

9.00 Research Methods

Lecture 2

Prof. John Gabrieli

“Almost half of children of divorces enter adulthood as worried, under-achieving, self-deprecating, and sometimes angry young men and women”

Time, “The Lasting Wounds of Divorce”

Psychology & Science

- what is science
- what is an experiment
- very brief history of psychology experimentation
- some issue in experimentation
- some psychological topics

HOW DO YOU KNOW WHAT IS TRUE?

AUTHORITY (faith)

REPETITION (tenacity)

A PRIORI (reasonable)

SCIENTIFIC ANALYSIS

WHAT MAKES SOMETHING SCIENCE?

Scientific community says it is scientific

WHAT MAKES SOMETHING SCIENCE?

SCIENTIFIC METHOD

- Falsifiable
- Probabilities
- Explanatory
- Description
- Correlation
- Experimentation
- Null hypothesis
you disprove
ideas, not prove
ideas
- Filter model
frontier vs.
textbook

Three cartoons removed due to copyright restrictions.

1. Nick Downes. "He's consistently right in proving his experiments wrong"

2. Nick Downes. Teacher writing the steps of The Scientific Method on chalkboard for his students; step 5 is "Have a beer"

3. Wiley Miller / Non-Sequitur. "The Truth and the Rebuttal." Dec. 4, 2001. <http://www.gocomics.com/nonsequitur/2001/12/04>

WHAT MAKES SOMETHING AN EXPERIMENT?

dependent variable

what you measure - the outcome

independent variable

what you vary

Wilhelm Wundt (1832-1920)

- University of Leipzig
- First textbook in psychology
- First university-based laboratory in psychology
- Mental chronometry*

Press key to light	(0.20 sec)
Press one key if red, Other key if green	(0.29 sec)
Time to judge color	<hr/> (0.09 sec)

Edward Titchener (1867-1927)

- English/Oxford
- Ph.D. at Leipzig with Wundt
- New department of psychology at
Cornell
- Introspection* - look inward
- objectivity
- Private vs. public technique

John B. Watson (1878-1958)

-University of Chicago/Johns Hopkins

-“Mind” unobservable

-*Behaviorism*

Study behavior = observable actions, not
the mind

-Identifying environmental conditions

-No fundamental difference between animals and
humans

-Describe lawful relations between
environment-behavior reflexes

STIMULI ----- RESPONSES
(environment) (behavior)

