PSC 202
SYRACUSE UNIVERSITY

INTRODUCTION TO POLITICAL ANALYSIS

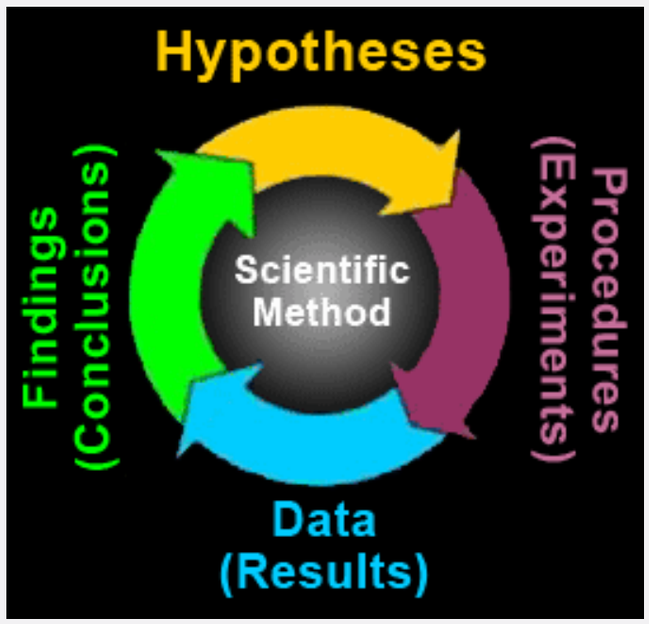
BIVARIATE HYPOTHESIS TESTING PART 1

HOUSEKEEPING

- Sections on Friday
- PS 5 due on Friday
- Posting PS 6 and next quiz already, but not due until after break

WHERE WE ARE

- Formulate research question
- Propose explanation/theory, hypotheses
- Data collection process
- Use data to evaluate hypotheses
- Reassess explanation



HURDLES

- Is there a credible causal mechanism that connects X to Y?
- Can we rule out the possibility that Y could cause X?
- Is there covariation between X and Y?
- Have we controlled for all confounding variables (Z) that might make the association between X and Y spurious?

CAUSALITY

- **What is the *causal* effect of attending Syracuse University on (future) income?**
- **As opposed to attending e.g. a public university**

HURDLES

- Is there a credible causal mechanism that connects X to Y?
- Can we rule out the possibility that Y could cause X?
- Is there covariation between X and Y?
- Have we controlled for all confounding variables (Z) that might make the association between X and Y spurious?

HURDLES

- Is there a credible causal mechanism that connects X to Y?
- Can we rule out the possibility that Y could cause X?
- Is there covariation between X and Y?
- Have we controlled for all confounding variables (Z) that might make the association between X and Y spurious?

HURDLES

- Is there a credible causal mechanism that connects X to Y?
- Can we rule out the possibility that Y could cause X?
- Is there covariation between X and Y?
- Have we controlled for all confounding variables (Z) that might make the association between X and Y spurious?

HURDLES

- Is there a credible causal mechanism that connects X to Y?
- Can we rule out the possibility that Y could cause X?
- Is there covariation between X and Y?
- Have we controlled for all confounding variables (Z) that might make the association between X and Y spurious?

CAUSALITY

- Income if attending SU - Income if attending public university
- C*ausal* effect of attending Syracuse University
- Problem?

CAUSALITY

- Income if attending SU - Income if attending public university
- Can either observe person's income after attending SU

CAUSALITY

- Income if attending SU - Income if attending public university
- Or person's income after attending public university

CAUSALITY

- Income if attending SU - Income if attending public university
- But not both!
- “Fundamental problem of causal inference”: We can’t observe alternate reality in which you didn’t attend SU!

