

**Vers une approche non réductionniste,
dynamique et intégrative de la
psychopathologie des troubles anxieux**

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& Institute of Neuroscience
Université catholique de Louvain
Belgium

My **talk** overview

From an empirical crisis to a theoretical crisis and vice versa

1

**Let's get
personal**

2

**Towards
complexity**

3

**My research
agenda(s)**

4

**My research
horizon**

My **talk** overview

From an empirical crisis to a theoretical crisis and vice versa

1

**Let's get
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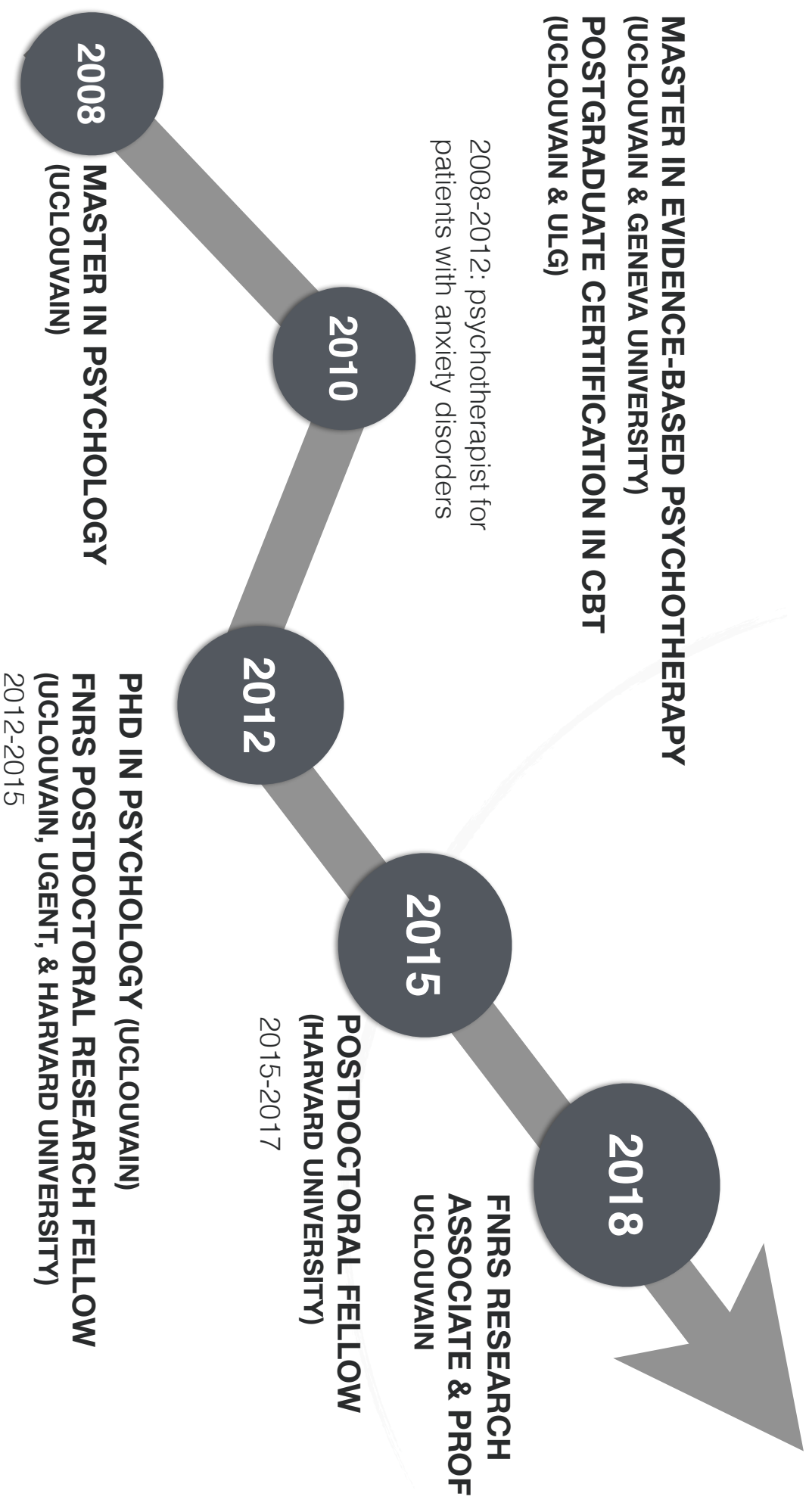
3


**My research
agenda(s)**

4

**My research
horizon**

Back to the past

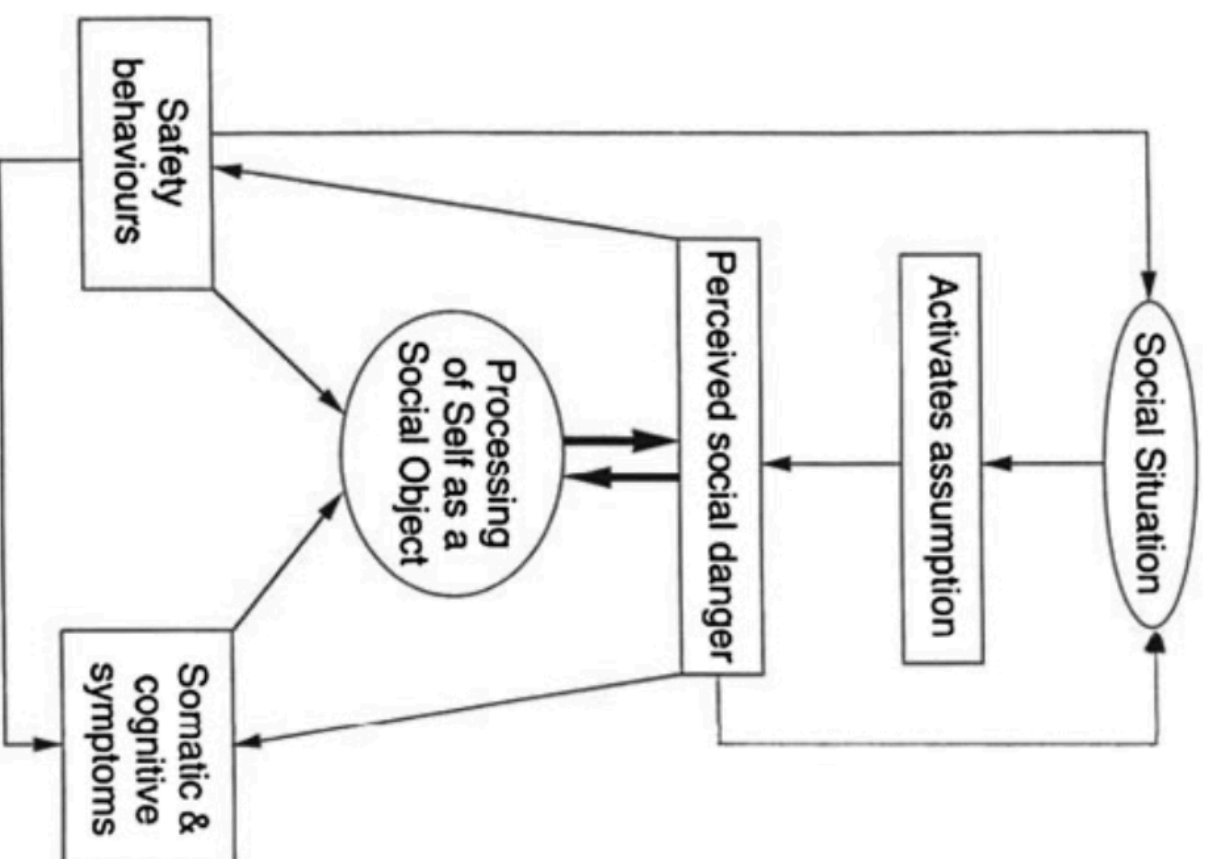




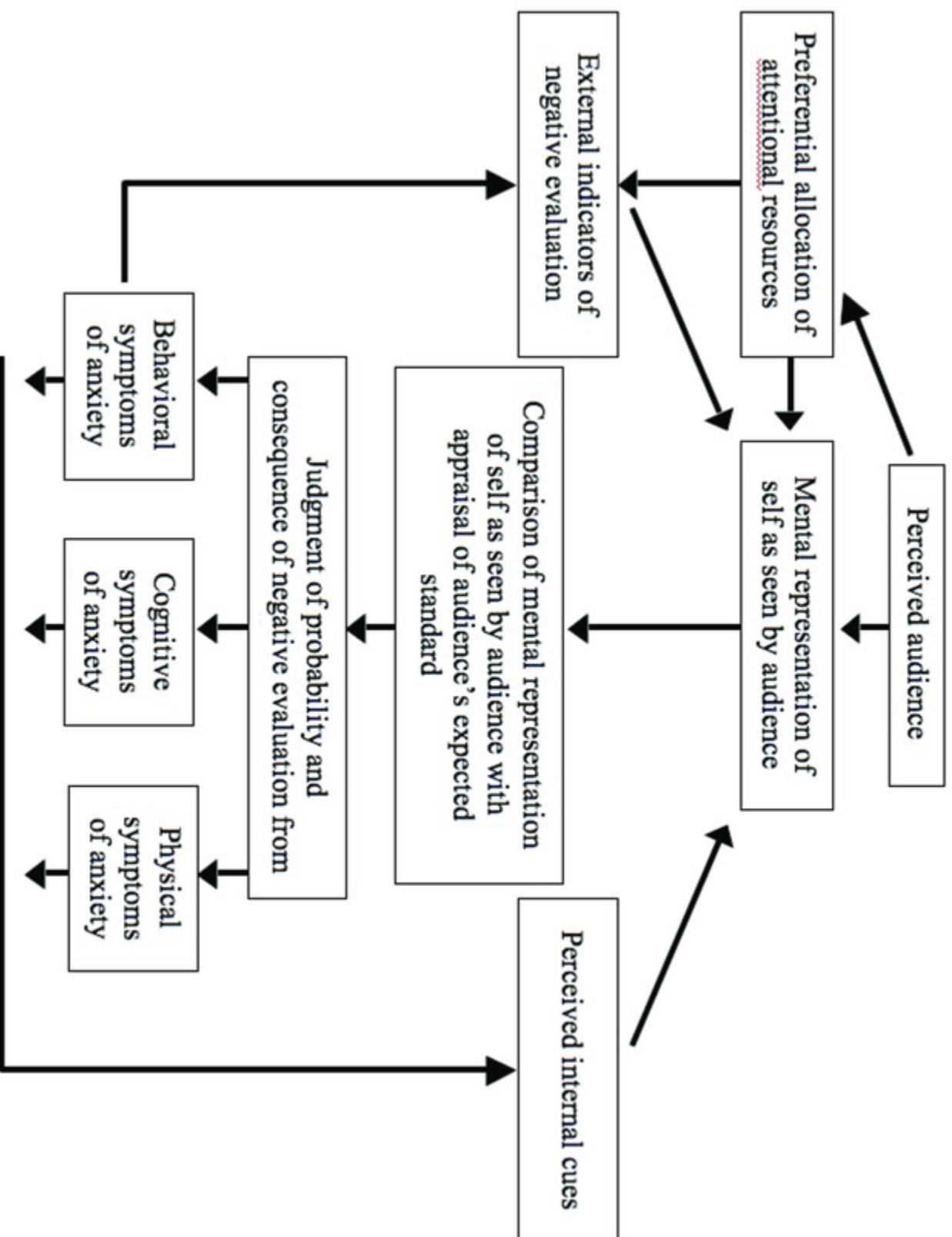
Why/How does anxiety persist?



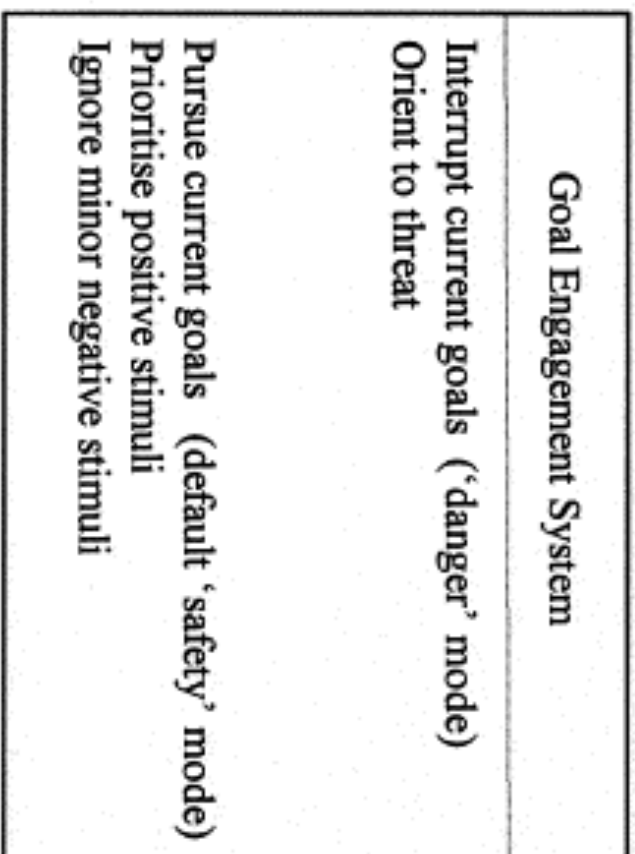
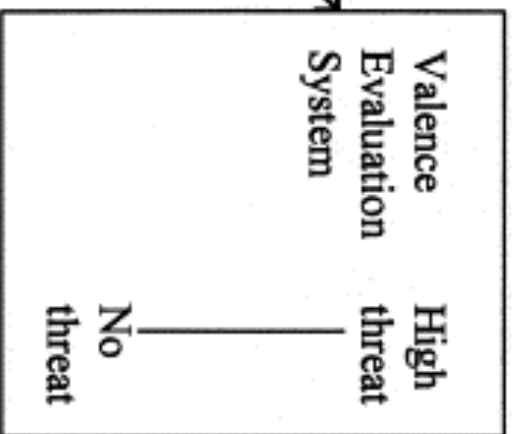
Cognitive models of anxiety disorders



Clark & Wells (1995)



- Stimulus input →
- Situational context ↗
- State anxiety ↗
- Prior learning ↗
- Biological Preparedness ↗

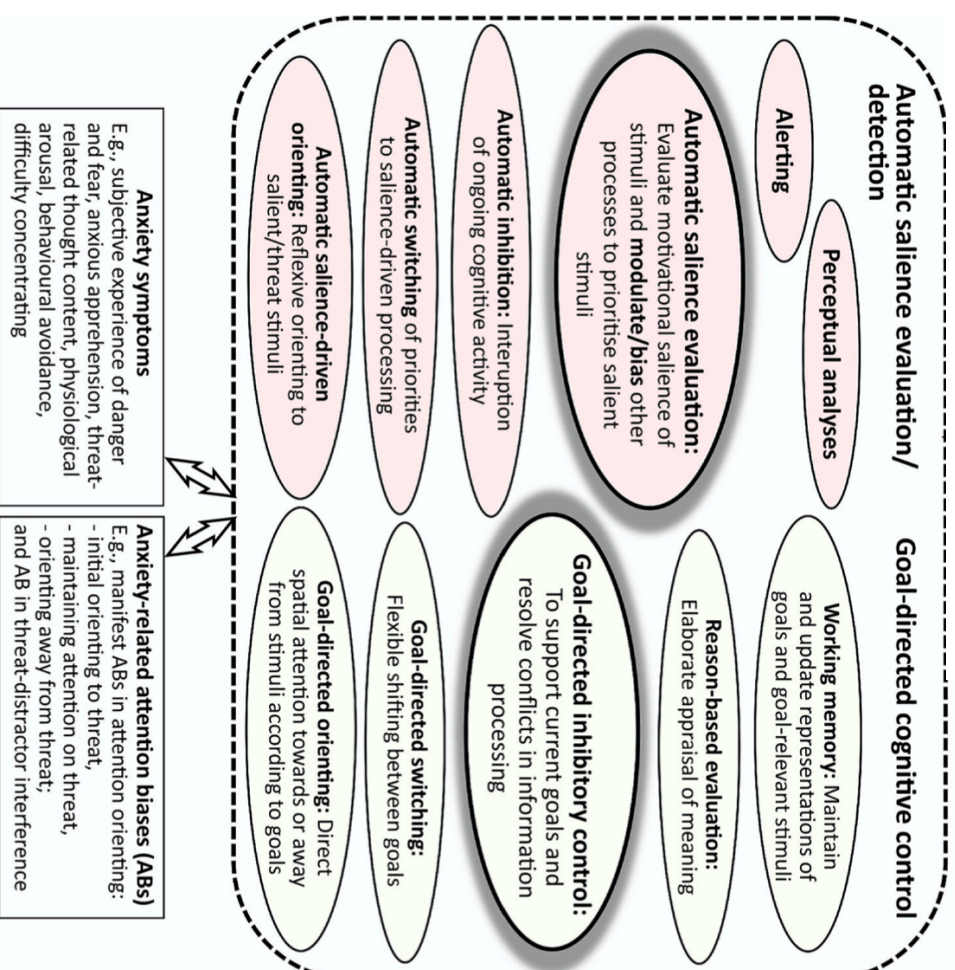


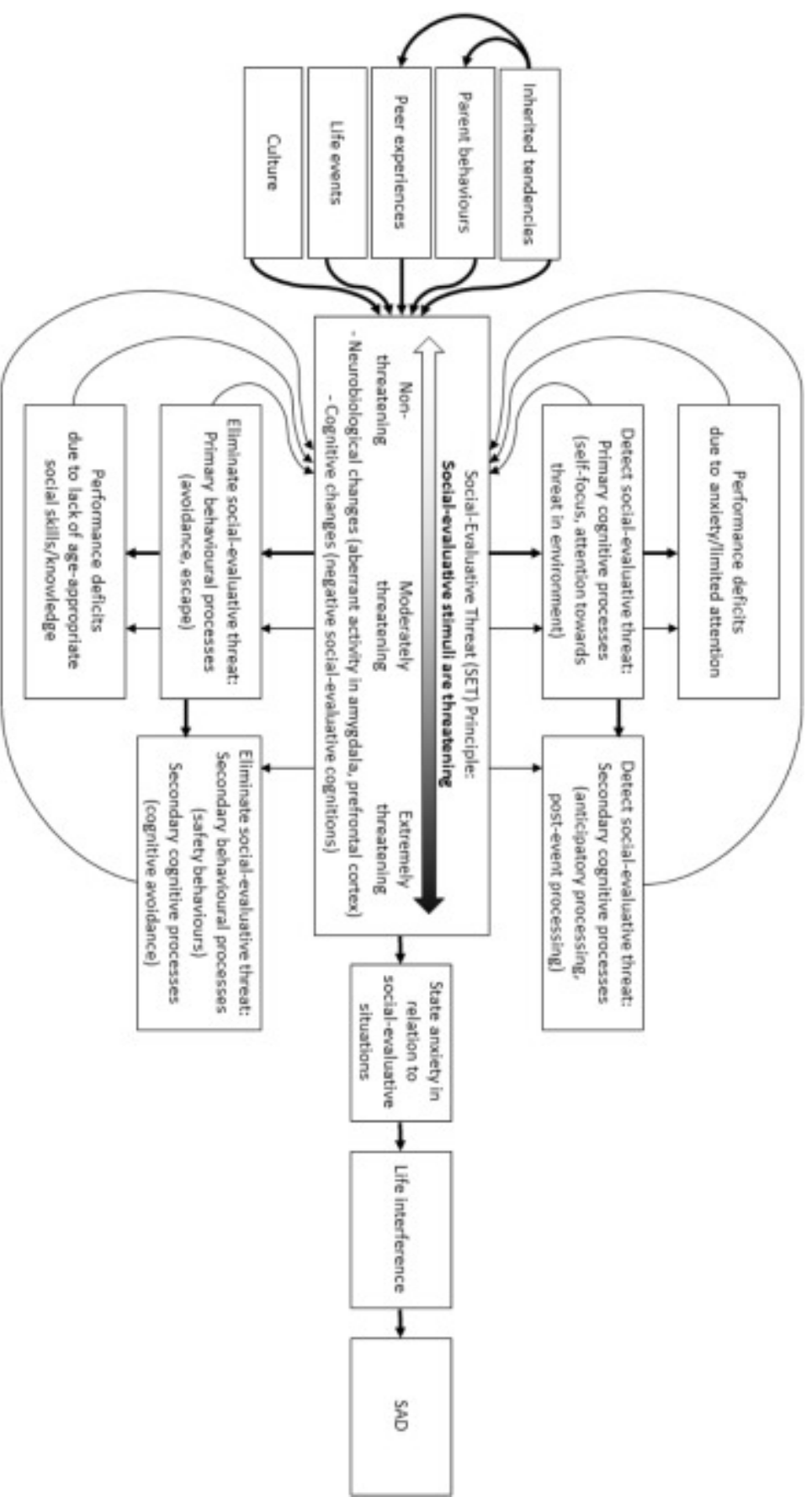
Trait anxiety reflects reactivity of Valence Evaluation system to aversive stimuli



**And not restricted
to the late 90s...**

Opinion

Anxiety and Threat-Related Attention:
Cognitive-Motivational Framework and
TreatmentKarin Mogg^{1,2,*} and Brendan P. Bradley^{1,2}





Review

Transdiagnostic models of anxiety disorder: Theoretical and empirical underpinnings

