SEM OVERVIEW

1. **VARIANCE- & COVARIANCE-BASED SEM**
2. **TESTING FOR COMMON METHOD BIAS IN SEM**
3. **NESTED MODELS AND MULTI-GOUP SEM**
4. **ADVANCES TO WATCH IN SEM**

VARIANCE- & COVARIANCE-BASED SEM

Four Questions:

1. When is it appropriate to use VBSEM (PLS)?
2. What is the state-of-art in PLS analysis?
3. What questions will likely arise in the review process?
4. What are some key references?

VARIANCE- & COVARIANCE-BASED SEM

VB-SEM	CB-SEM
Causal/formative/composite	Effect/reflective
Multidimensional Items (complete set)	Unidimensional item (useful redundancy)
Unidentified + 2 reflective measures = Identified	≥ 3 measures = Identified
Measures-error-free	Measures-error-prone
No Measurement Invariance	Yes Measurement Invariance

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SmartPlS

Source: http://www.smartpls.de/

VARIANCE- & COVARIANCE-BASED SEM

Hair, J.F./ Sarstedt, M./ Ringle, C.M./ Mena, J.A.: An assessment of the use of partial least squares structural equation modeling in marketing research, in: Journal of the Academy of Marketing Science (JAMS), Volume 40 (2012), Issue 3, pp. 414-433.

Lara Lobschat, Markus A. Zinnbauer, Florian Pallas and Erich Joachimsthaler: Why Social Currency Becomes a Key Driver of a Firm's Brand Equity: Insights from the Automotive Industry, Long Range Planning, Volume 46 (2013), pp. 125-148.

Sarstedt, M./ Henseler, J./ Ringle, C.M.: Multigroup analysis in partial least squares (PLS) path modeling: Alternative methods and empirical results, in: Advances in International Marketing (AIM), Vol. 22, Bingley 2011, pp. 195-218.

Edwards, Jeffery (2011), "The Fallacy of Formative Measurement," Organizational Research Methods, 14 (2): 370-388.

Hardin, Andrew and George Marcoulides (2011), "A Commentary on the Use of Formative Measurement," Educational Psychological Measurement, 71 (5): 753-764.

Treiblmaier, Horst, Peter Bentler and Patrick Mair (2011), "Formative Constructs Implemented via Common Factors," Structural Equations Modeling, 18:1, 1-17.

"In fact, our evidence suggests that even simple summed scales provide better reliability than PLS… In addition, using a model-based weighting system as used in PLS will guarantee problems with interpretational confounding."

Ronkko and Evermann (2013), "A Critical Examination of Common Beliefs about Partial Least Squares Path Modeling," ORM, online March 7, 2013.

"The authors [Hardin and Marcoulides 2011. p. 753] suggest that to avoid further confusing the consumers of this research, the prudent course of action may be to consider temporarily suspending the use of formative measurement."

They further contend that the debate on formative measurement should be restricted primarily to premier methods journals where experts can ultimately develop a theoretical perspective that supports or rejects its implementation."

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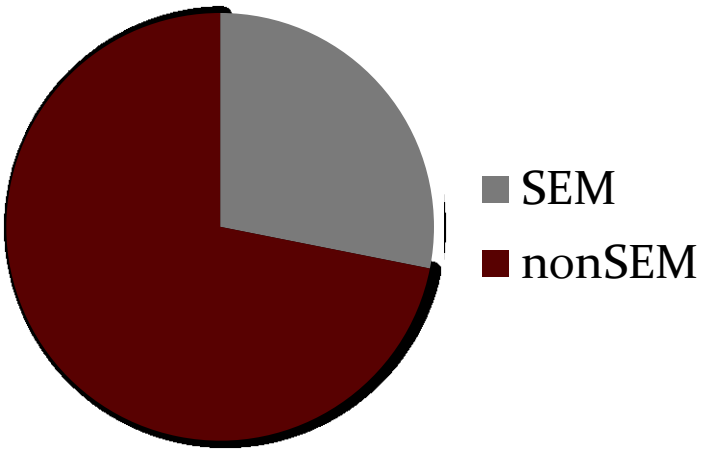
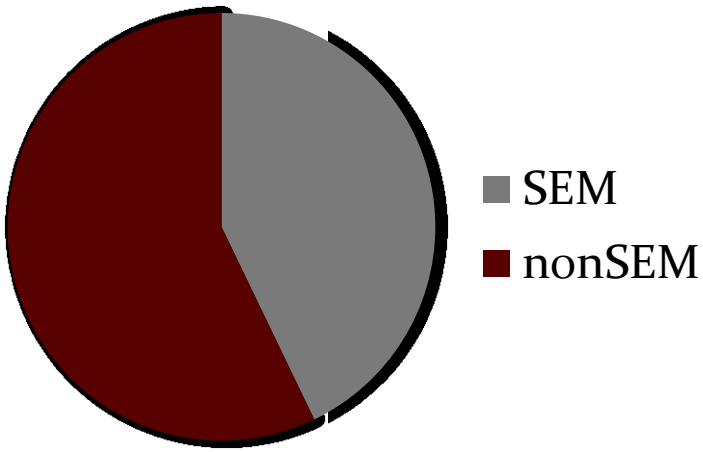
SEM IN RECENT SALES PUBLICATIONS

JPSSM 2012-13



JAMS January 2013



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COMMON METHOD BIAS

Three questions

1. How is CMB evaluated in SEM?
2. What questions will arise in the review process?
3. What are some key references?

COMMON METHOD BIAS

Marker Variable

Method Factor

Harmon

What is most appropriate and when?

Which is most robust?

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COMMON METHOD BIAS

Lindell, Michael K., and David J. Whitney (2001), "Accounting for Common Method Variance in Cross-Sectional Research Designs," Journal of Applied Psychology, 86 (1), 114–121.

Podsakoff, Philip M., Scott B. MacKenzie, Jeong-Yeon Lee, and Nathan P. Podsakoff (2003), "Common Method Bias in Behavioral Research: A Critical Review of the Literature and Recommended Remedies," Journal of Applied Psychology, 88 (October), 879–903.

NESTED MODELS

Four Questions

1. How are nested models used in SEM?
2. What are their strengths and pitfalls?
3. What questions will arise in the review process?
4. What are some key references?

