Dyadic methods and analysis:
What we know and what we need to figure out

Amie M. Gordon

Methods Hour

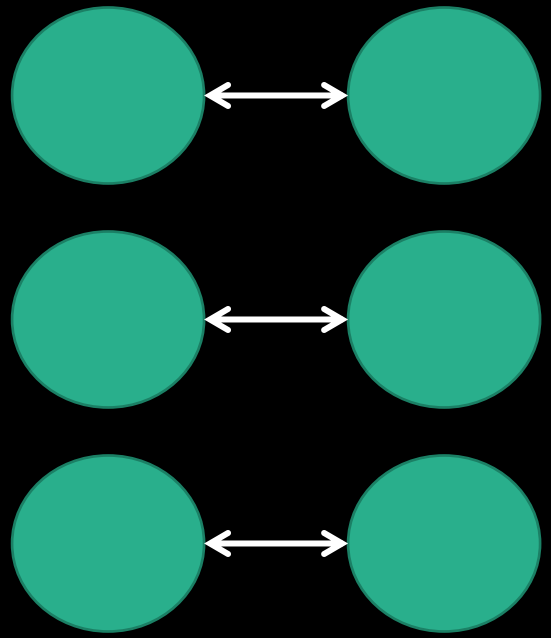
Social Psychology Area

Plan for Today

- What do I mean by dyadic methods?
- Benefits and examples of dyadic data
- Types of dyadic variables
- Conceptual Models
  - Actor-Partner Interdependence Model
  - Common Fate Model
  - Dyadic Response Surface Analysis
- Distinguishability
- Repeated measures models
- Statistical issues

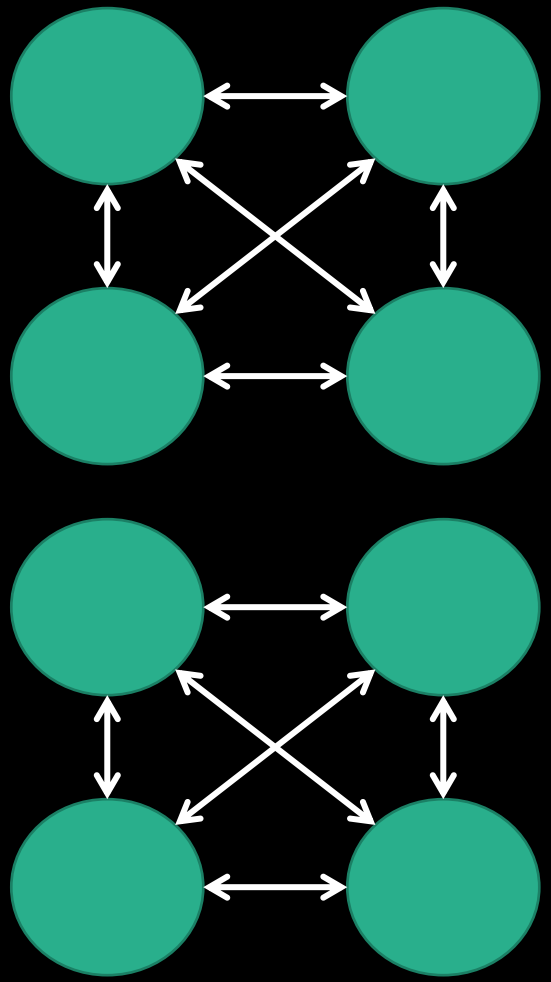
What do I mean by dyadic?

Standard Dyadic



What do I mean by dyadic?

Social Relations Model



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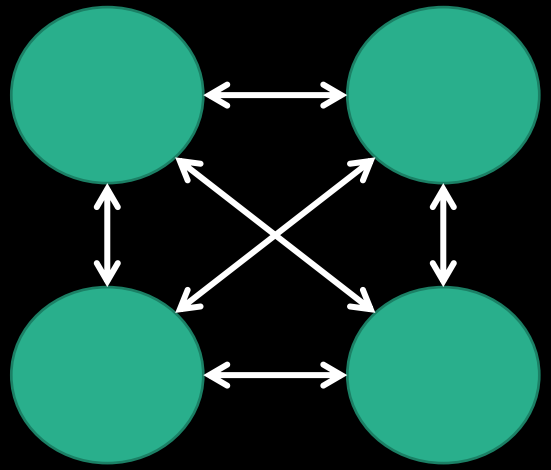
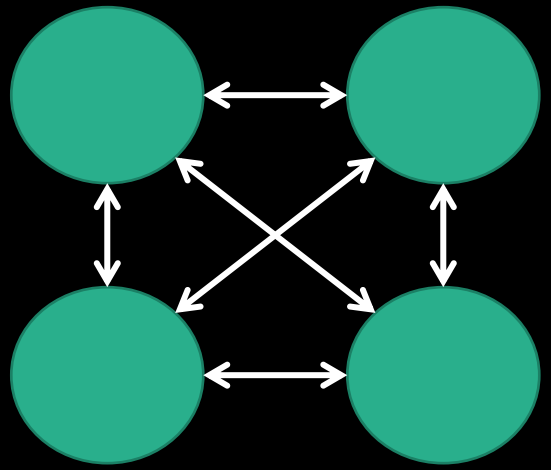
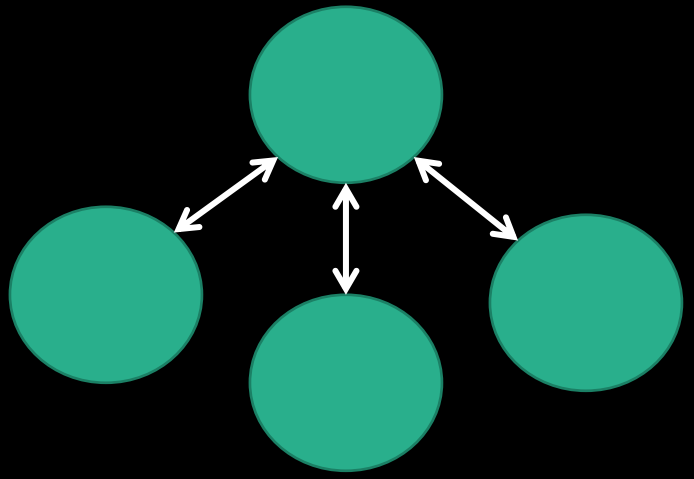




