The use of computational modeling for mapping the mind

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Modeling to disentangle effect of meditation on cognition

- Why use modeling?
  - Detailed description of the cognitive process under study (Mehlhorn et al., 2012)
  - Verbal descriptions often ambiguous

- What is cognitive modeling?
  - Decomposing a cognitive task into crucial cognitive operations
  - Defining it in equations or algorithms
  - Simulating the task on a computer
  - Matching parameters of the model to observed data

- Changes in parameters indicate specific cognitive mechanisms

Modeling to predict new effects of meditation on cognition

- Why make a model of a meditating computer?
  - Start with meditation instruction → put focus on goal “meditating”
  - Competition with a distracting “thought pump” process
  - How could it regain focus?

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The drift diffusion model of decision making

DDM shows reduction in perceptual noise

- More specific conclusions

Increased drift in attention network task

Conclusions

Meditation decreases mental noise

Interacting with time and group: p = 0.04 (non-parametric ANOVA)

Conclusions

- Development of a computational model of meditation
- Aims: comparing meditation model to task models
- First: verify predictions for transfer to attentional blink
- Next: make predictions for untested tasks (using ActionTransfer - Taatgen, in press)
- Ultimately: better understand why meditation helps people

van Vugt & Slagter (in preparation)