

The best theory is a flawed one

Ian Hussey

‘Not even wrong’

Strategic ambiguity

Ian Hussey

What is a ‘good’ theory?

What is a ‘good’ theory?

“theories are for helping us to understand the world, which facilitates description, prediction, and control.”

Fried (2020) Theories and Models: What They Are, What They Are for, and What They Are About

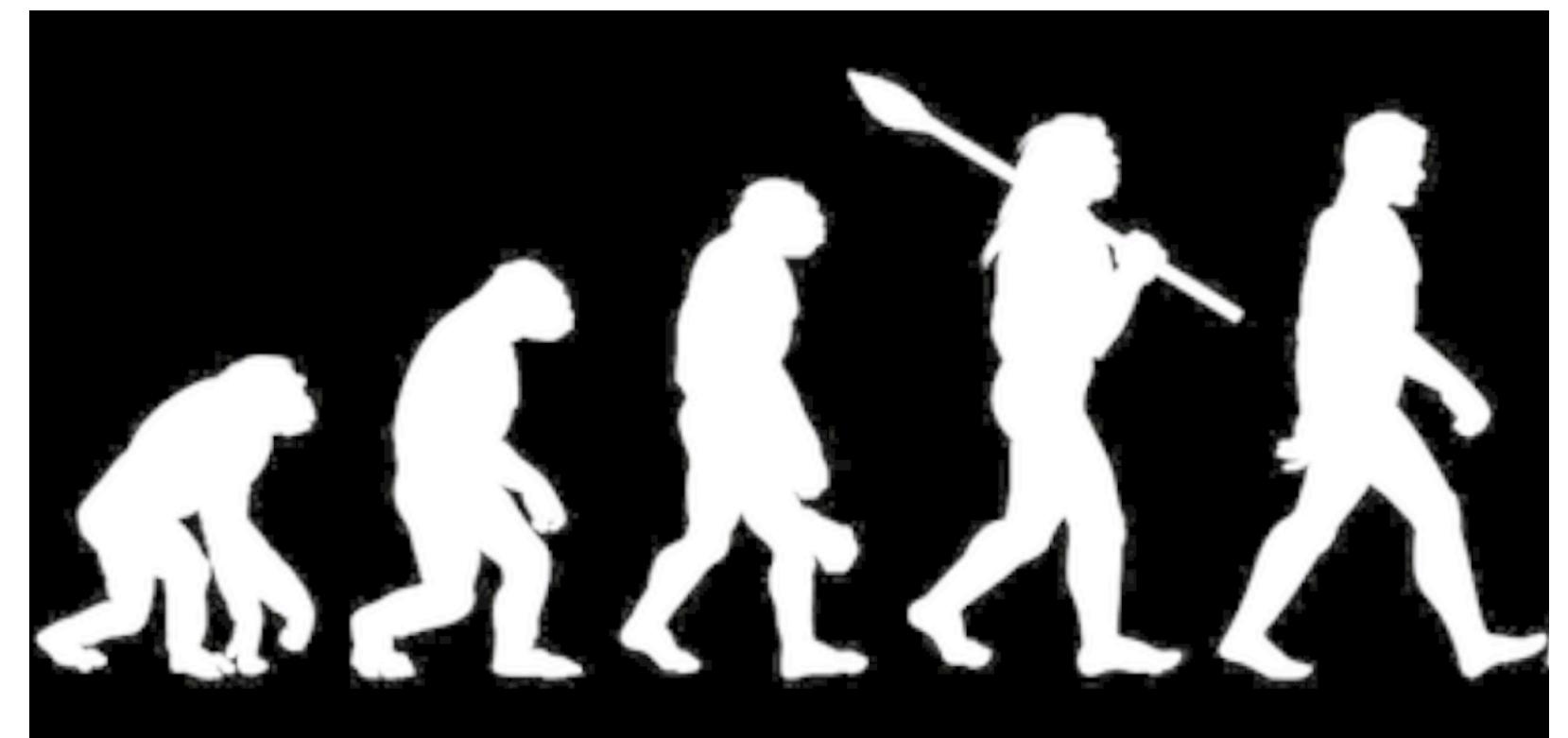
Typical understanding: good for us humans

What is a ‘good’ theory?

Put truth aside

Evolutionary perspective:
A good theory is one that **survives**

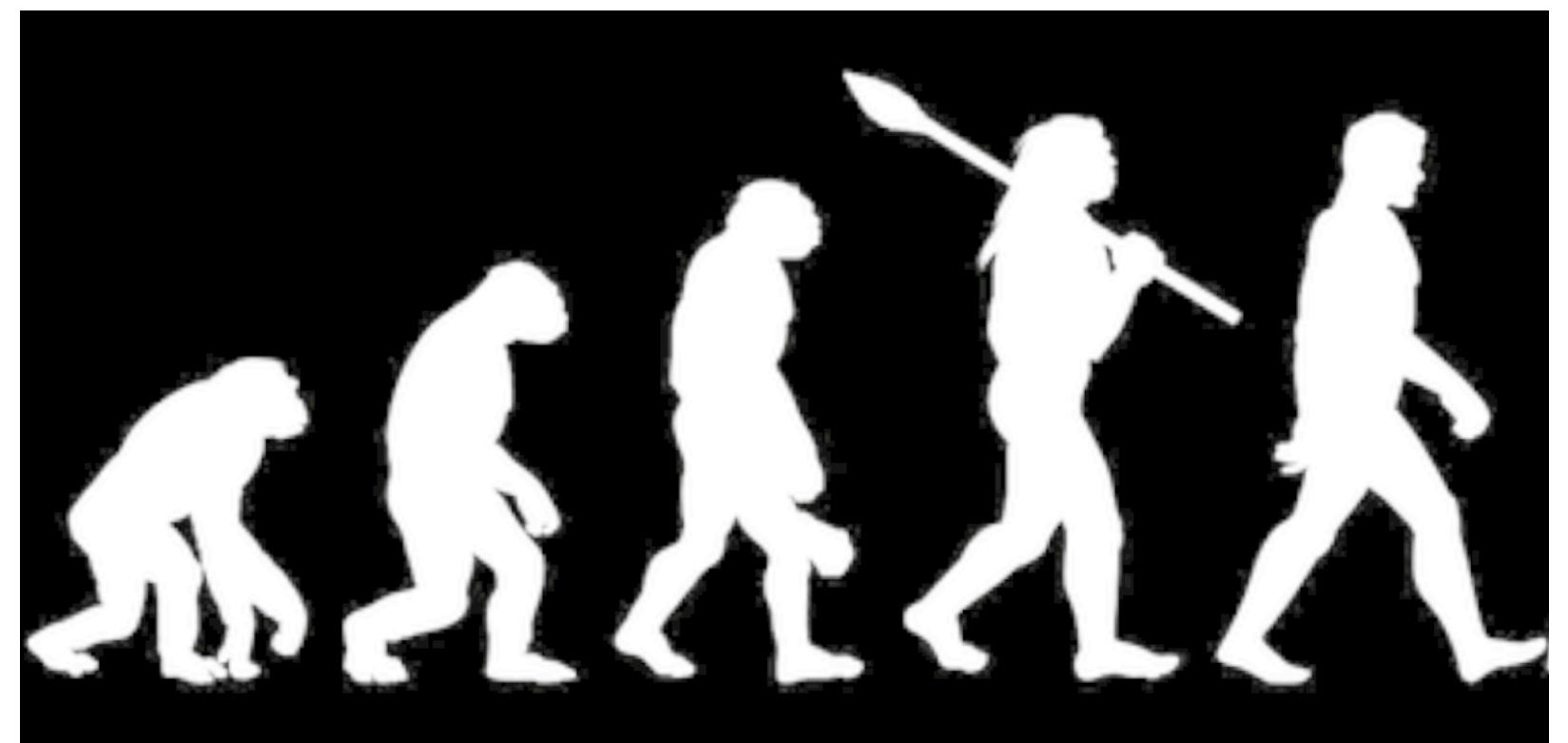
Good for the theory,
not necessarily good for us



What is a ‘good’ theory?

What is survival?

- Citations
- Funding
- Impact
 - Public awareness, policy implications
- Jobs for people who work on them



What is a ‘good’ theory?

Think of a theory as a living entity

Competing for limited resources

Needing to be talked about

Because to be discussed is to survive

A constant game of keepie-uppie



Evolutionary theory applied theory itself

The Meme (Dawkins, 1976)

Cultural units (eg ideas, behaviors & styles)
that propagate through
variation, mutation, competition, & inheritance

What is a ‘good’ theory?



Ask not what your theory can do for you,
but what you can do for your theory.

