

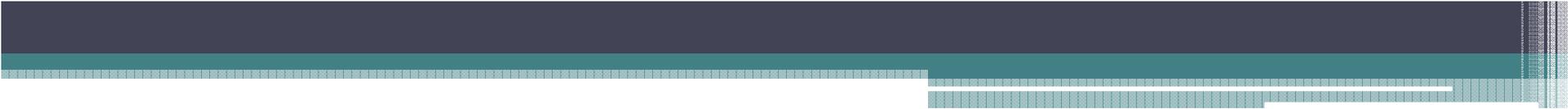
# Learning from Your Classmates: A Multi-Method Assessment of Classmate Peer Effects in First-Year Core Courses at Three Colleges

Jeffrey Parker, Reed College

Jon Rivenburg, Reed College

Jay Beaman, Lewis & Clark College

Neal Christopherson, Whitman College

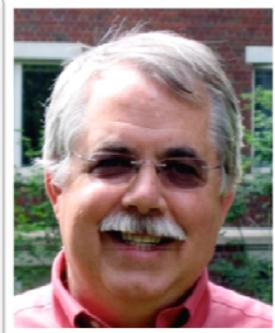


# Project Goal

- Learn whether and how classmate peers affect student learning in core humanities courses
  - What are the important individual attributes of beneficial peers?
  - What attributes of the classroom distribution of peer characteristics are associated with learning success?
  - Can peer effects guide admission decisions or section assignments to improve learning

# Project Design

- Statistical analysis
  - Do characteristics of the classroom distribution of measurable peer characteristics affect measurable learning outcomes?
    - Do classmates' higher average SAT scores improve a student's grades in other courses?
- Instructor interviews
  - What are instructors' perceptions of how classmates affect students' learning
    - Through individual behavior
    - Through collective group behavior



## Project Research Team

### **Reed College**

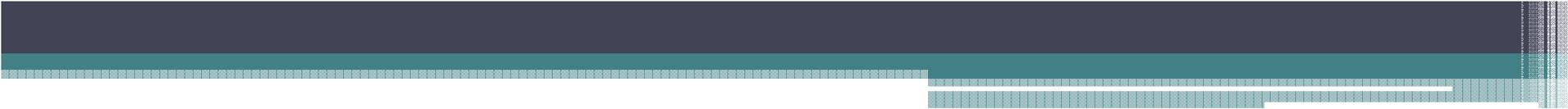
- Jeff Parker, Economics
- Jon Rivenburg, IR
- Nigel Nicholson, Core

### **Lewis & Clark College**

- James Grant, Economics
- Jay Beaman, IR
- Ben Westervelt, Core

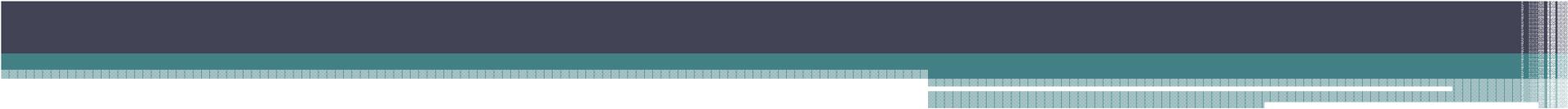
### **Whitman College**

- Jan Crouter, Economics
- Neal Christopherson, IR
- Ruth Russo, Core



# Core courses

- Required of all first-year students
- Mostly common syllabus across course sections
- Students are randomly or quasi-randomly assigned to course sections
- Course structure stable over many years
  - Humanities content
  - Discussion-based format
  - Emphasis on reading, writing, and intellectual discussion
  - Common pool of instructors over time



## Peer effects in core courses

- Strong because of interaction in discussion format
- Strong because first-year students are defining themselves as college students at this time
- Strong because reading, writing, and discussion skills are central to all college courses
- Strong because interdisciplinary course provides introduction to many humanities disciplines

# Statistical Evidence

Linking measurable outcomes to measurable peer characteristics

```
. reg ug GPA satm100 satv100 hsgpa hsp if humfresh==1 , robust
```

Linear regression

Number of obs	=	2627
F( 4, 2622)	=	98.68
Prob > F	=	0.0000
R-squared	=	0.1386
Root MSE	=	.56042

ug GPA	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
satm100	.0458213	.0162001	2.83	0.005	.0140549	.0775876
satv100	.1075896	.016606	6.48	0.000	.0750275	.1401518
hsgpa	.412315	.0462722	8.91	0.000	.3215812	.5030487
hsp	.4151115	.1224883	3.39	0.001	.1749281	.655295
_cons	.0506707	.1598826	0.32	0.751	-.2628381	.3641795

