



GHENT
UNIVERSITY

MODELING LONGITUDINAL DYADIC DATA IN THE SEM FRAMEWORK

FIEN GISTELINCK
PROMOTER: TOM LOEYS

CONTENT

- Longitudinal Dyadic Data
- Modeling Framework
- Questions

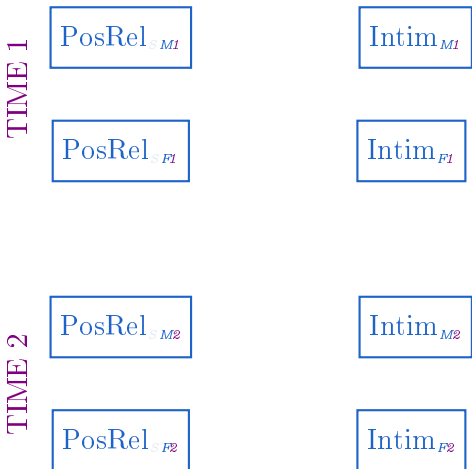
LONGITUDINAL DYADIC DATA

RESEARCH QUESTIONS

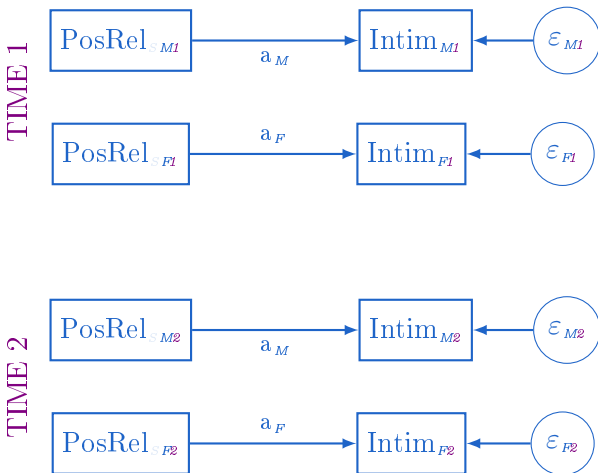
Consider heterosexual *couples* . . .

- How does an **increase** in positive relational feelings of one's partner on a particular day (as compared to his/her partner's average positive relational feelings) affect one's own perceived intimacy?
- To what extent is the perceived intimacy of one dyad member **related** to the perceived intimacy of the partner? **On a particular day?** **On average?**
- How strong is the association between the perceived intimacy on one day with the amount of perceived intimacy **on the next day** within a given person?