Peter J. Norton^{a,b,*}, Daniel J. Paulus^c

^a School of Psychological Sciences, Monash University, Australia

^b Monash Institute of Cognitive and Clinical Neurosciences, Australia

^c University

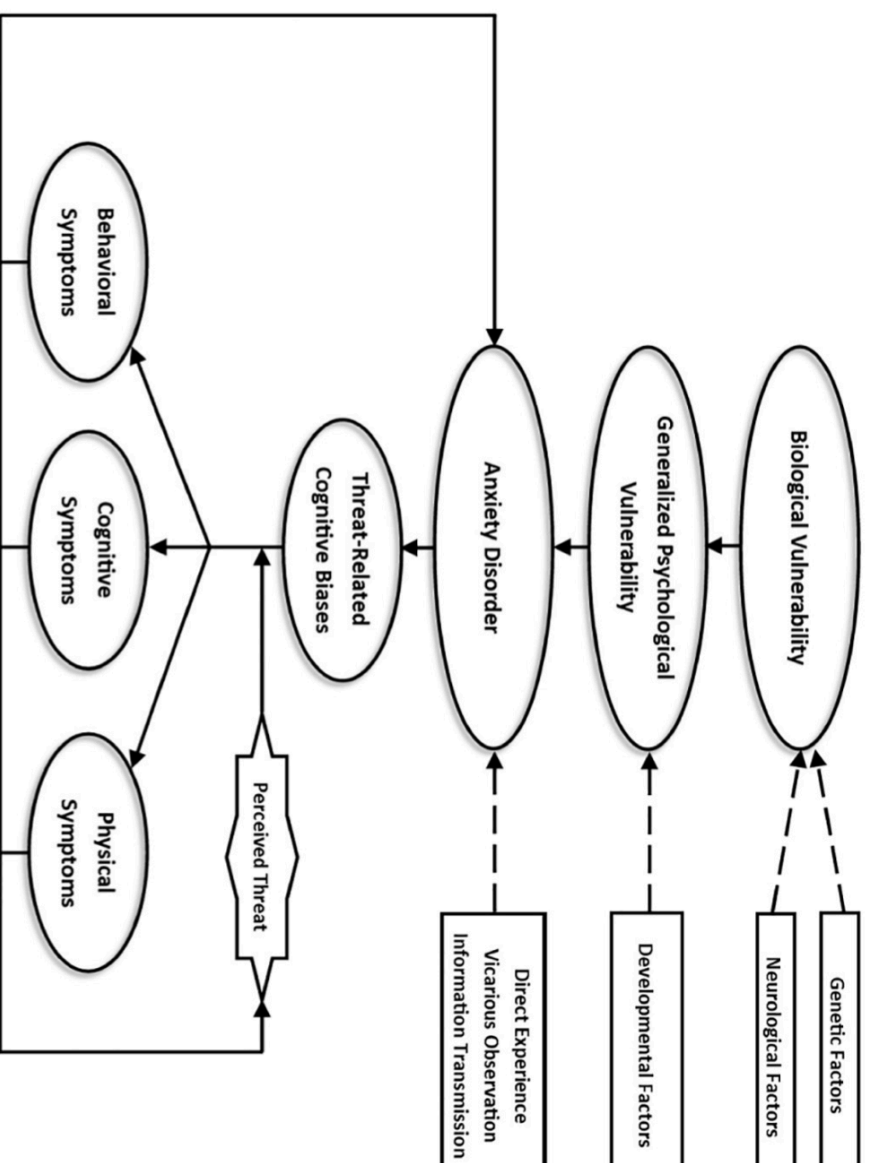
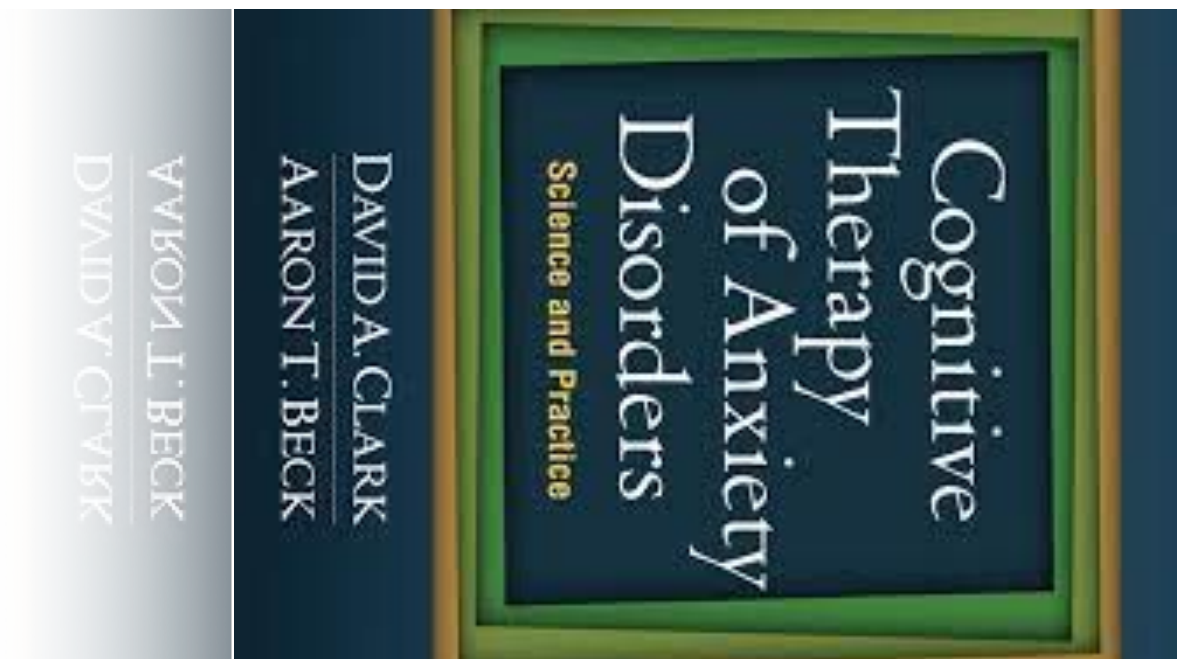


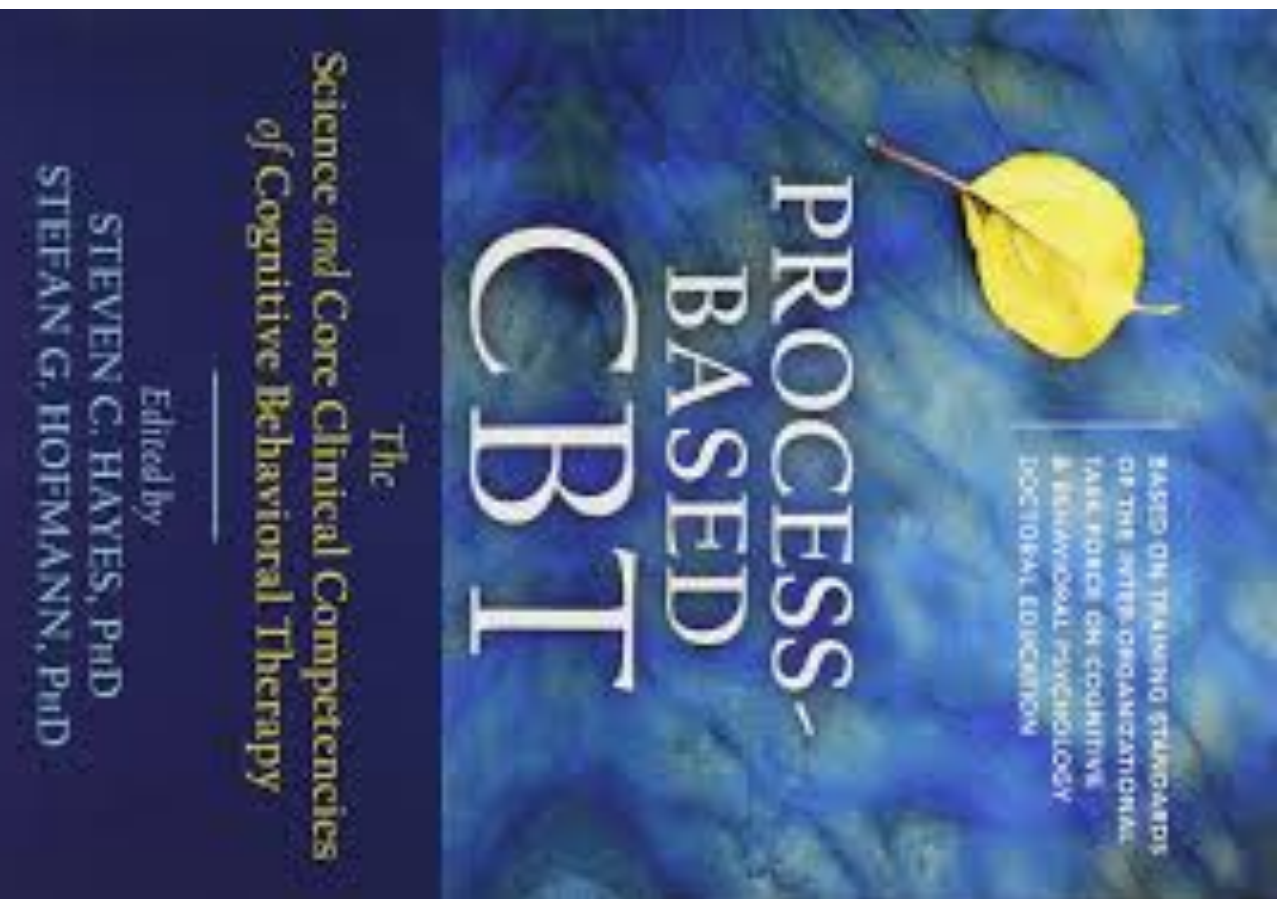
Fig. 3. A model of the development and maintenance of anxiety disorder.

Why are anxiety researchers so fascinated by cognitive models?



Clinical translations...





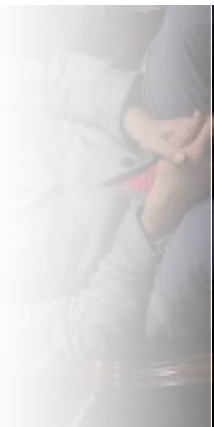
STEVEN G. HOFMANN, PHD
STEVEN C. HAYES, PHD
epi@csjpa



S.C. Hayes



S. G. Hofmann





Review

Transdiagnostic models of anxiety disorder: Theoretical and empirical underpinnings

Peter J. Norton^{a,b,*}, Daniel J. Paulus^c

^a School of Psychological Sciences, Monash University, Australia

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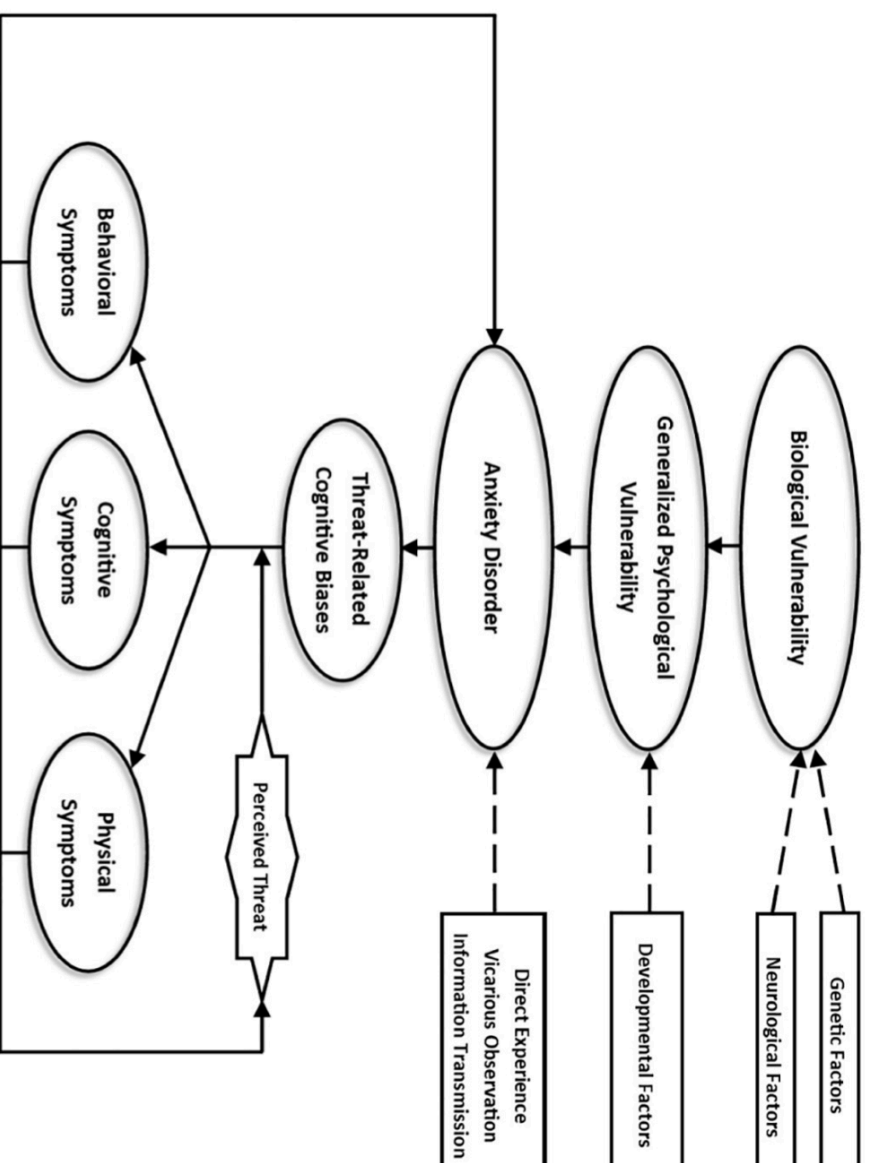


Fig. 3. A model of the development and maintenance of anxiety disorder.

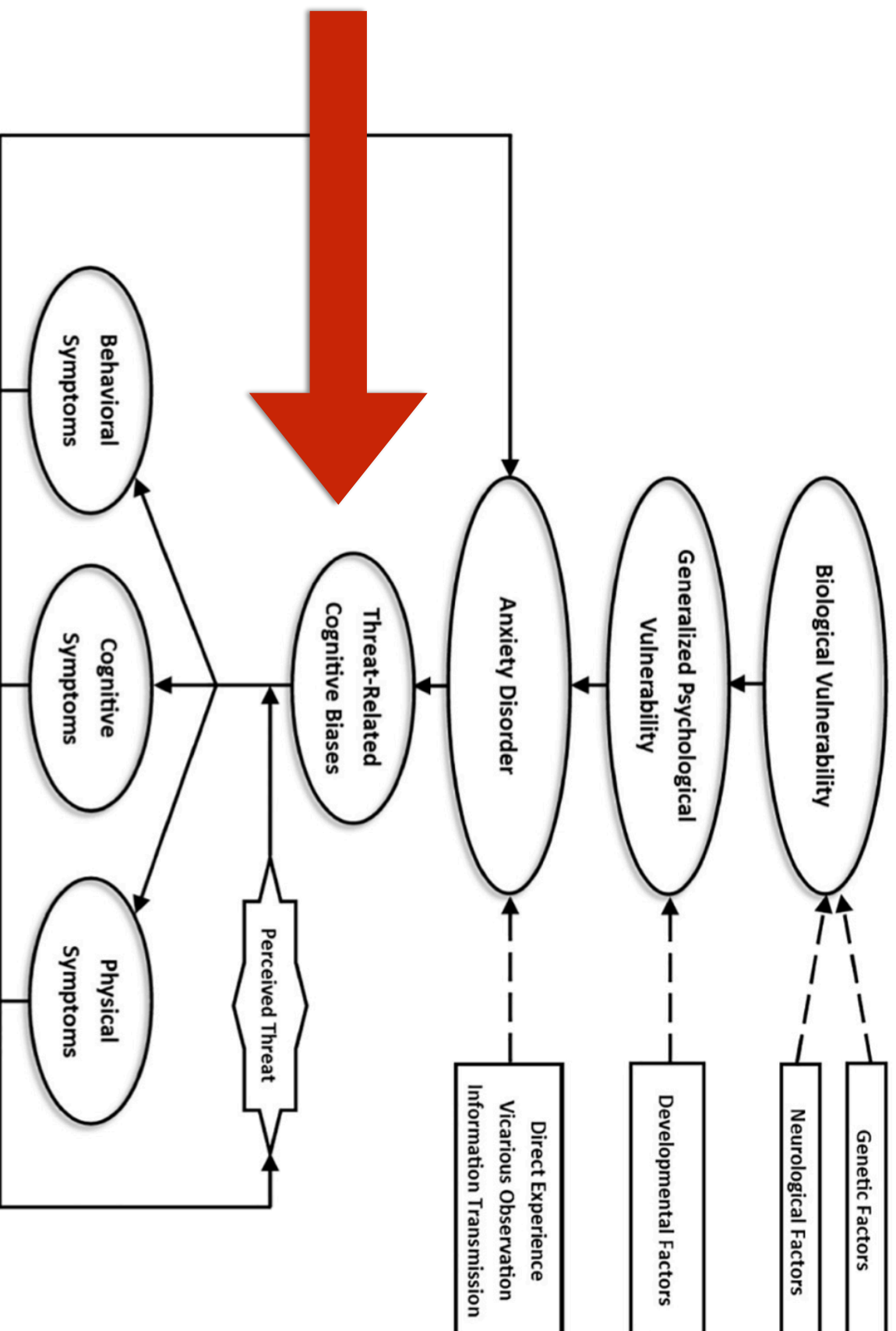


Fig. 3. A model of the development and maintenance of anxiety disorder.

Attentional bias for threat

People with anxiety pay more attention to threat

e.g. Bar-Haim et al., 2007

Can we change how people pay attention?

As an example:

Social Anxiety Disorder

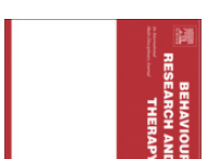
A causal role in the maintenance

Behaviour Research and Therapy 50 (2012) 30–39

Contents lists available at SciVerse ScienceDirect

Behaviour Research and Therapy

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



Attention training toward and away from threat in social phobia: Effects on subjective, behavioral, and physiological measures of anxiety

Alexandre Heeren^{a,b,*}, Hannah E. Reese^c, Richard J. McNally^d, Pierre Philippot^{a,*}

^a Université catholique de Louvain, Louvain-la-Neuve, Belgium

^b National Fund for Scientific Research, Brussels, Belgium

^c Department of Psychiatry, Massachusetts General Hospital, Boston, USA

^d Harvard University, Cambridge, USA

A causal role in the maintenance

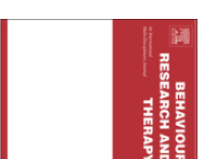
Behaviour Research and Therapy 50 (2012) 30–39



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Behaviour Research and Therapy

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



Attention training
on subjective, beh:

Alexandre Heeren ^{a,b,*}, I

^a Université catholique de Louvain, Louva
^b National Fund for Scientific Research, Bri
^c Department of Psychiatry, Massachusetts
^d Harvard University, Cambridge, USA



Contents lists available at ScienceDirect

Journal of Anxiety Disorders

Journal of Anxiety Disorders 25 (2011) 1108–1115



How does attention training work in social phobia: Disengagement from threat
or re-engagement to non-threat?

Alexandre Heeren ^{a,b,*}, Laurent Lievens ^a, Pierre Philippot ^{a,*}

A causal role in the maintenance

Behaviour Research and Therapy 50 (2012) 30–39

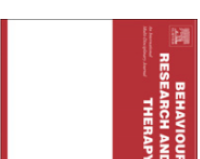
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Journal of Anxiety Disorders 25 (2011) 1108–1115

Contents lists available at ScienceDirect

Journal of Anxiety Disorders



ELSEVIER



Journal of Anxiety Disorders 29 (2015) 35–42

Contents lists available at ScienceDirect

Journal of Anxiety Disorders



ELSEVIER



Attention training on subjective, behi

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^a Université catholique de Louvain, Louv
^b National Fund for Scientific Research, B
^c Department of Psychiatry, Massachuset
^d Harvard University, Cambridge, USA

How does atten or re-engagemen

Alexandre Heeren ^{a,1}

Does attention bias modification improve attentional control? A double-blind randomized experiment with individuals with social anxiety disorder

Alexandre Heeren ^{a,*}, Cristina Mogoase ^b, Richard J. McNally ^c,
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Same goes for other anxiety disorders



NIH Public Access

Author Manuscript

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J Abnorm Psychol. 2009 February ; 118(1): 28–33. doi:10.1037/a0012589.

Attention modification program in individuals with Generalized Anxiety Disorder

e.g. GAD

Nader Amir¹, Courtney Beard², Michelle Cobb², and Jessica Bomyea¹

¹Joint Doctoral Program of San Diego State University/University of California, San Diego

²University of Georgia

Abstract

Research suggests that individuals with Generalized Anxiety Disorder (GAD) show an attention bias for threat-relevant information. However, few studies have examined the causal role of attention bias in the maintenance of anxiety and whether modification of such biases may reduce pathological anxiety symptoms. In the current paper, we tested the hypothesis that an eight-session attention modification program would (a) decrease attention bias to threat and (b) reduce symptoms of GAD. Participants completed a probe detection task by identifying letters (“E” or “F”) replacing one member of a pair of words. We trained attention by including a contingency between the location of the probe and the non-threat word in one group (Attention Modification program, AMP) and not in the other (Attention Control condition, ACC). Participants in the AMP showed change in attention bias and a decrease in anxiety, as indicated by both self-report and interviewer measures. These effects were not present in the ACC group. These results are consistent with the hypothesis that attention plays a causal role in the maintenance of GAD and suggest that altering attention mechanisms may effectively reduce anxiety.

A step further in the « causal » model

Cogn Ther Res (2012) 36:512–521

DOI 10.1007/s10608-011-9394-7

ORIGINAL ARTICLE

The Causal Role of Attentional Bias for Threat Cues in Social Anxiety: A Test on a Cyber-Ostracism Task

Alexandre Heeren · Virginie Peschard ·
Pierre Philippot

Causal influence in anxiety!

