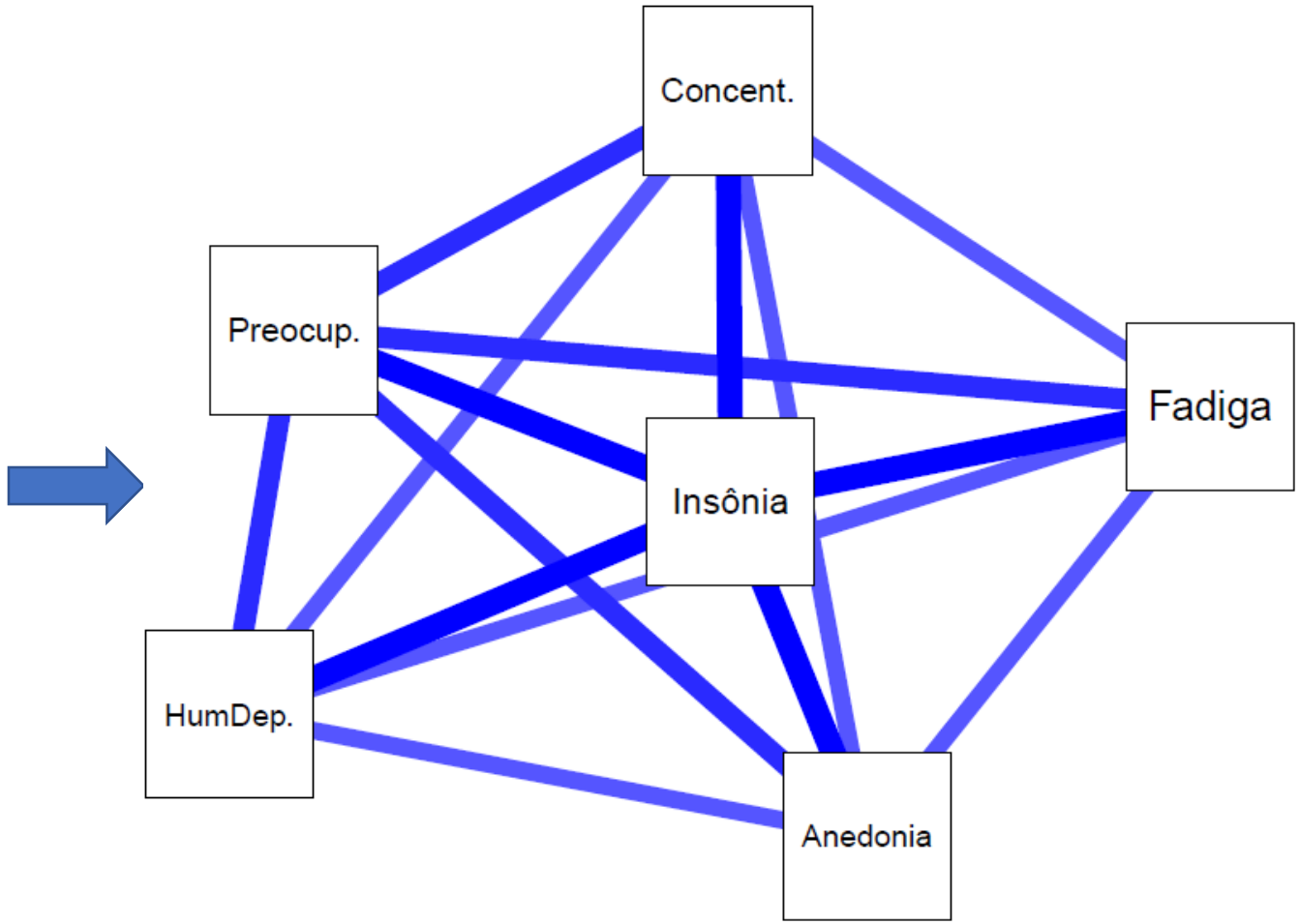
Insônia
Fadiga
Concentração
Preocupações
Humor Dep


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



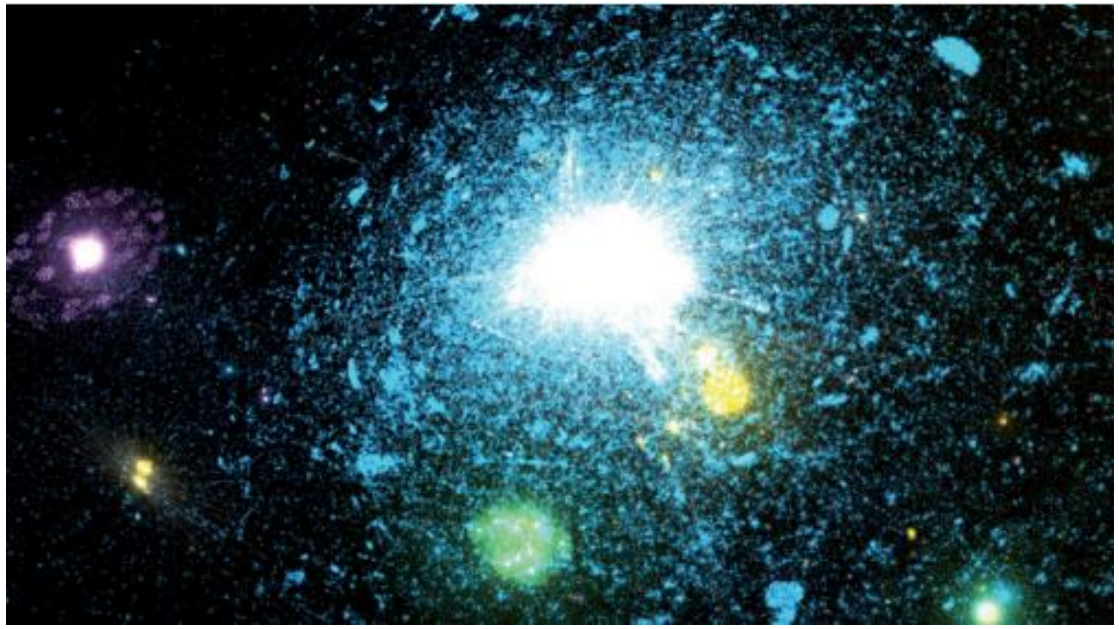
“Reductionism, as a paradigm, is expired, and complexity, as a field, is tired. Data-based mathematical models of complex systems are offering a fresh perspective, rapidly developing into a new discipline: network science.”

NATURE PHYSICS | COMMENTARY

The network takeover

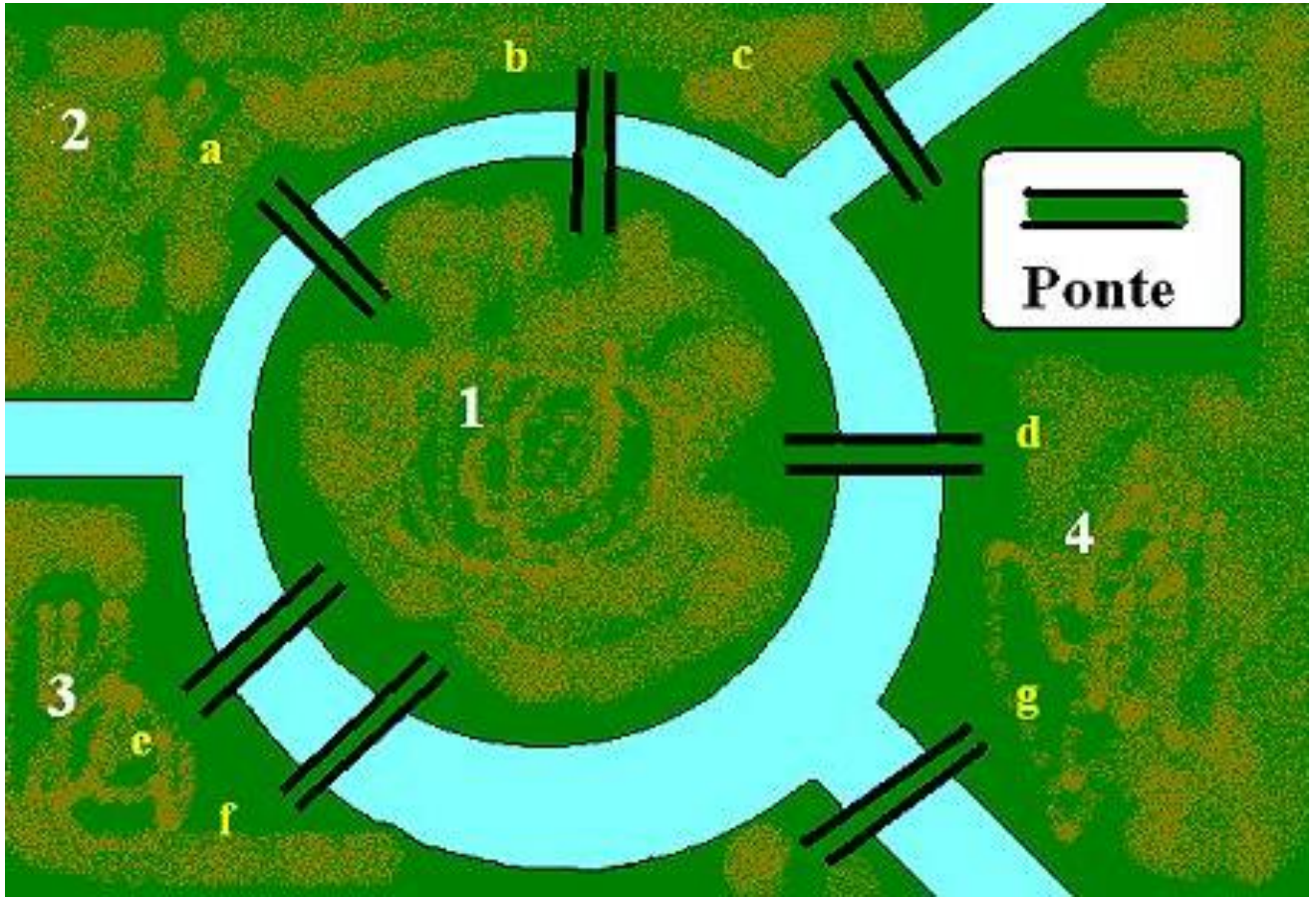
Albert-László Barabási

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



Teoria dos grafos

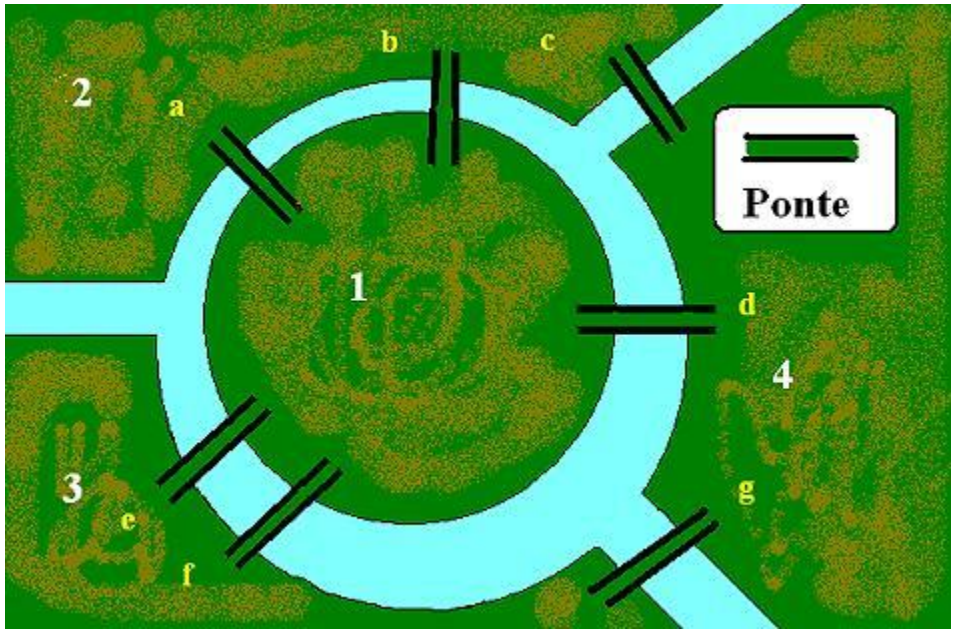
- O problema das pontes de Königsberg
- Discutia-se nas ruas da cidade a possibilidade de atravessar todas as pontes sem repetir nenhuma

