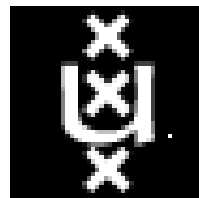




# Research Methods and Statistics

## Lecture 1: What is Science?

Riet van Bork



# Overview of Today

- 1) Practical information
- 2) Why scientific research?

Break

- 3) Properties of scientific research

# Practical information



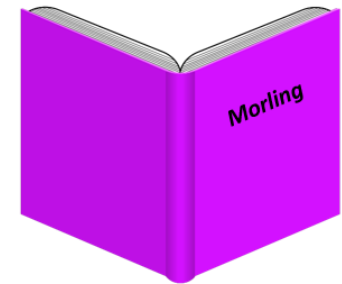
Riet van Bork



Johnny van Doorn

# Practical information

- 4 blocks of 4 weeks: check [rooster.uva.nl](http://rooster.uva.nl) for location, this might differ for different lectures!
- Block 1 to 3:
  - Week 1: Research methods
    - 2 lectures (Tuesday and Thursday)
      - 1 mandatory weekly assignment (except week 1 of block 1)
  - Week 2: Statistics
    - 2 lectures (Tuesday and Thursday)
    - 1 mandatory weekly assignment
  - Week 3: Statistics
    - 2 lectures (Tuesday and Thursday)
    - 1 mandatory weekly assignment
  - Week 4: Interim Exam
    - No lectures
    - Weekly assignment = practice exam



# Practical information

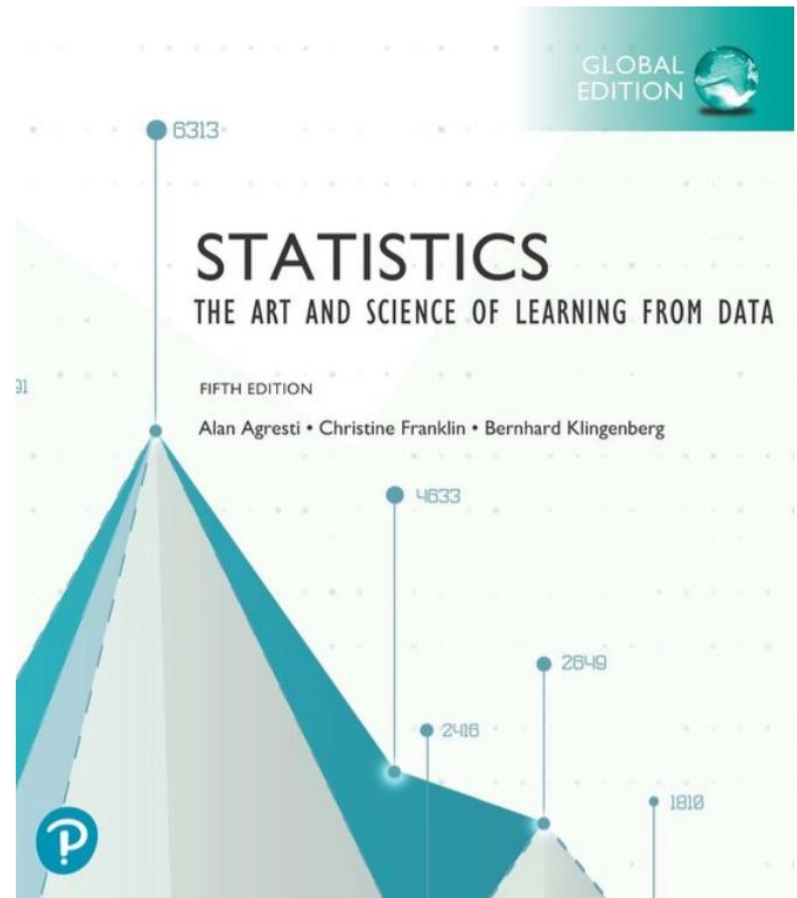
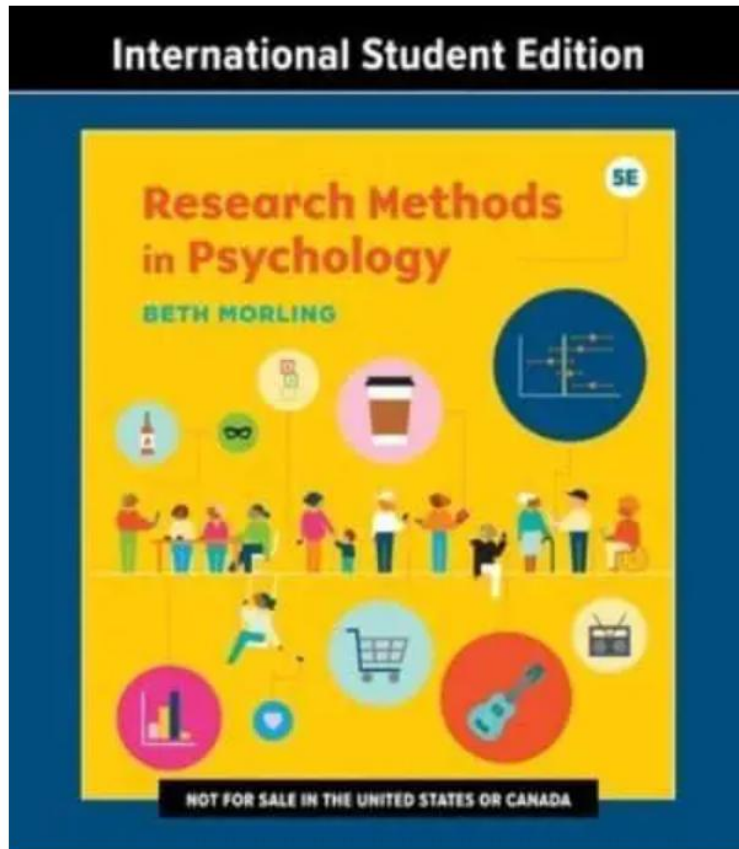
- Block 4:
  - Week 1: Statistics
    - 2 lectures (Tuesday and Thursday)
    - 1 mandatory weekly assignment
  - Week 2: Statistics
    - 2 lectures (Tuesday and Thursday)
    - 1 mandatory weekly assignment
  - Week 3: Statistics
    - 2 lectures (Tuesday and Thursday)
    - 1 mandatory weekly assignment
  - Week 4: Interim Exam
    - No lectures
    - Weekly assignment = practice exam

# Practical information

|                                                                                                 |                                                                                     |                                                         |                                                     |
|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------|-----------------------------------------------------|
| Exam I:                                                                                         |    | <b>Research Methods<br/>(Morling)</b><br><br>Ch 1, 2, 5 | <b>Statistics<br/>(Agresti)</b><br><br>Ch1-Ch3, Ch5 |
| Exam II:<br>   |    | Ch 3, 6, 7, 8, 10                                       | Ch 6 – Ch 8                                         |
| Exam III:<br> |   | Ch 4, 11, 12, 13, 14                                    | Ch 9 – Ch 11                                        |
| Exam IV:<br> |  | -                                                       | Ch 12, 14 +<br>Bayes book                           |

Check Canvas -> Modules for the exact exam material

# The Books



# The Books

- Morling, B. (2021). *Research methods in psychology* (5th ed.). New York: Norton. ISBN: 978-1324085805.
  - other ISBNs as well but check whether it is the “international student edition” and that it is “5<sup>th</sup> edition”.
  - Note: the 4th edition is also acceptable, as changes are minor — please note that using this edition is at your own discretion and may occasionally require extra care to page references and exercises
- Agresti, A., Franklin, C., Klingenberg, B. (2022). *Statistics: The Art and Science of Learning from Data* (5th ed.). Pearson. ISBN: 978-1292444765.
  - Note: the 4th edition is also acceptable, as changes are minor — please note that using this edition is at your own discretion and may occasionally require extra care to page references and exercises.
- van Doorn, J. (2024). [\*A Brief Introduction to Bayesian Inference: From Tea to Beer.\*](#)

# Exams

- There are four interim exams: See Canvas for the exact study material
- Each interim exam:
  - 25 multiple choice questions (25 points)
  - Open question (5 points)
  - Total: 30 points
  - 90 minutes
  - Practice with the software (e.g., Ans calculator)
  - Practice with the calculations (speed)
  - RM/S questions proportional to lectures
- Resit: no partial resits, only full resit (unless study advisor gave explicit permission)
- Please communicate any exam/study-interference (e.g., mental health, death in family, etc.) with [study advisor](#)



# Exams

- 'Introductory psychology and brain & cognition' and 'Research methods and statistics' exams together
- You can choose order yourself
- When you leave the exam hall you cannot go back in, so do not leave inbetween the two exams
- Each 90 minutes
- Remember Uvanet id + password
- Bring uva card
- Be on time
- More info:  
<https://canvas.uva.nl/courses/60177/pages/examinations-2>



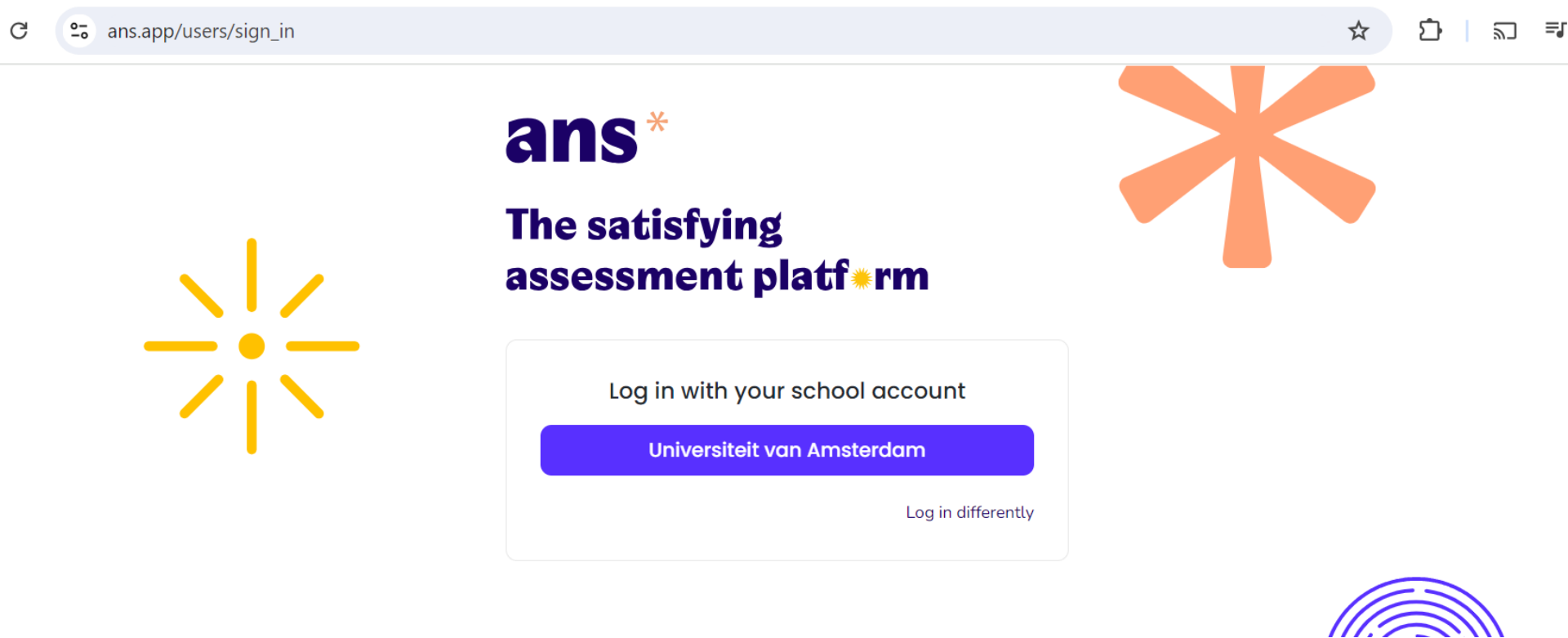
# Student Website

- <https://student.uva.nl/en>
  - Exam regulations:  
<https://student.uva.nl/en/information/teaching-and-examination-regulations-and-other-regulations>
  - Common topics (e.g., registration, tech-support) and who to contact
- Canvas page for additional resources
  - <https://canvas.uva.nl/courses/60177>
  - Discussion board for questions about content

# Weekly Assignments (WA)

- Provides extra practice
- Not necessarily same structure as exam
  - Practice exam in week 4 of each block
- Deadline Sunday 23:55 (no WA this first week)
- Missing WA's will result in point deduction
- *The WAs are mandatory for all students, also during the exam weeks, and also for non-psychology students and students who take the course again*