Why most psychological research findings are not even wrong

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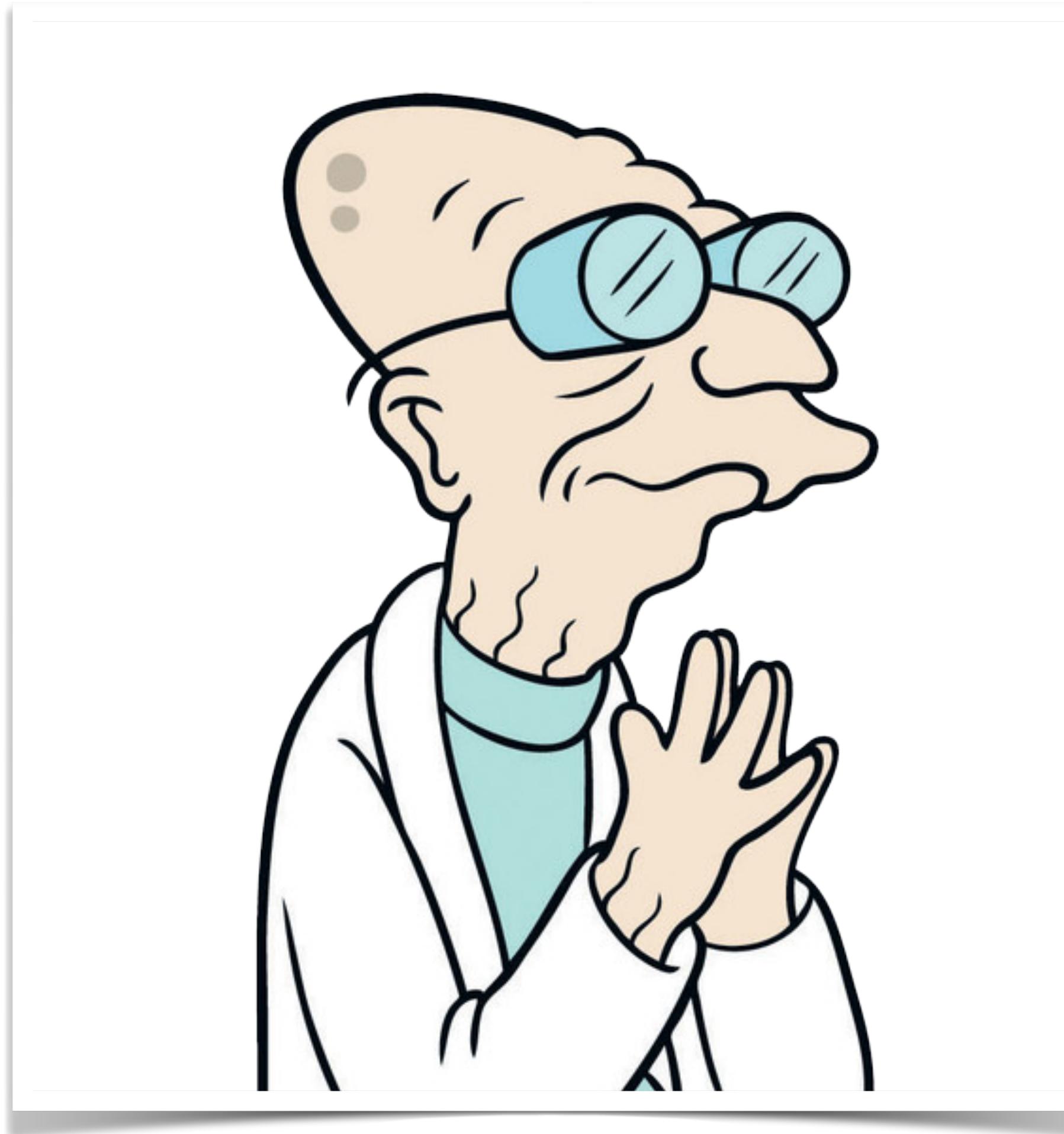
Nederlandse Organisatie voor
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Handling Editor: Moin Syed

Abstract

Psychology's replication crisis is typically conceptualized as the insight that the published literature contains a worrying amount of unreplicable, false-positive findings. At the same time, meta-scientific attempts to assess the crisis in more detail have reported substantial difficulties in identifying unambiguous definitions of the scientific claims in published articles and determining how they are connected to the presented evidence. I argue that most claims in the literature are so critically underspecified that attempts to empirically evaluate them are doomed to failure—they are not even wrong. Meta-scientists should beware of the flawed assumption that the psychological literature is a collection of well-defined claims. To move beyond the crisis, psychologists must reconsider and rebuild the conceptual basis of their hypotheses before trying to test them.

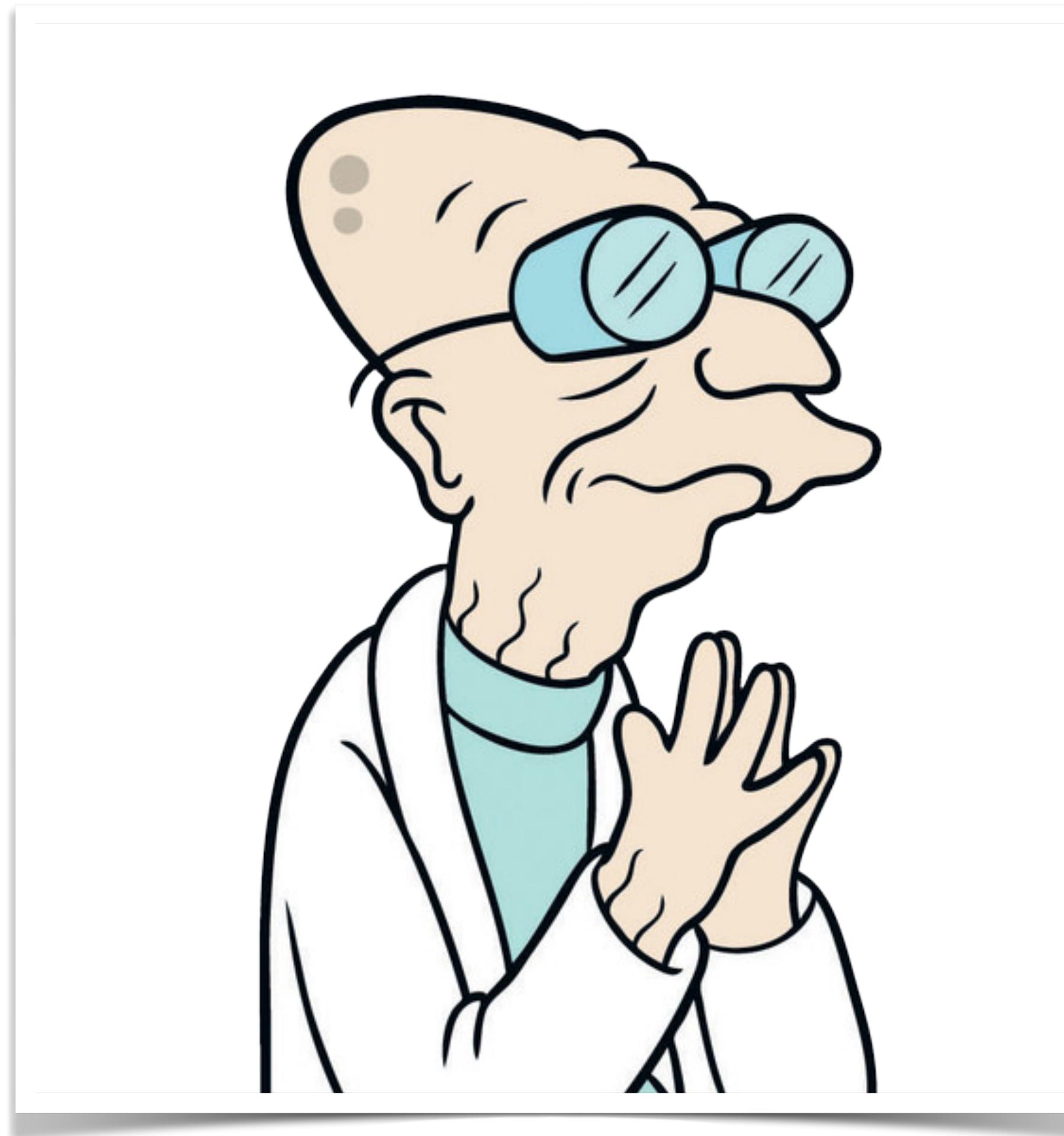
Imagine two theories



Farnsworth



Wernstrom



Farnsworth

The Farnsworth theory is **precise**

- Precise definitions & claims
- Explicitly falsifiable
- Good measurement
- Boundary conditions
- Small number of large studies