One with Many



Benefits of Dyadic Data

- **Actually examine social interaction/influence**
  - In social interactions, able to model the dynamic influence between partners
- **Get multiple reports on an experience** (own and partner/other group members)
  - Both people reporting on conflict
- **Capture both perception and reality**
  - How I think my partner feels versus how my partner reports actually feeling
- **Model unique dyadic outcomes**
  - How are dyads different as a result of their unique features?

Example: Sleep in Relationships

Individual Data:

- How does a person's sleep affect their relationship quality?
- How does a person's perception of their partner's sleep affect their relationship quality?

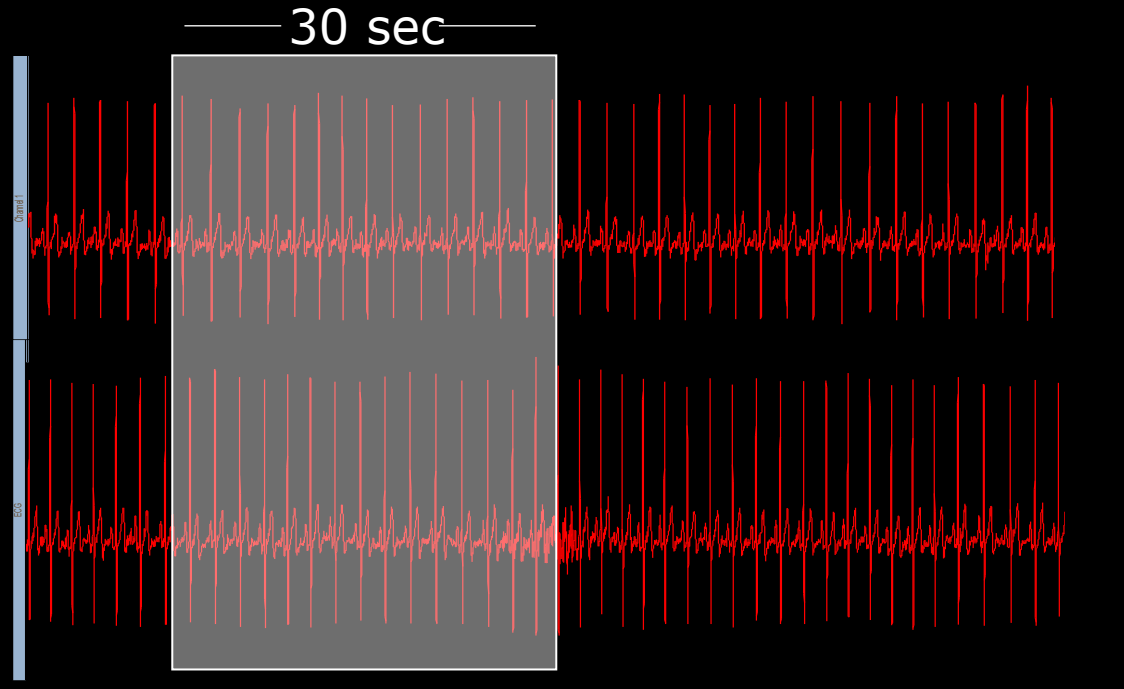
Example: Sleep in Relationships

Dyadic Data:

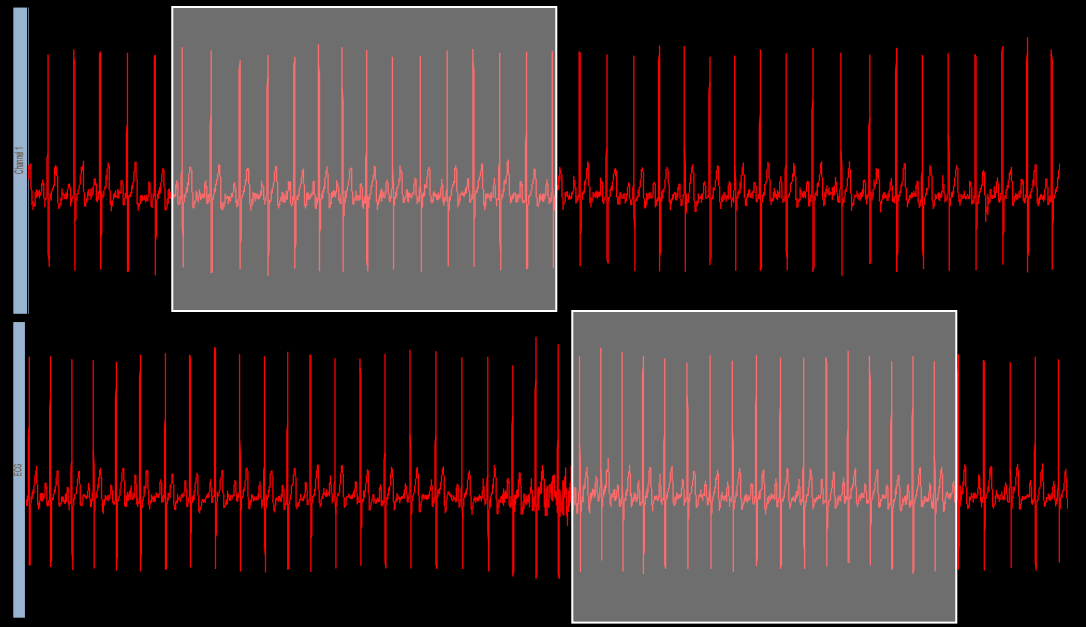
- How does one's partner's **actual** sleep affect one's relationship quality?
- How accurate are people's perceptions of how well their partner sleeps?
- Does this accuracy matter?
- How do the partners' sleep interact to predict relationship quality… is one well-rested partner enough, or does it take two good sleepers to maintain a high quality relationship?
- Is it better if partners sleep similarly?