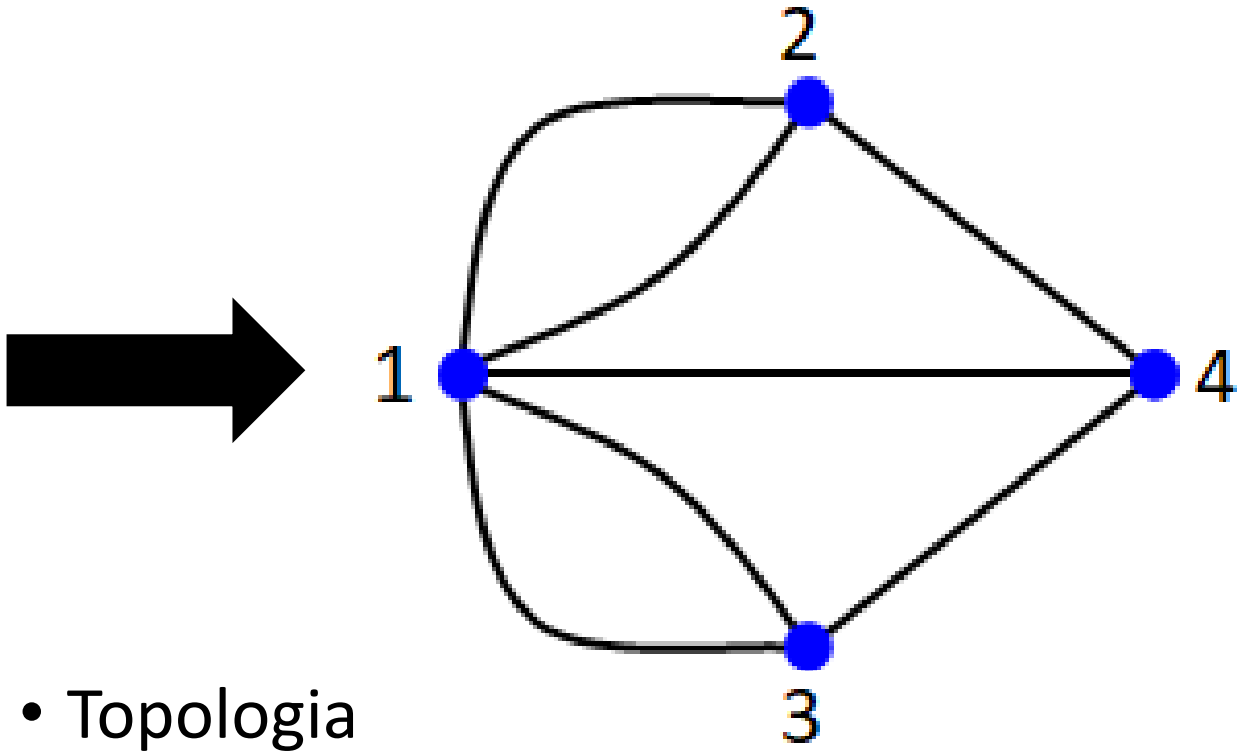


https://pt.wikipedia.org/wiki/Sete_pontes_de_K%C3%B6nigsberg

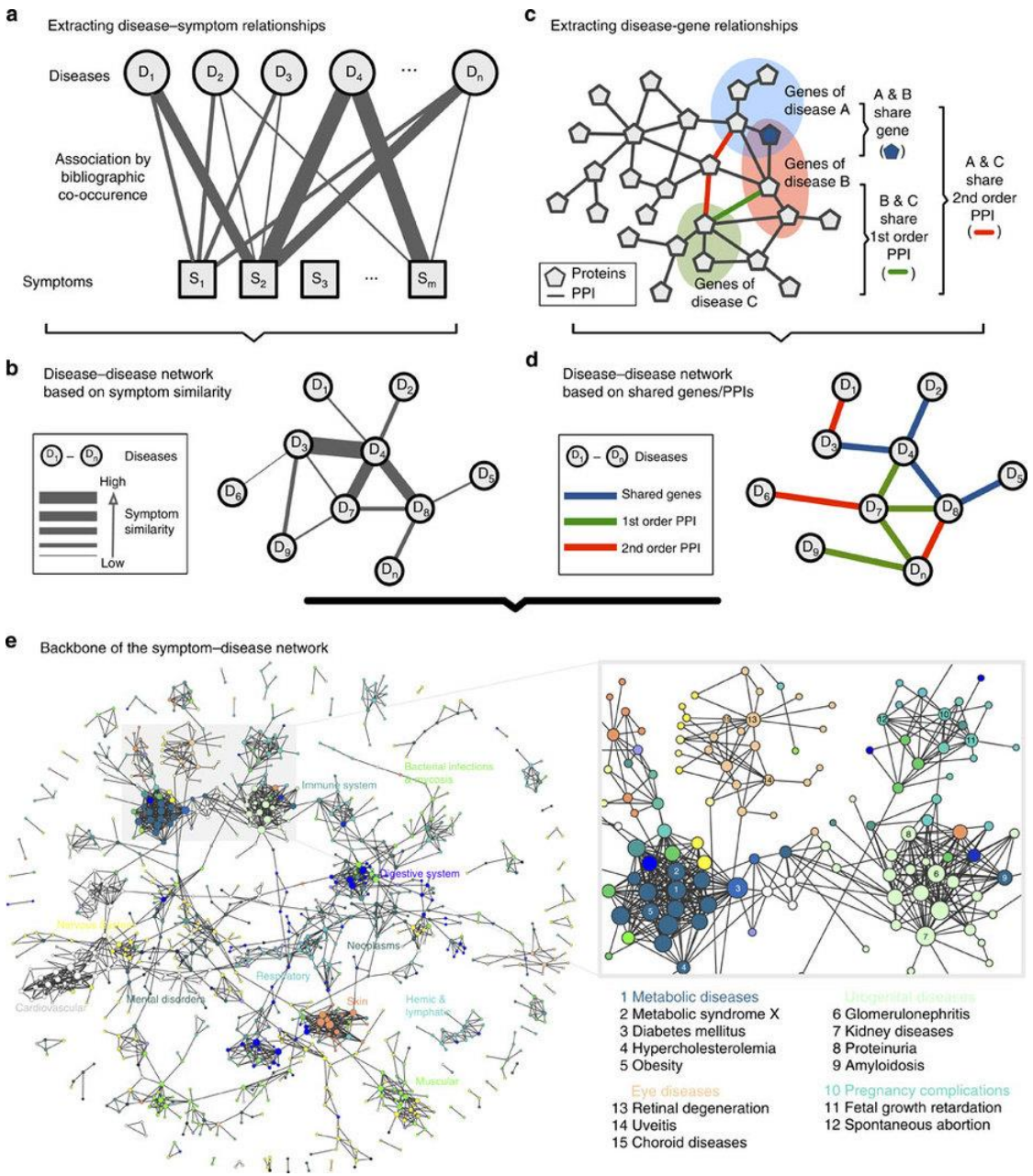
Teoria dos grafos

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





- Topologia



nature COMMUNICATIONS

Altmetric: 47 Views: 5,594 Citations: 33 More detail »

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

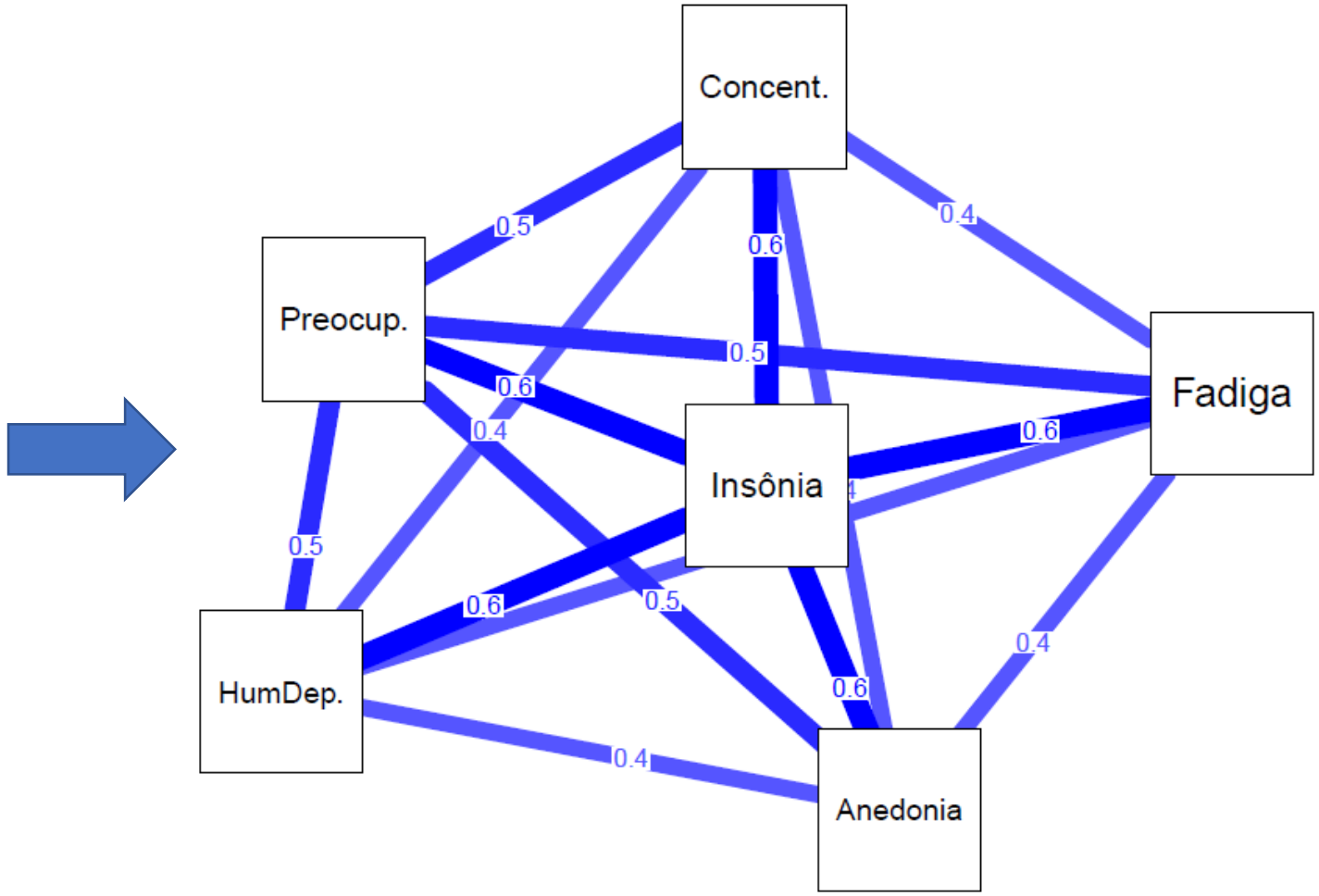
We extracted ***7,109,429*** (about 35.5% in over twenty million records) PubMed bibliographic records with one or more disease/symptom terms in the MeSH metadata field (see Methods), yielding a total of 4,442 disease terms and 322 symptom terms

O que é uma rede?