# WA's in Ans



See Canvas -> Modules -> Weekly Assignment for more information

# Overview of Today

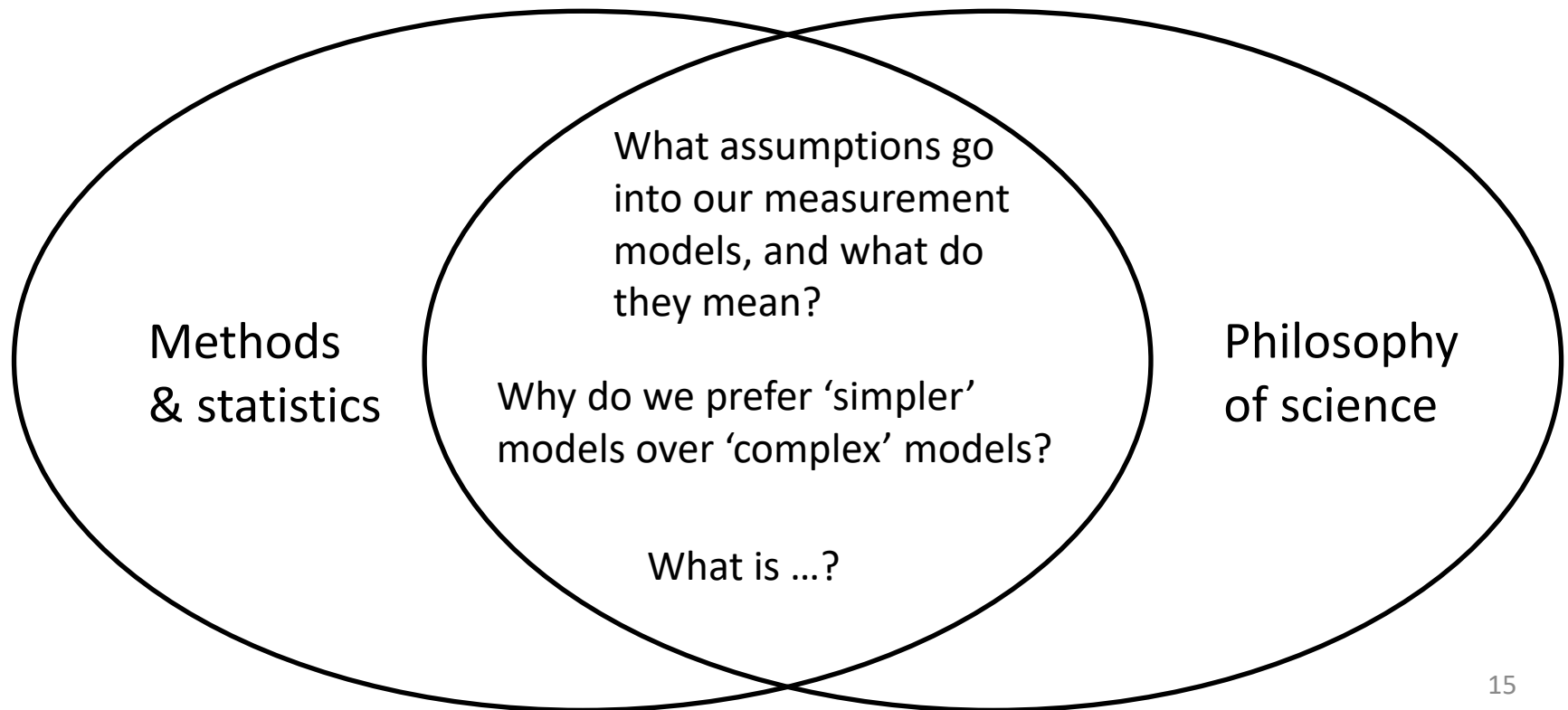
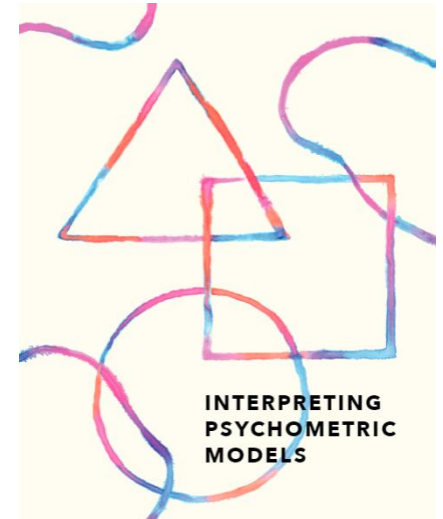
- 1) Practical information
- 2) Why scientific research?**

Break

- 3) Properties of scientific research

# Who am I?

- Assistant professor in the psychological methods group
- Research at the intersection of statistics and philosophy of science



# What is scientific psychology?

Home > Activities

## What Sort of Friend are You?

Find out your friendship style!

What Sort Of BFF Are You?

Find our friend style

START



COSMOPOLITAN

Celebs

Style

Beauty

Lifestyle

Shopping

SUBSCRIBE

Sign In

Sex & Relationships > Quizzes

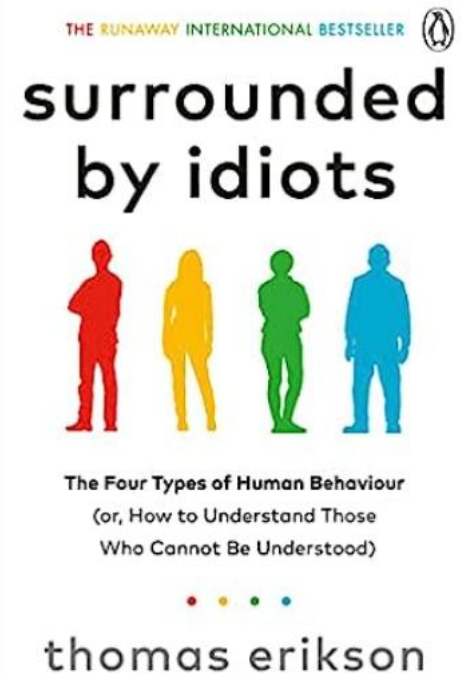
## Quiz: What the Way You Walk With Your Partner Says About Your Relationship

Are you butt-grabbers, or sidewalk isolationists?



BY HANNAH SMOTHERS PUBLISHED: OCT 13, 2016

SAVE ARTICLE



Source: <https://www.totalgirl.com.au/activity/what-sort-of-friend-are-you-557659>

And <https://www.cosmopolitan.com/sex-love/a5793695/quiz-walking-style-relationship/>

# What is scientific psychology?



Surrounded by Idiots criticism



Images

Books

News

Products

Videos

Maps

Flights

Finance

About 342,000 results (0,38 seconds)



Medium

<https://soccermetics.medium.com> > ...

How Swedes were fooled by one of the biggest scientific bluffs ...

13 Jan 2020 — Surrounded by Idiots has had a **major impact on how Swedish people talk to each other about psychology and discuss the behaviour** of those around ...

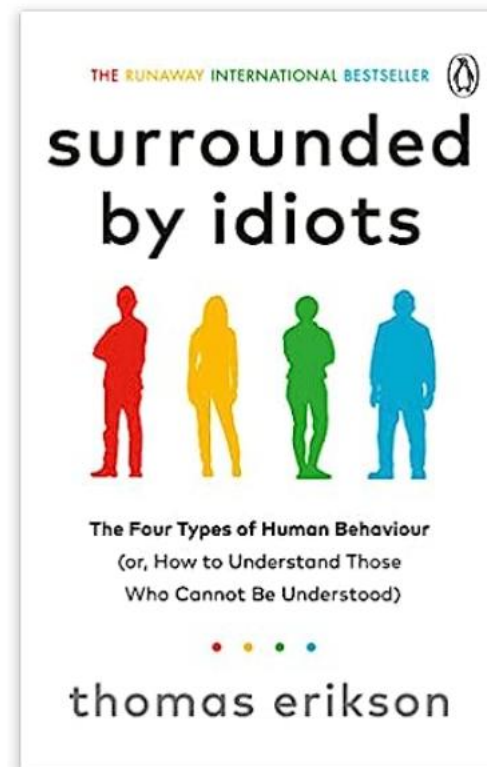
<https://medium.com> > feedium > book-review-surroun... > ...

Book Review: Surrounded by Idiots by Thomas Erikson

25 Jun 2021 — Unfortunately, he just had to use astute realizations about human nature to justify unbiased pseudoscience. It isn't enough for him to observe ...

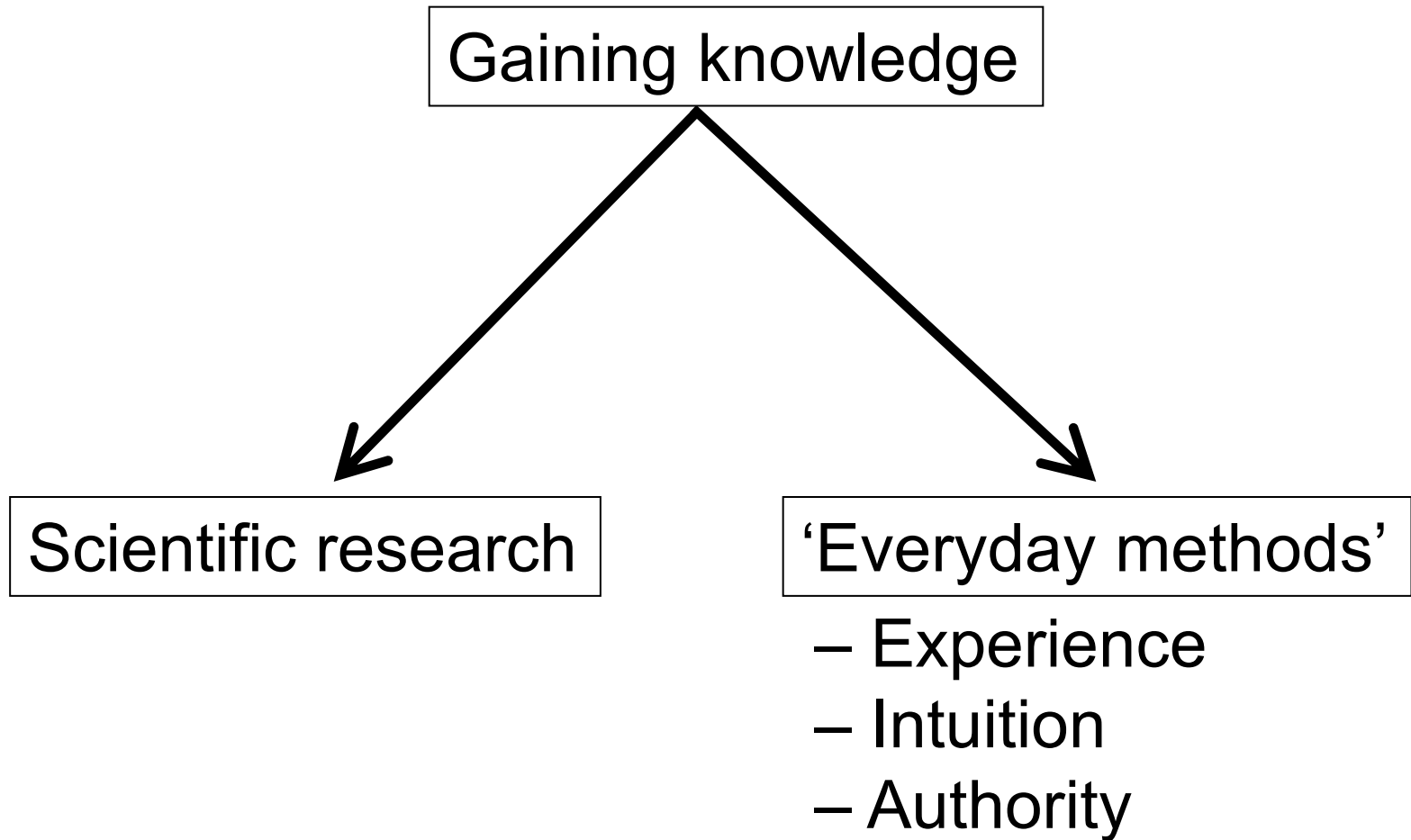


Unfortunately, the theory behind this book, and the various follow-ups, is no more than pseudoscientific nonsense. And Erikson appears to lack even basic knowledge of psychology or behavioural science. This is why we at VoF (*Vetenskap och Folkbildning* — *the Swedish Skeptics Society*) named Thomas Erikson fraudster of the year in 2018.



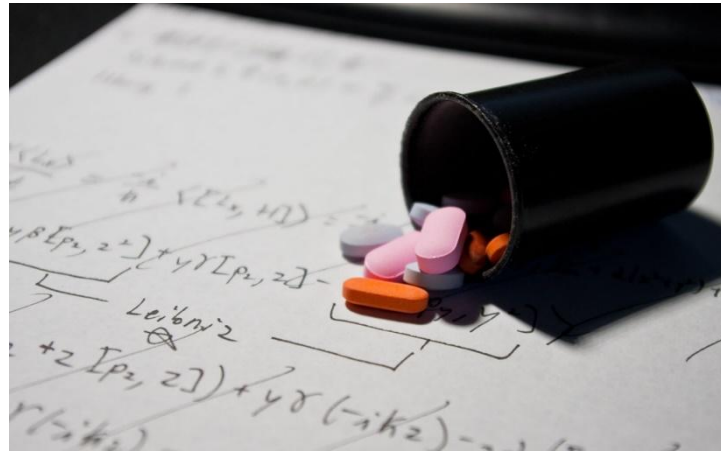
Source: <https://soccermetics.medium.com/how-swedes-were-fooled-by-one-of-the-biggest-scientific-bluffs-of-our-time-de47c82601ad> and <https://www.vof.se/blogg/one-of-swedens-biggest-scientific-bluffs/>