Example: Synchrony

Physiological Covariation
(concurrent)



Physiological Linkage
(time-lagged)



Statistical versus Conceptual Issues

Statistical Model

- Individuals are nested within a dyad, and this non-independence must be accounted for
  - Adjust for non-independence in residuals
  - Model dyads as clusters using mixed/multilevel modeling
  - Model in SEM with correct covariances and constraints

Conceptual Model

- Examining unique effects of self and partner on outcomes
- Examining unique dyadic influence through interaction/similarity effects

Conceptual Models

- Actor-Partner Interdependence Model
- Truth and Bias Model
- Stability and Influence Model
- Mutual Influence Model
- Common Fate Model
- Social Relations Model
- One-with-Many Model
- Dyadic Response Surface Analysis

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Types of Variables

- Between dyad: One score per dyad (differs between dyads)
  - Relationship length
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  - Division of labor (adds up to 100% for every couple, but divided differently within couples)
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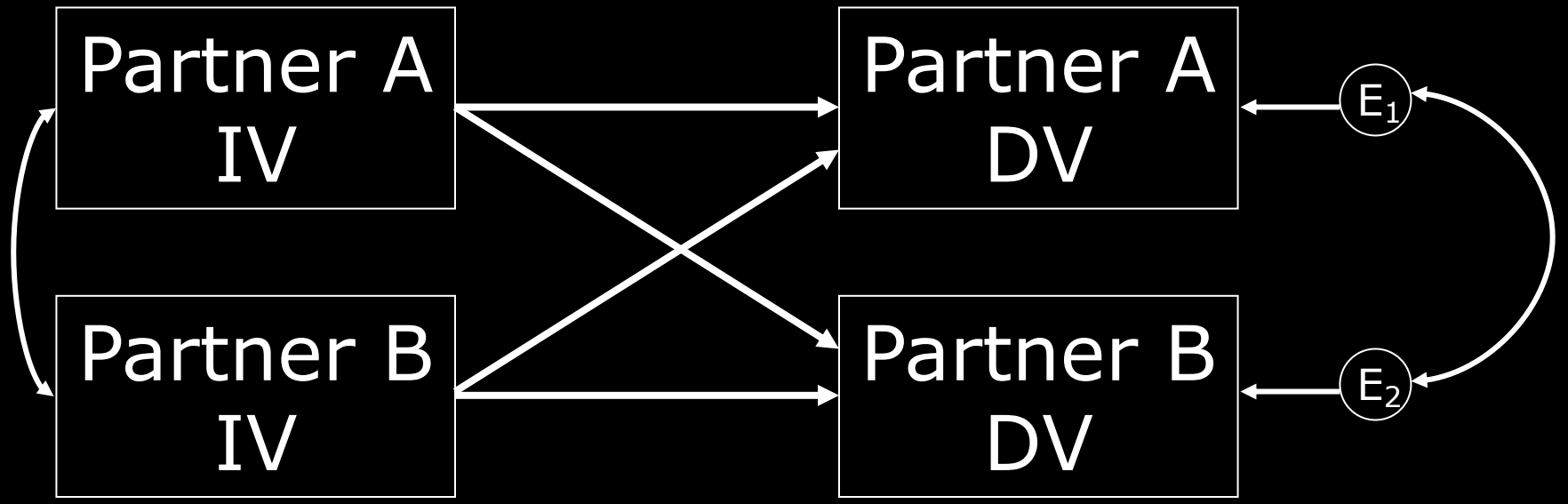
  - Amount of time spent talking in a 5 minute conversation in the lab
- Mixed (most common): Different within and between dyads
  - Self-reported relationship satisfaction
    - Couples have differing levels of satisfaction and partners differ in how satisfied they are
  - Age

Actor-Partner Interdependence Model (APIM)

A model that simultaneously estimates *actor* and *partner* effects on an outcome variable



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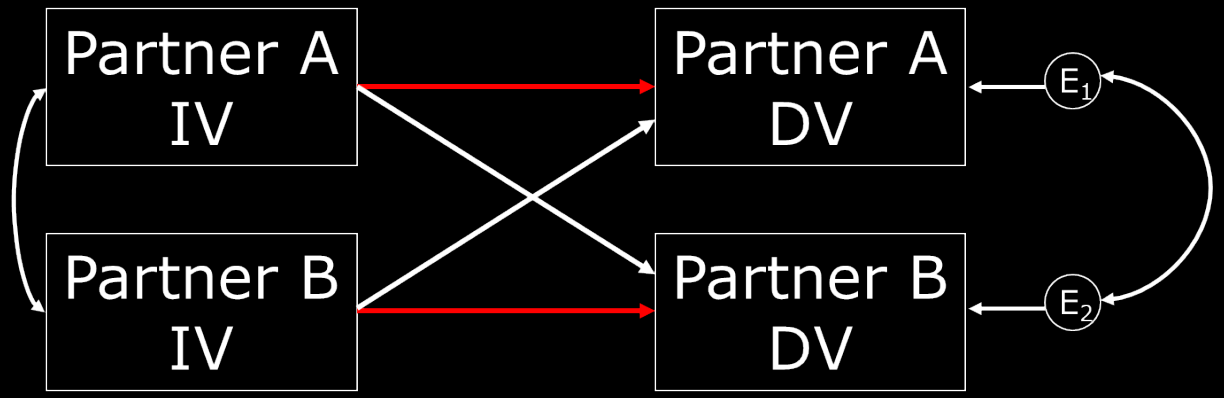

