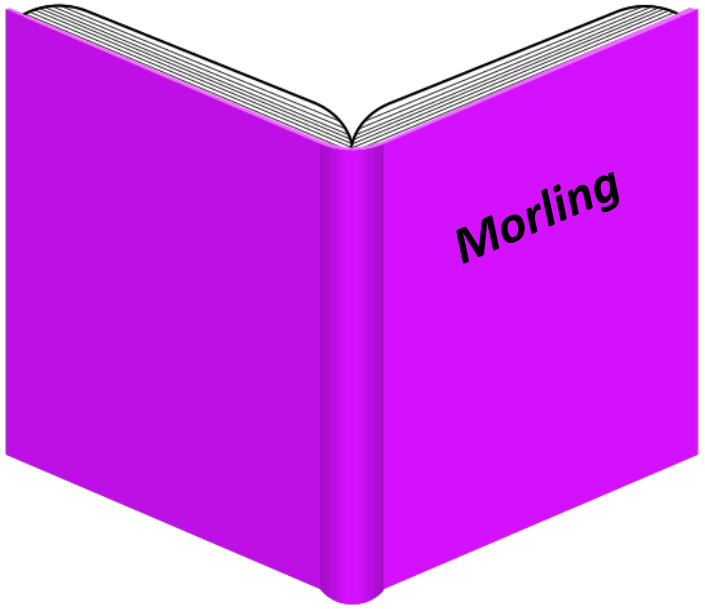


Research Methods and Statistics

Lecture 7: Frequency and association claims

Riet van Bork

Pictures source: pixabay.org

Exam

Sam is filling out a self-report questionnaire that is supposed to measure his interest in art. One of the questions asks whether he often visits a museum. Because Sam happened to have visited a museum that week, he overestimates how often he usually goes. This example illustrates:

a) The recency illusion
b) The present/present bias
c) The availability heuristic

While the correct answer was C (see Lecture 1 and Ch.2 p.33), it turns out that 'recency bias' is another term used for the availability heuristic. We therefore decided to also count answer A correct.

At what place is one more attracted to their date?

a) A high anxiety invoking place

b) A low anxiety invoking place

Picutres: pixabay.com

Misattribution theory describes the cognitive process of mistakenly identifying the source of a feeling, memory, or behavior, often leading to an inaccurate understanding of one's emotions or experiences. For example, you might misattribute feelings of arousal (adrenaline, increased heartbeat) that you get from an exciting rollercoaster to your date.

Journal of Personality and Social Psychology
1974, Vol. 30, No. 4, 510–517

SOME EVIDENCE FOR HEIGHTENED SEXUAL ATTRACTION UNDER CONDITIONS OF HIGH ANXIETY[1]

DONALD G. DUTTON[2] AND ARTHUR P. ARON

University of British Columbia, Vancouver, Canada

Male passersby were contacted either on a fear-arousing suspension bridge or a non-fear-arousing bridge by an attractive female interviewer who asked them to fill out questionnaires containing Thematic Apperception Test pictures. Sexual content of stories written by subjects on the fear-arousing bridge and tendency of these subjects to attempt postexperimental contact with the interviewer were both significantly greater. No significant differences between bridges were obtained on either measure for subjects contacted by a male interviewer. A third study manipulated anticipated shock to male subjects and an attractive female confederate independently. Anticipation of own shock but not anticipation of shock to confederate increased sexual imagery scores on the Thematic Apperception Test and attraction to the confederate. Some theoretical implications of these findings are discussed.

Cited 1603 times

There is a substantial body of indirect evidence suggesting that sexual attractions occur with increased frequency during states of

to Thematic Apperception Test (TAT)-like stimuli. Similar results were obtained in two further studies (Barclay, 1969, 1970) in

Association claim:
Higher sexual attraction in conditions with higher anxiety

Today

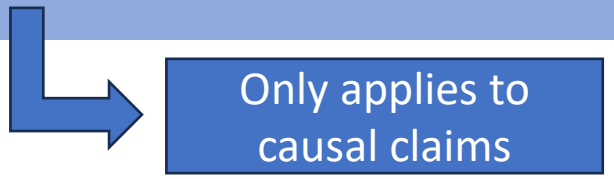
1) **The four big validities**

2) Frequency and association claims: Overview and challenges

The four big validities

You can judge the quality of a study using the four big validities:

1) *Statistical validity*: how well is the statistical effect backed up by data?
2) *Construct validity*: does the effect reflect an effect between the underlying constructs? That is, how well are the constructs measured or manipulated?
3) *External validity*: can we generalize the effect?
4) *Internal validity*: are there alternative explanations for the effect?



Dutton and Aron, 1974

High bridge

Low bridge

Picutres: pixabay.com

Thematic apperception test

Stories were later scored for manifest sexual content according to a slightly modified version of the procedure employed by Barclay and Haber (1965). Scores ranged from 1 (no sexual content) to 5 (high sexual content) according to the most sexual reference in the story. Thus, for example, a story with any mention of sexual intercourse received 5 points; but if the most sexual reference was "girl friend," it received a score of 2; "kiss" counted 3; and "lover," 4.

codebook

Number of phone calls

Picture Source: https://www.skepticink.com/gps/2012/12/20/the-thematic-apperception-test-science-or-pseudoscience/
Text from: Dutton and Aron (1974)

Picutres: pixabay.com

The four big validities

You can judge the quality of a study using the four big validities:

