6.1

Ethics, Replication, and Reading Research

A Visual Protocol for Scientific Literacy and Methodological Rigor

Ethical Protection	The Replication Crisis	Reading Habits
Protecting research participants	Systemic failures and modern reforms	Practical media and research literacy

Methods are not just about finding the right answer. They are about treating people with respect and being honest about uncertainty.

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6.2

1947

The **Nuremberg Trials**. Exposed horrific experiments on prisoners post-WWII. Resulted in the **1947 Nuremberg Code**, establishing the absolute requirement for **voluntary consent**.

1932–1972

The Tuskegee Study. Approximately 600 Black men in the United States were **deliberately left untreated** for syphilis for 40 years, long after penicillin became the standard cure.

Takeaway: **Modern ethics were not proactive; they grew directly from historical abuses.**

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6.3

The Belmont Report (1979)



Respect for Persons

Treating individuals as free agents; requiring informed consent; providing strict protections for those with limited ability to decide.



Beneficence

The obligation to maximize potential benefits while aggressively **minimizing harm**.



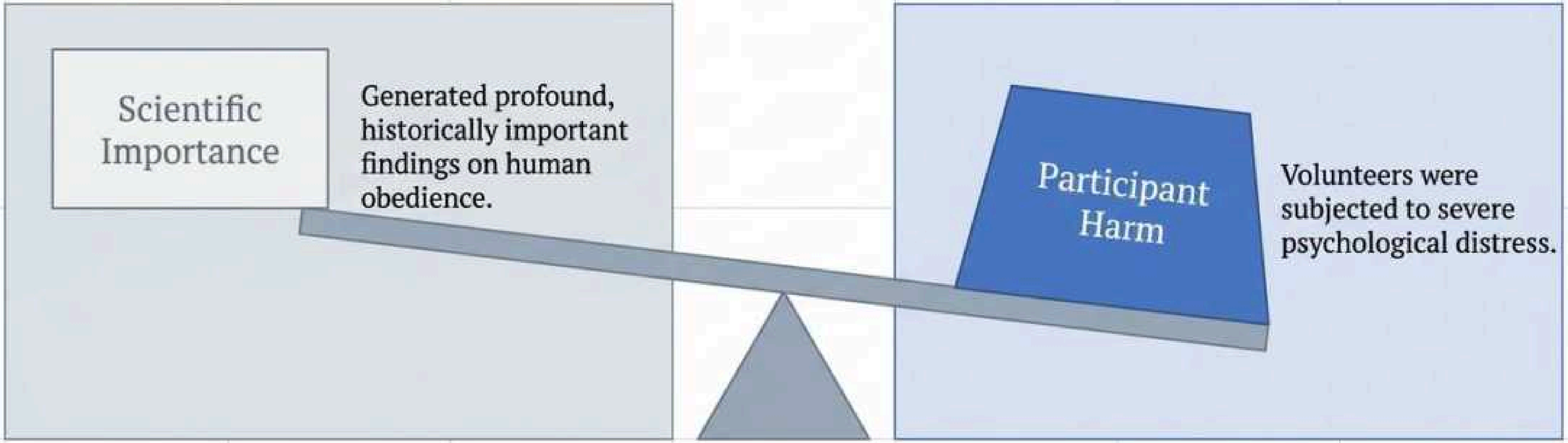
Justice

Ensuring the burdens and benefits of research are shared fairly across society, without exploiting vulnerable groups.

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6.4

Context Note: In the early 1960s, a landmark obedience study ordered volunteers to administer what they believed were increasingly painful electric shocks to another person. About two-thirds escalated to the highest level.



Conclusion: The profound tension between valuable data and human distress made this a **landmark case in research ethics**, accelerating the need for oversight.

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6.5

Proposed Human Research

The IRB (Institutional Review Board)

Committee conducts a rigorous Risk-vs-Benefit Analysis prior to study launch.

Informed Consent Guarantee

Participants must understand what will happen and that participation is entirely voluntary.