NESTED MODELS

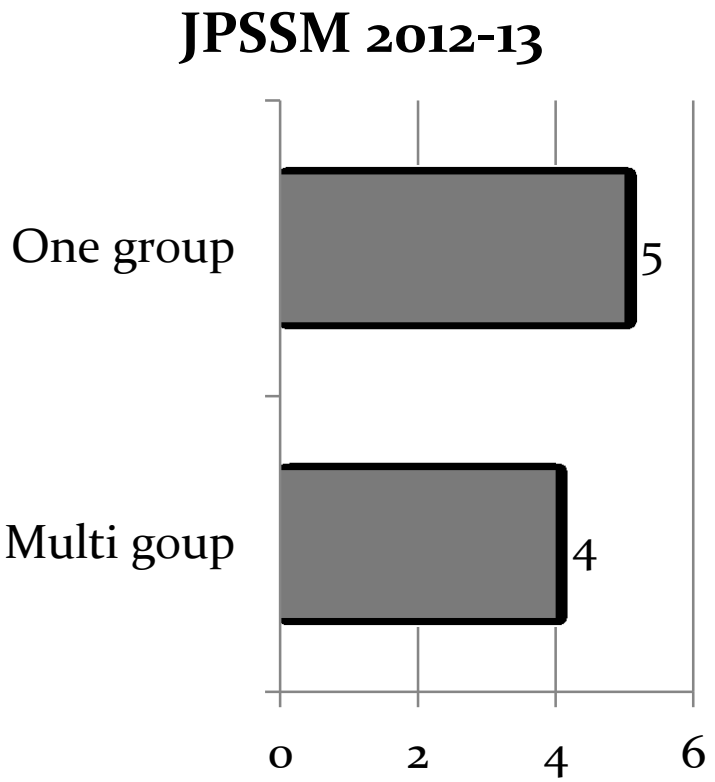
Measurement

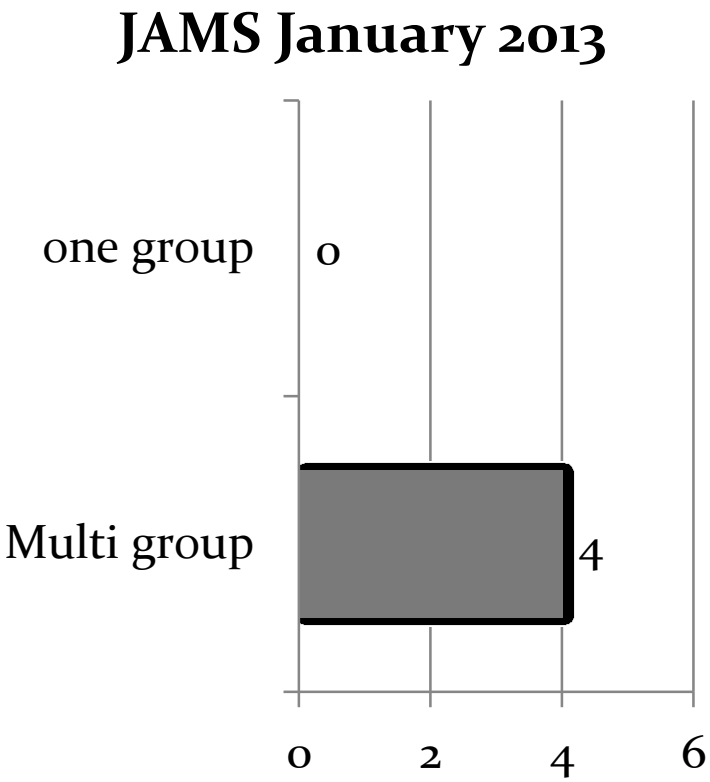
- Measurement vs. Structural Models
- Lower vs. Higher order Models
- Common method bias

Hypotheses Testing

- Moderation and group differences

MULTI-GROUP SEM IN RECENT SALES PUBLICATIONS





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NESTED MODELS

MacKenzie, Scott B. and R. A. Spreng (1992), "How Does Motivation Moderate the Impact of Central and Peripheral Processing on Brand Attitudes and Intentions?" *Journal of Consumer Research*, 18 (March), 519-29.

- Ping, Robert A. (1994), "Does Satisfaction Moderate the Association between Alternative Attractiveness and Exit Intention in a Marketing Channel?", *Journal of the Academy of Marketing Science*, 22 (Fall), 364-71.

Hair, Joseph F., William C. Black, Barry J. Babin, and Rolph E. Anderson (2009), *Multivariate Data Analysis*, 7th ed. Upper Saddle River, NJ: Prentice Hall.

MEDIATION, MODERATION, AND MULTIDATA: THE THREE MS OF SEM

SALES CONSORTIUM: 2013

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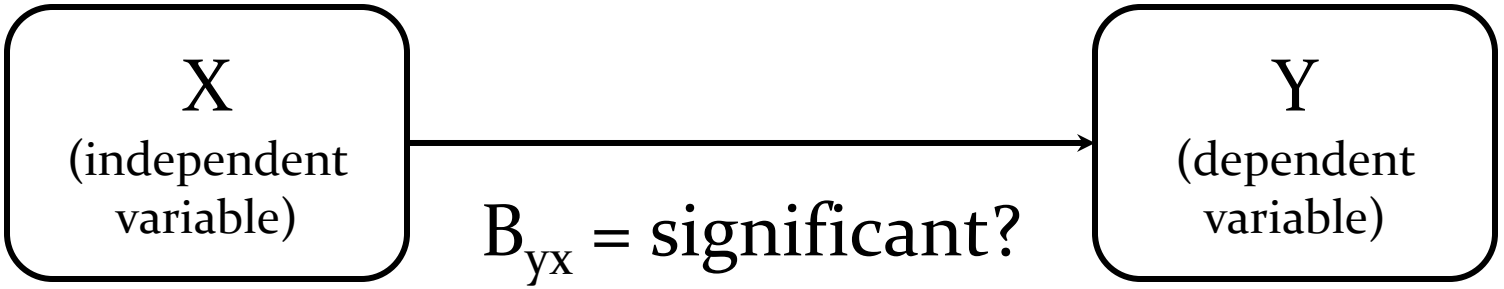
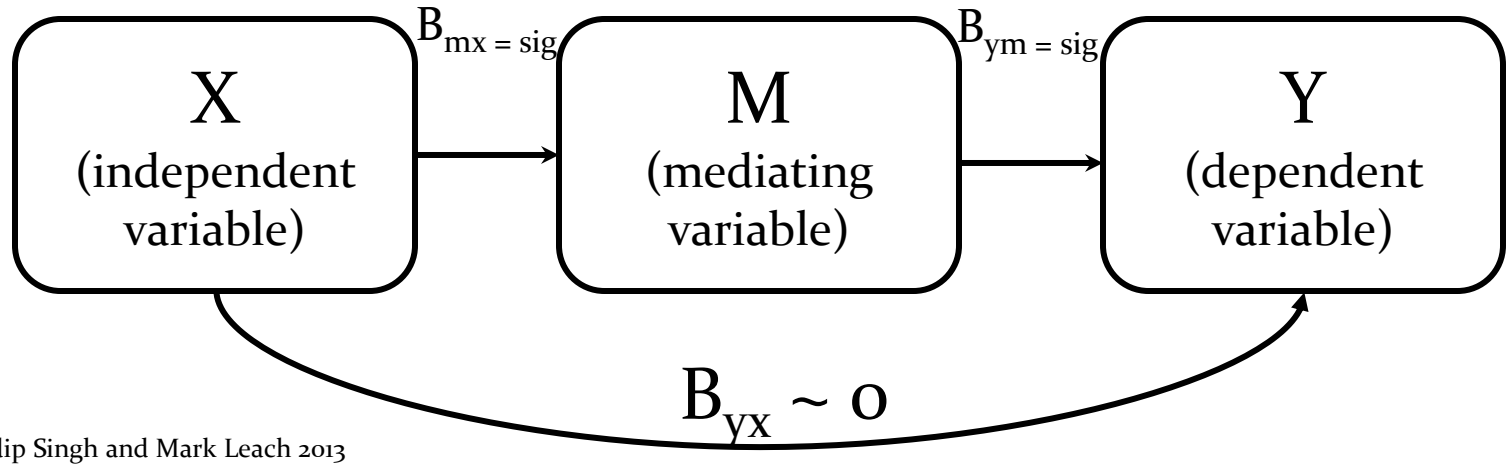
MEDIATION BASICS