Farnsworth

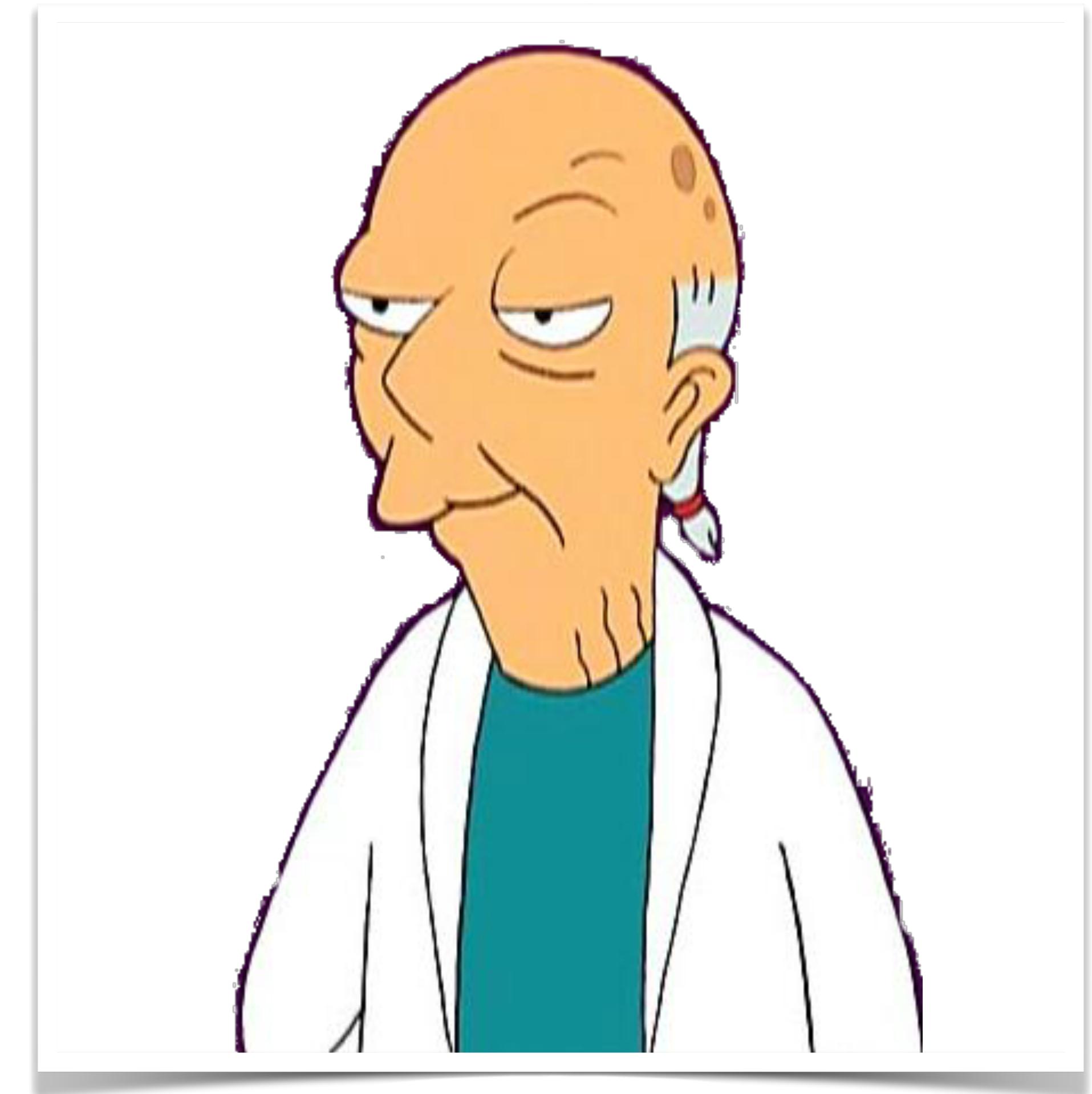
The Farnsworth theory is **precise**

Agnostic to whether it is ‘True’

- Work is slow
- Fewer publications
- Lower impact
- Less funding
- Aligned researchers get fewer jobs

The Wernstrom theory is **vague**

- Weak definitions
- Implied impact - “Big, If True”
- Weak tests of peripheral claims
- HARKing
- Small, underpowered studies
- Greater risk of bias

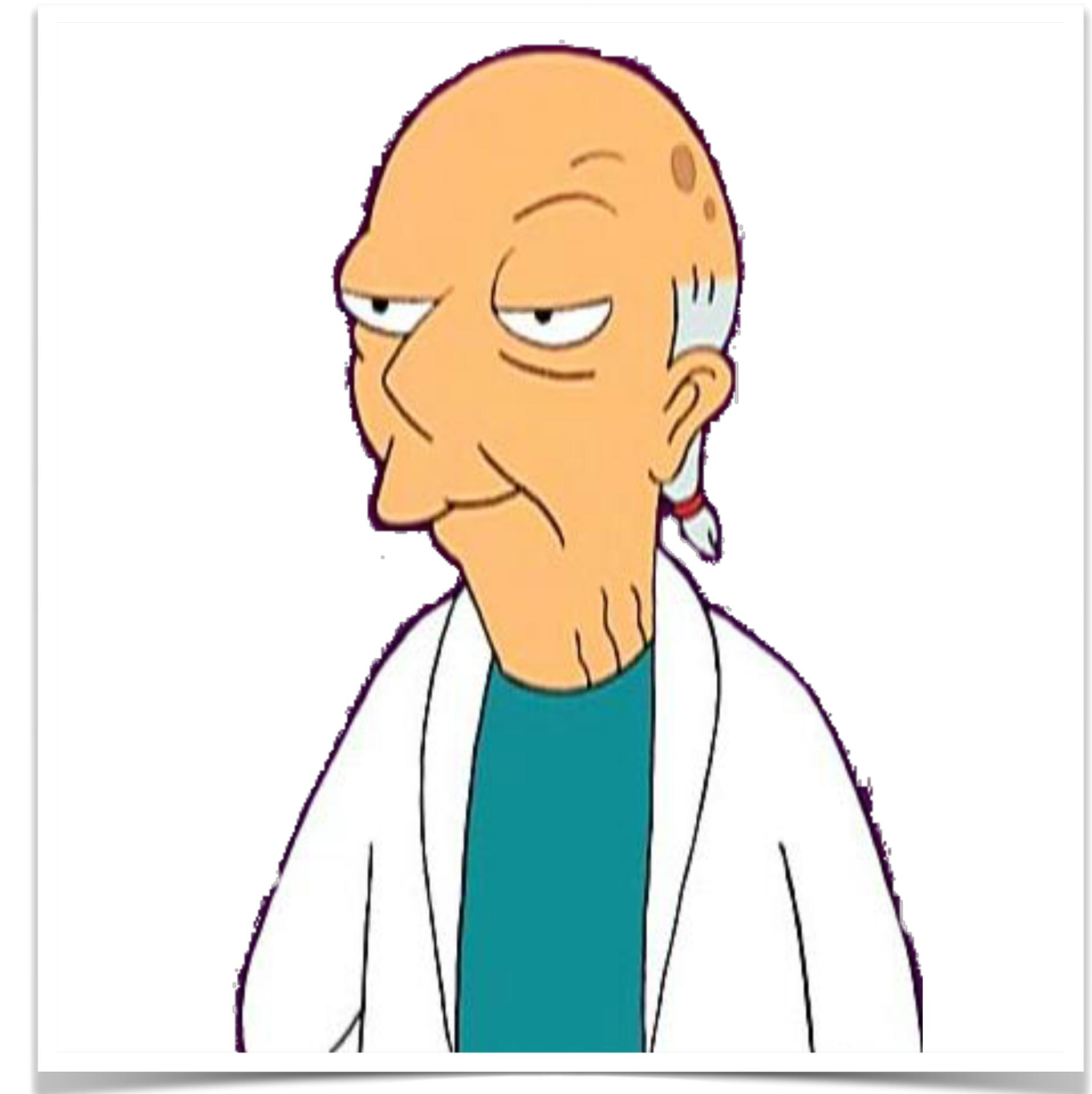


Wernstrom

The Wernstrom theory is **vague**

Agnostic to whether it is ‘True’

- Work is fast
- Many publications
- High impact, “only a few years away”
- More funding
- Aligned researchers get more jobs



