How should CBS react to the replication crisis in science?

Sandoz, De Houwer, Hayes, Hussey, McCracken

GHENT UNIVERSITY

Brief introduction to replicability

Why are we talking about replicability?

- Bem (2011)

    - "Evidence" humans can read the future

- Simmons et al. (2011)

    - Modal strategies can make any data produce statistically significant results

- Consensus that replicability of psychology research is problematically low

    - 1/3 of 100 experiments replicate (Open Science Collaboration, 2015)

    - 5/6 seminal studies do not replicate (Persp Psych Sci RRRs)

- Problem goes beyond replicability, but does include replicability

GHENT
UNIVERSITY

What is replicability?

- An unclear and contentious word

  - Replicability ≠ recreation of the past

  - Replic<u>ability</u> ≠ only running replication studies

    1. Reproducibility - *same data and analysis*

    2. Robustness - *different analytic strategy*

    3. Replicability - *same measures & population, different sample*

    4. Generalisability - *different materials and/or different samples*

- Open science & transparency

- ~~Fraud detection/prevention~~

- Real aim is to <u>increase the quality of our research</u>, increases in replicability is a side benefit

LeBel, Vanpaemel et al (2017), Nuijten et al (2016)

GHENT UNIVERSITY

Why are <u>we</u> talking about replicability?

- Are replication failures failures of theorising, methodology, or statistics?

  - CBS advantage on purpose/philosophy front

  - *But also vulnerable on methodology & statistics*

- Gap between the historically important behavioural work and what we mostly publish now

  - 79% of experimental papers in JCBS in 2016 stated *a priori* hypotheses and used null hypothesis significance testing (*p* values)

  - Clinical trials represent a important subsection of CBS research

    - At least this chunk of research would benefit from replicability initiatives

Key articles

- *Reasons and solutions discussed at length elsewhere:*

    - Asendorpf, Conner, De Fruyt, De Houwer, Denissen, Fiedler, … Wicherts. (2013). Recommendations for Increasing Replicability in Psychology: Recommendations for increasing replicability. *European Journal of Personality, 27*(2), 108–119.

    - Munafò, Nosek, Bishop, Button, Chambers, Percie du Sert, … Ioannidis. (2017). A manifesto for reproducible science. *Nature Human Behaviour, 1*(1), 21

    - Open Science Collaboration. (in press). Maximizing the reproducibility of your research. In Lilienfeld & Waldman (Eds.), *Psychological Science Under Scrutiny: Recent Challenges and Proposed Solutions.* New York, NY: Wiley.

    - Spellman, Gilbert, & Corker. (2017). Open Science: What, why, and how.