A significant relationship between X and Y...

Yes

vanishes with the inclusion of a third variable (M), which explains why X and Y are related



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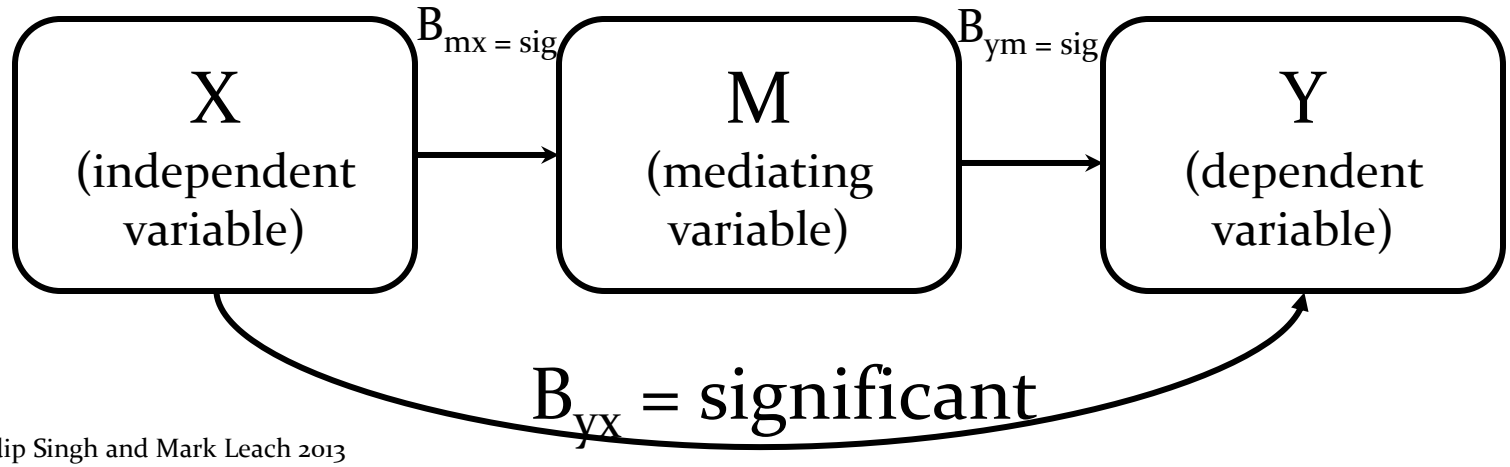
MEDIATION BASICS

A nonsignificant relationship between X and Y...

Yes

becomes significant with the inclusion of a third variable (M), which separates the positive and negative effects of X on Y



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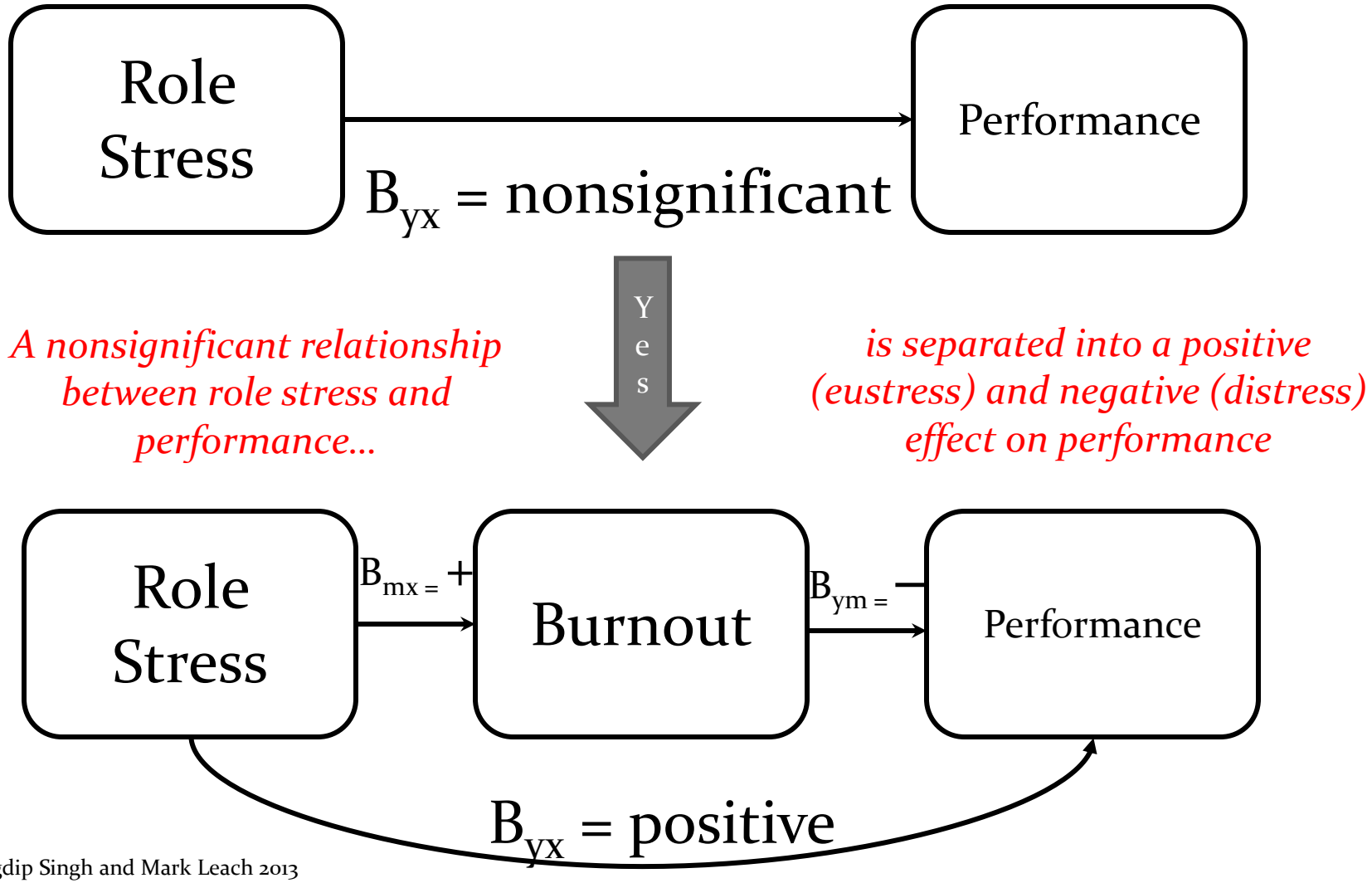
MEDIATION Example



