

# 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”  $\rightarrow P(\text{true}) = 1/12$
  - ▶ “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 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*: “foetal 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, two psychology-relevant claims that are:

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

In your pair:

- ▶ Introduce yourselves
- ▶ Pick one favourite psychology topic each
- ▶ Decide which is going to be largely scientific, and which largely unscientific
- ▶ 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
<i>JPSP</i> , social	7/31	23
<i>JEP:LMC</i> , cognitive	13/27	48
<i>PSCI</i> , social	7/24	29
<i>PSCI</i> , cognitive	8/15	53

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

# RStudio login

- ▶ Check your login works:  
`https://psyrstudio.plymouth.ac.uk`
- ▶ Any issues, contact Tech office urgently to resolve:  
`tech.psy@plymouth.ac.uk`

## Activity 2: Does it replicate?

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

In your tutor 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: Does it replicate?

At the beginning of the next lecture, I will ask:

- ▶ Any potential replications?
- ▶ Did they work?

## Further materials

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

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