# If I knew how it was made, would I still want to eat it?

‘‘I'm tired of being scared of my data’’
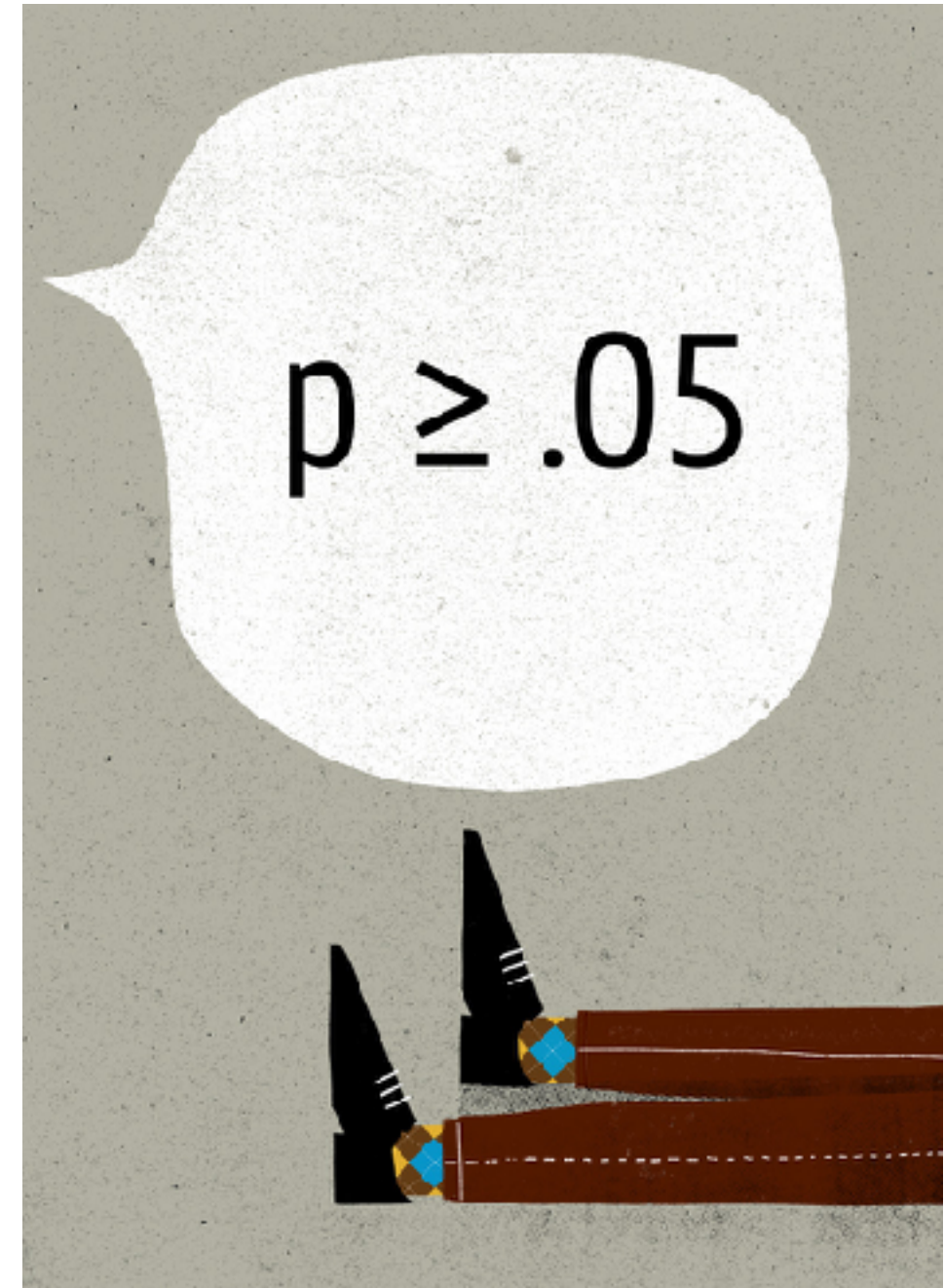
Contingencies governing behaviour of the scientist

- Publish or perish

    - Contingent on positive findings

    - Dominance of null hypothesis significance testing

- CBS in a unique position to study these contingencies!