ACTOR EFFECT

- **Definition:** The effect of a person's IV on their own DV
  - *How does my sleep uniquely predict my relationship quality?*
- Controls for effects of partner's sleep
- Both members of dyad have an actor effect

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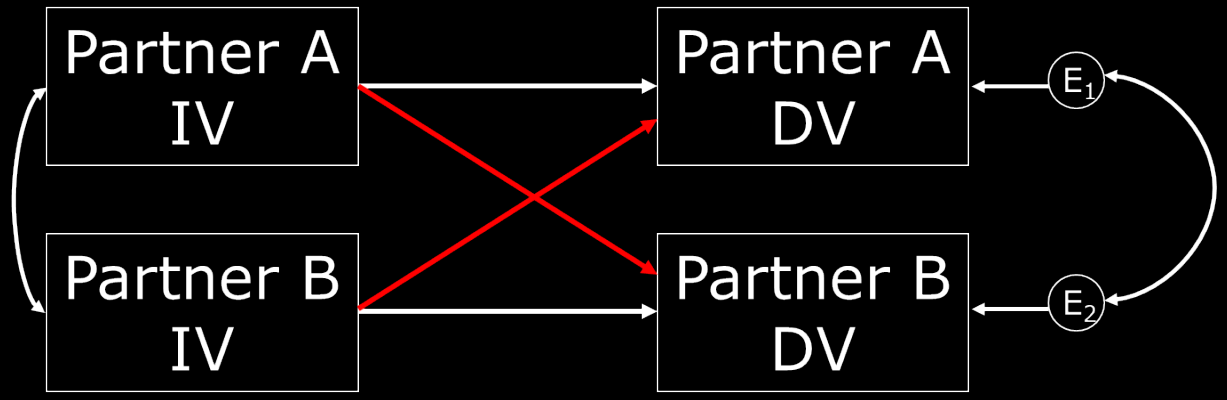
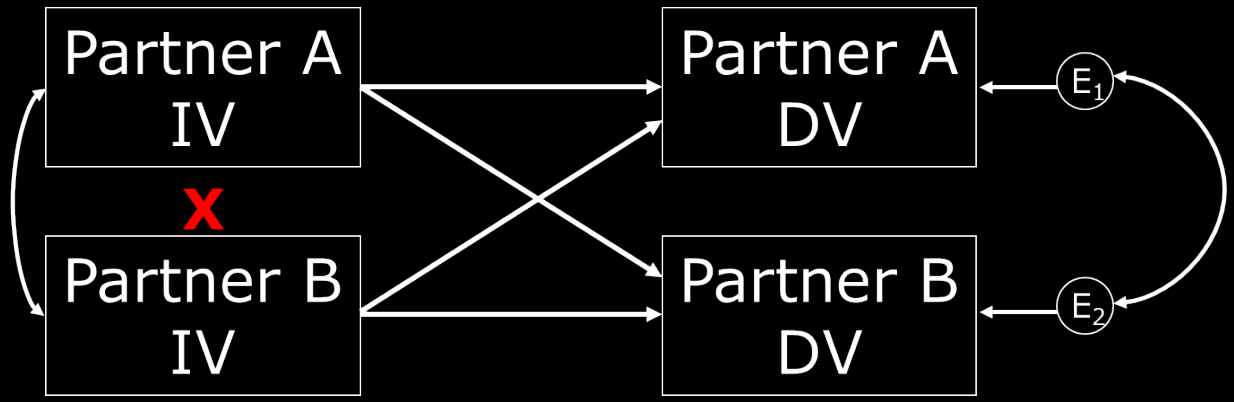


PARTNER EFFECT

- **Definition:** The effect of a person's *partner's* IV on the person's DV
  - *How does my partner's sleep uniquely influence my relationship quality?*
- Controls for effects of own sleep
- Both members of dyad have a partner effect

Actor-Partner Interdependence Model (APIM)