# Why Science?



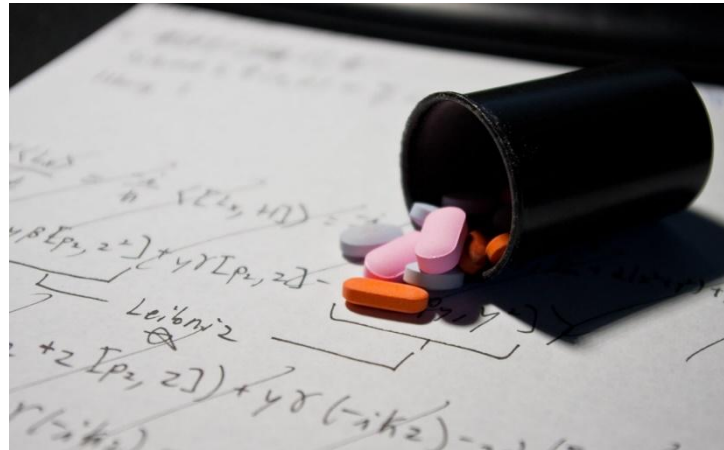
# Experience

Gaining knowledge on basis of experience



e.g., study drugs

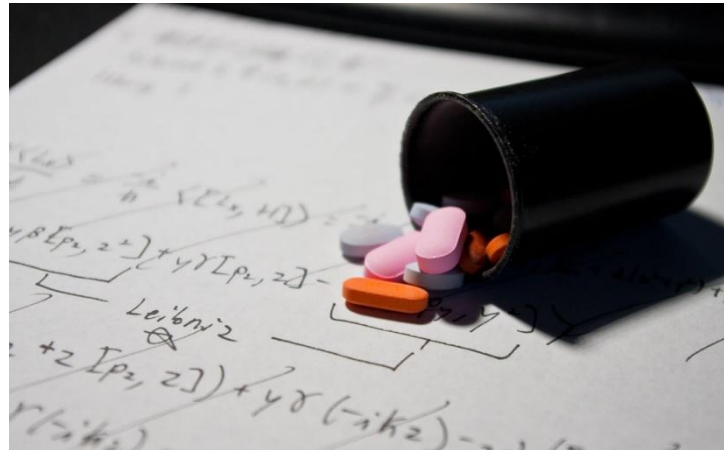
# Experience



|             | Study drug |
|-------------|------------|
| Passed exam | 8 students |
| Failed exam | 2 students |

Percentage passed: 80%

# No comparison group



|             | Study drug | No drug      |
|-------------|------------|--------------|
| Passed exam | 8 students | 280 students |
| Failed exam | 2 students | 70 students  |

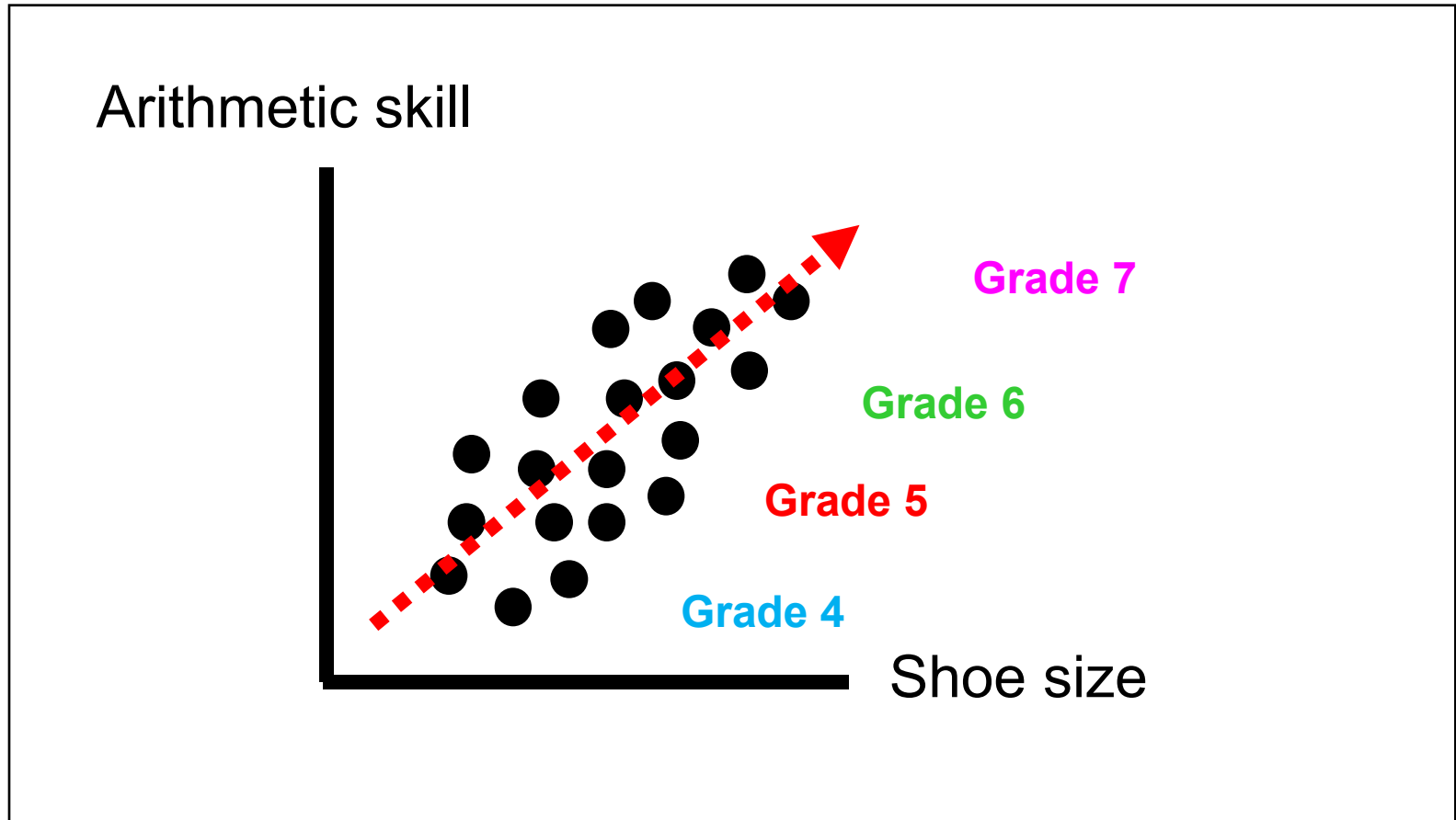
Percentage passed:

80%

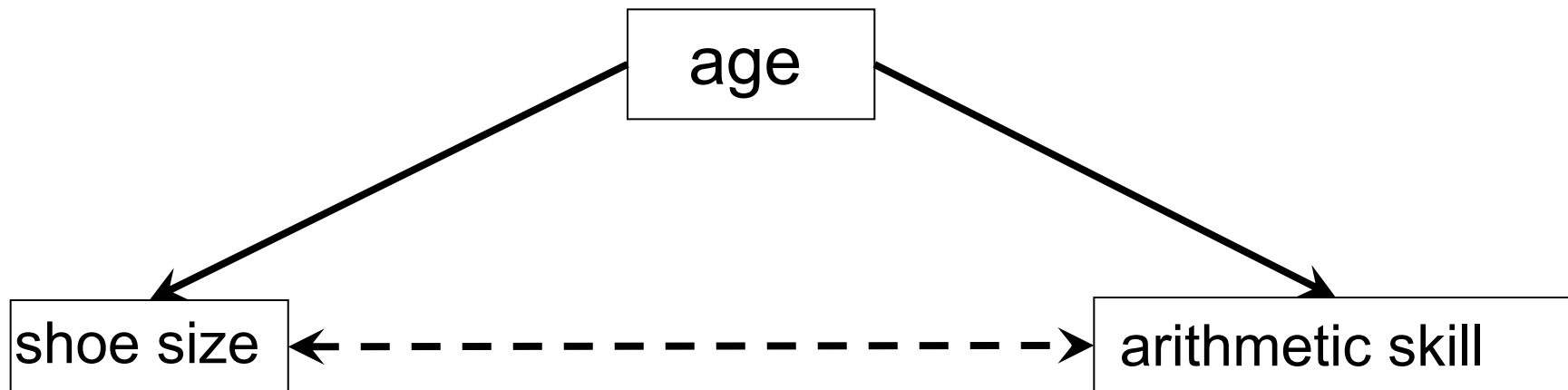
80%



# Relation arithmetic skill and shoe size in primary schools



# Confounds



*Variable “age” is a confound*

# Confounds

Across places there is a positive correlation between fire stations and number of babies born..



# Confounds

What about the positive correlation between ice cream sales and drownings?



# Confounds

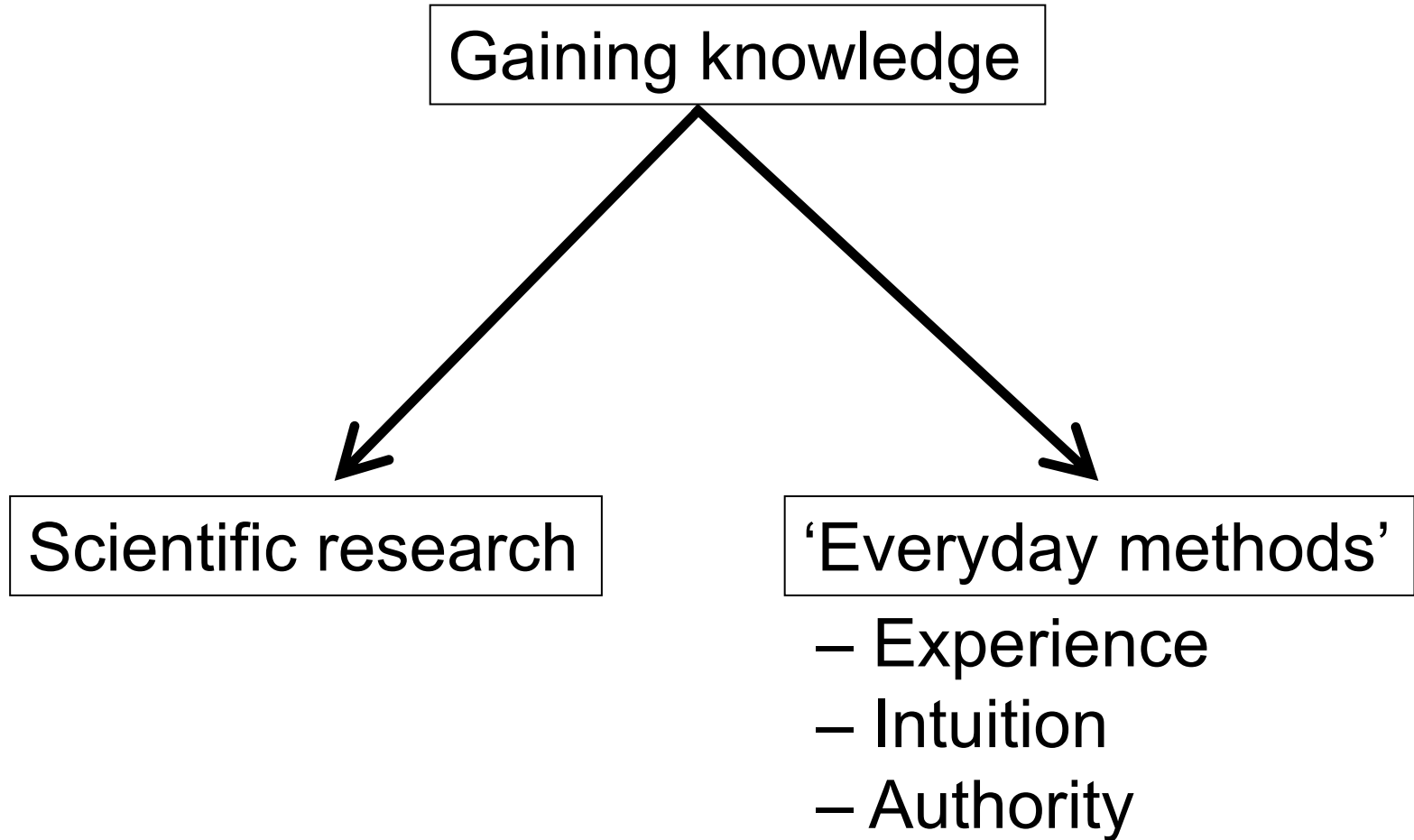
When studying the effect of X on Y, a confound is another variable C that gives an alternative explanation for the relation between X and Y

In personal experiences it is not possible to isolate variables, which makes it hard to infer which of the many possible variables explains some effect.

# Experience vs scientific research

|                          | Experience                                                                          | Scientific research                                                                  |
|--------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Comparison group         |   |   |
| Controls for confounders |  |  |

# Why Science?



# Intuition

- Good story bias
  - People tend to believe convincing stories
    - E.g., opposites attract
    - E.g., express anger to blow off steam/release pressure



**Sjamadriaan** @zeg\_eens\_aad · Aug 12



[danst vervreemdend om vrouw heen in de kroeg met twee bitterballen in m'n mond]: 'Zo doen de dieren dat ook!'



## **Wat is gezonder: in één keer veel water of de hele dag door slokjes?**

**Wie goed gehydrateerd wil blijven, drinkt twee liter water per dag. Kun je dit het beste in kleine beetjes**

**libelle**



### **IN ÉÉN KEER OF DE HELE DAG DOOR?**

Het beste is om dit vocht in grote hoeveelheden binnen te krijgen, volgens orthomoleculair expert Vivan Reijs. Kijk naar naar de natuur, zegt zij, dieren drinken ook niet een paar slokjes per keer. Zij drinken tot ze verzadigd zijn. Ook voor je lichaam zou dit beter zijn omdat het zo minder energie kost om het water te verwerken.



40



4



170



55.1K





**Sjamadriaan** @zeg\_eens\_aad · Aug 12

[danst vervreemdend om vrouw heen in de kroeg met twee bitterballen in m'n mond]: 'Zo doen de dieren dat ook!'