CAUSALITY

- Income of people attending SU - Income of people attending public university
  - This we can compute
  - But: Students who *choose* to attend SU are likely different from students who *choose* to attend public university
  - These differences potentially affect our ability to compute the causal effect of attending SU

HURDLE 4

Parents' wealth

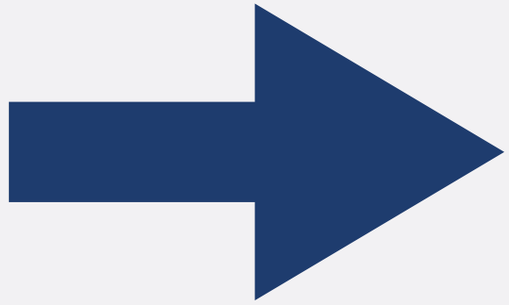
Attending SU vs. public university

Future Income

HURDLE 4

Parents' wealth

Attending SU vs. public university



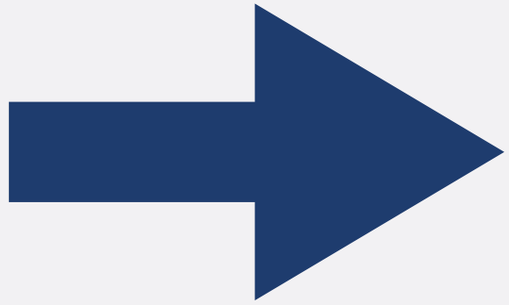
Future Income

- SU is more expensive than public university
  - Students with rich parents more likely to attend SU
  - Students without rich parents more likely to attend public university

HURDLE 4

Parents' wealth

Attending SU vs. public university



Future Income

- Getting a well-paying job is (in part) about connections
  - Students with rich parents have better connections to companies with well-paying jobs
  - Students without rich parents have fewer connections

HURDLE 4

- So: income differences can be due to:
  - Causal effect of SU, and/or
  - Differences in parents' wealth
- If we want to estimate causal effect of SU, we need to "control for" differences in parents' wealth
  - Want to compare students who did and did not attend SU with similar parental wealth

HURDLES

- Is there a credible causal mechanism that connects X to Y?
- Can we rule out the possibility that Y could cause X?
- Is there covariation between X and Y?
- Have we controlled for all confounding variables (Z) that might make the association between X and Y spurious?

LARGE N AND SMALL N

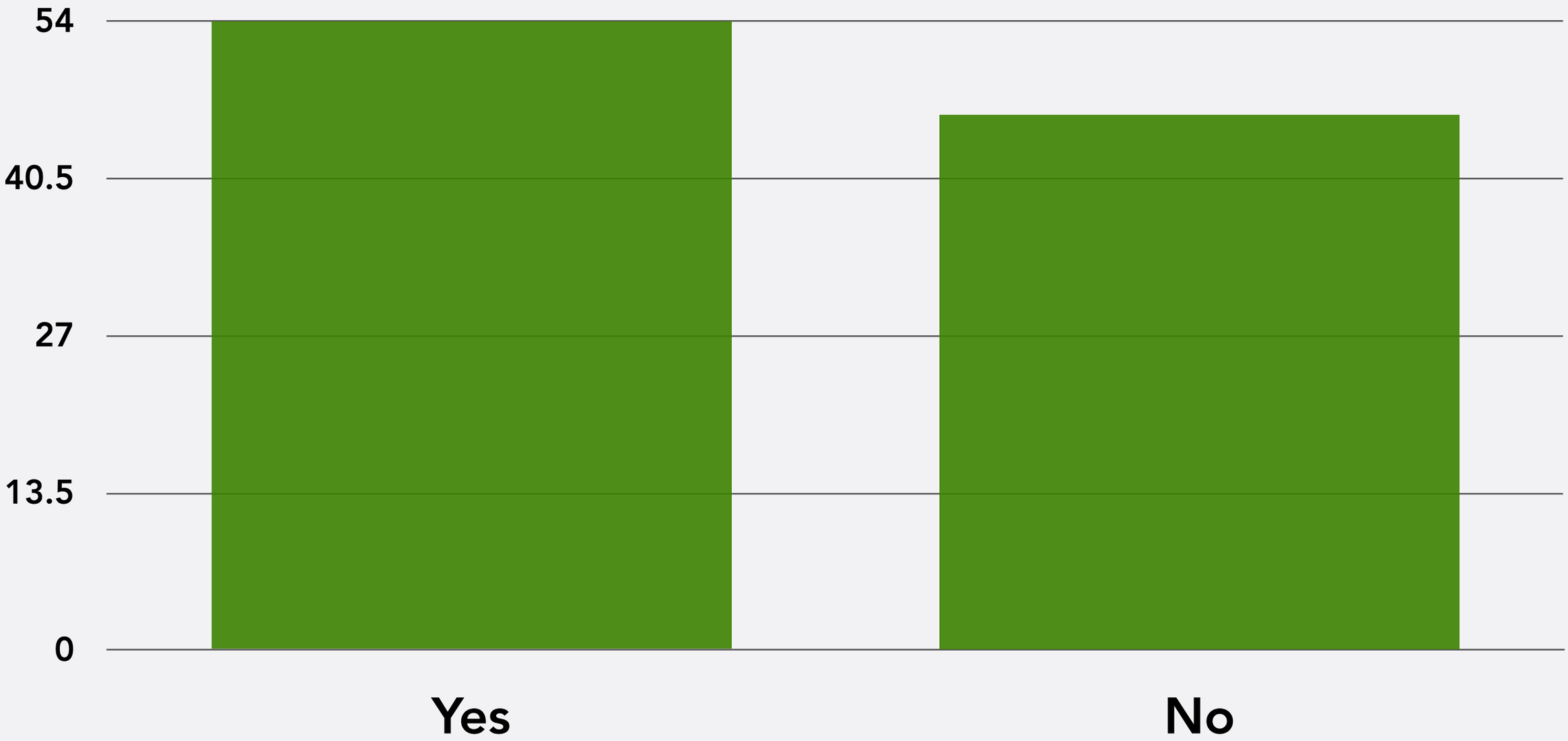
- Qualitative studies (small n)
- Quantitative studies (large n)