And not restricted to AB



And not restricted to AB

Emotion
2008, Vol. 8, No. 3, 364–378

Copyright 2008 by the American Psychological Association
1528-3542/08/\$12.00 DOI: 10.1037/1528-3542.8.3.364

Processing Mode Causally Influences Emotional Reactivity: Distinct Effects of Abstract Versus Concrete Construal on Emotional Response

Ed Watkins and Nicholas J. Moberly

University of Exeter

Michelle L. Moulds

University of New South Wales

Three studies are reported showing that emotional responses to stress can be modified by systematic prior practice in adopting particular processing modes. Participants were induced to think about positive and negative scenarios in a mode either characteristic of or inconsistent with the abstract-evaluative mind-set observed in depressive rumination, via explicit instructions (Experiments 1 and 2) and via implicit induction of interpretative biases (Experiment 3), before being exposed to a failure experience. In all three studies, participants trained into the mode antithetical to depressive rumination demonstrated less emotional reactivity following failure than participants trained into the mode consistent with depressive rumination. These findings provide evidence consistent with the hypothesis that processing mode modifies emotional reactivity and support the processing-mode theory of rumination.

Keywords: processing mode, emotional reactivity, rumination, training, overgeneralization

And not restricted to AB

Emotion
2008, Vol. 8, No. 3, 364–378

Copyright 2008 by the American Psychological Association
1538-5542/08/\$12.00 DOI: 10.1037/1538-5542.8.3.364

Processing Mode Causally Influences Emotional Reactivity: Distinct Effects of Abstract Versus Concrete

Ed Watkins and Nicholas J. Moberly
University of Exeter

Three studies are reported showing that practice in adopting particular processing negative scenarios in a mode either chair observed in depressive rumination, via induction of interpretative biases (Experiment three studies, participants trained into the emotional reactivity following failure of rumination. These findings provide evidence that modifies emotional reactivity and supports the hypothesis.

Keywords: processing mode, emotional reactivity

Journal of Anxiety Disorders 45 (2017) 1–8

Contents lists available at ScienceDirect

Journal of Anxiety Disorders



Cognitive bias modification of interpretation in children with social anxiety disorder

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^a School of Psychology and Clinical Language Sciences, University of Reading, Whiteknights Road, Reading, RG6 6AL, United Kingdom
^b Newham College University Centre, London, E15 4HT, United Kingdom
^c Division of Psychology and Language Sciences, University College London, London, WC1E 6BT, United Kingdom

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Keywords:

Social anxiety disorder
Interpretation
Cognitive bias modification
Child

ABSTRACT

Negative (or a lack of positive) interpretation of ambiguous social situations has been hypothesised to maintain social anxiety disorder in children, yet there is currently limited evidence to support this. Cognitive Bias Modification of Interpretation (CBM-I) provides a means to explore the causal influence of interpretation bias on social anxiety disorder, and has been associated with a reduction in social anxiety symptoms in adults. Seven to twelve year old children with a diagnosis of social anxiety disorder completed CBM-I training, adapted from materials designed for socially anxious children in the community, or no training. Effects on interpretation bias and social anxiety were assessed. The adapted CBM-I training was not associated with significant changes in benign or negative interpretation. Unsurprisingly given the lack of successful interpretation training, there were no significant changes in child or parent reported social anxiety symptoms, clinician-rated severity or diagnoses and change in interpretation was not significantly associated with change in social anxiety. These findings contrast with some studies with community populations although it is possible that more intensive CBM-I training is required to fully test this hypothesis among clinical groups.


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"Tout est pour le mieux dans le meilleur des mondes » (Voltaire)



Yet...

Contents lists available at ScienceDirect

Clinical Psychology Review



Attention bias modification for social anxiety: A systematic review and meta-analysis



Alexandre Heeren^{a,*}, Cristina Mogoase^b, Pierre Philippot^a, Richard J. McNally^c

^a Psychological Sciences Research Institute, Université catholique de Louvain, Louvain-la-Neuve, Belgium

^b Department of Clinical Psychology and Psychotherapy, Babeş-Bolyai University, Cluj-Napoca, Romania

^c Department of Psychology, Harvard University, Cambridge, MA, USA

HIGHLIGHTS

- We examined the effects of attention bias modification (ABM) for social anxiety (SA).
- ABM had small effects on SA symptoms, attentional bias, and reactivity to speech challenge.
- ABM's characteristics, study design, and trait anxiety moderated effect sizes.
- Effects on secondary symptoms and SA symptoms at 4-month follow-up were nonsignificant.
- The quality of the studies was substandard and wedged the effect sizes.

ARTICLE INFO

ABSTRACT

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Keywords:
Attention bias modification
Social anxiety disorder
Speech performance
Cognitive bias modification
Attentional bias
Meta-analysis
Systematic review

Research on attention bias modification (ABM) for social anxiety disorder (SAD) is inconclusive, with some studies finding clear positive effects and other studies finding no significant benefit relative to control training procedures. In this meta-analysis, we assessed the efficacy of ABM for SAD on symptoms, reactivity to speech challenge, attentional bias (AB) toward threat, and secondary symptoms at posttraining as well as SAD symptoms at 4-month follow-up. A systematic search in bibliographical databases uncovered 15 randomized studies involving 1043 individuals that compared ABM to a control training procedure. Data were extracted independently by two raters. The *Q* statistic was used to assess homogeneity across trials. All analyses were conducted on intent-to-treat data. ABM produced a small but significant reduction in SAD symptoms ($g = 0.27$), reactivity to speech challenge ($g = 0.46$), and AB ($g = 0.30$). These effects were moderated by characteristics of the ABM procedure, the design of the study, and trait anxiety at baseline. However, effects on secondary symptoms ($g = 0.09$) and SAD symptoms at 4-month follow-up ($g = 0.09$) were not significant. Although there was no indication of significant publication bias, the quality of the studies was substandard and wedged the effect sizes. From a clinical point of view, these findings imply that ABM is not yet ready for wide-scale dissemination as a treatment for SAD in routine care. Theoretical implications for the integration of AB in the conceptualization of SAD are discussed.

And not restricted to AB

BJPsych

The British Journal of Psychiatry (2015)
206, 7–16. doi: 10.1192/bjp.bp.114.146761

Review article

Efficacy of cognitive bias modification interventions in anxiety and depression: meta-analysis

Ioana A. Cristea, Robin N. Kok and Pim Cuijpers

Background

Cognitive bias modification (CBM) interventions are strongly advocated in research and clinical practice.

Aims

To examine the efficiency of CBM for clinically relevant outcomes, along with study quality, publication bias and potential moderators.

Method

We included randomised controlled trials (RCTs) of CBM interventions that reported clinically relevant outcomes assessed with standardised instruments.

Results

We identified 49 trials and grouped outcomes into anxiety

and depression. Effect sizes were small considering all the samples, and mostly non-significant for patient samples. Effect sizes became non-significant when outliers were excluded and after adjustment for publication bias. The quality of the RCTs was suboptimal.

Conclusions

CBM may have small effects on mental health problems, but it is also very well possible that there are no significant clinically relevant effects. Research in this field is hampered by small and low-quality trials, and by risk of publication bias. Many positive outcomes are driven by extreme outliers.

Declaration of interest

None.

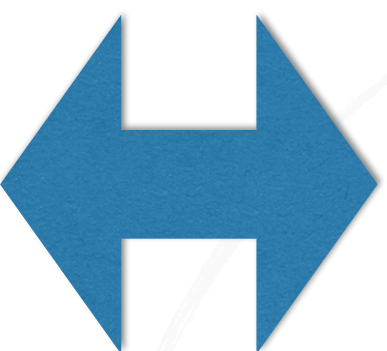
So...



In limbo...

Option #1

Good models but bad empirical approach

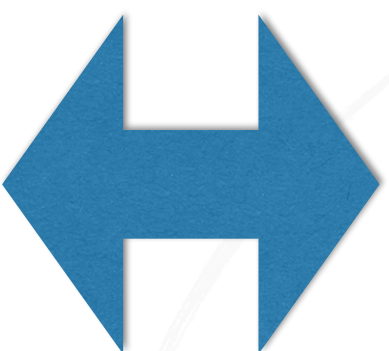


Option #2

Bad models but good empirical approach

Option #1

Bad models but good empirical approach



Option #2

Good models but bad empirical approach



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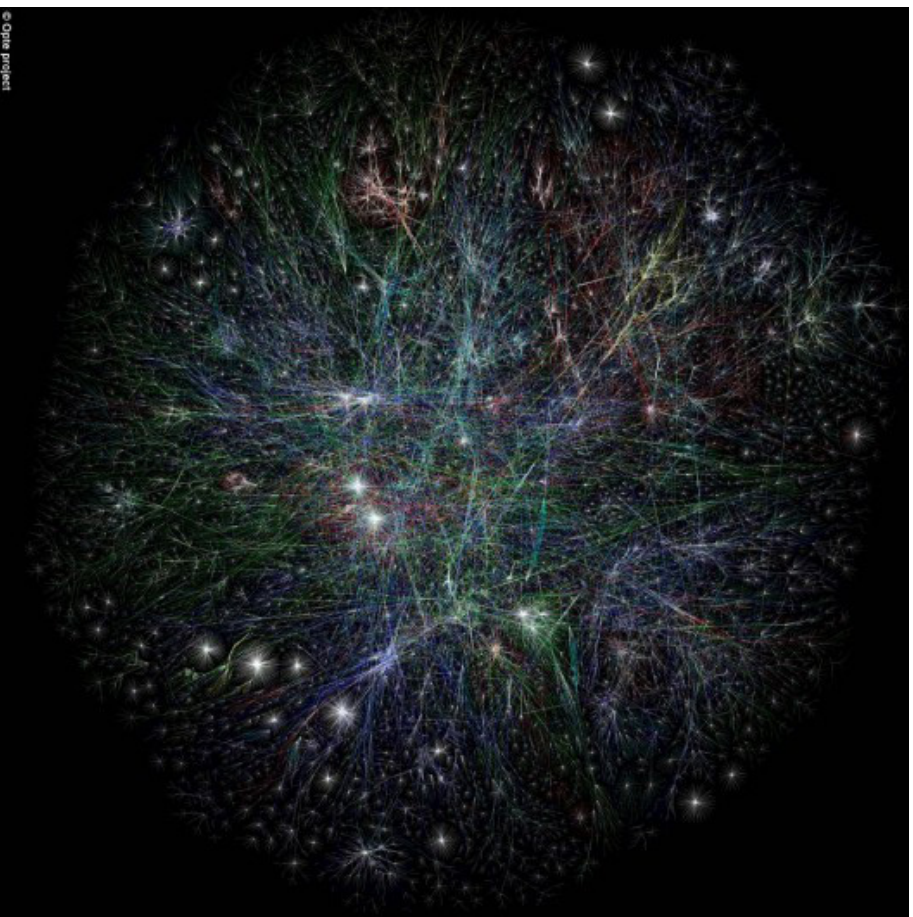
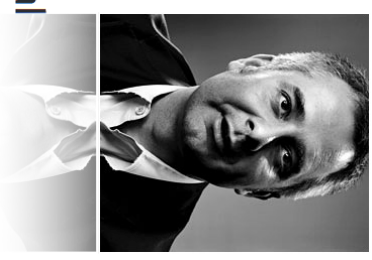
4

My research
horizon

The network takeover

Albert-László Barabási

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 (2012)

COMPLEX NETWORK SYSTEMS ARE EVERYWHERE

D. Borsboom



Network approach

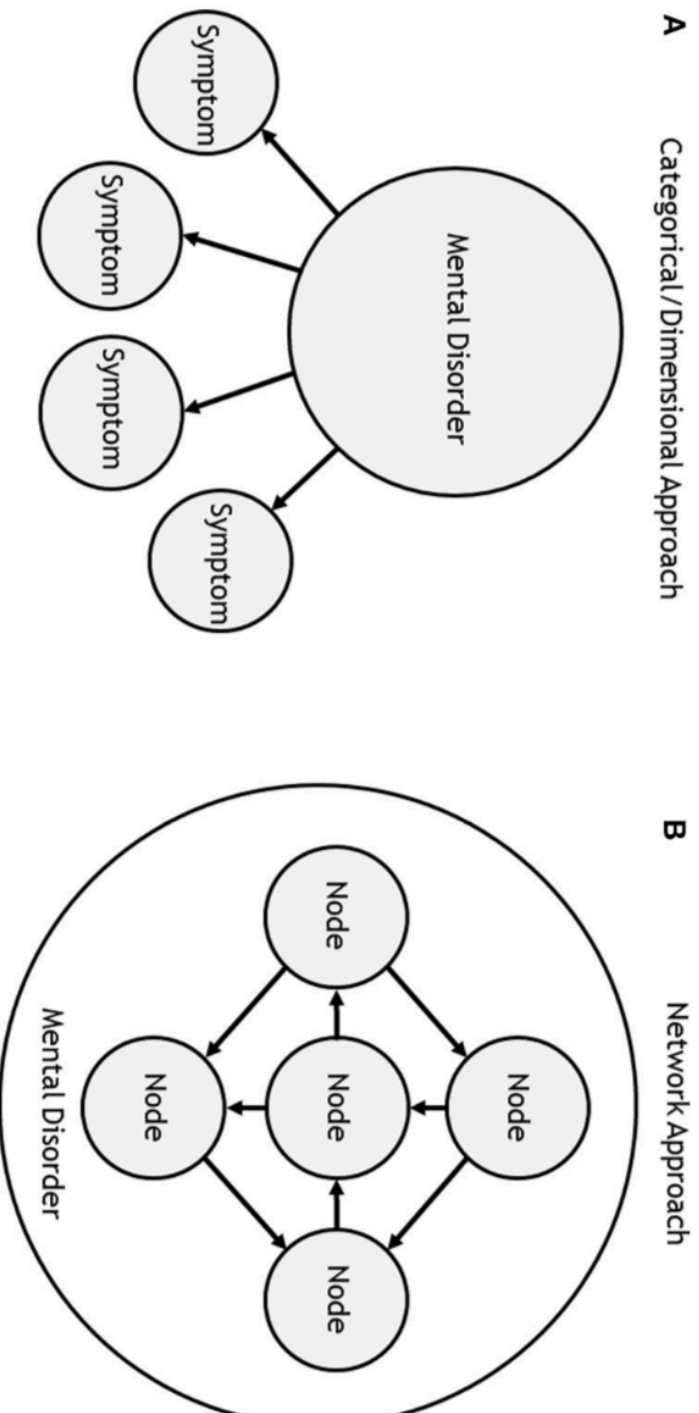


FIGURE 1 | Latent vs. network approach to psychopathology. **(A)** Both Categorical and dimensional approaches to psychopathology assume that a latent entity is causally responsible for symptoms. **(B)** The network approach to psychopathology posits that mental disorders can be explained by the interactions between nodes in a complex network. The relationship between nodes and disorders is mereological (i.e., parts to whole) rather than causal. In the traditional network approach, nodes correspond directly to the “symptoms” in the categorical/dimensional approach. In the expanded network approach, nodes are not limited to symptoms: they may also consist of biological, cognitive, or other individual-level processes.

A Tutorial on Regularized Partial Correlation Networks

Sacha Epskamp and Eiko I. Fried
University of Amsterdam

Abstract

Recent years have seen an emergence of network modeling applied to moods, attitudes, and problems in the realm of psychology. In this framework, psychological variables are understood to directly affect each other rather than being caused by an unobserved latent entity. In this tutorial, we introduce the reader to estimating the most popular network model for psychological data: the partial correlation network. We describe how regularization techniques can be used to efficiently estimate a parsimonious and interpretable network structure in psychological data. We show how to perform these analyses in R and demonstrate the method in an empirical example on posttraumatic stress disorder data. In addition, we discuss the effect of the hyperparameter that needs to be manually set by the researcher, how to handle non-normal data, how to determine the required sample size for a network analysis, and provide a checklist with potential solutions for problems that can arise when estimating regularized partial correlation networks.

Translational Abstract

Recent years have seen an emergence in the use of networks models in psychological research to explore relationships of variables such as emotions, symptoms, or personality items. Networks have become particularly popular in analyzing mental illnesses, as they facilitate the investigation of how individual symptoms affect one-another. This article introduces a particular type of network model: the partial correlation network, and describes how this model can be estimated using regularization techniques from statistical learning. With these techniques, a researcher can gain insight in predictive and potential causal relationships between the measured variables. The article provides a tutorial for applied researchers on how to estimate these models, how to determine the sample size needed for performing such an analysis, and how to investigate the stability of results. We also discuss a list of potential pitfalls when using this methodology.

Keywords: Partial correlation networks, Regularization, Network modeling, Tutorial



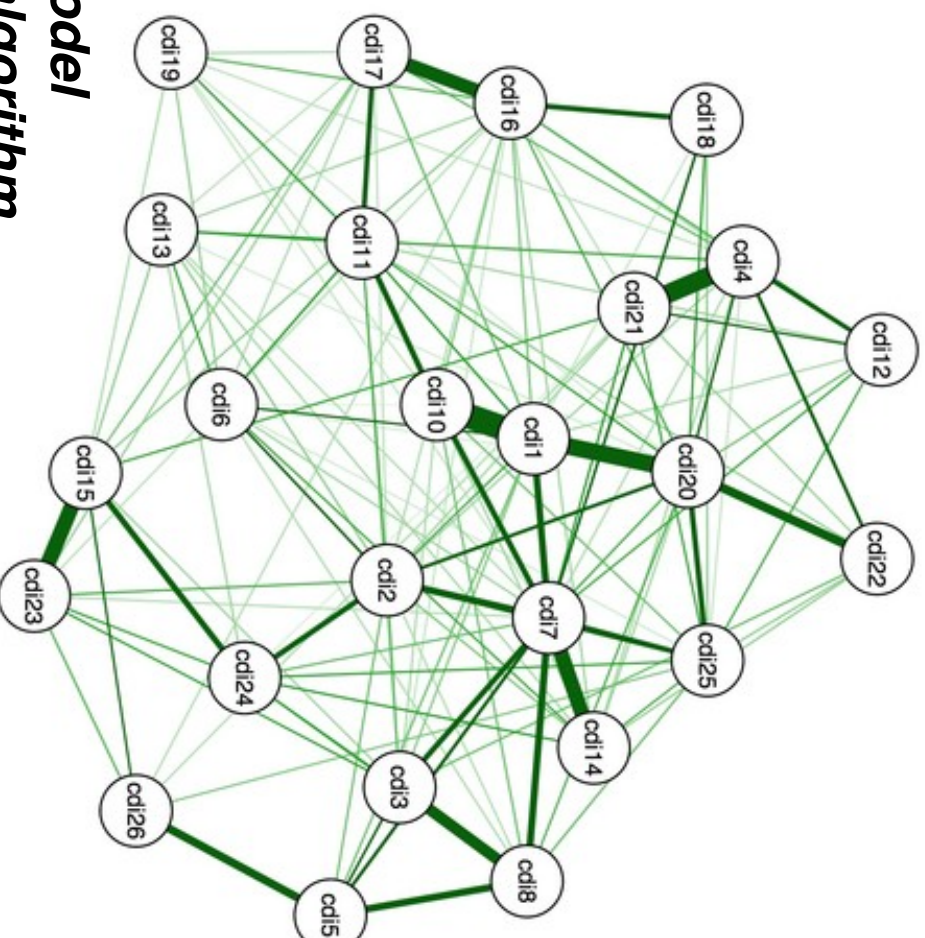
S. Epskamp

Depression

Using Network Analysis to Identify Central Symptoms of Adolescent Depression

Michael C. Mullarkey , Igor Marchetti & Christopher G. Beavers

Pages 656-668 | Published online: 13 Mar 2018

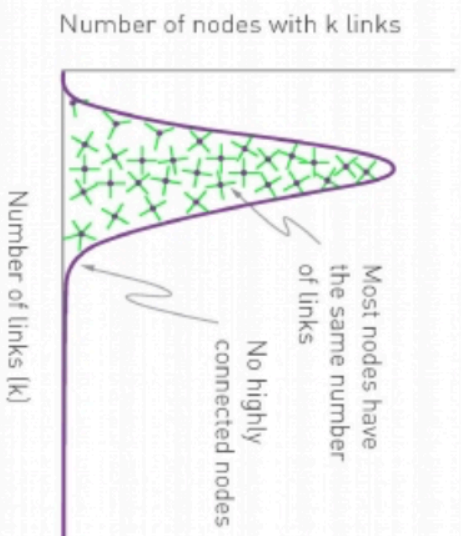


**Graphical Gaussian Model
via Graphical LASSO algorithm**

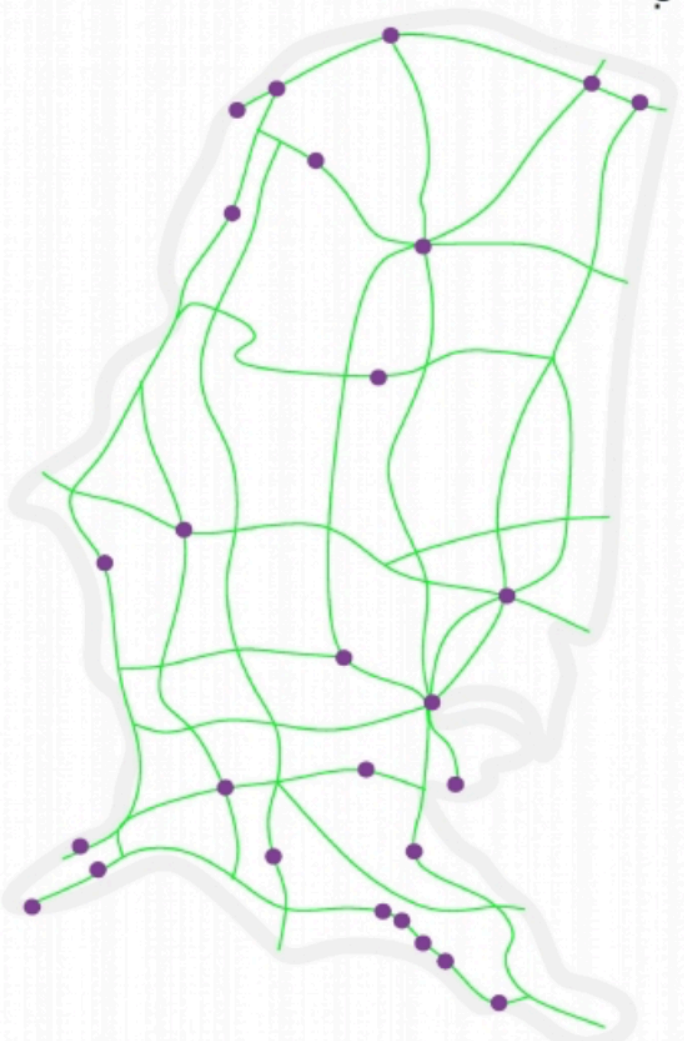
- cdi1: Sadness
- cdi2: Pessimism
- cdi3: Self-deprecation
- cdi4: Anhedonia
- cdi5: Misbehavior
- cdi6: Pessimistic worrying
- cdi7: Self-hatred
- cdi8: Self-blame
- cdi10: Crying
- cdi11: Irritability
- cdi12: Social withdrawal
- cdi13: Indecisiveness
- cdi14: Negative body image
- cdi15: School work difficulty
- cdi16: Sleep disturbance
- cdi17: Fatigue
- cdi18: Reduced appetite
- cdi19: Somatic concerns
- cdi20: Loneliness
- cdi21: School dislike
- cdi22: Lack of friendship
- cdi23: School performance decrement
- cdi24: Low self-esteem
- cdi25: Feeling unloved
- cdi26: Disobedience

