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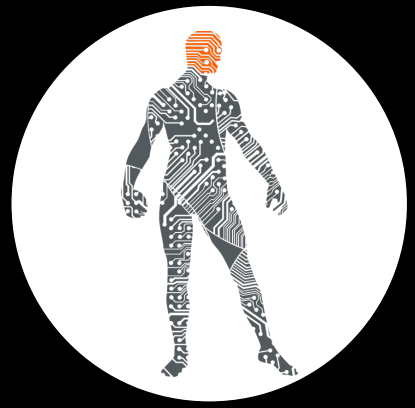


# Research Methods in Engineering Psychology – Lecture 4

B.Sc. Engineering Psychology

Prof. Dr. Robin Welsch

# Doing better research

- Ethical challenges & Ethical standards
- Ethics at Aalto
- Questionable research practices
- Open Science and Pre-registration
- Scientific Misconduct

# Milgram experiment

https://www.youtube.com/watch?v=rdrKCilEhC0&t=1402s

- Participants (teachers) were instructed to give electrical shocks of increasing shocks to a learner if they did wrong in a learning-task
- Experimenters prompted participants to give more shocks
- The learner was an actor and screamed in pain

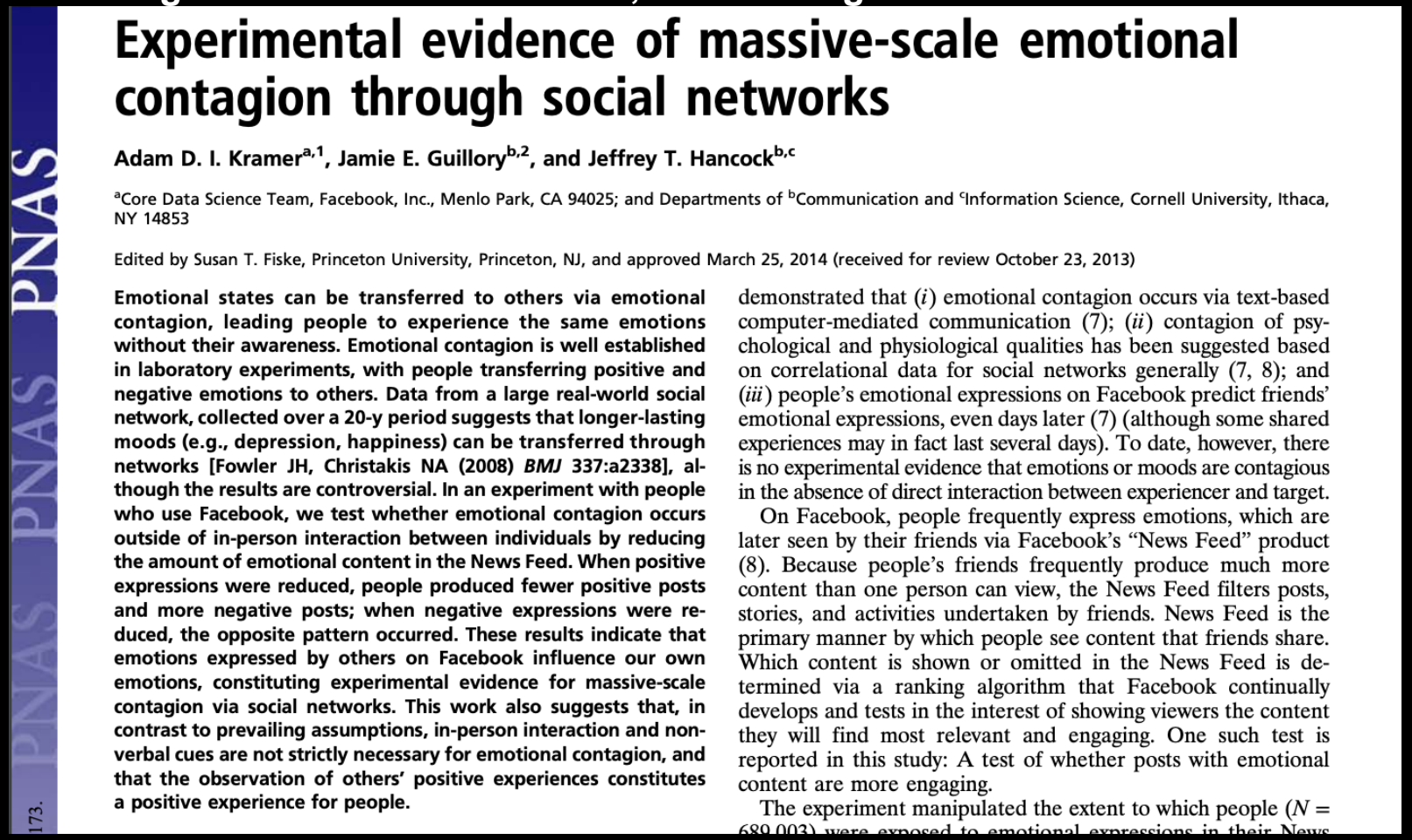
| Voltage | Up to 300 V | 300 V | 315 V | 330 V | 345 V | 360 V | 375 V | 390 V to 435 V | **450 V** |
|---|---|---|---|---|---|---|---|---|---|
| Number of people stopping | 0 | 5 | 4 | 2 | 1 | 1 | 1 | 0 | **26** |

# Can research do harm?

Discuss for 5 minutes

# Facebook's manipulation of the timeline

**The authors noted in their paper, "[The work] was consistent with Facebook's Data Use Policy, to which all users agree prior to creating an account on Facebook, constituting informed consent for this research."**