Freedom to Withdraw

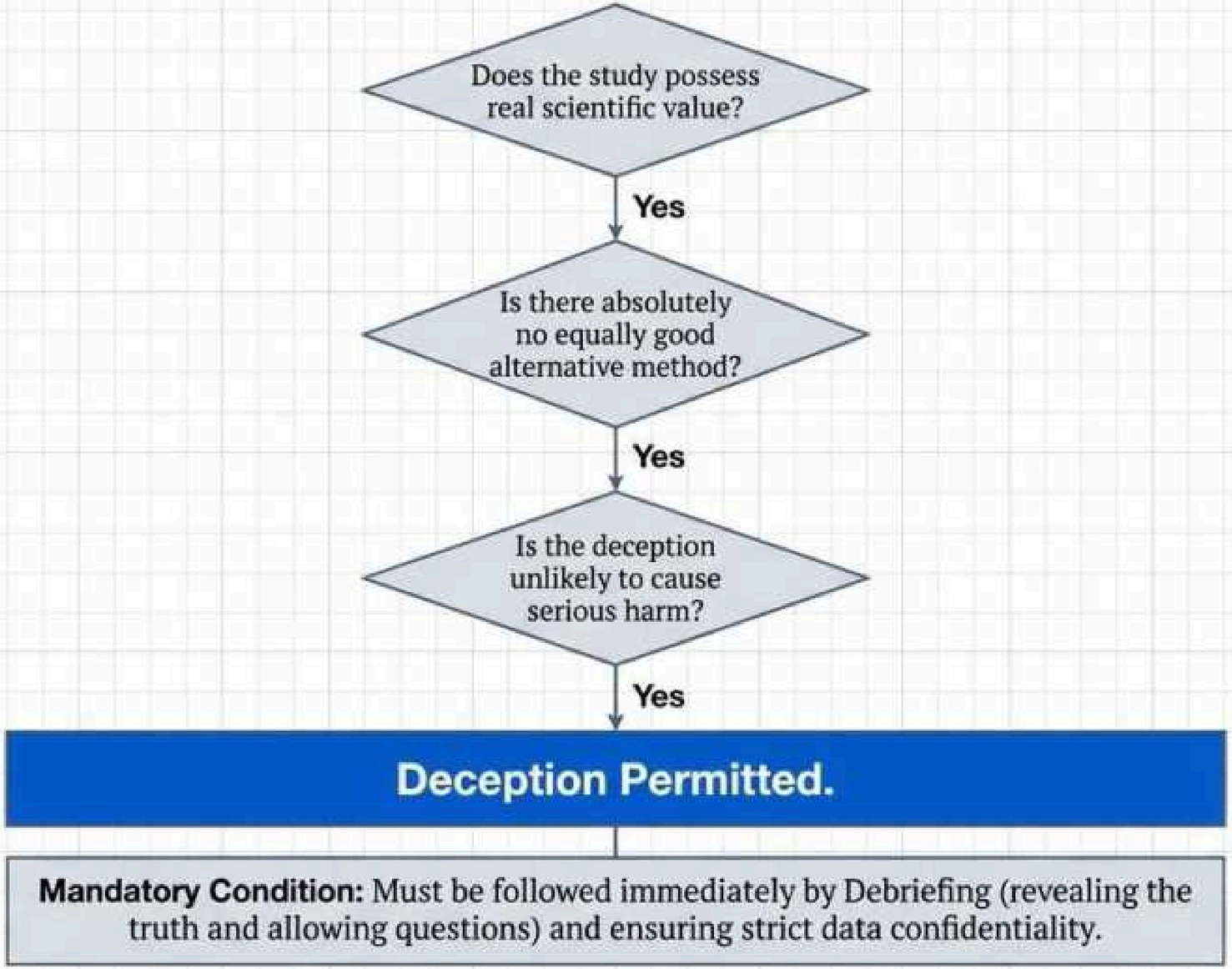
Participants may leave at any time without penalty.

Vulnerable Group Protections

Extra safeguards required for studies involving children or marginalized populations.