Wernstrom





Essential to note: this is agnostic to researchers' intentions

No cynical or bad actors necessary

Just between-theory variation, competition & selection

“Wernstrom” refers to theories, not theorists



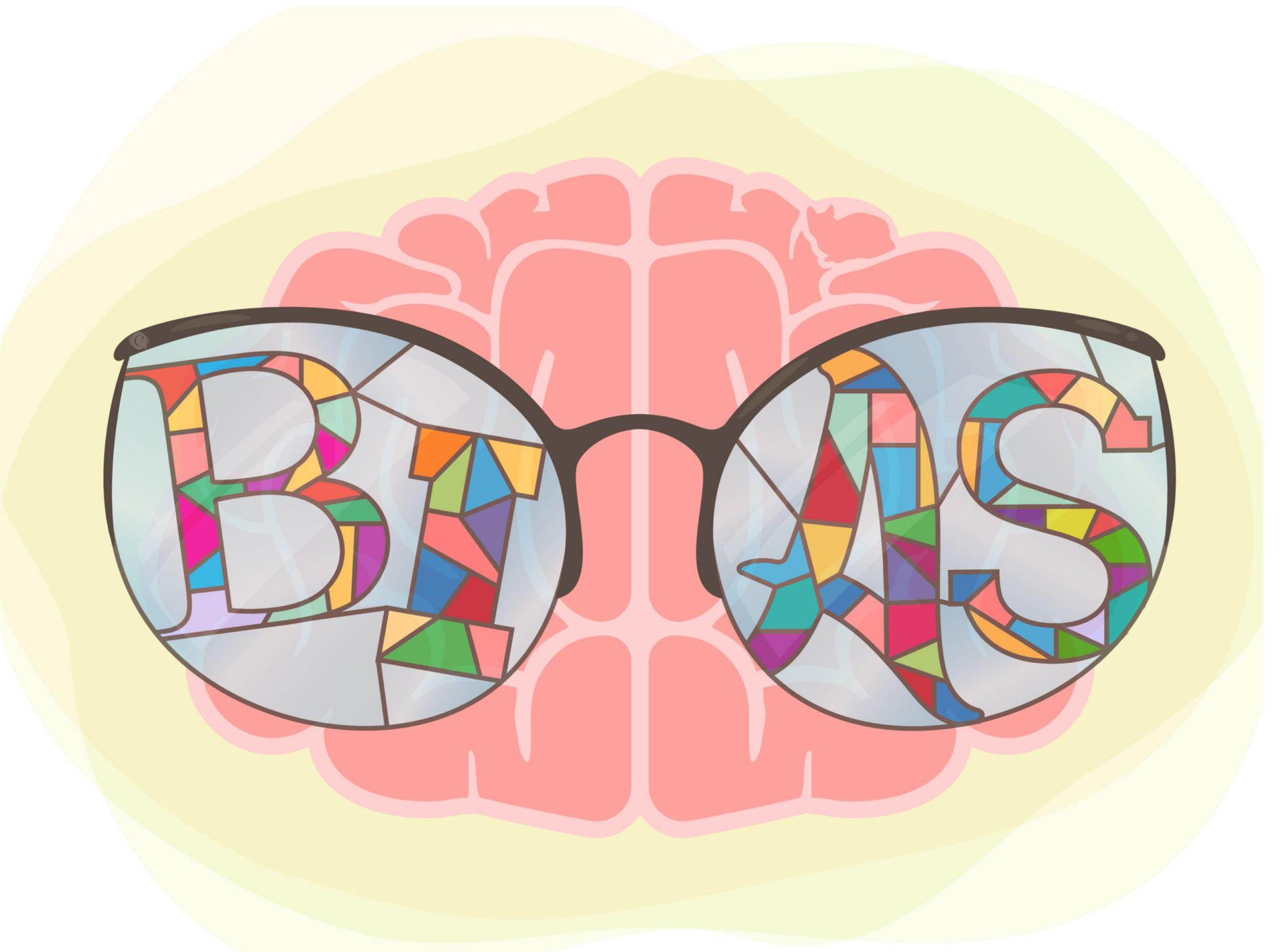
Implicit cognition:
A very good theory

Implicit attitudes

Not a single theory

But a literature and a body of thought

Defined by research using implicit measures



Implicit Association Test

Best known implicit measures

Categorise stimuli under time pressure

Categories share response keys
& switch between blocks of trials

Black people & positive, White people & negative
vs
Black people & negative, White people & positive

Reaction time biases ≈ implicit associations



Do one yourself: implicit.harvard.edu/implicit/selectatest.html

Key claims

1. Implicit measures measure unconscious associations
2. Uniquely predictive of overt behaviour
3. Reliable & valid measures
4. Acquired via unconscious experience

Fazio & Olson (2003), Greenwald et al. (1995), Olson & Fazio (2001)

Thinking in evolutionary terms of survival,

e.g. generating papers, citations, funding, & jobs,

How good is this theory?

**“Implicit measures
measure unconscious associations”**

No

“Implicit ≠ Unconscious”

- No. Greenwald & Banaji (2017), Greenwald & Lai (2020)

“Unavailable to self-report or introspection”?

- No, individuals can accurately report them. Hahn et al. (2014)

“Implicit measures measure unconscious associations”

No

“Implicit ≠ Unconscious”

- No. Greenwald & Banaji (2017) Greenwald & Lai (2020)

“Unavailable to self-report or introspection”?

- No, individuals can accurately report them. Hahn et al. (2014)

Good for the theory!
More research necessary!

**“Implicit measures
measure unconscious associations”**

No

What is it we're even trying to measure?

- Purely associative mental representations (Fazio, Bargh)
- Purely propositional mental representations (De Houwer)
- Dual process representations (Gawronski)
- The responses on the task are the associations (Nosek)
- Who cares: focus on predictions (Greenwald)

“Implicit measures measure unconscious associations”

- What is it we're even trying to measure?**
- Purely associative mental representations (Fazio, Bargh)
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 - Dual process representations (Gawronski)
 - The responses on the task are the associations (Nosek)
 - Who cares: focus on predictions (Greenwald)

No
Good for the theory!
Dozens of papers!

**“Implicit associations
drive overt behavior”**

No

Do they cause overt behaviour?

- Many weasel words: guide, drive, shape, influence, determine
- Rarely/never “cause” - Simon Says!

“Implicit associations drive overt behavior”

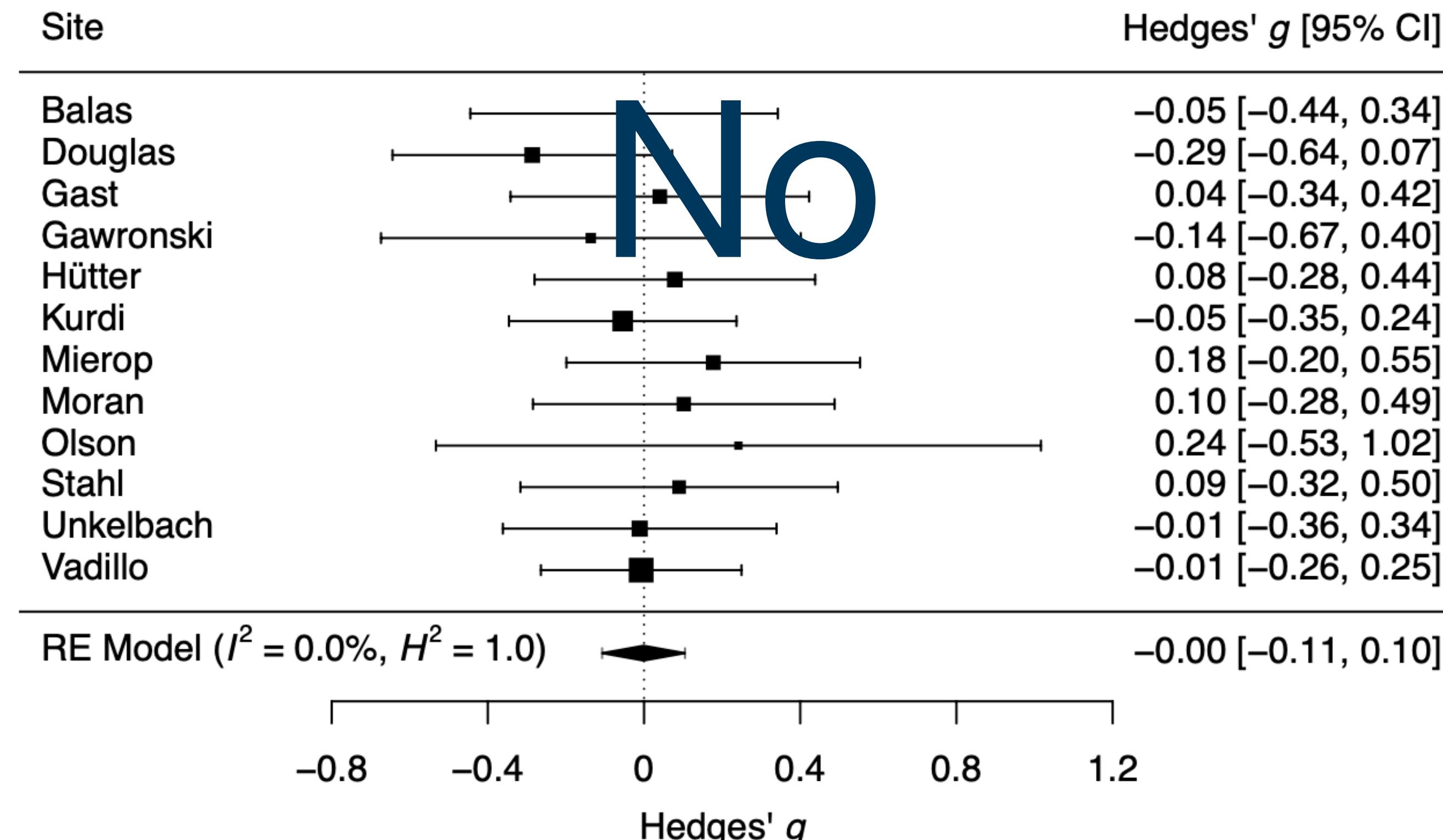
Do they cause overt behavior?