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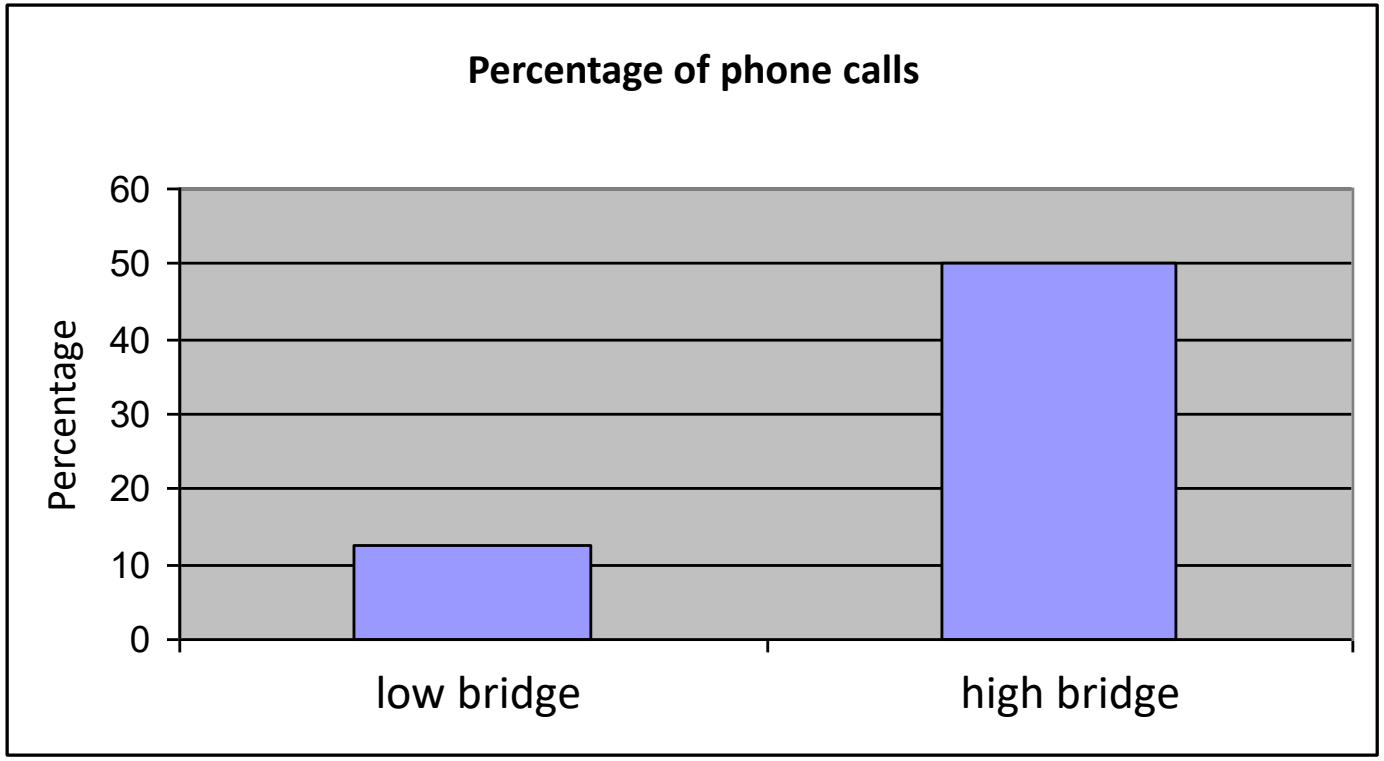
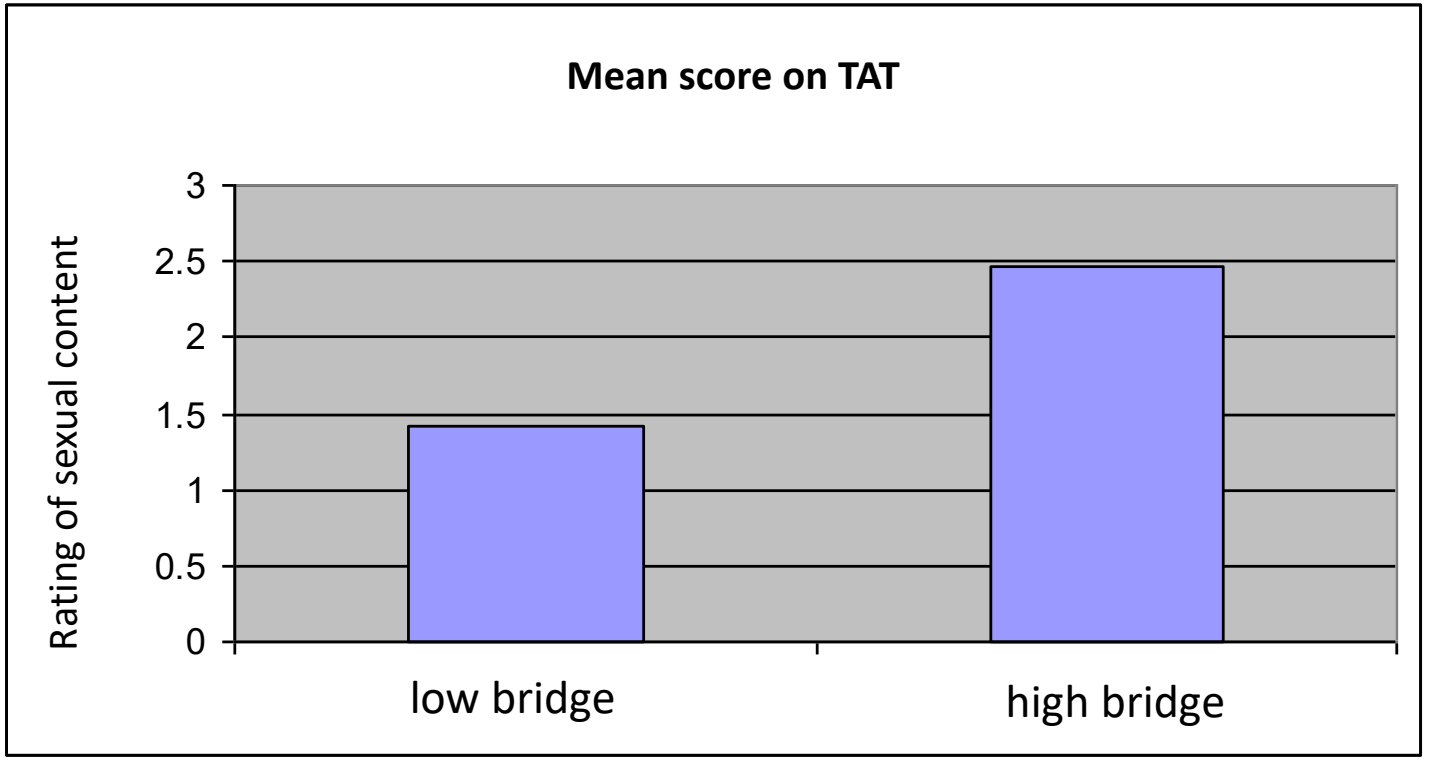
4) *Internal validity*: are there alternative explanations for the effect?