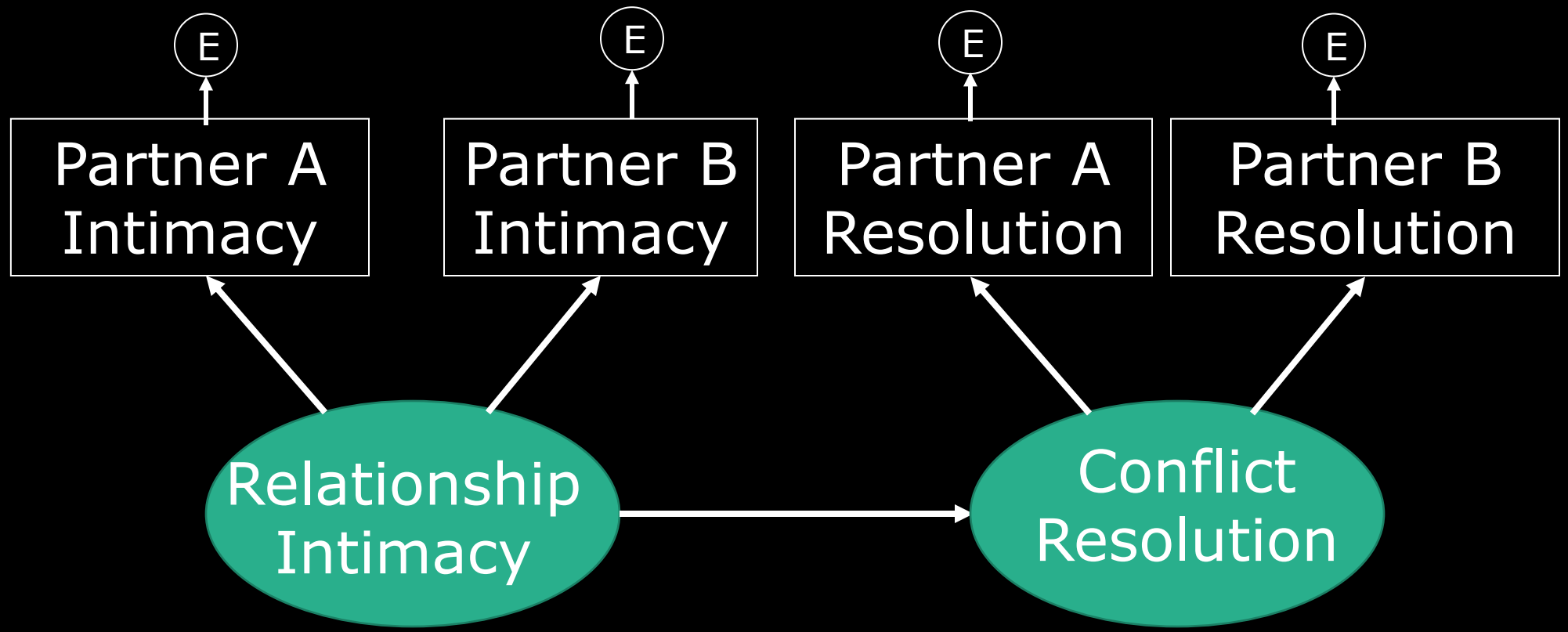
INTERACTION EFFECT

(extension of the APIM)

- **Are actor and partner effects independent or do they interact?**
  - Are people especially unsatisfied when both partners are sleep-deprived, or does it take only one sleep-deprived partner?

Common Fate Model

- Individual scores are representative of dyad-level effect



Dyadic Surface Response Analysis (dyadic RSA)

- A newer way to look at similarity/accuracy in dyads and whether that similarity/accuracy matters
- Similarity/accuracy as a predictor

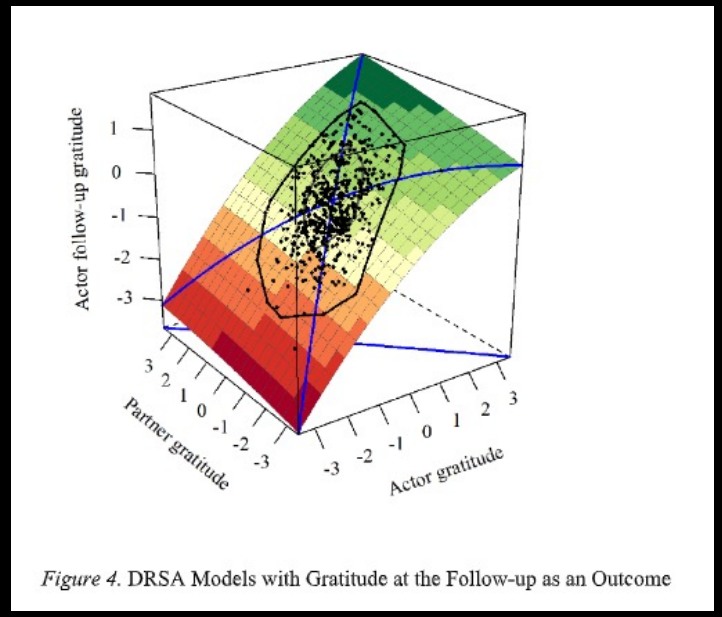
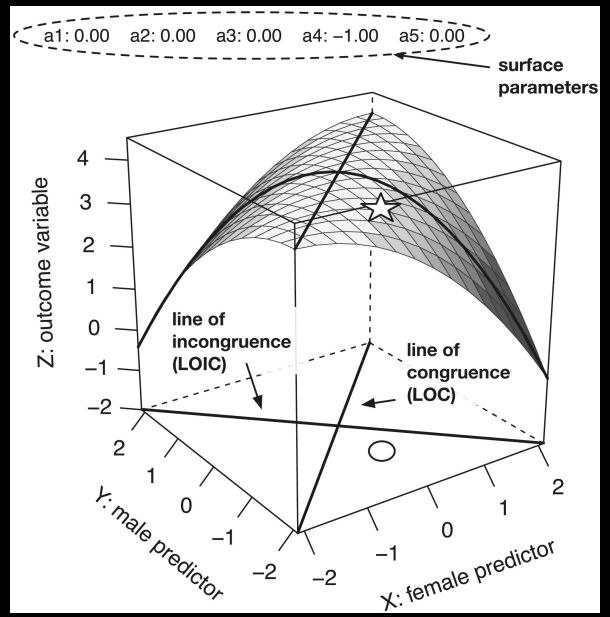
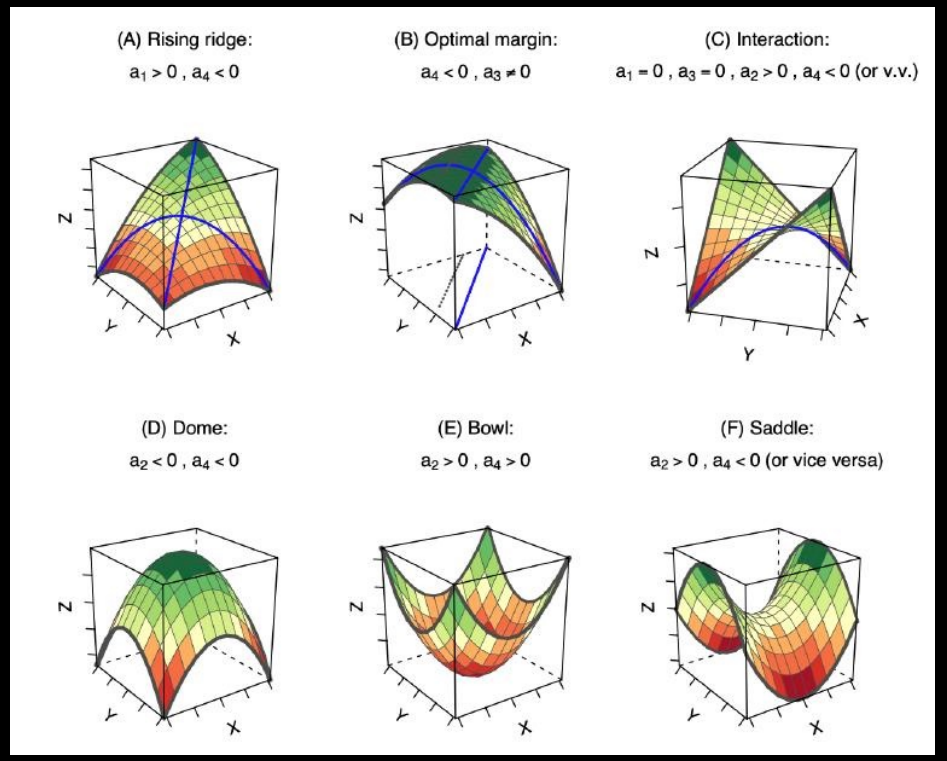