HURDLE 3

- Is there a credible causal mechanism that connects X to Y?
- Can we rule out the possibility that Y could cause X?
- Is there covariation between X and Y?
- Have we controlled for all confounding variables (Z) that might make the association between X and Y spurious?

SURVEY

- Do you approve or disapprove of the way Joe Biden is handling his job as President?



- Excluding students who said “Don’t know”

BIVARIATE RELATIONSHIP

? → Approval of J. Biden

- What explains why some of you approve, while others don’t?

BIVARIATE RELATIONSHIP

Gender → Approval of J. Biden

- If gender has an effect on approval, what would we expect to see?
- How could we show it?

BIVARIATE RELATIONSHIP

- Male
  - Approve: 19
  - Do not approve: 25
- Female
  - Approve: 38
  - Do not approve: 25

- Excluded students who said “Don’t know”
- Excluded students who identified as non-binary or other
  - Only a few students, so one might be able to infer answers for specific people (would break anonymity promise)

CROSS-TABULATIONS

Approve of Biden	Gender: Male	Gender: Female
Approve	19	38
Do Not Approve	25	25

CROSS-TABULATIONS

Approve of Biden	Gender: Male	Gender: Female	Total
Approve	19	38	57
Do Not Approve	25	25	50
Total	44	63	107

CROSS-TABULATIONS

Gender

Approve of Biden	Male	Female	Total
Approve	19	38	57
Do Not Approve	25	25	50
Total	44	63	107

Total number approving

CROSS-TABULATIONS

Approve of Biden	Gender: Male	Gender: Female	Total
Approve	19	38	57
Do Not Approve	25	25	50
Total	44	63	107

Total number Men

CROSS-TABULATIONS

Approve of Biden	Gender: Male	Gender: Female	Total
Approve	19	38	57
Do Not Approve	25	25	50
Total	44	63	107

Total number

CROSS-TABULATIONS

Approve of Biden	Gender: Male	Gender: Female	Total
Approve	19	38	57
Do Not Approve	25	25	50
Total	44	63	107

CROSS-TABULATIONS

Approve of Biden	Gender: Male	Gender: Female	Total
Approve	% (19)	% (38)	% (57)
Do Not Approve	% (25)	% (25)	% (50)
Total	% (44)	% (63)	100% (107)

CROSS-TABULATIONS

Approve of Biden	Gender: Male	Gender: Female	Total
Approve	43.2% (19)	% (38)	% (57)
Do Not Approve	56.8% (25)	% (25)	% (50)
Total	100% (44)	% (63)	100% (107)

