Discussion
Modeling Intensive Longitudinal Data: The basics
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Discrete Time and Continuous Time: A comparison

Discrete-Time Models

- ▶ Based on auto-regressive ("difference") equations
- ▶ Equally spaced (or corrected) measurements
- ▶ **Disadvantage:** Time-interval Dependency
- ▶ **Advantage:** Can be interpreted as approximation of dynamics at a particular interval
- ▶ **Advantage:** Usually easier to fit

Continuous-Time Models

- ▶ Based on differential equations (and integral solutions)
- ▶ Unequal measurement occasions can be used (preferable?)
- ▶ **Advantage:** Models time-interval dependency
- ▶ **Disadvantage:** Makes stricter assumptions about underlying dynamics (e.g., complex models needed for "negative autoregression")
- ▶ **Disadvantage:** Requires specialist software (ctsem, dynr)

Advanced Issues

Extensions to Multiple Subjects

▶ Multilevel time series & Dynamic SEM

▶ Clustering approaches (e.g., GIMME by Gates & Molenaar)

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General Modeling Issues/Assumptions

- ▶ Linear vs Non-linear models
- ▶ Categorical models (markov models)
- ▶ Models with other distributional assumptions
- ▶ Absence of Measurement Error
- ▶ Variable selection/model selection

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Assumptions/issues related to Dynamics

- ▶ Stationarity
- ▶ Equidistant measurements
- ▶ Mediation, Interventions and Causality
- ▶ Modeling processes on that take place at different time scales

Importance of Theory

- ▶ In this workshop: Models with qualitatively simple behaviour
- ▶ Theoretical models - features like bi-stability, multiple timescales, etc. (Haslbeck & Ryan, 2021)
- ▶ More complicated models - generally harder to fit!
- ▶ Both frameworks a good starting point for formulating theoretical dynamical systems models
- ▶ Psychology - recent focus on "formal modeling" (Borsboom et al. 2021, Guest & Martin, 2021, Haslbeck, Ryan, Robinaugh et al. 2021)
- ▶ Sometimes easier to produce some qualitative behaviour with differential equations (CT; background of physics, ecology) than auto-regressive equations (DT; econometrics, focus on forecasting).

Discussion

Thanks for coming!

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