\* Dancing weirdly around a woman in the pub with two snacks in my mouth\*: That's how animals do it!!



libelle

**N ÉÉN KEER OF DE HELE DAG  
DOOR?**

Het beste is om dit vocht in grote  
hoeveelheden binnen te krijgen, volgens  
orthomoleculair expert Vivan Reijs. Kijk

Drinking a lot of water in one go, because (some) animals in the wild do it

je dit het beste in kleine beetjes



40



4



170



55.1K



# Good story bias

- Influencers who advise not to wear sunglasses or use sunscreen

Lars van den Nieuwenhoff

Home Mijn verhaal Diensten > Programma's Producten Media Contact



Zonnetraining  
BluePrint

[LEES MEER](#)



Epigenetica BluePrint

[LEES MEER](#)



## Geen zonnebrandcrème of zonnebril: influencers maken gevaarlijke claims

Vandaag om 07:00 • Aangepast vandaag om 08:12



NL ▼



Image sources: <https://www.omroepbrabant.nl/nieuws/4323204/geen-zonnebrandcreme-of-zonnebril-influencers-maken-gevaarlijke-claims>  
And <https://www.ikiguide.nl/zonnetraining-blueprint>

See also Sjamadriaan's blog: <https://www.sjamadriaan.nl/t/zonnebrand>

# Good story bias

**Jij bestaat uit miljarden cellen. In elke cel lopen tot wel 100.000 biochemische processen per seconde!**

Je begrijpt dat al deze processen **tot op de nanoseconde nauwkeurig getimed** moeten worden. Zo niet, dan ontstaat er direct chaos en binnen no-time bijbehorende klachten, pijntjes of zelfs ziekte.

Gelukkig heb je **een centrale biologische klok** in je brein die extreem nauwkeurig de tijd bepaalt op basis van de prikkels uit jouw natuurlijke omgeving (licht, duisternis, magnetisme etc.). Op deze manier kan je **elk vitaal proces** in je lichaam met verbazingwekkende precisie coördineren, MITS... je jouw klok de juiste input geeft!

Onze moderne levens zijn te arm aan **de juiste/natuurlijke input**, terwijl we overspoeld worden met **verstorende onnatuurlijke input**. Hierdoor is onze biologische klok standaard van slag, waardoor we letterlijk tijd (lees: vitaliteit!) verliezen.



Intuition that ‘natural’ is better + a “good story” convinces people, but dermatologist and eye doctor warn that these stories are harmful and dangerous

Image sources: <https://www.omroepbrabant.nl/nieuws/4323204/geen-zonnebrandcreme-of-zonnebril-influencers-maken-gevaarlijke-claims>

And <https://www.ikiguides.nl/zonnetraining-blueprint>

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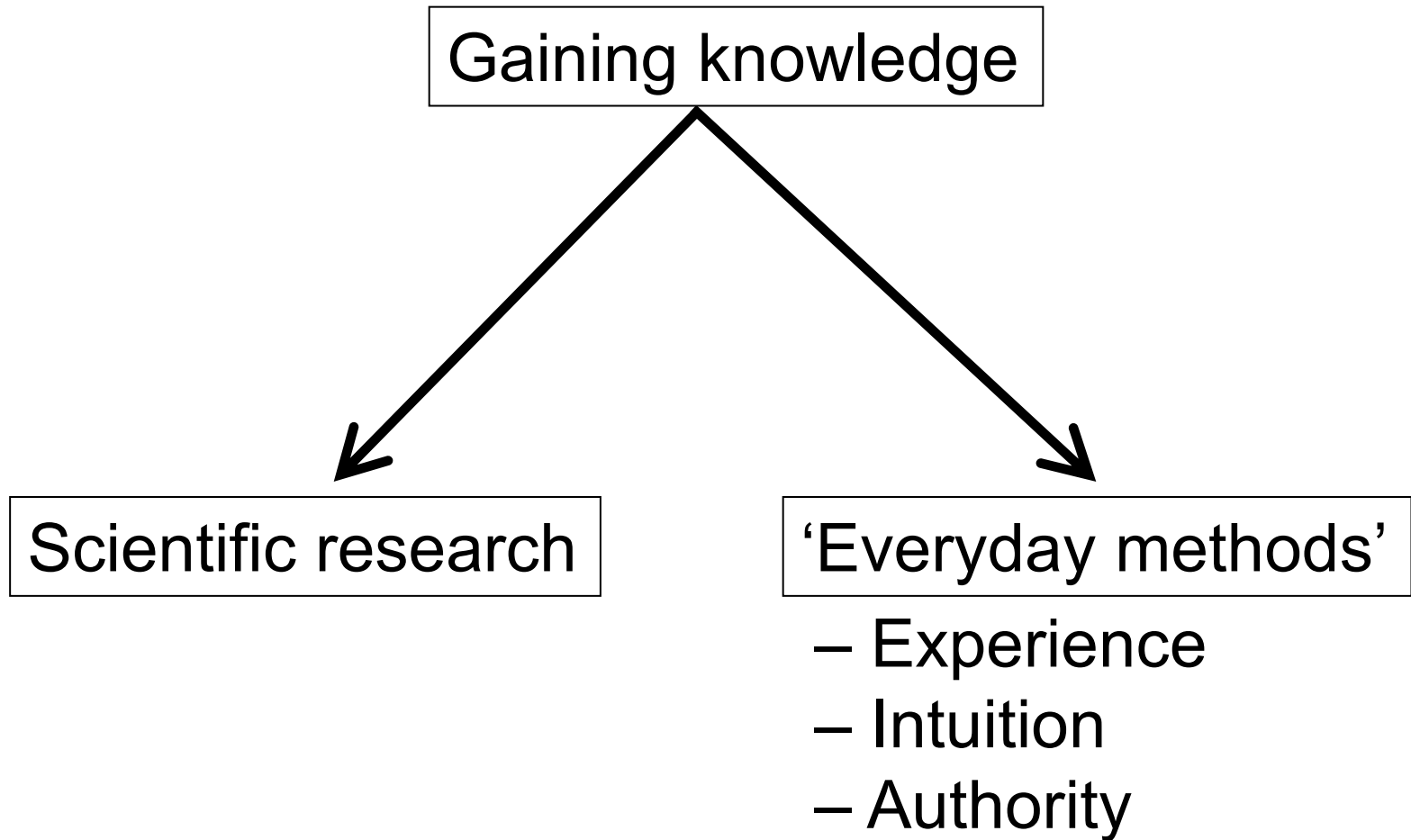
# Intuition

- Good story bias
  - People tend to believe good stories
  - E.g., opposites attract
  - E.g., express anger to blow off steam/release pressure
- Availability heuristic
  - People put more weight on information that comes to mind easily
  - E.g., plane crashes vs car accidents
- Present/present bias
  - Fail to consider comparison group information
  - For two things that are notable we start to see an association because the cases in which both are present are most notable (see also 'illusory correlation')
  - E.g., thinking of friend before they call
  - E.g., connecting a minority group to a distinct behavior (stereo typing)
- Confirmation bias
  - Focusing on information that agrees with your view
  - E.g., bias in search engine searches ("study drugs effective")

You think that you are invulnerable to all of these biases? Ok, one more:

- Bias blind spot

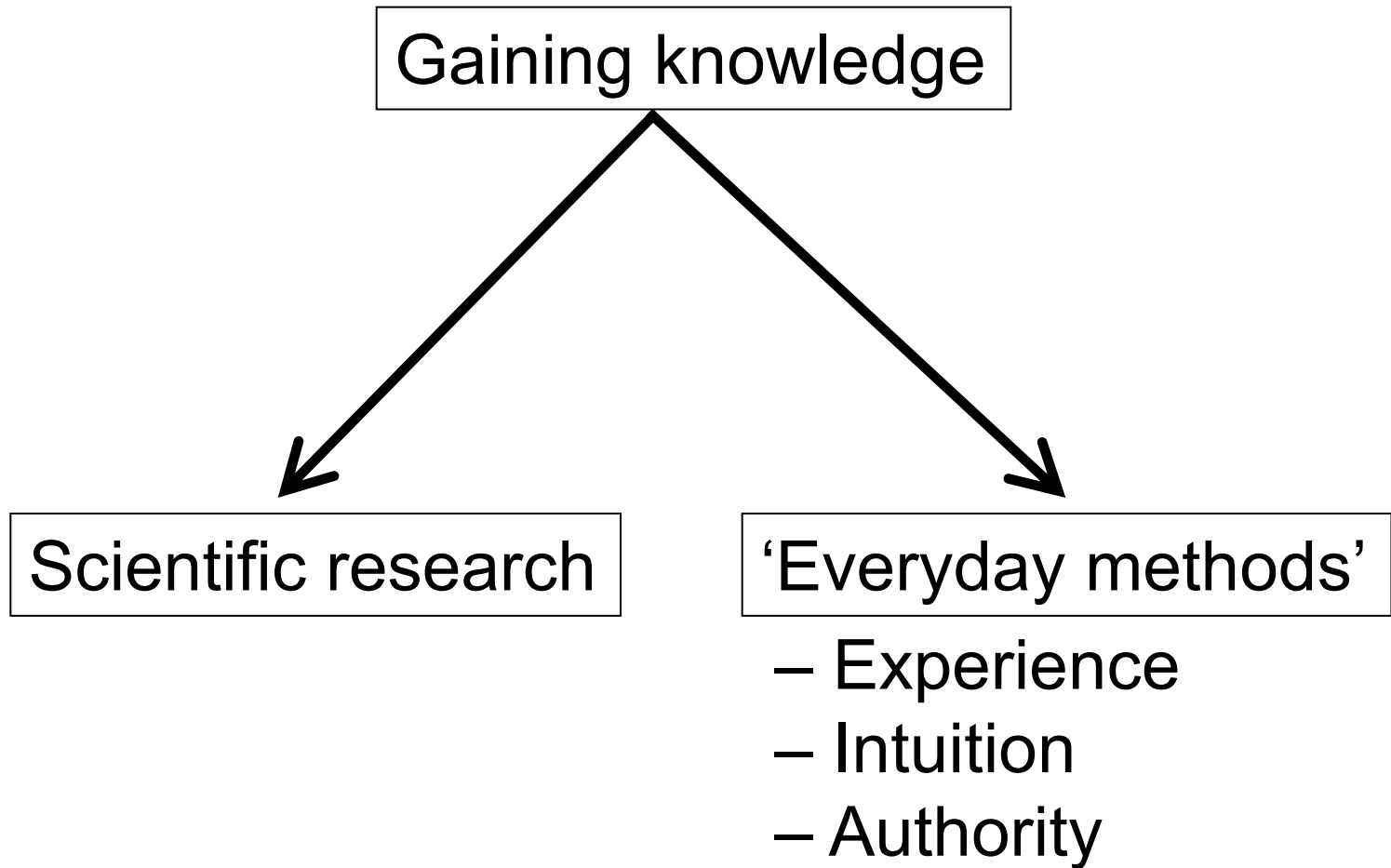
# Why Science?



# Authority

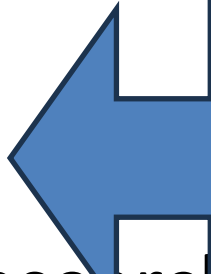
- Accept something because an authority said so
- How did the authority get the knowledge?
  - Personal experience?
  - Intuition?
  - Research in the authority's field?
- In the last case, where the authority bases the knowledge on research *in their area of expertise*, it can be reasonable to accept it.

# Science?



# Overview of Today

- 1) Practical information
- 2) Why scientific research?
- 3) Properties of scientific research



Other 'everyday methods' to gain knowledge have problems that scientific methods try to protect us from. But, that does NOT mean that these everyday methods have no value: they also play a role in science.

# Overview of Today

- 1) Practical information
- 2) Why scientific research?
- 3) Properties of scientific research**

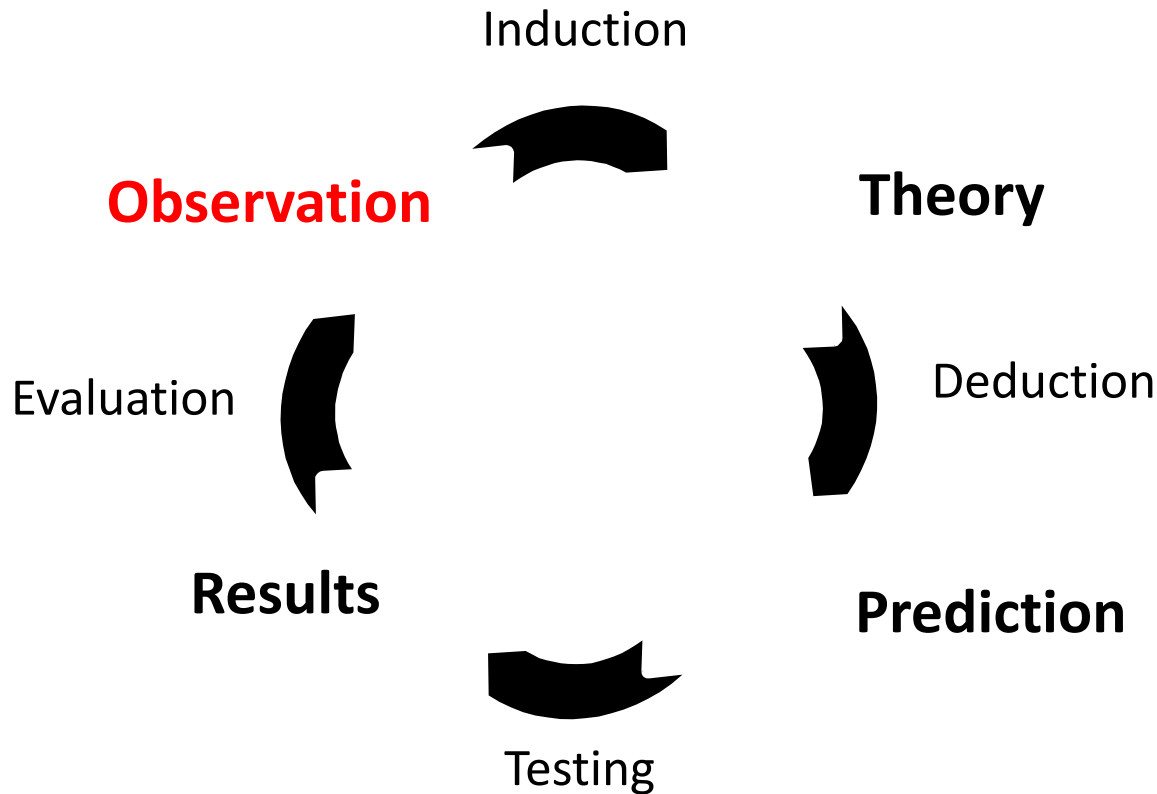
# Properties of scientific research

- I. The empirical cycle
- II. Correction mechanism
- III. Making science open

# Properties of science

- Scientists are part of a community and as such follow a set of norms (shared expectations about how they should act)
- These norms may differ across different disciplines and across places and time!
- Psychology is an empirical science and an important norm is that we follow the empirical cycle