Figure 4. DRSA Models with Gratitude at the Follow-up as an Outcome



Strict Matching



Distinguishability of Dyads

Is there a meaningful and defining characteristic that distinguishes between the two members of the dyad?

Distinguishability is a mix of theoretical and empirical considerations.
For dyads to be considered distinguishable it should be…

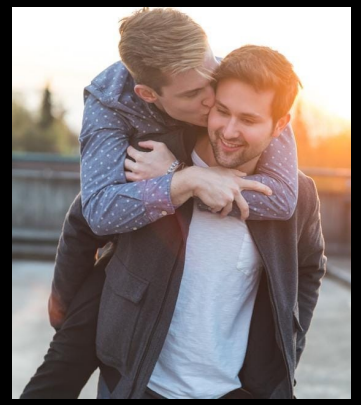
A) Theoretically important to make a distinction between members
B) Empirically shown that there are meaningful differences between the members of the dyad

Distinguishability of Dyads

Distinguishable Dyads




Indistinguishable/Exchangeable Dyads



Distinguishability of Dyads

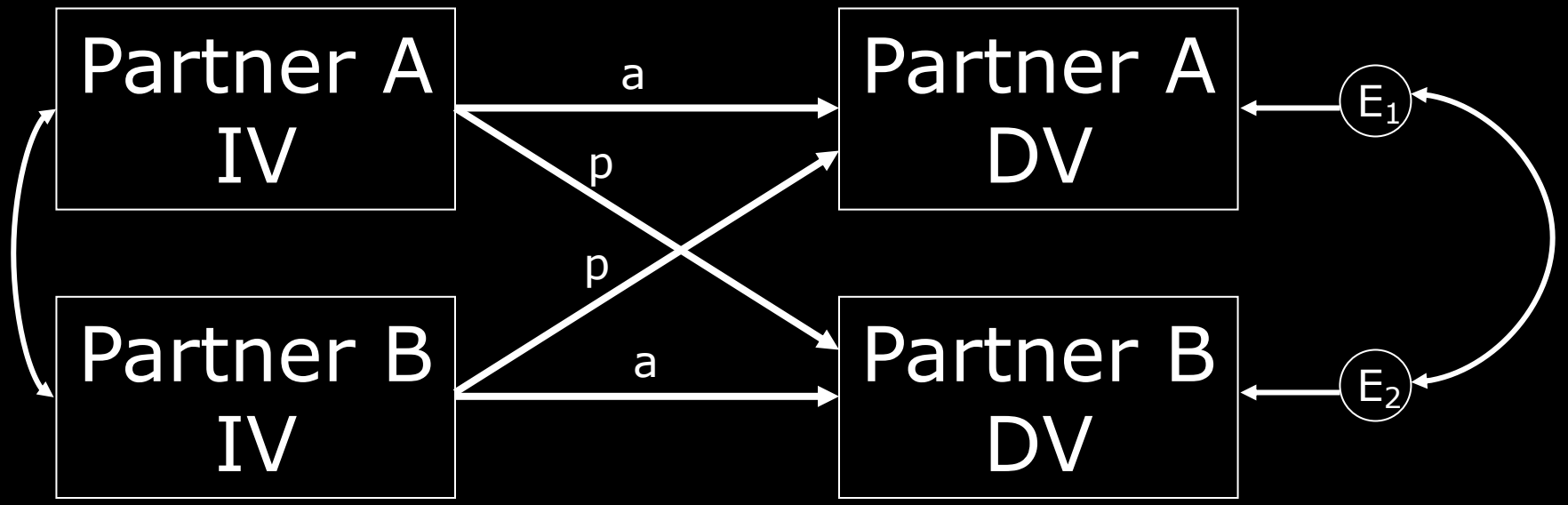
DyadID	PID	Identifier
100	1001	1
100	1002	2
101	1011	1
101	1012	2
102	1021	1
102	1022	2