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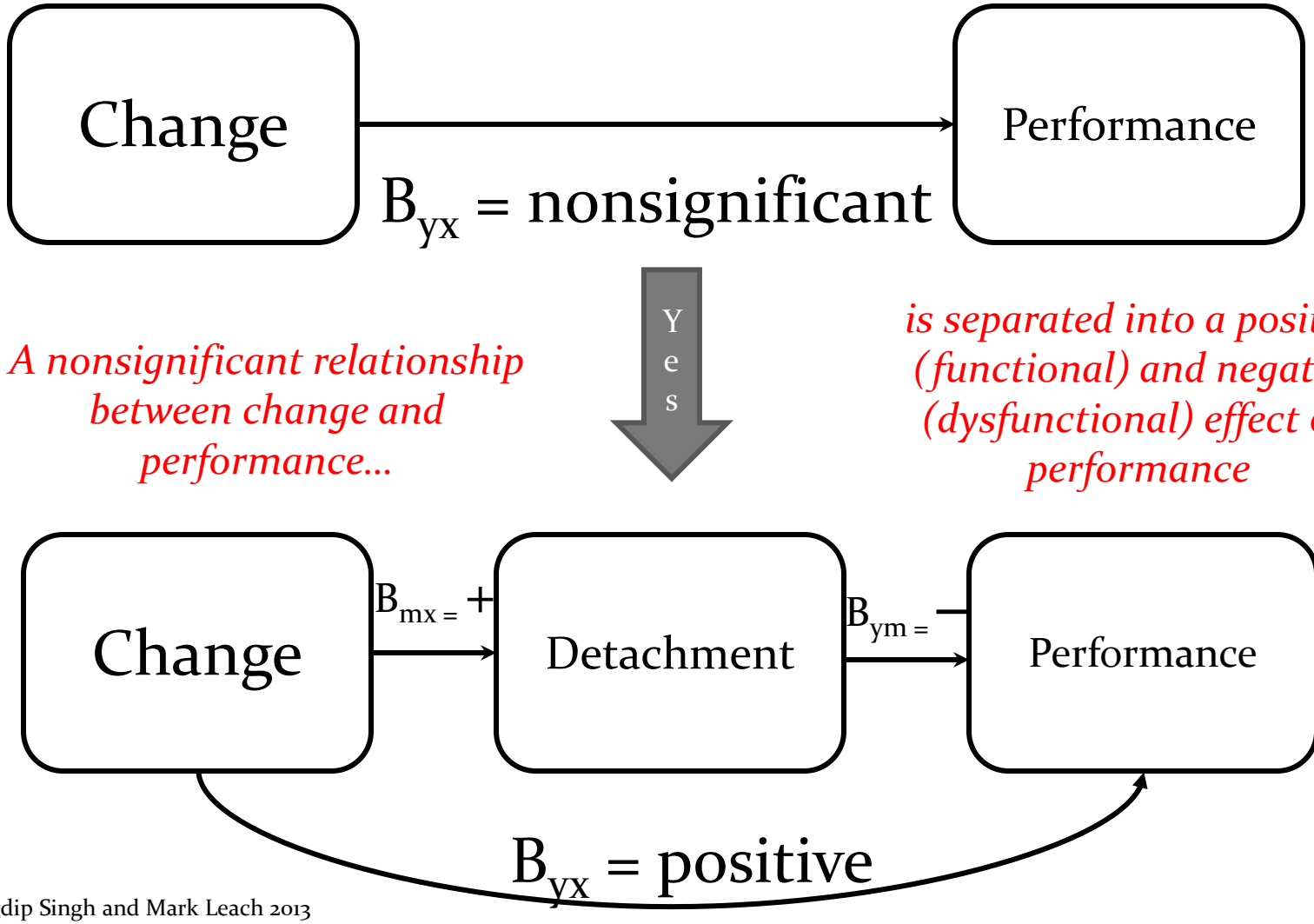
MEDIATION Example