1) Statistical validity



1) Statistical validity



The four big validities

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2) Construct validity

Association claim:
Higher sexual attraction in conditions with higher anxiety

What are the constructs/conceptual variables?

- Sexual attraction
- Anxiety

How are they operationalized?

- Thematic Apperception Test & number of phone calls
- High vs Low bridge

2) Construct validity

- Covered in lecture 2 and Chapter 5
- Does the measure truly measure the underlying construct?
  - Does the TAT measure attraction?
  - Does the number of phone calls indicate attraction?

Thematic apperception test

Number of phone calls

Picture Source: https://www.skepticink.com/gps/2012/12/20/the-thematic-apperception-test-science-or-pseudoscience/

Picutres: pixabay.com

2) Construct validity

- And, is anxiety operationalized well?
- Maybe the bridge does not induce anxiety
- Or the bridge also induces other differences
  - E.g., ‘joy’, ‘excitement’

In response to the question “How fearful were you while crossing the bridge?” experimental-bridge males gave a rating of 65 and control-bridge males a rating of 3 ($t = 10.6$, $p < .001$, $df = 28$, two-tailed). Hence, it can be concluded that most people are quite anxious on the experimental bridge but not on the control bridge.

High bridge

Low bridge

Picutres: pixabay.com

The four big validities

You can judge the quality of a study using the four big validities:

1) *Statistical validity*: how well is the statistical effect backed up by data?
2) *Construct validity*: does the effect reflect an effect between the underlying constructs? That is, how well are the constructs measured or manipulated?
3) *External validity*: can we generalize the effect?
4) *Internal validity*: are there alternative explanations for the effect?

3) External validity

- Is the sample representative for the population?

- Does the effect hold in other populations?

- Does the effect hold with other operationalizations?

  E.g., Dutton and Aron (1974) replicated the study in a laboratory setting
  - Half the participants were assigned to high electric shock condition
  - Half the participants were assigned to low electric shock condition

  →In the high condition, participants rated female confederate more attractive

The four big validities

You can judge the quality of a study using the four big validities:

1) *Statistical validity*: how well is the statistical effect backed up by data?
2) *Construct validity*: does the effect reflect an effect between the underlying constructs? That is, how well are the constructs measured or manipulated?
3) *External validity*: can we generalize the effect?
4) *Internal validity*: are there alternative explanations for the effect?

4) Internal validity

Internal validity: are there alternative explanations for the association?

For a purely associational claim (non-causal) you do not need internal validity, because you are not commiting to any explanation.

But, often some explanation is suggested..

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1974, Vol. 30, No. 4, 510–517

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Requires internal validity!!

Association claim:
'Higher sexual attraction in conditions with higher anxiety'

Suggested explanation (causal claim):
'Increased anxiety causes people to experience more attraction'
(theory: misattribution of arousal)

At what place is one more attracted to their date?

a) A high anxiety invoking place

b) A low anxiety invoking place

Picutres: pixabay.com

Causal conclusions

Three criteria for causation:

1) Covariance of cause an effect: There is an association.
2) Temporal precedence: The cause comes before the effect in time.
3) Internal validity: There should not be plausible alternative explanations for the association.

When you already have 2 of the criteria, it is tempting to think that there is a causal relation… but you also need to establish internal validity!

Association?

Drop in column of mercury in barometer

Storm

Association: Yes!

Drop in column of mercury in barometer

Storm

Temporal precedence?

Drop in column of mercury in barometer

Storm

Temporal precedence: yes!

First:
Drop in column of mercury in barometer

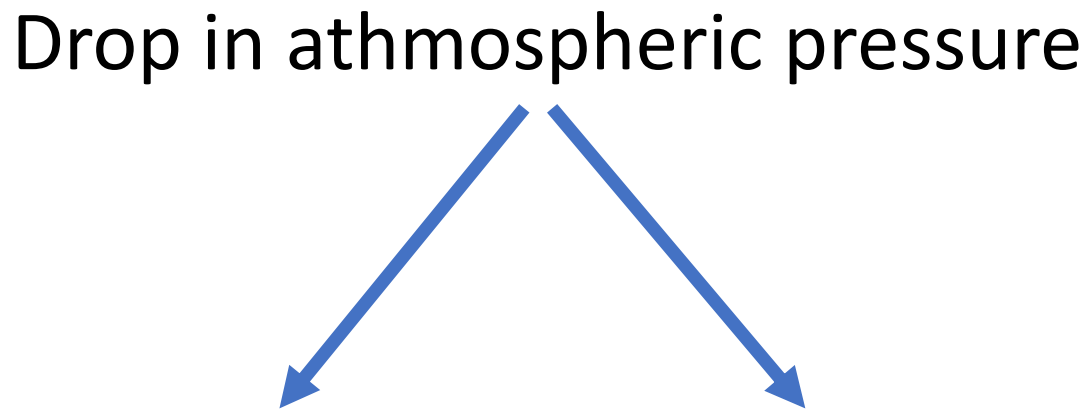
Later:
Storm

Absence of third variable?

