Lecture 13: Complex (Factorial) Designs

Monday, October 16, 2023

Your Teaching Fellows:

003/004:	Zahra Abolghasem	Bronwen Grocott
	Vasileia Karasavva	Ni An
010:	Thalia Lang	Malina Lemmons
	Ruoning Li	Irene Wen

Lectures: MWF 12:00 PM – 1:00 PM (003); 1:00 PM – 2:00 PM (004); 2:00 PM – 3:00 PM (010)
Office hours: Tuesdays 2:00 PM – 4:00 PM

Factorial designs – doggy style

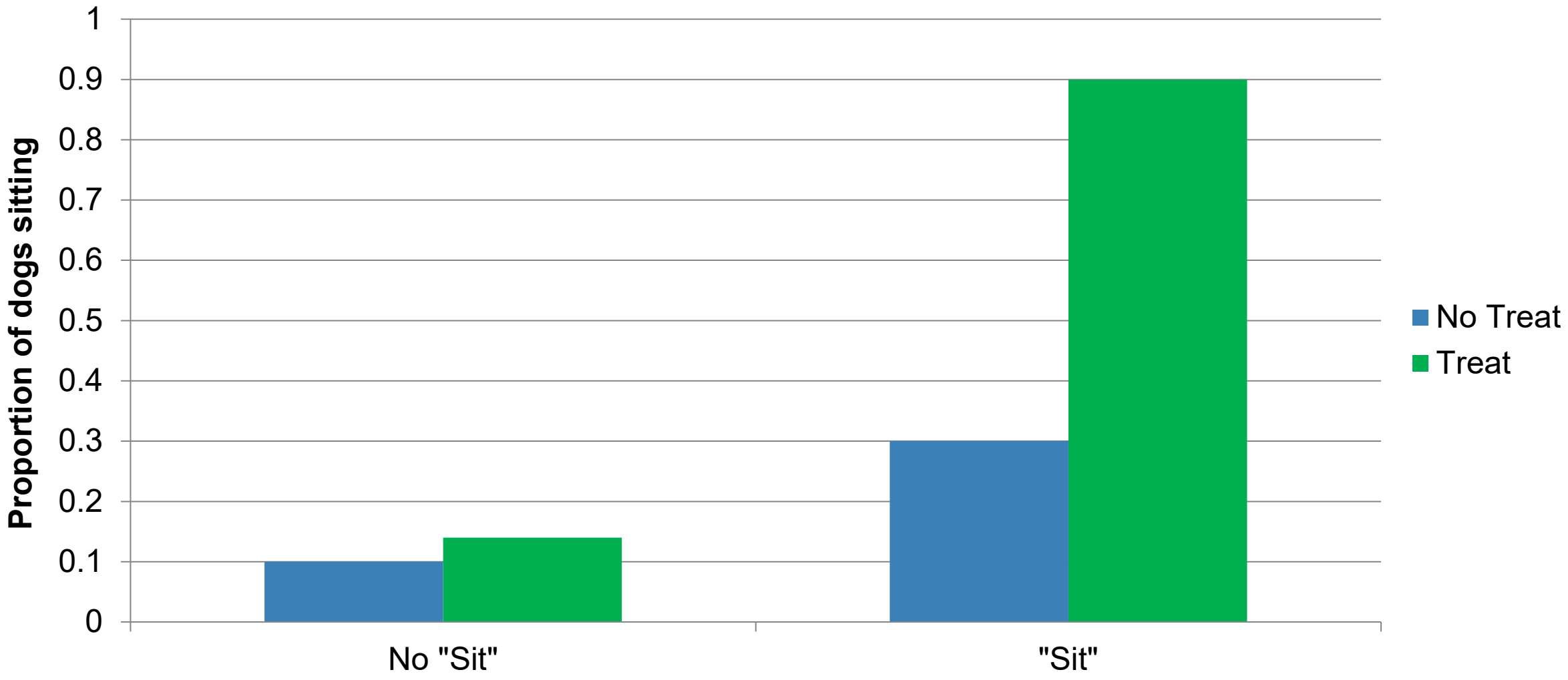
		Presence of Food		
		No Treat	Treat	*Marginal mean of command*
Command	No "Sit"	0.10	0.14	0.12
	"Sit"	0.30	0.90	0.60
	Marginal mean of presence of food			
		+0.20	+0.76	+0.48