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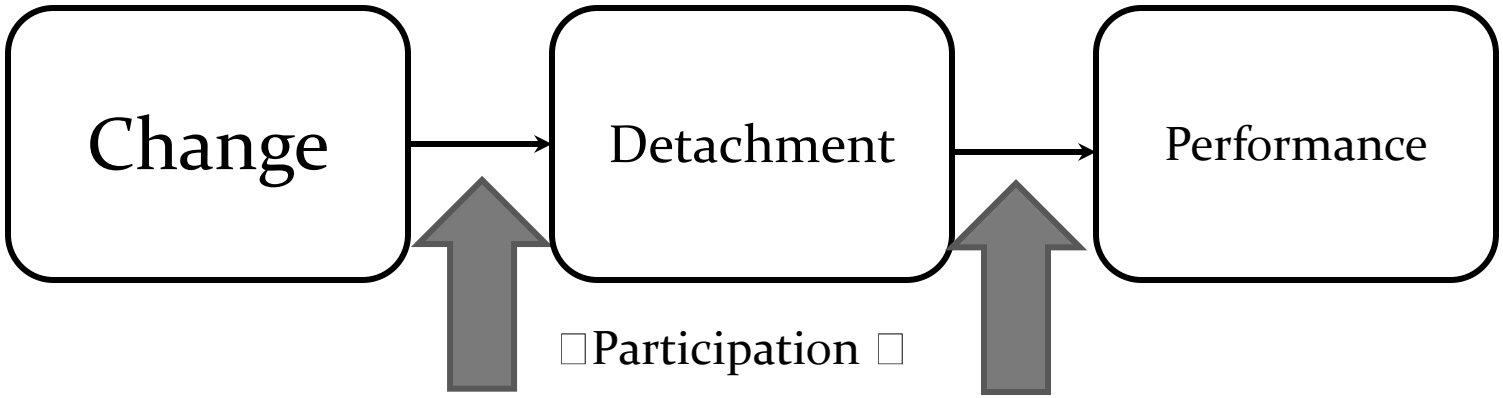
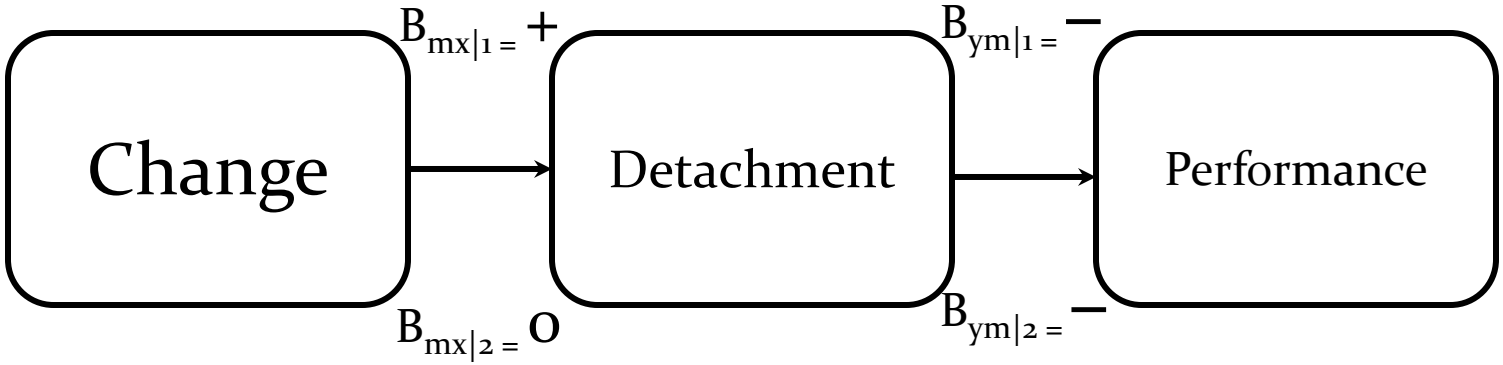
MODERATED MEDIATION Example



A significant mediated relationship between change and performance…

is turned off or on by a third variable that makes one or both mediated paths nonsignificant



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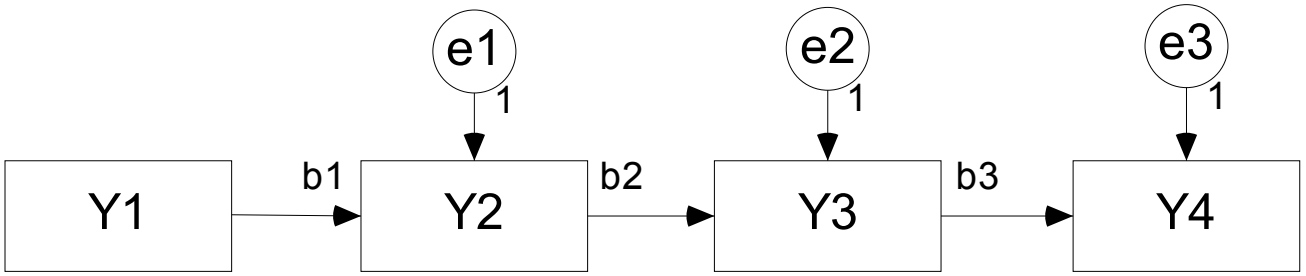
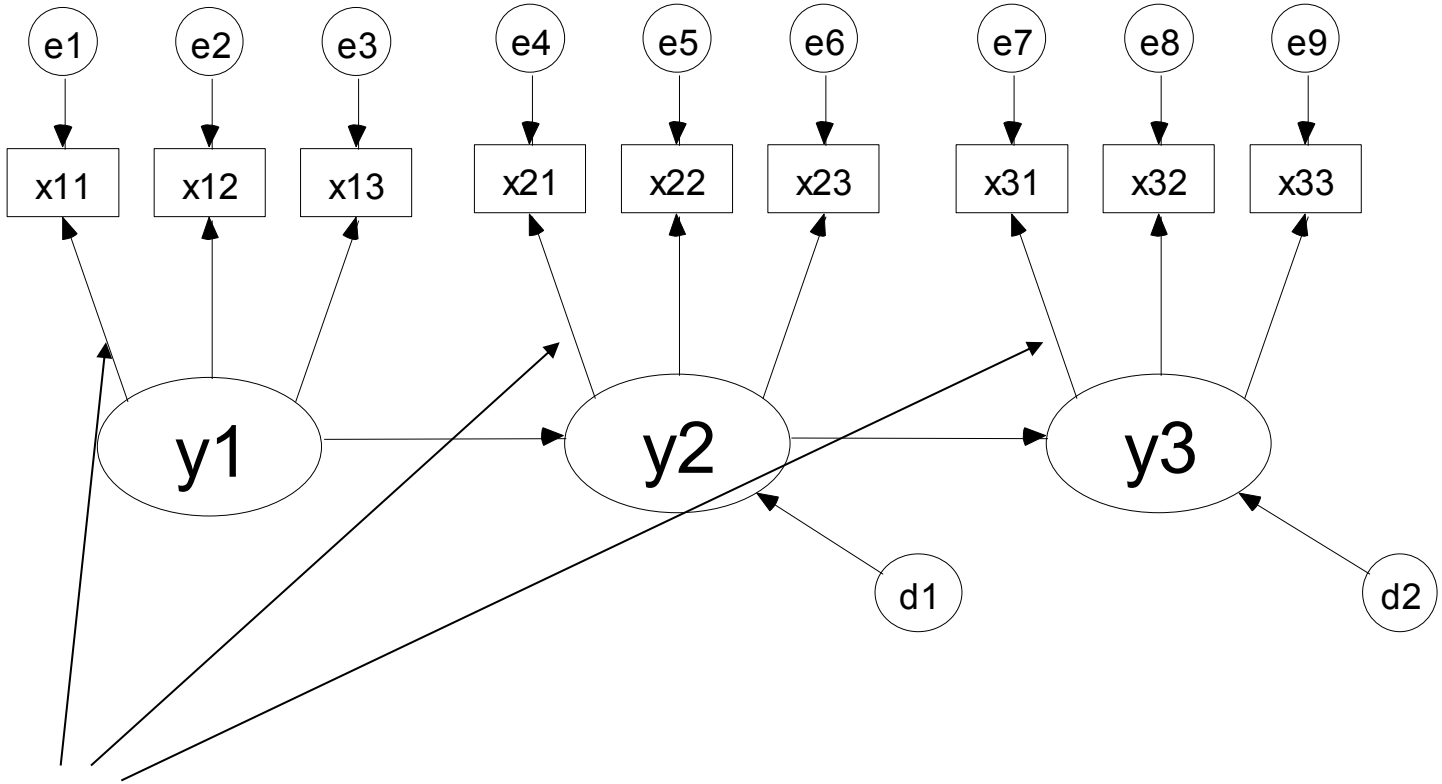
MIULTI-PERIOD Example