CROSS-TABULATIONS

Approve of Biden	Gender: Male	Gender: Female	Total
Approve	43.2% (19)	60.3% (38)	% (57)
Do Not Approve	56.8% (25)	39.7% (25)	% (50)
Total	100% (44)	100% (63)	100% (107)

CROSS-TABULATIONS

Approve of Biden	Gender: Male	Gender: Female	Total
Approve	43.2% (19)	60.3% (38)	53.2% (57)
Do Not Approve	56.8% (25)	39.7% (25)	46.7% (50)
Total	100% (44)	100% (63)	100% (107)

CROSS-TABULATIONS

Approve of Biden	Gender: Male	Gender: Female	Total
Approve	43.2% (19)	60.3% (38)	53.2% (57)
Do Not Approve	56.8% (25)	39.7% (25)	46.7% (50)
Total	100% (44)	100% (63)	100% (107)

% Men who approve

CROSS-TABULATIONS

Gender

Approve of Biden	Male	Female	Total
Approve	43.2% (19)	60.3% (38)	53.2% (57)
Do Not Approve	56.8% (25)	39.7% (25)	46.7% (50)
Total	100% (44)	100% (63)	100% (107)

% Women who approve

CROSS-TABULATIONS

Gender

Approve of Biden	Male	Female	Total
			% who approve
Approve	43.2% (19)	60.3% (38)	53.2% (57)
Do Not Approve	56.8% (25)	39.7% (25)	46.7% (50)
Total	100% (44)	100% (63)	100% (107)

TEMPLATE

Independent Variable

Dependent Variable	I V Value 1	I V Value 2	Total
D V Value 1	% In Column (# Cases)	% In Column (# Cases)	% Of Total (# In Row)
D V Value 2	% In Column (# Cases)	% In Column (# Cases)	% Of Total (# In Row)
Total	100% (# In Column)	100% (# In Column)	100% (# Total)

CROSS-TABULATIONS

Approve of Biden	Gender: Male	Gender: Female	Total
Approve	43.2% (19)	60.3% (38)	53.2% (57)
Do Not Approve	56.8% (25)	39.7% (25)	46.7% (50)
Total	100% (44)	100% (63)	100% (107)

COVARIATION

- Covariation between gender and approval: Proportion of women who approve is larger than proportion of men who approve

TERMINOLOGY

- Zero-order relationship: relationship between two variables, without controlling for any other factors
- Women are 17.1 percentage points more likely to approve of Biden than men (60.3% vs. 43.2%)

EXERCISE

- In fraternity/sorority
  - Approve: 25
  - Do not approve: 12
- Not in fraternity/sorority
  - Approve: 33
  - Do not approve: 38

- What is the zero-order relationship between being in a fraternity/sorority and Biden approval?

CROSS-TABULATIONS

Approve of Biden	Sorority/Fraternity: Member	Sorority/Fraternity: Not A Member	Total
Yes	67.6% (25)	46.5% (33)	53.7% (58)
No	32.4% (12)	53.5% (38)	46.3% (50)
Total	100% (37)	100% (71)	100% (108)

- Zero-order relationship: Greek members are 21.1 percentage points more likely to approve of Biden than non-members

BIVARIATE RELATIONSHIPS

Dependent Variable \ Independent Variable	Nominal/Ordinal	Interval
Nominal/Ordinal	Cross-Tabulation	?
Interval	?	?

