Science, truth, and honesty

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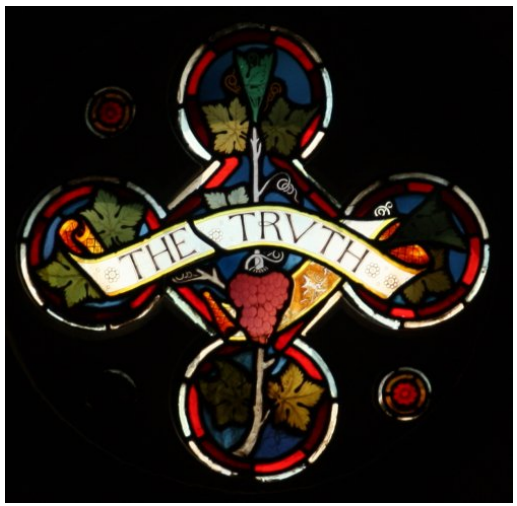
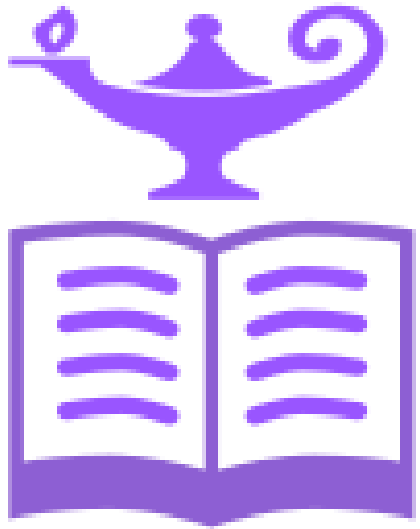
Topics

- What is truth?
- What is science?





Truth as a property of claims

- Statements about truth
  - "Andy is in Plymouth" $\rightarrow$ TRUE
  - "Andy is on the Moon" $\rightarrow$ FALSE
- Statements about the limits of our knowledge
  - "Andy was born in the month of June" $\rightarrow P(true) = 1/12$
  - "Andy has £3.57 in his pocket" $\rightarrow$ UNKNOWN

Subjective and objective claims

- **Subjective claims** are those whose truth differs for different people.
- "My favourite colour is blue"
- **Objective claims** are those whose truth value is not affected by who says it.
- "Charlotte Smith's favourite colour is blue"
- The term *subjective* is widely misused.
- "I think chocolate tastes better than cabbage" is subjective.
- "Chocolate tastes better than cabbage" is objective, and is amenable to scientific test.

Testing a claim

Online poll 1 ...

Vague claims are subjective

- "Smoking is wrong" - Subjective.
- "Smoking increases life expectancy" - Objective.
- Note: Claims do not need to be correct to be objective.

Objective or subjective?

Online poll 2 ...

Scientific claims

- Science is the process of making scientific claims...
- ...and determining whether those claims are true or false.
- Scientific claims are **objective** rather than **subjective**.
- Scientific claims are those whose truth can, at least in principle, be clearly determined.
- Scientific claims are largely **descriptive** rather than **prescriptive**.

Descriptive versus prescriptive claims

- **Descriptive claims** say something about how the world is, was, or will be:
  - "Plymouth University was once a polytechnic"
  - "Reaction times slow as people age"
  - "The UK's Gross Domestic Product will grow by 3% next year"

Descriptive versus prescriptive claims

- **Prescriptive claims** say something about how how things *should* be:
  - "Abortion should be made illegal"
  - "People should not drink and drive"
- How to examine prescriptive claims scientifically:
  - Look for a descriptive claim that might support the prescriptive claim:
  - *Anti-abortion*: "feotal pain receptors have developed by eight weeks gestation"
  - *Pro-abortion*: "foetal pain receptors are not connected to the brain until 20 weeks"
  - *Anti-drink-driving*: "Risk of car accidents doubles at 80mg/100ml blood alcohol (UK drink-driving limit)"

Descriptive versus prescriptive claims

- Science is not about avoiding societally difficult questions; nor is it exclusively about societal impact.
- It's about making claims that can be reliably examined.
  - Some of those claims have direct societal impact (drink driving claims)
  - Other claims change the way we view ourselves and the world in the longer term.