A few more dogs sit when commanded to sit

Way more dogs sit when commanded to sit

OVERALL: More dogs sit when commanded to sit

Factorial designs – doggy style



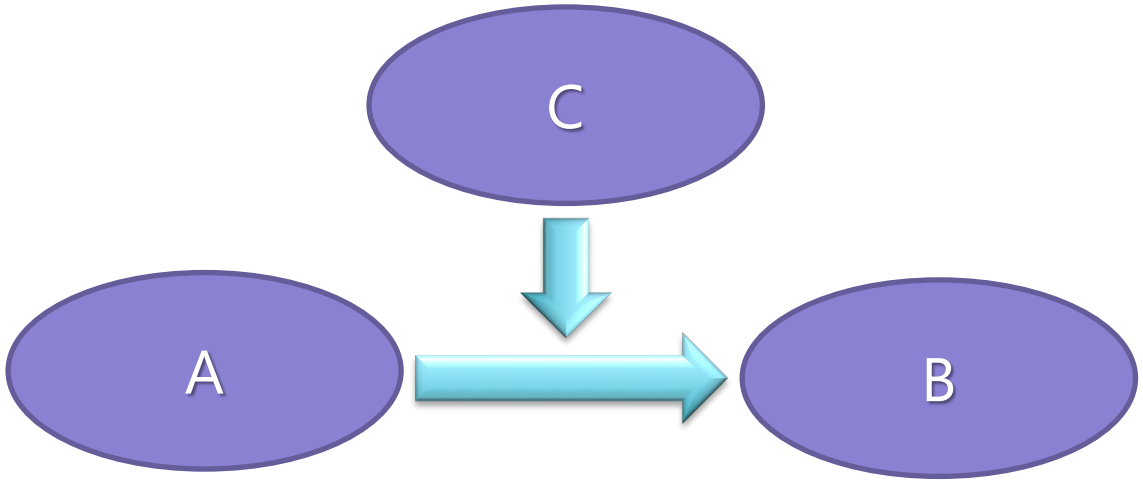
Factorial designs – doggy style

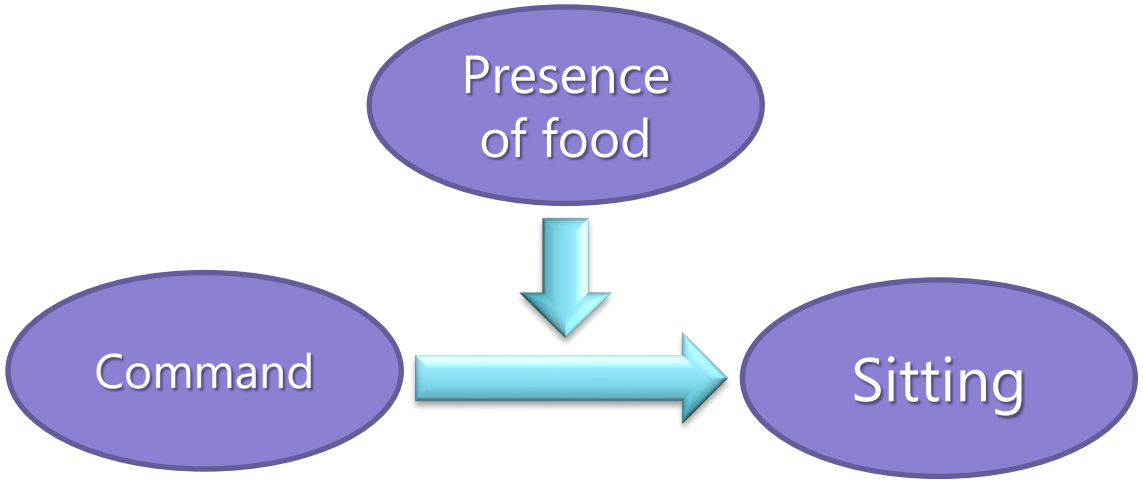
- Results of doggy study is example of interaction
  - **The effect** of command on proportion of dogs sitting is **different** *depending on* whether food is present or not
  - When effect of the first IV on the DV changes *depending on* the level of the second IV
    - Second IV = “Moderator” or “moderator variable”