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

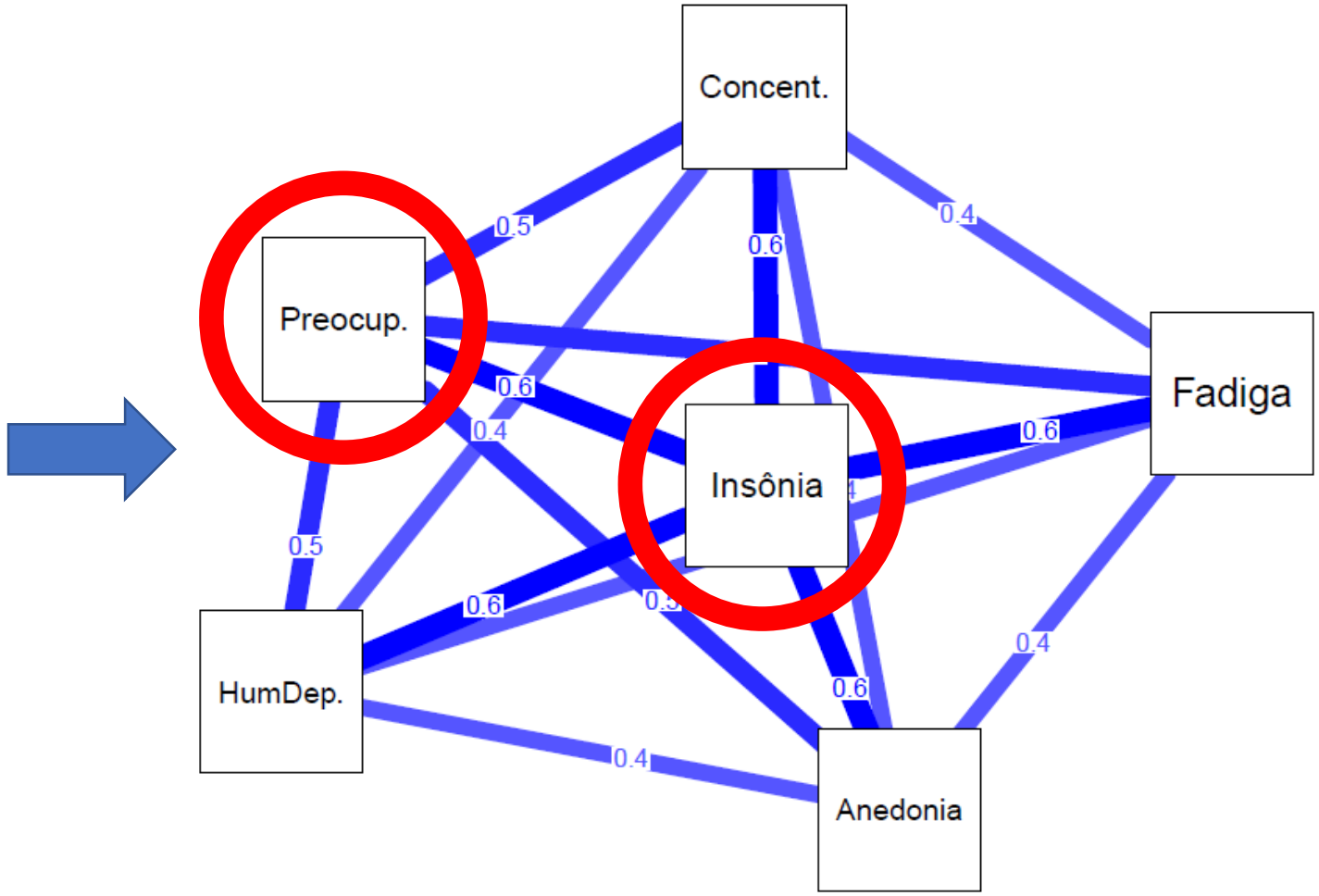
Depressão: estrutura e dinâmica de um sistema

	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

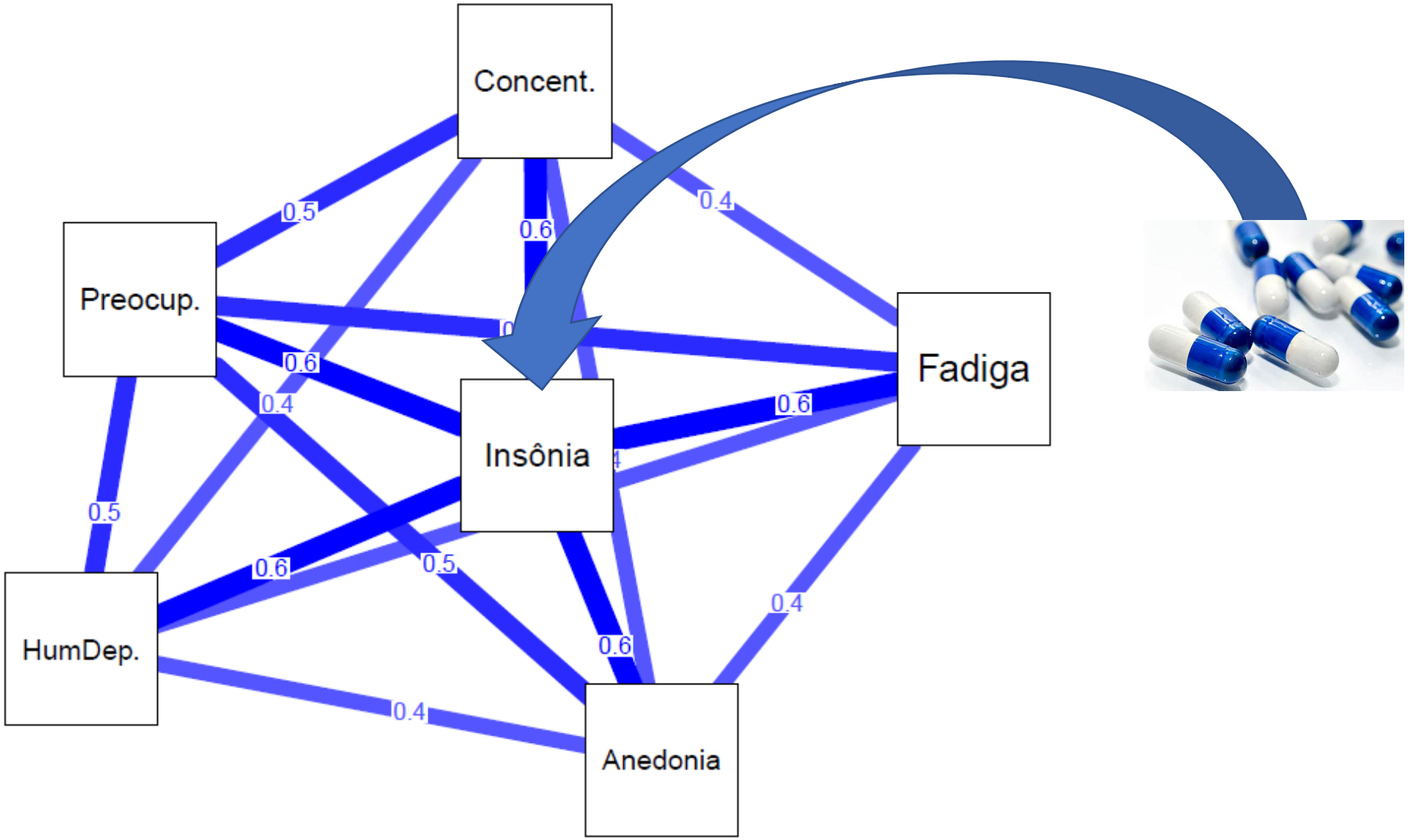


Depressão: estrutura e dinâmica de um sistema

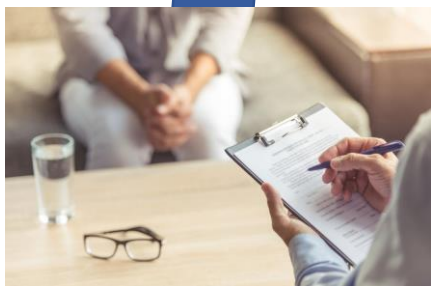
	Insônia	Fadiga	Concent.	Preocup.	HumDep.	Anedonia
Insônia	1.0	0.6	0.6	0.6	0.6	0.6
Fadiga	0.6	1.0	0.4	0.5	0.4	0.4
Concent.	0.6	0.4	1.0	0.5	0.4	0.4
Preocup.	0.6	0.5	0.5	1.0	0.5	0.5
HumDep.	0.6	0.4	0.4	0.5	1.0	0.4
Anedonia	0.6	0.4	0.4	0.5	0.4	1.0

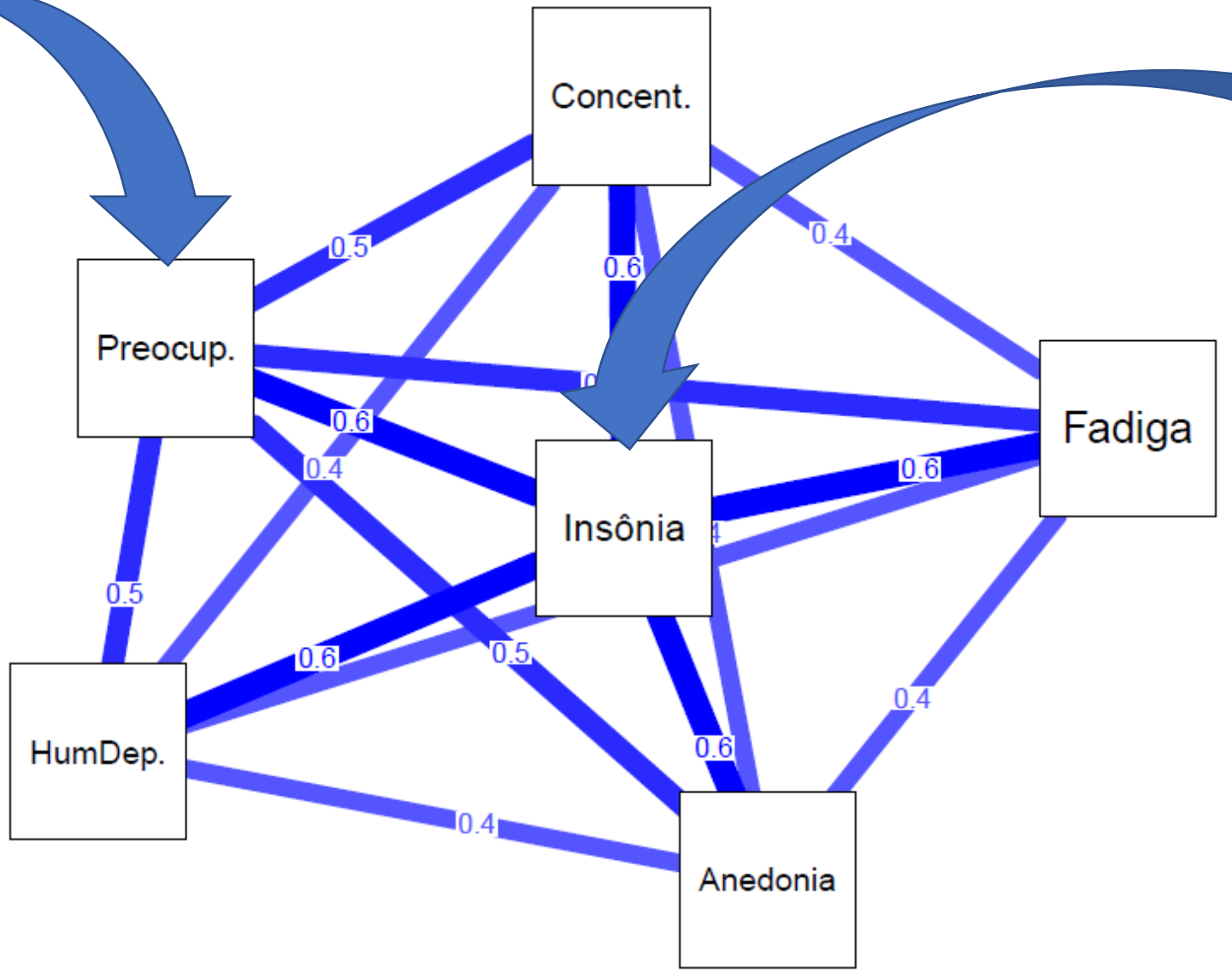


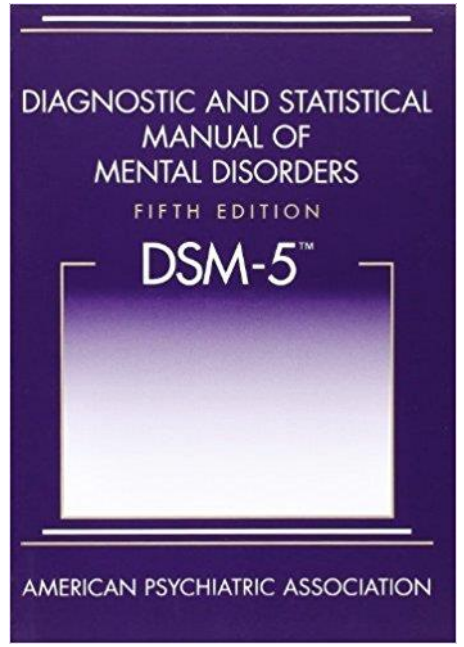
Depressão: estrutura e dinâmica de um sistema

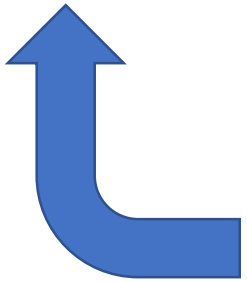


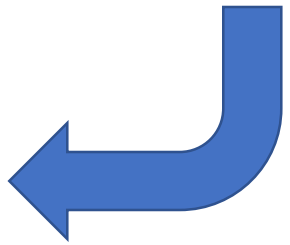
Depressão: estrutura e dinâmica de um sistema