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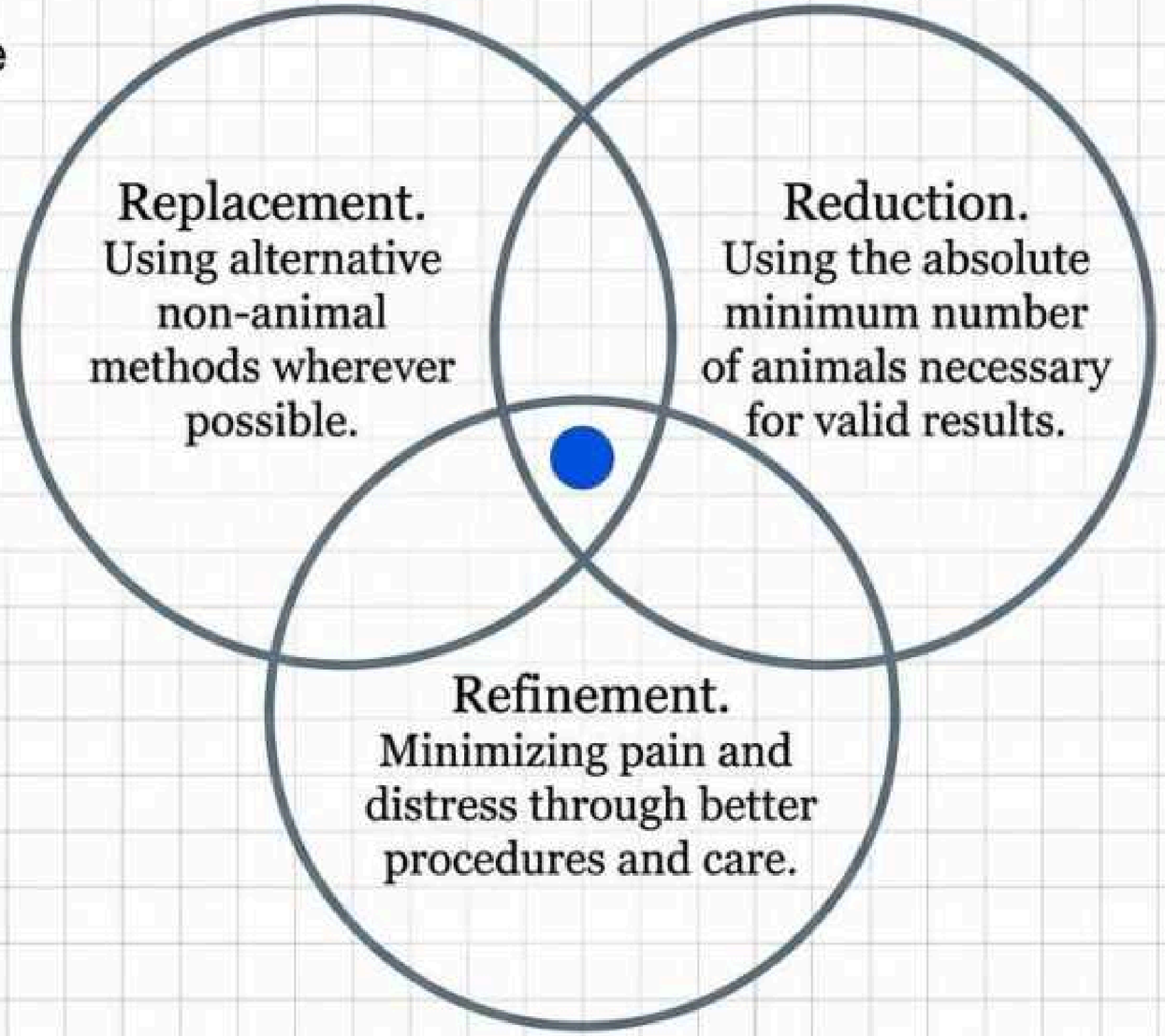
6.6 When is deception allowed in research?



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6.7

Ethics of Animal Research (Where consent is impossible)



Note: While animal research has produced vast knowledge about learning and the brain, citizens continue to debate exactly where the where the ethical lines belong. Every project requires strict committee review.

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6.8 Data Honesty and Fraud

Fabrication	**Falsification**
Completely inventing data that never existed.	Altering or manipulating real data to fit a narrative.

Context: In 2011, a prominent case involved a researcher inventing data across dozens of published papers.