- Benefits:
  - Allow us to find interactions
  - More closely mimics real world situations as simple relationships are too unrealistic

Factorial designs – doggy style

- Understanding interactions





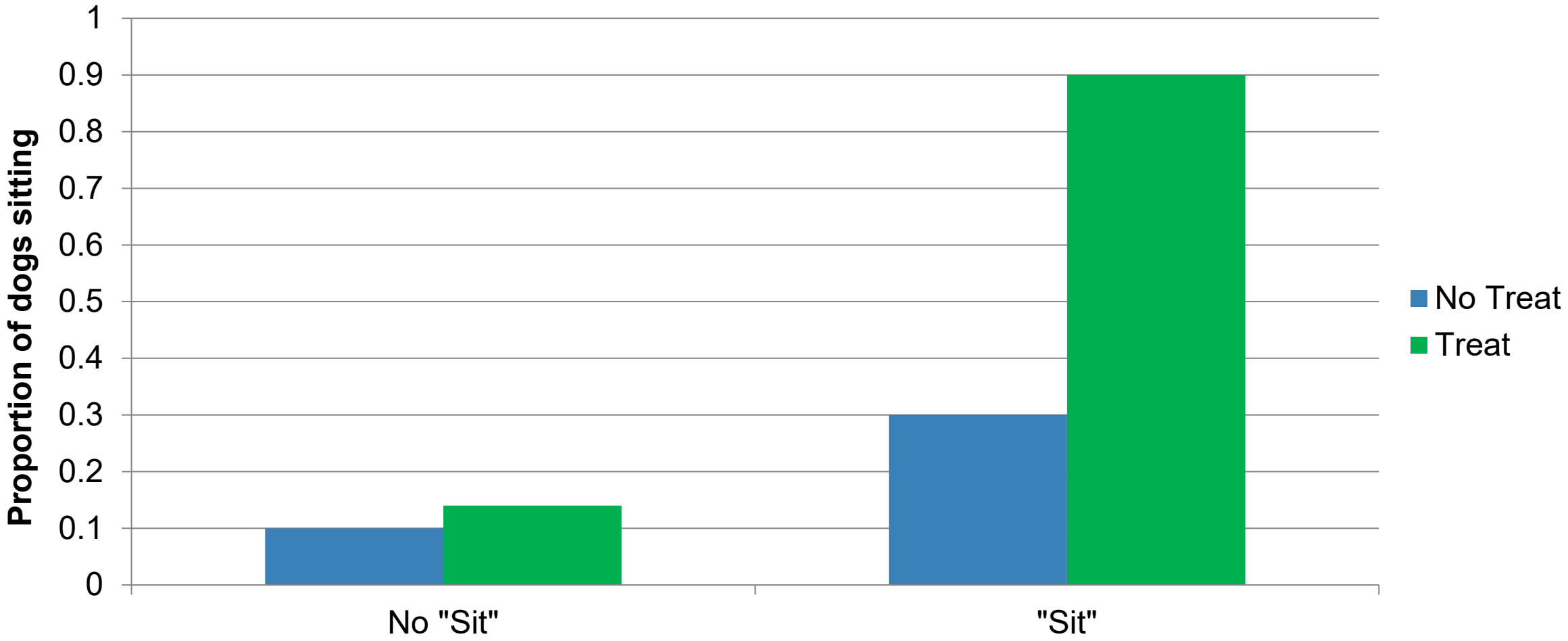
Factorial designs – doggy style

- In this study, results support conclusion that…
  - Dogs respond best when you command them AND provide them with an incentive!