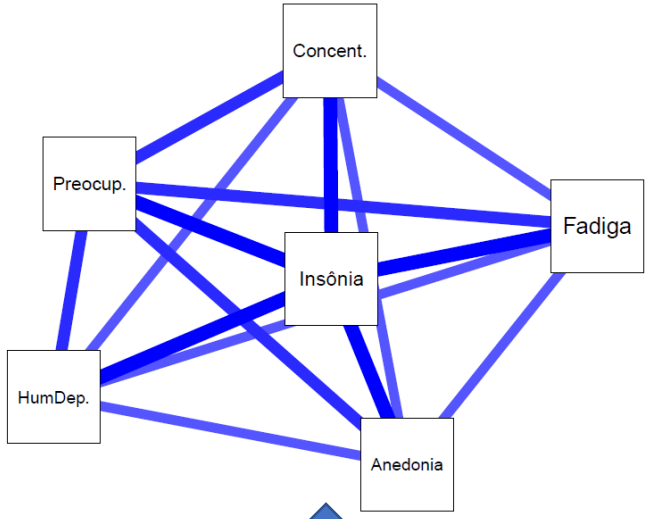


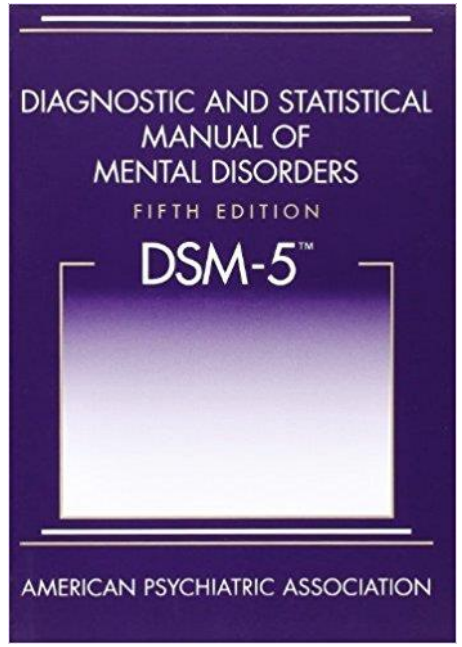



DIAGNOSTIC AND STATISTICAL
MANUAL OF
MENTAL DISORDERS
FIFTH EDITION
DSM-5™
AMERICAN PSYCHIATRIC ASSOCIATION






Concent.
Preocup.
Fadiga
Insônia
HumDep.
Anedonia


DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS
FIFTH EDITION
DSM-5™
AMERICAN PSYCHIATRIC ASSOCIATION

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]

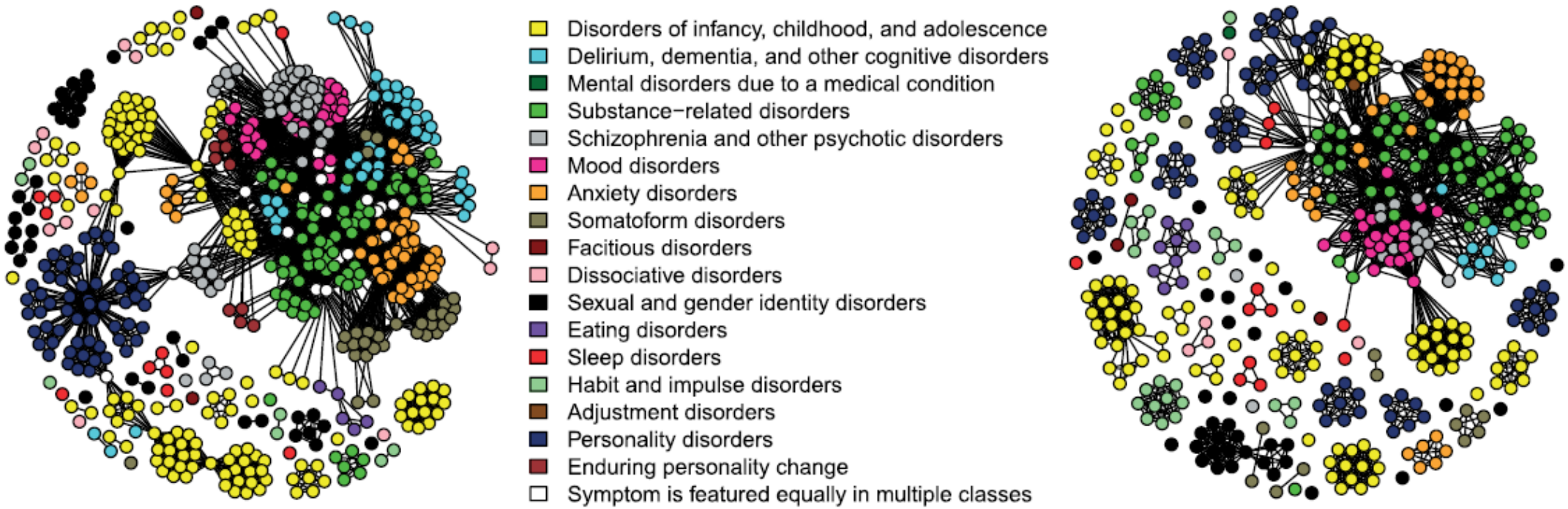
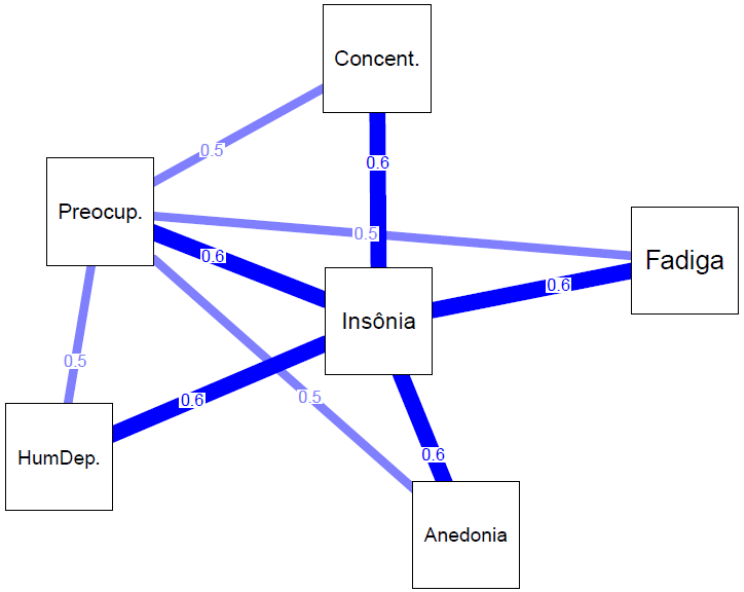


Table 2. Top 10 criteria with the highest degree for ICD-10 and DSM-IV-TR network

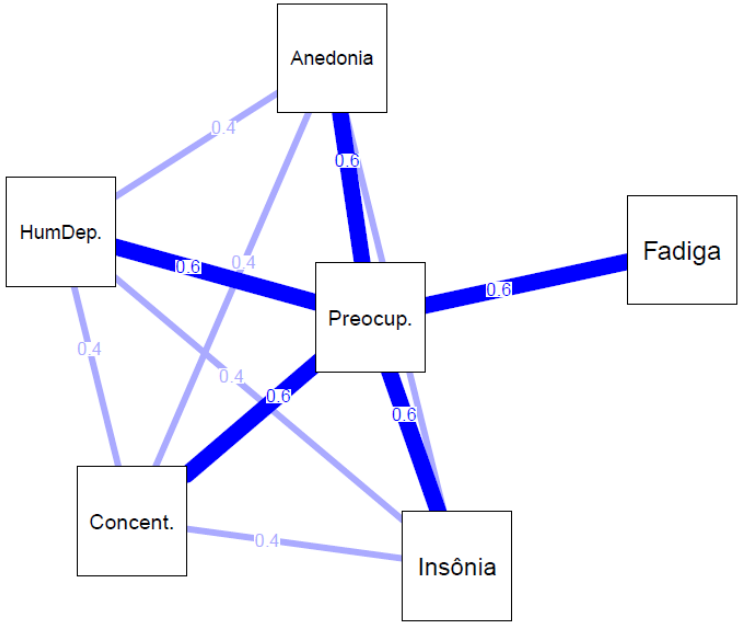
	ICD-10	DSM-IV-TR
1	Insomnia[1]	Insomnia[1]
2	Irritability[1]	Psychomotor agitation
3	Apathy	Psychomotor retardation[1]
4	Difficulty in concentrating[1]	Depressed
5	Nausea	Accelerated heart rate
6	Emotional liability	Distractibility
7	Sweating[1]	Irritability[1]
8	Chest pain	Anxiety and Hypersomnia
9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

Paciente A



Paciente B



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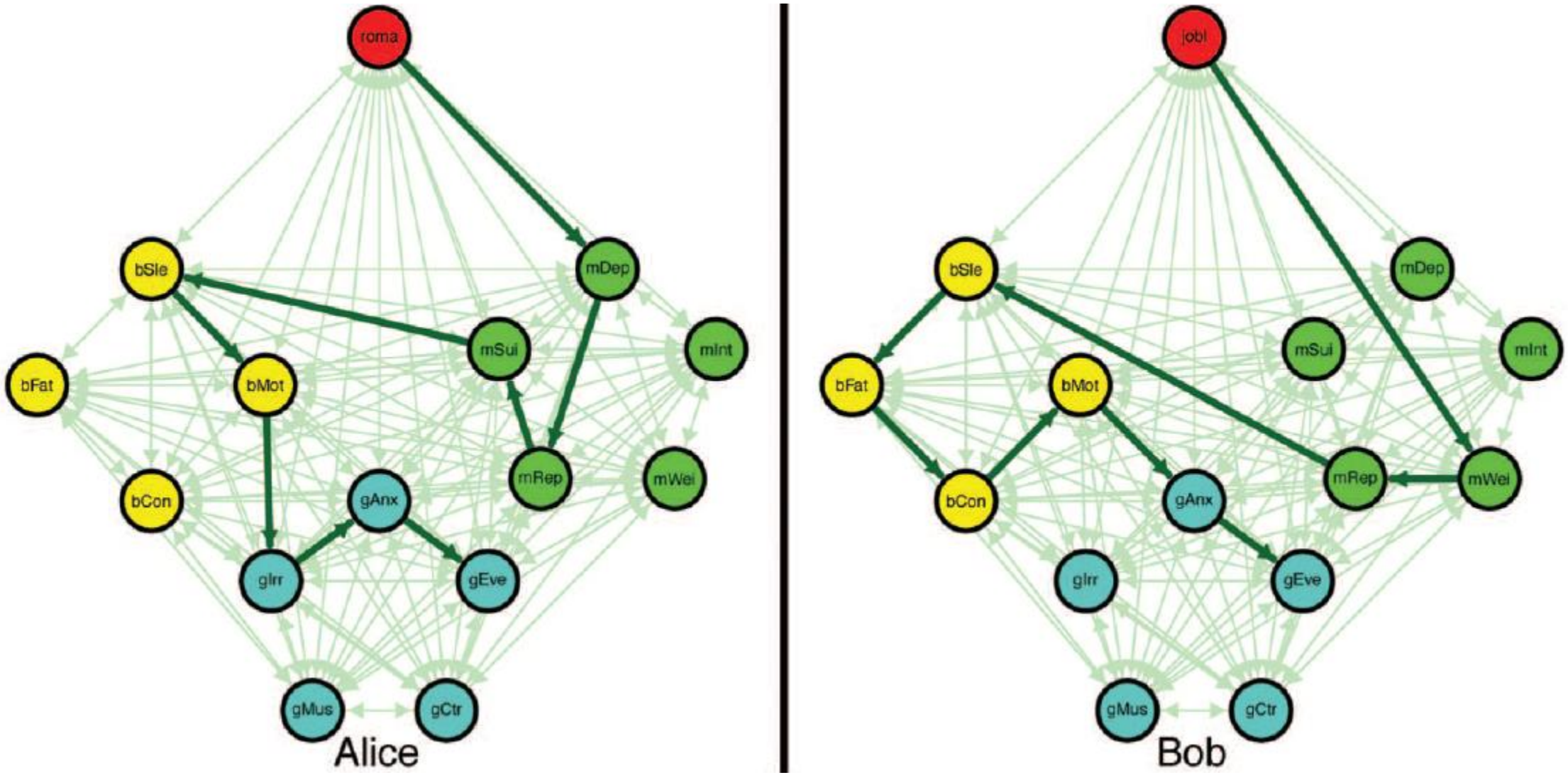
PLoS one