Cognitive Revolution

- Mental (and later neural) representations of stimuli and responses

STIMULI → $\frac{\text{MIND}}{\text{BRAIN}}$ → Responses

Correlation vs. Causation

- only an experiment (independent variable) can define causation

Age of Parent & Risk for Disease in Child

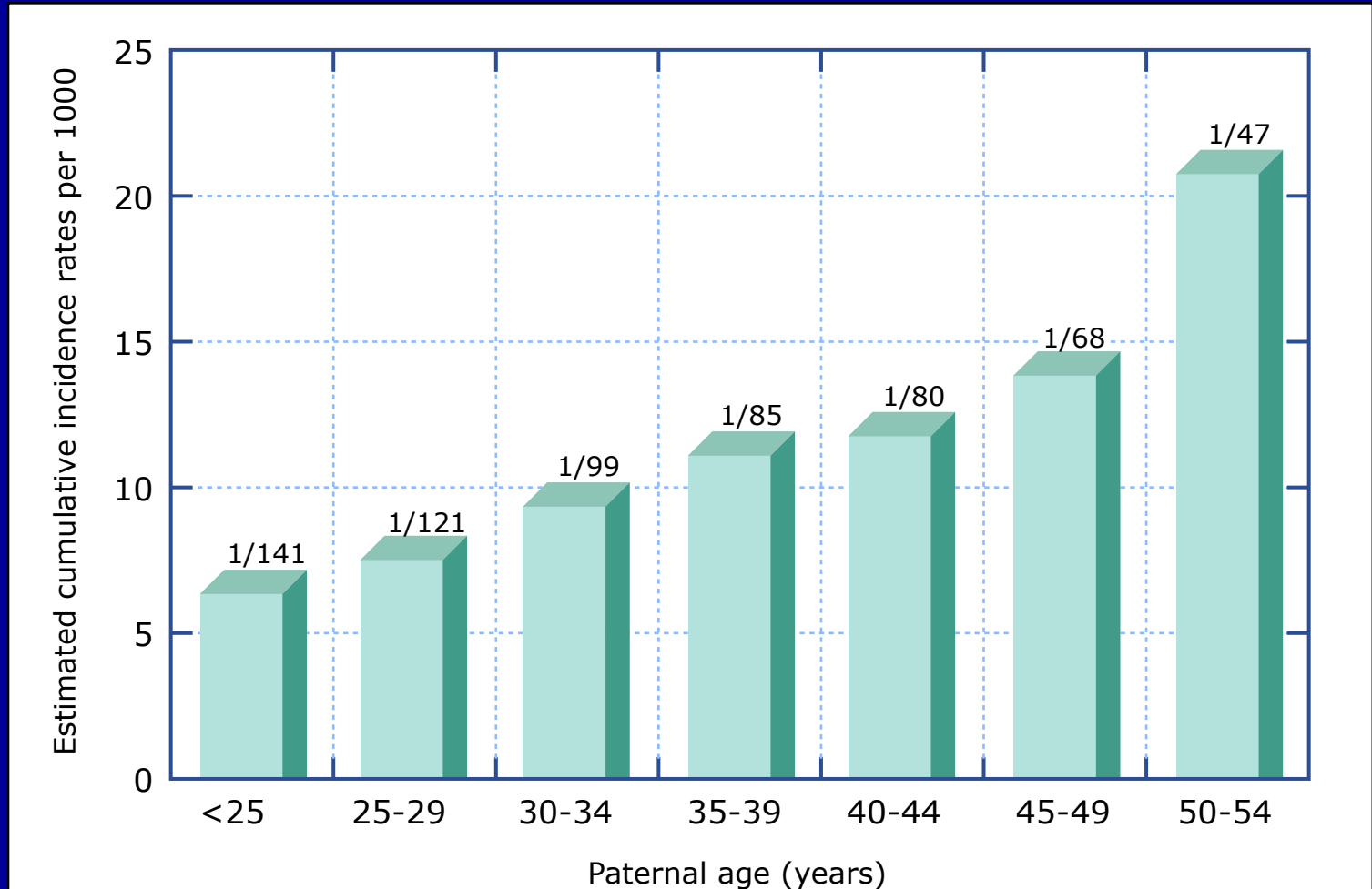
DOES AGE OF MOTHER INCREASE LIKLIHOOD OF DISEASE IN CHILDREN?

Down's Syndrome

Mother ages 20-24 - 1/1562
over 42 - 1/19

**DOES AGE OF FATHER
INCREASE LIKLIHOOD OF
DISEASE IN CHILDREN?**

Estimated cumulative incidence and percentage of offspring estimated to have an onset of schizophrenia by age 34 years, for categories of paternal age



Data from Malaspina, D., et al. "Advancing Paternal Age and the Risk of Schizophrenia." *Arch Gen Psychiatry* 58, no. 4 (2001): 361-7.

**DOES AGE OF FATHER
INCREASE LIKLIHOOD OF
DISEASE IN CHILDREN?**

aging sperm?

DOES AGE OF FATHER INCREASE LIKLIHOOD OF DISEASE IN CHILDREN?

aging sperm?

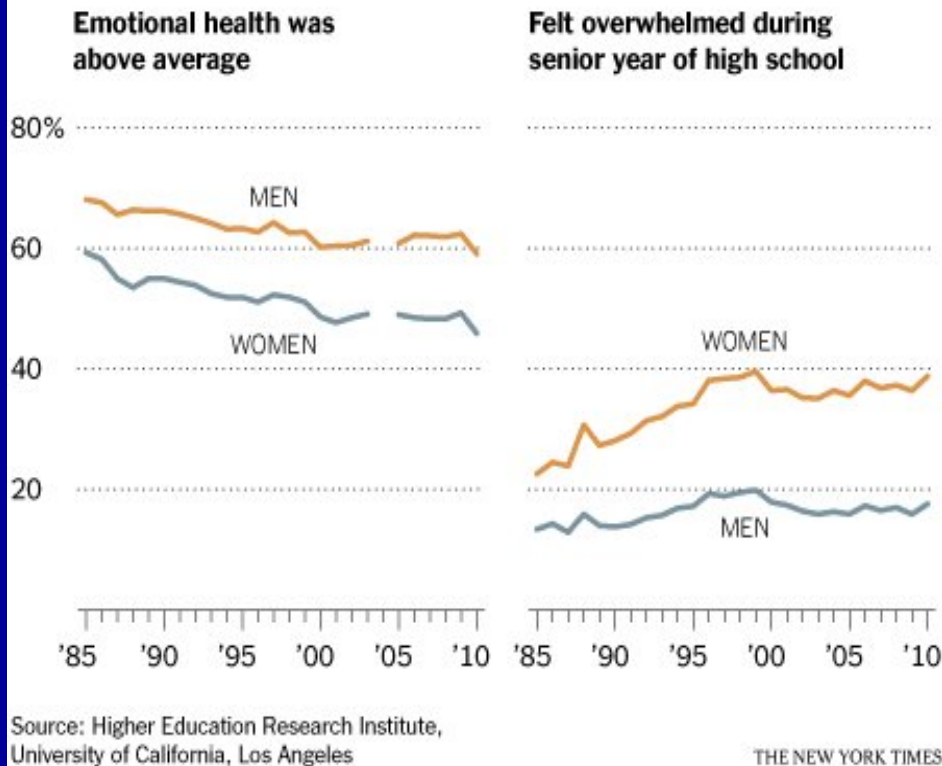
or who marries later in life?