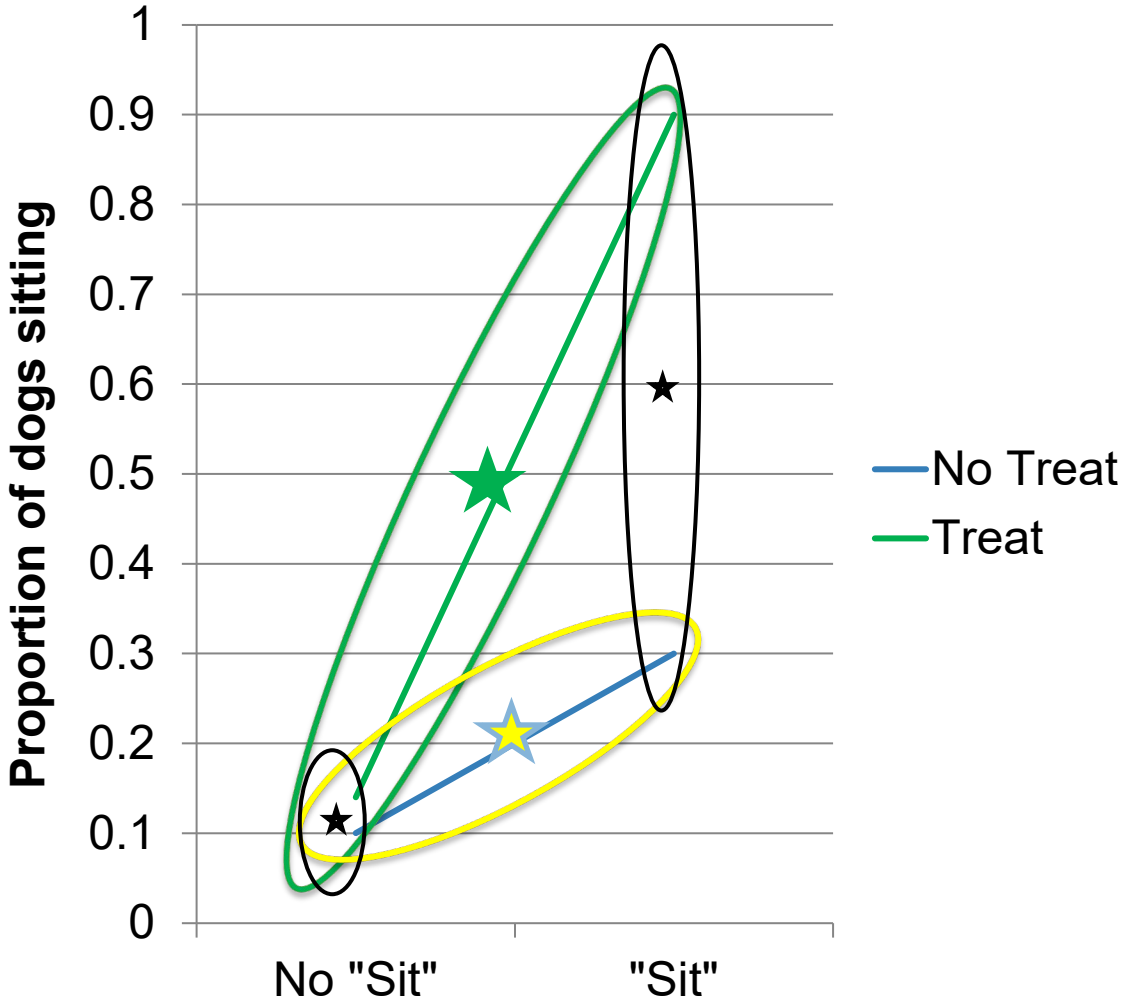
Interpreting interaction graphs

- Why?
  - To understand psychological phenomena more comprehensively, we need to understand interactions
  - Learning to visualise data can be tough at first; but makes interpreting data much easier once you get the hang of it
  - Easier to read journal articles