PNAS PNAS PNAS

## Experimental evidence of massive-scale emotional contagion through social networks

Adam D. I. Kramer[a,1], Jamie E. Guillory[b,2], and Jeffrey T. Hancock[b,c]

[a]Core Data Science Team, Facebook, Inc., Menlo Park, CA 94025; and Departments of [b]Communication and [c]Information Science, Cornell University, Ithaca, NY 14853

Edited by Susan T. Fiske, Princeton University, Princeton, NJ, and approved March 25, 2014 (received for review October 23, 2013)

**Emotional states can be transferred to others via emotional contagion, leading people to experience the same emotions without their awareness. Emotional contagion is well established in laboratory experiments, with people transferring positive and negative emotions to others. Data from a large real-world social network, collected over a 20-y period suggests that longer-lasting moods (e.g., depression, happiness) can be transferred through networks [Fowler JH, Christakis NA (2008) *BMJ* 337:a2338], although the results are controversial. In an experiment with people who use Facebook, we test whether emotional contagion occurs outside of in-person interaction between individuals by reducing the amount of emotional content in the News Feed. When positive expressions were reduced, people produced fewer positive posts and more negative posts; when negative expressions were reduced, the opposite pattern occurred. These results indicate that emotions expressed by others on Facebook influence our own emotions, constituting experimental evidence for massive-scale contagion via social networks. This work also suggests that, in contrast to prevailing assumptions, in-person interaction and nonverbal cues are not strictly necessary for emotional contagion, and that the observation of others' positive experiences constitutes a positive experience for people.**

demonstrated that (*i*) emotional contagion occurs via text-based computer-mediated communication (7); (*ii*) contagion of psychological and physiological qualities has been suggested based on correlational data for social networks generally (7, 8); and (*iii*) people's emotional expressions on Facebook predict friends' emotional expressions, even days later (7) (although some shared experiences may in fact last several days). To date, however, there is no experimental evidence that emotions or moods are contagious in the absence of direct interaction between experiencer and target.

On Facebook, people frequently express emotions, which are later seen by their friends via Facebook's "News Feed" product (8). Because people's friends frequently produce much more content than one person can view, the News Feed filters posts, stories, and activities undertaken by friends. News Feed is the primary manner by which people see content that friends share. Which content is shown or omitted in the News Feed is determined via a ranking algorithm that Facebook continually develops and tests in the interest of showing viewers the content they will find most relevant and engaging. One such test is reported in this study: A test of whether posts with emotional content are more engaging.

The experiment manipulated the extent to which people ($N$ = 689,003) were exposed to emotional expressions in their News

173.

Kramer, A. D., Guillory, J. E., & Hancock, J. T. (2014). Experimental evidence of massive-scale emotional contagion through social networks. Proceedings of the National Academy of Sciences, 111(24), 8788-8790.

# Do participants need to know they are part of a study?

Discuss for 5 minutes

# Ethical challenges

- Nuremberg, 1947: Nazi physicians on trial for conducting cruel experiments on concentration camp prisoners during WWII.
  - Breaking bones
  - High Altitudes and freezing waters
  - Physicians convicted
- Tuskegee Syphilis Study, 1932-1972: Observing the effects of untreated syphilis
  - Treatment was possible (since 1943)
  - 400 African Americans with syphilis → more than 100 died of syphilis
  - Researchers told the men they were being treated for “bad blood,” → no consent

# Nuremberg code

**Ethical code in response to 2nd world war ca. 1949 developed by the United States Military Tribunal during the trial of doctors who had conducted unethical medical experiments on prisoners at the Auschwitz concentration camp**

1. The voluntary consent of the human subject is absolutely essential.
2. The experiment should be such as to yield **fruitful results for the good of society**, unprocurable by other methods or means of study, and not random and unnecessary in nature.
3. The experiment should be so designed and based on the results of animal experimentation and a knowledge of the natural history of the disease or other problem under study that the anticipated results will **justify the performance of the experiment**.
4. The experiment should be so conducted as to **avoid all unnecessary physical and mental suffering** and injury.
5. No experiment should be conducted where there is an **a priori reason to believe that death or disabling injury** will occur; except, perhaps, in those experiments where the experimental **physicians also serve as subjects**.
6. The **degree of risk** to be taken should never **exceed that determined by the humanitarian importance** of the problem to be solved by the experiment.
7. **Proper preparations** should be made and adequate facilities provided to protect the experimental subject against even remote possibilities of injury, disability, or death.
8. The experiment should be conducted only by **scientifically qualified persons**. The highest degree of skill and care should be required through all stages of the experiment of those who conduct or engage in the experiment.
9. During the course of the experiment the human subject should be at **liberty to bring the experiment to an end** if he has reached the physical or mental state where continuation of the experiment seems to him to be impossible.
10. During the course of the experiment the **scientist in charge must be prepared to terminate the experiment** at any stage, if he has probable cause to believe, in the exercise of the good faith, superior skill and careful judgment required of him that a continuation of the experiment is likely to result in injury, disability, or death to the experimental subject.

