

# *Introduction to Dyadic Analysis: Challenges and Opportunities*

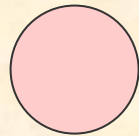
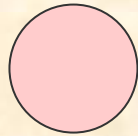
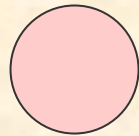
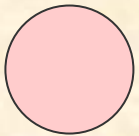
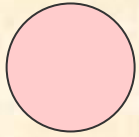
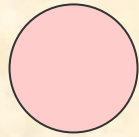
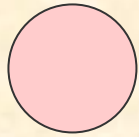
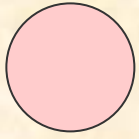
**David A. Kenny**

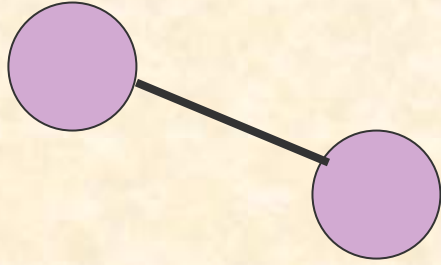
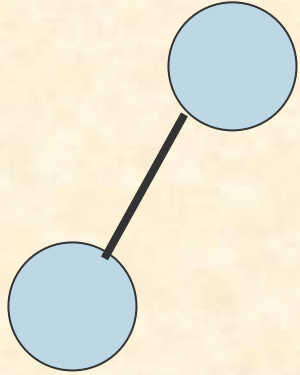
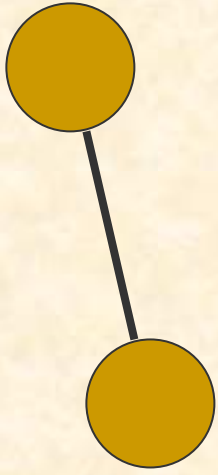


**University of Connecticut**

# *Overview*

- Nonindependence
- Key Terms
- Effects of Nonindependence
- Seven Deadly Sins of Dyadic Data Analysis





# *Nonindependence:*

## *Definition*

- Degree of greater similarity (or dissimilarity) between linked observations versus unlinked observations
- Nonindependence as the *correlation* between linked observations.
- Variance is sometimes used.
  - Cannot handle negative nonindependence
  - Treats negative correlation as if the data were independent

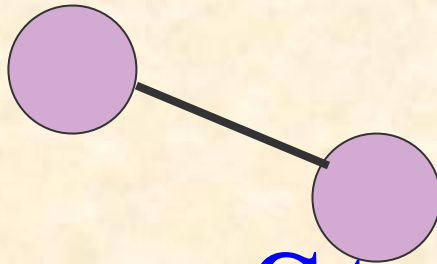
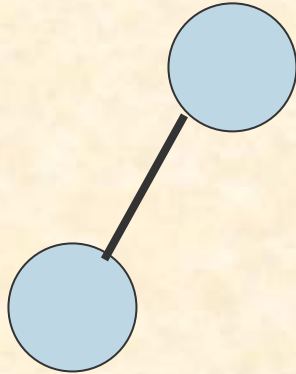
# *Negative Nonindependence*

- Two scores from the same dyad are more dissimilar than two scores from different groups.
- How?

- *Compensation*: If one person has a large score, the other person lowers his or her score. For example, if one person acts very friendly, the partner may distance him or herself,
- *Social comparison*: The members of the dyad use the relative difference on some measure to determine some other variable. For instance, satisfaction after a tennis match is determined by the score of that match.
- *Zero-sum*: The sum of two scores is the same for each dyad. For instance, the two members divide a reward that is the same for all dyads.
- *Division of labor*: Dyad members assign one member to do one task and the other member to do another. For instance, the amount of housework done in the household may be negatively correlated.

# *Nonindependence: Sources*

- Non-random assignment to dyads
  - assortative mating
  - compositional effects
- Common fate
  - climate or norm
  - culture
- Mutual Influence



# Standard Dyadic Design

# *Types of Variables*

## Between-Dyads

**Both members have the same score**

$$X = X'$$

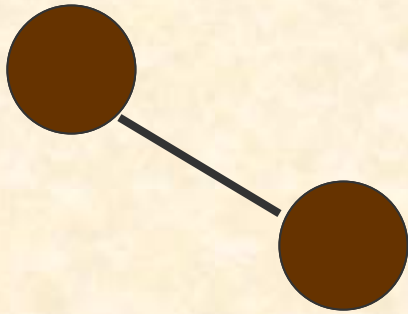
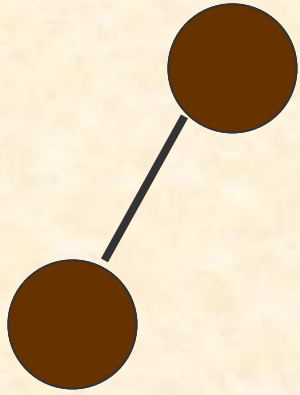
## Within-Dyads