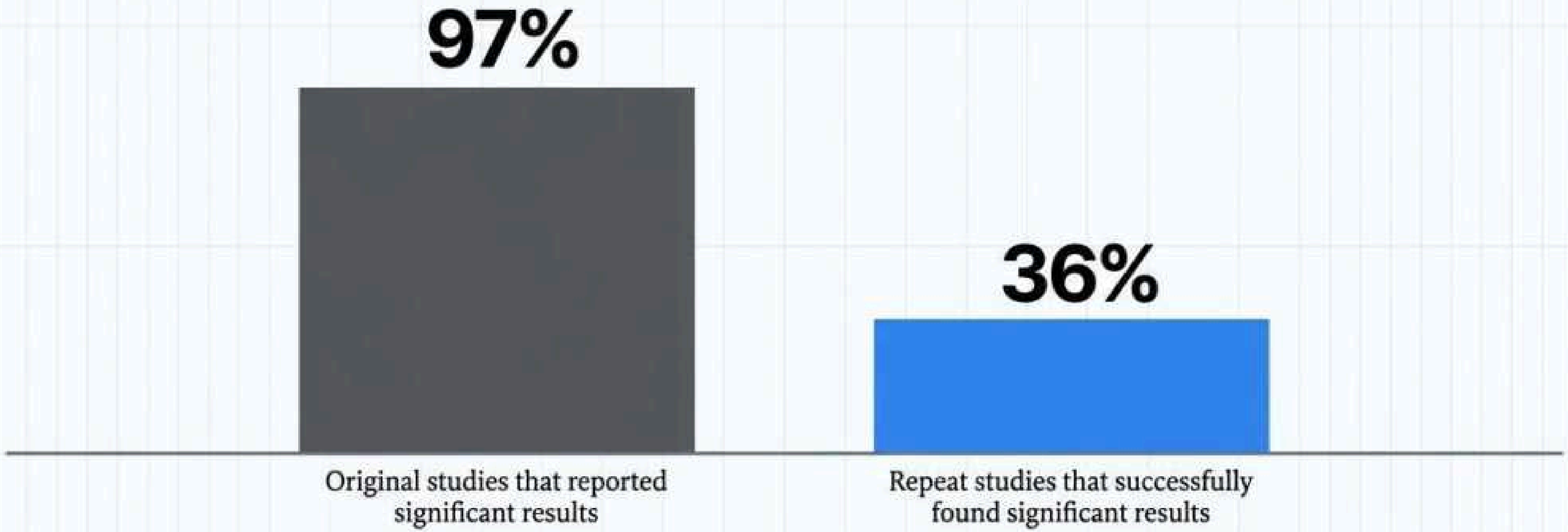
While outright fraud is rare, it is structurally devastating. Science is cumulative; researchers build their own work upon prior results they trust. Fraud poisons the foundation of future discovery.