Not all nodes are equally important

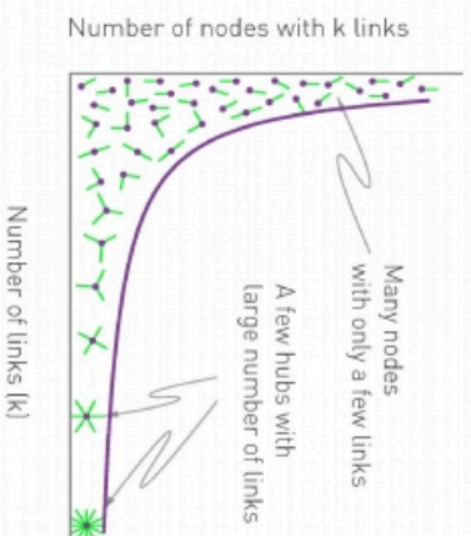
a. POISSON



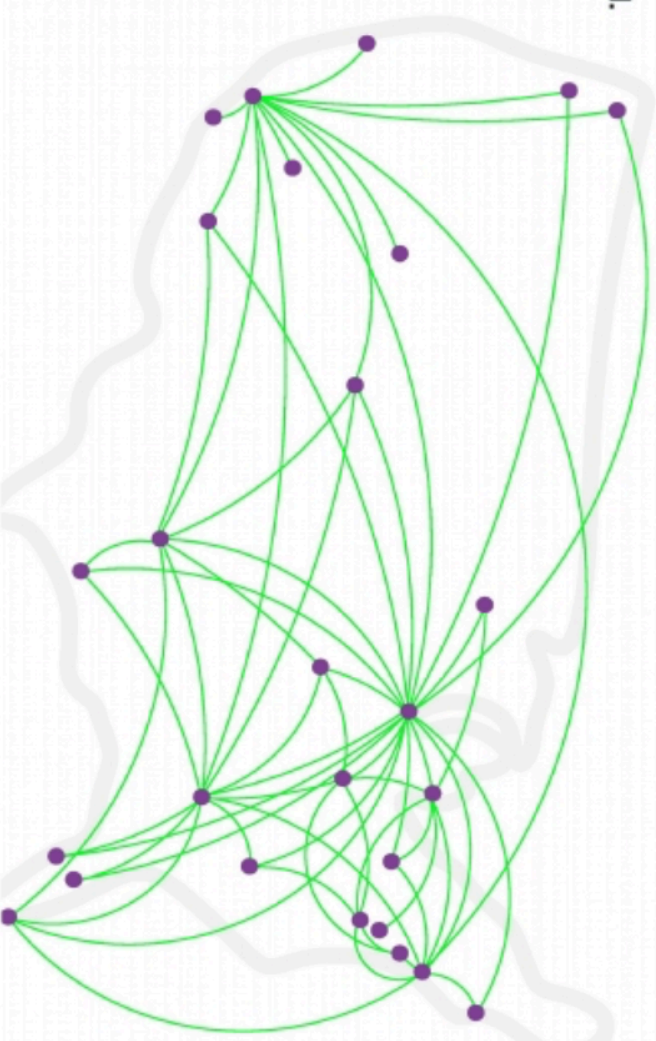
b.



c. POWER LAW



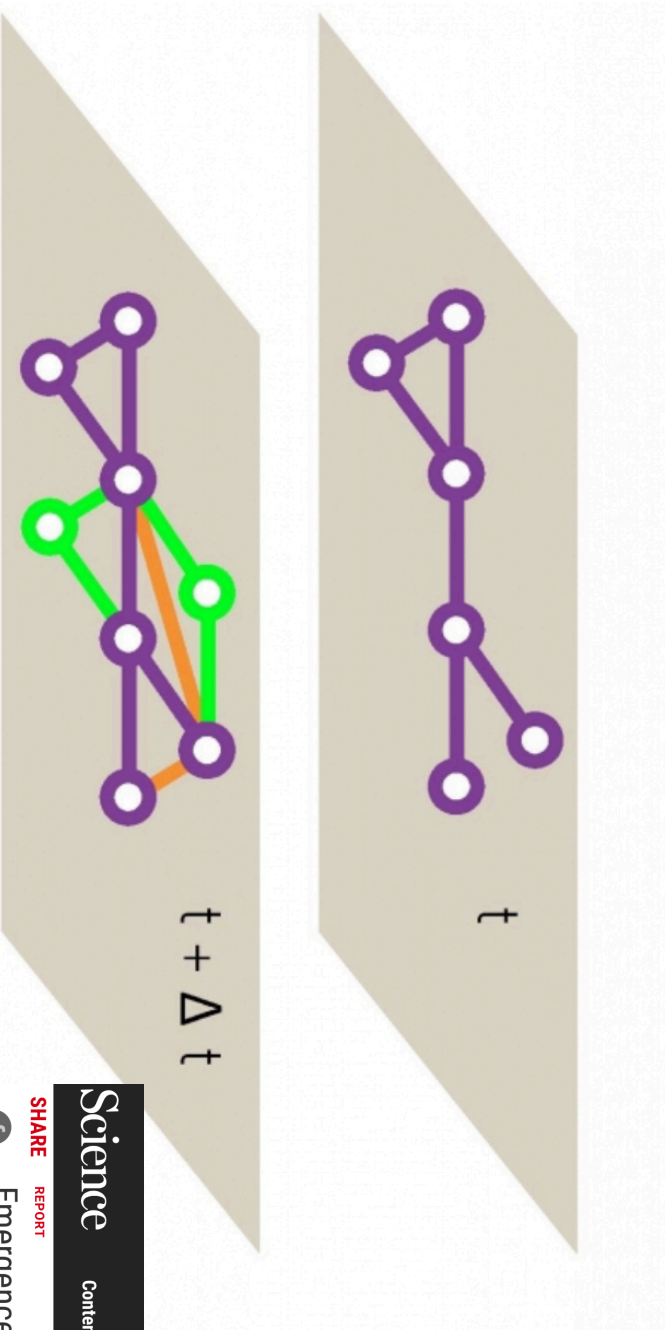
d.



And why does that matter?

Preferential Attachment

- New nodes prefer to link with the more connected nodes
- « Barabási-Albert mathematical model »



Barabasi & Albert (1999)

Science Contents News Careers Journals

SHARE REPORT

Emergence of Scaling in Random Networks

Albert-László Barabási*, Réka Albert
* See all authors and affiliations

Science 15 Oct 1999, Vol. 286, Issue 5439, pp. 509-512
DOI: 10.1126/science.286.5439.509

Article Figures & Data Info & Metrics eLetters PDF

How Everything Is Connected to
Everything Else and What It Means for
Business, Science, and Everyday Life

Linked



"Remarkable.... A sweeping look at a new and exciting science." —*Science*

Albert-László Barabási



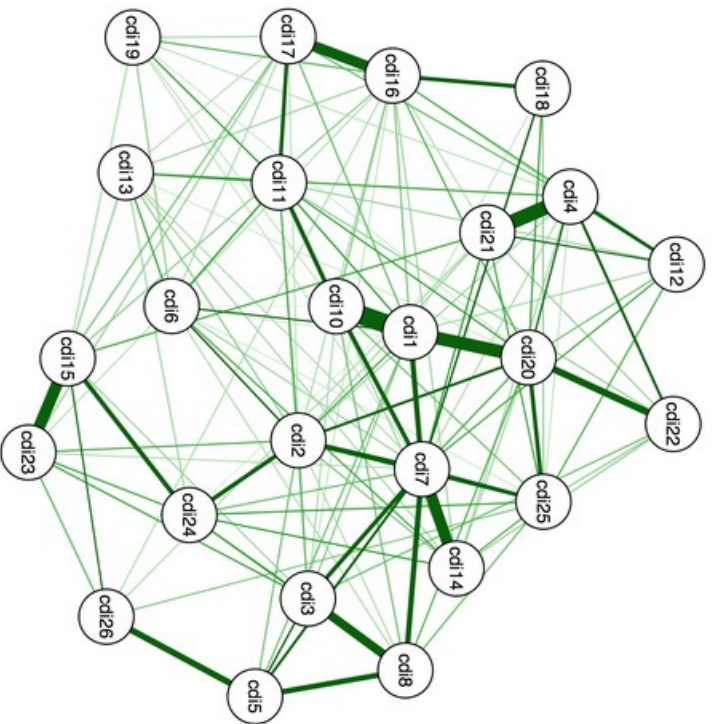
Barabasi & Albert (1999)

Depression

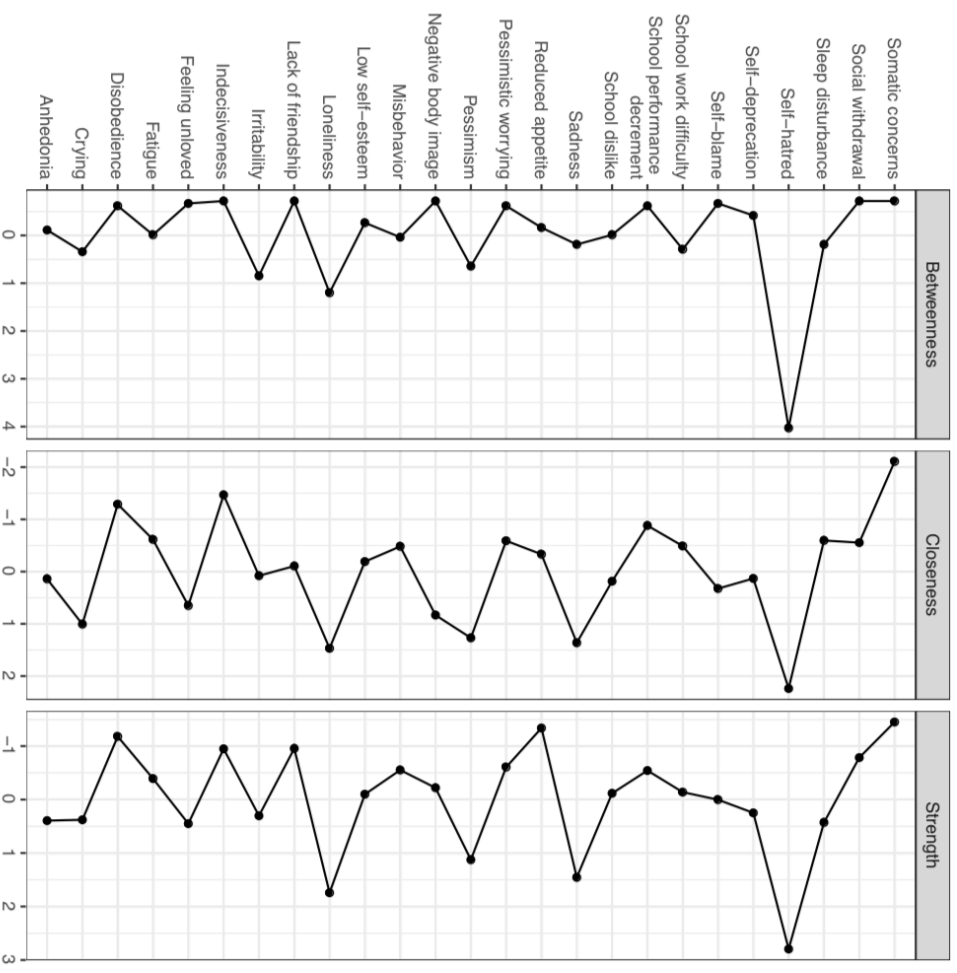
Using Network Analysis to Identify Central Symptoms of Adolescent Depression

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Pages 656-668 | Published online: 13 Mar 2018



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- cdi17: Fatigue
- cdi18: Reduced appetite
- cdi19: Somatic concerns
- cdi20: Loneliness
- cdi21: School dislike
- cdi22: Lack of friendship
- cdi23: School performance decrement
- cdi24: Low self-esteem
- cdi25: Feeling unloved
- cdi26: Disobedience



Research Article |  Free Access

Pre-treatment Posttraumatic Stress Disorder Symptom Network Metrics Predict the Strength of the Association Between Node Change and Network Change During Treatment

Santiago Papini , Mikael Rubin, Michael J. Telch, Jasper A. J. Smits, Denise A. Hien

First published: 25 July 2019 | <https://doi.org/10.1002/jts.22379> | Citations: 5

Empirical Article


Central Symptoms Predict Posttreatment Outcomes and Clinical Impairment in Anorexia Nervosa: A Network Analysis



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¹Department of Psychology, Harvard University, and ²Institute of Psychiatry, Psychology, and Neuroscience, King's College London

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DOI: 10.1177/2167702619865958
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Abstract

Network analysis can be used to identify central symptoms of eating disorders such as anorexia nervosa (AN), but the validity of this approach has been questioned. Using network analysis, in the present study we identify central symptoms of adult AN, identify key bridge symptoms between AN and anxiety/depression, and examine whether central symptoms at baseline are important predictors of treatment outcomes. We conducted network analyses for AN and comorbid depression and anxiety using longitudinal data ($N = 142$) with measurements at baseline, and at 6-month, 12-month, and 24-month posttreatment. Central symptoms were identified, and identified central symptoms and bridge symptoms were used to predict treatment outcomes. We conducted network analyses for AN and comorbid depression and anxiety using longitudinal data ($N = 142$) with measurements at baseline, and at 6-month, 12-month, and 24-month posttreatment. Central symptoms were identified, and identified central symptoms and bridge symptoms were used to predict treatment outcomes.

And many **other** labs



The Study of Psychopathology from the Network Analysis Perspective: A Systematic Review

Alba Contreras^a Ines Nieto^a Carmen Valiente^a Regina Espinosa^b
Carmelo Vazquez^a

^aDepartment of Clinical Psychology, School of Psychology, Complutense University, Madrid, Spain;

^bDepartment of Psychology, School of Education and Health, Camilo José Cela University, Madrid, Spain



A. Contreras



C. Vazquez



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Moving Forward: Challenges and Directions for Psychopathological Network Theory and Methodology

Eiko I. Fried and Angélique O. J. Cramer

Department of Psychology, University of Amsterdam



E. I. Fried



A.O.J. Cramer

Perspectives on Psychological Science
1–22

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My talk overview

From an empirical crisis to a theoretical crisis and vice versa

1

Let's get
personal

2

Towards
complexity

3

My research
agenda(s)

4

My research
horizon



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A network theory of mental disorders

Denny Borsboom

First published: 26 January 2017 | <https://doi.org/10.1002/wps.20375> | Citations: 360



D. Borsboom

**Holds that the constitutive components of networks ("nodes")
correspond to symptoms that appear in diagnostic manuals!**

Beyond symptoms?

Commentary: A network theory of mental disorders

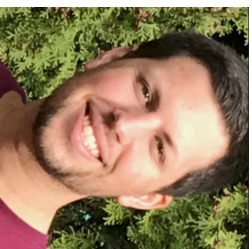
Payton J. Jones^{1*}, Alexandre Heeren^{1,2,3} and Richard J. McNally¹

¹ Department of Psychology, Harvard University, Cambridge, MA, United States, ² Institute of Psychological Sciences, Université Catholique de Louvain, Louvain-la-Neuve, Belgium, ³ Institute of Neuroscience, Université Catholique de Louvain, Brussels, Belgium

Keywords: network theory, network approach, psychopathology, mental disorders, symptoms, etiology, cognitive therapy

A commentary on

A network theory of mental disorders
by Borsboom, D. (2017). *World Psychiatry* 16, 5–13. doi: 10.1002/wps.20375



P.J. Jones



R.J. McNally





ELSEVIER



An integrative network approach to social anxiety disorder: The complex dynamic interplay among attentional bias for threat, attentional control, and symptoms

Alexandre Heeren^{a, b, *}, Richard J. McNally^a

^a Department of Psychology, Harvard University, Cambridge, MA, USA

^b Psychological Science Research Institute, Université Catholique de Louvain, Louvain-la-Neuve, Belgium



In patients with a
DSM-5 diagnosis of SAD

Listed as a **Highly Influential paper** by ISI Web of Science

Measures

Measure of AB

- *Modified Spatial Cueing Task* (Amir et al., 2003; Heeren et al., 2011).
- Assessing distinctively both « *difficulty disengaging from threat* » and « *engagement with threat* »

Measure of Attention Control

- *Attention Network task* (ANT; Fan, McCandliss, Sommer, Raz, & Posner, 2002)
- Three independent attentional components: *Alerting*, *Orienting*, and *Executive Control*
- *Alerting & Orienting*: Greater scores indicate greater efficiency - *Executive control*: greater score indicates increased difficulty with executive control.

Measures

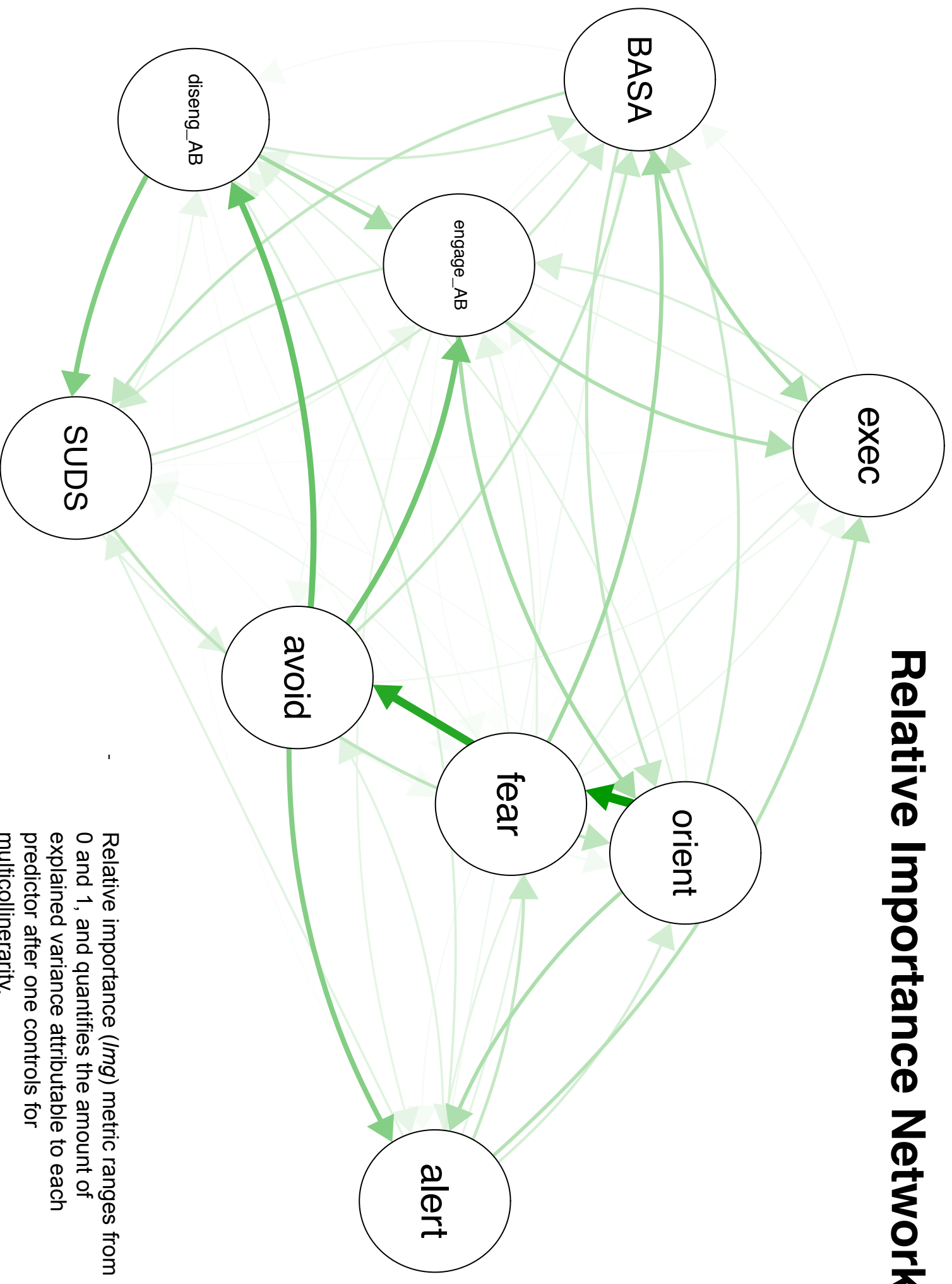
Fear and Avoidance

- **Liebowitz Social Anxiety Scale** (LSAS; Liebowitz, 1987)
- 24 social and performance situations (e.g., returning goods to a store; going to a party; taking a test)
- 4-point Likert-type 24-item scale: once for the intensity of fear and once for frequency of avoidance of the situation
- Separate scores for fear and avoidance ratings