# Declaration of Helsinki (1964)

- In the purely scientific application of clinical research carried out on a human being, it is the duty of the **doctor to remain the protector of the life and health** of that person on whom clinical research is being carried out.
- The **nature, the purpose and the risk** of clinical research must be explained to the subject by the doctor.
- Clinical research on a human **being cannot be undertaken without his free consent** after he has been informed; if he is legally incompetent, the consent of the legal guardian should be procured.
- The subject of clinical research should be in such a mental, physical and legal state as to be able to exercise **fully his power of choice**
- **Consent should, as a rule, be obtained in writing**. However, the responsibility for clinical research always remains with the research worker; it never falls on the subject even after consent is obtained
- The investigator must respect the right of each individual to **safeguard his personal integrity**, especially if the subject is in a dependent relationship to the investigator.
- At any time during the course of clinical research the subject or his guardian should be free to **withdraw permission** for research to be continued.
- The investigator or the investigating team should **discontinue** the research if in his or their judgement, it may, if continued, be harmful to the individual

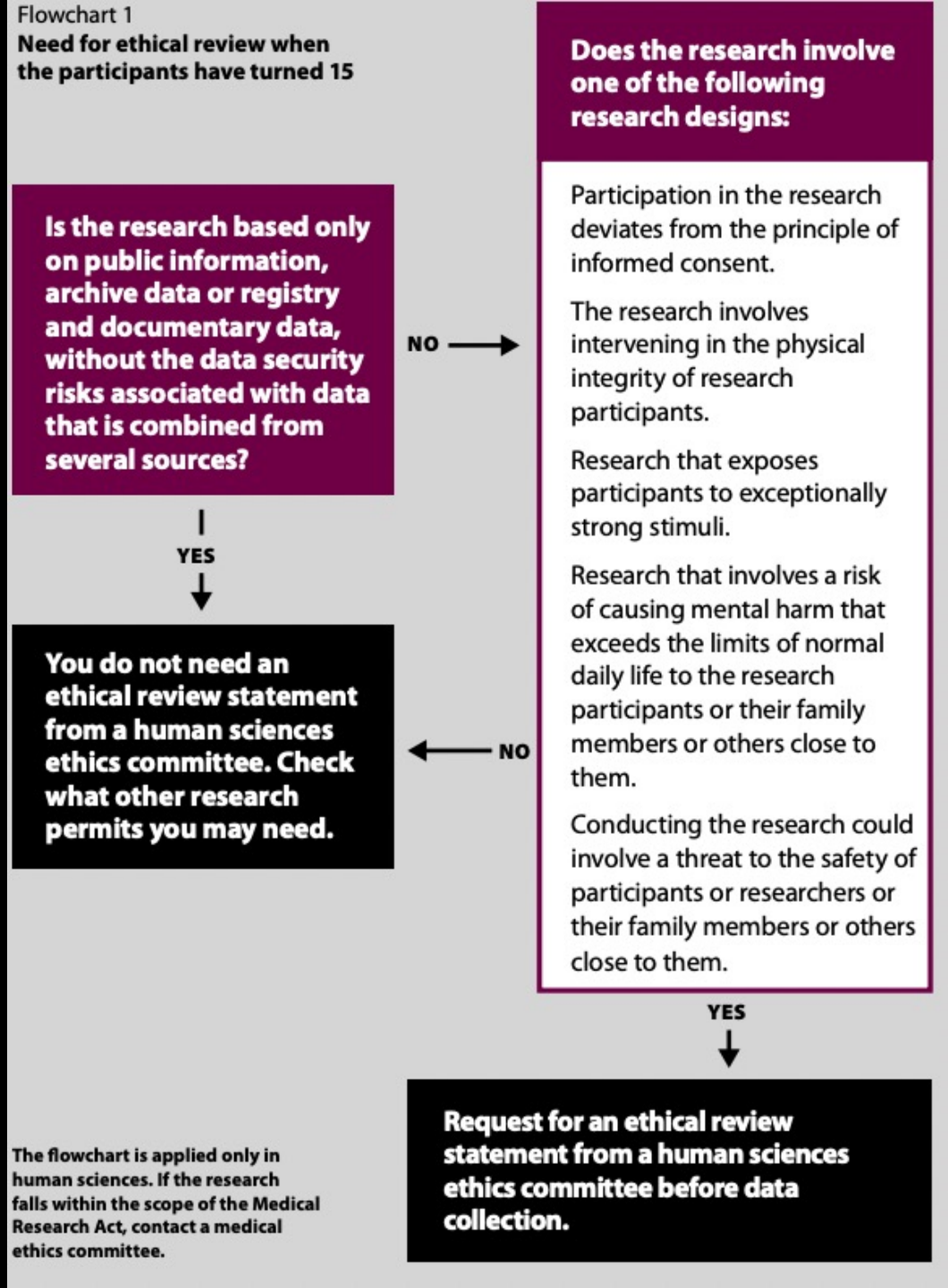
# Declaration of Helsinki (2013)

**Issued by the World Medical Assosciation  in 1964 and updated last in 2013**

- Focuses on medical research but is adopted in a lot of research domains that involve human subjects such as psychology
- Has 37 points that include
  - Research Registration and Publication and Dissemination of Results
  - The use of unproven interventions (only if no proven medical treatement is effective)
  - Post-trial provisions
  - Use of placebo
  - Informed consent
  - Privacy and Confidentiality
  - The implementation and work of research ethic comittees
  - Use of research protocols
  - Protection of vulnerable groupts
  - Risk has to be managed

# When to get ethical review

- Tenk has published guidelines that structure in which cases to get ethical review
- Aalto has specified these more closely
- Certain criteria warrant ethical review before the start of the study
- In doubt: always undergo ethical review




https://tenk.fi/sites/default/files/2021-01/Ethical_review_in_human_sciences_2020.pdf

# Checklist for obtaining ethical review

- ❑ Deviation from informed consent
- ❑ Violation of physical integrity
- ❑ Research with minors <15 years
- ❑ Research involving people with limited capacity
- ❑ research that exposes participants to exceptionally strong stimuli
- ❑ Research that involves a risk of causing mental harm that exceeds the limits of normal daily life
- ❑ conducting the research could involve a threat to the safety of participants or researchers

https://tenk.fi/sites/default/files/2021-01/Ethical_review_in_human_sciences_2020.pdf