Interpreting interaction graphs

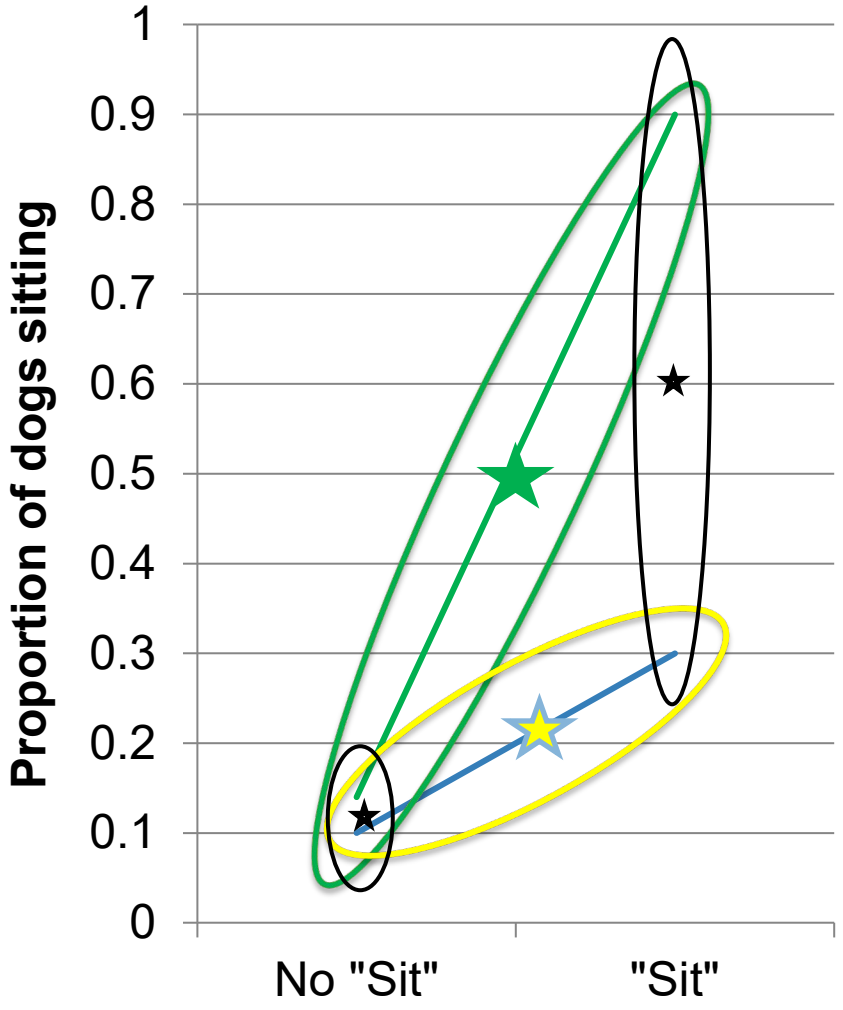


Interpreting interaction graphs



- Key questions
  - Are the lines parallel?
  - Are the midpoints of the lines different?
  - Are the average values of the DV at each level of the IV different?

Interpreting interaction graphs



		Presence of Food		
		No Treat	Treat	*Marginal mean of command*
Command	No "Sit"	0.10	0.14	0.12
	"Sit"	0.30	0.90	0.60
	Marginal mean of presence of food	0.20	0.52	

Interpreting interaction graphs

- Strongly recommend that you look at Figure 11.4 in your text
  - 8 examples of different possible outcomes of 2 x 2 factorial designs
  - Try them, and see how many you get right
  - Come Monday with questions!