# The empirical cycle



Adriaan de Groot  
1914 - 2006

In book: "Theory-data cycle" → incomplete

# Observation

Studies start with an observation, e.g.:

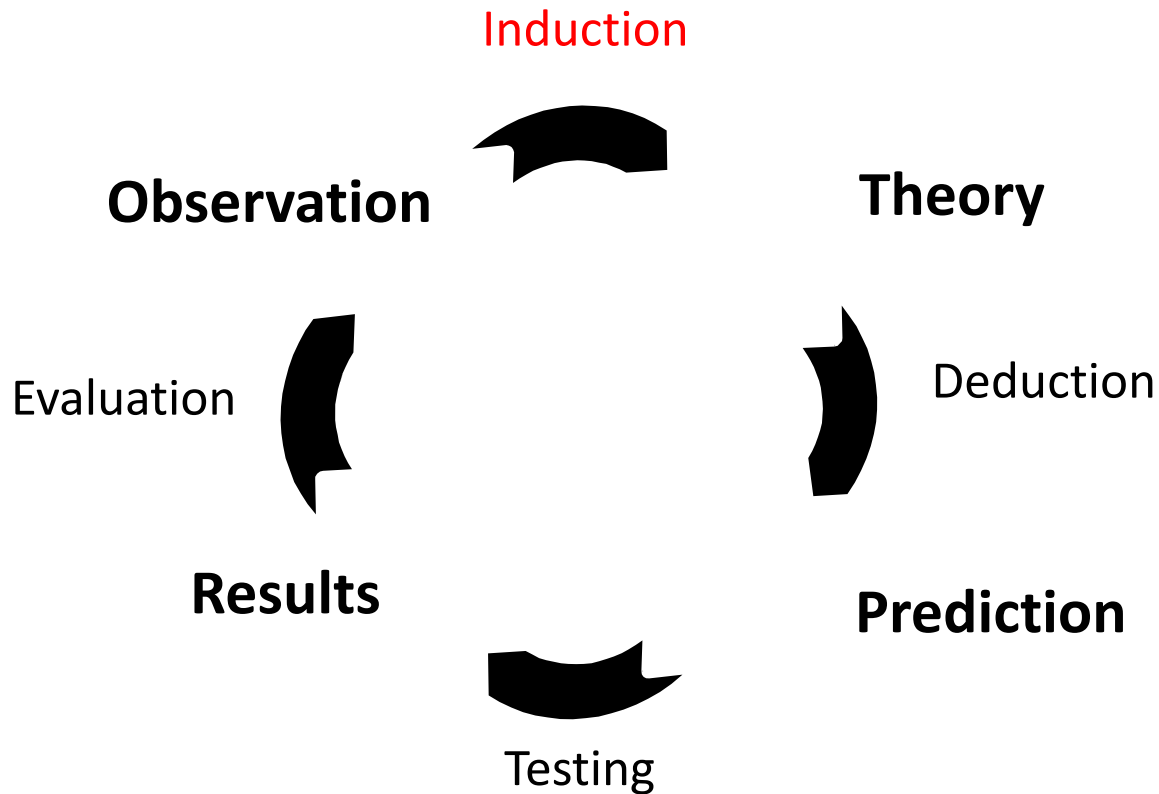
- Previous research
- An 'everyday method' such as experience



**Example:**

Someone orders drinks at the bar. The bartender turns around to grab the drinks, turns back, and forgot who to give the drinks to!

# The empirical cycle



Adriaan de Groot  
1914 - 2006

In book: "Theory-data cycle" → incomplete

# Induction

- Inductive inference is based on generalization from a specific set of observations ('this swan is white, that swan is white') to a general claim ('all swans are white')
- In deductive inferences you go from a general claim ('all dogs bark') to something specific ('Bobby is a dog so Bobby barks').
- In deductive inferences the conclusion follows logically, but inductive inferences are fallible
- In Morling (the book), the fact that empirical sciences (like psychology) rely on induction is given as a reason for why empirical researchers do not use the word 'prove': observations can *support* a theory but not *prove* it



# Induction

Induction: The process of coming up with a theory that explains your observation

Observation → Theory

- Search the literature:
  - PsychINFO
  - Google Scholar
- Construct your own theory



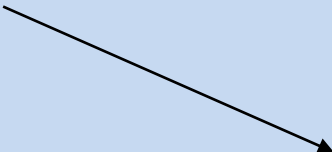
Google Scholar

# Induction

## Example:

OBSERVATION: Bartender fails to identify me as the initial customer

THEORY: Selective attention theory: Individuals have a tendency to process information from only one part of the environment with the exclusion of other parts



RESEARCH QUESTION: In a conversation, do people encode the main characteristics of their conversation partner if there is something more important to process (e.g., the order of drinks)?

# Theory

Theory: A set of statements that describe general principles about how variables relate to one another

- A good theory is:
  - Supported by data from previous studies
  - Falsifiable
  - ...

# Falsifiability

It needs to be *possible* to observe something that contradicts the theory (i.e., that will lead you to reject the theory)

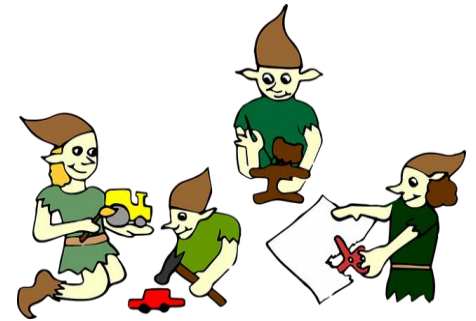
Falsifiable, e.g.,:

- General relativity theory:
  - Solar eclipse (Eddington experiment)  
→ specific prediction of light deflection that could be *wrong*!!
- Selective attention theory:
  - Falsify if changes in the background *are* being noticed

Karl Popper  
1902 - 1994

# Falsifiability

- Not falsifiable:
  - ‘Human beings are operated by little gnomes who live in your head and disappear when you look at them’
  - ‘There is a small powerful elite that secretly governs the world and leaves no trace’
  - ‘Facilitated communication works but stops working when you question it’

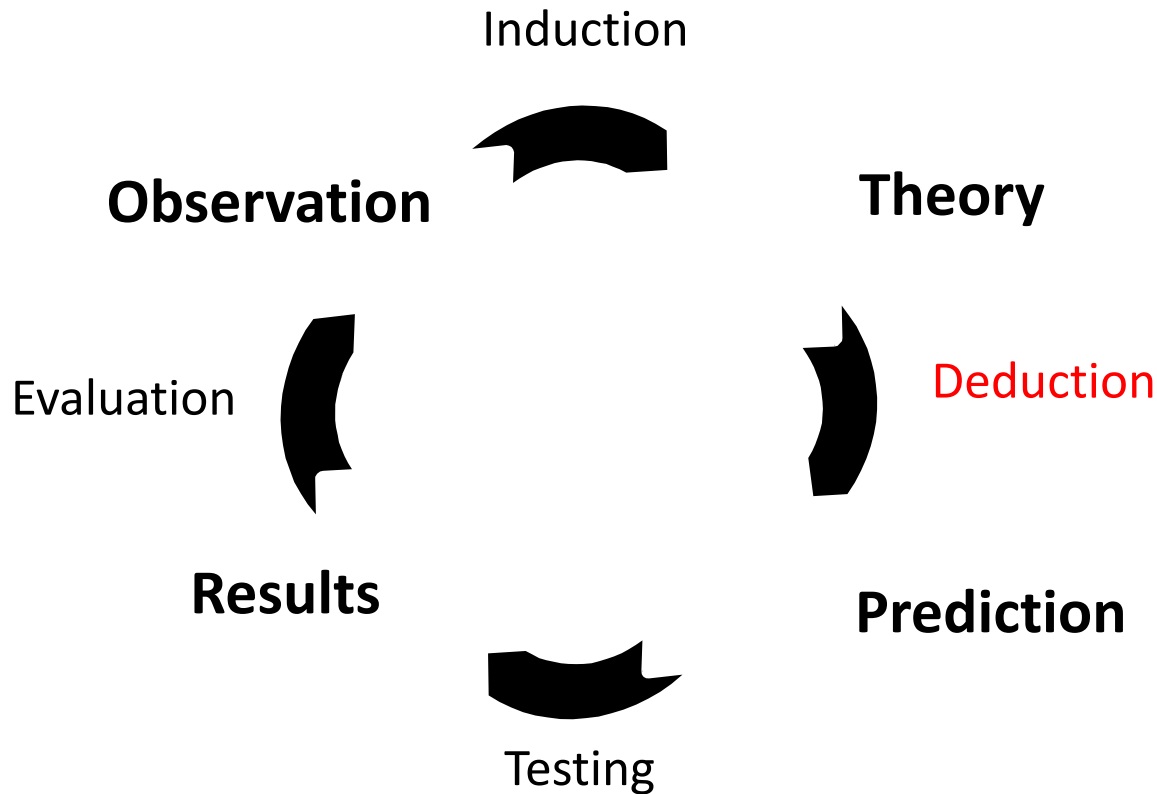


# Falsifiability

- Generally, when constructing a theory, think about in what cases you would be prepared to reject the theory
- If you cannot come up with possible observations in research that would contradict your theory such that you would reject it, then you have a problem..

Karl Popper  
1902 - 1994

# The empirical cycle



Adriaan de Groot  
1914 - 2006

In book: "Theory-data cycle" → incomplete

# Deduction

Deduction in the empirical cycle: The process of deriving a prediction that follows from your theory by means of a hypothesis

Theory → Hypothesis

Hypothesis: An answer to your research question derived from your theory

# Deduction

## **Example:**

THEORY: Selective attention theory

RESEARCH QUESTION: In a conversation, do people encode the main characteristics of their conversation partner if there is something more important to process (e.g., the order of drinks)?

HYPOTHESIS: People will not notice changes in important characteristics of their conversation partner if there is something else more important to process

# Prediction

Prediction: A specific event that will occur *if your hypothesis is true*. Prediction is about ‘new observations’

HYPOTHESIS: People will not notice changes in important characteristics of their conversation partner if there is something else more important to process

**Operationalize:** determine how the conceptual variables in the hypothesis are measured or manipulated

# Prediction

## Example:

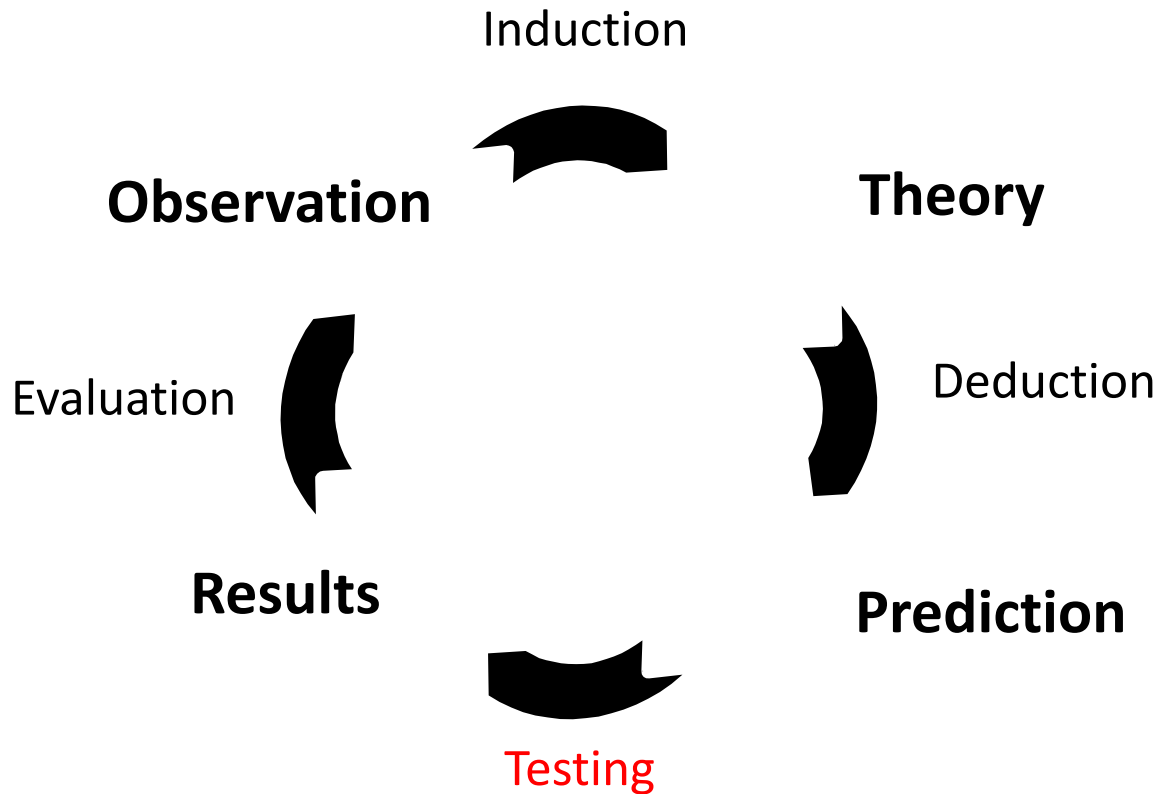
HYPOTHESIS: People will not notice changes in important characteristics of their conversation partner if there is something else more important to process

### *Operationalizations:*

- How do you get the participants to focus on something else?
- How do you replace the conversation partner?
- How do you determine if the participant noticed the change?