The Small World of Psychopathology

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

Department



SPECIAL ARTICLE

A network theory of mental disorders

Denny Borsboom

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

Complexity, Chaos and Catastrophe:

Modeling Psychopathology as a Dynamic System

Jolanda J. Kossakowski

Angélique O. J. Cramer

Network Analysis: An Integrative Approach to the Structure of Psychopathology

Denny Borsboom and Angélique O.J. Cramer

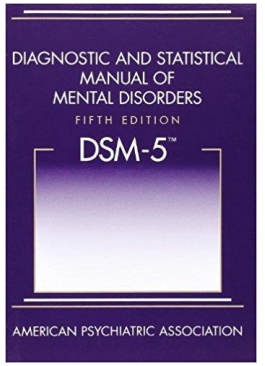
y of Amsterdam, Amsterdam 1018 XA, The Netherlands;

Clinical Neuropsychiatry (2016) 13, 4/5, 68-76

MENTAL DISORDERS AS COMPLEX NETWORKS:
AN INTRODUCTION AND OVERVIEW OF A NETWORK APPROACH TO PSYCHOPATHOLOGY*

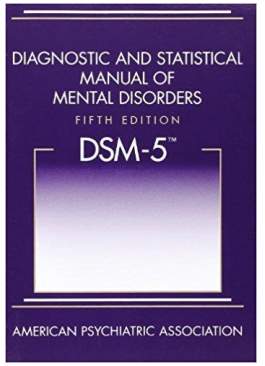
Michèle B. Nuijten, Marie K. Deserno, Angélique O. J. Cramer, Denny Borsboom

Comorbidade: uma perspectiva de rede



ANSIEDADE	DEPRESSÃO
ANSIEDADE PREOCUPAÇÃO	HUMOR DEPRIMIDO
IRRITABILIDADE	ANEDONIA
TENSÃO MUSCULAR	ALTERAÇÕES DE PESO
ALTERAÇÕES NO SONO	ALTERAÇÕES NO SONO
PROBLEMAS DE CONCENTRAÇÃO	PROBLEMAS CONCENTRAÇÃO
AGITAÇÃO	AGITAÇÃO
FADIGA	FADIGA

Comorbidade: uma perspectiva de rede



ANSIEDADE	DEPRESSÃO
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AGITAÇÃO	AGITAÇÃO
FADIGA	FADIGA

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

Comorbidity: A network perspective

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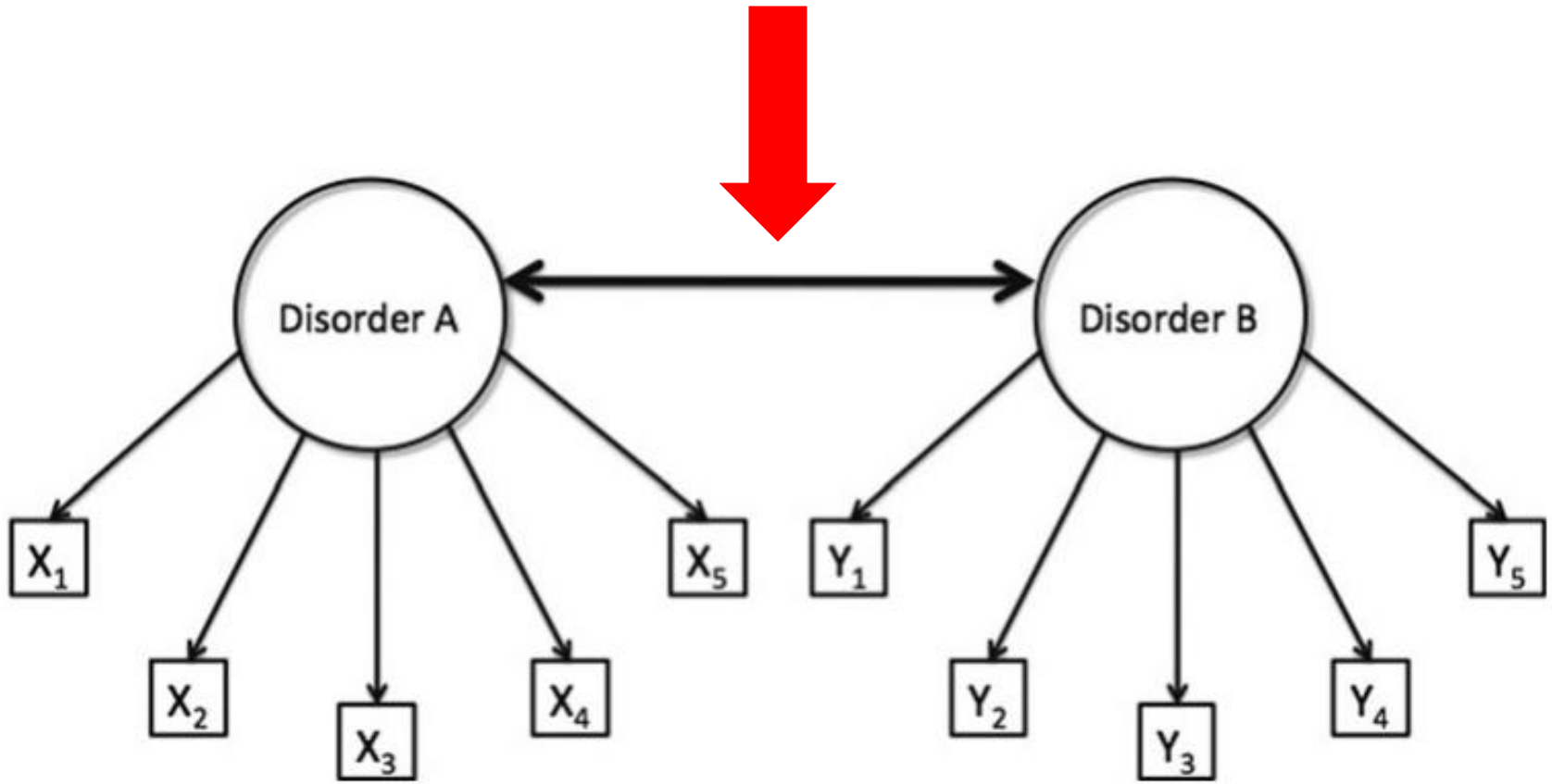
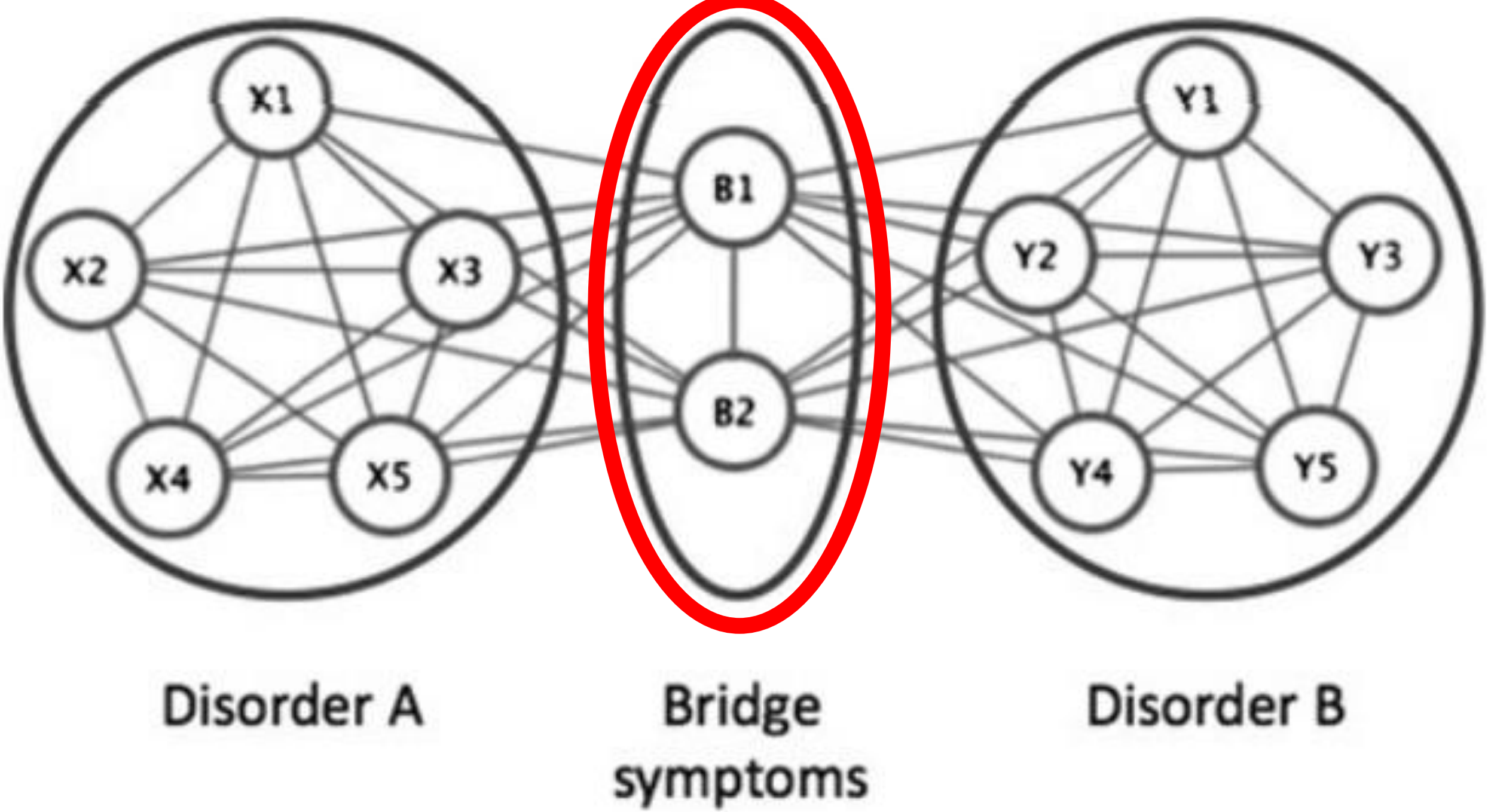
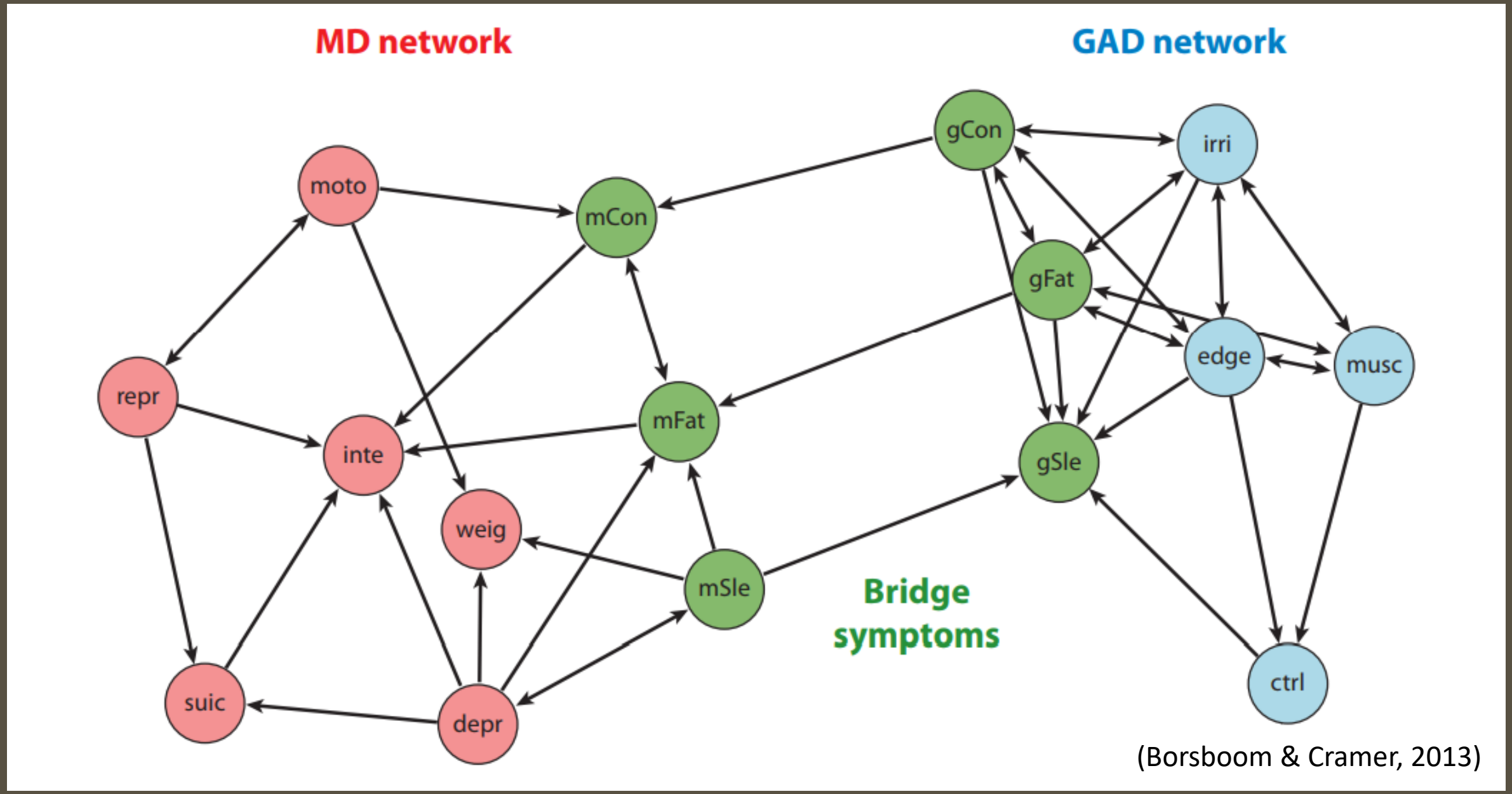
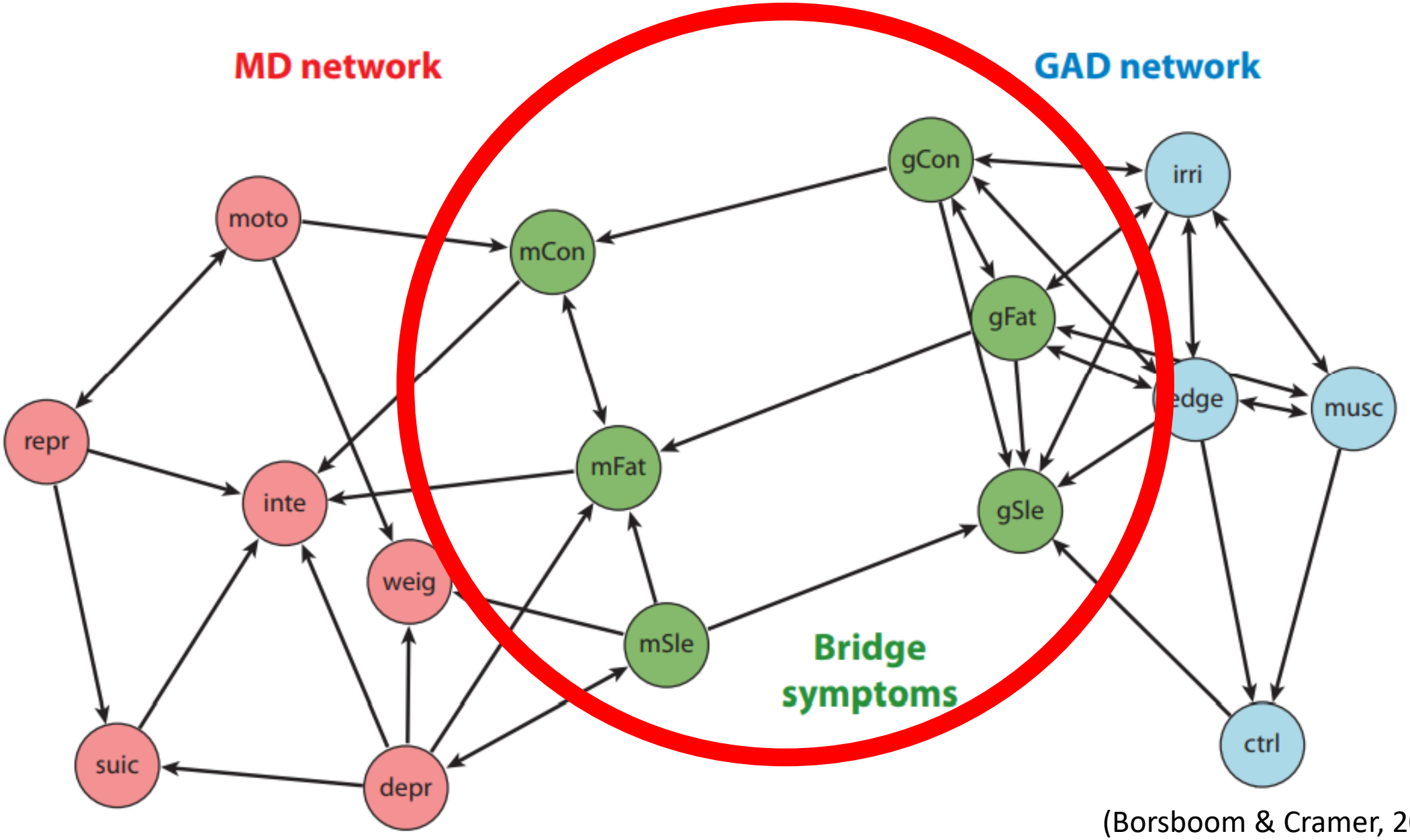