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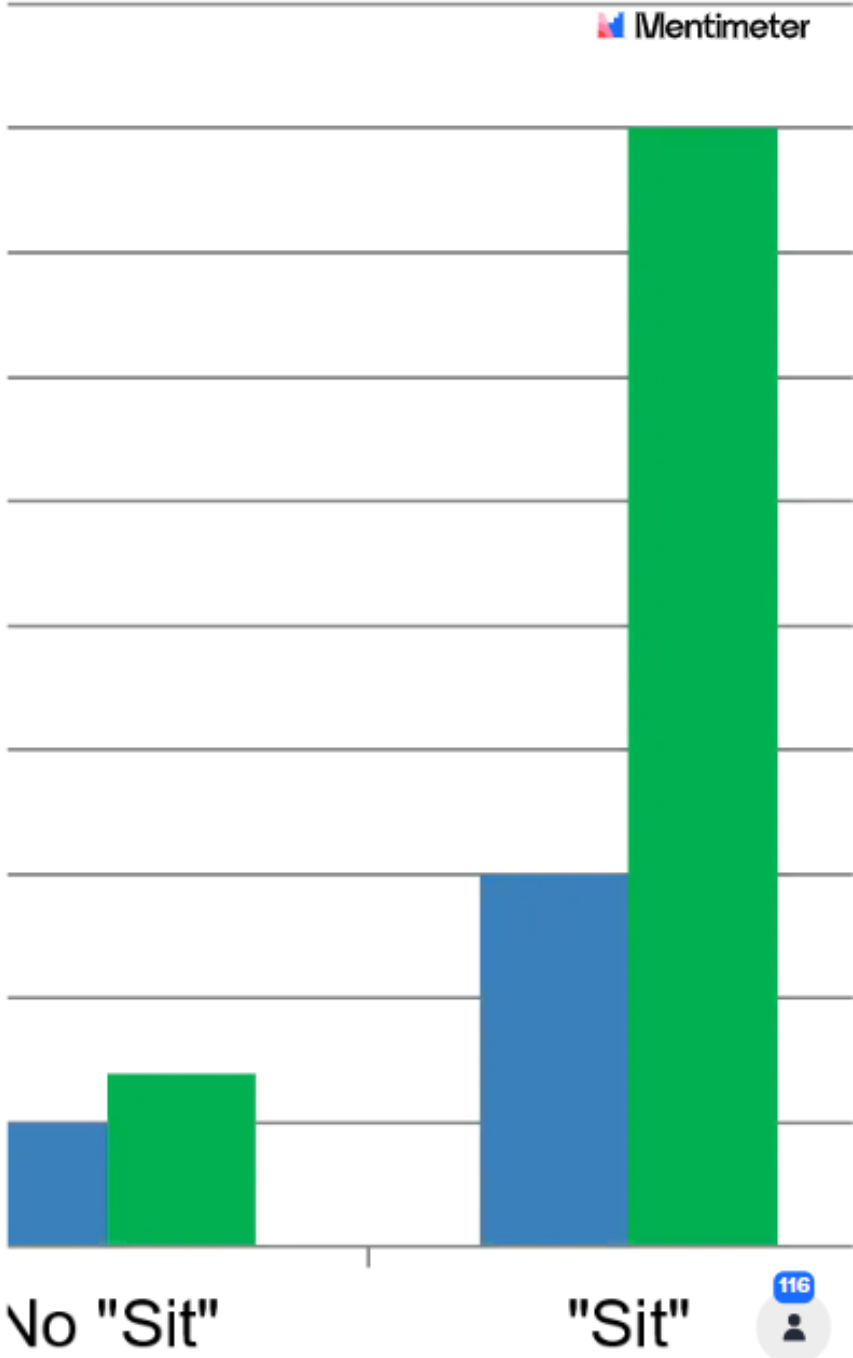
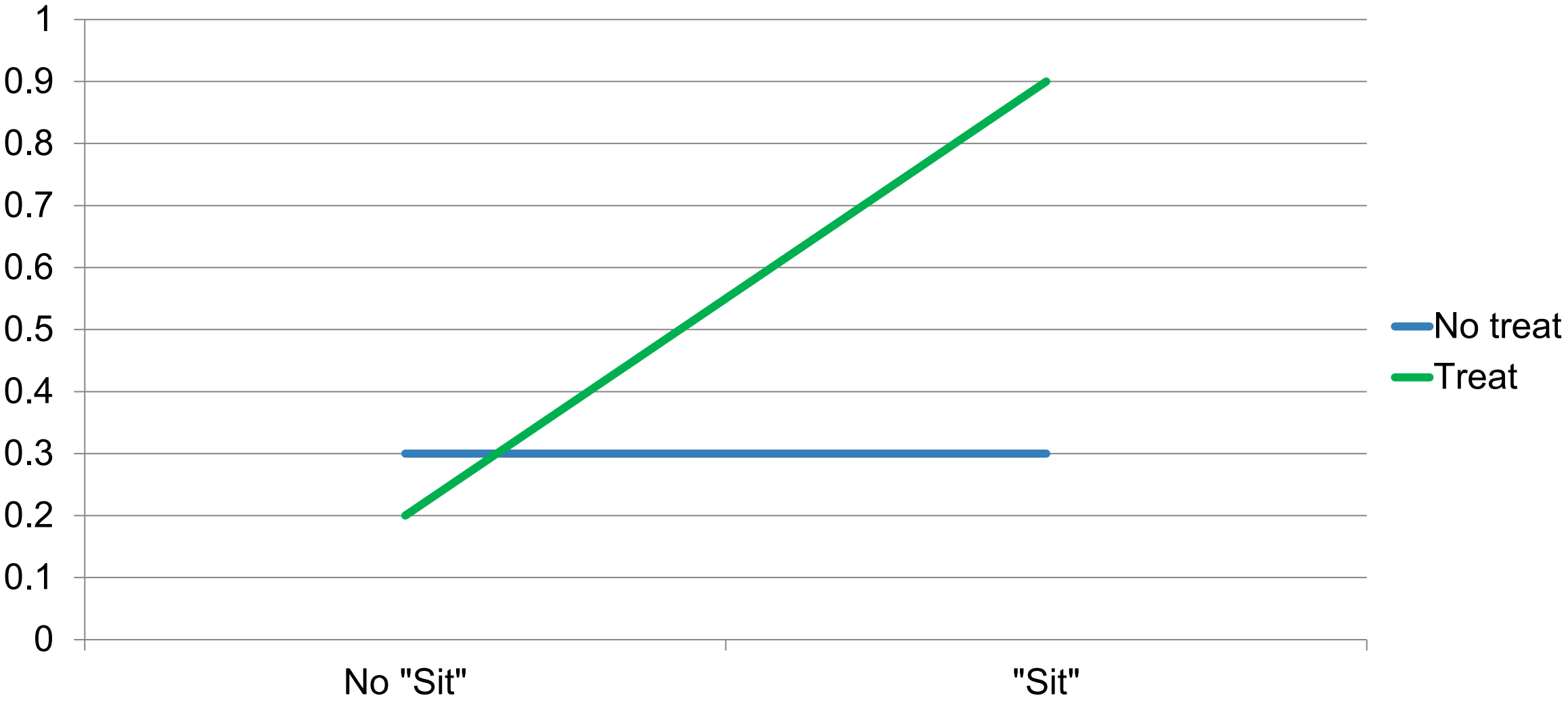
The effect of presence of food is...