**Your Level of Stress &
Empathy Relative to Prior
Years of College Students?**

Your Level of Stress

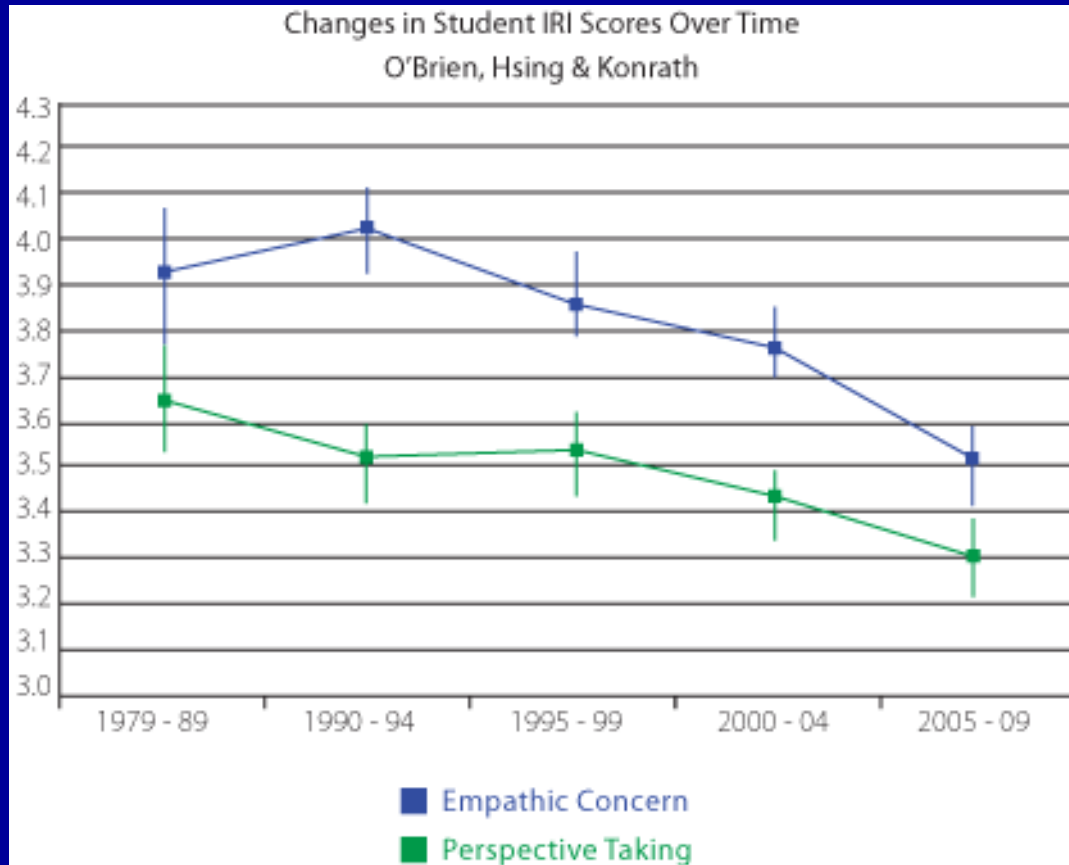
College Freshmen's Emotional Health

Freshmen's self-assessment of their emotional health hit a 25-year low this year, according to an annual report. A much larger share of students said they had felt frequently overwhelmed with all they had to do as high school seniors. Women were twice as stressed as men.