Figure 1. A model of comorbidity between disorders A and B, under the standard assumptions of latent variable modeling. The *circles* represent the disorders (i.e., latent variables) and the *rectangles* represent the observable core symptoms of those disorders (i.e., $X_1 - X_5$ for disorder A, and $Y_1 - Y_5$ 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)

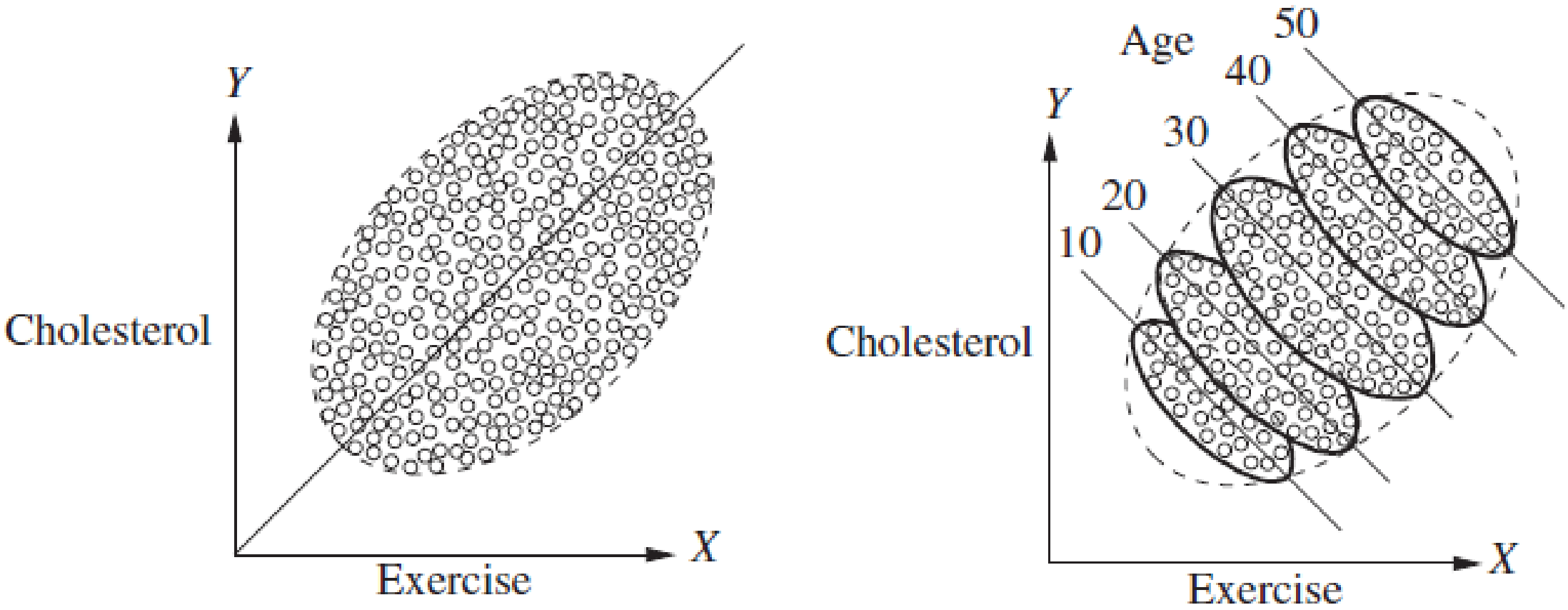
Perguntas:

- Como aplicar o conhecimento de um sistema estimado a partir de um grupo em *um indivíduo*?

- Como determinar qual sintoma *causa* outro?

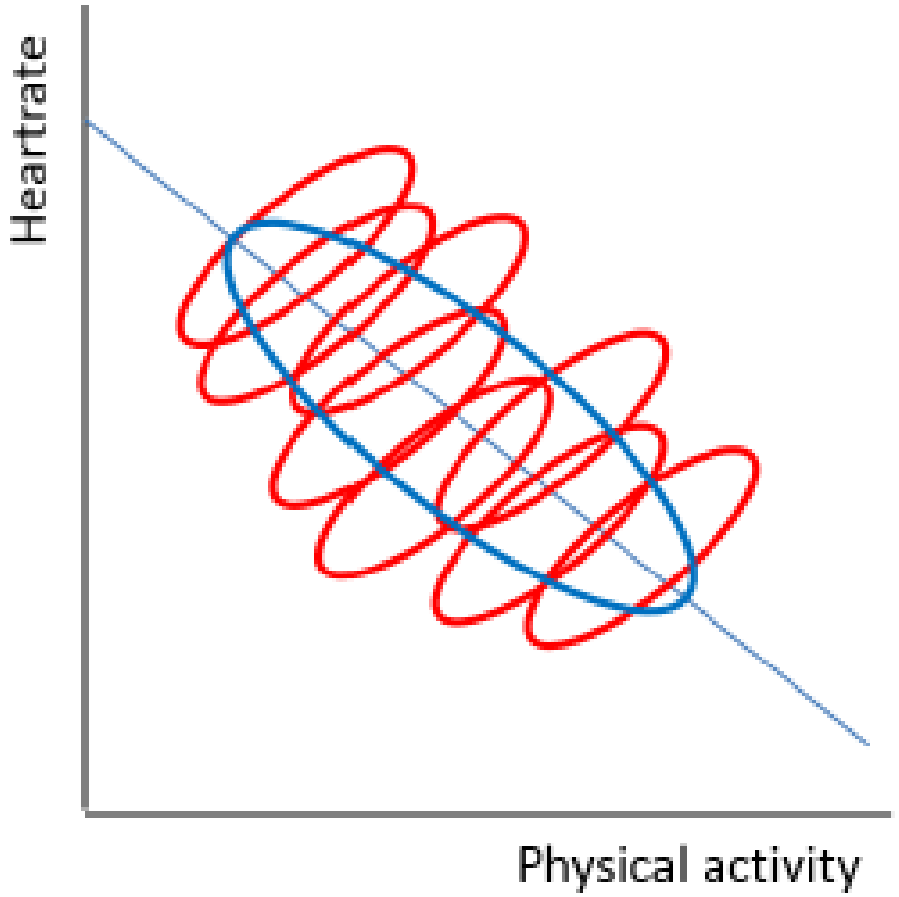
Modelos e indivíduos

- Algumas inferências sobre indivíduos são incorretamente deduzidas a partir de informações sobre grupos (grandes amostras)
- Falácia ecológica (https://en.wikipedia.org/wiki/Ecological_fallacy)