Simple main effects



Simple main effects

- No – main effects are *qualified* by an interaction between the two independent variables

- Simple main effects = effect of one IV on the DV *within a single level of the second IV*
  - More dogs will sit when you tell them to “sit” rather than not telling them to “sit” – IF you hold food in your hand
  - If you do not hold food in your hand, telling dogs to “sit” versus not telling them to “sit” does not affect the proportion of dogs that sit

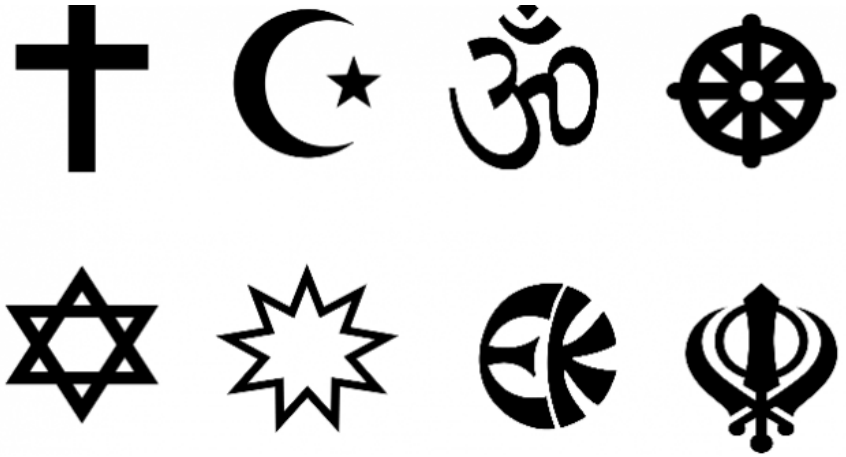
- Decide on ONE WAY to split the data

Learning objectives

- By the end of this class, you should be able to:
  - Explain IV x PV designs
  - Differentiate between crossed factorial designs and nested factorial designs

