

A machine learning approach to relationships among alexithymia components

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What is alexithymia and why study it?

- A, léxis, thymos (lack of word for emotion)
- Difficulty identifying, verbalizing and analyzing emotions, poor fantasy life, poor insight
- Study alexithymia to understand disorders associated with emotions (e.g. mood disorders & addiction)
- Overlap with autism and psychopathy in neuroimaging research
- Bermond Vorst Alexithymia Questionnaire 5 domains
- Alexithymia as a latent variable or complex system?
 - Latent variable: alexithymia as a hidden cause
 - Complex system: set of interactions among components that make alexithymia arise

Psychiatric constructs & disorders as networks

- Network theory of mental disorders
 - Symptoms/items are components of a network
 - They are connected through edges
 - Connections reflect conditional probabilities with partial correlations
- Relevant network components serve as targets for clinical intervention
- However, finding relevant components is difficult with psychometric scales because of the many items
- Topological overlap to overcome redundancy, but never used experimentally
- Bayesian AI allows for retrieving causal connections

Aims of this work

- Investigate network structures of the AQ
- First: partial correlation network of the entire AQ
- Second: find important items and *shrink* the network
- Third: partial correlation network of important items
- Fourth: using machine learning (Bayesian AI) to uncover causal connections among alexithymia components

Subjects

- 537 university students in French-speaking Belgium
- 17-25 years old, $M=20$ years ; $SD=1.7$
- 71% F and 29% M
- 20 item AQ questionnaire French version
- Ethical approval by the academic hospital

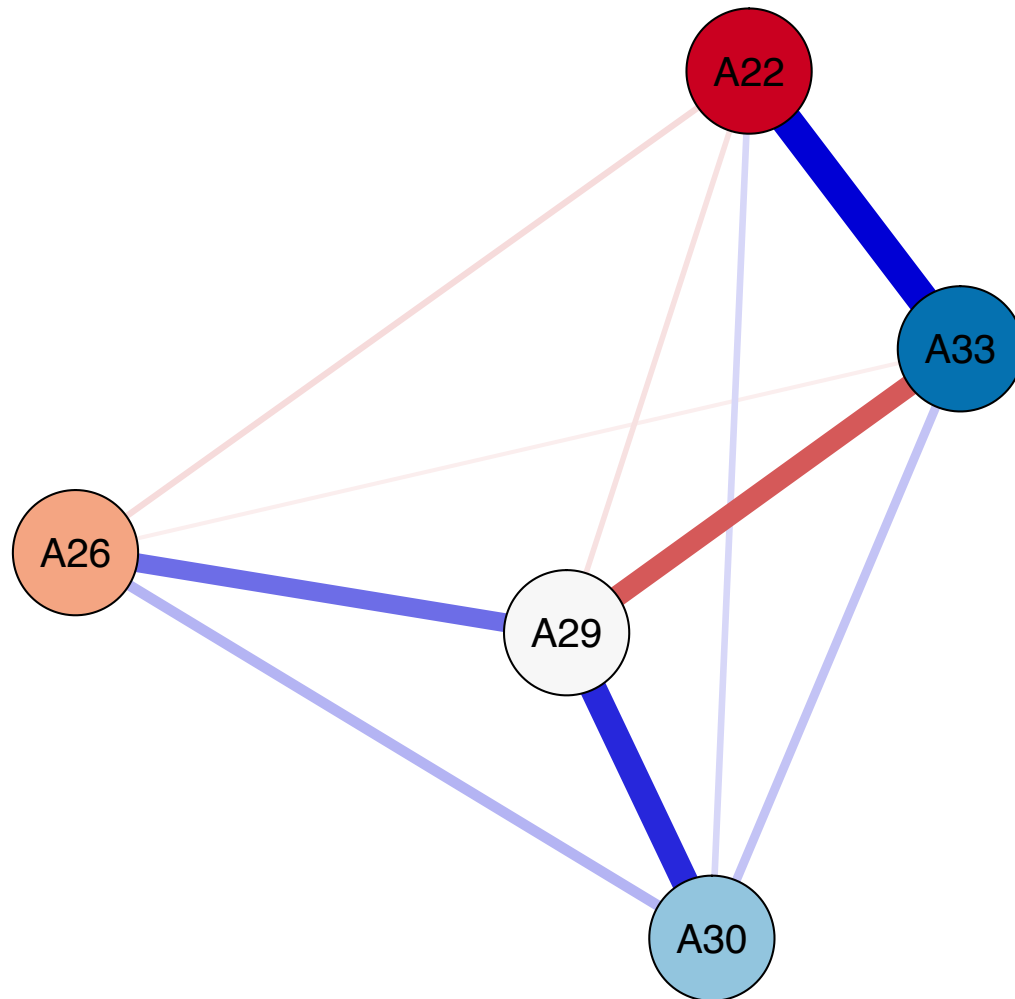
Methods – 1 – Partial correlation networks

- Analysis carried out in R for Statistical Computing
- Gaussian Graphical Model (GGM, partial correlation network) computed as the inverse covariance matrix
- Each item – a node
- Each edge – partial correlation
- Important items identified through strength centrality (sum of edges)
- Stability analyses – bootstrapping
- Topological overlap – one item per domain
- Final network – 5 domain network