PREDICTION: If I take some random people on the street and have a conversation partner ask them directions, and then replace this conversation partner with a new person without them seeing this, the participants will not say anything about it.

# The empirical cycle



Adriaan de Groot  
1914 - 2006

In book: "Theory-data cycle" → incomplete

# Testing

**Testing:** The process of verifying your prediction

## Example:

The 'door' study of Simons & Levin (1998)

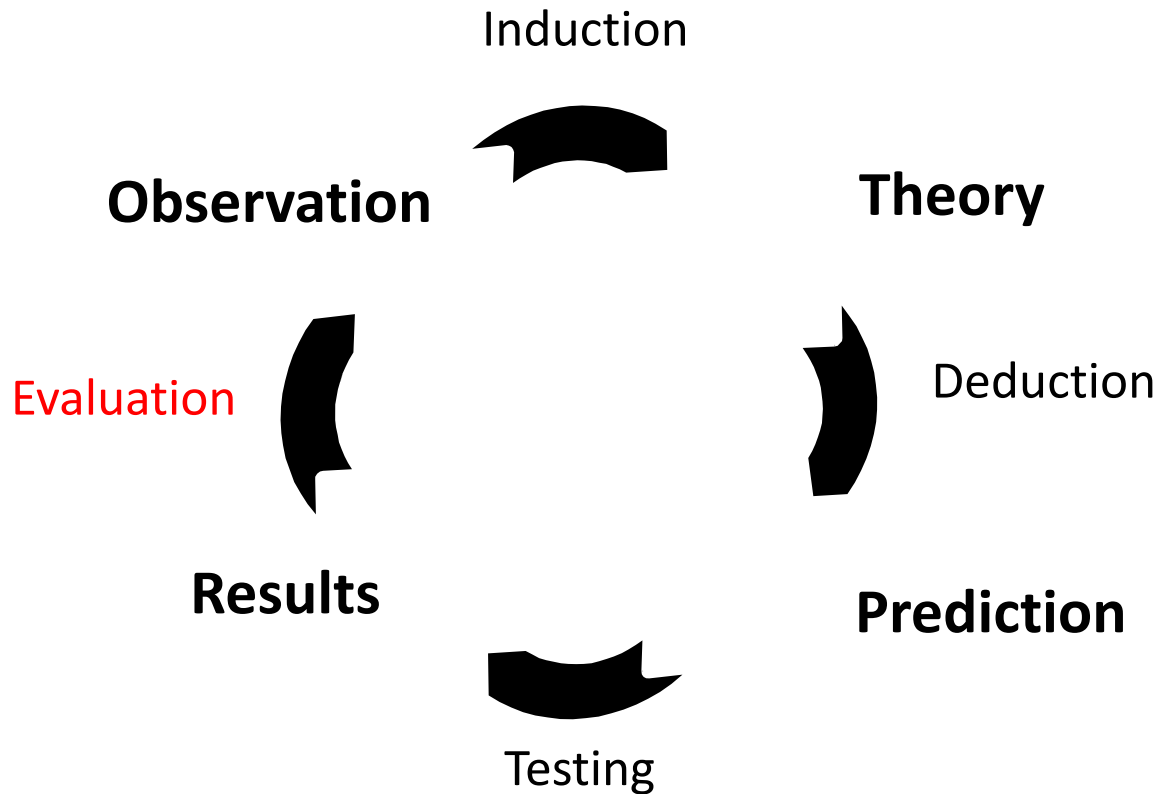
<http://www.youtube.com/watch?v=FWSxSQsspiQ>

# Results

| <b>Noticed the change</b> | <b>Did not notice the change</b> |
|---------------------------|----------------------------------|
| 7                         | 8                                |

*From: Simons & Levin (1998)*

# The empirical cycle



Adriaan de Groot  
1914 - 2006

In book: "Theory-data cycle" → incomplete

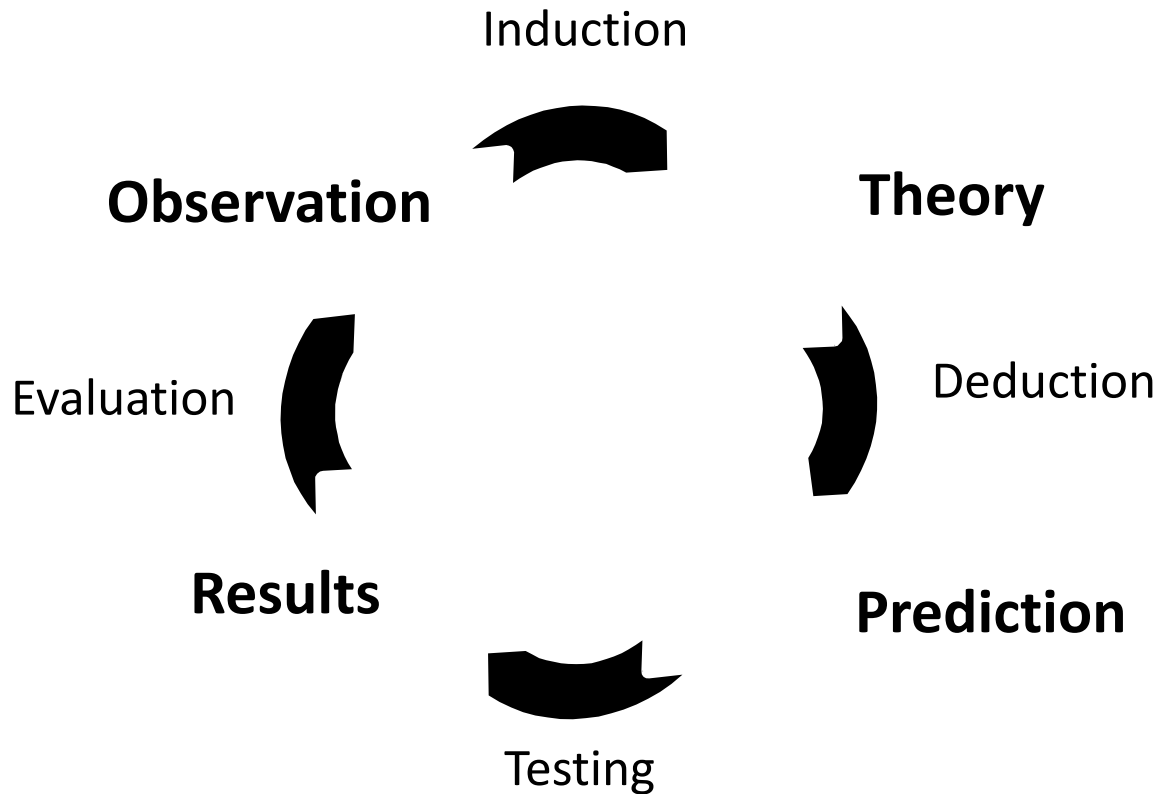
# Evaluation

The process of reflecting on your study to come to a new study (a new cycle!)

## Example:

- Number of participants (15)?
- Convincing (8 out of 15)?
- Operationalizations?
  - E.g.,: How realistic is the intervening-door situation?
  - E.g.,: How appropriate is it to ask people whether they'd seen a change?
- Alternative explanations?
  - All 8 participants who did not notice the change were elderly
  - Selective attention stronger in older people?
  - Only notice change when same social group? Ingroup vs outgroup

# The empirical cycle



Adriaan de Groot  
1914 - 2006

In book: "Theory-data cycle" → incomplete

From specific  
(observation or  
results) to general  
(theory)

# The empirical cycle

Induction

From general (theory) to  
specific (prediction)

**Observation**

**Theory**

Evaluation

Deduction

**Results**

**Prediction**

Testing

Adriaan de Groot  
1914 - 2006

In book: "Theory-data cycle" → incomplete

# Properties of scientific research

- I. The empirical cycle
- II. Correction mechanism
- III. Making science open

# Correction mechanisms

Scientists better intuitions or less biased?

No! We rely on *methods* to correct us

- Maybe my observation is a coincidence?
  - Statistical testing

# Statistical testing

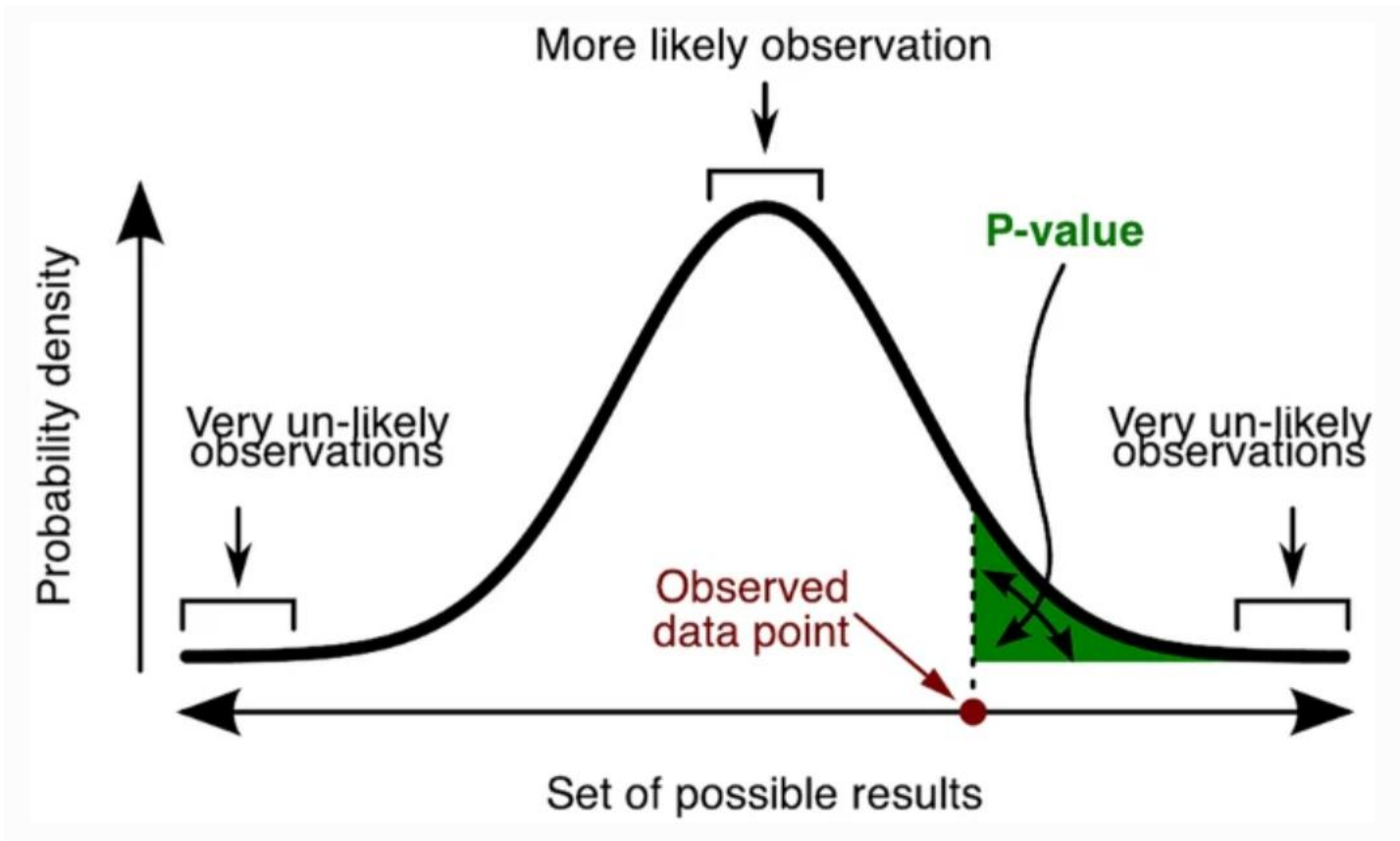


Image Source: Madjarova, S. J., Williams III, R. J., Nwachukwu, B. U., Martin, R. K., Karlsson, J., Ollivier, M., & Pareek, A. (2022). Picking apart p values: common problems and points of confusion. *Knee Surgery, Sports Traumatology, Arthroscopy*, 30(10), 3245-3248.