Impromptu speech task in front of a video camera

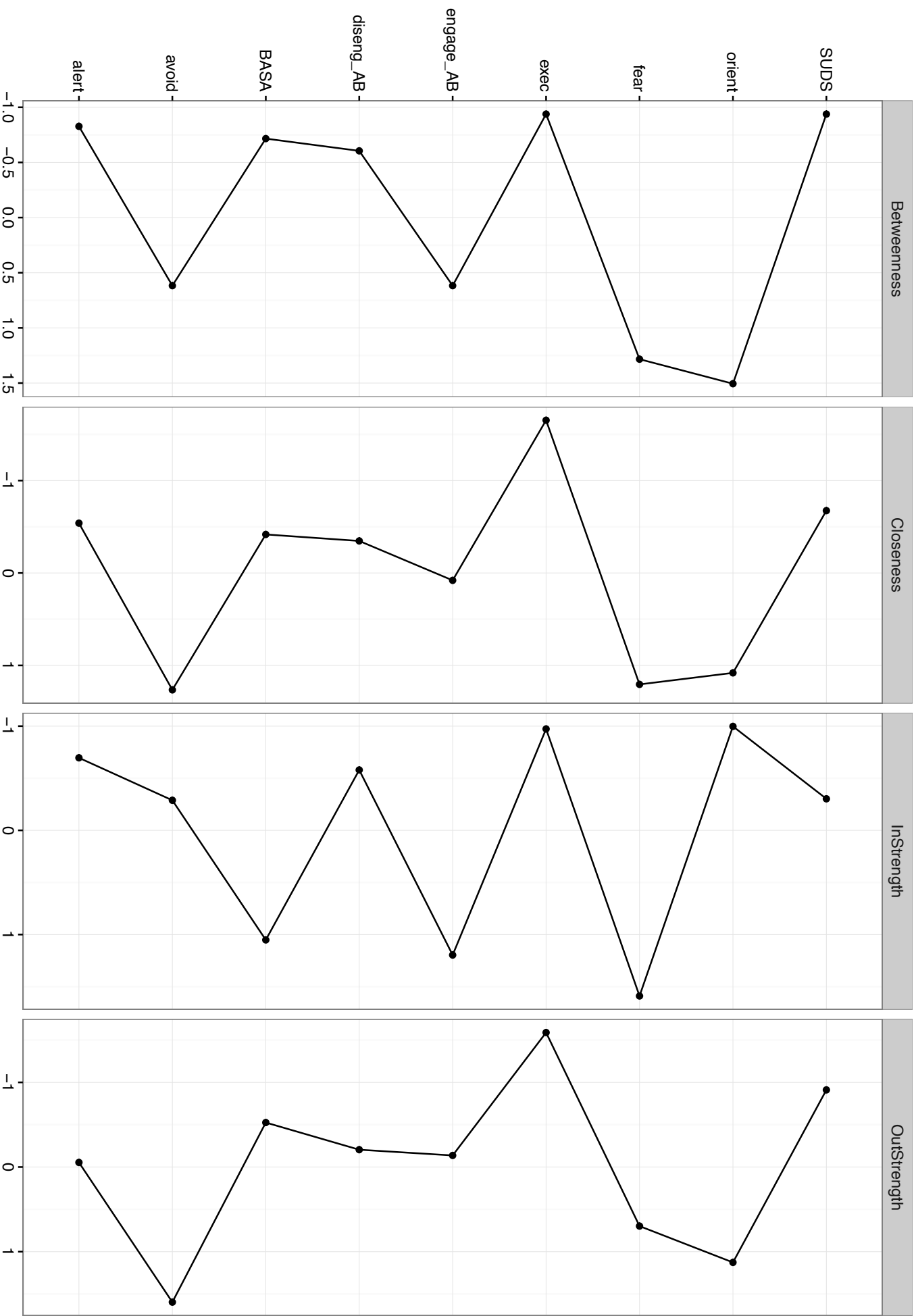
- Anticipation/Apprehension: Subjective Units of Discomfort Scale (SUDS; Wolpe, 1958)
Level of situational anxiety from 0 (not anxious) to 100 (extremely anxious)
- **Behavioral Assessment of Speech Anxiety** (BASA; Mulac & Sherman, 1974)
Two clinical psychologists rated their behaviors (e.g., having a clear voice, searching for the words)

Relative Importance Network

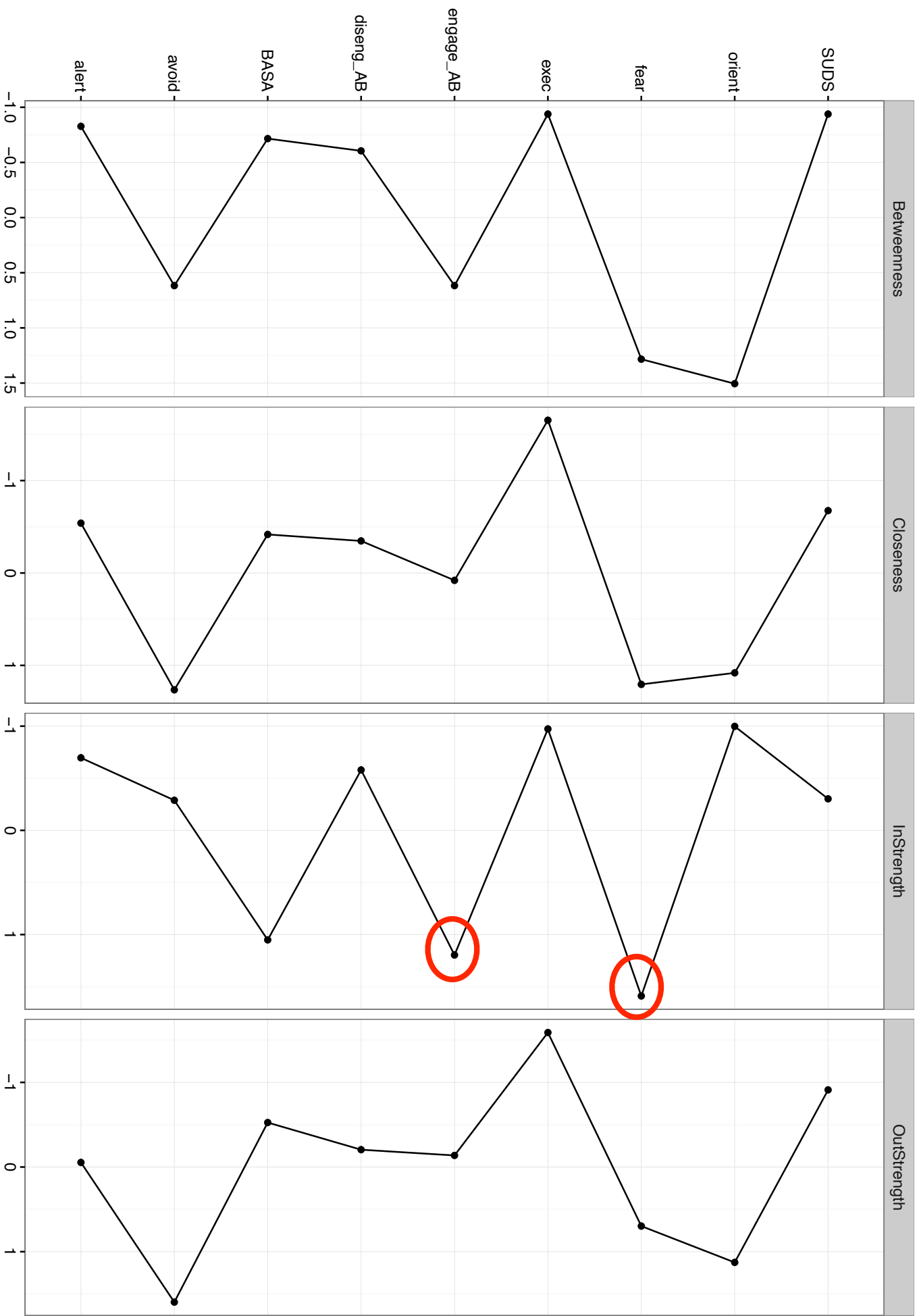


Relative importance (*lmg*) metric ranges from 0 and 1, and quantifies the amount of explained variance attributable to each predictor after one controls for multicollinearity.

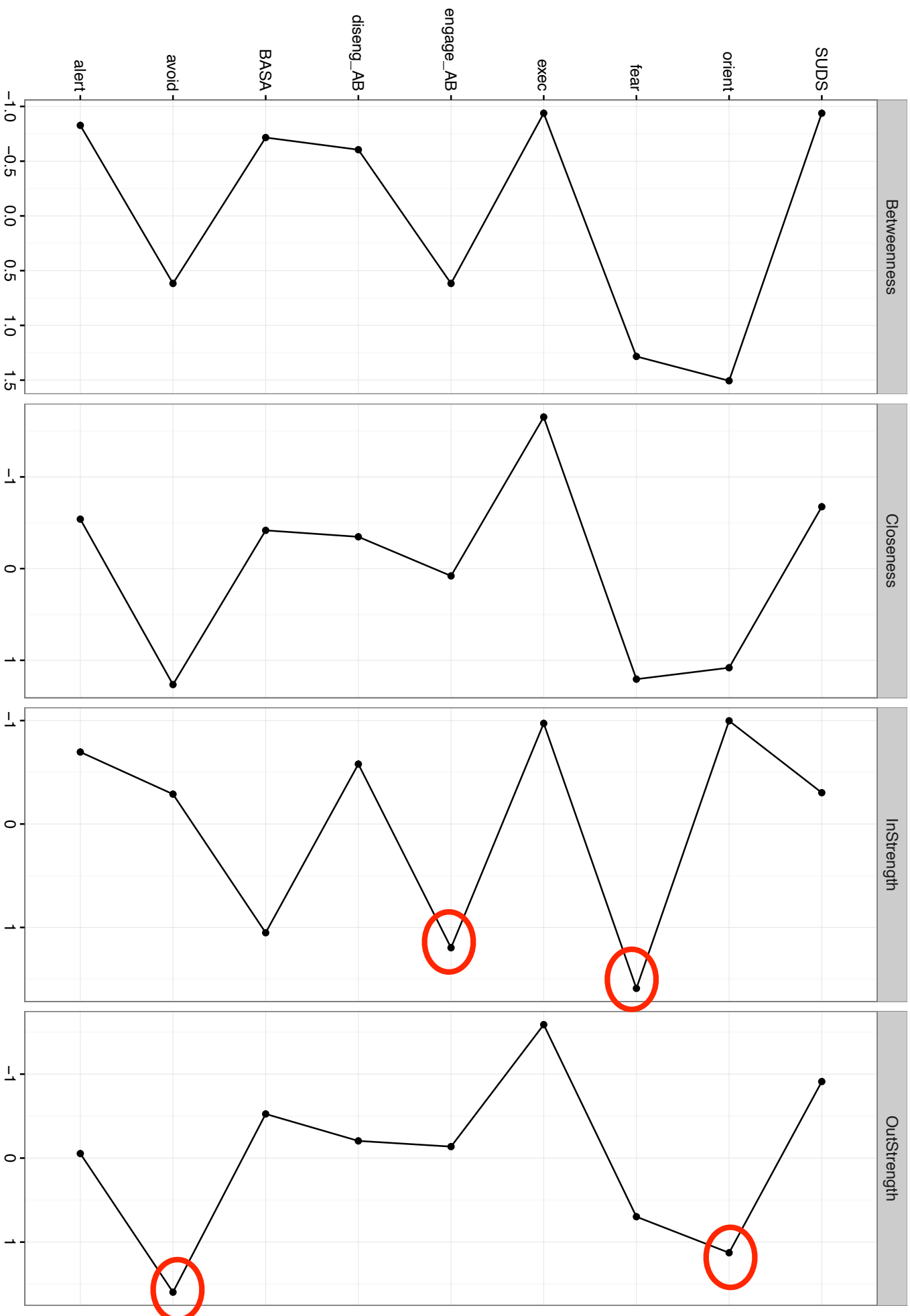
Centrality analysis



Centrality analysis



Centrality analysis



Discussion

To sum up

- The two most central variables were avoidance of social situations and the orienting component of attention
- AB towards threat yielded high centrality as a predicted variable

Theoretical implications

- Difference of orienting response may interact with a child's temperamental bias toward behavioral inhibition (Kagan et al., 1988) — > see Heeren, Maurage, & Philippot, 2015
- Avoidance conceptualized as a core component of anxiety disorders (e.g., Mowrer, 1942, 1960)

Limitations

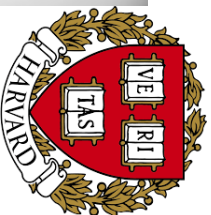
- The cross-sectional nature of the data does not allow drawing strong inference vis-à-vis the cause-effect relationships
- Restricted sample size.

Let's get back to our models

Let's get rid of ABI!



E.E. Bernstein



R.J. McNally



ELSEVIER



Bridging maladaptive social self-beliefs and social anxiety: a network perspective

Alexandre Heeren^{a,b,*}, Emily E. Bernstein^c, Richard J. McNally^c

^a Psychological Sciences Research Institute, Université catholique de Louvain, Louvain-la-Neuve, Belgium

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ARTICLE INFO

ABSTRACT

Keywords:
Fear
Avoidance
Social anxiety disorder
Maladaptive social self-beliefs
Probabilistic dependencies
Network analysis
Directed acyclic graph

The Clark and Wells (1995) model of social anxiety disorder postulates that three types of maladaptive social self-beliefs (high standard, conditional, and unconditional beliefs) play a crucial role in the development of fear and avoidance of social-evaluative situations—i.e., the hallmark symptoms of social anxiety disorder. In this project, we examined associations between the three types of maladaptive social self-beliefs and fear and avoidance of social-evaluative situations in a nonclinical community sample ($n = 389$). We used network analysis to estimate functional relations among aspects of maladaptive self-beliefs, fear, and avoidance and compared two different network models, a graphical Gaussian model (GGM) and a directed acyclic graph (DAG). Each model estimates edges and the importance of nodes in different ways. Both GGM and DAG pointed to fear and conditional beliefs as especially potent bridges between maladaptive social self-beliefs and social anxiety in our nonclinical sample. Altogether, these results offer data-driven heuristics in the field's larger, ongoing effort to illuminate pathways at play in the development of social anxiety. We situate this study within novel network approaches for developing theory-driven models and tests of the instigation and interactions of maladaptive social self-beliefs and social anxiety. However, because this is the first study to combine GGM and DAG in social anxiety research, we also discussed the caveats to this approach to help to usher the field forward.

Numerous cognitive models of SAD maintenance

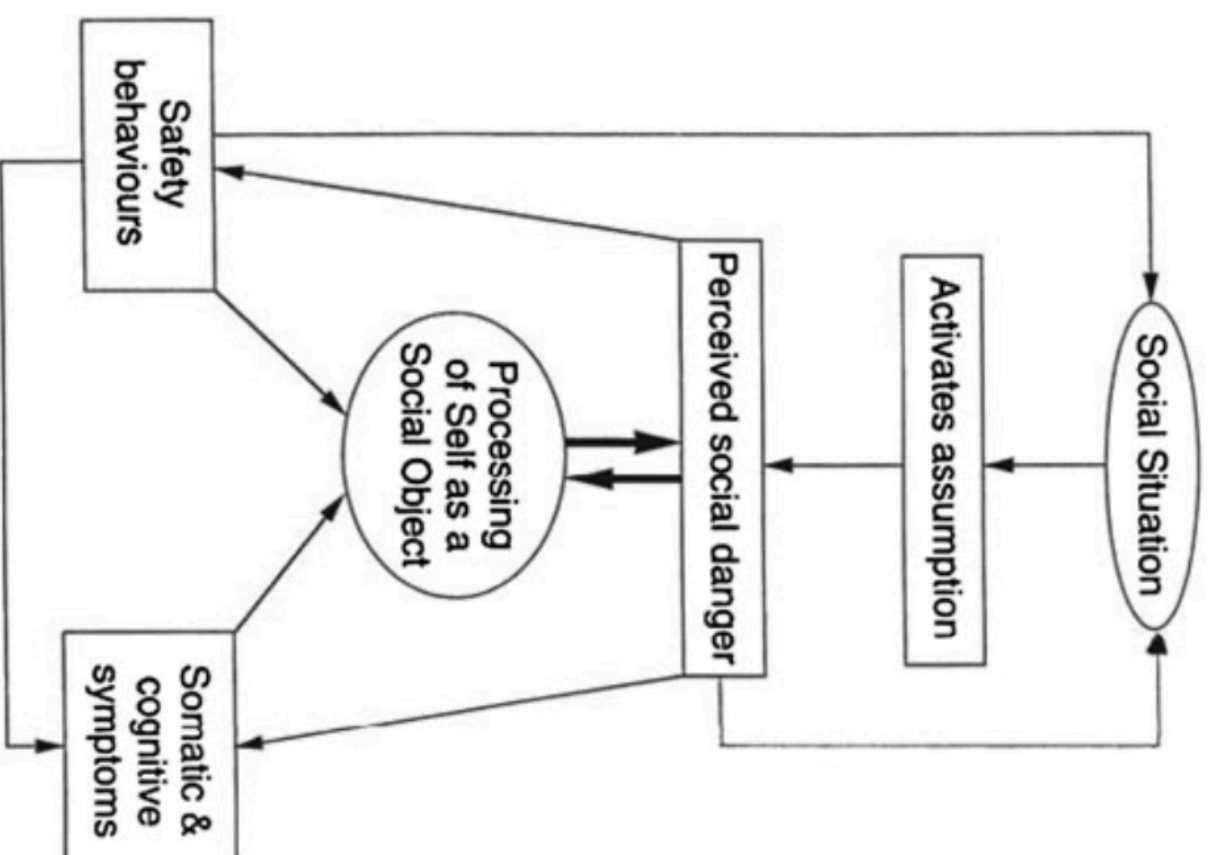
(e.g., Clark & Wells, 1995; Heimberg et al., 2010; Rapee & Heimberg, 1997; for a review, see Wong & Rapee, 2016)

When speaking of SAD onset...

A common feature is the emphasis on maladaptive social self-beliefs

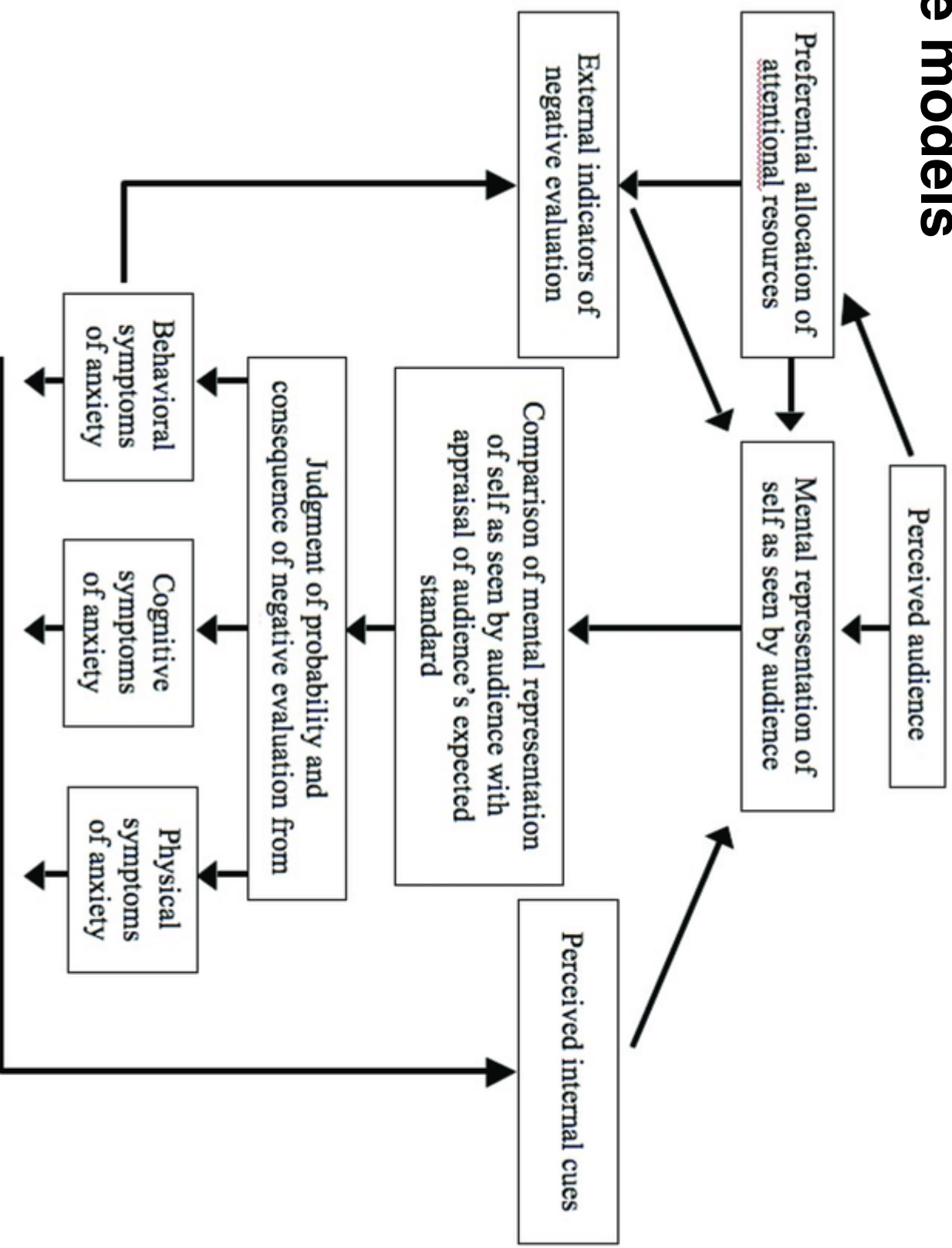
(for reviews, see Gkika, Wittkowski, & Wells, 2018; Gregory, Peters, & Rapee, 2016; Wong & Rapee, 2016).