Drop in column of mercury in barometer

Storm

Absence of third variable: no..



Drop in column of mercury in barometer

Storm

There is an association between drops in column of mercury and storm, but no causal relation

4) Internal validity

Internal validity: are there alternative explanations for the association?

When there is another variable that explains the association this is called the *third-variable* problem

Remember from lecture 1: what is the confounder/third variable explaining the association between:

- Number of fire stations and number of babies born in different cities
  -> ‘city size’ explains the association
- Number of ice cream sales and number of drownings
  -> ‘weather’ explains the association

4) Internal validity

Sensation seeking personality

Low bridge

High bridge

Picutres: pixabay.com

4) Internal validity

Locals vs tourists

Low bridge

High bridge

Picutres: pixabay.com

4) Internal validity

High bridge	Low bridge
• High anxiety	• Low anxiety
• Sensation seekers	• The scared
• Tourists	• Locals
• Nice view	• Neutral view
• Etc.	• Etc.

Any of these differences that are associated with the outcomes (number of phone calls & TAT) are 'third variables'. Third variables are associated with both variables involved in the statistical effect.

Internal validity and construct validity

- In some cases a threat to construct validity is also a threat to internal validity and vice versa
  - E.g., the operationalization of anxiety measures excitement (construct validity), and excitement is not only related to the bridges but also to the probability that the person calls back (internal validity)
- But you can also have one without the other
  - E.g., the operationalization of anxiety measures excitement (threat to construct validity), but excitement is not related to any of the sexual arousal measures (no threat to internal validity)
  - Or, if the claim is not a causal claim then you can still have a threat to construct validity but it will not be a threat to internal validity

Today

1) The four big validities

2) Frequency and association claims: Overview and challenges

Different kinds of research

- Surveys / interview research
  - Send out questionnaires, conduct interviews
- Observational research
  - Observe behavior that you are interested in
- Correlational research
  - Study the association between (at least) two variables
- Experimental research
  - Manipulate the cause and study the effect

Three types of research claims

1) Frequency claims → Surveys & Observational research

e.g. 3.2% of Dutch adults are diagnosed with ADHD

2) Association claims → Correlational research

e.g. Children who are bullied experience more anxiety

3) Causal claims → Experimental research

e.g. stress causes poorer short term memory recall
(many different words that express a causal relation: 'affects', 'leads to', 'changes', 'makes', 'prevents', etc..)

To describe a single variable

To describe relation between multiple variables

(each variable can be based on surveys and observation)

Different kinds of research

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Lecture 8 on Thursday

Surveys.. Some examples

- **Vouchercloud.net survey**
  - 11% believes that HTML is a sexually transmitted disease
  - 27% believes gigabyte is an insect commonly found in South Africa
  - 23% thought an MP3 was a Star Wars robot
  - 18% believes Blue-ray is a marine animal
- **2012 Wakefield Research, 1000 subjects**
  - 51% thinks stormy weather might affect computer files in the Cloud.
- **2012 National Science Foundation survey, 2200 USA people**
  - 26% thinks the sun moves around the earth
- **Georgia Regents University and Cape Fear Community College.**
  - 40% of people would save their dog over a foreign tourist

Challenges: Biased samples (external validity)

See book

- Probability sampling:
  - Simple random sample
    - Everybody in population same probability of being selected
  - Cluster sampling
    - Sample random schools, use all children in each school
  - Multistage sampling
    - Sample random school, and sample random from each school
  - Stratified random sampling
    - e.g., in population blood type 0+: 40%, 0-: 8%, A+: 35%, A-: 7% etc. Sample according to these percentages
  - Oversampling
    - e.g., blood type AB- only 0.5% of population. Sample extra AB- people to prevent unreliability
  - Systematic sampling
    - E.g., each fifth person in a class

- Non-probability sampling:
  - Convenience sampling → Used a lot in psychology
    - A sample that is easily accessible, e.g., first year students
  - Purposive sampling
    - Search for participants that meet specific requirements
  - Snowball sampling
    - Start with a couple of subjects (e.g., diagnosed with autism), and ask these subjects whether they know more subjects
  - Quota sampling
    - Set a quota (e.g., 50 psychology students, 50 law students, 50 communication students), and select nonrandomly up until quota's are filled

Biased samples and external validity

- Frequency claims
  - External validity of key importance
    - Claims are useless when based on biased samples
      - E.g. “In the Netherlands, 1 in 5 secondary school students abuse alcohol”
      - E.g., all survey results on the previous slide

- Association and causal claims
  - Unbiased samples not of key importance, often generalizability is left to next studies
    - Causal claim can be a “proof of principle” (e.g., effect of stress on short term memory)
    - Also associations can be interesting even in a biased sample
      - E.g., (negative) correlation between neuroticism and social well-being
  - You can do replication studies to study generalizability