<https://link.springer.com/article/10.1007/s00167-022-07083-3>

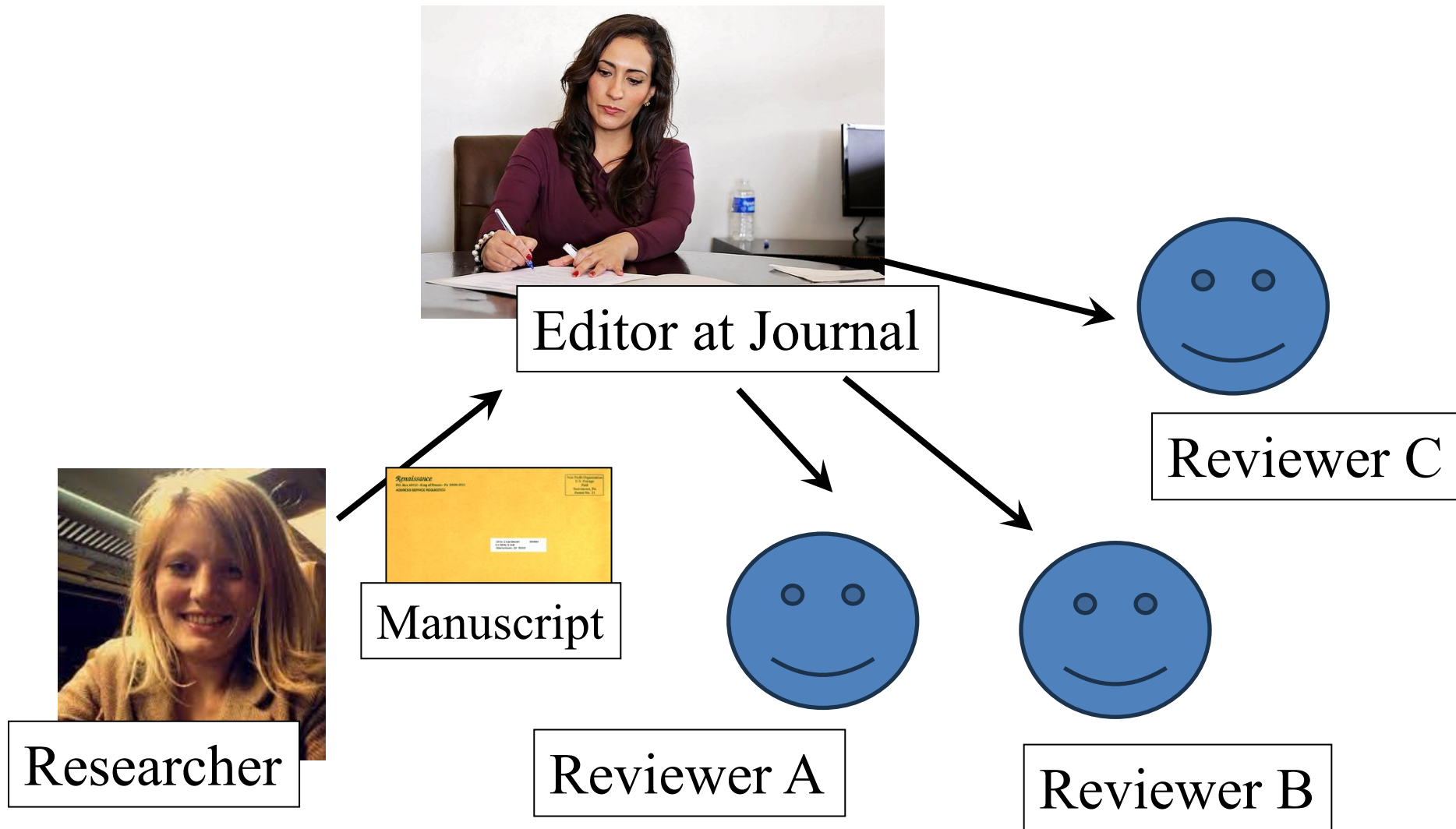
# Correction mechanisms

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No! We rely on *methods* to correct us

- Maybe my observation is a coincidence?
  - Statistical testing
- Maybe someone else would do the research differently/  
recognizes flaws?
  - Peer review

# Peer Review



# Correction mechanisms

Scientists better intuitions or less biased?

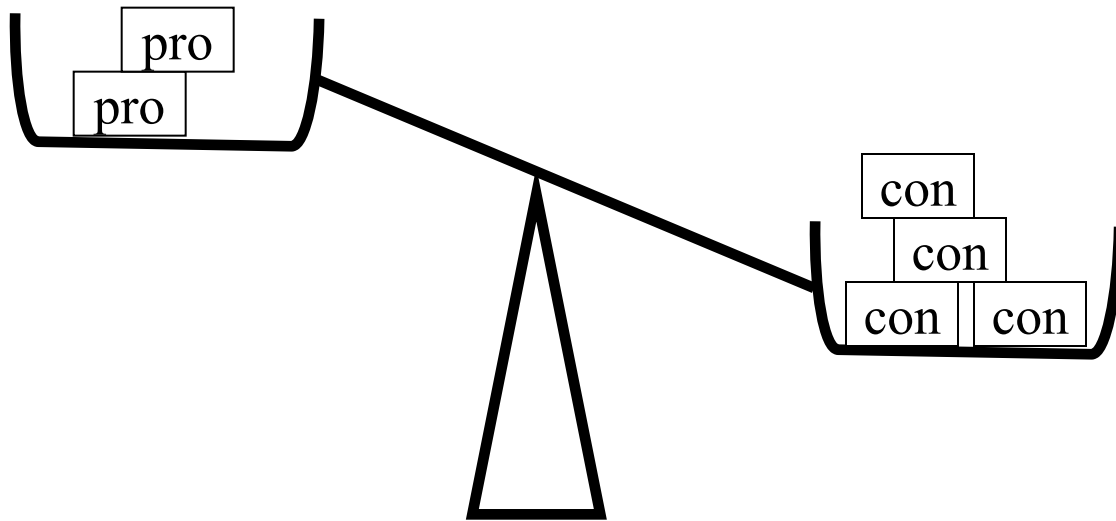
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  - Statistical testing
- Maybe someone else would do the research differently/  
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  - Peer review
- Maybe doing it again would give different results?
  - Replication

# Replication



# Replication



*“weight of the evidence”*

# Correction mechanisms

Scientists better intuitions or less biased?

No! We rely on *methods* to correct us

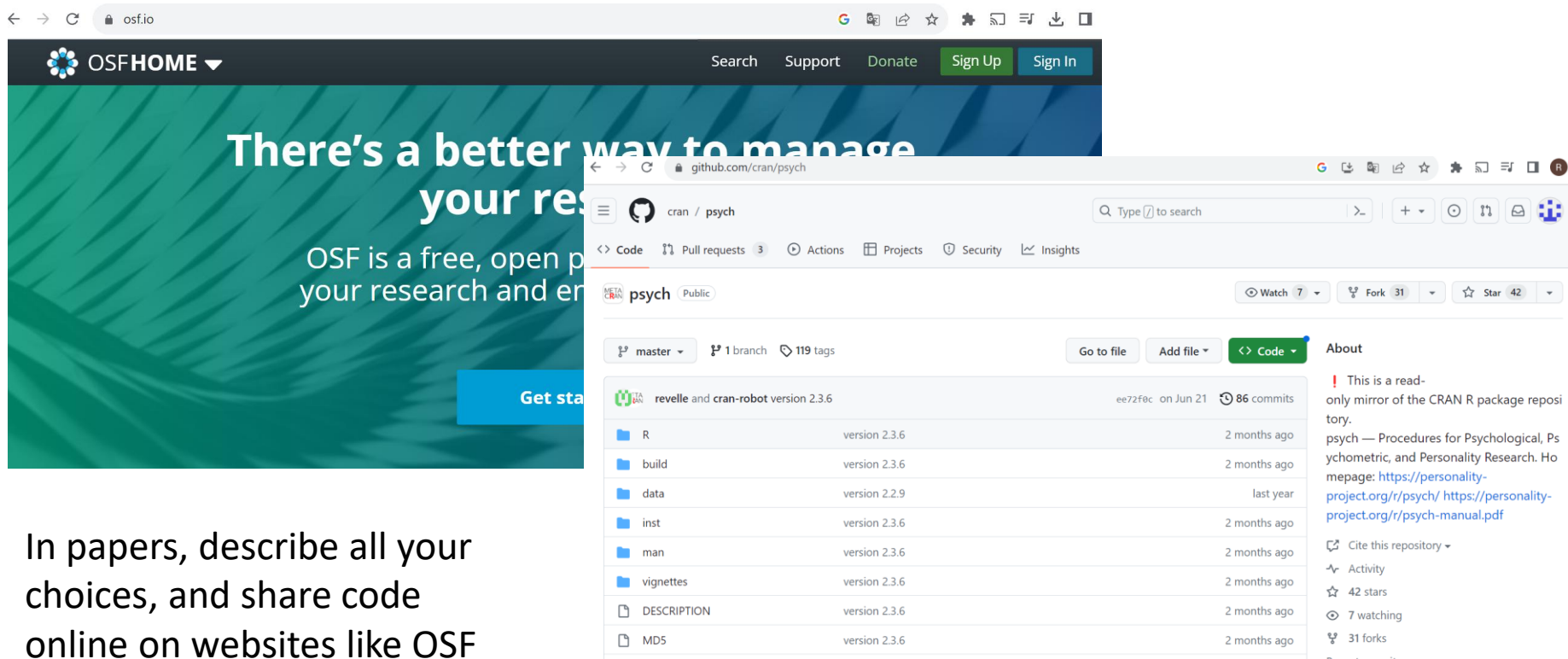
- Maybe my observation is a coincidence?
  - Statistical testing
- Maybe someone else would do the research differently/  
recognizes flaws?
  - Peer review
- Maybe doing it again would give different results?
  - Replication
- Maybe there are confounds?
  - Controlled experiment & randomization

# Properties of scientific research

- I. The empirical cycle
- II. Correction mechanism
- III. Making science open

# Properties of science

*Openness:* Everybody can see how you did it



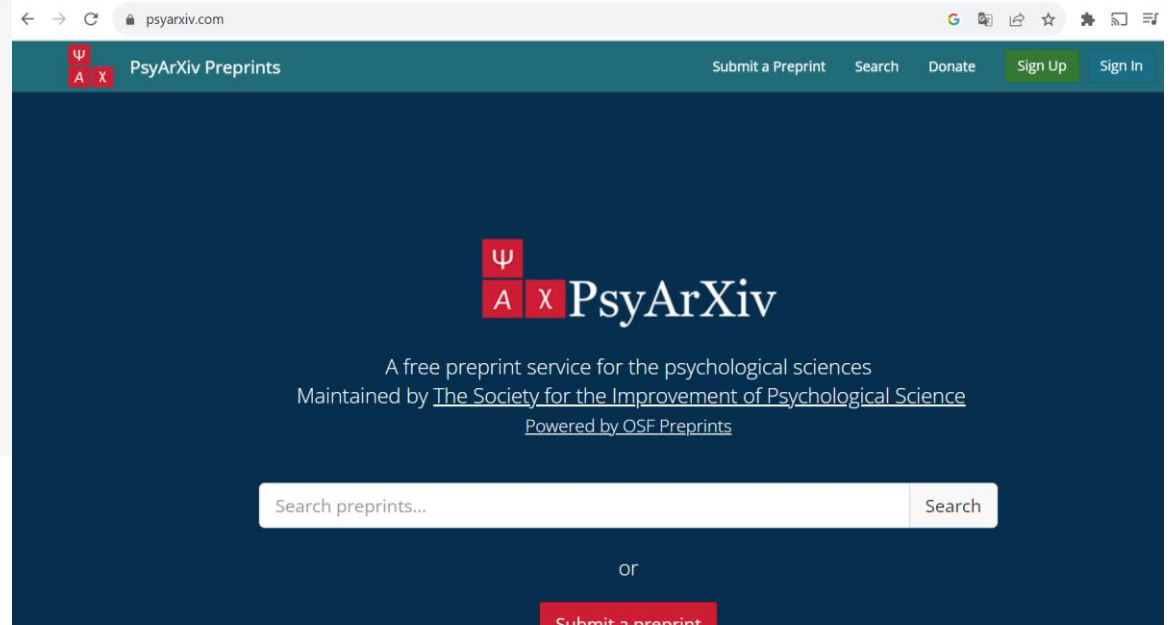
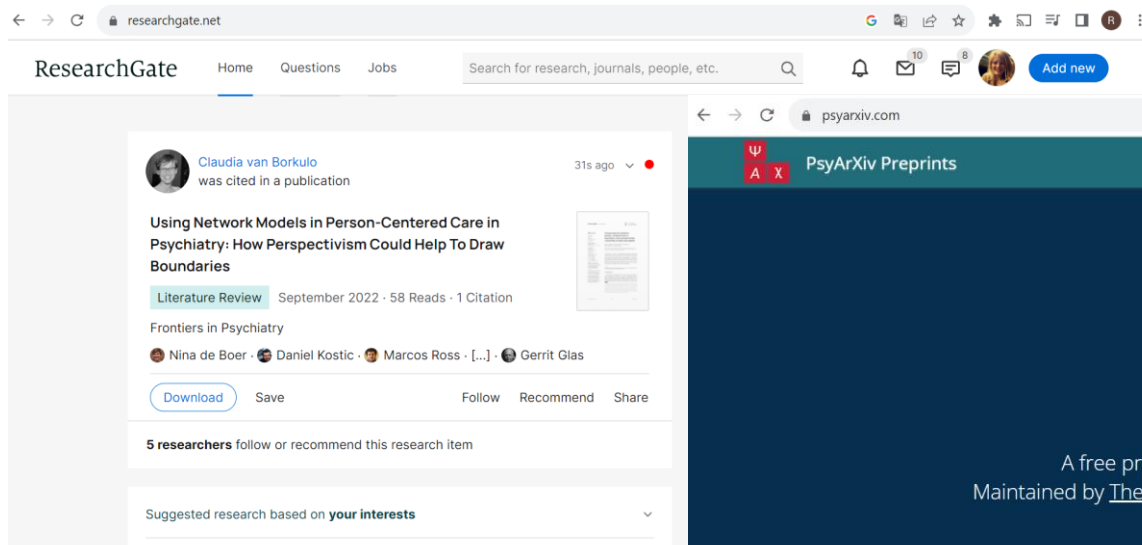
The image displays two overlapping web browser screenshots. The background screenshot is the OSFHOME website, featuring a green and blue abstract pattern and the text "There's a better way to manage your research" and "OSF is a free, open platform for your research and education". The foreground screenshot is a GitHub repository page for "cran / psych". The repository is public and contains a table of files and folders.