Back to the models

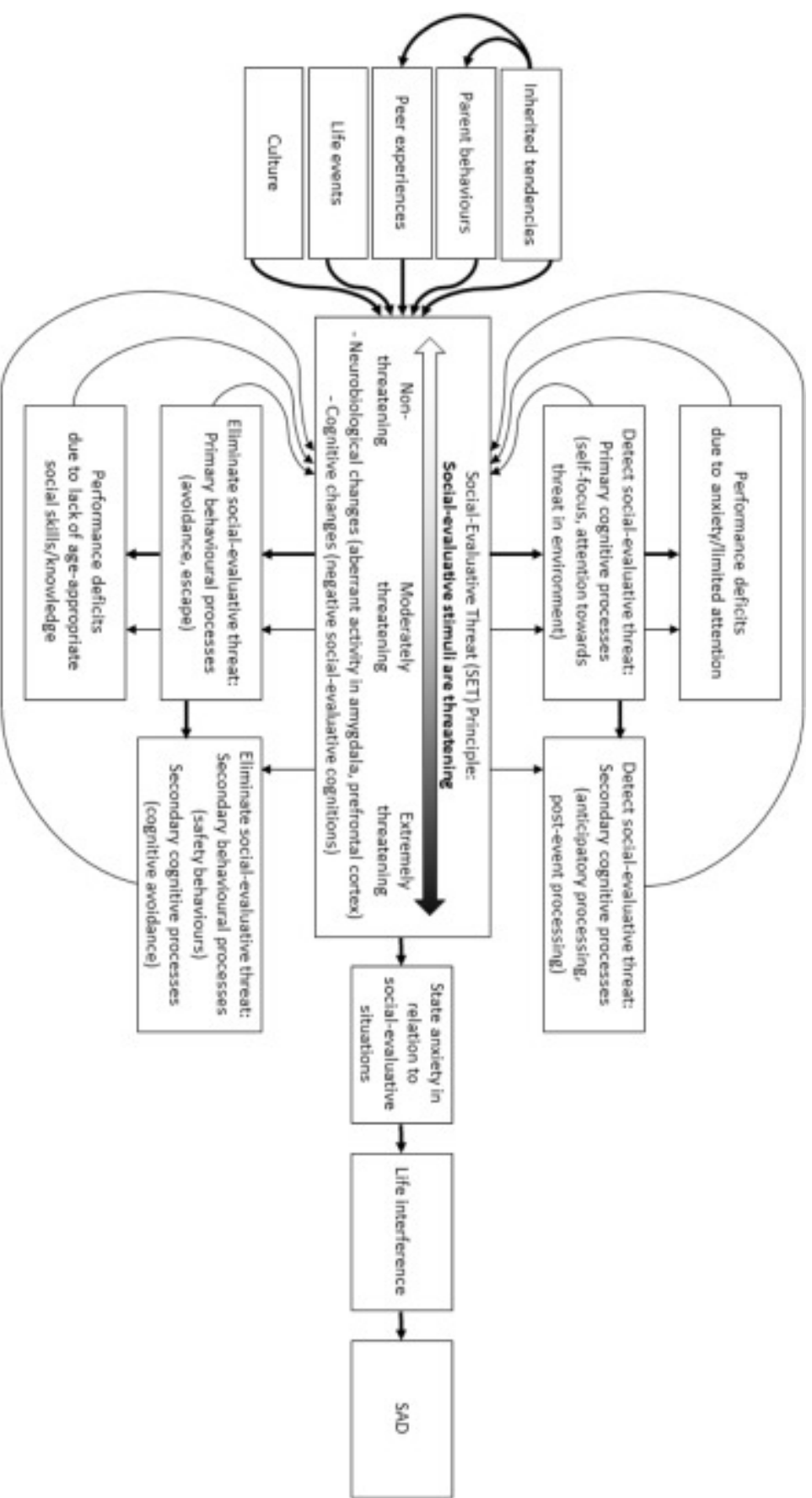


Clark & Wells (1995)

Back to the models



Back to the models



Three types of social self-beliefs that may strengthen fear and avoidance

- **High standards** (e.g., “I must be able to convey a favorable impression to everyone”)
- **Conditional beliefs** (e.g., “If people see I’m anxious, they’ll think that I’m weak”)
- **Unconditional beliefs** (e.g., “People think badly of me”)

Clark & Wells (1995)

Three types of social self-beliefs that may strengthen fear and avoidance

- **High standards** (e.g., “I must be able to convey a favorable impression to everyone”)
- **Conditional beliefs** (e.g., “If people see I’m anxious, they’ll think that I’m weak”)
- **Unconditional beliefs** (e.g., “People think badly of me”)

Clark & Wells (1995)

In both clinical and nonclinical samples:

-Best-fitting model

**-Associated with the
severity of social anxiety**

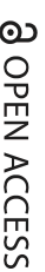
(e.g., Heeren, Wong et al., 2014; Maeda et al., 2017; Wong & Moulds, 2009;
2011; Wong, Moulds, & Rapee, 2014)

Predictions

**Three types of social self-beliefs should
foster/trigger fear and avoidance**



BASIC RESEARCH ARTICLE



A Bayesian network analysis of posttraumatic stress disorder symptoms in adults reporting childhood sexual abuse

Richard J. McNally^a, Alexandre Heeren^{a,b} and Donald J. Robinaugh^c

^aDepartment of Psychology, Harvard University, Cambridge, MA, USA; ^bInstitute of Psychological Science, Université Catholique de Louvain, Louvain-la-Neuve, Belgium; ^cDepartment of Psychiatry, Massachusetts General Hospital and Harvard Medical School, Boston, MA, USA

ABSTRACT

Background: The network approach to mental disorders offers a novel framework for conceptualizing posttraumatic stress disorder (PTSD) as a causal system of interacting symptoms.

Objective: In this study, we extended this work by estimating the structure of relations among PTSD symptoms in adults reporting personal histories of childhood sexual abuse (CSA; $N = 179$).

Method: We employed two complementary methods. First, using the graphical LASSO, we computed a sparse, regularized partial correlation network revealing associations (edges) between pairs of PTSD symptoms (nodes). Next, using a Bayesian approach, we computed a directed acyclic graph (DAG) to estimate a directed, potentially causal model of the relations among symptoms.

Results: For the first network, we found that physiological reactivity to reminders of trauma, dreams about the trauma, and loss of interest in previously enjoyed activities were highly central nodes. However, stability analyses suggest that these findings were unstable across subsets of our sample. The DAG suggests that becoming physiologically reactive and upset in response to reminders of the trauma may be key drivers of other symptoms in adult survivors of CSA.

Conclusions: Our study illustrates the strengths and limitations of these network analytic approaches to PTSD.

ARTICLE HISTORY

Received 22 December 2016

Accepted 6 June 2017

KEYWORDS

Network analysis; directed acyclic graph; PTSD; childhood sexual abuse

Data analytic procedure

Bayesian Networks — Directed Acyclic Graph (DAG)

- DAG to estimate a directed, potentially « causal » (probabilistic dependencies) structure of the system (Pearl et al., 2016).
- Bayesian hill-climbing algorithm via the R package *bnlearn* (Scutari, 2010; Scutari & Denis, 2014).
- A bootstrap function computes the structural aspects of the network model by adding edges, removing them, and reversing their direction to ultimately optimize the goodness-of-fit target score (i.e., BIC).
- As this iterative procedure unfolds, the function returns the best fitting network
- To ensure the stability of the resultant DAG, we then bootstrapped 10,000 samples (with replacement).
- DAG provides clues about causality, but direction alone cannot be interpreted as a causal effect — i.e. **hypothesis generating, rather than hypothesis testing**

Causal Protein-Signaling Networks Derived from Multiparameter Single-Cell Data

Karen Sachs^{1,*}, Omar Perez^{2,*}, Dana Pe'er^{3,*}, Douglas A. Lauffenburger^{1,t}, Garry P. Nolan^{2,t}

¹ Biological Engineering Division, Massachusetts Institute of Technology (MIT), Cambridge, MA 02139, USA.

² Stanford University School of Medicine, The Baxter Laboratory of Genetic Pharmacology, Department of Microbiology and Immunology, Stanford, CA 94305, USA.

³ Harvard Medical School, Department of Genetics, Boston, MA 02115, USA.

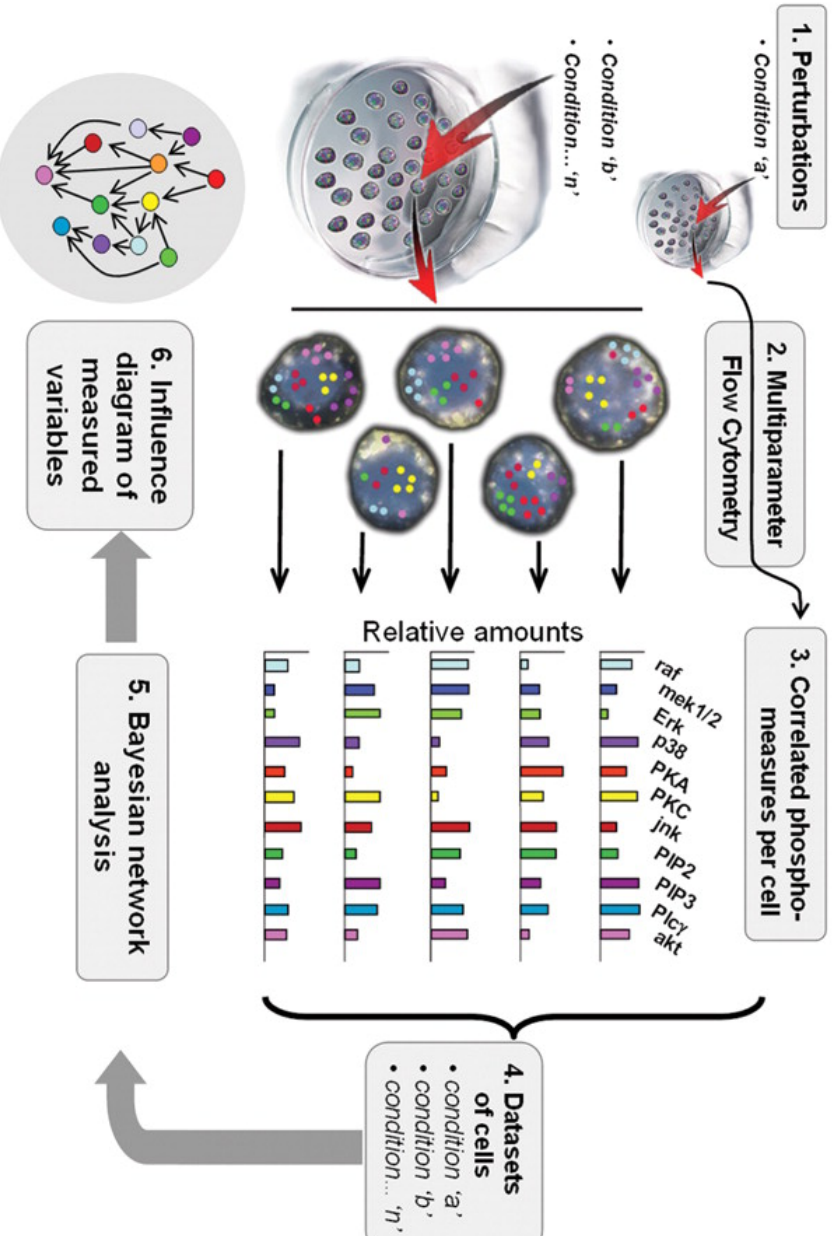
^t To whom correspondence should be addressed. E-mail: lauffen@mit.edu (D.A.L.); gnolan@stanford.edu (G.P.N.)

✉* These authors contributed equally to this work.

- Hide authors and affiliations

Science 22 Apr 2005;
Vol. 308, Issue 5721, pp. 523-529
DOI: 10.1126/science.1105809

A





ELSEVIER



Identifying significant edges in graphical models of molecular networks

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^b Division of Biomedical Informatics, Department of Biostatistics, College of Public Health, University of Kentucky, 725 Rose Street, Multidisciplinary Science Bldg, 230F, Lexington, KY 40536-0082, USA

Greedy search score-based algorithm that maximises the posterior Bayesian probability of the network

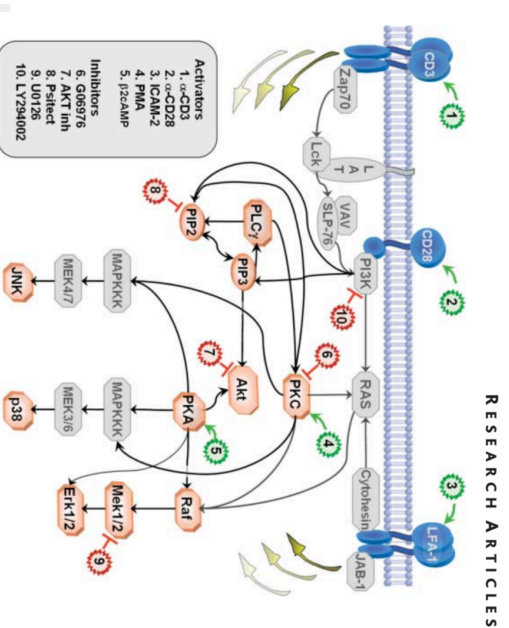
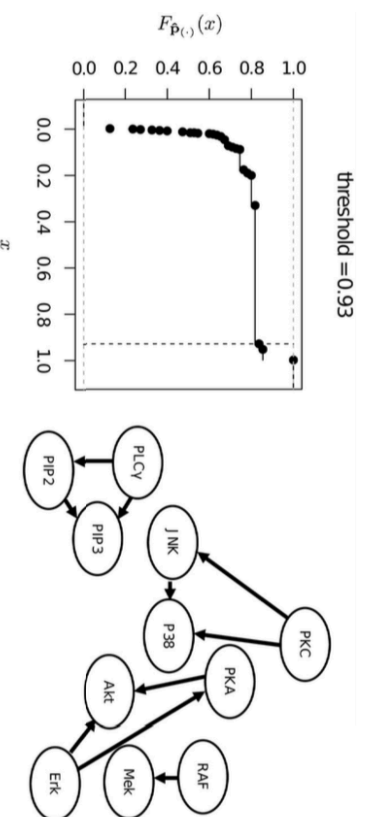


Fig. 9. The empirical CDF of $\hat{P}_{1(\cdot)}$ for the flow cytometry data from Sachs et al. [21] (on the left), and the network structure resulting from the selection of fine significant edges (on the right). The vertical dashed line in the plot of $\hat{F}_{\hat{P}_{1(\cdot)}}$ represents the threshold $\hat{F}_{\hat{P}_{1(\cdot)}}^{-1}(\tau)$.

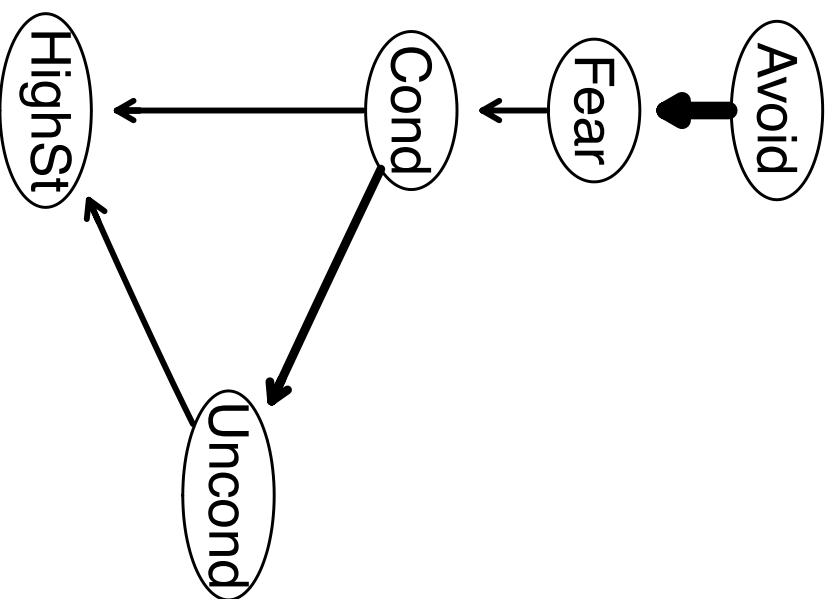


Bridging maladaptive social self-beliefs and social anxiety: a network perspective

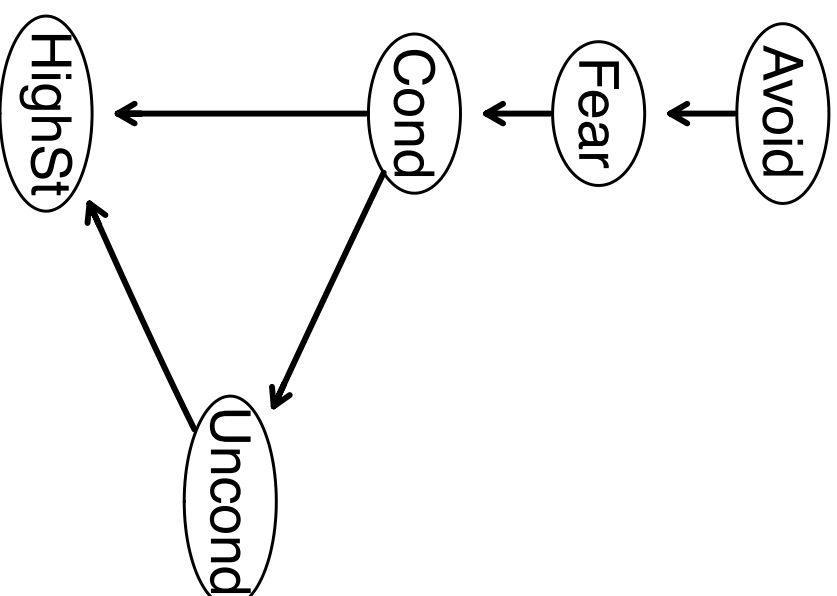
Alexandre Heeren^{a,b,*}, Emily E. Bernstein^c, Richard J. McNally^c

$n = 389$

A



B



One main limitation of the DAG: no feedback loop

— > ongoing temporal study



**2020 STAR Early Career Award
from the Stress and Anxiety Research Society**

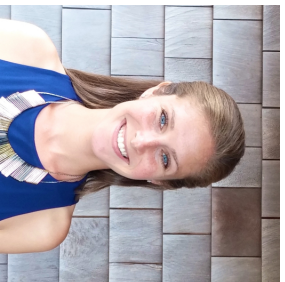
**A radically new vistas for
research in experimental
and cognitive psychopathology?**

Unpacking Rumination and Executive Control: A Network Perspective

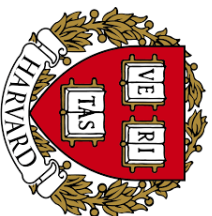
Emily E. Bernstein, Alexandre Heeren, and