# Informed consent

- Informed consent is the process of obtaining permission from a research participant before they agree to participate in a study
- We need informed consent to protect the rights and autonomy of research participants and ensure that they are aware of the nature and purpose of the research, any potential risks or benefits, and their rights as participants
- Sometimes informed consent is not fully possible (e.g. one has to deceive the participant) → full informed consent can be obtained afterwards
  - This procedure needs review from an ethics committee

# Checklist informed consent

- ❑A clear and concise explanation of the research and its purpose
- ❑A description of any procedures or interventions involved in the research
- ❑A disclosure of any potential risks or benefits associated with participation
- ❑An explanation of the participant's rights, including the right to withdraw from the study at any time
- ❑A clear statement that participation is voluntary and that the participant is free to decline or withdraw without consequences
- ❑An opportunity for the participant to ask questions and receive answers before deciding to participate
- ❑A signed consent form or other written documentation of the participant's agreement to participate.

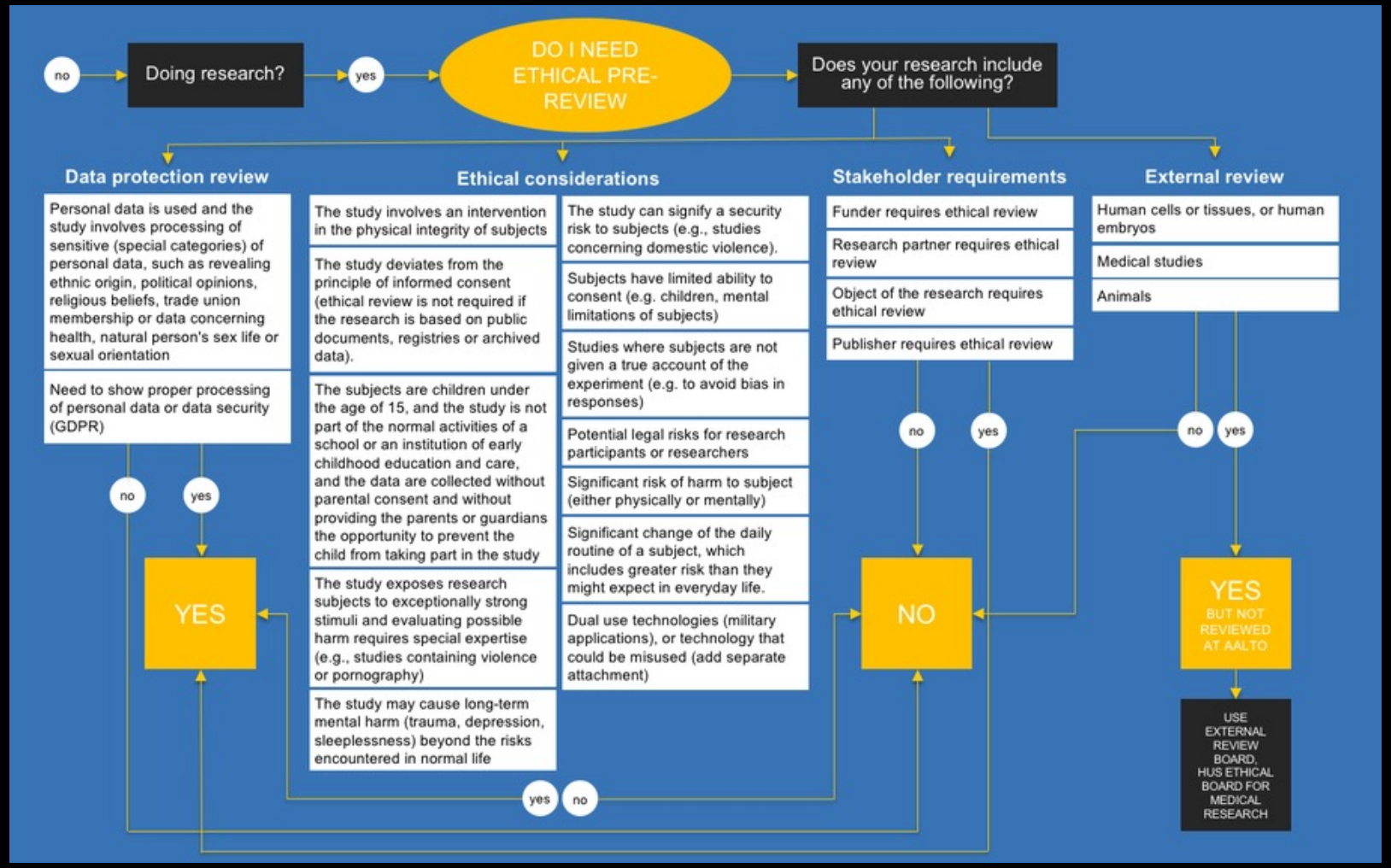
# Data protection

- General Data Protection Regulation (GDPR) is a European Union (EU) law that regulates the collection, use, and protection of personal data
- any research that involves the collection, processing, or use of personal data from EU citizens needs to be carefully designed to suit GDPR

# GDPR Checklist

- ❑ Collect and use personal data only for the purposes stated in the informed consent form
- ❑ Protect personal data through appropriate security measures, such as encryption and secure storage
- ❑ Provide participants with the right to access, rectify, erase, or restrict the processing of their personal data
- ❑ Retain personal data for no longer than necessary for the purposes of the research
- ❑ Appoint a data protection officer (DPO) to oversee compliance with GDPR.