# What is measurable?

## Outcomes

- Grade-point average
  - Always exclude core-course GPA because of smart peers might drive up the curve
  - Undergraduate GPA
  - GPA in 1<sup>st</sup> and 1<sup>st</sup> & 2<sup>nd</sup> years
  - GPA in core-related courses
- Persistence

## Peer characteristics

- SAT scores
- High-school GPA
- High-school class rank
- Demographic characteristics

## Missing data problems...

- High-school variables
  - Missing at random
- L&C missing SAT scores
  - Not missing at random

# Does the core-course section matter?

- Yes.
- Regress GPA measures on dummy variables for core-course sections:

	Lewis & Clark	Reed	Whitman
Outcome (excluding core grades):	<i>p</i> value of ANOVA <i>F</i> test		
Cumulative GPA	0.001	<0.001	0.001
First-year GPA	<0.001	<0.001	0.016
1 <sup>st</sup> & 2 <sup>nd</sup> year GPA	<0.001	<0.001	0.002
Narrow core-related GPA	0.001	<0.001	0.003
Broad core-related GPA	0.003	<0.001	0.003

# Is this just an instructor or year effect?

- Probably not.
- Regress GPAs on section dummies with instructor & year dummies, and individual characteristics

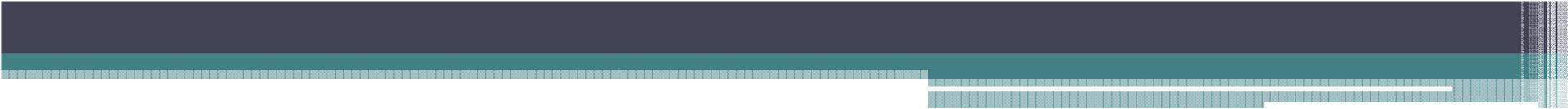
GPA measure (excluding core):	Lewis & Clark		Reed	Whitman
	SAT	No SAT	Full sample	Full sample
	<i>p</i> -value on <i>F</i> test for section dummies, controlling for instructor and individual student characteristics			
All courses	0.003	<0.001	0.052	0.51
First-year courses	0.017	<0.001	0.017	0.30
First- & second-year courses	0.002	<0.001	0.021	0.50
Narrow core-related courses	0.002	<0.001	<0.001	0.62
Broad core-related courses	0.005	<0.001	0.008	0.50

- *Something* about core section other than instructors affects non-core GPA

# Is the section effect due to measurable peer characteristics?

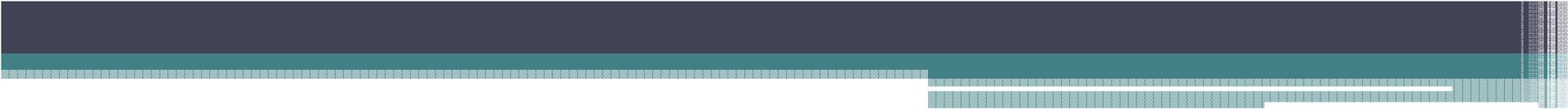
- Not that we can find

Dependent variable is GPA (excluding core) in	Coefficient (standard error) on peer-mean predicted GPA			
	Lewis & Clark		Reed	Whitman
	SAT	No SAT	Full sample	Full sample
All courses	-0.183 (0.119)	-0.144 (0.182)	0.119 (0.151)	-0.0445 (0.110)
First-year courses	-0.215 (0.148)	0.134 (0.231)	-0.0580 (0.174)	-0.0143 (0.129)
First- & second-year courses	-0.201 (0.127)	0.129 (0.196)	-0.0840 (0.161)	-0.0399 (0.113)
Narrow core-related courses	-0.142 (0.161)	0.221 (0.281)	-0.0043 (0.174)	-0.0582 (0.125)
Broad core-related courses	-0.165 (0.122)	0.113 (0.182)	0.0824 (0.161)	-0.0896 (0.112)



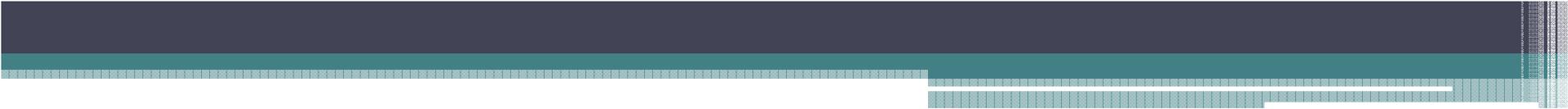
# Endless variations we tried

- Other characteristics of peer distribution
  - Median
  - Dispersion: standard deviation or interquartile range
  - Quantiles: % in each quartile of student distribution
- Other outcomes
  - Core-course grade (veteran instructors only)
  - Persistence to graduation
  - Academic actions



# Evidence from instructor interviews

Looking behind the numbers ...