BIVARIATE RELATIONSHIPS

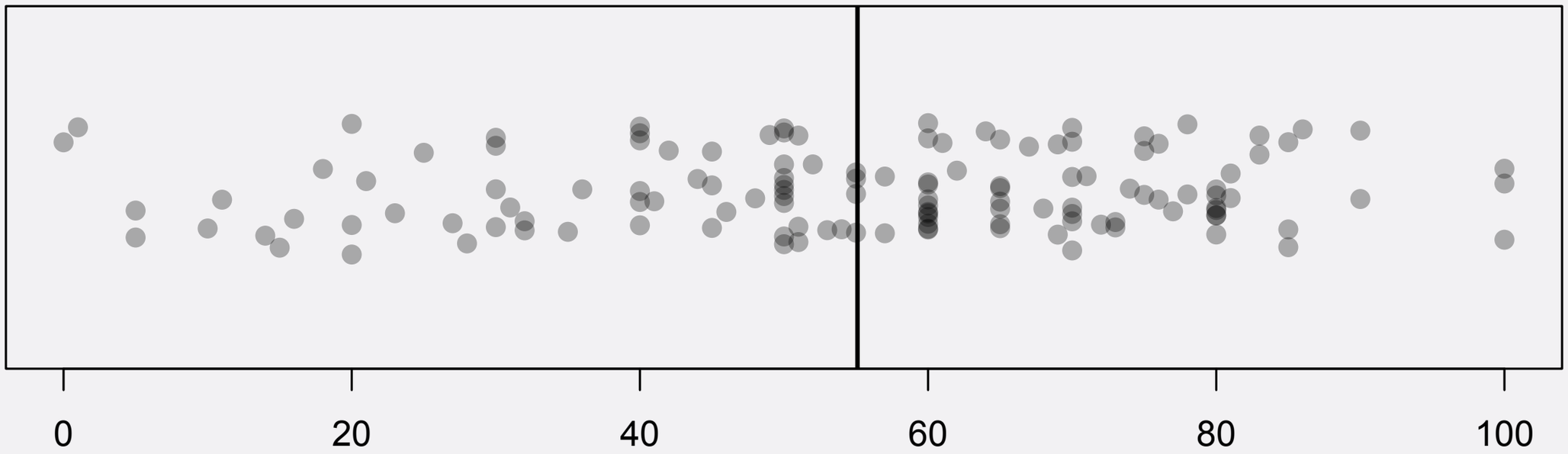
Dependent Variable	Independent Variable: Nominal/Ordinal	Independent Variable: Interval
Nominal/Ordinal	Cross-Tabulation	Not In This Class…
Interval	?	?

BIVARIATE RELATIONSHIPS

Dependent Variable	Independent Variable: Nominal/Ordinal	Independent Variable: Interval
Nominal/Ordinal	Cross-Tabulation	Not In This Class…
Interval	?	?

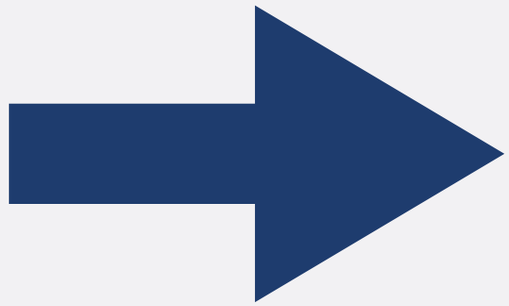
SURVEY

- Feelings towards the Democratic Party



BIVARIATE RELATIONSHIP

?



Feelings towards Democratic Party

- What explains variation in feelings towards the Democratic Party?

BIVARIATE RELATIONSHIP

Gender → Feelings towards Democratic Party

- If gender has an effect on feelings towards Democratic Party, what would we expect to see?
- How could we show it?

DEMOCRATIC PARTY

	Mean Thermometer Score	Frequency
Female	62.7	79
Male	43.9	50
Total	55.1	129

ZERO-ORDER RELATIONSHIP

	Mean Thermometer Score	Frequency
Female	62.7	79
Male	43.9	50
Total	55.1	129

18.8

ZERO-ORDER RELATIONSHIP

- There is covariation between gender and feelings towards Democratic Party
- Women's feelings towards the party are on average 18.8 points higher than men's

MEAN COMPARISON TABLE

	Average of DV	Frequency
IV Value 1	Mean of DV for IV Value 1	# Cases IV Value 1
IV Value 2	Mean of DV for IV Value 2	# Cases IV Value 2
Total	Mean of DV overall	# Cases overall

- DV: Dependent variable; IV: Independent variable

REPUBLICAN PARTY

	Mean Thermometer Score	Frequency
Female	31.0	79
Male	40.3	50
Total	34.7	129

-9.3

ZERO-ORDER RELATIONSHIP

- There is covariation between gender and feelings towards Republican Party
- Women's feelings towards the party are on average 9.3 points lower than men's

BIVARIATE RELATIONSHIPS

Dependent Variable	Independent Variable: Nominal/Ordinal	Independent Variable: Interval
Nominal/Ordinal	Cross-Tabulation	Not In This Class…
Interval	Mean Comparison	?