Richard J. McNally

Harvard University



E.E. Bernstein



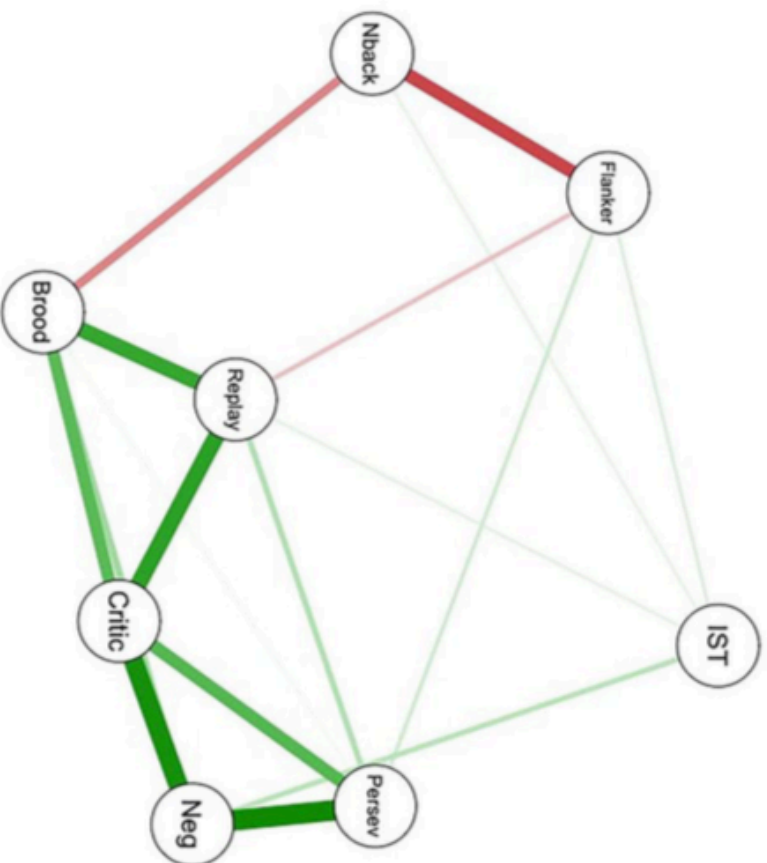
R.J. McNally



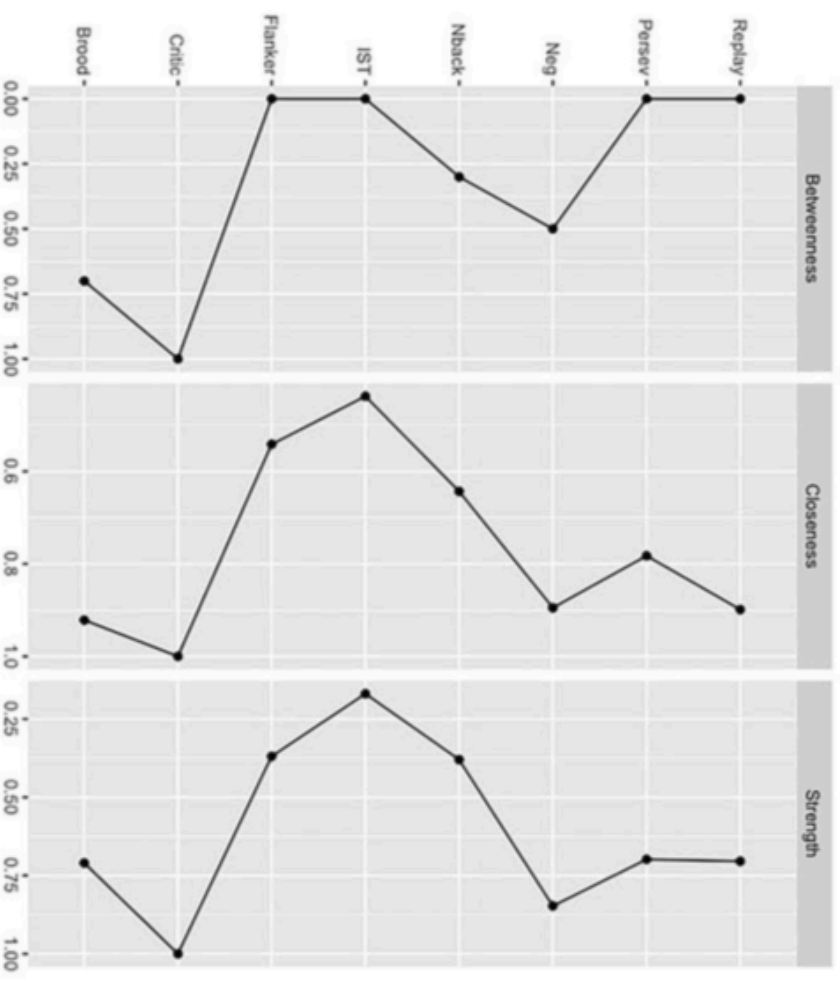
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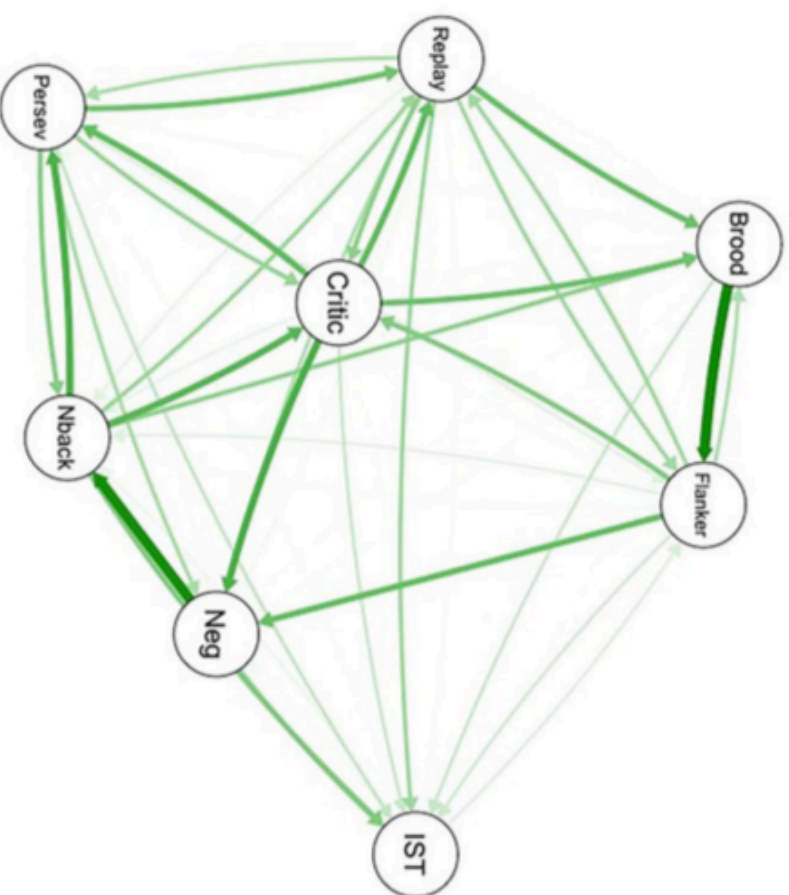


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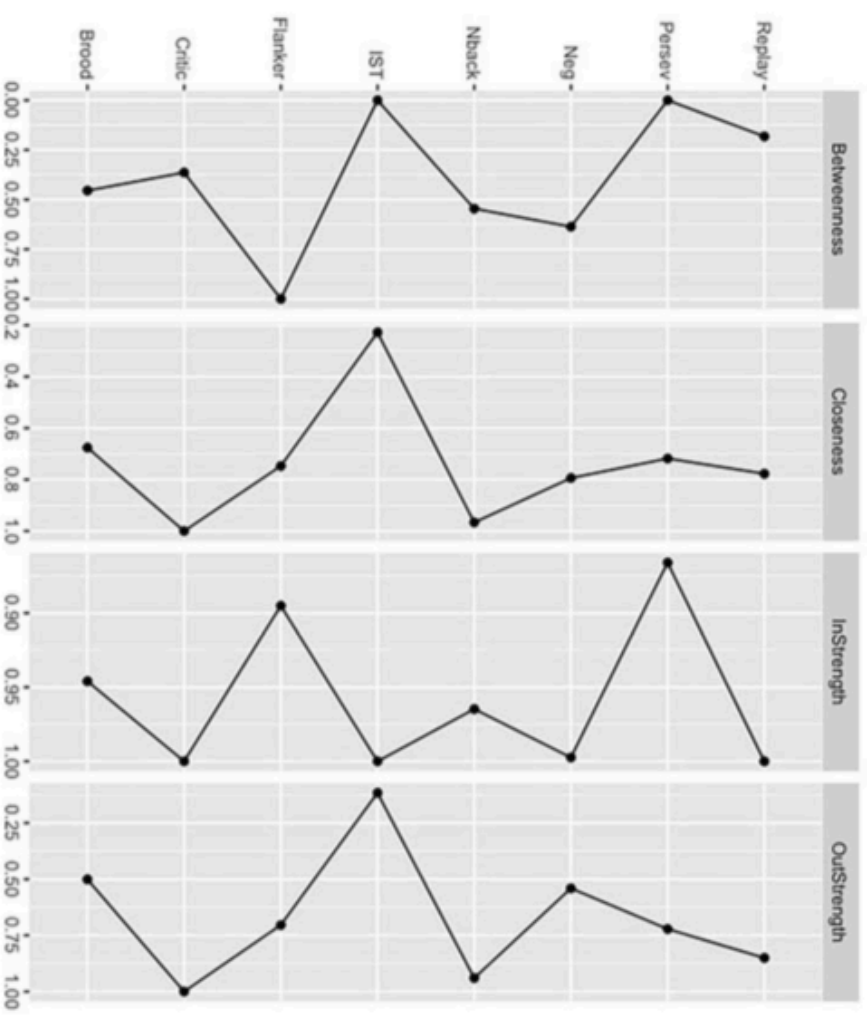


GGM: Graphical LASSO network

A

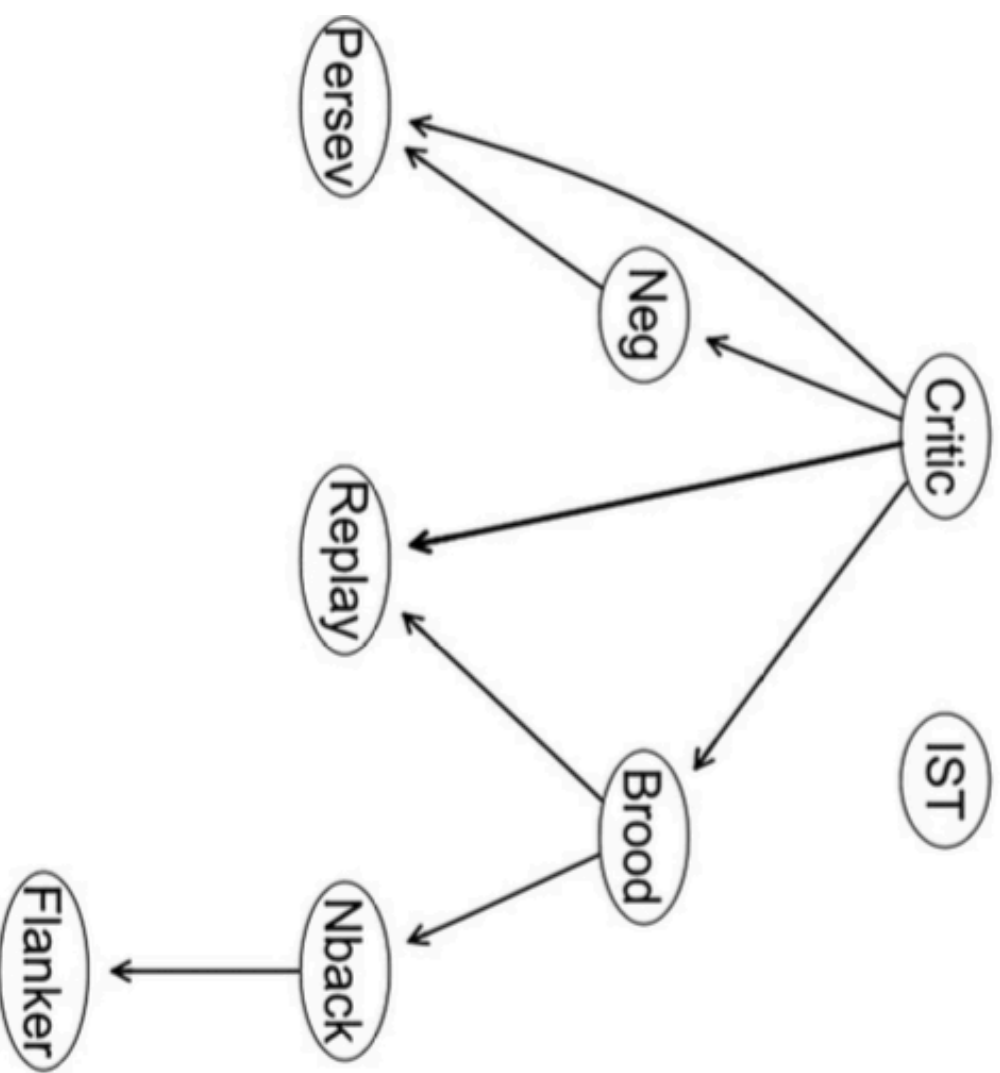


B



Relative importance network

Bayesian directed acyclic graph

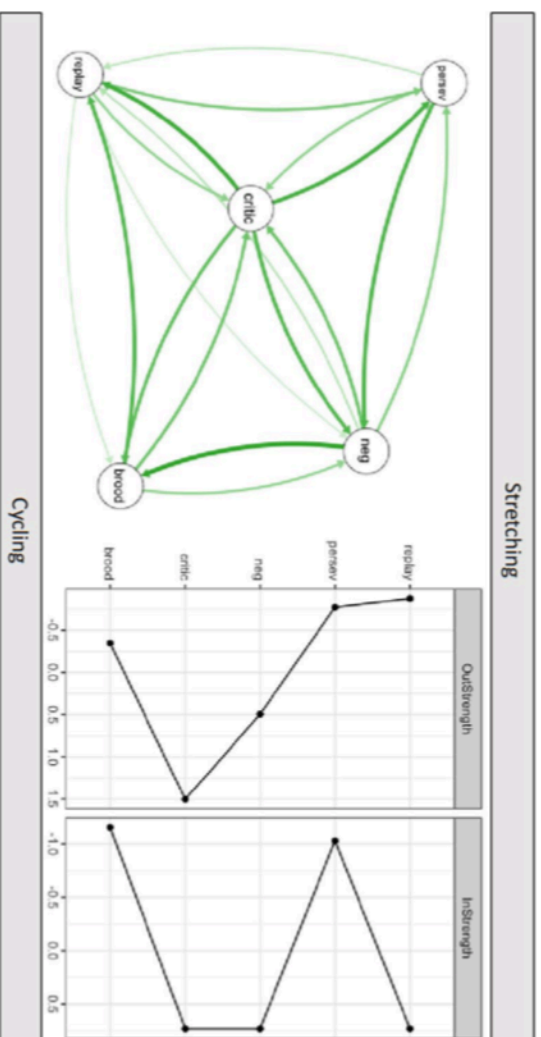




A Network Approach to Understanding the Emotion Regulation Benefits of Aerobic Exercise

Emily E. Bernstein¹ · Alexandre Heeren² · Richard J. McNally¹

Cognitive Therapy and Research



E.E. Bernstein



R.J. McNally



B. Kraft



Empirical Article

Attention Bias Modification in Remitted Depression Is Associated With Increased Interest and Leads to Reduced Adverse Impact of Anxiety Symptoms and Negative Cognition

***n* = 400**



C. Harmer

Brage Kraft¹, Rune Jonassen^{1,2}, Alexandre Heeren³, Catherine Harmer⁴, Tore Stiles⁵, and Nils Inge Landrø^{1,6}

¹Department of Psychology, University of Oslo; ²Division of Psychiatry, Akershus University Hospital, Lørenskog, Norway; ³Psychological Sciences Research Institute, Université Catholique de Louvain;

⁴Department of Psychiatry, University of Oxford; ⁵Department of Psychology, Norwegian University of Science and Technology; and ⁶Department of Psychiatry, Diakonhjemmet Hospital, Oslo, Norway

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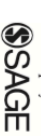
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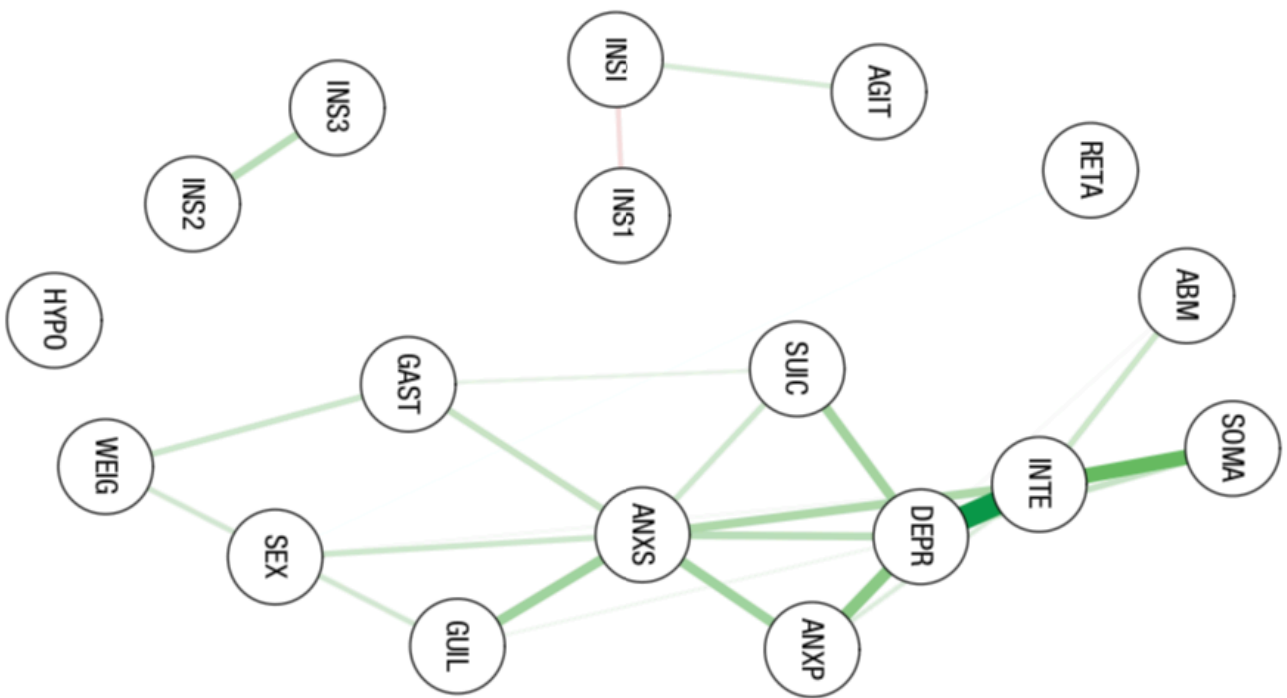
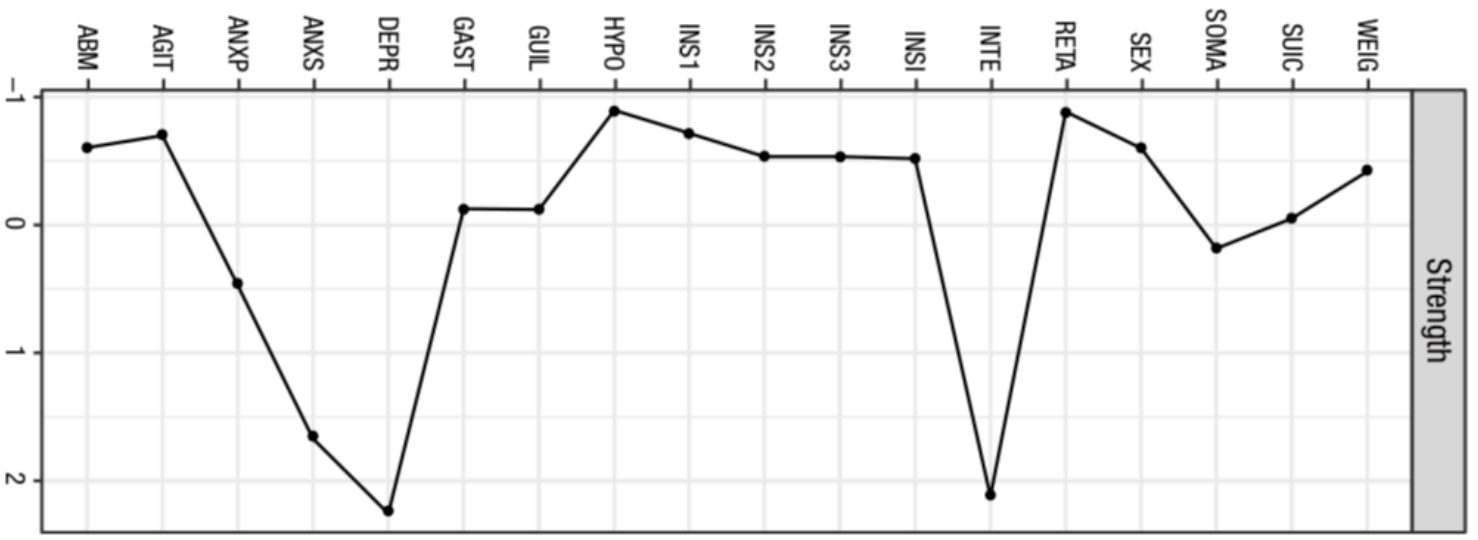
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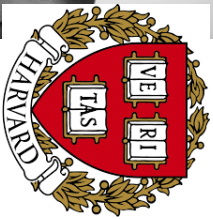




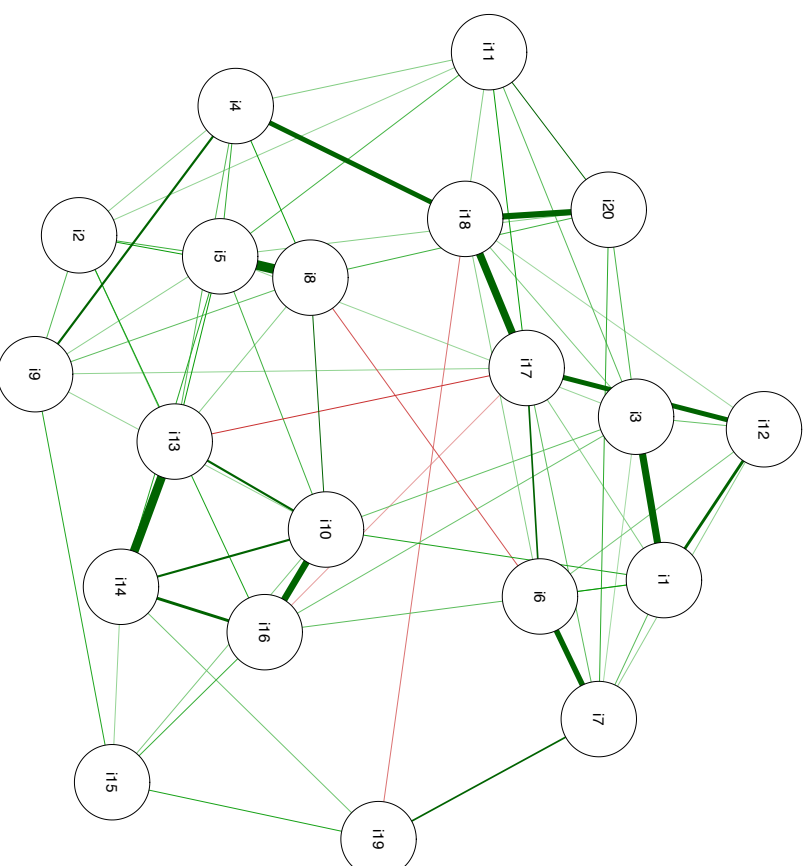
E.E. Bernstein

Deconstructing trait anxiety: a network perspective

Alexandre Heeren ^{a,b,c}, Emily E. Bernstein^a and Richard J. McNally^a



R.J. McNally



$n = 611$

Centrality: Intrusive thoughts & Difficulty disengaging from concern-related materials