# Ethical review at Aalto




https://www.aalto.fi/en/services/research-ethics-committee

# Responsible conduct of research

**TENK**

1. The research follows the principles that are endorsed by the **research community**, that is, integrity, meticulousness, and accuracy in conducting research, and in recording, presenting, and evaluating the research results.
2. The **methods** applied for data acquisition as well as for research and evaluation, conform to scientific criteria and are ethically sustainable. When publishing the research results, the results are communicated in an open and responsible fashion that is intrinsic to the dissemination of scientific knowledge.

https://www.tenk.fi/sites/tenk.fi/files/HTK_ohje_2012.pdf

# Responsible conduct of research

**TENK**

3. The researcher takes due account of the work and achievements of **other researchers** by respecting their work, citing their publications appropriately, and by giving their achievements the credit and weight they deserve in carrying out the researcher's own research and publishing its results.

4. The researcher complies with the **standards set for scientific knowledge in planning and conducting the research, in reporting** the research results and in recording the data obtained during the research.

https://www.tenk.fi/sites/tenk.fi/files/HTK_ohje_2012.pdf

# Responsible conduct of research

**TENK**

5. The necessary **research permits** have been acquired and the preliminary ethical review that is required for certain fields of research has been conducted.

6. Before beginning the research or recruiting the researchers, all parties within the research project or team (the employer, the principal investigator, and the team members) **agree** on the researchers' rights, responsibilities, and obligations, principles concerning authorship, and questions concerning archiving and accessing the data. These agreements may be further specified during the course of the research.

# Responsible conduct of research

**TENK**

7. Sources of financing, **conflicts of interest** or other commitments relevant to the conduct of research are announced to all members of the research project and reported when publishing the research results.
8. Researchers **refrain** from all research-related evaluation and decision-making situations, when there is reason to suspect a conflict of interest.
9. The research organisation adheres to **good personnel and financial administration** practices and takes into account the **data protection** legislation.

https://www.tenk.fi/sites/tenk.fi/files/HTK_ohje_2012.pdf

# Stanford Prison Experiment

https://archive.org/details/cst_000035

- Stanford Prison Experiment remains among the “most notable—and notorious—research projects ever carried ou”
- At various times, they were taunted, stripped naked, deprived of sleep and forced to use plastic buckets as toilets.
- For six days, half the study's participants endured cruel and dehumanizing abuse at the hands of their peers (the other half as prison guards).
- Some of them rebelled violently; others became hysterical or withdrew into despair.
  - extreme emotional trauma

# The study's results are not robust

- Replication attempts have shown that violence does only occur when prompted by authority
- Participant's faked some scenes in the original study
- Participant's request to leave was not granted
- Zimbardo influenced the study deliberately

https://gen.medium.com/the-lifespan-of-a-lie-d869212b1f62
By Elekes Andor - Own work, CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=72119796
Haslam, S. A., Reicher, S. D., & Van Bavel, J. J. (2019). Rethinking the nature of cruelty: The role of identity leadership in the Stanford Prison Experiment. *American Psychologist*, *74*(7), 809.

# Research Misconduct

**Research misconduct refers to misleading the research community and often also to misleading decisionmakers. T**

- Fabrication
- Falsification
- Plagiarism
- Misappropriation

https://www.tenk.fi/sites/tenk.fi/files/HTK_ohje_2012.pdf

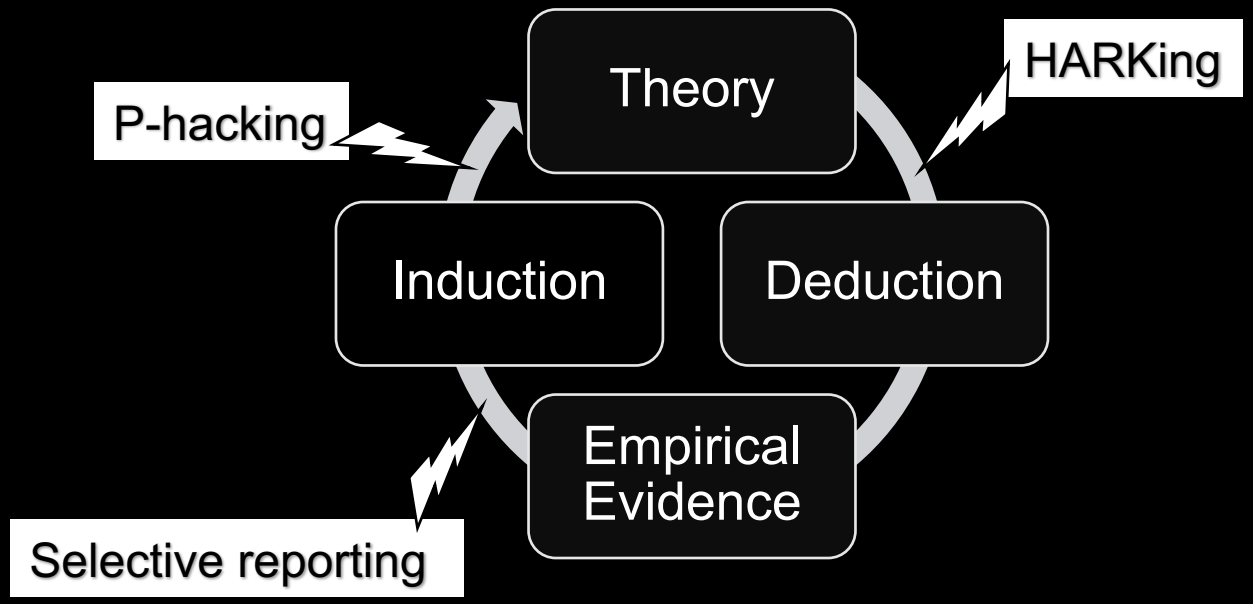
Picture: https://cmweb.nl/2020/02/diederik-stapel-wat-ik-heb-gedaan-is-volledig-fout-maar-zo-begon-het-niet/

https://www.nytimes.com/2013/04/28/magazine/diederik-stapels-audacious-academic-fraud.html