Absolute versus contextual claims

- **Absolute claims** are invariant. They hold always. Their truth value is not conditional on circumstances. They are not conditional on time or place.
- **Contextual claims** hold under a defined set of conditions.
  - "The leadership positions that women occupy are less promising than those of their male counterparts"
  - Not intended to be an absolute claim.
  - If the claim is true now, but no longer true in 20 years, this does not undermine the truth value of the original claim.
- Scientists generally wish to make claims that are as context-independent as possible; otherwise it is hard to make further predictions.
  - "The leadership positions that women in 2003 in UK FTSE100 companies occupy are less promising than those of their male counterparts"

Observable, measurable states

- Scientific claims are based on observable, measurable states
- Objective, descriptive claims are not always measurable.
- "Impulsive people are more likely to be criminals"
  - Being a criminal is a state that is observable and measurable.
  - Impulsivity is a vague concept that must be translated into something measurable.
  - e.g. Barratt Impulsivity Scale.
- "People with one or more criminal convictions score higher on the BIS than people without a conviction"

Independent replication

- Scientific claims must be expressed in such a way that they permit independent replication.
  - "Willsian Therapy reduces depression"
  - Wills is the only person who can perform Willsian therapy
  - The claim is not scientific because any attempt to assess its truth value would have to involve Wills and hence could not be independently replicated.

Scientific claims

- **O**bjective
- **D**escriptive
- **A**ppropriately context-independent
- **T**rue or false
- **B**ased on observable measurable states
- **I**ndependent replication
- **F**alsifiable

Activity 1: Scientific claims

Come up with, or find, three psychology-relevant claims that are:

1. Largely unscientific (0-1 ODA.BIF)
2. Somewhat scientific (2-3 ODA.BIF)
3. Largely scientific (5-6 ODA.BIF)

In your group:

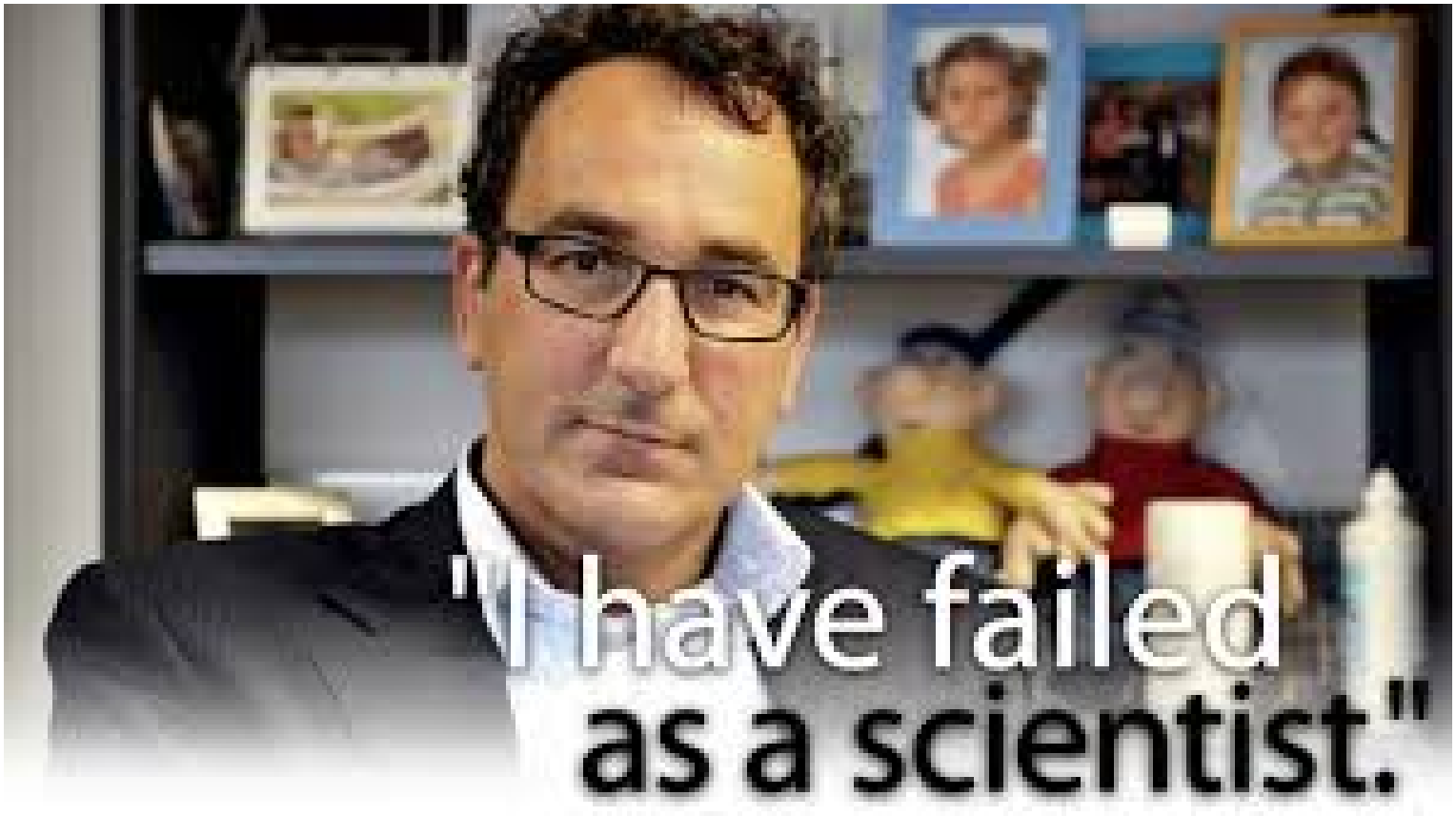
- Introduce yourselves
- Pick one favourite psychology topic each
- Decide which is going to be 1,2,3 scientific
- Write, or find online, a claim for each