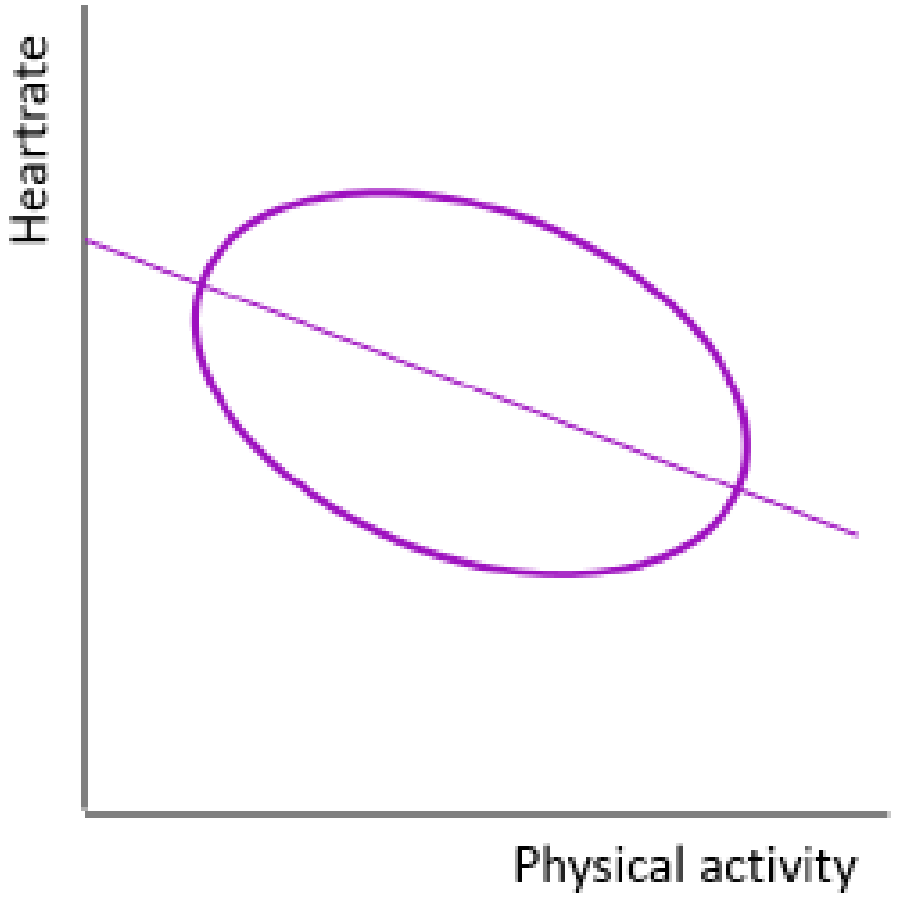


Paradoxo de Simpson (Pearl, Glymour & Jewell, 2016)

Within-person and between-person



Cross-sectional



(Hamaker, 2017)

Modelos e indivíduos

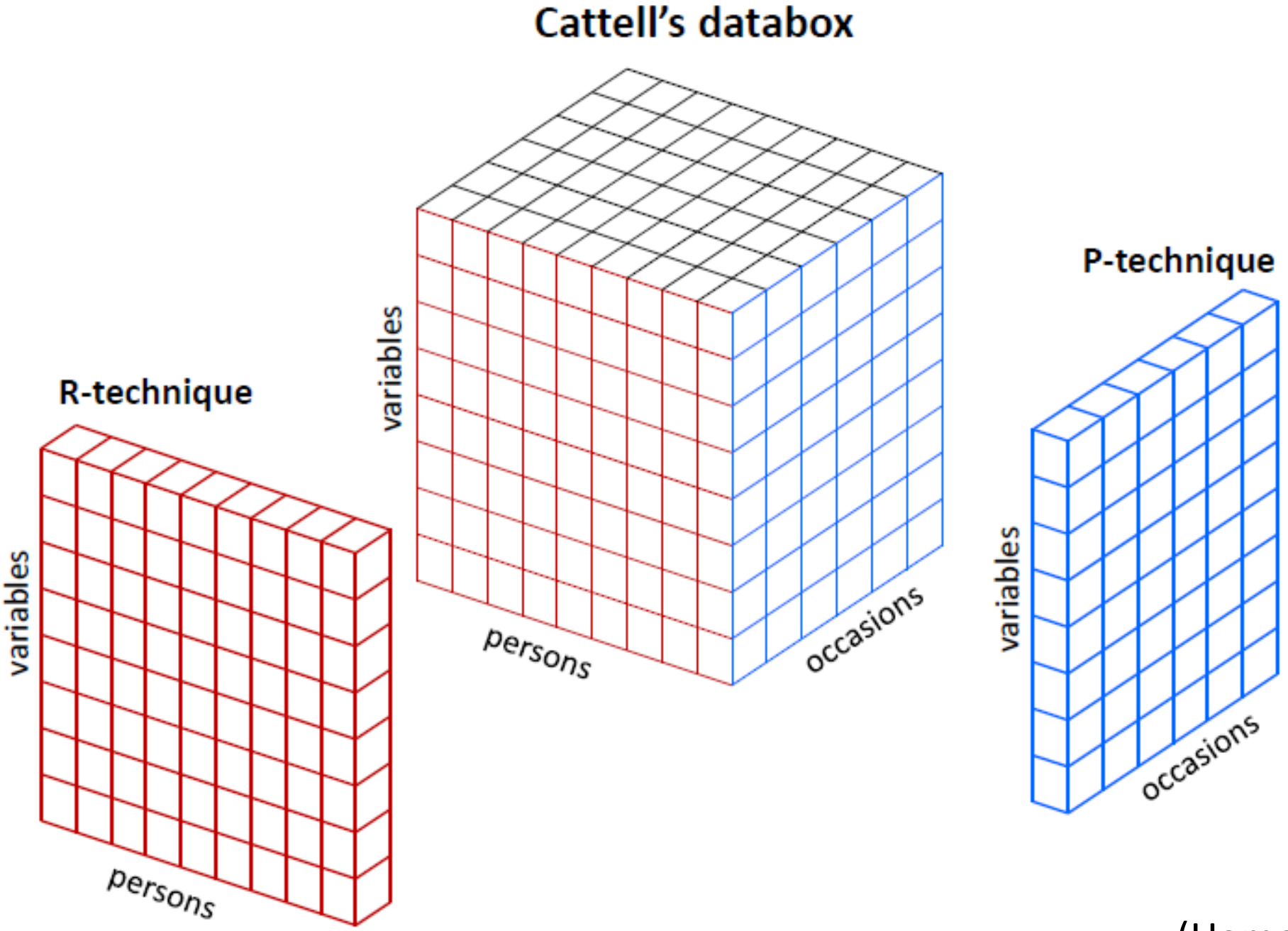
- **Ergodicidade** (https://pt.wikipedia.org/wiki/Teoria_erg%C3%B3dica)
- Variações na estrutura de medida
- Big-Five: estrutura diferente quando observada variabilidade intraindividual

MEASUREMENT, 2(4), 201–218

FOCUS ARTICLE

A Manifesto on Psychology as Idiographic Science: Bringing the Person Back Into Scientific Psychology, This Time Forever

Peter C. M. Molenaar



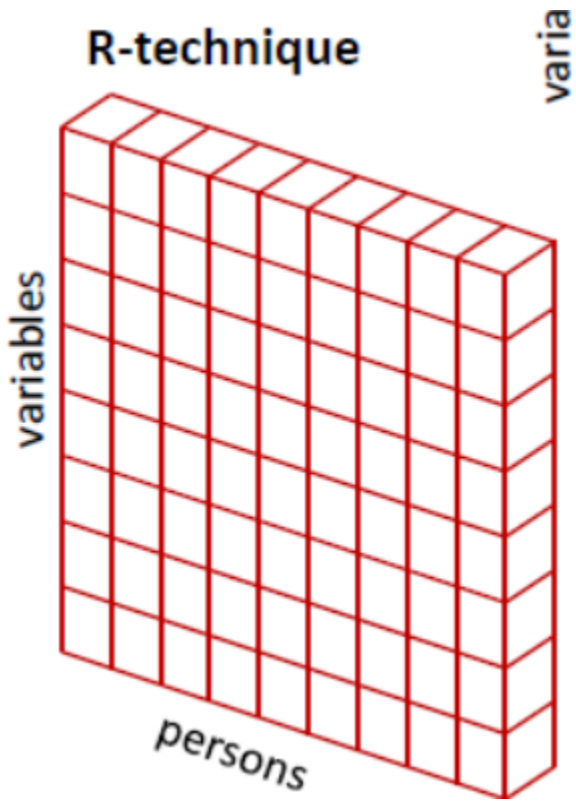
(Hamaker, 2017)

British Journal of Mathematical and Statistical Psychology (1995), **48**, 211–220 *Printed in Great Britain*

Spearman and the origin and development of factor analysis

D. J. Bartholomew†

London School of Economics and Political Science, Houghton Street, London WC2A 2AE, UK

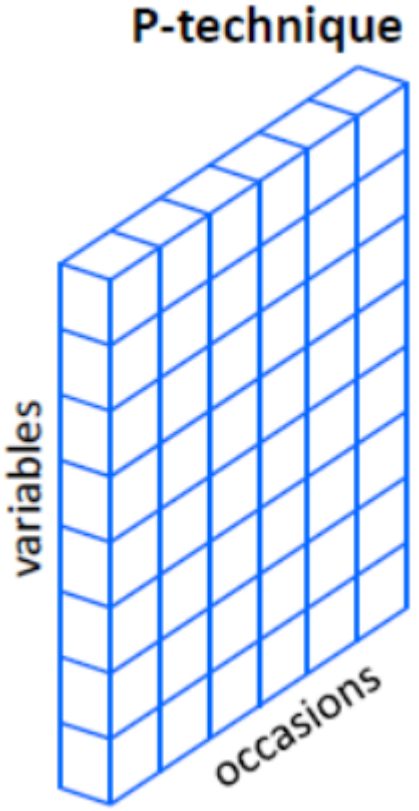


DECEMBER, 1947
PSYCHOMETRIKA—VOL. 12, NO. 4

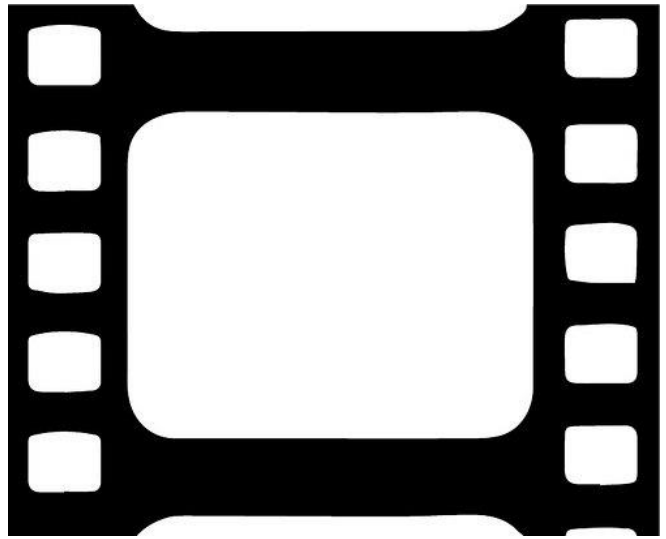
P-TECHNIQUE DEMONSTRATED IN DETERMINING PSYCHO-PHYSIOLOGICAL SOURCE TRAITS IN A NORMAL INDIVIDUAL