# Questionable research practices

- are actions or behaviors that undermine the integrity of scientific research and may lead to biased or invalid results
- can have serious consequences
  - misleading the scientific community and the public
  - damaging the credibility of the research
  - wasting valuable resources
  - Polluting the scientific record
- To ensure the integrity of scientific research, we adhere to ethical guidelines and best practices in research design, conduct, and reporting

# QRPs attack the Hypothetico deductive method from different angles



# Selective reporting

- selectively reporting or omitting data that does not support the desired hypothesis or conclusion
- Typical strategies include to report results
  - that are statistically significant
  - that align with their expectations
  - that ignore or downplay results that contradict their hypothesis
- E.g., effect is found in only a sample of “responders” and ”non-responders” are not analyzed

```
def selectiveReporting(results, significanceLevel):
    # Initialize empty list to store significant results
    significantResults = []

    # Iterate through each result in the list of results
    for result in results:
        # If the result's significance level is greater than or equal to the required significance level,
        # append it to the list of significant results
        if result.significanceLevel >= significanceLevel:
            significantResults.append(result)

    # Return the list of significant results
    return significantResults
```

# HARKing

**Hypothesizing after the results are known**

- practice of forming a hypothesis after the results of a study have been collected and analyzed
- Does not conform to the hypothetico-deductive scientific method
- can occur when researchers conduct exploratory analyses that is reformulated as hypothesis-driven afterward
- Researchers may be more likely to HARK when under pressure
- Mitiagtion strategy: Registering of hypothesis before data collection publicly in a pre-registration

```
FUNCTION HARKing(results) hypotheses = [] # create an
empty list to store hypotheses

FOR EACH result IN results hypothesis =
generate_hypothesis(result) # generate a hypothesis
based on the result hypotheses.append(hypothesis) #
add the hypothesis to the list

END FOR

RETURN hypotheses # return the list of hypotheses END
FUNCTION
```

# *p*-Hacking

- P-hacking refers to the practice of manipulating data or analyses in order to achieve statistical significance in a study
  - Selective exclusion or inclusion of data based on the p-value
  - Multiple testing of the same hypothesis without correcting alpha
- Mitigation strategy: pre-register how data is transformed and analysed statistically and how the statistical models map onto the hypothesesis

```
function p_hack(data, alpha):
  # Set p-value threshold for statistical significance
  p_threshold = alpha

  # Set initial p-value to 1
  p_value = 1

  # Loop until p-value is less than the threshold
  while p_value > p_threshold:
    # Select subset of data
    data_subset = select_data(data)
    # Run statistical test on data subset
    p_value = run_test(data_subset)
    # If p-value is not significant, try again with a different
subset of data
  # Return significant p-value
  return p_value
```

# Correcting the scientific record

- Comments by the authors
- Correction by the journal
- Correction by the authors
- Retraction by the authors
- Retraction by the journal
- Commentaries

## Correction: Sexual attraction modulates interpersonal distance and approach-avoidance movements towards virtual agents in males

The PLOS ONE Staff

Published: September 24, 2020 • https://doi.org/10.1371/journal.pone.0239935

Article | Metrics | Comments | Media Coverage

Notice of Republication

Reference

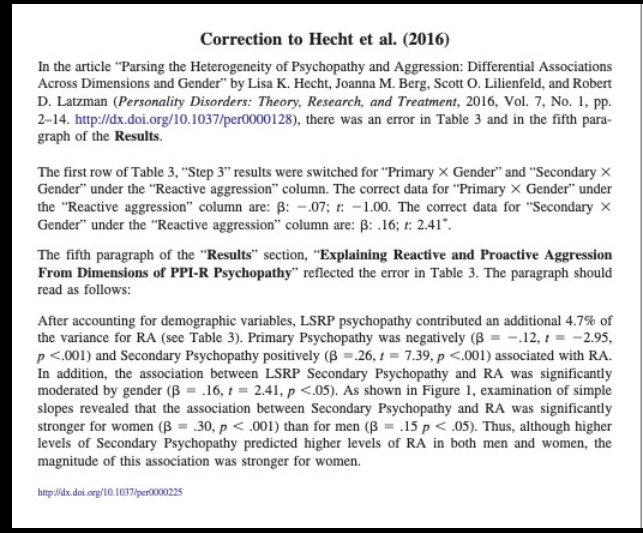
Reader Comments

### Notice of Republication

Incorrect versions of Fig 3 and the Supporting Information files were published in error. This article was republished on May 18, 2020, to correct for this error. The publisher apologizes for the errors. Please download this article again to view the correct version.