General Markov process (linear)



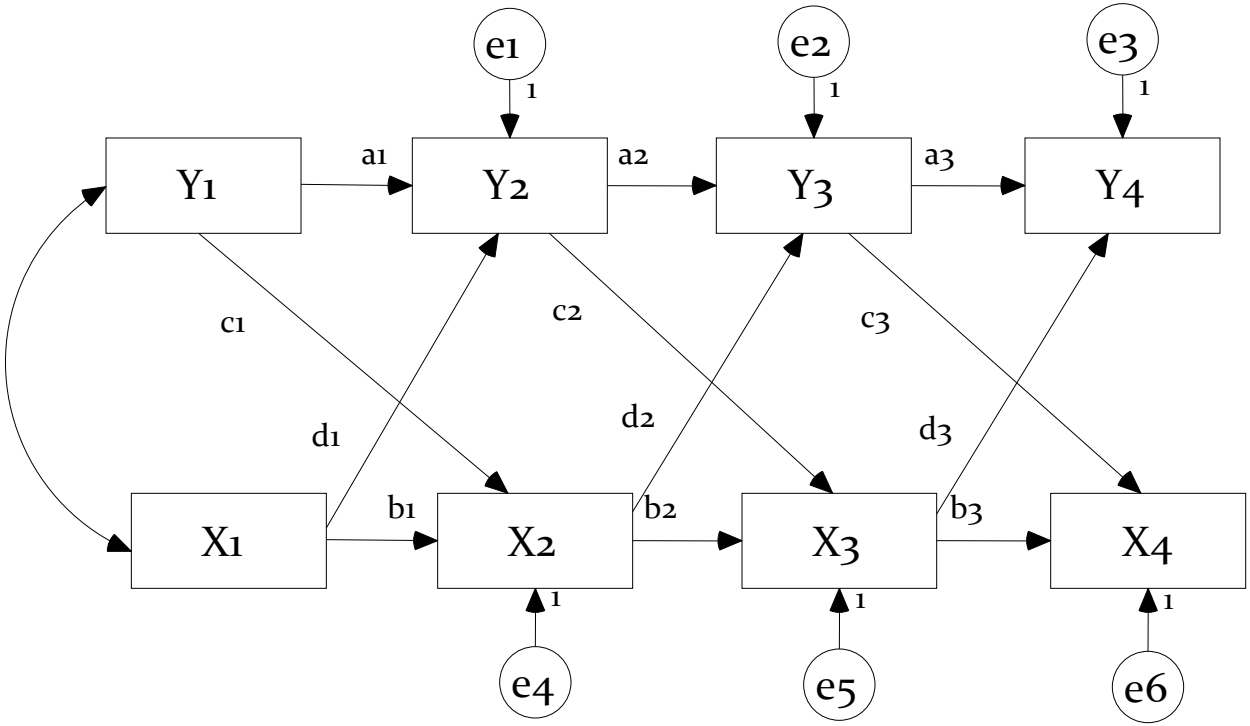
Stable process b1 = b2 = b3

General Markov process with Factorial Invariance



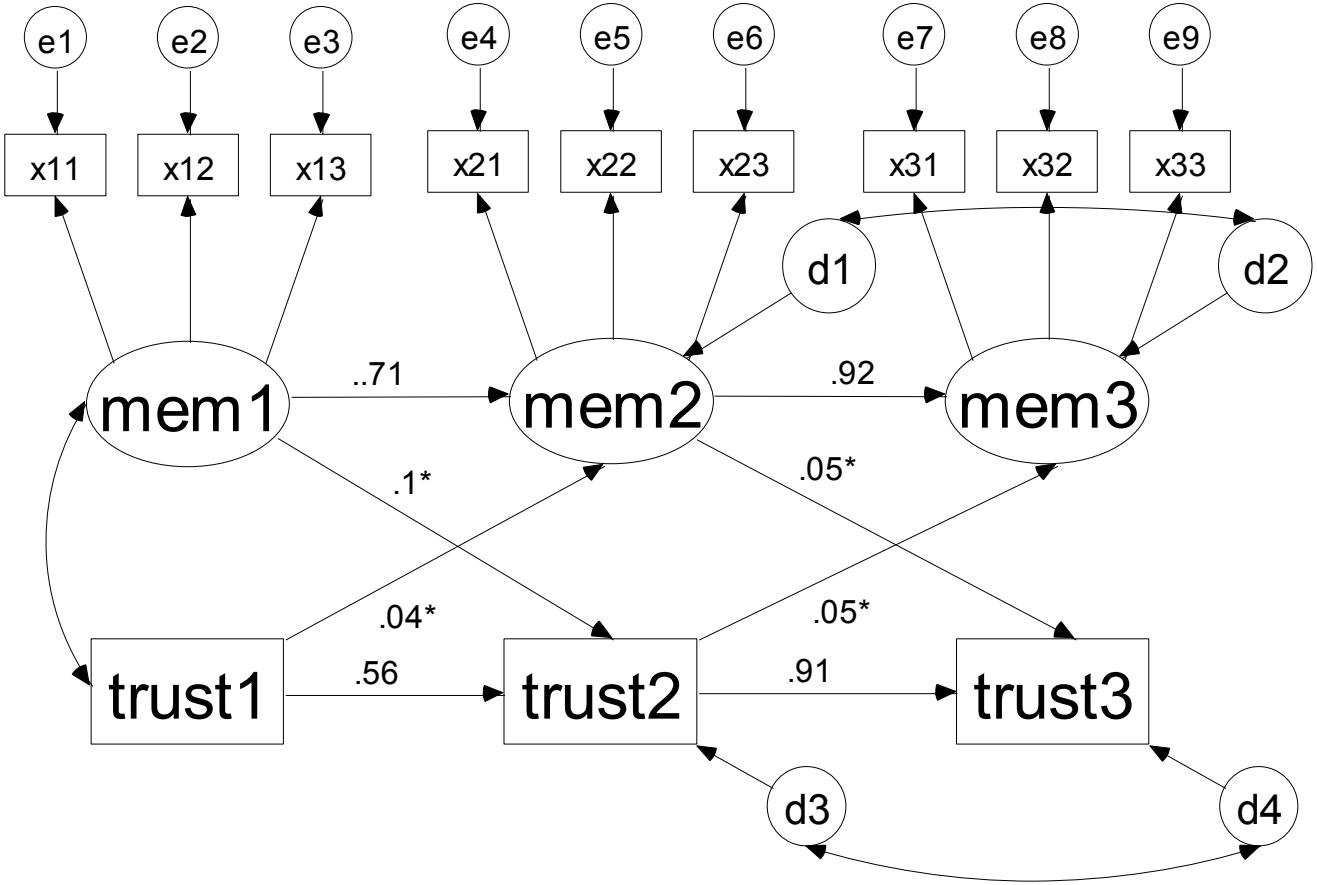
Constrain same loading to be equal over time

Cross-lagged Panel Data Model