R. B. CATTELL, A. K. S. CATTELL, AND R. M. RHYMER
UNIVERSITY OF ILLINOIS

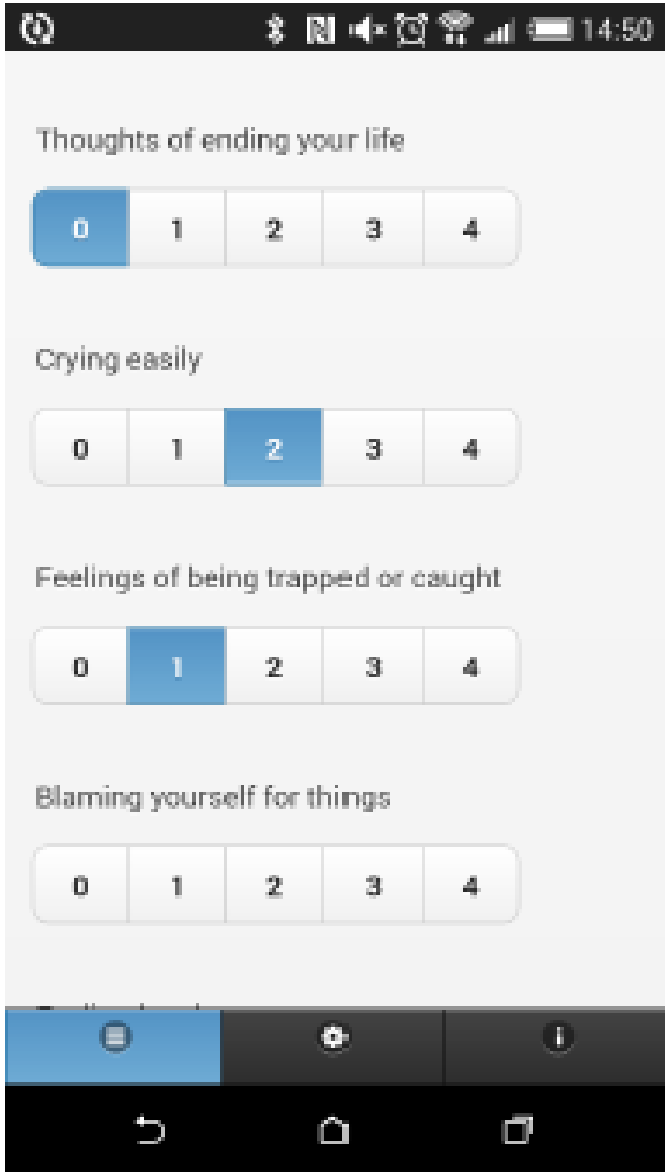
- Wundt
- N = 1
- Introspecção e replicações



Estudos transversais



Séries temporais



(Epskamp, 2017)

Transversal →

Subject	Time	Item 1	Item 2	Item 3
Subject 1	Time 1	2	2	4
Subject 2	Time 1	4	1	2
Subject 3	Time 1	1	3	0

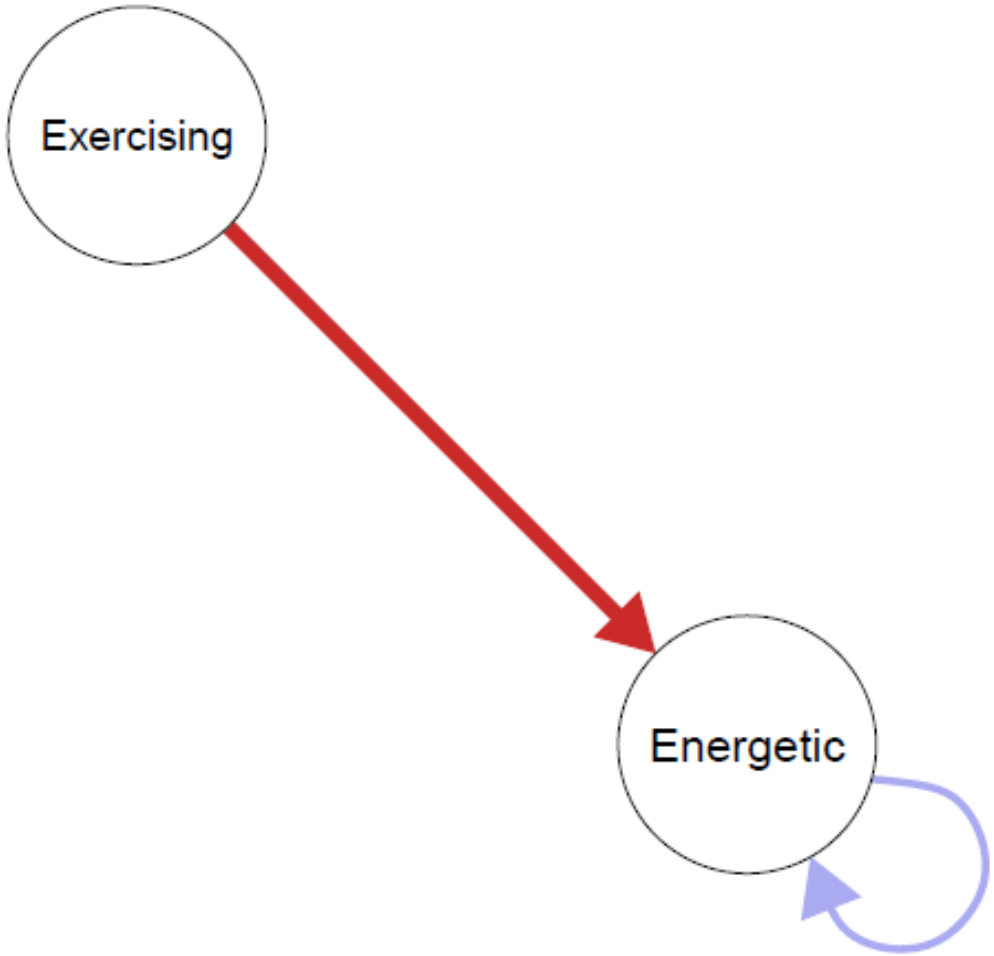
Série temporal N = 1 →

Subject	Time	Item 1	Item 2	Item 3
Subject 1	Time 1	2	2	4
Subject 1	Time 2	2	4	4
Subject 1	Time 3	1	4	3

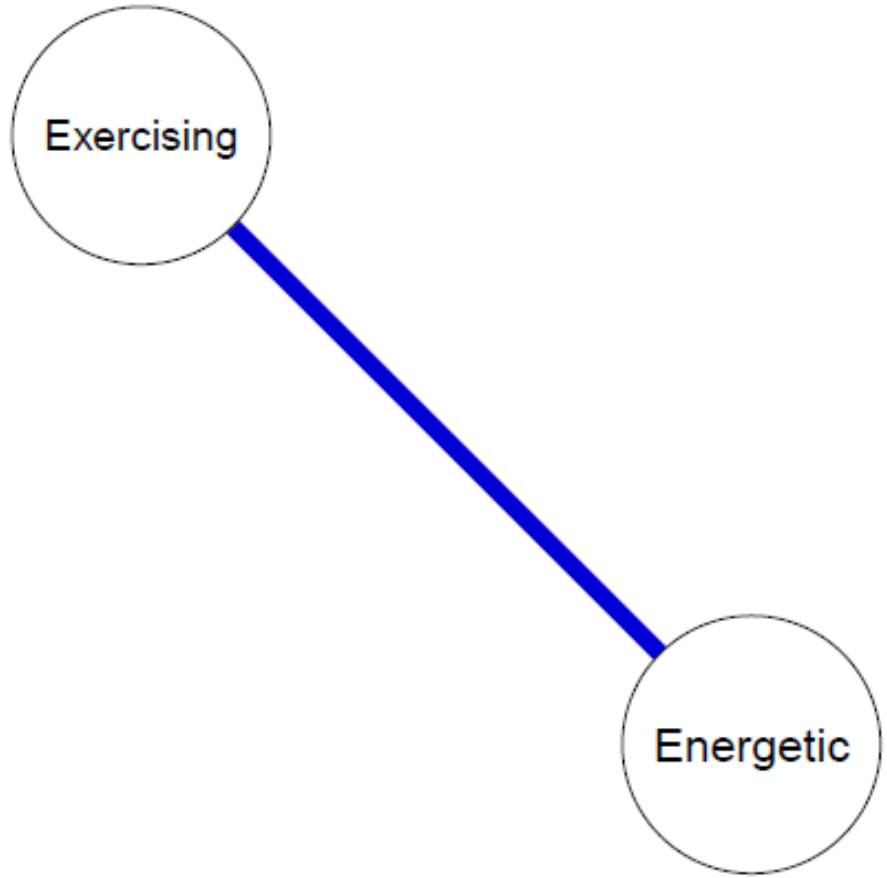
Série temporal N > 1 →

Subject	Time	Item 1	Item 2	Item 3
Subject 1	Time 1	2	2	4
Subject 1	Time 2	2	4	4
Subject 1	Time 3	1	4	3
Subject 2	Time 1	4	1	2
Subject 2	Time 2	3	1	2
Subject 2	Time 3	3	2	1
Subject 3	Time 1	1	3	0
Subject 3	Time 2	4	0	1
Subject 3	Time 3	0	3	3

Temporal network



Contemporaneous network



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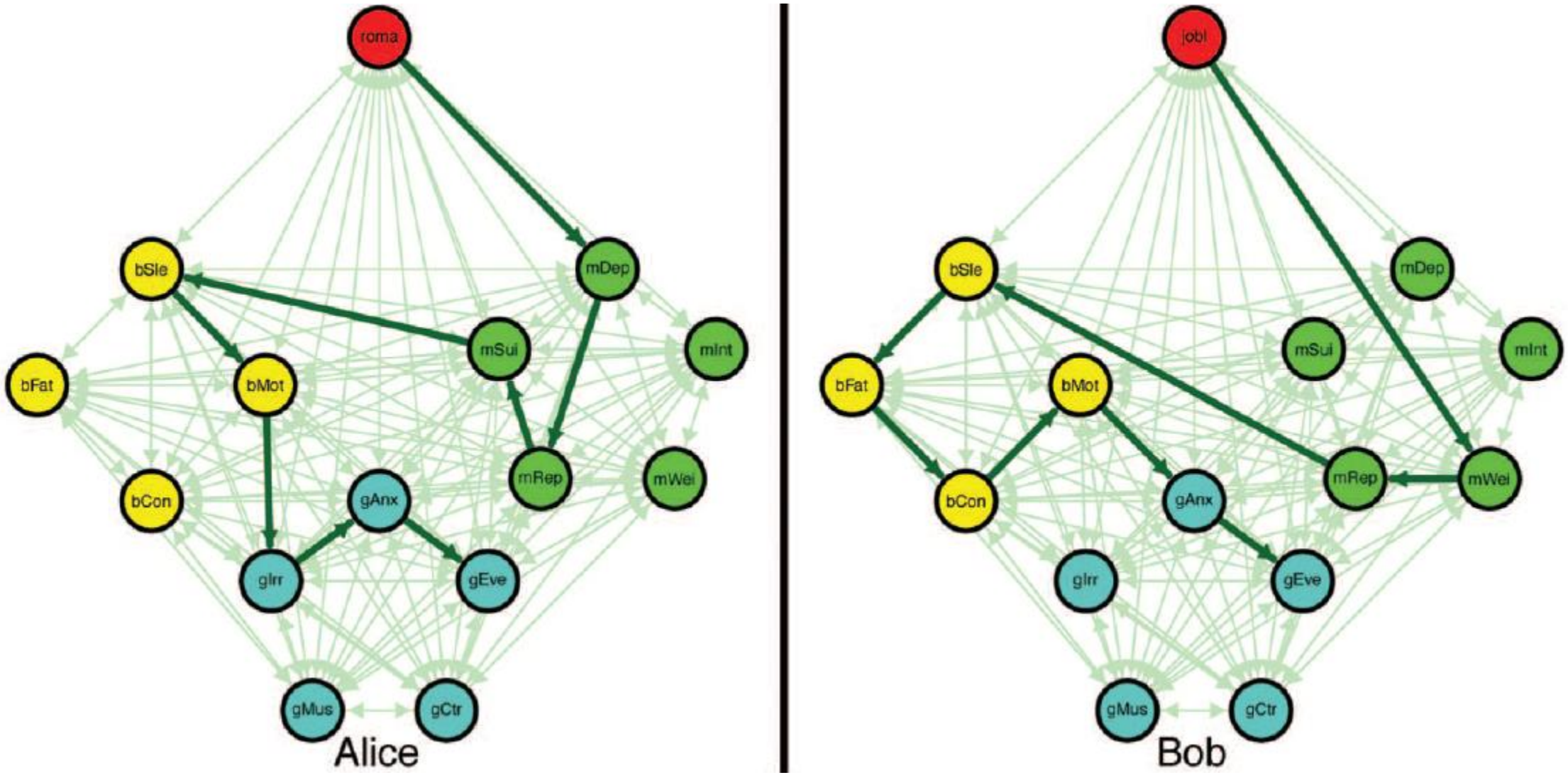
PLoS one

The Small World of Psychopathology

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

Department



Considerações finais:

- Os modelos de redes representam ferramentas úteis para a compreensão da psicopatologia e da comorbidade
- A avaliação dinâmica pode tornar intervenções mais efetivas e personalizadas
- Permite a transição entre os níveis nomotético e idiográfico na prática clínica e de pesquisa

GRUPO DE PESQUISA

AVALIAÇÃO EM BEM-ESTAR E SAÚDE MENTAL

Muito obrigado!!!

Modelos de rede em psicopatologia e comorbidade

Prof. Dr. Wagner de Lara Machado

wagner.machado@pucrs.br