**Sum of two scores a constant**

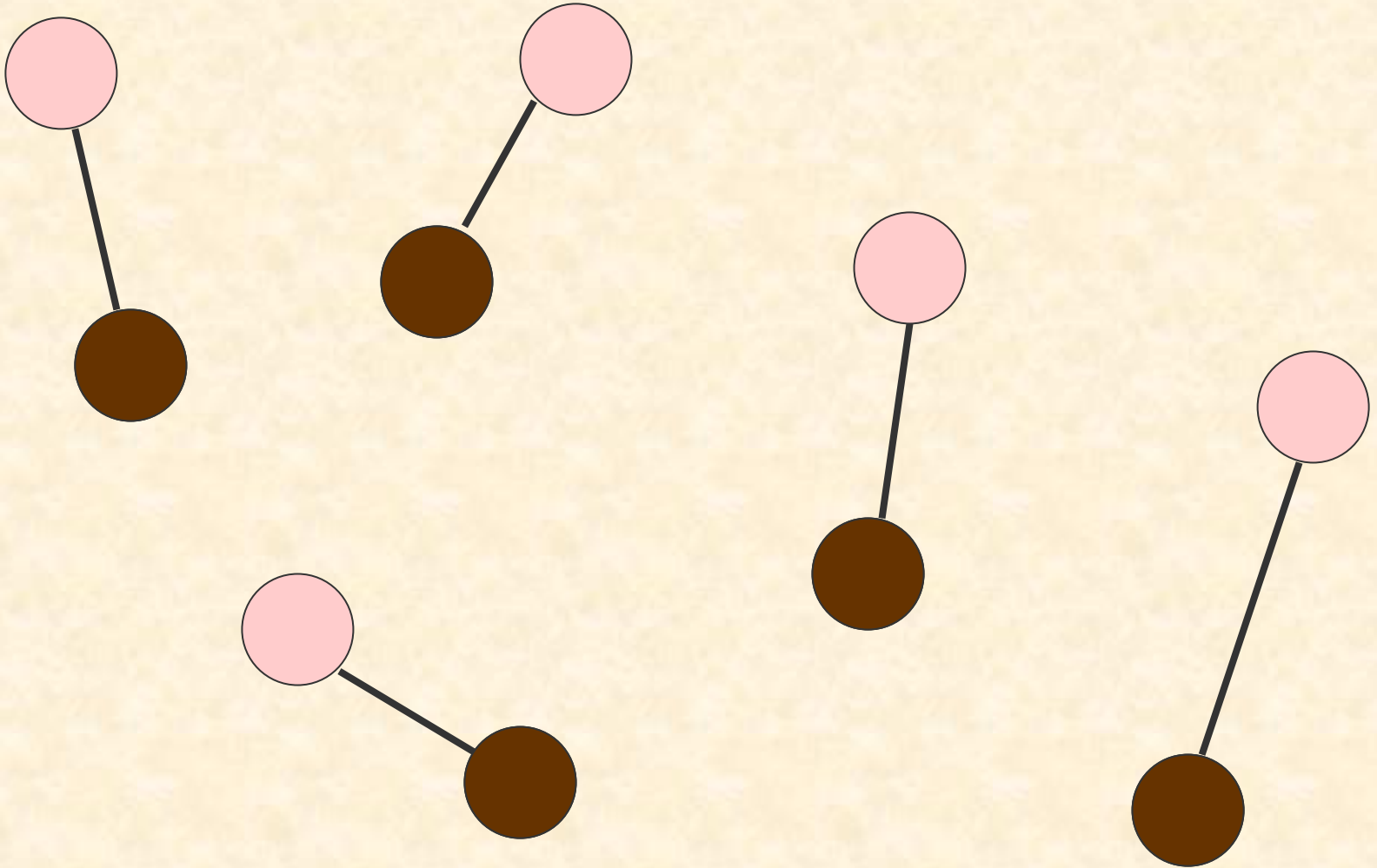
$$X + X' = c \text{ for all dyads}$$

*In the remainder of this presentation, it assumed that*

- 1) the design is a standard dyadic design,*
- 2) at one time point, and*
- 3) the level of measurement is at the interval level.*