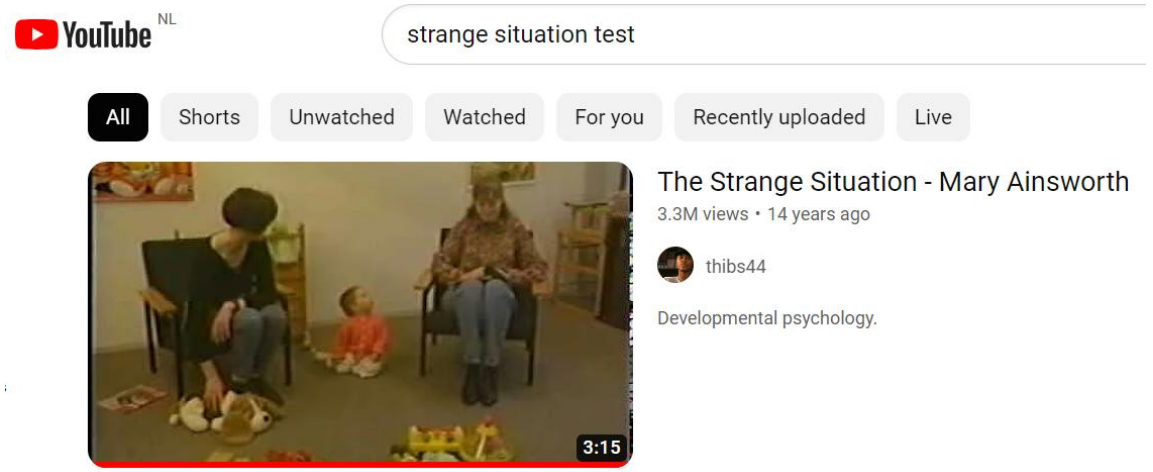
Different kinds of research

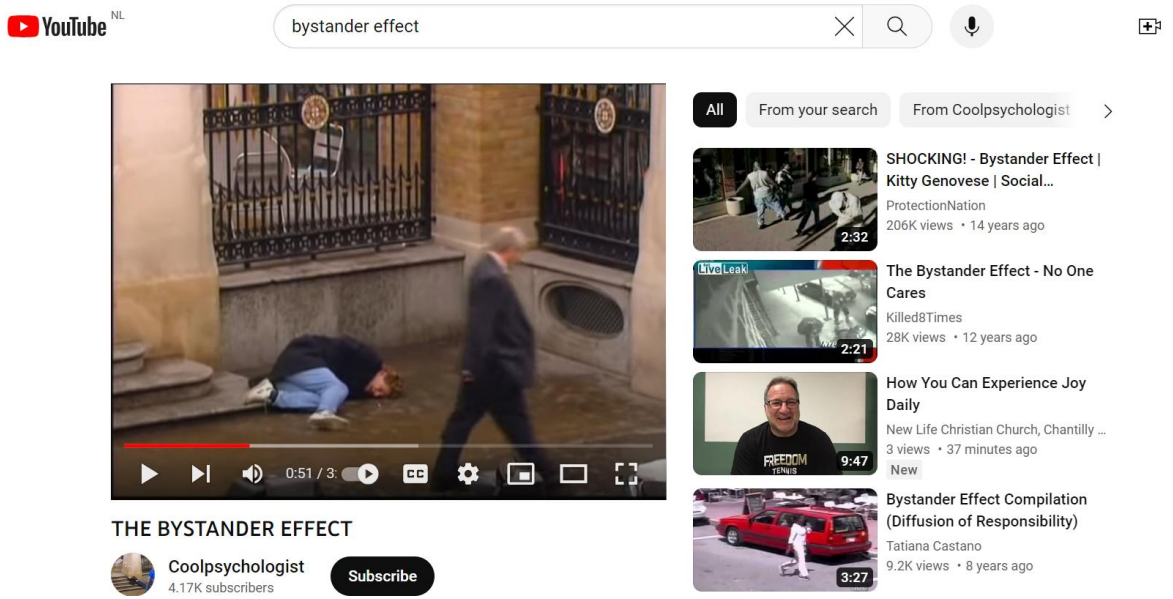
- Surveys / interview research
  - Send out questionnaires, conduct interviews
- **Observational research**
  - **Observe behavior that you are interested in**
- Correlational research
  - Study the association between (at least) two variables
- Experimental research
  - Manipulate the cause and study the effect

Lecture 8 on Thursday

Observational research

- Directly observe the behavior of interest
  - E.g.,: Strange situation test
  - Observing behavior on the street
- Observational research is a way to operationalize a conceptual variable: construct validity?





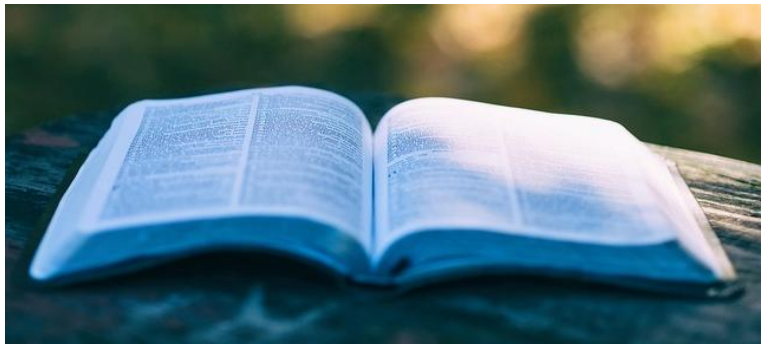
Challenge #1 and #2: Observer effect and Observer bias (construct validity)

- Observer effect (or 'expectency effect')
  - Observer affects the subject's behavior so that it matches expectations
    - E.g., in the strange situation test, the observer might stimulate parents to promote dissmisive behavior
    - E.g., 'clever hans' (see book)

- Observer bias
  - Your observations are influenced by your expectations.
    - E.g., in the strange situation test, the observer thinks to see dismissive behavior because of a bad impression about the parent

- Note the difference:
  - Observer effect: the observer influences the behavior
  - Observer bias: the observer's expectation influences their *interpretation* of behavior

Solutions: Observer effects and Observer bias



Unambiguous codebook

Use multiple observers

Masked design

The observers are unaware of the study purposes
E.g., strange situation test: don't tell the observers about the attachment styles

Photo source pixabay.com

Challenge #3: Reactivity (construct validity)

- People may behave differently when they know that they are being observed
  - E.g., Observing children in a class room
  - E.g., video taping family dynamics in someone's house

Photo source pixabay.com

Solutions: Reactivity

- Blend in
  - Unobtrusive observation: make yourself less noticable
    - e.g., a one way mirror
    - e.g., observing in a bar: pretend to be a customer
- Wait it out
  - E.g., children will get used to your presence
- Unobtrusive data
  - Study results (traces) of behavior
  - E.g., number of coffee cups in the trash bin
  - E.g., the records of the coffee machine in an office

Different kinds of research

- Surveys / interview research
  - Send out questionnaires, conduct interviews
- Observational research
  - Observe behavior that you are interested in
- **Correlational research**
  - **Study the association between (at least) two variables**
- Experimental research
  - Manipulate the cause and study the effect

Lecture 8 on Thursday

Correlational research

- Association between playing violent video games and aggressive behavior and delinquency

Anderson, C. A., & Dill, K. E. (2000). Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of Personality and Social Psychology, 78*, 772–790.