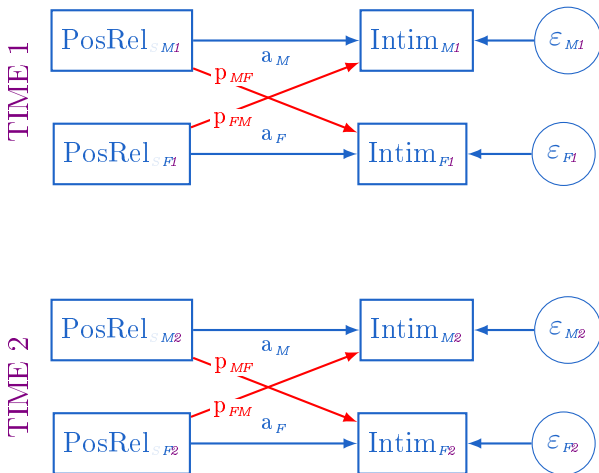
ACTOR PARTNER INTERDEPENDENCE MODEL



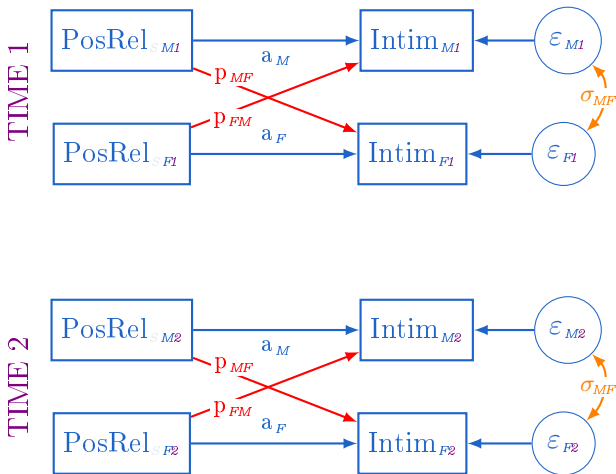
ACTOR PARTNER INTERDEPENDENCE MODEL



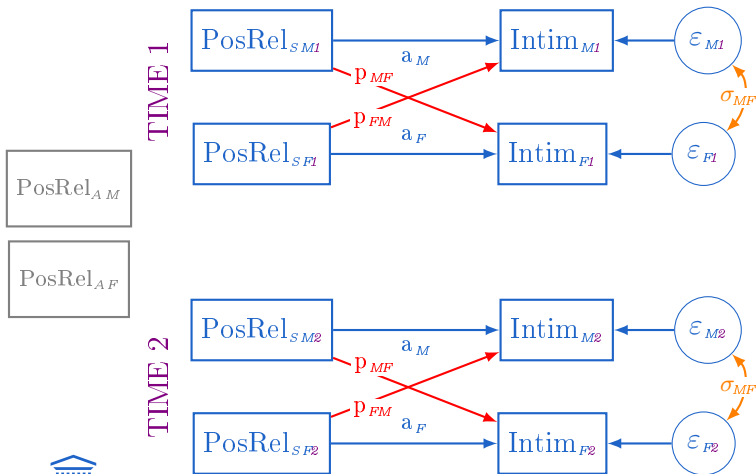
ACTOR PARTNER INTERDEPENDENCE MODEL



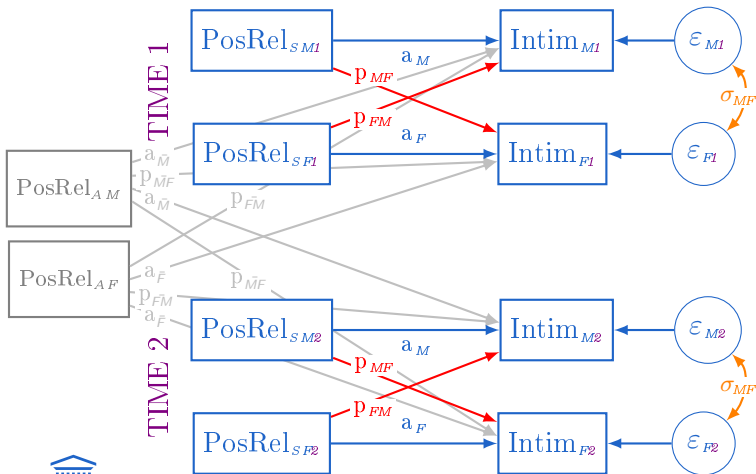
ACTOR PARTNER INTERDEPENDENCE MODEL



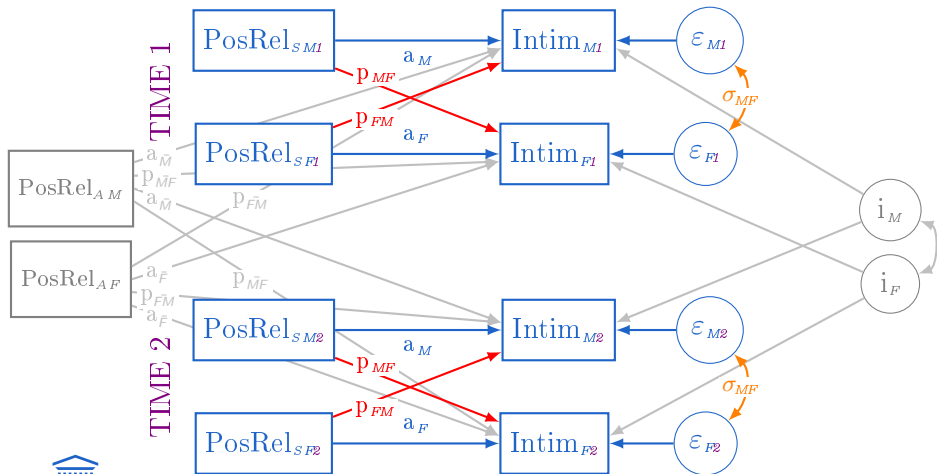
LONGITUDINAL APIM



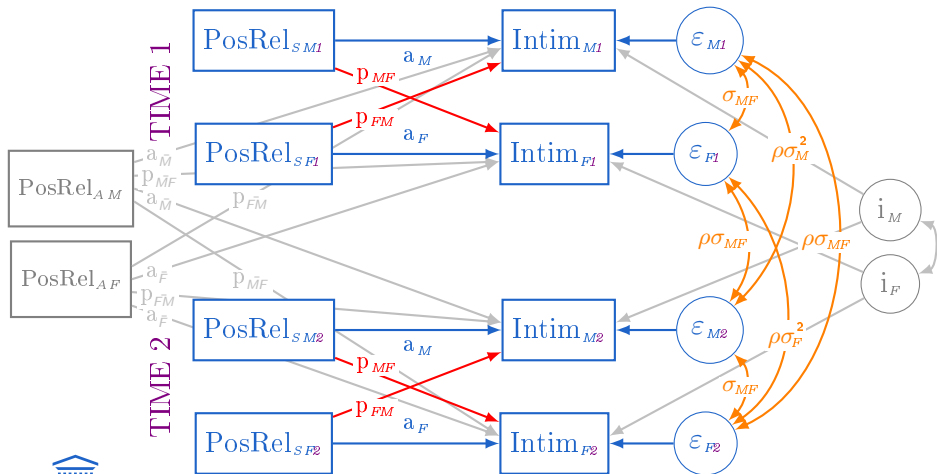
LONGITUDINAL APIM



LONGITUDINAL APIM



LONGITUDINAL APIM



RESIDUAL COVARIANCE STRUCTURE

$$\text{Cov}\left(\begin{matrix} \varepsilon_{M1} \\ \varepsilon_{M2} \\ \vdots \\ \varepsilon_{MT} \\ \varepsilon_{F1} \\ \varepsilon_{F2} \\ \vdots \\ \varepsilon_{FT} \end{matrix}\right) = \begin{pmatrix} \sigma_M^2 & \sigma_{MF} \\ \sigma_{MF} & \sigma_F^2 \end{pmatrix} \otimes \begin{pmatrix} 1 & \rho & \dots & \rho^{T-1} \\ \rho & 1 & \dots & \rho^{T-2} \\ \vdots & \vdots & \ddots & \vdots \\ \rho^{T-1} & \rho^{T-2} & \dots & 1 \end{pmatrix}$$

STATISTICAL CHALLENGES

- 1 The correlation between dyad members
- 2 The autocorrelation
- 3 The effect of actor and partner characteristics
- 4 The partitioning into time-specific and time-averaged effects

⇒ L-APIM takes up all these challenges

⇒ Implementation?

MODELING FRAMEWORK

MULTILEVEL MODELING

</> Software:

nmle, lme4, SAS, HLM, ...

✓ Between-dyad variation:

Using random effects

❓ Residual covariance structure

✘ Standard packages fail

✍ SAS: UN@AR(1), UN@CS, UN@UN

! Indistinguishable dyads

STRUCTURAL EQUATION MODELING

</> Software:

lavaan, Mplus, EQS, LISREL, ...

✓ Between-dyad variation:

Using latent variables

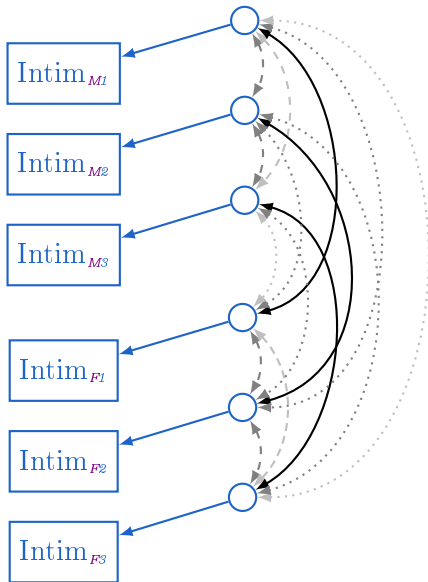
⊛ Residual covariance structure

✘ MSEM fails

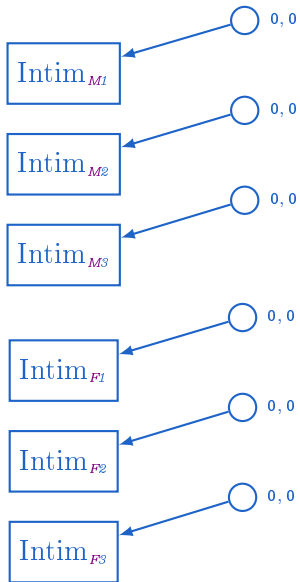
✍ Standard SEM: use constraints

! Computational intensive

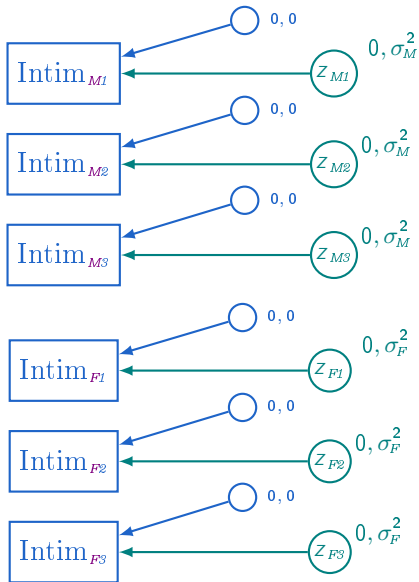
MOVING AVERAGE APPROACH



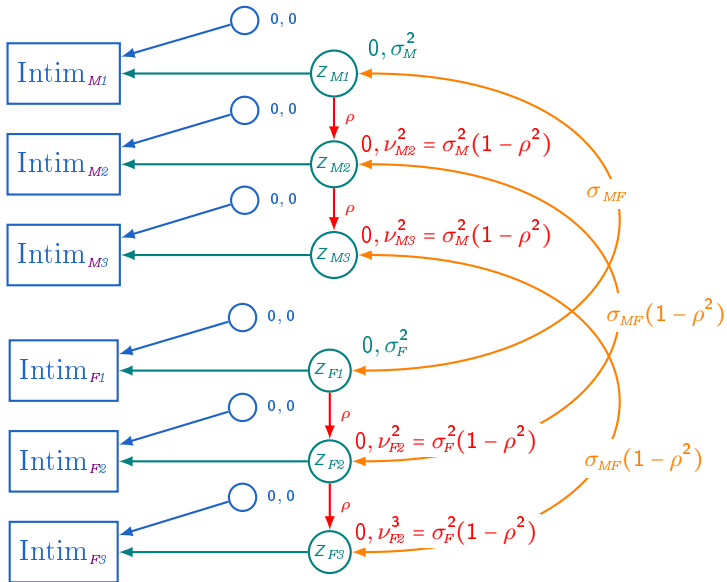
MOVING AVERAGE APPROACH



MOVING AVERAGE APPROACH



MOVING AVERAGE APPROACH



ADVANTAGES SEM

- Allows latent outcome variables
⇒ Incorporates measurement error
- Allows latent decomposition
⇒ No imposed manifest approach
- Easily implements constraints
⇒ Relaxes the assumptions of the L-APIM
- Assumes wide data structure
⇒ Applies FIML to deal with missingness
- ⚠ Assumes wide data structure
☹ Multi-equation coding

R-SHINY APPLICATION

LDD in SEM

L-APIM

Info

Contact

The L-APIM for Longitudinal Dyadic Data

1. Data specifics

Reading in the data

Column name specifics

2. Variable specifics

Variable types

Variable centering

3. Model specifics

(In)distinguishable effects

Random effect covariance structure

Residual covariance structure

RUN

Data

Print

More Info

Reading in the data

Upload your data file (*)

Browse...

No file selected

In which format is your data set displayed?

 Wide format Long format

(*) Please make sure your uploaded data file is in one of the following extensions: .sav, .txt, .csv or .xpt
You can check your uploaded data file by clicking on the 'Print' button.

If you would like to experiment with the application, please select one of the following exemplary data sets.
The 'Example1.sav' data file is uploaded by default and will be ignored once you upload your own data file.

Load example data

Example1.sav

Reset



http://fgisteli.shinyapps.io/Shiny_LDD

CONCLUSION

The L-APIM

- extends the cross-sectional APIM
- allows researchers to model longitudinal dyadic data
- tackles the statistical challenges
- within the SEM framework
- can be fitted using the R-Shiny app:

http://fgisteli.shinyapps.io/Shiny_LDD

Any Questions?

A Shiny-what?



Fien Gistelinck
PhD Student

DEPARTMENT OF DATA ANALYSIS

P Tom Loeys

E fien.gistelinck@ugent.be

T +32 9 331 01 01

 Ghent University

 @ugent

 Ghent University

www.ugent.be