- Many weasel words: ~~gut~~, drive, shape, influence, determine
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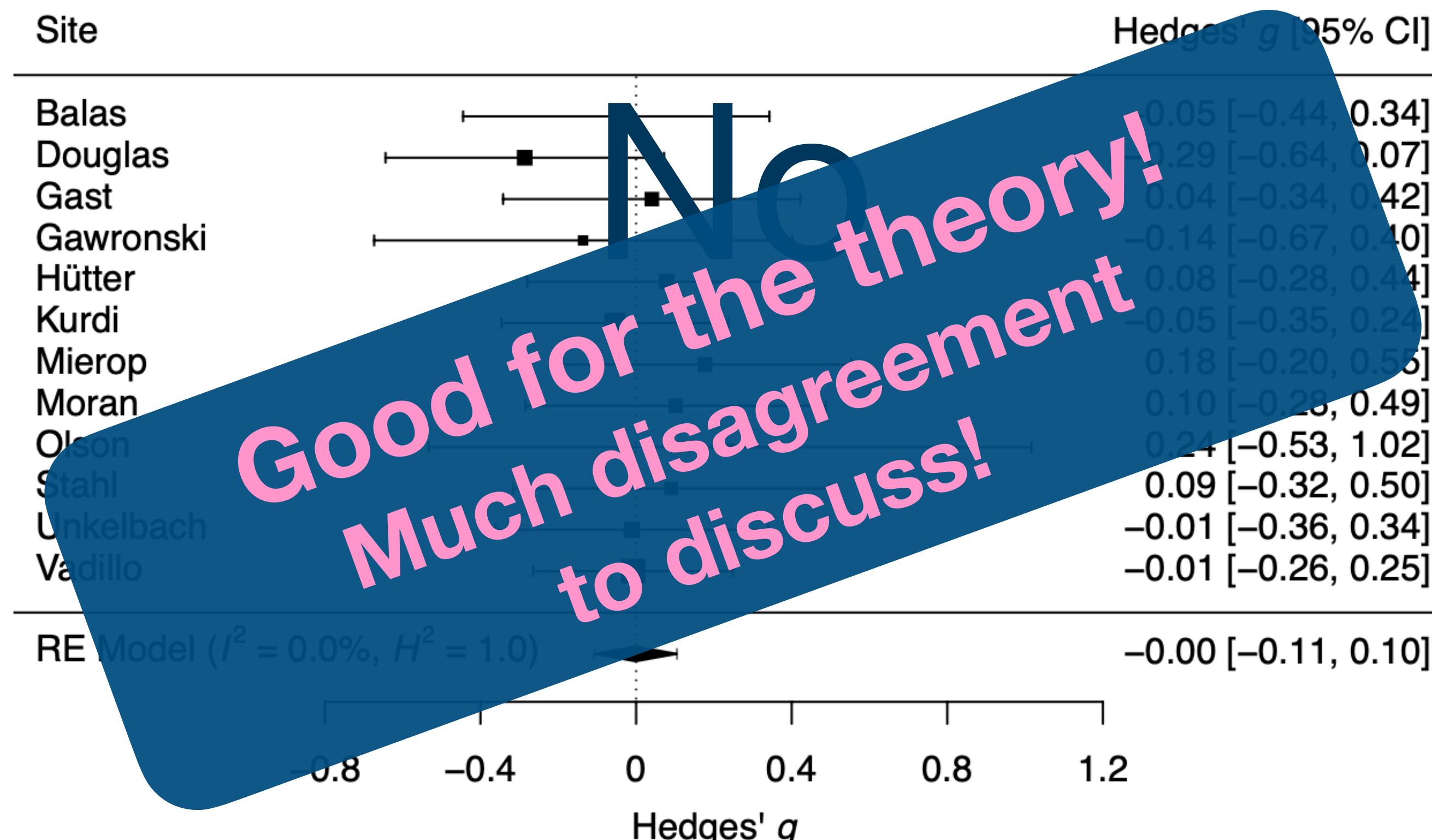
No

Good for the theory!
Lowers risk of critique!

“Implicit attitudes learned unconsciously”



“Implicit attitudes learned unconsciously”



**“Implicit associations
are highly predictive of overt behavior”**

No

Not very usefully (Kurdi et al., 2019)

“debates about whether implicit cognition and behavior are related to each other are unlikely to offer any meaningful conclusions.”

Pearson's r 90% Prediction Interval = [-0.14, .32]

**“Implicit associations
are highly predictive of overt behavior”**

Not very usefully

(Kurdi et al., 2013)

“debates about whether implicit cognition and behavior are related to each other are unlikely to offer any meaningful conclusions.”

Pearson's r 90% Prediction Interval = [-0.14, .32]

No

Good for the theory!
Published in a huge journal!

Implicit measures measure something different from self-reports?

No

- “Yes” (Greenwald et al., 1995, 2020)
- “Effectively no” (Greenwald et al., 2003)
- “Sometimes” Moderation by other variables such as social desirability or sensitivity (Greenwald & Lai, 2020)
 - “Sometimes... maybe” If you actually read the results of Greenwald & Lai (2020)
- “No” (Schimmack, 2021: $N > 100k$)
- “No” (Schmidt et al., 2022: $N > 100k$)

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No
Good for the theory!
What are the moderators?

“Implicit measures
measure attitudes”

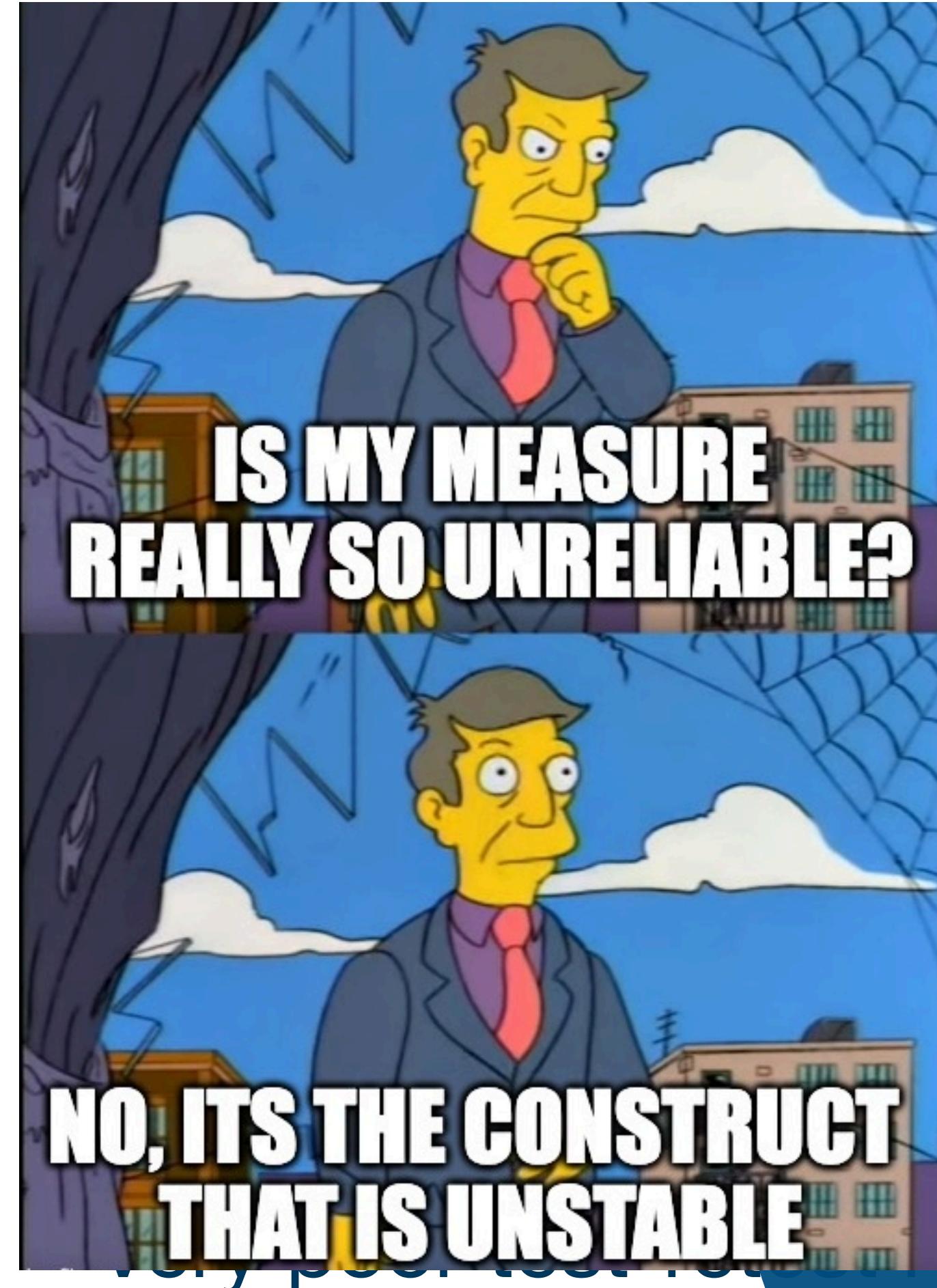
Not very well

Very poor test-retest reliability: $r = .30$ (Nosek et al., 2005)

Worse measures of attitudes than self-reports (Corneille & Gawronski, 2024)

We knew this 20+ years ago

It could have been the first and last study



Worse measures of

We knew this 20+ years

“Implicit measures measure attitudes”

Not very well!