Photo source pixabay.com

Correlational research

- Trait aggression
  - E.g., “If somebody hits me, I beat back” (physical aggresivesness)
  - E.g., “I cant help getting into arguments when people diagree with me”(verbal aggresiveness)
  - “Some of my friends think I’m a hothead” (anger)
  - “At times I feel I have gotten a raw deal out of life”(hostility)
- Video Game violence
  - Name your 5 favorite games
  - How violent is each
  - How long do you play each
- Aggresive deliquent behavior
  - "hit (or threatened to hit) other students"
  - "attacked someone with the idea of seriously hurting or killing him/her”
- Non-aggressive deliquent behavior
  - purposely damaged or destroyed property belonging to a school
  - questions about theft, drug use, etc

Correlational research

Table: Correlations

	Violence in game
Trait aggresion	0.22
Aggressive delinquent behavior	0.46
Non-aggressive delinquent behavior	0.31
Gender	0.43

Result from:
Anderson, C. A., & Dill, K. E. (2000). Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of Personality and Social Psychology, 78*, 772–790.

Correlational research

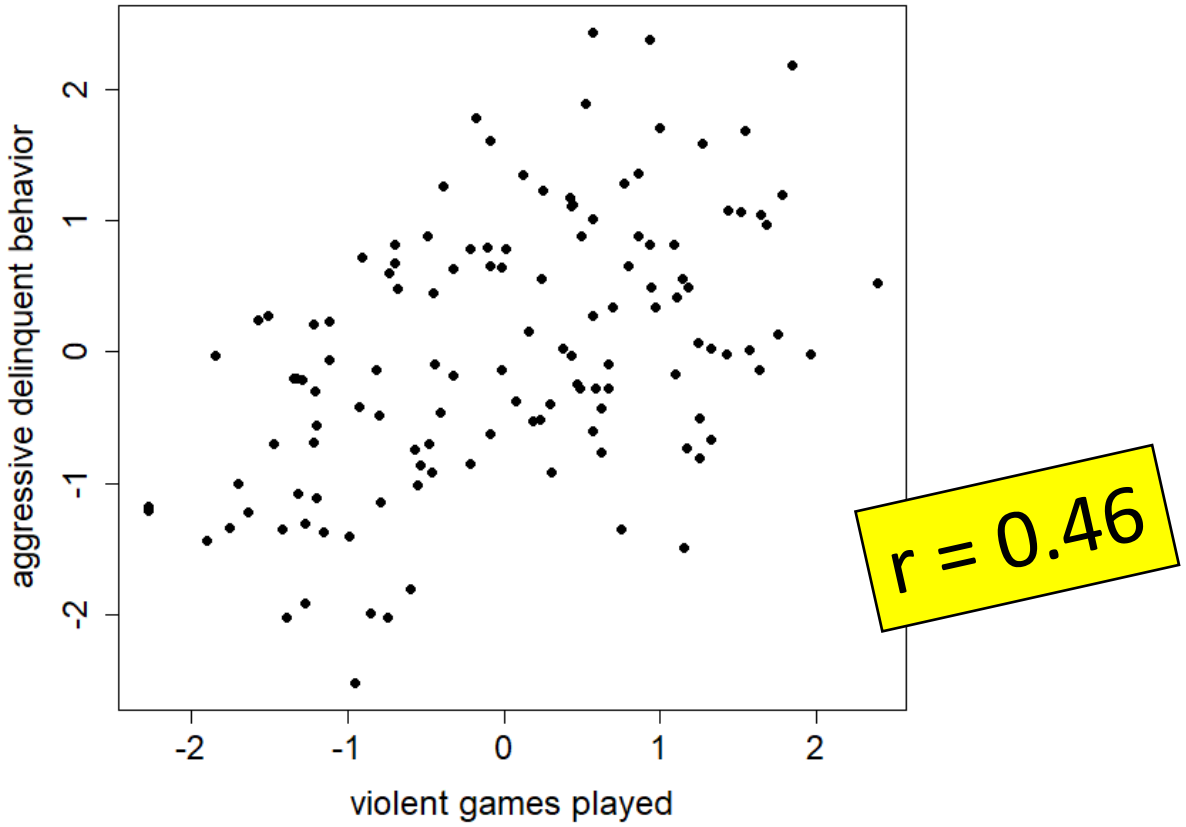
Table: Correlations

	Violence in game	**Time played**
Trait aggresion	0.22	0.16
Aggressive delinquent behavior	0.46	0.20
Non-aggressive delinquent behavior	0.31	0.15
Gender	0.43	0.35

Result from:
Anderson, C. A., & Dill, K. E. (2000). Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of Personality and Social Psychology, 78*, 772–790.