### Reference

1. Welsch R, von Castell C, Rettenberger M, Turner D, Hecht H, Fromberger P (2020) Sexual attraction modulates interpersonal distance and approach-avoidance movements towards virtual agents in males. PLoS ONE 15(4): e0231539. https://doi.org/10.1371/journal.pone.0231539 pmid:32315317
View Article • PubMed/NCBI • Google Scholar



### Correction to Hecht et al. (2016)

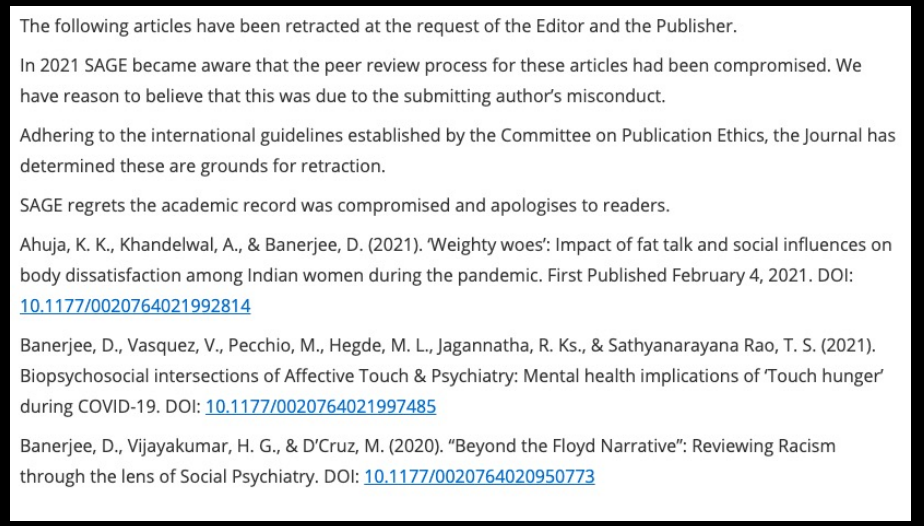
In the article "Parsing the Heterogeneity of Psychopathy and Aggression: Differential Associations Across Dimensions and Gender" by Lisa K. Hecht, Joanna M. Berg, Scott O. Lilienfeld, and Robert D. Latzman (*Personality Disorders: Theory, Research, and Treatment*, 2016, Vol. 7, No. 1, pp. 2–14. http://dx.doi.org/10.1037/per0000128), there was an error in Table 3 and in the fifth paragraph of the **Results**.

The first row of Table 3, "Step 3" results were switched for "Primary × Gender" and "Secondary × Gender" under the "Reactive aggression" column. The correct data for "Primary × Gender" under the "Reactive aggression" column are: β: −.07; *t*: −1.00. The correct data for "Secondary × Gender" under the "Reactive aggression" column are: β: .16; *t*: 2.41*.

The fifth paragraph of the "**Results**" section, "**Explaining Reactive and Proactive Aggression From Dimensions of PPI-R Psychopathy**" reflected the error in Table 3. The paragraph should read as follows:

After accounting for demographic variables, LSRP psychopathy contributed an additional 4.7% of the variance for RA (see Table 3). Primary Psychopathy was negatively ($\beta = -.12$, $t = -2.95$, $p < .001$) and Secondary Psychopathy positively ($\beta = .26$, $t = 7.39$, $p < .001$) associated with RA. In addition, the association between LSRP Secondary Psychopathy and RA was significantly moderated by gender ($\beta = .16$, $t = 2.41$, $p < .05$). As shown in Figure 1, examination of simple slopes revealed that the association between Secondary Psychopathy and RA was significantly stronger for women ($\beta = .30$, $p < .001$) than for men ($\beta = .15$ $p < .05$). Thus, although higher levels of Secondary Psychopathy predicted higher levels of RA in both men and women, the magnitude of this association was stronger for women.

http://dx.doi.org/10.1037/per0000225



The following articles have been retracted at the request of the Editor and the Publisher.

In 2021 SAGE became aware that the peer review process for these articles had been compromised. We have reason to believe that this was due to the submitting author's misconduct.

Adhering to the international guidelines established by the Committee on Publication Ethics, the Journal has determined these are grounds for retraction.

SAGE regrets the academic record was compromised and apologises to readers.

Ahuja, K. K., Khandelwal, A., & Banerjee, D. (2021). 'Weighty woes': Impact of fat talk and social influences on body dissatisfaction among Indian women during the pandemic. First Published February 4, 2021. DOI: 10.1177/0020764021992814

Banerjee, D., Vasquez, V., Pecchio, M., Hegde, M. L., Jagannatha, R. Ks., & Sathyanarayana Rao, T. S. (2021). Biopsychosocial intersections of Affective Touch & Psychiatry: Mental health implications of 'Touch hunger' during COVID-19. DOI: 10.1177/0020764021997485