Good for the theory!
Maybe implicit measures have
high ‘contextual sensitivity’!

Very poor test-retest reliability ($\alpha = .400$) (Nosek et al., 2005)

Reports (Corneille & Gawronski, 2024)

It could have been the first and last study

We're still trying to define what implicit means

Check for updates

Review

Implicit? What Do You Mean? A Comprehensive Review of the Delusive Implicitness Construct in Attitude Research

Olivier Corneille¹ and Mandy Hütter²

Personality and Social Psychology Review
Volume 21 Number 1 March 2020
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Abstract
This article provides a comprehensive review of diverse conceptualizations of the “implicit” construct that have emerged in attitude research over the last two decades. Doing so, our goal is to raise awareness of the harmful consequences of conceptual ambiguities associated with the terminology. We identify three main conceptualizations of the “implicitness” construct: the procedural conceptualization (implicit-as-indirect), the functional conceptualization (implicit-as-automatic), and the mental-theory conceptualization (implicit-as-associative), as well as two hybrid conceptualizations (implicit-as-indirect-and-automatic, implicit-as-affect-gut-reactions). We discuss critical limitations associated with each conceptualization and explain that confusion also arises from their coexistence. We recommend discontinuing the usage of the “implicit” terminology in attitude research and research inspired by it. We offer terminological alternatives aimed at increasing both the precision of theorization and the practical value of future research.

Good for the theory!
Explanans/Explanandum
confusion is an
opportunity for debate!

Key claims

- 1. Implicit measures measure unconscious associations**
- 2. Uniquely predictive of overt behaviour**
- 3. Reliable & valid**
- 4. Acquired via unconscious experience**

Fazio & Olson (2003), Greenwald et al. (1995), Olson & Fazio (2001)

So, how good is this theory?

The original IAT article
by Greenwald et al. (1998) now has

18,000

citations



The ‘Implicit Revolution’ was a great success

(Greenwald & Banaji, 2017; Greenwald & Lai, 2020)



The ‘Implicit Revolution’ was a great success
(Greenwald & Banaji, 2017; Greenwald & Lai, 2020)

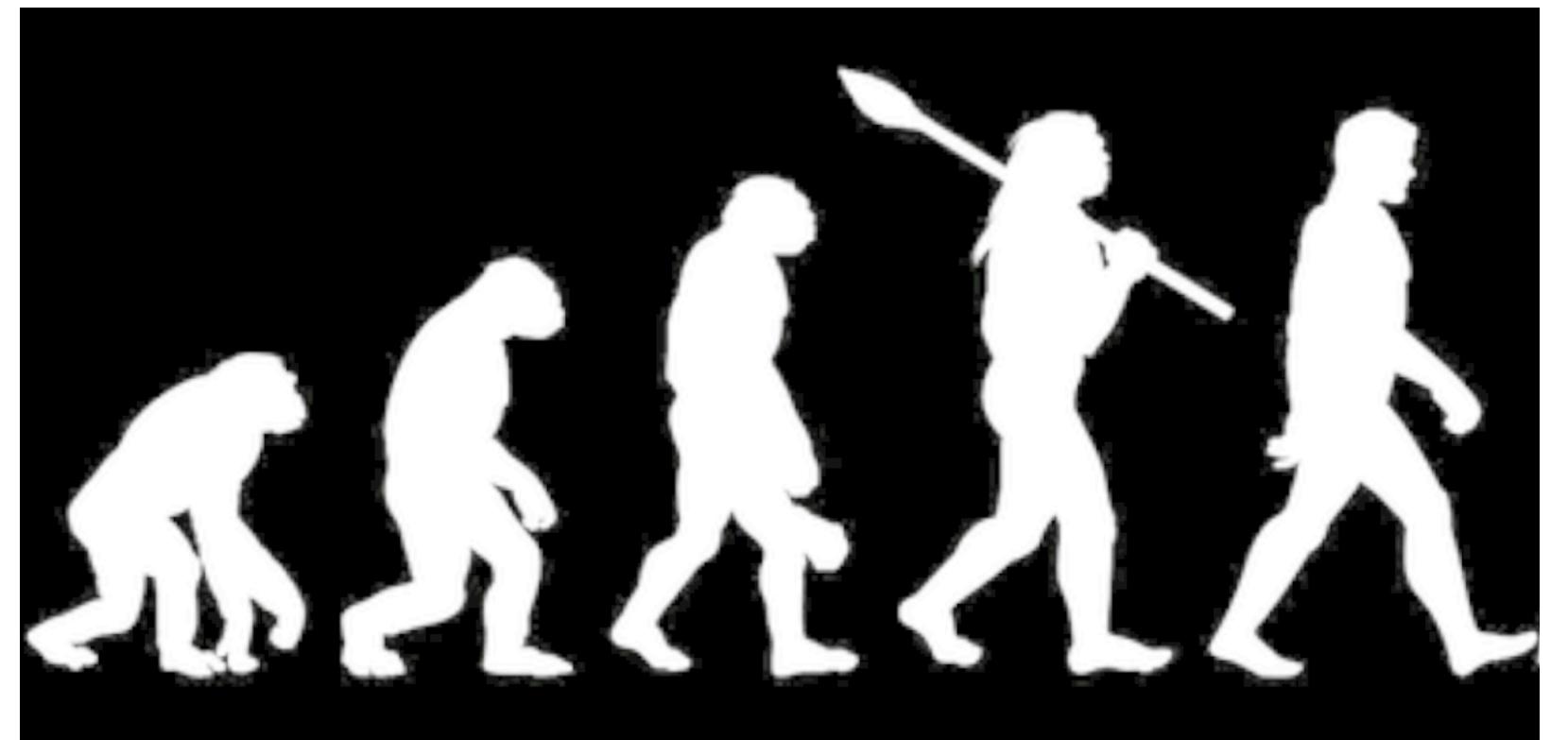
It was, from the theory’s perspective

Why?

What is a ‘good’ theory?

A good theory is one that survives

Good for the theory,
not necessarily good for us



Why?