A series of chi-square difference tests enables selection of parsimonious model, for example, c1 = c2 = c3, or d1 = d2 = d3 = 0.

Cross-lagged Panel Data Model with Correlated Errors



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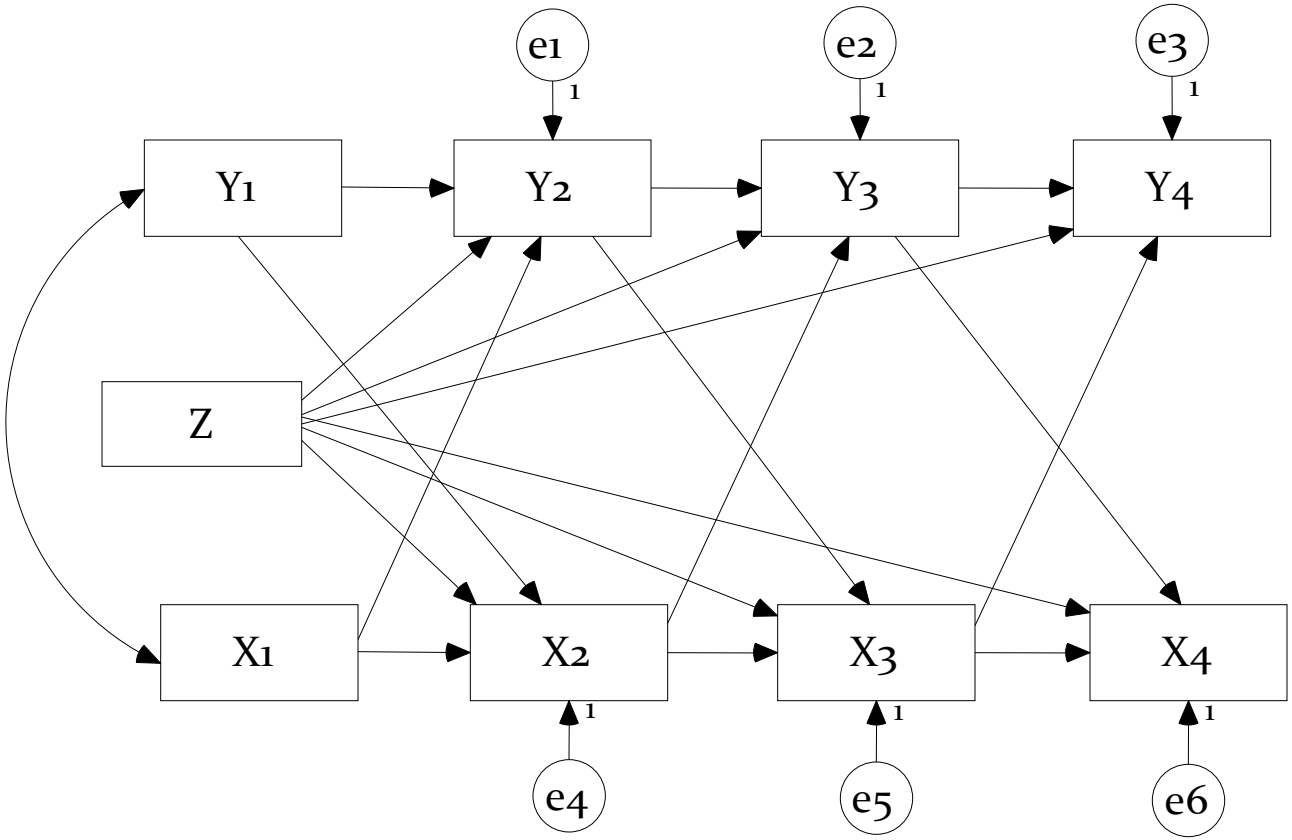
Cross-lagged Panel Data Model with Covariate Z