Challenge: Correlation does not say anything about what causes the association (internal validity)

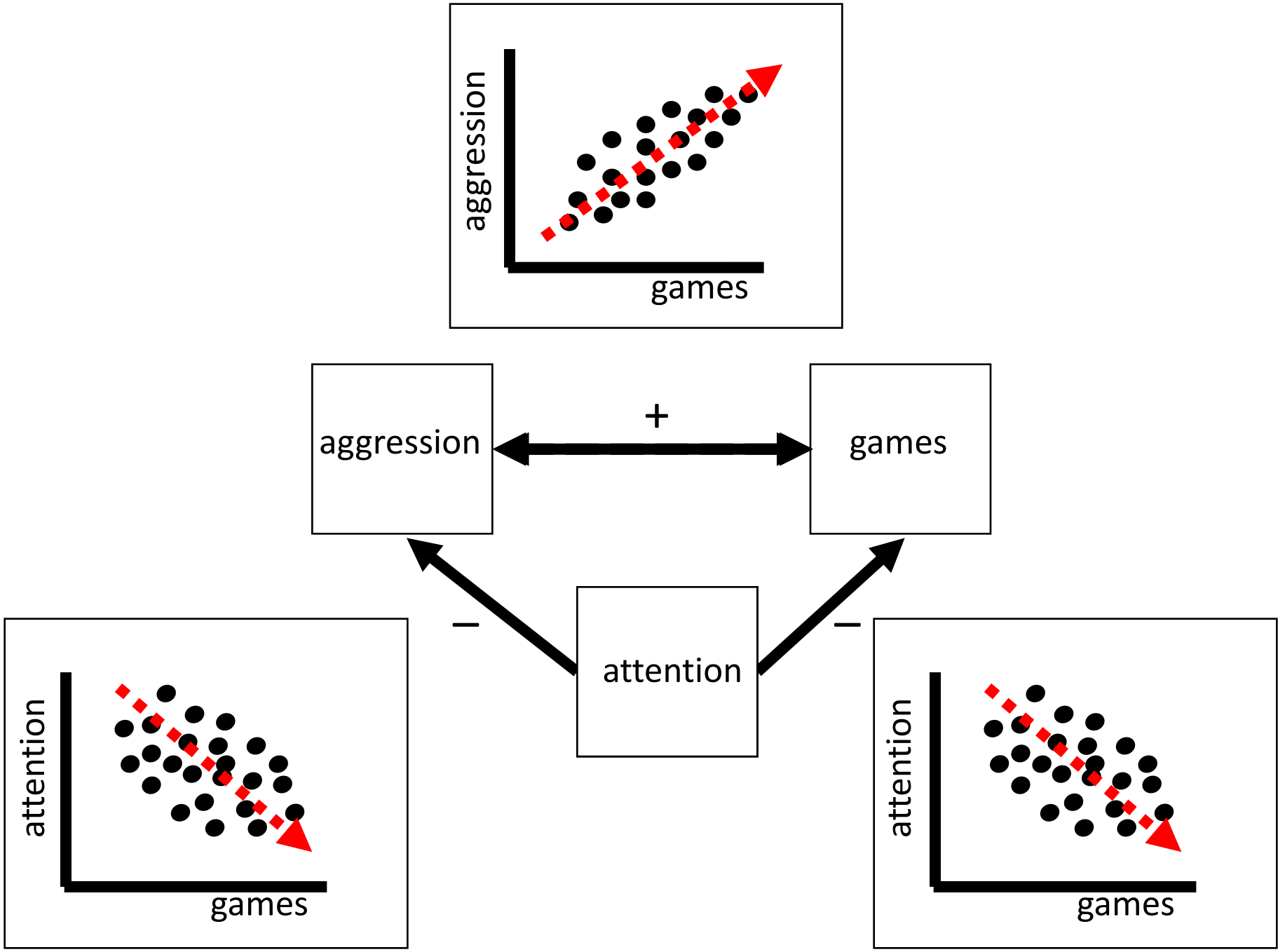
Association between ‘playing violent video games’ and ‘aggressive delinquent behavior’ in children (Anderson & Dill, 2000)



If you want to make a causal claim, be explicit about it and check internal validity!

- Three possible mechanisms that can result in a correlation

1) A causes B
   - playing violent video games causes aggressive delinquent behavior
2) B causes A
   - aggressive delinquent behavior causes playing violent video games
3) Association can be due to a ‘third variable’
   - *(see next slide)*