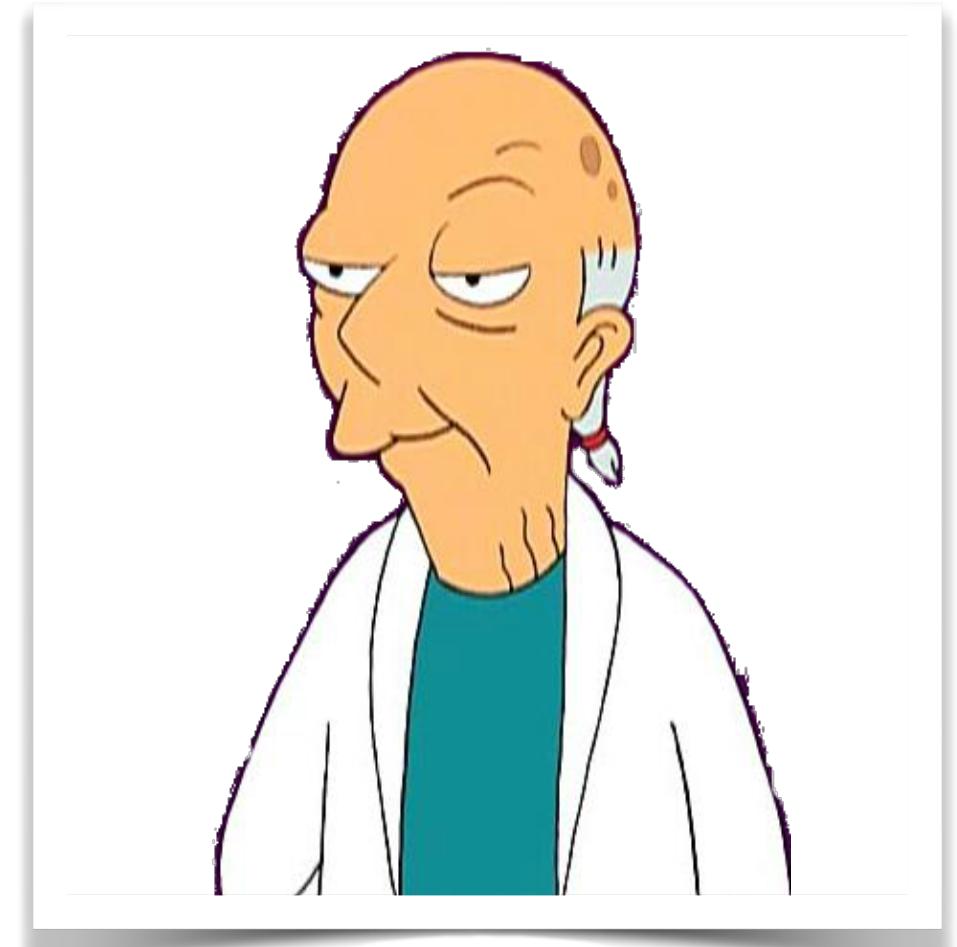
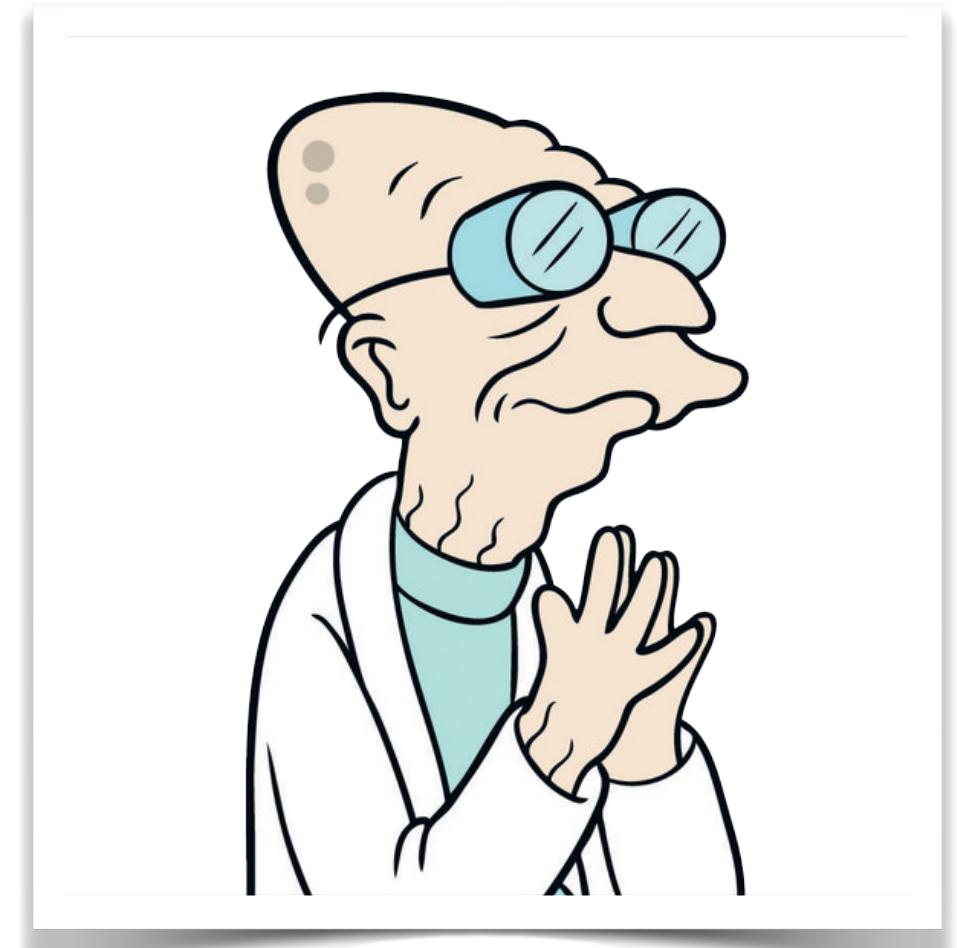
Whose fault is this?

No-one.

No individual cynicism, just selection-by-consequence.

Flawed theories survive better because the environment they exist within,

which rewards generating cool questions over useful answers.

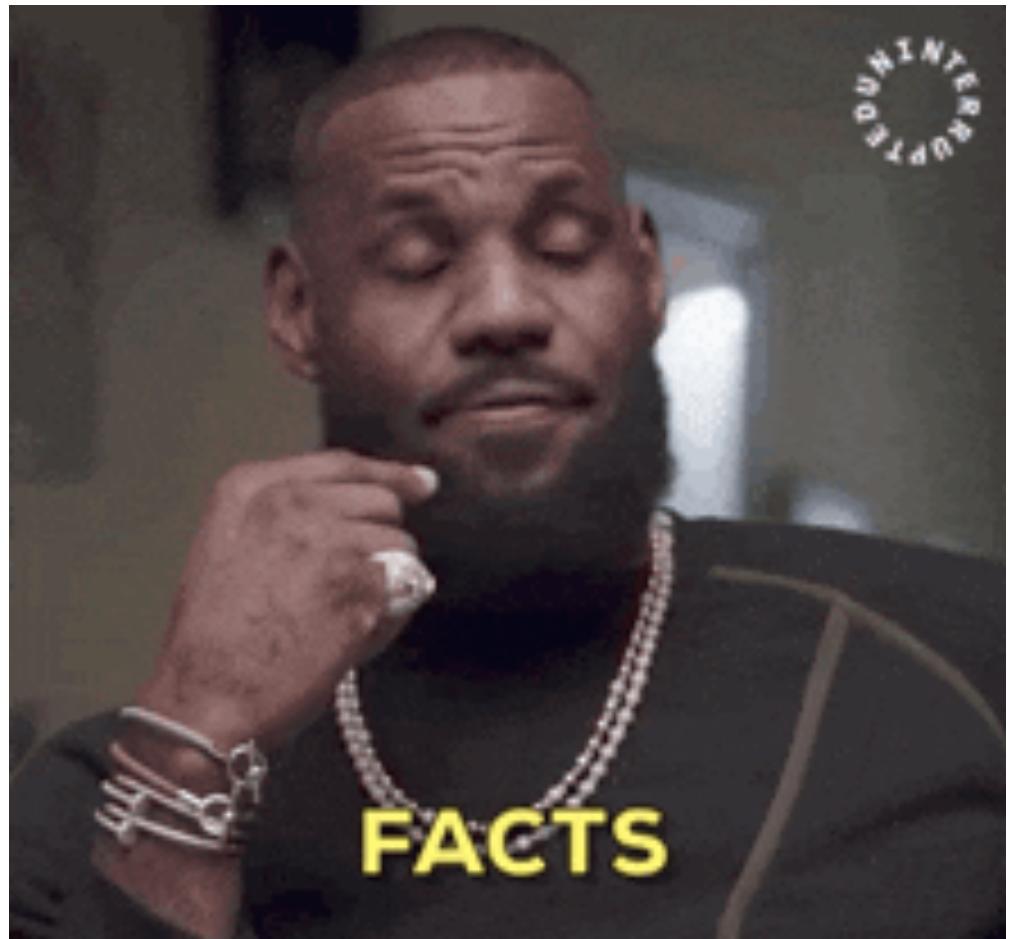


That would be tight

The best theory is a cool one

Psychological theory is almost universally presented as **indicative** theory

→ What is the case



Psychological theory is almost universally presented as **indicative** theory

→ **What is the case**



We argue that much of psych theory is in fact **subjunctive** theory

→ **What would be tight/cool/awesome if it were the case**
→ **Regardless whether it is the case or not**



ARTICLES

Preventing the return of fear in humans using reconsolidation update mechanisms

Daniela Schiller^{1,2}, Marie-H. Monfils^{1,3}, Candace M. Raio², David C. Johnson², Joseph E. LeDoux¹
& Elizabeth A. Phelps^{1,2}

Recent research on changing fears has examined targeting reconsolidation. During reconsolidation, stored information is rendered labile after being retrieved. Pharmacological manipulations at this stage result in an inability to retrieve the memories at later times, suggesting that they are erased or persistently inhibited. Unfortunately, the use of these pharmacological manipulations in humans can be problematic. Here we introduce a non-invasive technique to target the reconsolidation of fear memories in humans. We provide evidence that old fear memories can be updated with non-fearful information provided during the reconsolidation window. As a consequence, fear responses are no longer expressed, an effect that lasted at least a year and was selective only to reactivated memories without affecting others. These findings demonstrate the adaptive role of reconsolidation as a window of opportunity to rewrite emotional memories, and suggest a non-invasive technique that can be used safely in humans to prevent the return of fear.

Learning about potential dangers in the environment is critical for adaptive function, but at times fear learning can be maladaptive, resulting in excessive fear and anxiety. Research on changing fears has highlighted several techniques, most of which rely on the inhibition of the learned fear response. An inherent problem with these inhibition techniques is that the fear may return, for example with stress¹. Recent research on changing fears targeting the reconsolidation process overcomes this challenge to some extent. During reconsolidation, stored information is rendered labile after being retrieved, and pharmacological manipulations at this stage result in an inability to retrieve the memories at later times, suggesting that they are either erased or persistently inhibited^{2–6}. Although these pharmacological manipulations are potentially useful for changing learned fears, their use in humans can be problematic. Here we show that invasive techniques are not necessary to alter fear by targeting reconsolidation. This is based on the premise that reconsolidation is an adaptive update mechanism by which new information is incorporated into

Why would such a recurrent window of vulnerability exist for old memories? From an evolutionary perspective, reconsolidation may serve as an adaptive update mechanism allowing for new information, available at the time of retrieval, to be integrated into the initial memory representation^{3,7,8}. This view captures the fluidity of memory and suggests a dynamic process through which memories are formed, updated and maintained.