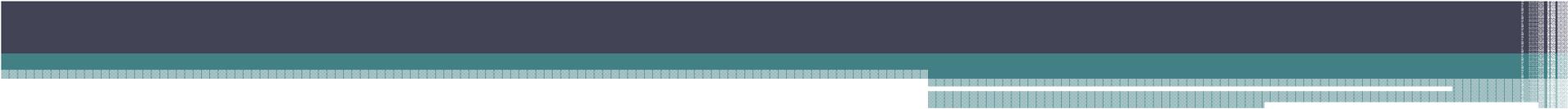


# Interview methodology

- 10 instructors from each college
  - Interviewed by Parker and the local core-course project team member
- One-hour conversations based on prepared set of prompting questions
  - Details are in the paper
- Results were analyzed by project team
  - May 2008 conference assembled team with many interviewees and other core-course instructors to discuss and (perhaps) validate team's tentative conclusions

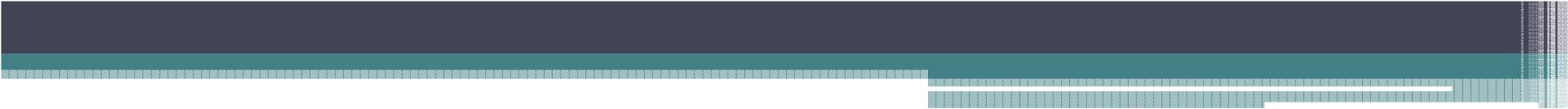
# Main result: Attitude over aptitude

- Within the population of students at these selective colleges ...
- Within the context of first-year, discussion-based core courses ...
- There was a strong consensus that positive or negative peer effects resulted:
  - Mostly from the peer's personality and attitude, and
  - Very little from the peer's academic aptitude.



# Beneficial peer behaviors

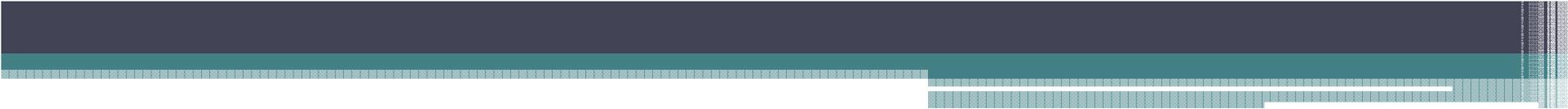
- Attendance and careful preparation for class
- Maturity, leadership, and concern for class
- General intellectual curiosity
- Respect for others' opinions
- Demonstrated enthusiasm for course and subject
- Openness to new ideas and approaches
- Cooperative rather than competitive attitude
- Willingness to speak in class
- Willingness to take chances



# Detrimental peer behaviors

- Dismissive or judgmental behavior
- Rigidity of views
- Rejection of peer learning altogether
- Excessive loquaciousness
- Active or ostentatious disengagement