Methods – 2 – Bayesian network

- Edges represent causal pathways between 2 nodes
- Directed Acyclic Graph (DAG) produced through constraint based algorithm (Peter & Clark)
- Markov blanket \rightarrow V structure
- Bootstrapping 1000 networks and report
 - Connections that appear in $> 85\%$ of networks
 - Directions that appear in $> 50\%$ networks

Results & Discussion – 1 – Five domain network

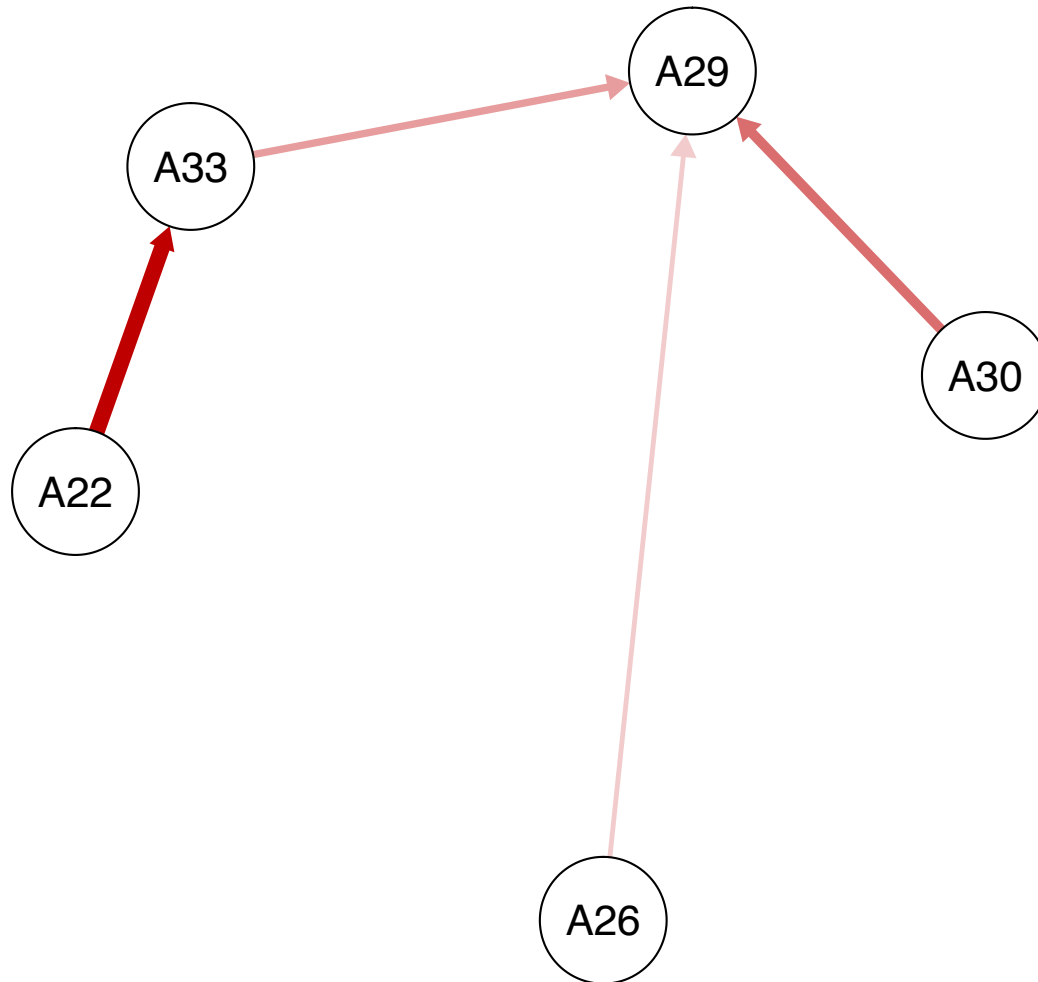


A22: Difficulty Identifying Emotions
A26: Difficulty Verbalizing Emotions
A29: Poor Emotional Insight
A30: Difficulty Analyzing Emotions
A33: Poor Fantasy

Results & Discussion – 1 – Five domain network

- Poor fantasy – Difficulty identifying emotions
- Poor emotional insight – highly connected
- Alexithymia is not a uniform construct ?

Results & Discussion – 2 – Bayesian network



A22: Difficulty Identifying Emotions
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Results & Discussion – 2 – Bayesian network

- Poor emotional insight is highly connected because it is the common effect (it is highly controllable)
- Poor fantasy and poor emotional insight negatively connected because in a V structure
- Difficulty identifying, verbalizing and analyzing emotions are the three causal domains of alexithymia, while the latter two are the effects
 - Do they represent the same thing?

Limitations of this study

- University students
- Absence of loops in Bayesian networks
- Causation can be inferred as long as there is an assumption of no confounding/sampling bias

Conclusions

- Alexithymia as an important construct in psychiatry
- Investigating alexithymia through networks allows for a deeper understanding of its complex nature
- Poor fantasy and insight, although potential effects, play a key role in the self-determination of alexithymia
- Potential overlap of identifying, verbalizing and analyzing emotions as causes of alexithymia
- Future works may endeavor to replicate our findings in other samples.

Thank you for your attention

- A machine learning approach to relationships among alexithymia components
 - Briganti G, Scutari M, Linkowski P