From Lewin, T. "Record Level of Stress Found in College Freshmen." *The New York Times*, January 26, 2011. © The New York Times Company. All rights reserved. This content is excluded from our Creative Commons license. For more information, see <http://ocw.mit.edu/fairuse>.

Your Level of Empathy



Graph provided by Education-Portal.com and original data modeled after "Changes in Dispositional Empathy Over Time in American College Students" by Sara Konrath, University of Michigan.

40% lower today than 20 years ago

The “broken window” theory

Political scientist James
Wilson & criminologist
George Kelling

Photo removed due to copyright restrictions.
New York City mayor Rudy Giuliani swearing in
new NYPD Commissioner Bill Bratton (1994).



Photo courtesy of [Grant MacDonald](#) on Flickr.

**Stop petty crime,
lower major crime
in NYC, major crime
went down**

Freakonomics

Levitt & Dubner

- **Abortion legalized in 1973 - women least able to parent kids (poor, unstable, addictions) had access to abortion - reduced number of males ages 16-24 in poor communities (much debated)**
- **Or reduction in crack epidemic?**
- **Or high rate of incarceration due to new drug laws?**

The “broken window” theory Experiment - Keizer et al., *Science*, 2008

When people observe that others violate a social norm or legitimate rule, are they more likely to violate other norms or rules, and thus disorder spreads?

Independent measure - environment

Dependent measure - number of people who violate

white flyers attached



Source: Keizer, K., S. Lindenberg, and L. Steg. "The Spreading of Disorder." *Science* 322, no. 5908: 1681-5.
© AAAS. All rights reserved. This content is excluded from our Creative Commons license. For more information, see <http://ocw.mit.edu/fairuse>.

white flyers attached

33% littered



69% littered



Source: Keizer, K., S. Lindenberg, and L. Steg. "The Spreading of Disorder." *Science* 322, no. 5908: 1681-5.
© AAAS. All rights reserved. This content is excluded from our Creative Commons license. For more information, see <http://ocw.mit.edu/fairuse>.

Experimental and control group

- 1970's - Clofibrate to lower mortality from coronary artery disease
- Those who took drug 80% or more had a 15% mortality rate within 5 years
- Those who took drug less than 80% had a 25% mortality rate within 5 years
- Same for placebo!!!
- Self-selection bias
- importance of *random assignment of subjects & control conditions*

Who Is in Your Experiment?

- **Random recruitment; random assignment of people to conditions; generalize from a small specific group to human population as a whole**

generalizable principles of human mind & behavior

Who Is in Your Experiment?

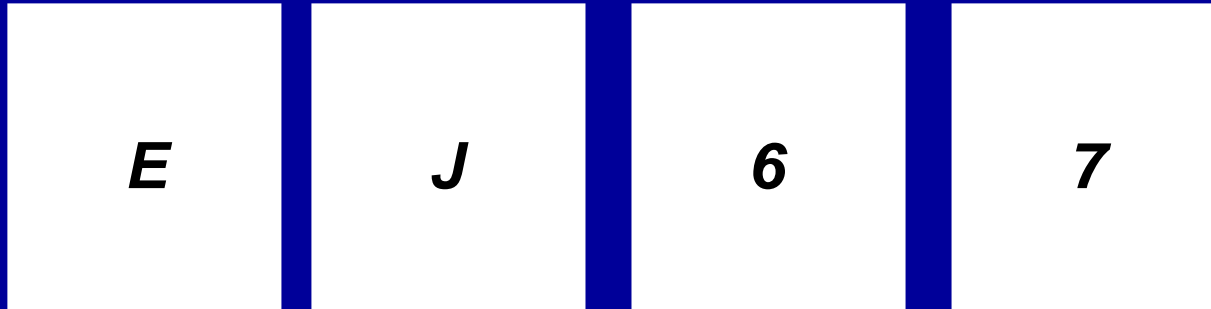
- Really random? Who volunteers?
- WEIRD research
Westernized, Educated,
Industrialized, Rich Democracies
- US college student 4000 times more likely research participant
generalizable principles of human mind & behavior?

Experimenter bias or demand characteristics

- **200 sheets of papers filled with random digits - add them pairwise - would take hours - did it for hours**
- **Or also pick up a card after each page that instructed them to tear the page into at least 32 places**

Experimenter Effects

- **Students told that rats were either “maze-bright” or maze-dull”**
- **Actually rats were just rats**
- **Students tested the rats on a maze**
- **“Maze-bright” rats performed significantly better than “maze-dull” rats!**



Each card has a letter on one side, and a number on the other side.