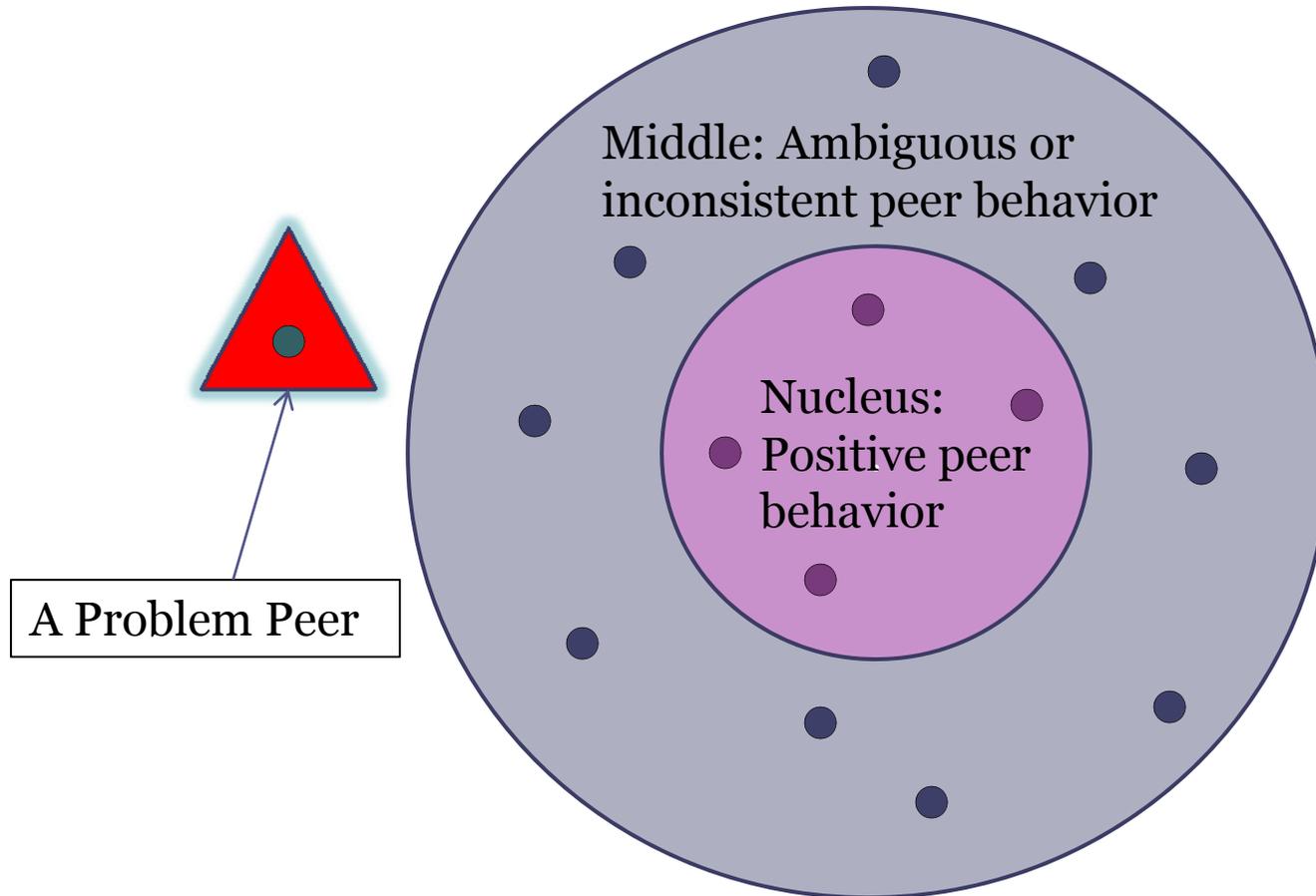
Quiet peers and nice peers: Not usually a problem



# Individual Peer Behavior and Classroom Peer Interaction

- What makes a successful class?
  - Obvious: More students with good peer behavior
  - But most classes have some “good peers,” some less effective peers, and perhaps one or two detrimental peers
- Is there a formula or model for combining individual peer characteristics into a measure of class effectiveness?

# A Simple Picture of Peer Distribution



# Key Question: How Much do Student Behaviors Change During Class?

- Is the class “personality” determined by students’ characteristics when they walk in the door?
  - Our preconception was to think of pre-existing student characteristics as “inputs”
- Does student behavior evolve in important ways during the semester?
  - Is this influenced by peers?
  - Can it be guided by instructors?

# Modeling Classes with Stable Student Behavior

## Critical-mass model

- Need a sufficient nucleus of students with good peer behavior to make the class successful (3-6 in class of 15-20)
- Can usually live with one disruptive peer
- The class will be successful if the nucleus is large enough to keep the discussion lively and if the negative peer(s) on the periphery are not too distracting

# Modeling Classes with Changing Student Behavior

## Gravitational-attraction model

- Students' behavior evolves through the course
- Good peers provide positive role models that others emulate
- Sufficient nucleus of good peers can pull most of the class toward the nucleus  $\Rightarrow$  outstanding class
- Detrimental peers can influence peers toward negative behavior and, in an extreme case, destroy class
- Instructor can influence peer behavior as well

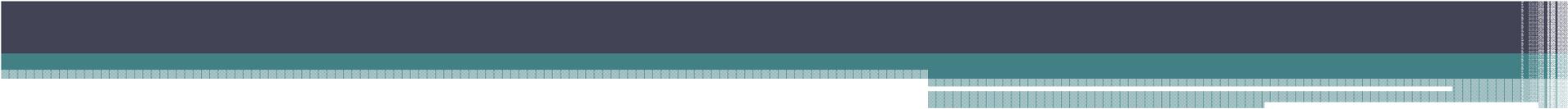
# Do We Want “All Good Peers” or Are There Desirable Differences?

## Role-playing model

- Some behaviors are universally desirable
  - Respect, maturity, enthusiasm, preparation, etc.
- For others, a mix may be best
  - Analogy to a basketball team needing players with different skills to play different positions
  - Need one or two “first-speakers,” some “responders,” some “skeptics,” some “translators,” etc.

# Conclusions

- Peer effects are very complex
- It may be impossible to measure peer effects statistically
  - We have certainly failed!
- Statistical work based on attitudes and personalities of peers may be more successful
  - Must generate the data for such analysis
  - Prototype surveys done at Reed in 2009-10 might be a basis for future study



Questions?