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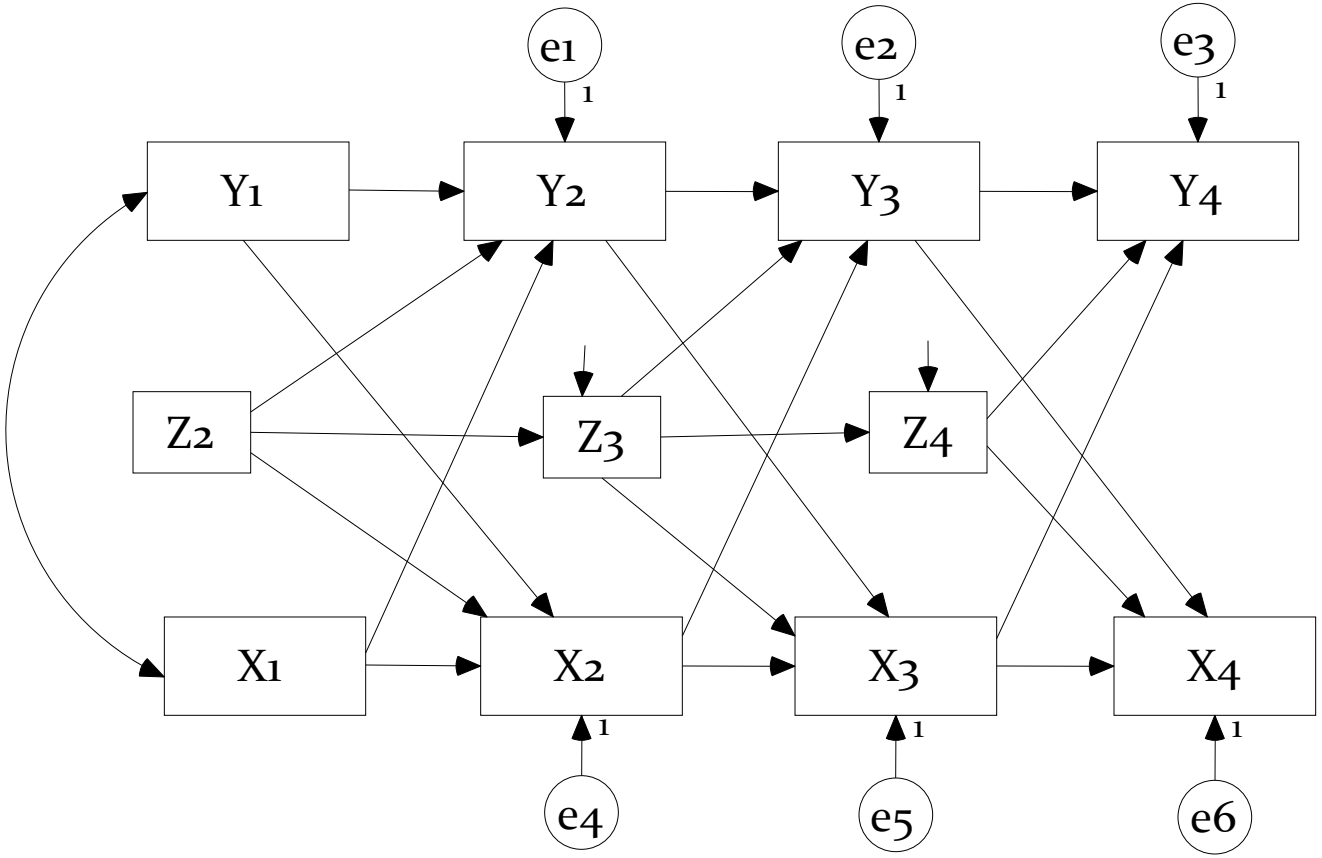
Cross-lagged Panel Data Model with Time-dependent Covariate Z



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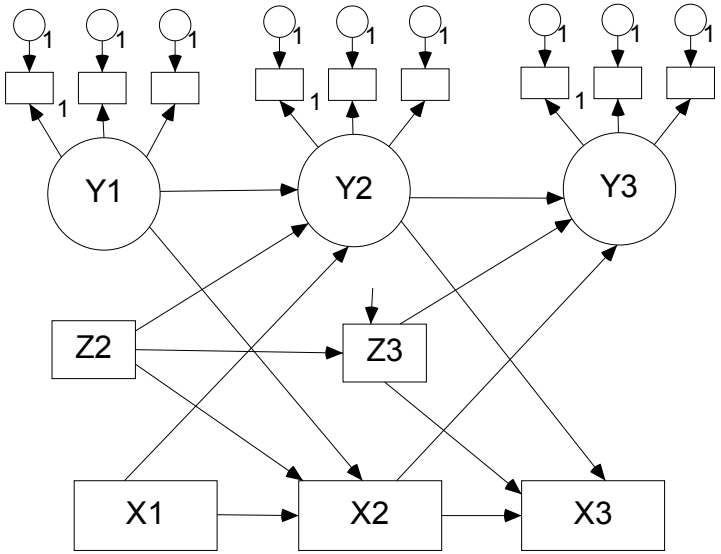
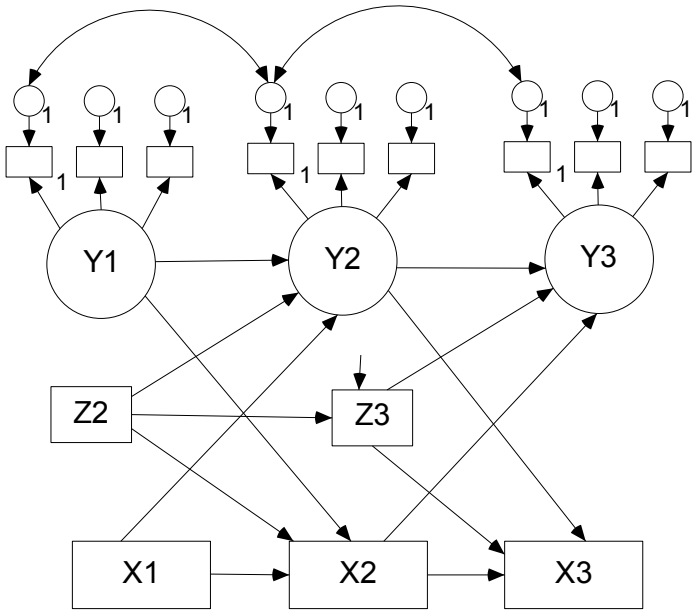
Longitudinal SEM models can include:

- Multiple group analysis
  - Interaction effects
  - Different models for different racial/ethnic groups
- Multiple indicators at each wave of measurement
  - Allows estimation of reliability and appropriate path coefficient adjustment for unreliability
  - Psychometric assessment of measurement invariance
- Multiple Covariates
  - Time invariant covariates, gender, or personal characteristics
  - Time varying covariates, household income.
- Complex error structures

GROUP 1



GROUP 2



UNCONDITIONAL RANDOM COEFFICIENTS GROWTH CURVE MODEL: BASIC IDEA