| File/Folder | Version       | Last Commit  |
|-------------|---------------|--------------|
| R           | version 2.3.6 | 2 months ago |
| build       | version 2.3.6 | 2 months ago |
| data        | version 2.2.9 | last year    |
| inst        | version 2.3.6 | 2 months ago |
| man         | version 2.3.6 | 2 months ago |
| vignettes   | version 2.3.6 | 2 months ago |
| DESCRIPTION | version 2.3.6 | 2 months ago |
| MDS         | version 2.3.6 | 2 months ago |

In papers, describe all your choices, and share code online on websites like OSF and Github

# Properties of science

- You can share preprints as well as accepted versions of articles on e.g., ResearchGate and PsyArxiv



# Properties of science

- Share research findings!
- e.g., through teaching (to students), through conferences (to colleagues) or through media (to the general public)

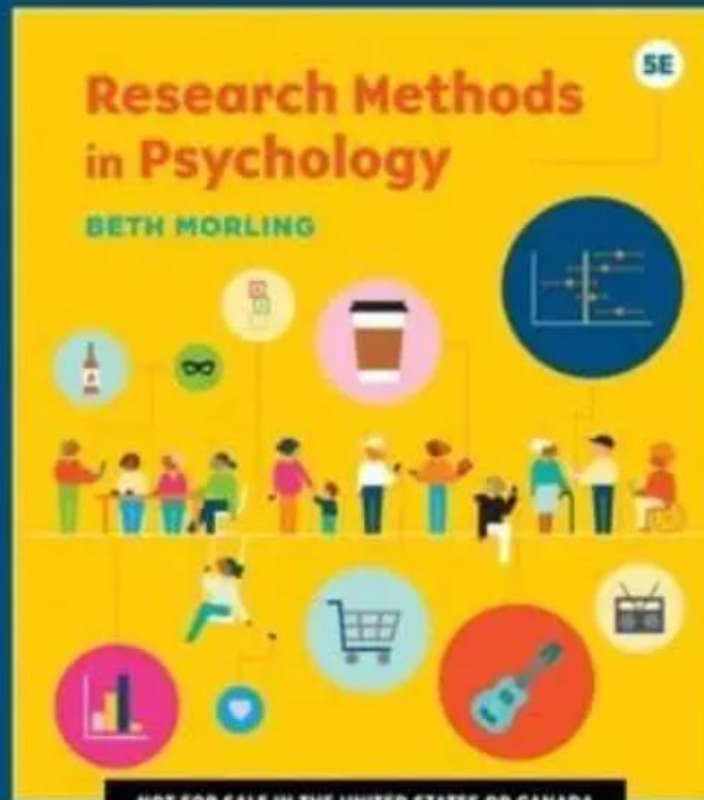


At conferences, scientists share their work with colleagues. For example, in a talk or poster presentation

# Today

- Experience and intuition can serve as an important starting point for scientific research, but the scientific method helps protect us against flaws in these two information sources (e.g., by adding a comparison group and controlling for confounders)
- Psychology is an empirical science and the norm is to follow (all steps of) the empirical cycle
- Other properties of science are the presence of a correction mechanism and that it is open for others to see how you did it

International Student Edition



# Chapter review includes summary and practice questions

## CHAPTER REVIEW



It's time to complete your study experience! Go to **INQUIRY** to practice actively with this chapter's concepts and get personalized feedback along the way.

### Summary

People's beliefs can be based on their own experience, on their intuition, on authorities, or on controlled research. Of these, research information is the most accurate source of knowledge.

#### THE RESEARCH VERSUS YOUR EXPERIENCE

- Beliefs based on personal experience may not be accurate. One reason is that personal experience usually does not involve a comparison group. In contrast, research explicitly asks: Compared to what?
- In addition, personal experience is often confounded. In daily life, many things are going on at once, and it is impossible to know which factor is responsible for a particular outcome. In contrast, researchers can closely control for confounding factors.
- Research has an advantage over experience because researchers design studies that include appropriate comparison groups.
- Conclusions based on research are probabilistic. Research findings cannot predict or explain all cases all the time; instead, they aim to predict or explain a high proportion of cases. Individual exceptions to research findings do not nullify the results.

#### THE RESEARCH VERSUS YOUR INTUITION

- Intuition is a flawed source of information because it is affected by biases in thinking. People are likely to accept an explanation that makes sense intuitively, even if it is not true.
- People can overestimate how often something happens if they consider only readily available thoughts, those that come to mind most easily.

- Intuition is also subject to confirmation bias. We seek out evidence that confirms our initial ideas and fail to seek out evidence that can disconfirm them.
- We all seem to have a bias blind spot and believe we are less biased than everyone else.
- Scientific researchers are aware of their potential for biased reasoning, so they create special situations in which they can systematically observe behavior. They create comparison groups, consider all the data, and allow the data to change their beliefs.

#### TRUSTING AUTHORITIES

- Authorities may attempt to convince us to accept their claims. If their claims are based on their own experience or intuition, we should probably not accept them. If they use well-conducted studies to support their claims, we can be more confident about taking their advice.

#### FINDING AND READING THE RESEARCH

- Tools for finding research in psychology include the online database PsycINFO, available through academic libraries. You can also use Google Scholar or the websites of researchers.
- Journal articles, chapters in edited books, and full-length books should be read with a purpose by asking: What is the theoretical argument? What is the evidence? What do the data say?

- Popular media articles and books can be good sources of information about psychology research, as long as you think critically. Journalists might not always cover psychology research accurately. You can compare a popular media story to the original empirical article to be sure.

- Disinformation is news that is deliberately created to mislead or provoke. Many people believe news that is demonstrably false. When you encounter popular Internet sources, pause and read laterally to verify their claims.

### Key Terms

- |                               |                                  |                        |
|-------------------------------|----------------------------------|------------------------|
| comparison group, p. 26       | bias blind spot, p. 35           | open access, p. 44     |
| confound, p. 29               | empirical journal article, p. 40 | disinformation, p. 49  |
| confederate, p. 29            | review journal article, p. 40    | click restraint, p. 50 |
| probabilistic, p. 31          | meta-analysis, p. 40             | lateral reading, p. 50 |
| availability heuristic, p. 33 | effect size, p. 40               |                        |
| confirmation bias, p. 34      | paywalled, p. 44                 |                        |



To see samples of chapter concepts in the popular media, visit [www.everydayresearchmethods.com](http://www.everydayresearchmethods.com) and click the box for Chapter 2.

### Review Questions

1. Destiny concluded that her new white noise machine helped her fall asleep last night. She based this conclusion on personal experience, which might have confounds. In this context, a confound means:
  - a. Another thing might have also occurred last night to help Destiny fall asleep.
  - b. Destiny's experience has left her puzzled or confused.
  - c. Destiny has not compared last night with times she didn't use the white noise machine.
2. What does it mean to say that research results are probabilistic?
  - a. Researchers refer to the probability that their theories are correct.
  - b. Research predicts all possible results.
  - c. Research conclusions explain a certain proportion of possible cases but may not explain all cases.
  - d. If there are exceptions to a research result, it means the theory is probably incorrect.
3. After two students from his school commit suicide, Marcelino starts to believe that the most likely cause of death in teenagers is suicide. In fact, suicide is not the most likely cause of death in teens. What happened?
  - a. Marcelino was probably a victim of the bias blind spot.
  - b. Marcelino was probably influenced by the availability heuristic; he was too influenced by cases that came easily to mind.
  - c. Marcelino thought about too many examples of teens who died from other causes besides suicide.
  - d. Marcelino did not consider possible confounds.

# More practice at the end of each major section (green heading)



## RETRIEVAL PRACTICE

1. What are two general problems with basing beliefs on experience? How does empirical research work to correct these problems?
2. What does it mean to say that research results are probabilistic?

Time to check your understanding in your Norton Illumine Ebook!

## THE RESEARCH VERSUS YOUR INTUITION

Personal experience is one way we might reach a conclusion. Another is intuition—that is, using our hunches about what seems “natural,” or attempting to think about things logically. While we may believe our intuition is a good source of information, it can lead us to make less effective decisions.

### Ways That Intuition Can Be Biased

Humans are not natural scientific thinkers. We might be aware of our potential to be biased, but we may be too busy or not sufficiently motivated to correct and control for these biases. What’s worse, most of us think we aren’t biased at all. Fortunately, the formal processes of scientific research help prevent these biases from affecting our decisions. Here are four examples of biased reasoning.

#### BEING SWAYED BY A GOOD STORY

One example of a bias in our thinking is accepting a conclusion just because it makes sense or feels natural. We tend to believe good stories—even ones that are false. For example, to many people, bottling up negative emotions seems unhealthy. As with a pimple or a boiling kettle of water, it might seem better to release the pressure by expressing our anger. Sigmund Freud was an early proponent of catharsis, and his biographers speculate that he was influenced by the industrial technology of his day (Gay, 1989). Back then, engines used the power of steam to create vast amounts of energy. If the steam was too compressed, it could have devastating effects on a machine. Freud seems to have reasoned that the human psyche functions the same way. Catharsis makes a good story because it draws on a pressure metaphor that is familiar to most people.

Last century’s cancer surgeons may have been swayed by a good story, too. Cancer multiplies aggressively and fatally. To surgeons (and even to the patients themselves), radical mastectomy may have felt like the right dose of treatment for a terrifying disease. One surgeon wrote in 1956, “The disease, even in its early stages, is such a formidable enemy that it is my duty to carry out as radical an operation as the . . . anatomy permits” (Haagensen, cited in Mukherjee, 2010, p. 194).

The Scared Straight program is another commonsense story that turned out to be wrong. As you read in Chapter 1, such programs propose that when teenagers susceptible to criminal activity hear about the difficulties of prison from actual inmates, they will be scared away from committing crimes in the future. It certainly seems reasonable that impressionable young people *should* be frightened and deterred by such experiences—it’s a good story. However, research has consistently found that Scared Straight programs are ineffective; in fact, they sometimes even cause *more* crime. The intuitive appeal of such programs is strong (which explains why some communities still invest in them), but the research warns against them. One psychologist estimated that the widespread use of the program in New Jersey might have “caused 6,500 kids to commit crimes they otherwise would not have committed” (Wilson, 2011, p. 138). Faulty intuition can even be harmful.

Sometimes a good story will turn out to be accurate, of course, but it’s still important to be aware of the limitations of intuition. When empirical evidence contradicts what your common sense tells you, be ready to adjust your beliefs on the basis of the research. Automatically believing a story just because it makes sense can lead you astray.

#### BEING PERSUADED BY WHAT COMES EASILY TO MIND

Another bias in thinking is the **availability heuristic**, which states that things that pop up easily in our mind tend to guide our thinking (Tversky & Kahneman, 1974). When events or past experiences are vivid, recent, or memorable, they come to mind more easily, leading us to overestimate how often such things happen.

**Figure 2.8** provides an example. Americans are about as likely to die from heart disease as they are from cancer. But Americans are 18 times more likely to use Google to search for information on cancer than information on heart disease. Why? Perhaps because the media report on cancer news more often. If media reports make cancer more cognitively available to us, we may become more concerned and search for information about it. The figure shows a similar trend for terrorism and homicide: Americans search relatively often for these terms, perhaps reflecting their emotional impact and availability in the media. But very few Americans die from these causes.

The availability heuristic leads us to wrongly estimate the number of something or how often something happens. For example, if you visited my campus, you might see some women wearing a headscarf (hijab) and conclude there are many Muslim women here. The availability heuristic could lead you to overestimate, simply because hijabi Muslim women stand out visually. People who practice many other religions do not stand out, so you may underestimate their frequency.

Our attention can be inordinately drawn to certain instances, leading to overestimation. A professor may complain that “everybody” uses a cell phone during their class, when in fact only one or two students do so; it’s just that their annoying behavior stands out. You might overestimate how often your kid sister leaves her bike out in the rain, only because it’s harder to notice the times she puts it away. When driving, you may complain that you always hit the red lights, only

# MC question

Why does Morling (author of the methods book) write that psychological scientists don't prove theories?

- a) As empiricists we want to support claims with direct observations, and observations can not prove general theories because we never observe all cases.
- b) Psychology is an empirical science and therefore structured observations rather than theories are the goal.
- c) Psychology is a complex topic to study that involves many confounds.

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This MC question is based on Ch.1, p.13 in Morling, and see also slide 46

# MC question

Sara tells Peter that all swans are white. From this statement, Peter infers that the next swan he will see will be white. What kind of inference is Peter applying?

- a) Inductive inference
- b) Deductive inference
- c) Both deductive and inductive inference

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This MC question is based on the slides of this lecture: see slide 46

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Which of the following is a problem of *experience* as a source of information?

- a) There is no comparison group
- b) People are swayed by a good story
- c) People focus on the evidence they like best

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Which of the following is a problem of *experience* as a source of information?

- a) **There is no comparison group**
- b) People are swayed by a good story
- c) People focus on the evidence they like best

This MC question is based on Morling Ch.2, p.26.  
The other answers represent problems with  
“intuition” as a source of information (p32-35).