If a card has a vowel on one side, then it has an even number on the other side.

Correct answer - E & 7 (10%)

Common answers - E, E & 6

Confirmation bias

We look for evidence that confirms what we believe, and overlook evidence that could disconfirm what we believe.

E - see an even number - confirm

6 - not even needed, but feels like it confirms

7 - would disconfirm - if there is a vowel on the other side

LITTLE THINGS CAN INFLUENCE BEHAVIOR

- Williams & Bargh, *Science*, 2008
- “warm” and “cold” people - strongly influences how we see other people – *embodied cognition*

LITTLE THINGS CAN INFLUENCE BEHAVIOR

- **two temperature conditions**
 - meet subject in lobby, carry cup of coffee (hot/cold), clipboard, 2 textbooks, please hold cup while I write down your name (on elevator)**

LITTLE THINGS CAN INFLUENCE BEHAVIOR

- read a description of a person -
“warm condition”
rated person as “warmer”

possible confound?

(correlates with independent
variable)

LITTLE THINGS CAN INFLUENCE BEHAVIOR

- read a description of a person -
“warm condition”
rated person as “warmer”

possible confound?

experimenter knowledge/bias

LITTLE THINGS CAN INFLUENCE BEHAVIOR

**hot/icy therapeutic pad - experimenter
blind - rate pad - product evaluation**

**choose either Snapple beverage or 1\$
gift certificate for ice-cream store for
either YOU or A FRIEND**

**Cold pad - 75% for themselves (25%
friend)**

**Warm pad - 46% for themselves (54%
for friend)**

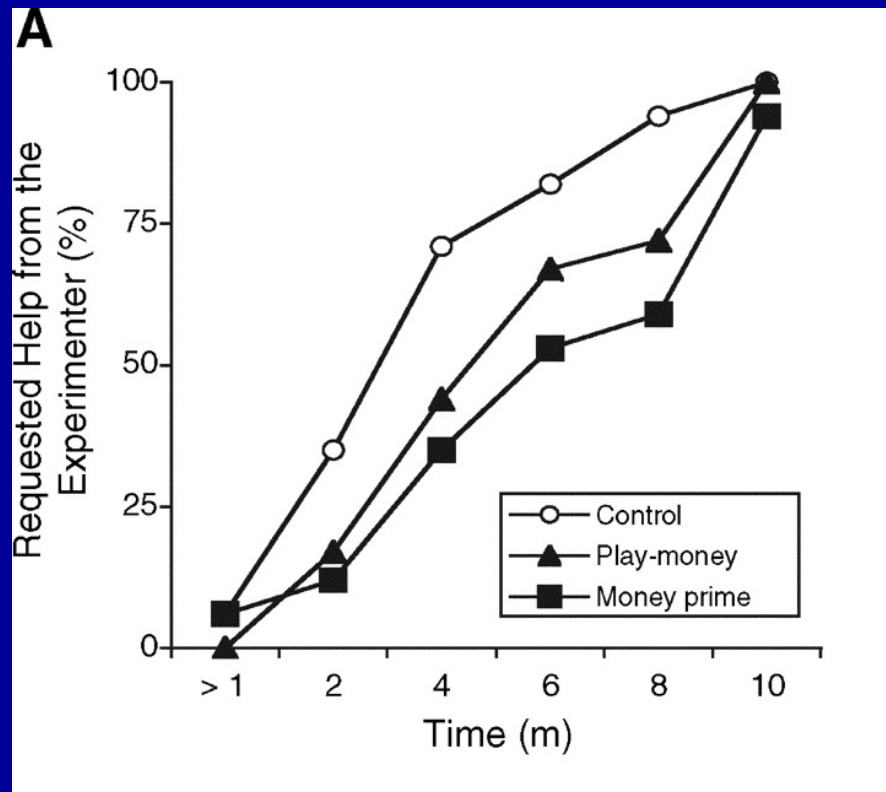
LITTLE THINGS CAN INFLUENCE BEHAVIOR

- \$\$\$\$\$ - money

LITTLE THINGS CAN INFLUENCE BEHAVIOR

- Vohs et al., 2006, *Science*
- thinking about money influences motivation & behavior towards others
- Exp 1 – descrambling task
 - (neutral) *cold it desk outside is* OR
 - (money) *high a salary desk paying* OR
 - (neutral +\$) – stack of Monopoly \$\$ in corner
- Hard task – 12 disks into square with 5 per side; experimenter offers help, leaves room; time to ask for help

Percentage of participants who asked for help as a function of money prime and length of time that had elapsed while working on a difficult task (from Experiment 1) or (B)



Source: Vohs, K. D., et al. "The Psychological Consequences of Money." *Science* 314, no. 2206: 1154-6. © AAAS. All rights reserved. This content is excluded from our Creative Commons license. For more information, see <http://ocw.mit.edu/fairuse>.