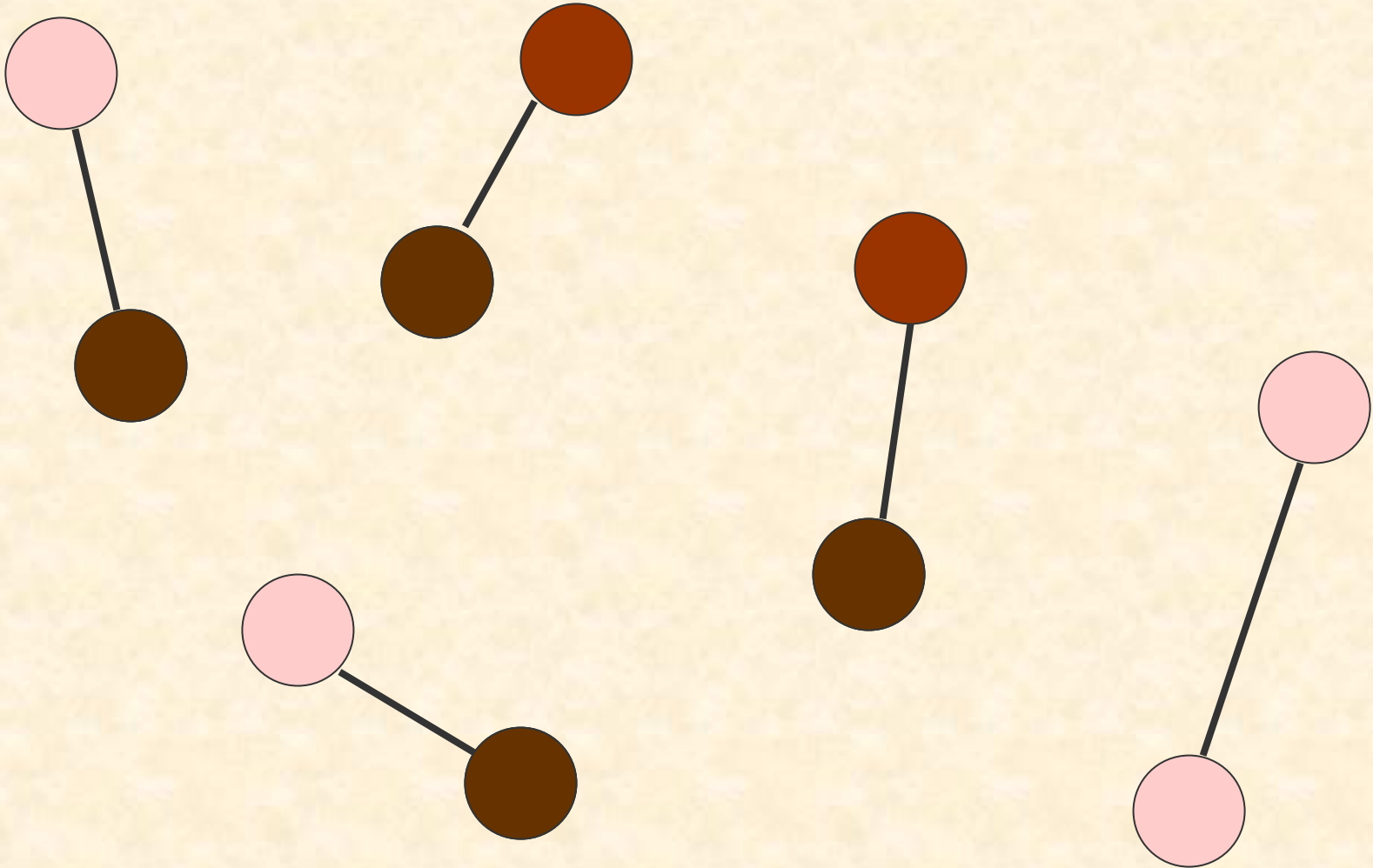
**Between**



**Within**

# *Mixed Variables*

- Variables that vary within and between groups
- Examples
  - Most outcomes (and mediators)
  - Individual differences (e.g., personality)



**Mixed**

# *Gender and the Three Types*

Between

Gay and Lesbian Couples

Within

Heterosexual Married Couples

Mixed

Friends

# *Types of Dyads*

## Definitions

### **Distinguishable or Unexchangeable**

**Dyads with a categorical within-dyads variables that makes a difference**

**E. g., parent-child**

### **Indistinguishable or Exchangeable**

**Ordering of the two members is arbitrary**

**E.g. roommates**

Whether dyads are distinguishable or not is matter of theoretical and statistical considerations.

*Measurement of  
Nonindependence:  
Distinguishable Dyads*

Pearson  
Correlation

# *Measurement of Nonindependence: Indistinguishable Dyads*

- Intraclass Correlation (ICC)
- Based on Analysis of Variance with dyad as the independent variable
- $ICC = [MS_B - MS_W] / [MS_B + MS_W]$
- Two sided test of significance.
- Equals one when  $X = X'$  (between dyads)
- Equals minus one when  $X + X' = c$  (within dyads).

# *Effect of Ignoring Nonindependence*

Effect Estimates Unbiased

Loss of Degrees of Freedom

Standard Errors Biased

- Sometimes too large
- Sometimes too small
- Sometimes hardly biased

# *Direction of Bias Depends on*

## Direction of Nonindependence

**Positive:** linked scores more similar

**Negative:** linked scores more dissimilar

## Between-Dyads and Within-Dyads Independent Variable

**Between:** linked scores in the same  
condition

**Within:** linked scores in different  
conditions

# *Effect of Ignoring Nonindependence on Significance Tests*

**Positive**      **Negative**

**Between**

Too liberal

Too  
conservative

**Within**

Too  
conservative

Too liberal

# *What to Do If the Data are Nonindependent*

Dyad Must Be Included in the Analysis

How?

Change Unit of Analysis

Multilevel Modeling

# *Opportunities of Dyadic Analysis*

Study What We Are Really Interested In  
Interdependence  
Reciprocity

Examine Mutual Influence in the Dyad  
Actor-Partner Interdependence Model  
Over-time Effects  
Entrainment

It can be complex, but the complexity is required by  
the important questions that we ask.