Dyadic Data Analysis & Visualization

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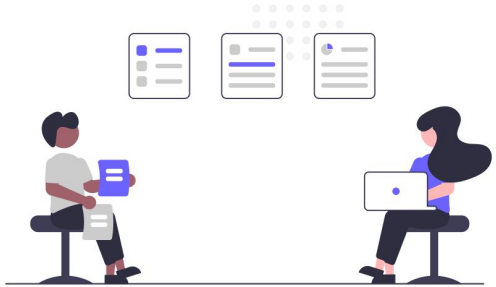
Temple University COG summer workshops 2023

Workshop Agenda

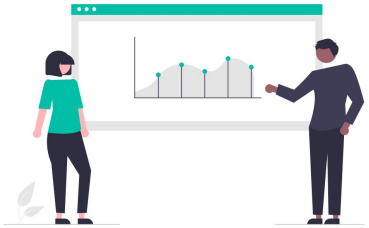
I. Overview
II. Brief coverage of dyadic analysis concepts
III. Introduction to the data

Within R markdown:

IV. Wrangling dyadic data
V. Multilevel modeling with dyadic data
    A. Example
    B. Practice
VI. Actor-Partner Interdependence Model 3 ways
    A. Example
    B. Practice



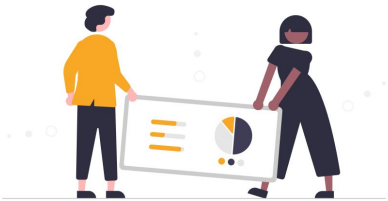
I. Overview of the workshop



- Goal
  - Provide brief introduction to dyadic data analysis and visualization in R
  - ***This workshop mainly follows concepts laid out by Kenny, Kashy, & Cook (2006)***
- What this workshop won't cover
  - In-depth statistical foundations of dyadic analyses covered
  - More complex topics in dyadic analysis
    - e.g., Bayesian dyadic analysis, intensive longitudinal modeling
  - See *recommended resources and references* for in-depth coverage and complex methods
- Pre-requisites
  - R programming language and R Studio user interface downloaded
  - Basic familiarity with R
  - Basic familiarity with multivariate statistical analysis
  - Interest in interpersonal processes of some kind
    - including but not limited to parent-child, couple, friend, clinical, boss-employee relationships

II. Why dyadic analysis?

- Social processes are often studied in individuals rather than at their fundamental unit– the dyad– in psychological research, for example…
  - Married couples
  - Parents and children
  - Strangers introduced in the lab
  - A therapist and each of their patients
- Dyadic analysis allows researchers to account for *nonindependence*
  - Conceptually: the idea that two people in a dyad will share scores that are more similar, or different, than two people who are not members of the same dyad
  - Statistically: violations of the assumption of independence of observations

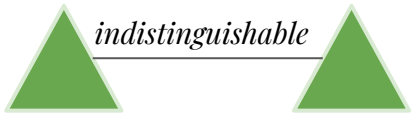


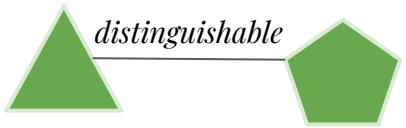
II. Definitions in dyadic analysis

- Distinguishability
  - Distinguishable dyads are those where all dyad members can be reliably differentiated on a theoretically and empirically meaningful feature
    - Examples: parent-child, winner-loser
  - Indistinguishable dyads are those where dyad members cannot be consistently differentiated by any meaningful factor
    - Examples: roommates, coworkers, best friends
  - Distinguishability is all-or-nothing
- Between-, within-, and mixed variables
  - Between-dyad variables vary across dyads, but dyad members share the same score
    - $X_{P_1} = X_{P_2}$
    - Example: length of relationship
  - Within-dyad variables vary between people within a dyad, but the dyad average is the same across all
    - $X_{P_1} + X_{P_2}$ = same value for each dyad
    - Example: percentage of housework completed in couples
    - Distinguishable dyads are differentiated on binary within-dyad variables
  - Mixed variables both vary between people within a dyad, *and* the dyad average varies across dyads
    - Example: age in couples, relationship satisfaction
    - Most outcome variables (DVs) are mixed in dyadic analyses

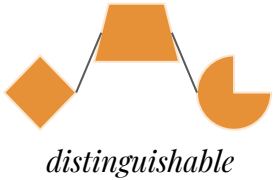
II. Dyadic designs

- Standard dyadic design: each person is paired with one other person (e.g., marriages)
  - *Are you the one? (MTV)*

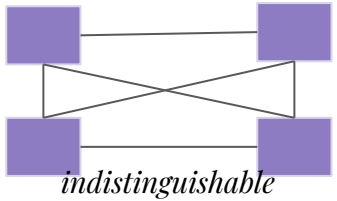


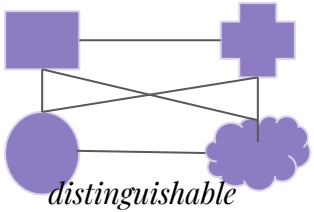


- One-with-many design: each person is paired with many partners, but partners are paired with only one person each (e.g., patient-doctor)
  - *The Bachelor/Bachelorette (ABC)*



- Social Relations Model: All persons interact with all possible partners (e.g., teams)
  - *Love is Blind (Netflix)*