LITTLE THINGS CAN INFLUENCE BEHAVIOR

- Vohs et al., 2006, *Science*
- thinking about money influences motivation & behavior towards others
- thinking about money makes people more self-sufficient (reduced requests for help) & reduced helpfulness toward others (help experimenter code data sheets 42 min after neutral vs. 25 min in \$\$\$ conditions)

LITTLE THINGS CAN INFLUENCE BEHAVIOR

- dating between men and women
- who is more selective in their dating choices?
- evolutionary psychology perspective
(investment in offspring)
- but how could we know who is more selective?

LITTLE THINGS CAN INFLUENCE BEHAVIOR

- dating between men and women
- who is more selective in their dating choices?
- evolutionary psychology perspective
(investment in offspring)
- but how could we know who is more selective?
 - *on-line dating*
 - *speed dating*

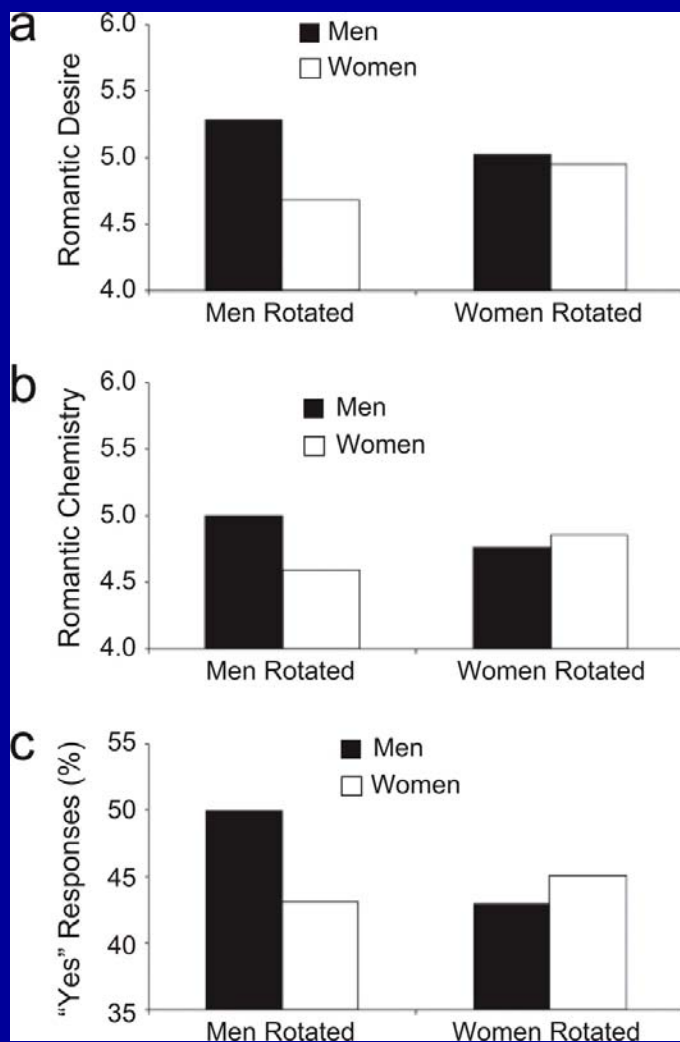
LITTLE THINGS CAN INFLUENCE BEHAVIOR

- dating between men and women
- who is more selective in their dating choices?
- but how could we know who is more selective?
 - *on-line dating*; men 1.5x more likely to send email offering date
 - *speed dating*; 4 min; yes/no match cards; men make more yes responses

LITTLE THINGS CAN INFLUENCE BEHAVIOR

- dating between men and women
- - *speed dating*; 4 min; yes/no match cards; men make more yes responses
- men rotate from table to table of women
- is it man/woman or approach/receive?

