

To Be Or Not To Be (Depressed)? Assessing the Risk for the Development of Depression

Jolanda J. Kossakowski, MSc & Dr. Lourens J. Waldorp
University of Amsterdam

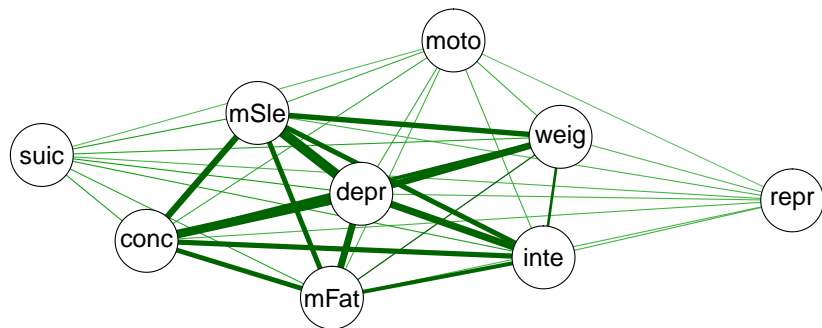
<http://www.jolandakossakowski.eu>

J.J.Kossakowski@uva.nl

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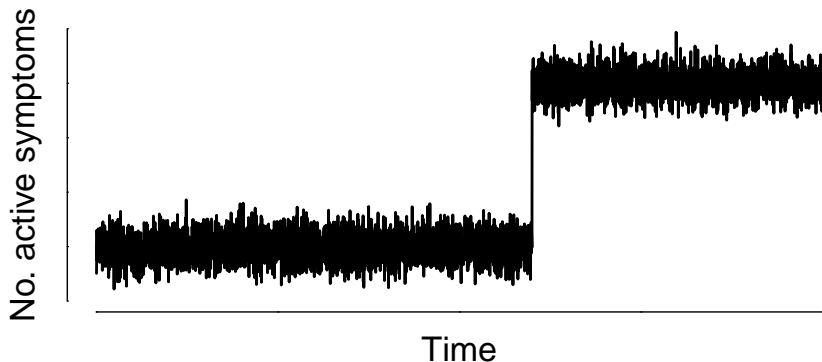
Introduction

Symptom interactions are key to any psychological disorder

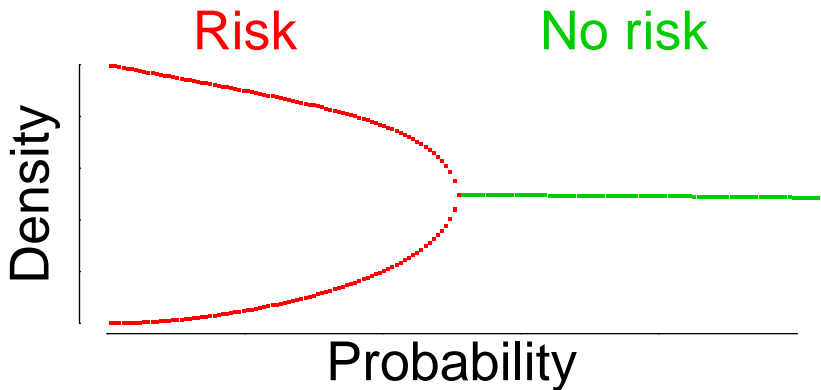


Introduction

- ▶ What if we can determine whether someone is at risk for sudden mood shifts?
- ▶ Suppose we can assess whether a child is in a stage where learning is difficult?



By reducing such a complex and multivariate system with a *Mean Field Approximation*, we can assess whether an individual is at risk for sudden mood shifts or at risk to be stuck in a stage where learning is difficult.



Goal

To demonstrate how this method works in practice by assessing the risk for experiencing a sudden mood shift in two individuals.

Participants

Both participants participated in a bachelor research project either voluntarily or for either research credit

Participant 9

- ▶ 55-year old female
- ▶ 99 measurements in 15 days ($\mu = 6.60$ per day)
- ▶ 6 missed measurements

Participant 29

- ▶ 26-year old male
- ▶ 90 measurements in 14 days ($\mu = 6.43$ per day)
- ▶ 8 missed measurements

Methods

Questionnaire

- ▶ 13-item questionnaire
 - ▶ 9 items based on DSM-V depression symptoms
 - ▶ Self-esteem
 - ▶ Rumination
 - ▶ Anger
- ▶ 5-point Likert scale
- ▶ Questionnaire was offered 7 times a day
- ▶ Completed via Qumi app (Oppenheim, 2016)

Methods

Data preparation

- ▶ Replace any missing values with median
- ▶ Dichotomize data using median split
- ▶ Exclude variables with zero variance
- ▶ Exclude variables with categories observed less than three times

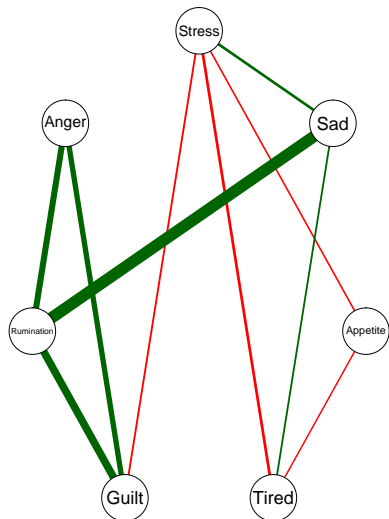
Procedure

- ▶ Estimate network with `IsingFit` package (Borkulo et al., 2014)
- ▶ Calculate percentage of active symptoms (*density*) for each time point
- ▶ Optimize risk parameter using Maximum Likelihood Estimation
- ▶ Determine where sudden mood shifts can occur and compare it to risk parameter