One source of claims:
`https://nobaproject.com/browse-content`

Activity 1

- Claims you came up with.
- General Q & A for part 1.

Diderik Stapel

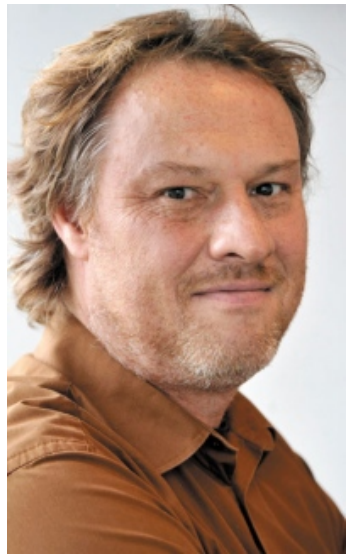


Dutch social psychologist - admitted to inventing data
See also - Dirk Smeesters - Dutch social psychologist - “cherry picked” data.

Science and dishonesty

- Dishonesty
  - Partially reporting your results (if your intention is obfuscation).
  - Choosing a form of data analysis because it gives you the result you want.
  - Publishing the same data more than once.
  - Making up data!
- Dishonesty gets in the way of reliably evaluating claims.

Failures to replicate



Ap Dijksterhuis. Dutch social psychologist - his "intelligence priming" effects fail to replicate.
`http://www.nature.com/news/disputed-results-a-fresh-blow-for-social-psychology-1.12902`
See also - John Bargh - US social psychologist - his "age and walking pace" results fail to replicate

Reproducibility project

	Replications $P < 0.05$ in original direction	Percent
Overall	35/97	36
JPSP, social	7/31	23
JEP:LMC, cognitive	13/27	48
PSCI, social	7/24	29
PSCI, cognitive	8/15	53

http://www.sciencemag.org/content/349/6251/aac4716

Activity 2: Does it replicate?

Ludmer et al. (2011). "Uncovering camouflage: amygdala activation predicts long-term memory of induced perceptual insight"

In your group:

1. Use Google Scholar to find Ludmer et al. (2011)
2. Click "cited by" to get list of citations
3. Split pages of citations between you
4. To get freely-available versions of papers, you may need to click "all X versions"

Activity 2: Does it replicate?

On your pages, search for replications:

- Following words in title, journal name or abstract means you can skip “review“, “meta-analysis“, “lecture“, “theory article“, “discussion article“ - these are discussions, not attempts to replicate.
- No Results section - not an experiment - skip
- No pictures of brains - not a neuroscience study - skip
- Not studying humans - skip
- Not written in English - you can skip for this exercise
- Not a replication - e.g. studies speech, musical creativity
- If it might be a replication i.e. does an aha! experiment or something like it - are the results the same? Specifically, is activation of the amygdala demonstrated?

Activity 2

- Any potential replications? Did they work?
- General Q & A for part 2.

RStudio login

- Check you have received email with login details
- Check your login works: rstudio.plymouth.ac.uk
- Any issues, contact Tech office urgently to resolve: tech.psy@plymouth.ac.uk

Further materials

- The notes accompanying this lecture
- NOVA chapter: `https://nobaproject.com/modules/the-replication-crisis-in-psychology`