Distinguishable
Identifier is meaningful

Indistinguishable
Identifier is randomly assigned

Distinguishability of Dyads

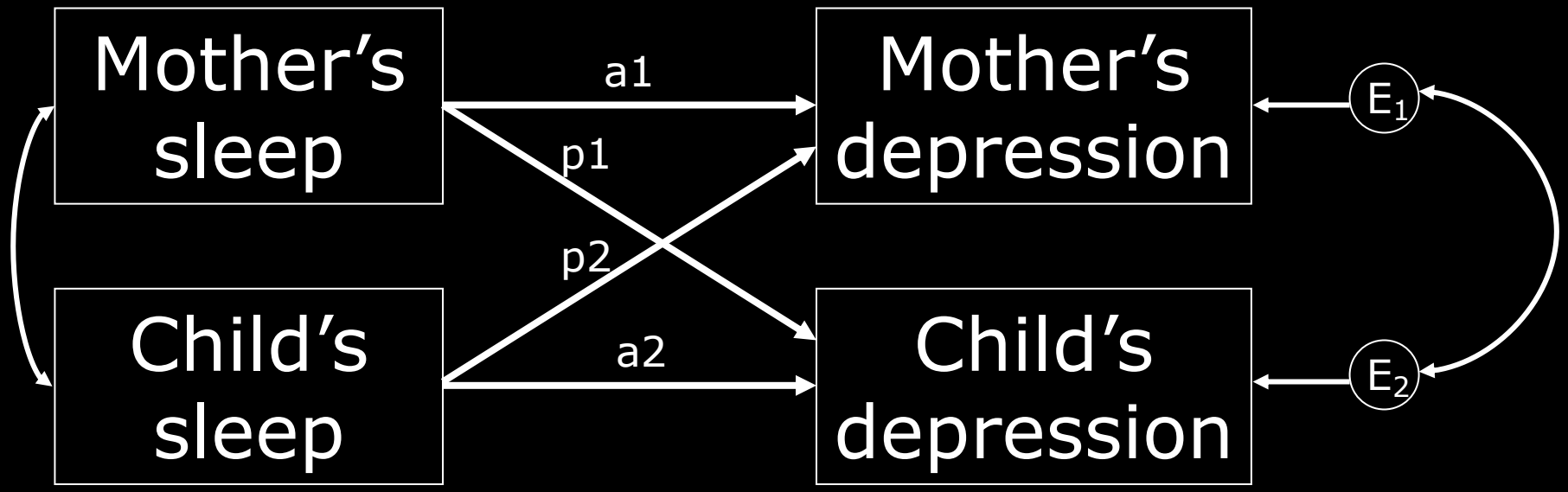
INDISTINGUISHABLE



Total regression estimates: **2**

Distinguishability of Dyads

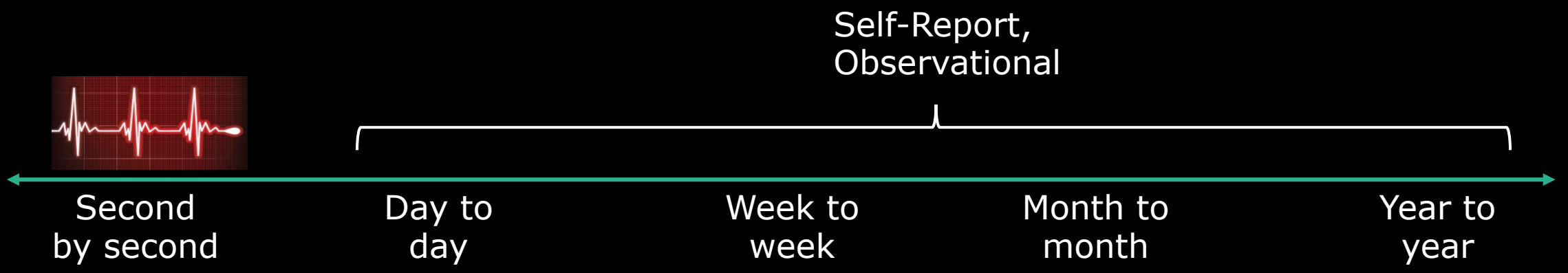
DISTINGUISHABLE



Total regression estimates: **4**

Repeated Measures Models

- How do people change and influence each other over time?
  - Continuous physiological assessments
  - Diary
  - Longitudinal studies



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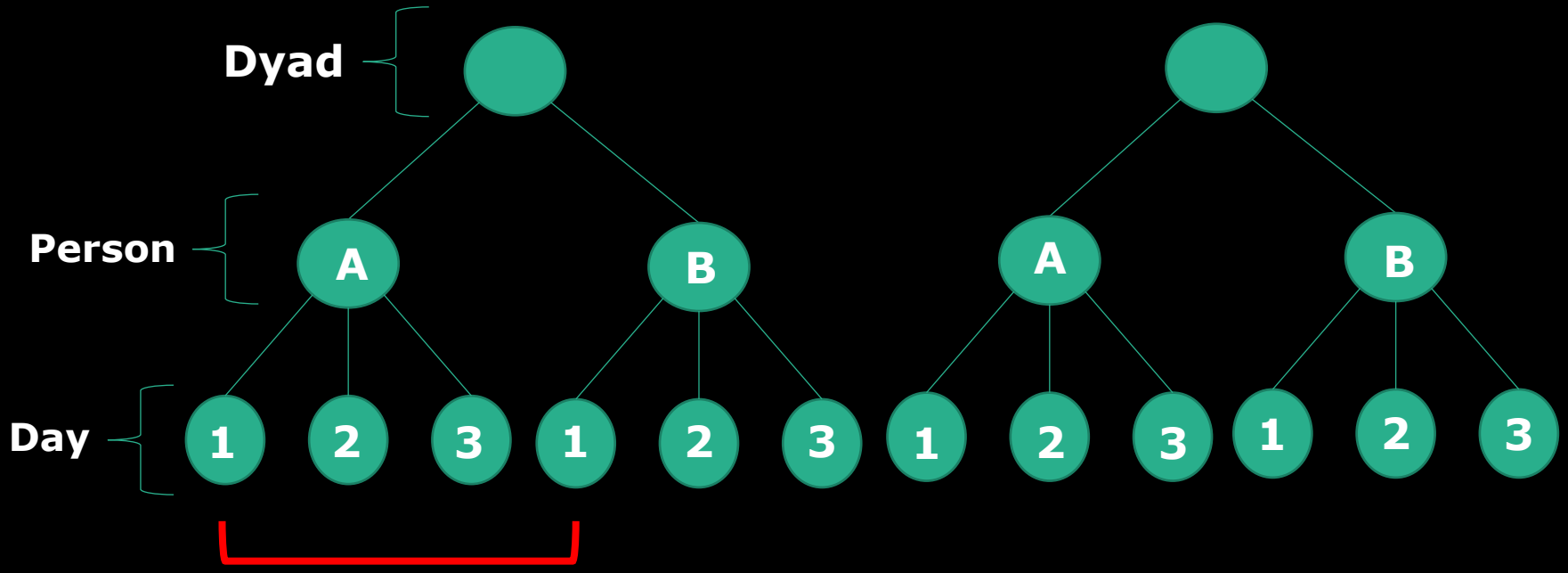
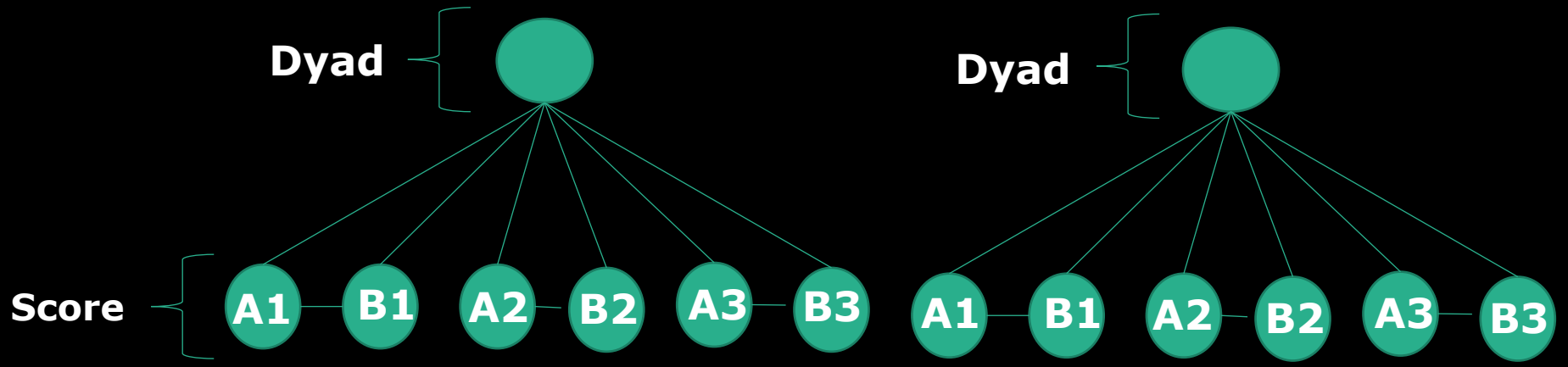