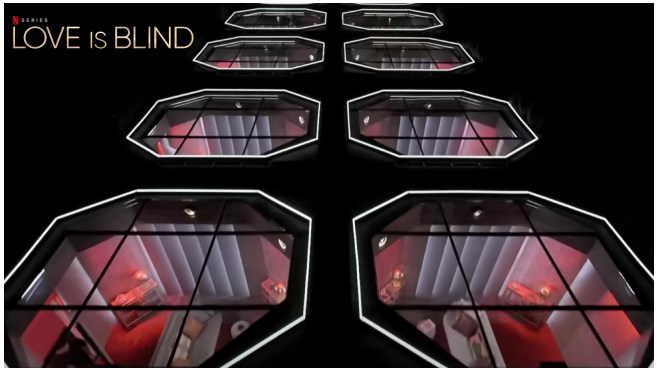


III. About the data

Speed-dating data

(*Fisman, Iyengar, Kamenica, & Simonson, 2006*, *via* *Gelman & Hill, 2006*)

- Distinguishable dyads
  - Distinguishable on self-identified gender
- Half-Block Round-Robin Structure
  - In each "wave," all members interacted with all other possible partners
- We will look at first dates within this dataset– everyone's first interactions across all rounds.
  - This makes the data into a *standard dyadic design* where each person is paired with only one other person.



III. Analysis Plan

1) Wrangling dyadic data
2) Multilevel modeling with dyadic data
    a) Example: Does reporting liking one's partner vary by gender and overlap in interests between partners?
    b) Practice: Does reporting liking one's partner vary by gender and discrepancies in dyad members' perceptions of one another's' qualities (e.g., ambition, intelligence, attractiveness)?
3) Actor-Partner Interdependence Model (*distinguishable dyads*)
    a) Example: What is the effect of one's rating of their partner's level of fun (actor effect), and their partner's rating of their own level of fun (partner effect), on rating of liking one's partner?
        i) How would this model be performed in dyads distinguishable on self-identified gender (MLM approach)?
        ii) How would this model change if dyads were indistinguishable (MLM approach)?
        iii) How would this model be performed in dyads distinguishable on self-identified gender using an SEM approach?
    b) Practice: What is the effect of one's rating of their partner's level of another trait (e.g., sincerity, ambition, intelligence) (actor effect), and their partner's rating of their own level of that trait (partner effect), on rating of liking one's partner (distinguishable MLM approach, distinguishable MLM approach, or distinguishable SEM approach)?

References & Recommended resources

- Podcasts
  - Quantitude Podcast S3E13: https://quantitudepod.org/s3e13-the-actor-partner-interdependence-model
  - Quantitude Podcast S4E9: https://quantitudepod.org/s4e09-ild/
- Tutorials
  - UCLA statistics department intro to SEM in lavaan tutorial: https://stats.oarc.ucla.edu/r/seminars/rsem
  - Dyadic Bayesian multilevel modeling tutorial by Dr. Katherine Zee: https://kzee.github.io/DyadicMLM_Demo.html
  - Dyadic Data Analysis workshop by Dr. Randi Garcia & Dr. David Kenny: https://randilgarcia.github.io/week-dyad-workshop
  - Garcia, R. & Kenny, D. (2018). DATIC: Dyadic Data Analysis 2018 Workshop. https://randilgarcia.github.io/week-dyad-workshop.
  - Penn State QuantDev APIM tutorial: https://quantdev.ssri.psu.edu/tutorials/actor-partner-interdependence-model-apim-basic-dyadicbivariate-analysis
  - Penn State QuantDev Dyadic Multilevel Modeling tutorial: https://quantdev.ssri.psu.edu/tutorials/apa-ati-intensive-longitudinal-data-session-m-dyadic-multilevel-model
- Textbook learning
  - Kenny, D. A., Kashy, D. A., & Cook, W. L. (2006). Dyadic data analysis. Guilford Press. <http://www.davidakenny.net/dyad.htm>
  - Bolger, N., & Laurenceau, J.-P. (2013). Intensive longitudinal methods: An introduction to diary and experience sampling research. Guilford Press. <http://www.intensivelongitudinal.com>
  - Gelman, A. & Hill, J. (2006). Data analysis using regression and multilevel/hierarchical models. http://www.stat.columbia.edu/~gelman/arm/
- Empirical articles
  - Palumbo, R. V., Marraccini, M. E., Weyandt, L. L., Wilder-Smith, O., McGee, H. A., Liu, S., & Goodwin, M. S. (2017). Interpersonal Autonomic Physiology: A Systematic Review of the Literature. Personality and social psychology review : an official journal of the Society for Personality and Social Psychology, Inc, 21(2), 99--141. <https://doi.org/10.1177/1088868316628405>
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  - Ledermann, T., & Kenny, D. A. (2017). Analyzing dyadic data with multilevel modeling versus structural equation modeling: A tale of two methods. Journal of Family Psychology, 31, 442--452.
  - Garcia, R. L., Kenny, D. A., & Ledermann, T. (2015). Moderation in the actor--partner interdependence model. Personal Relationships, 22(1), 8--29. <https://doi.org/10.1111/pere.12060>
  - Kenny, D. A., & Garcia, R. L. (2012). Using the Actor--Partner Interdependence Model to Study the Effects of Group Composition. Small Group Research, 43(4), 468--496. <https://doi.org/10.1177/1046496412441626>
  - Kashy, D. A., & Kenny, D. A. (2000). The analysis of data from dyads and groups. In H. T. Reis & C. M. Judd (Eds.), Handbook of research methods in social and personality psychology (pp. 451–477). Cambridge University Press.
  - Fisman, R., Iyengar, S., Kamenica, E., & Simonson, I. (2006). Gender Differences in Mate Selection: Evidence From a Speed Dating Experiment. Quarterly Journal of Economics, 121, 673-697.
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  - https://www.dexerto.com/entertainment/love-is-blind-concept-explained-how-do-the-pods-work-2089252/
  - Openmoji.org