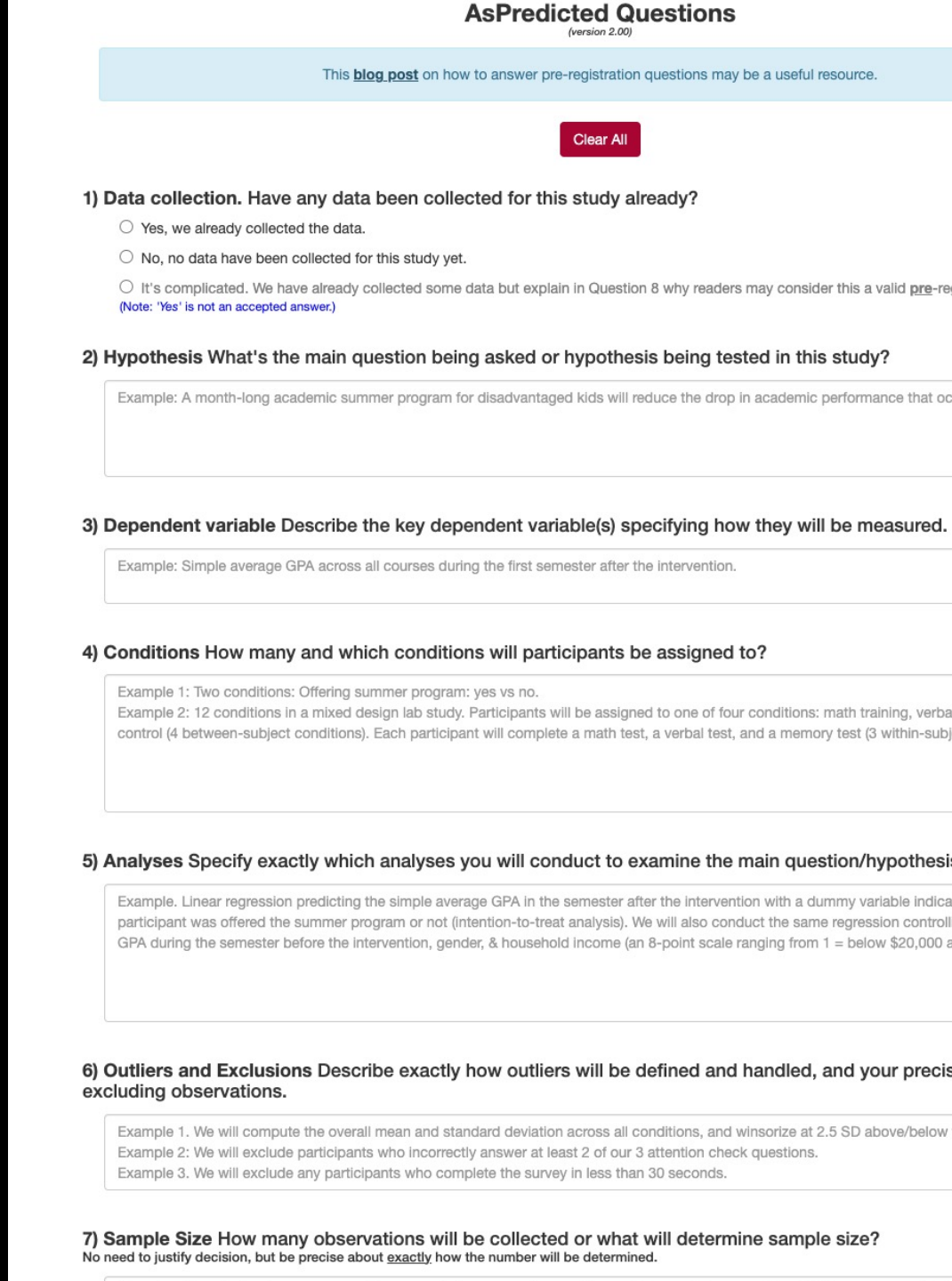
Banerjee, D., Vijayakumar, H. G., & D'Cruz, M. (2020). "Beyond the Floyd Narrative": Reviewing Racism through the lens of Social Psychiatry. DOI: 10.1177/0020764020950773

# Open Science

- Open science is a movement that promotes transparency, reproducibility, and accessibility in scientific research
- In psychology, open science practices include pre-registration, open data and materials, and open access publishing
- Adopting open science practices can improve the credibility and reliability of research findings in psychology

# Pre-registration

- Pre-registration in psychological studies is the practice of planning and documenting the details of a study before collecting any data. This helps to ensure that the study is conducted in an ethical and transparent manner.
- Pre-registration addresses the following questionable research practices:
  - HARKing: Pre-registration requires researchers to clearly state their hypothesis before collecting any data, which helps to prevent HARKing.
  - P-hacking: Pesearchers to specify the statistical analyses they will use before collecting any data
  - Selective Reporting: Pre-registration motivates researchers to clearly document all aspects of their study, including the research question, participants, methods, and analyses, which helps to ensure transparency in the research process.



AsPredicted Questions
(version 2.00)

This blog post on how to answer pre-registration questions may be a useful resource.

Clear All

1) Data collection. Have any data been collected for this study already?

- Yes, we already collected the data.
- No, no data have been collected for this study yet.
- It's complicated. We have already collected some data but explain in Question 8 why readers may consider this a valid pre-re

(Note: 'Yes' is not an accepted answer.)

2) Hypothesis What's the main question being asked or hypothesis being tested in this study?

Example: A month-long academic summer program for disadvantaged kids will reduce the drop in academic performance that oc

3) Dependent variable Describe the key dependent variable(s) specifying how they will be measured.

Example: Simple average GPA across all courses during the first semester after the intervention.

4) Conditions How many and which conditions will participants be assigned to?

Example 1: Two conditions: Offering summer program: yes vs no.
Example 2: 12 conditions in a mixed design lab study. Participants will be assigned to one of four conditions: math training, verba
control (4 between-subject conditions). Each participant will complete a math test, a verbal test, and a memory test (3 within-subj

5) Analyses Specify exactly which analyses you will conduct to examine the main question/hypothesis

Example. Linear regression predicting the simple average GPA in the semester after the intervention with a dummy variable indica
participant was offered the summer program or not (intention-to-treat analysis). We will also conduct the same regression controll
GPA during the semester before the intervention, gender, & household income (an 8-point scale ranging from 1 = below $20,000 a

6) Outliers and Exclusions Describe exactly how outliers will be defined and handled, and your precis
excluding observations.

Example 1. We will compute the overall mean and standard deviation across all conditions, and winsorize at 2.5 SD above/below
Example 2: We will exclude participants who incorrectly answer at least 2 of our 3 attention check questions.
Example 3. We will exclude any participants who complete the survey in less than 30 seconds.

7) Sample Size How many observations will be collected or what will determine sample size?
No need to justify decision, but be precise about exactly how the number will be determined.

# Summary

- Psychological Research presents ethical challenges
- We have guidelines that human-centered research adheres to
- We have committees that evaluate research proposals
- Scientific Misconduct and Questionable Research Practices pollute the scientific record
- Open Scientific Practices, Corrections and Pre-registration can mitigate the process