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6.9

The Replication Crisis

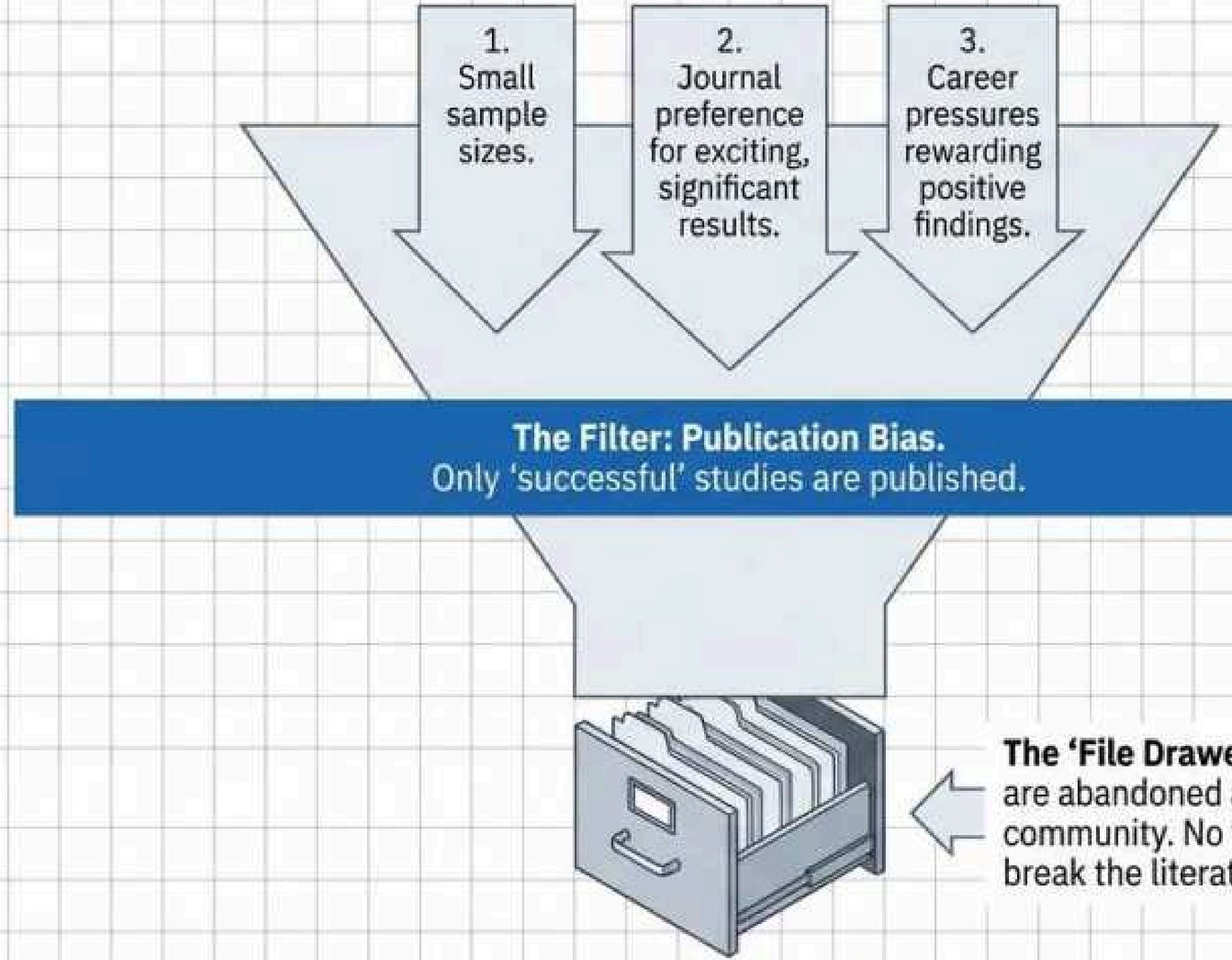
Context: In 2015, a large-scale project attempted to repeat 100 published psychology studies.



Key Takeaways:
In the successful repeats, effect sizes were, on average, only half as large as originally claimed. This systemic weakness spans multiple disciplines, including medicine, and is not isolated to psychology.

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6.10 How Honest Researchers Produce Unreliable Literature



The 'File Drawer': Studies that found nothing are abandoned and hidden from the scientific community. No fraud is required to break the literature—only skewed incentives.

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6.11
The Dangers of Flexible Analysis

P-Hacking	HARKing
Trying different analysis options (whom to exclude, what to measure, when to stop data collection) until a significant result is found.	Hypothesizing After Results are Known. Presenting a finding discovered in the data as if it had been predicted from the start.

Both practices drastically inflate False Alarms within the scientific literature.