aggression
games
aggression
+
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attention
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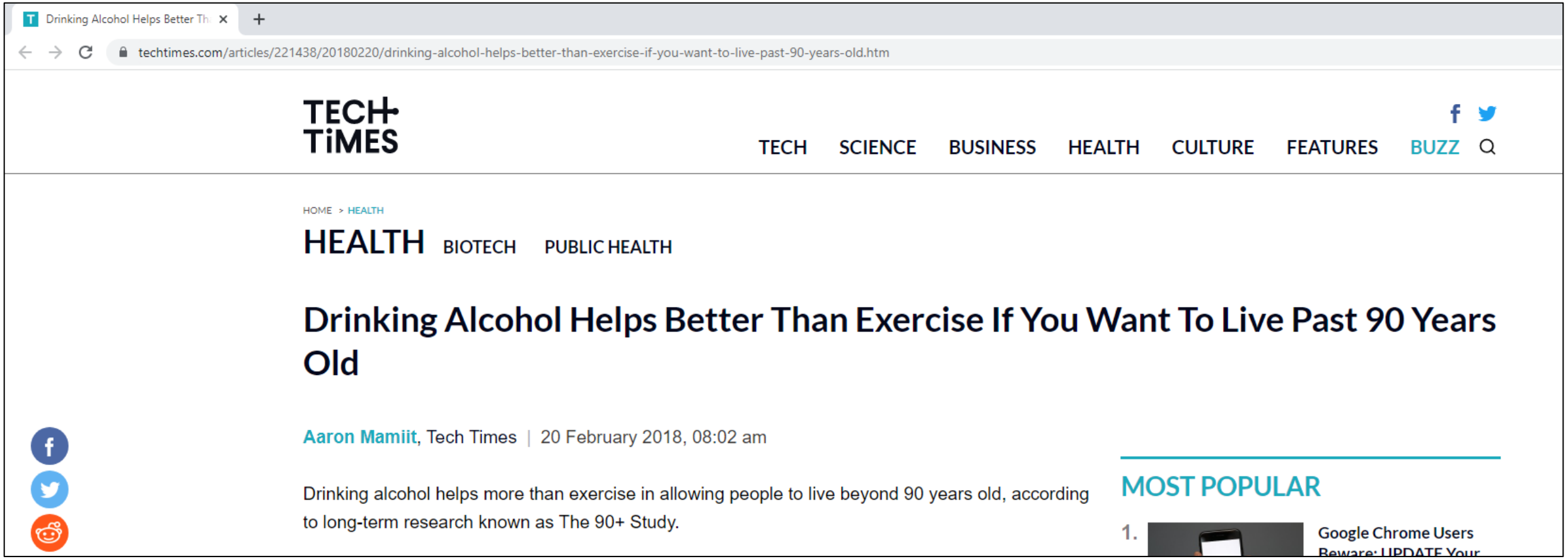
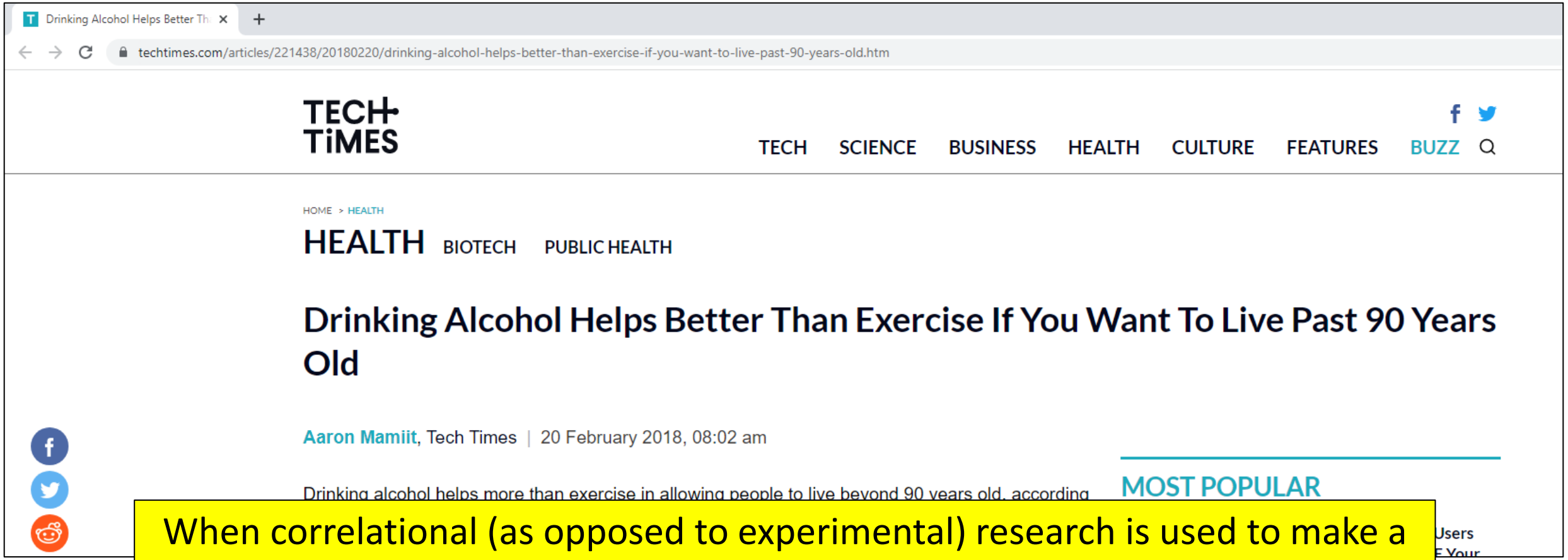
attention
games



[…] the subjects who consumed about two glasses of alcohol per day, whether beer or wine, were 18 percent less likely to suffer from a premature death […]

Drinking too much beer and wine will certainly have negative side effects, but for people with ages of over 90 years old, modest drinking of alcohol surprisingly **contributed** to a longer life.



When correlational (as opposed to experimental) research is used to make a causal claim, be skeptical! Causal claims require evidence of internal validity!!

[…] the subjects who consumed about two glasses of alcohol per day, whether beer or wine, were 18 percent less likely to suffer from a premature death […]

Drinking too much beer and wine will certainly have negative side effects, but for people with ages of over 90 years old, modest drinking of alcohol surprisingly **contributed** to a longer life.

Today

- Three types of claims: frequency claims, association claims and causal claims
- Four types of validity: statistical validity, construct validity, external validity and internal validity

(Remember lecture 2: construct validity can be investigated by assessing face validity, content validity, discriminant validity, convergent validity)

- Frequency claims concern one variable, while association and causal claims concern at least two variables
- For frequency claims, external validity is crucial, more so than for causal and correlational claims
- If you want to go beyond an association claim to a causal claim, you need internal validity
- To ensure internal validity you need *experimental* research (as opposed to survey, observational and correlational research). Next week!

Practice MC question

For which of the following claims is external validity most crucial?

a) Causal claim
b) Association claim
c) Frequency claim

Practice MC question

For which of the following claims is external validity most crucial?

a) Causal claim
b) Association claim
c) Frequency claim

Practice MC question

Nadia is reviewing an article and writes in her review that the study only includes children who live in big cities and that the found effect might not hold for children who grow up in rural areas. Nadia is commenting on the …. of the study.

a) external validity
b) construct validity
c) internal validity

Practice MC question

Nadia is reviewing an article and writes in her review that the study only includes children who live in big cities and that the found effect might not hold for children who grow up in rural areas. Nadia is commenting on the …. of the study.

a) **external validity**
b) construct validity
c) internal validity