Repeated Measures Models

Longitudinal Dyadic Data



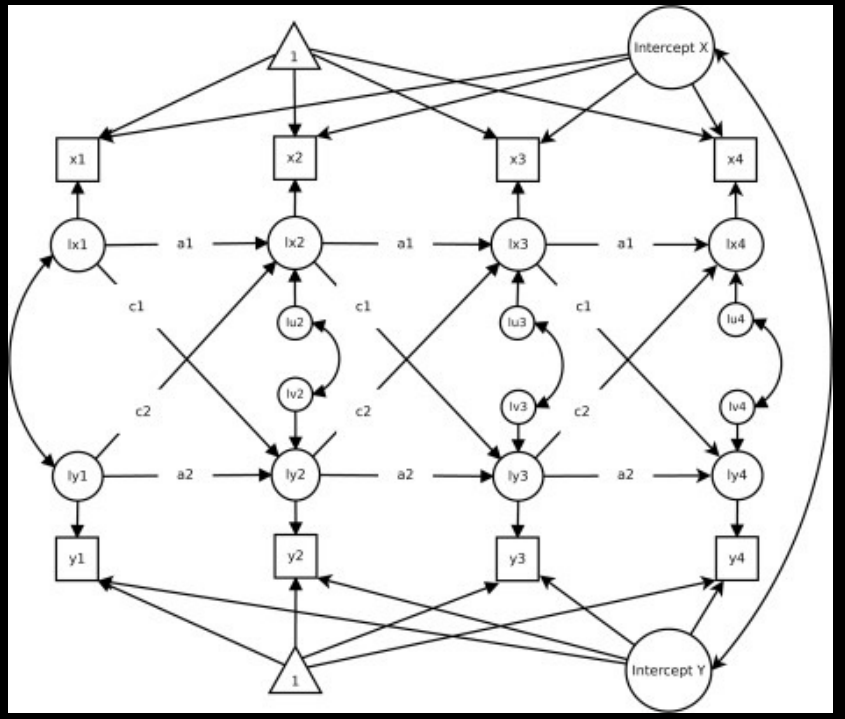
These are some of the more complicated models to analyze, still figuring out best way to do some analyses well, like mediation and power analyses

Issues with multilevel modeling (e.g., properly centering data) apply, but now are dyadic

Repeated Measures Models

- Stability and Influence Model
- Random Intercept Cross-Lagged Panel Model
- Dyadic Growth Curve Analysis

Which model you use is going to depend on number of timepoints, length between timepoints, conceptual questions



Statistical Issues

- Dealing with non-independence
  - Marginal Models that account for non-independence in residuals
  - Multilevel Modeling, treating dyad as a random factor
  - Structural Equation Modeling

- Some conceptual models can be analyzed with any of these approaches and will yield similar results
- Some models may be easier or require one type of approach
  - SEM: Common fate modeling in which you have a latent factor
  - MLM: Overtime data with many repeated measures (can do in SEM but tedious to define all of the time points in a 30 day diary)

Not all dyadic data is non-independent

Some data should be analyzed at the *dyad* level

- Each dyad is independent, so doesn't violate assumptions

This is the case when:

- Outcome is a between-dyad variable
  - Example: Relationship dissolution
- Outcome was only measured for one person in dyad
  - Example: Child's depression

Questions and Thanks

A few of the dyadic methods pioneers:

- Niall Bolger
- Rich Gonzalez
- Dale Griffin
- Dave Kenny
- Deborah Kashy
- J-P Laurenceau
- Tom Ledermann
- Tessa West