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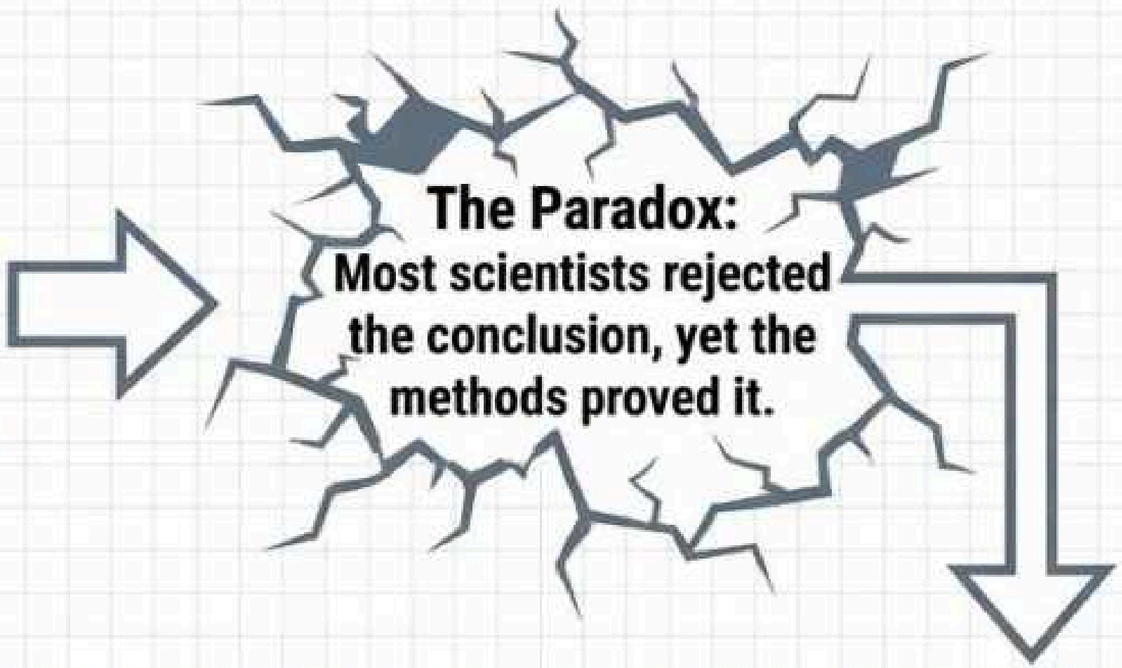
6.12 The Catalyst for Methodological Reform

Context: In 2011, a leading journal published nine experiments appearing to show that human beings could sense the future.

Standard, accepted scientific methods

+

Impossible claims (sensing the future)



The Resolution: If standard methods can produce accepted evidence for the impossible, the methods themselves are fatally flawed and require immediate tightening.

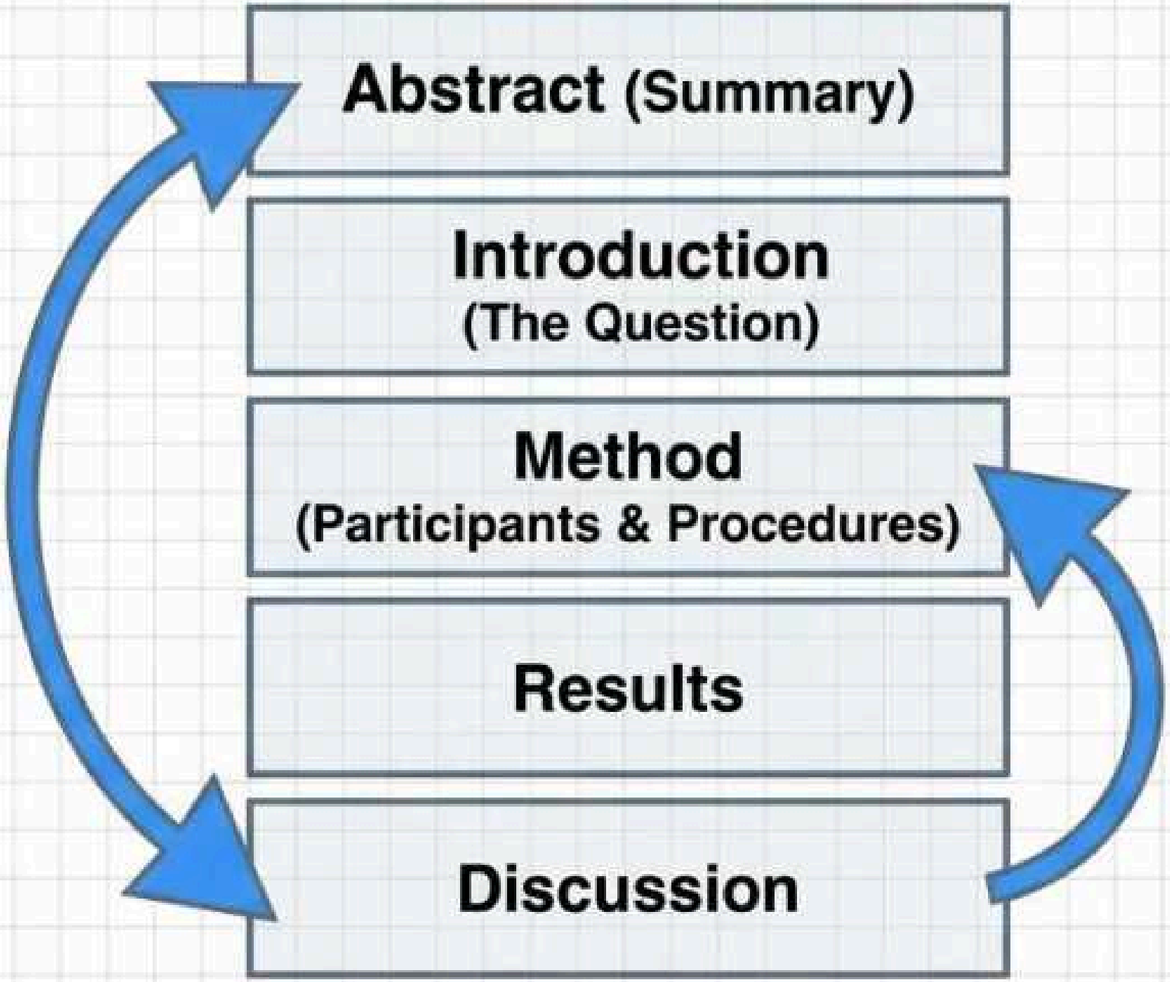
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6.13 Systemic Reforms to Fix the Science