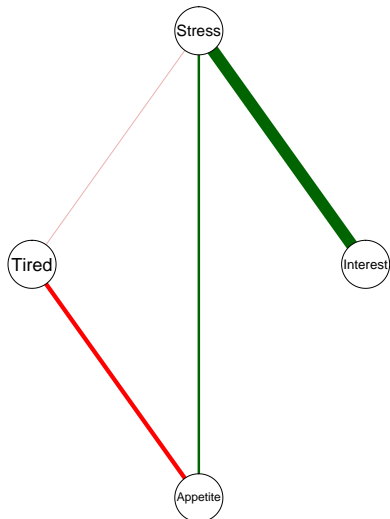
Results

Network

Participant 9

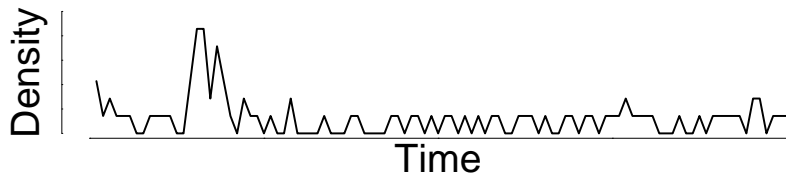


Participant 29

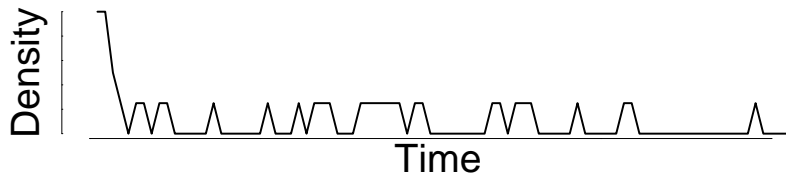


Progression over time

Participant 9

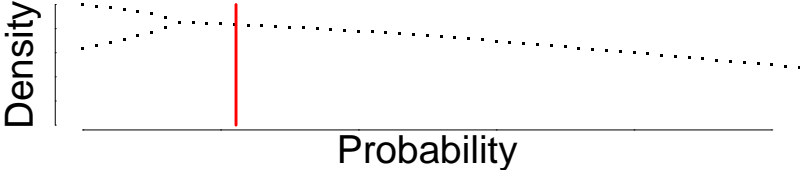


Participant 29

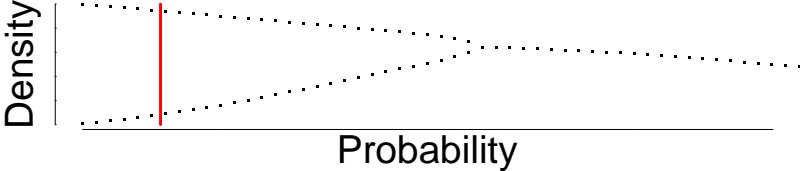


Risk Assessment

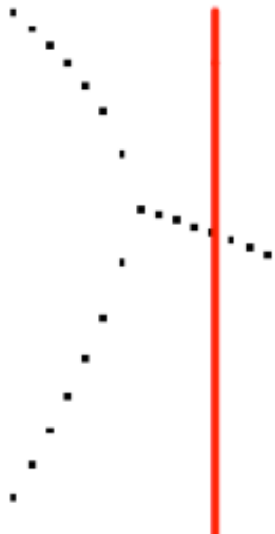
Participant 9



Participant 29

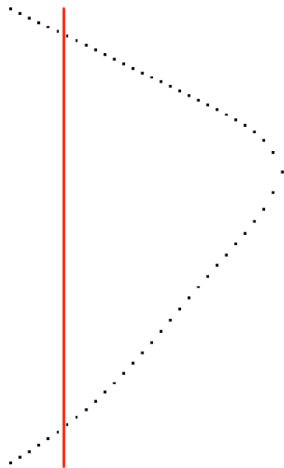


Risk Assessment: Participant 9



- Prongs indicate the area in which sudden mood shifts are possible
- Participant is **not** at risk for experiencing a depressive episode

Risk Assessment: Participant 29



- Prongs indicate the area in which sudden mood shifts are possible
- Participant **is** at risk for experiencing a depressive episode

Conclusions

- ▶ A new method was demonstrated for assessing the risk that participants may have for experiencing sudden mood shifts
- ▶ By means of two examples, it was shown that one participant has an increased risk, whereas the other does not have an increased risk
- ▶ The method shown today is freely accessible through an online network application:
<https://jolandakos.shinyapps.io/NetworkApp/>

Limitations

- ▶ The proposed method only works with 'perfect' data:
 - ▶ No missing data allowed
 - ▶ Items with zero variance are excluded
 - ▶ Items holding categories with few observations are excluded as well
- ▶ We are currently working on solutions to cope with these non-trivial problems.

References

Borkulo, C. D. van, Borsboom, D., Epskamp, S., Blanken, T. F., Boschloo, L., Schoevers, R. A., & Waldorp, L. J. (2014). A new method for constructing networks from binary data. *Scientific Reports*, 4, 1–10.

Oppenheim, B. (2016). Qumi for apple iOS (version 0.5.41) [mobile application software]. Retrieved from <http://qumi-app.blogspot.nl>