- Sidman (1960) lists several motivations to run a study

    1. Test a hypothesis

    2. Demonstrate novel behavioural phenomena

    3. Try a new procedure

    4. Inquisitiveness about the world

GHENT
UNIVERSITY
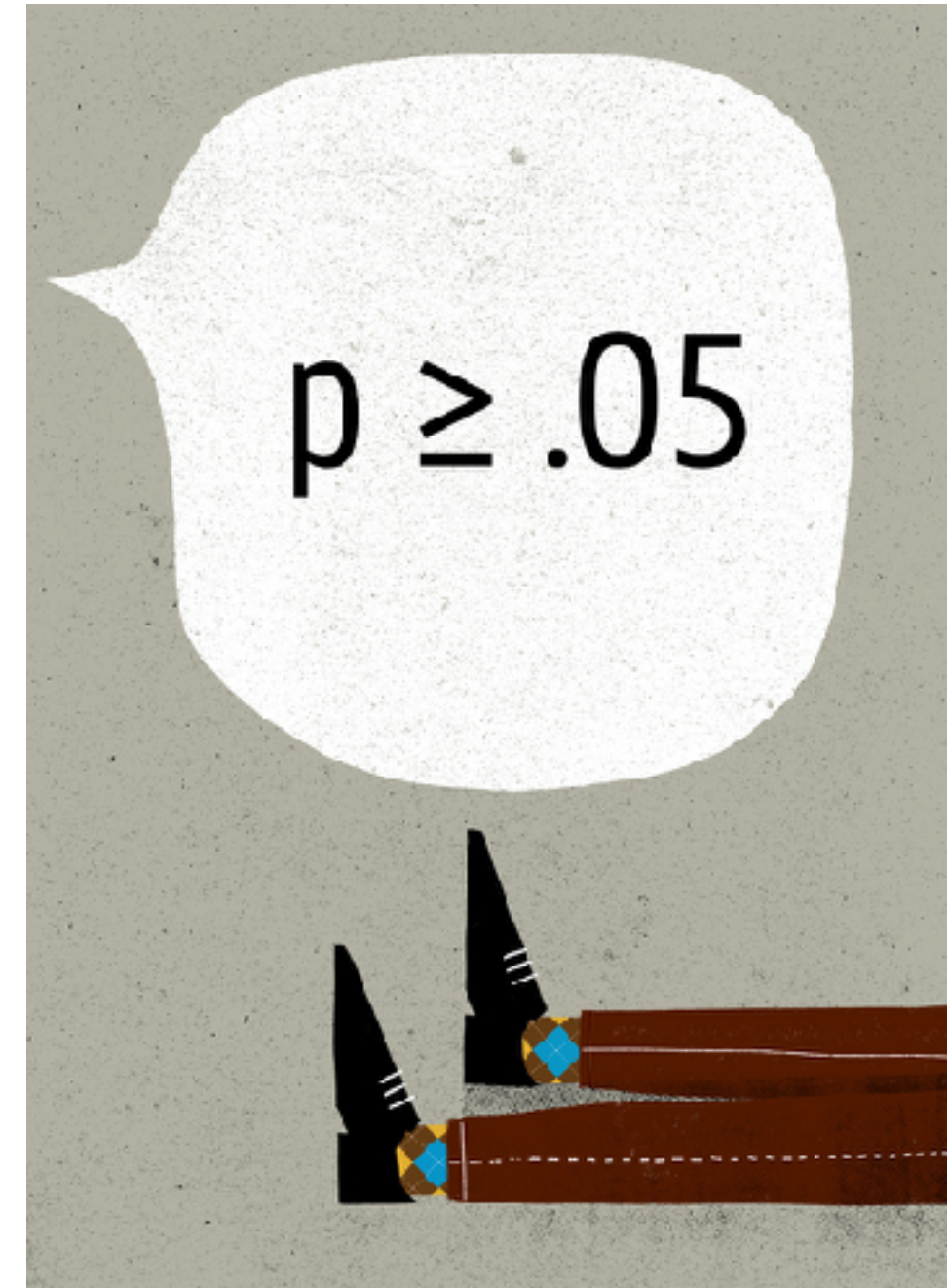
Replicability initiatives that could enhance CBS

- **Open materials**

- **Open data**

  - Required by US federal funding and EU funding

  - EU prescribes that it is the norm

- **Preregistration**

  - Lab-book approach to research

- **Registered reports**

  - Moves contingencies of publishing from *finding* positive results to *asking* good questions

- **21 word solution**

Common fears and issues

- *"Adhering to these initiatives would slow down my research"*

    - No, especially across studies

        - Decrease duplication of effort, save time and money

            - Obtaining, creating and modifying materials
            - Running studies
            - Processing & analysing data
            - Informing future research
            - Track your own thought process over time

    - Easier to publish inductive work, null results, "imperfect" data

    - All optional: *positive reinforcement only*

Common fears and issues

- *"You cannot replicate any experiment, because behaviours-in-context always differ"*

  - "Replicability" is more about quality of research than doing replication studies

  - More than repeating old experiments, but repeating old experiments to gain new data

    - Not fact checking

  - Inevitable deviations between experiments in:

    - past environment (pre experimental learning history)
    - current environment (experiment context)
    - observed behaviour

  - Studying impact of these deviations speaks to the nature of the phenomena

Benefits already supported by data

↑ Understanding of the nature of the phenomena

↑ Citations

↑ Funding

↑ Visibility

↑ Ability to do riskier research, publish "imperfect" results

↑ Speed of selection and discarding of ideas

↓ Reporting mistakes

(McKiernan et al., 2016 review; Wicherts et al., 2011)

Panel discussion