1. Preregistration Researchers must publicly publish their hypotheses and exact analysis plans before collecting any data.	**2. Registered Reports** Journals commit to publishing a study based solely on the quality of its design, regardless of whether the final results are positive or negative.
3. Open Data Scientists publicly share their raw data and study materials for independent verification.	**4. Large-Scale Collaboration** Utilizing vastly larger sample sizes and conducting massive replication projects across many independent labs.

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6.14 The Anatomy of a Journal Article



The Reading Path

A sensible reader begins with the Abstract and Discussion to grasp the claims, then immediately scrutinizes the Method section, where the true **strengths and weaknesses** of the study are visible.

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6.15 Evaluating the Source of Publication

The Filter



Peer Review

Independent experts evaluate a paper prior to publication. It catches many errors, but is not a flawless guarantee (reviewers rarely see raw data).

The Megaphone



Preprints

Papers posted publicly before peer review. They spread findings incredibly fast, but the methods and claims remain completely unchecked.

Bottom Rule: Treat both formats as steps in a scientific process, never as final, unassailable truth.

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6.16 Media Translation vs. Original Research

Expectation vs. Reality

News Reports	Interrogating the Original
Frequently exaggerate claims. They routinely turn simple correlations into causal facts, and present studies on mice as direct medical advice for humans.	When reading news, find the linked paper and ask:
	Was it an experiment or just a correlation?
	Who took part? How many?
	Was the actual effect size large or tiny?

Golden Rule: Be the most careful with the most exciting claims.

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6.17 The Universal Claim Checklist (Takes one minute; highly revealing)

- [ ] Who was studied, and were they truly representative?
- [ ] What was compared, and how were participants assigned?
- [ ] Exactly how was the outcome measured?
- [ ] How large was the effect, and how precise was the measurement?
- [ ] Has this specific finding been repeated by independent researchers?
- [ ] Who paid for the study?

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6.18 Uncertainty is the Engine of Trust

Lexicon of Humility

Suggests...

Is consistent with...

Is evidence for...

