Panel data
SEM 2 2020

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Cattell’s data box

 variables

 persons

 occasions
Cross-sectional research: A single snapshot
A fundamental problem in a nutshell

Cross-sectional relationship

Within-person relationship

Between-person relationship

Taken from Hamaker (2012).
Panel research: A few snapshots
Cross-lagged panel model
Some problems with Cross-lagged panel model:

- Does not adequately separate within- and between-subjects variance
- Does not take individual differences in intercept at $t = 1$ into account

These problems can in some extend be overcome by adding a random intercept or by using latent change score models.


One important aim of psychonometrics is to model cross-lagged panel models with network structures!
Latent change score models

- Model change as a latent variable
- The self-feedback parameter (here $\beta$) is typically negative
  - Regression towards the mean
- Testing significance of the changescore mean (here $\mu_{\Delta \text{COG}_1}$) is akin to performing a paired $t$-test
  - https://dx.doi.org/10.3389/2Ffpsyg.2013.00738

https://doi.org/10.1016/j.dcn.2017.11.007