My **talk** overview

From an empirical crisis to a theoretical crisis and vice versa

1

Let's get
personal

2

Towards
complexity

3

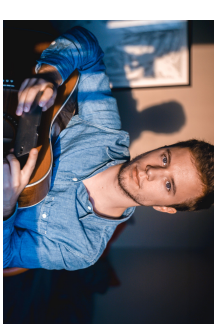
My research
agenda(s)

4

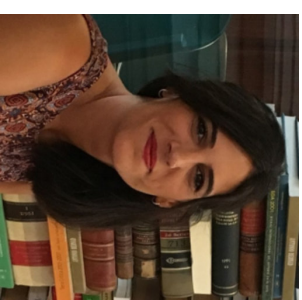
My research
horizon



A. Blanchard



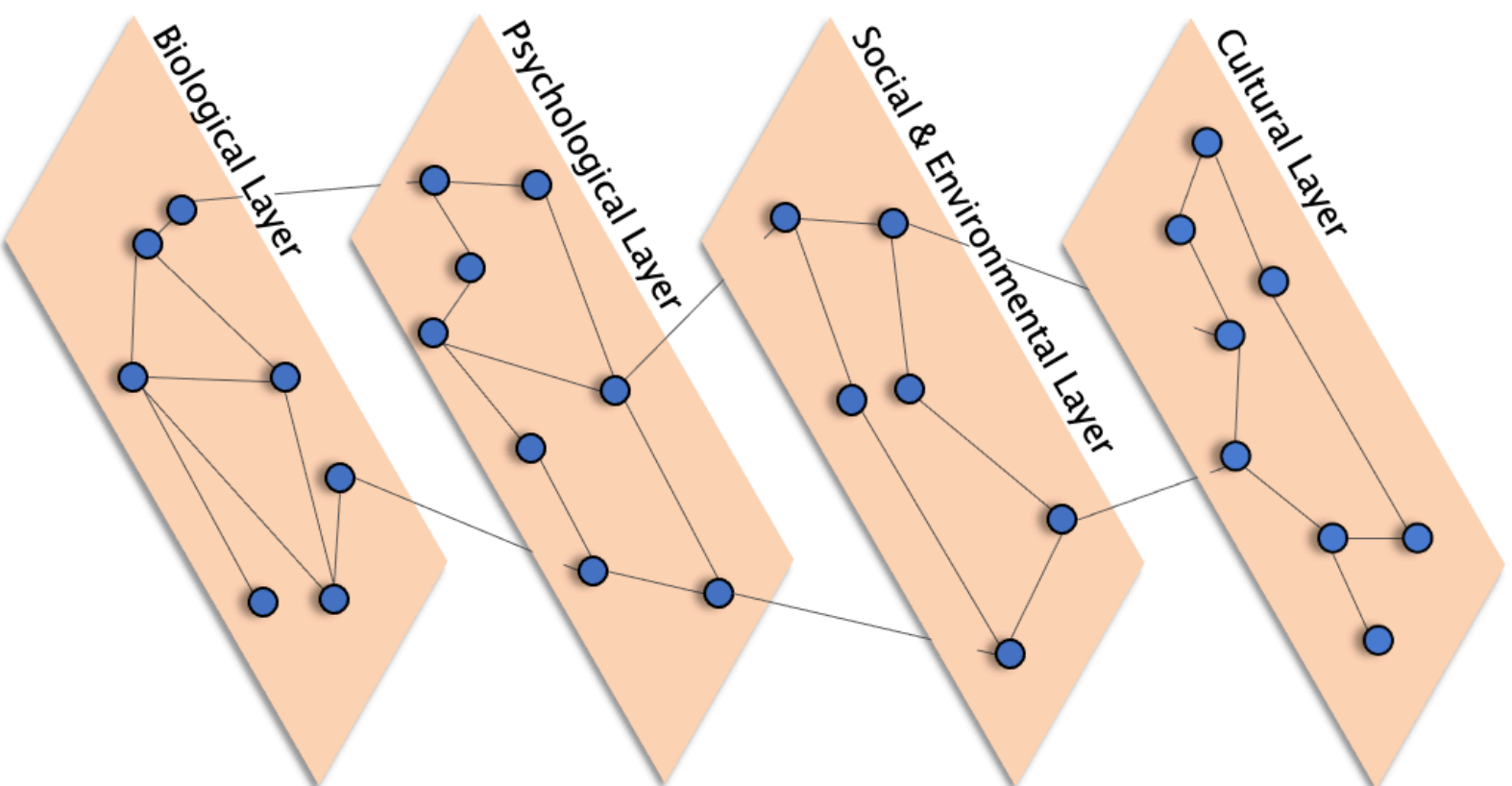
Y. Hoebeke



A. Contreras



C. Mouguiana



Extending Inwards to Biology & Outwards to Social Context



M. A. Blanchard

DOI: 10.1002/cad.20377

OPINION

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**Why we should move from reductionism and
embrace a network approach to parental
burnout**

M. Annelise Blanchard¹  | Alexandre Heeren^{1,2} 

Towards the integration of the family system

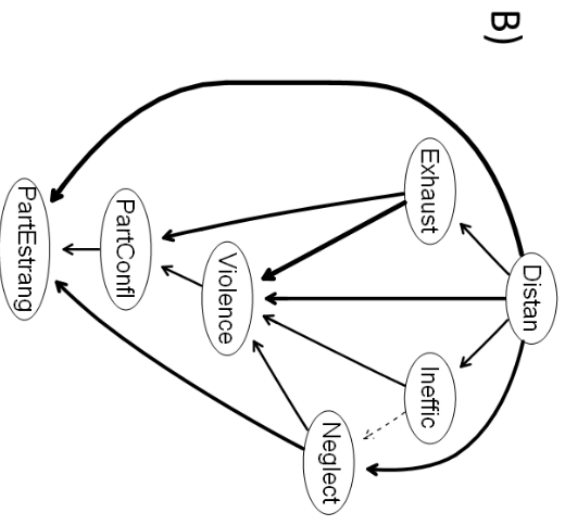
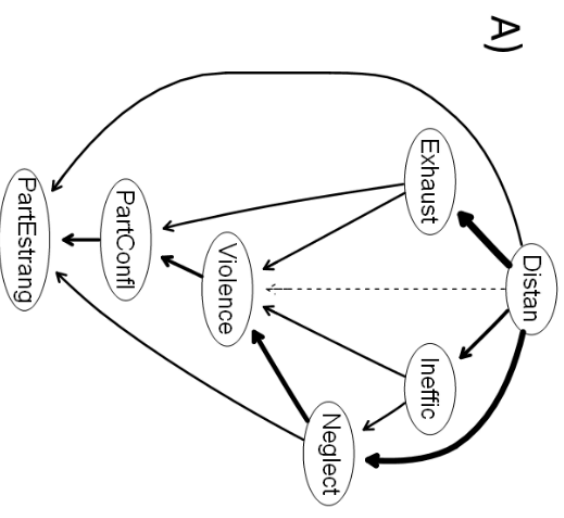
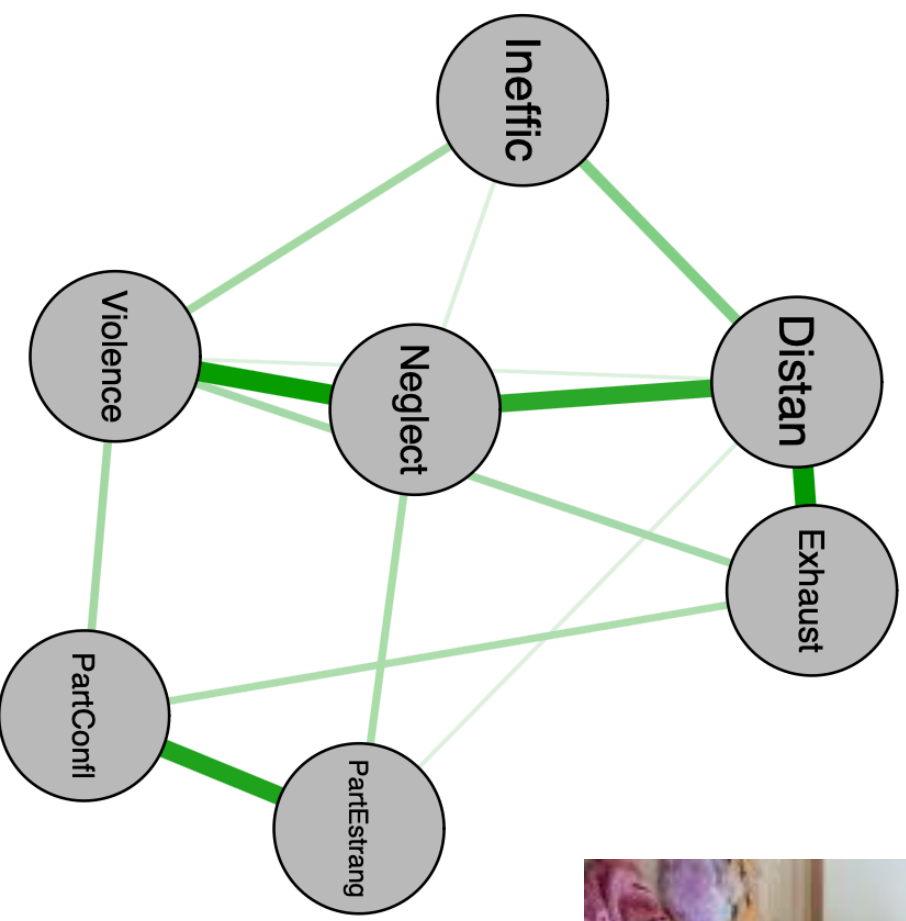


A network approach to parental burnout

by Blanchard, Roskam, Mikolajczak, & Heeren (2021)



$n = 1551$





A temporal network approach to parenting stress and family dynamics



I. Roskam

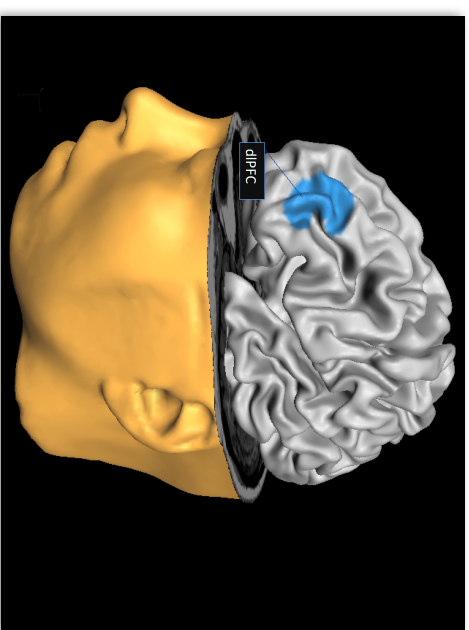


M. Mikolajczak



Stress Contagion?

Brain Stimulation



Social Cognitive and Affective Neuroscience

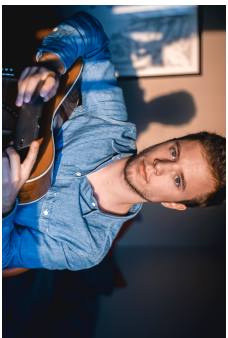
Impact of transcranial direct current stimulation on attentional bias for threat: a proof-of-concept study among individuals with social anxiety disorder

Alexandre Heeren,^{1,2} Joël Billieux,² Pierre Philippot,² Rudi De Raedt,³ Chris Baeken,^{4,5} Philippe de Timary,^{2,6,7} Pierre Maurage,^{2,6} and Marie-Anne Vanderhasselt^{3,4,8}

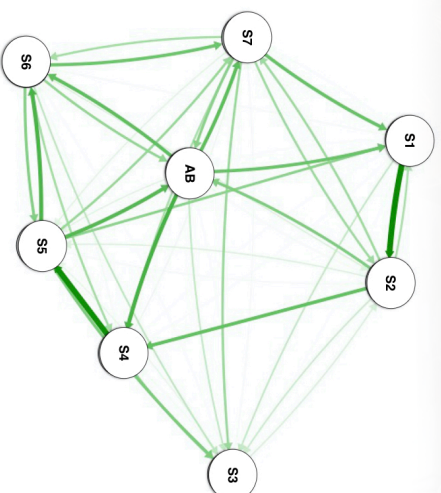
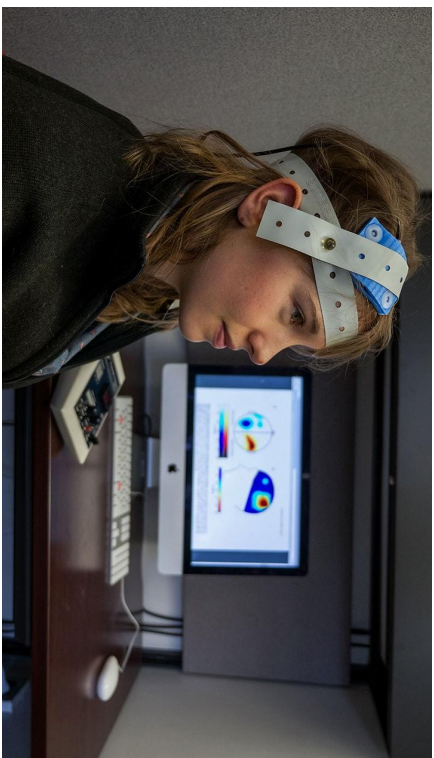


Heeren, Baeken, Vanderhasselt, Philippot, & De Raedt (2015)

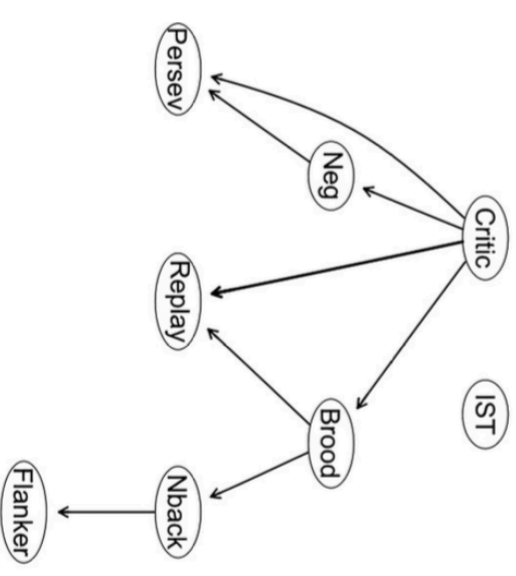
Heeren, Billieux, Philippot, de Raedt, Baeken, de Timary, Maurage, & Vanderhasselt (2017)



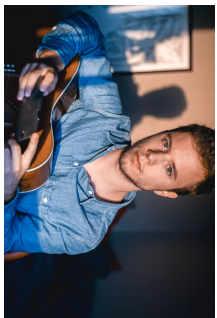
Y. Hoebbecke



+



Relative importance network + **Bayesian directed acyclic graph**

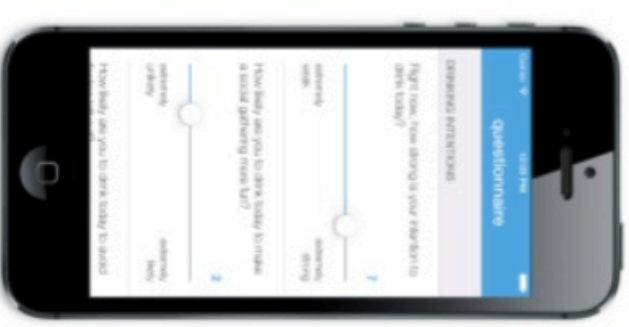


Y. Hoebeke

A temporal network approach to executive control and rumination processes

experience sampling

- a form of moment-to-moment data collection
- increased ecological validity
- minimise retrospective bias
- participant burden
- different kinds of questions



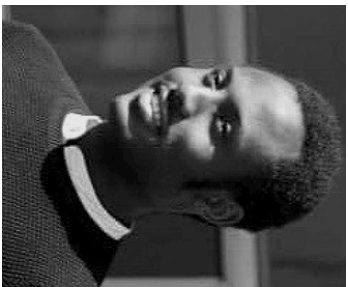


A. Contreras

**The temporal dynamics between the
neurocognitive processes assumed by
the prominent models of anxiety**

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C. Mouguiama

Core transdiagnostic processes to anxiety as a function of climate change





M. A. Blanchard

Ongoing and Future Challenges of the Network Approach to Psychopathology: From Theoretical Conjectures to Clinical Translations

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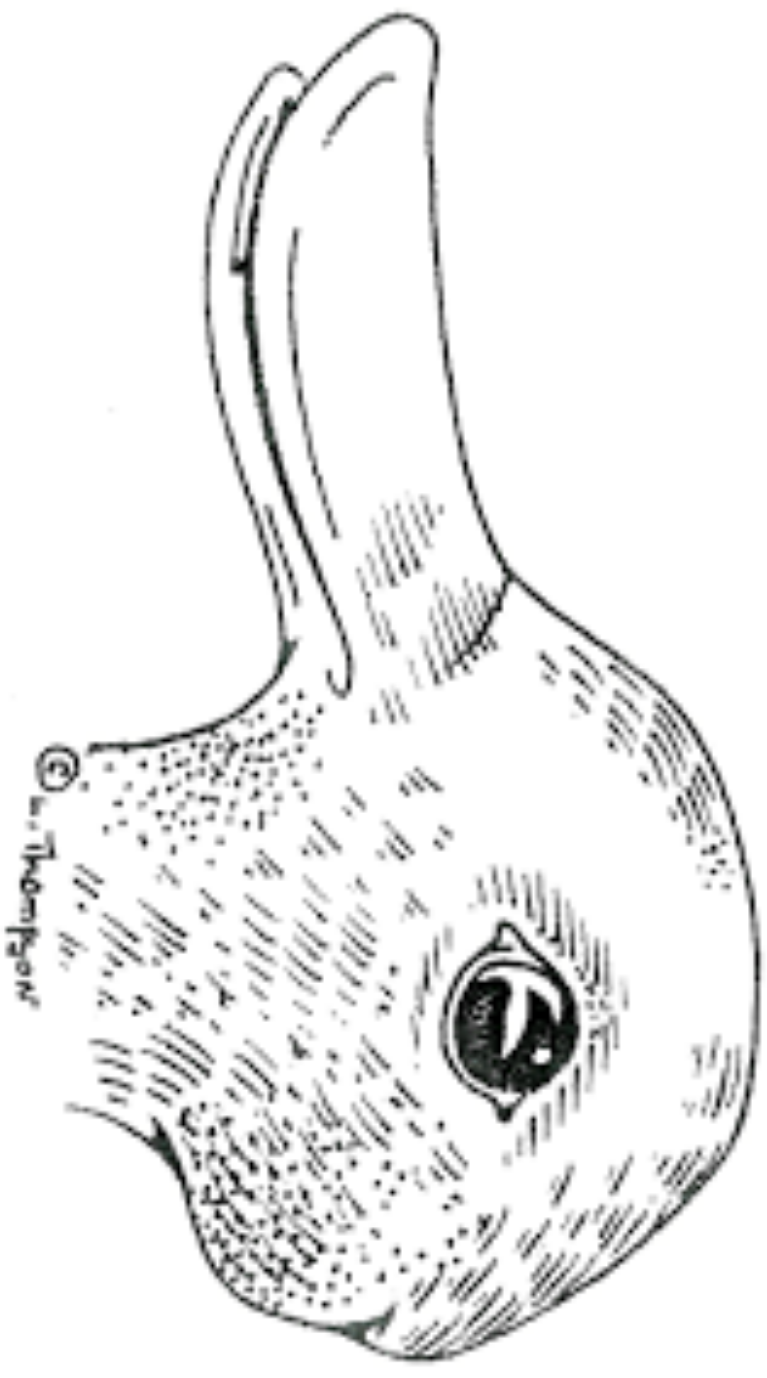
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CONCLUSION

Wittgenstein's duck rabbit



L. Wittgenstein

The Theory Crisis in Psychology: How to Move Forward

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Abstract

Meehl argued in 1978 that theories in psychology come and go, with little cumulative progress. We believe that this assessment still holds, as also evidenced by increasingly common claims that psychology is facing a “theory crisis” and that psychologists should invest more in theory building. In this article, we argue that the root cause of the theory crisis is that developing good psychological theories is extremely difficult and that understanding the reasons why it is so difficult is crucial for moving forward in the theory crisis. We discuss three key reasons based on philosophy of science for why developing good psychological theories is so hard: the relative lack of robust phenomena that impose constraints on possible theories, problems of validity of psychological constructs, and obstacles to discovering causal relationships between psychological variables. We conclude with recommendations on how to move past the theory crisis.

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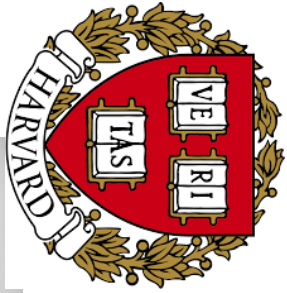
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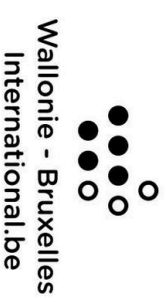
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Harvard University, Cambridge, MA, USA

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Feel inspired



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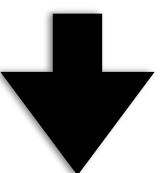
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R code + data



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« *I think the next century [21st] will
be the century of complexity* »

Stephen Hawking (2000)