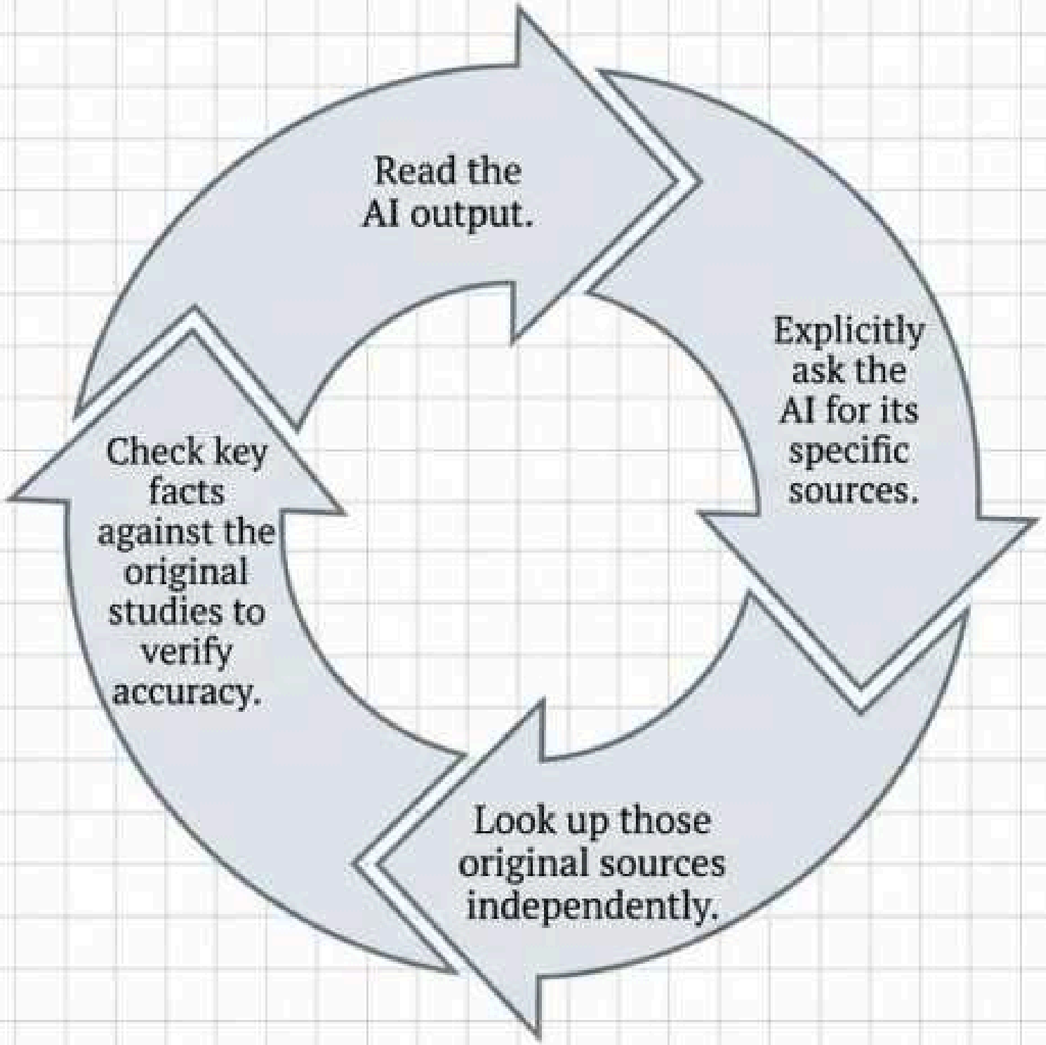
Analysis: Honest scientists use these terms because a single study never settles a question.

Takeaway: Uncertainty is not a weakness. A field that admits what it does not know is the only type of field that can improve.

You can hold a view firmly while remaining willing to change it when better evidence arrives.

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6.19 Practicing AI Literacy



Warning: Smooth writing does not equal accuracy. Both an articulate tool and a confident expert can be entirely wrong.

6.20

The Journey to Best Methods

Measuring Well. (Ensuring precision and validity in data).	**Comparing Fairly.** (Establishing correct controls and representative samples).
Treating People with Respect. (Upholding ethics, consent, and minimizing harm).	**Being Honest About Doubt.** (Embracing uncertainty and acknowledging limitations).

When reading any claim about human behavior, the ultimate question is always: **How could anyone know?**

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