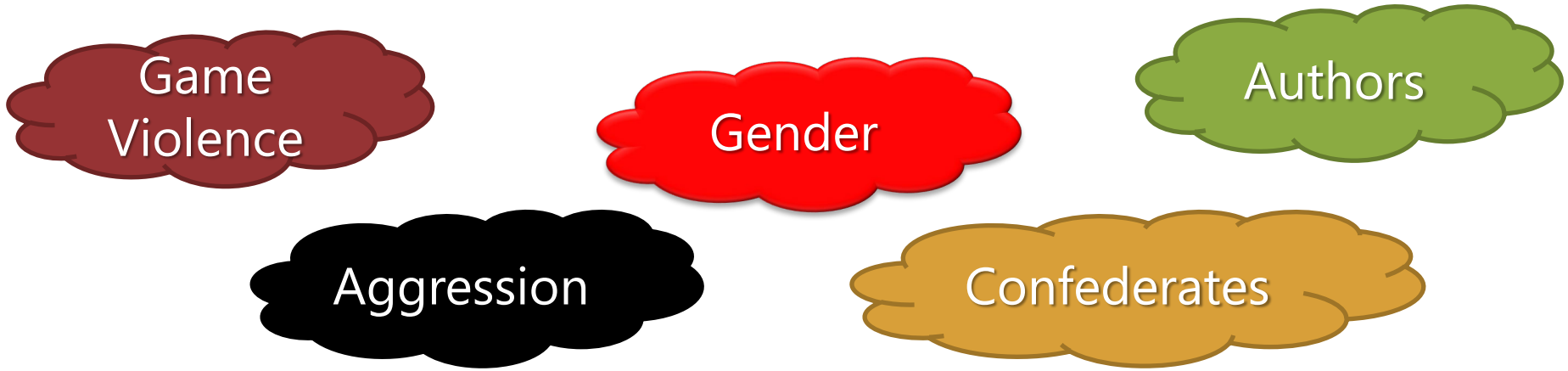
IV x PV

- Give me examples of participant variables:



IV x PV

- Bartholomew and Anderson (2002):
  - Playing violent video games results in more aggression than playing non-violent video games
- Game violence:
  - Half played violent game, half played non-violent game
- Gender:
  - Half identified as men, half identified as women



Factorial designs – Aggression

Factor #1: Game violence	Factor #2: Gender	DV: Aggression
 	 	

Factorial designs – Aggression

		Gender	
		Women	Men
Game violence	DBD		
	PGA Tour		

Known as a (2)-way factorial design

Specifically, a (2) x (2) factorial design

Factorial designs – Aggression

		Gender		
		Women	Men	*Sample sizes*
Game violence	DBD	n = 10	n = 12	n = 22
	PGA Tour	n = 11	n = 10	n = 21
	Sample sizes	n = 21	n = 22	

Factorial designs – Aggression

		Gender		
		Women	Men	*Marginal mean of violence*
Game violence	DBD	5.05	7.01	6.03
	PGA Tour	4.61	4.60	4.60
	Marginal mean of gender	4.83	5.80	

Main Effect of Gender

Main Effect of Game Violence

Factorial designs – Aggression

		Gender		
		Women	Men	*Marginal mean of violence*
Game violence	DBD	5.05	7.01	6.03
	PGA Tour	4.61	4.60	4.60
	Marginal mean of gender	4.83	5.80	
		+0.44	+2.41	+1.43
		A bit stronger white noise	*Way* stronger white noise	OVERALL: Stronger white noise after violent game