Men's and women's (a) romantic desire for their speed-dating partners, (b) romantic chemistry with their partners, and (c) percentage of “yes” responses to their partners as a function of which sex rotated



Source: Finkel, E. J., and P. W. Eastwick. "Arbitrary Social Norms Influence Sex Differences in Romantic Selectivity." *Psychological Science* 20 (2009):1290-5. © Association for Psychological Science. All rights reserved. This content is excluded from our Creative Commons license. For more information, see <http://ocw.mit.edu/fairuse>.

Group Effects

- **Group Effects**

sex, age, culture, genes

are these independent variables?

Individual Differences

- many studies also examine individual differences among people

Folk Psychology & Scientific Psychology

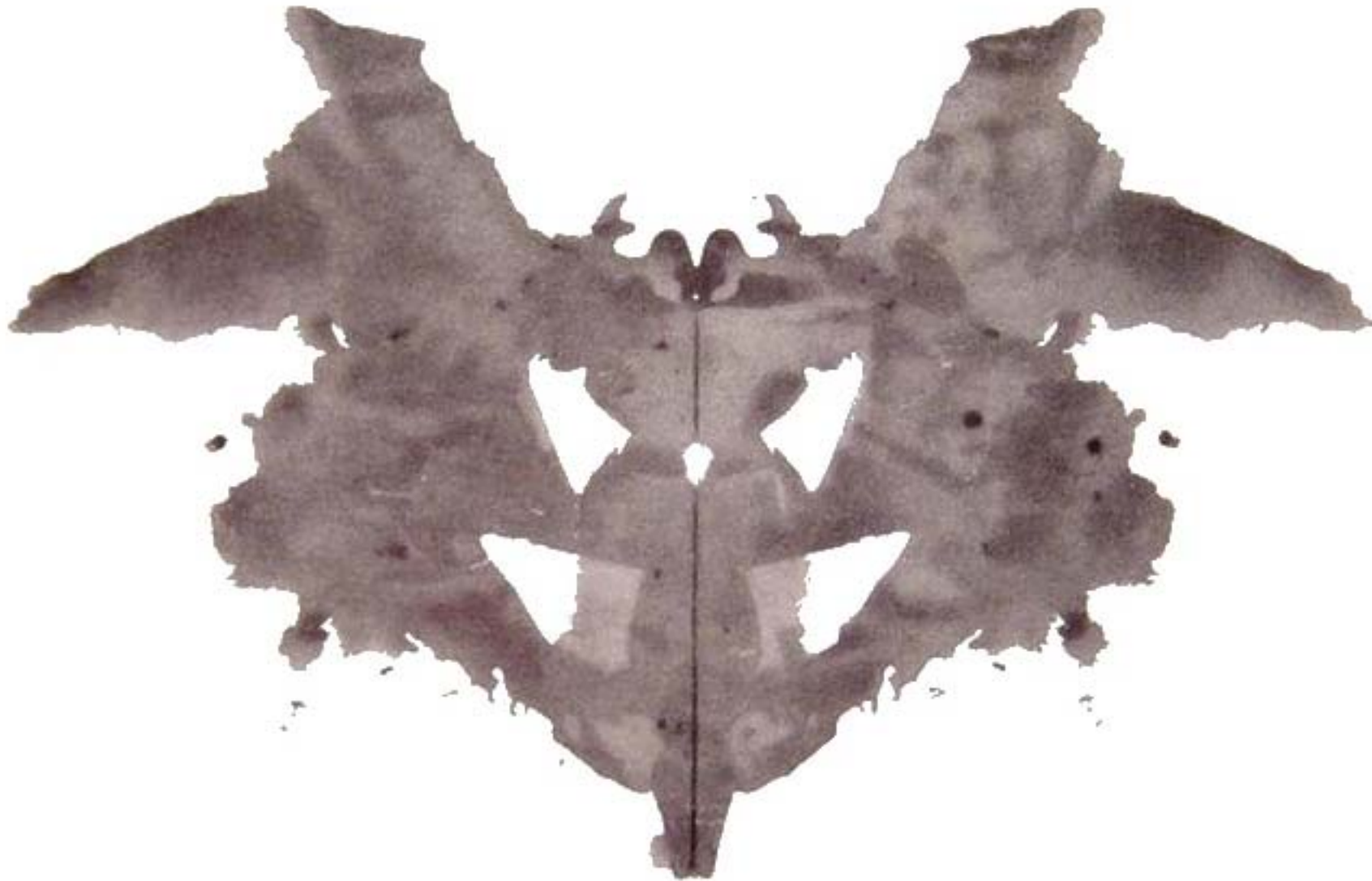
- *everybody* has ideas about how they think and behave and how other people think and behave
- *scientific psychology* sometimes supports and sometimes contradicts these ideas

Ideas About People & Psychology

1. <i>Opposites attract, on average</i>	Yes	No
2. <i>Familiarity breeds contempt, on average</i>	Yes	No
3. <i>The more people present at an emergency, the more likely that someone will intervene</i>	Yes	No
4. <i>There are visual learners and there are verbal learners</i>	Yes	No
5. <i>Hypnosis is baloney</i>	Yes	No
6. <i>Subliminal advertising works</i>	Yes	No
7. <i>Playing Mozart's music to infants boosts their intelligence</i>	Yes	No
8. <i>Old age, on average, is associated with dissatisfaction</i>	Yes	No
9. <i>If you are unsure of your answer when taking a test, it's best to stick with your initial hunch</i>	Yes	No
10. <i>Ulcers are caused primarily by stress</i>	Yes	No
11. <i>A positive attitude can stave off cancer</i>	Yes	No
12. <i>Raising children similarly leads to similarities in their adult personalities</i>		
13. <i>Low-self esteem is a major cause of psychological problems</i>	Yes	No
14. <i>People's responses in the Inkblots Test tells us a great deal about their personalities</i>	Yes	No
15. <i>Interviews help identify those most likely to succeed in medical school</i>	Yes	No

Ideas About People & Psychology

1. *Opposites attract, on average* No
2. *Familiarity breeds contempt, on average* No
3. *The more people present at an emergency,
the more likely that someone will intervene* No
4. *There are visual learners and there are verbal learners* No
5. *Hypnosis is baloney* No
6. *Subliminal advertising works* No
7. *Playing Mozart's music to infants boosts their intelligence* No
8. *Old age, on average, is associated with dissatisfaction* No
9. *If you are unsure of your answer when taking a test,
it's best to stick with your initial hunch* No
10. *Ulcers are caused primarily by stress* No
11. *A positive attitude can stave off cancer* No
12. *Raising children similarly leads to similarities
in their adult personalities* No
13. *Low-self esteem is a major cause of
psychological problems* No
14. *People's responses in the Inkblots Test tells us a
great deal about their personalities* No
15. *Interviews help identify those most likely to succeed
in medical school* No



Public domain image.

An inkblot used in the Rorschach test

Projective Tests

Rorschach inkblots (10)

Location

Determinants (form, color)

Content

Thematic Apperception Test (TAT)

Validity? After 10,000 papers, no

Medical School Interviews

Yale

- Compare students who were accepted or rejected on the basis of an interview but went elsewhere to the same schools (why same schools?)
- No difference

Medical School Interviews

April, 1979

- **University of Texas at Houston enlarged from 150 to 200 students**
- **150 selected by looking at 2200 applications, picking 800**
- **800 invited for interviews**
- **All 150 who came were among top 350 choices**
- **50 students came from last 700-800 - how did they do?**
- **No differences in performance at all**

SELF ESTEEM

- high self-esteem sounds good to everybody
- higher self-esteem is correlated with (a) initiative & persistence & (b) happiness & emotional resilience & (c) narcissism & bullying
- Baumeister et al., 2003 – reviewed 15,000 studies – no evidence to support view that self-esteem is causal (higher self-esteem may be a product rather than a cause of positive things)

How Praise May Harm

How Praise May Harm

- Carol Dweck - 5th graders
- perform a hard task - correct & incorrect examples
 - praise for intelligence
 - praise for hard work
 - no praise (control)
- perform a harder task

How Praise May Harm

- Carol Dweck - 5th graders
- performance on 2nd task
 - praise for intelligence
performance declined
 - praise for hard work
performance improved
 - control/no praise
performance did not change

How Praise May Harm

praise for intelligence (vs. effort)

- worse performance
- care more about performance than about learning
- less task persistence
- less task enjoyment
- more low-ability attributions
- trait (fixed) vs. effort (growth)

Psychology & Science

- what is science
- what is an experiment
- very brief history of psychology experimentation
- some issue in experimentation
- some psychological topics

MIT OpenCourseWare
<http://ocw.mit.edu>

9.00SC Introduction to Psychology
Fall 2011

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.