Using Pavlovian fear conditioning as a model paradigm, research in non-human animals has detailed the molecular processes involved in emotional memory reconsolidation by pharmacologically blocking various stages of this process, after which the memory was no longer expressed. Most of these studies use protein synthesis inhibitors, or other pharmacological agents, that are not safe for use in humans^{3,4,6,11–14}. Because the ability to impair emotional memories has important implications for the treatment for anxiety disorders linked to traumatic memories, such as post-traumatic stress disorder (PTSD), identifying techniques to target reconsolidation that can be

What if we could
selectively erase our most
painful memories?

[nature](#) > [news](#) > [article](#)

News | Published: 09 December 2009

Fear memories erased without drugs

[Lizzie Buchen](#)

[Nature](#) (2009) | [Cite this article](#)

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Memories of fear could be permanently erased, study shows

Research in mice reveals a new approach to wiping memories from the brain, demonstrating that specific memories can be weakened or strengthened

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How the Brain Learns to Forget - The Neural Signature of Fear Memory Erasure

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How the Brain Learns to Forget

Exciting findings in the past two decades suggest that it is possible to selectively and retro-actively **wipe out previously acquired memories of emotional events**, through targeted pharmacological or behavioural interventions at the time of memory retrieval. At first glance, the phenomenon of **post-retrieval amnesia** could indeed dramatically change our conceptions about the nature and dynamics of memory. It may also pave the way for radically new interventions to treat psychological problems in which emotional memories play a pivotal role, such as anxiety, PTSD, addiction or depression, through targeted memory erasure.

€ 2'000'000 in new funding

How?

Exploitation of memory reconsolidation update mechanisms:

“The presentation of relevant information during memory reconsolidation can result in the modification of a destabilized memory trace by allowing the memory trace to be updated before being reconsolidated.”

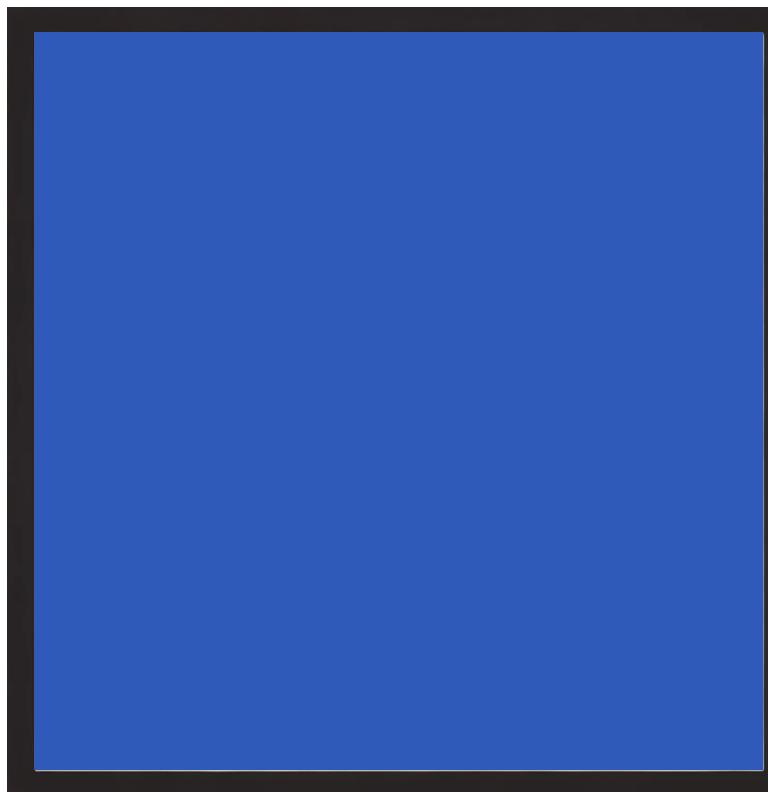
Exploitation of memory reconsolidation update mechanisms:

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[Learning phase]

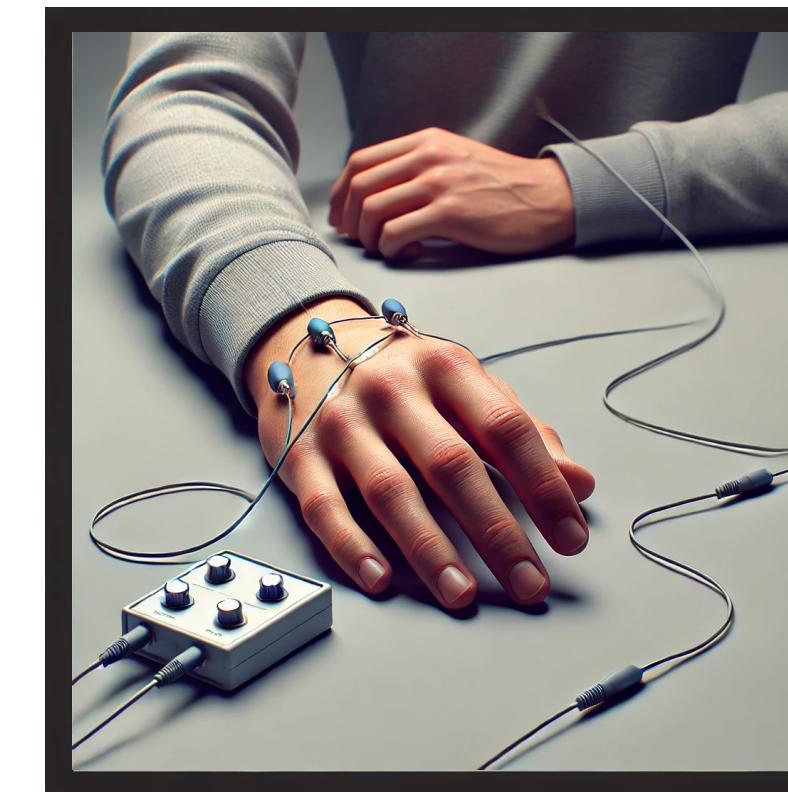
Stimulus



Shock



Skin Conductance
Response



Fear!

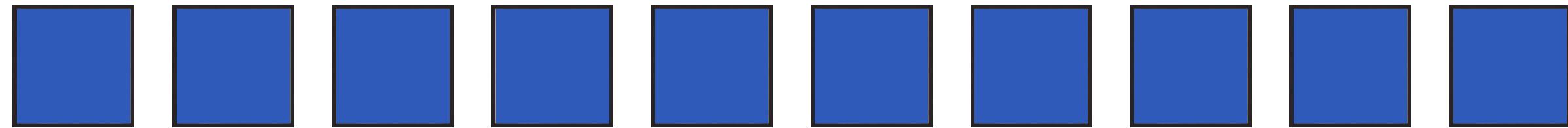
6 CS+ / US
10 CS+ / No US
10 CS-

Blue square predicts electric shock

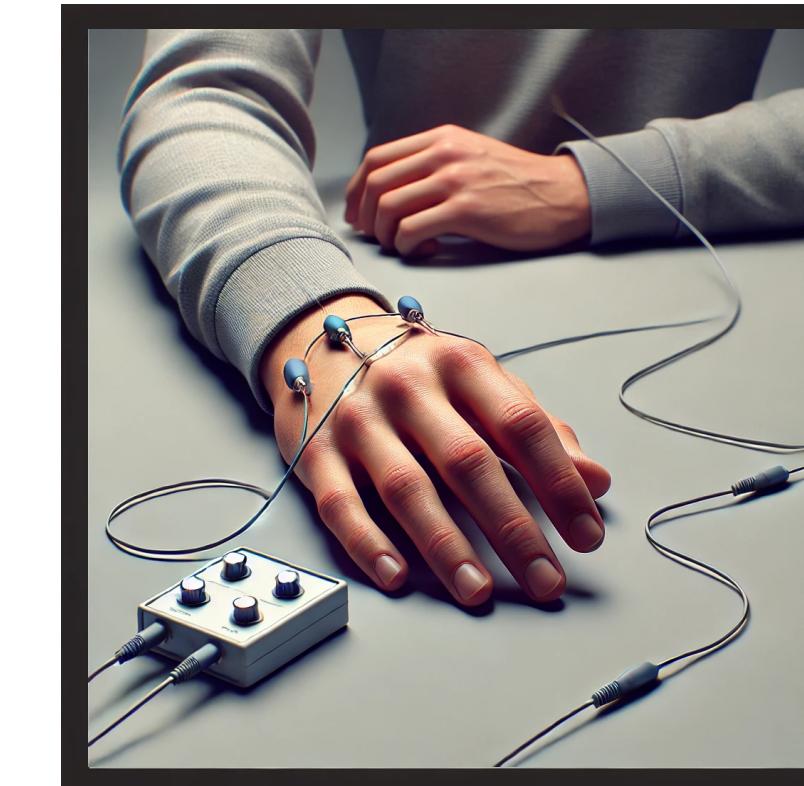
[Extinction phase - 24 hours later]

Stimulus but no shock

Standard extinction: 10 trials



Reduced
Skin Response



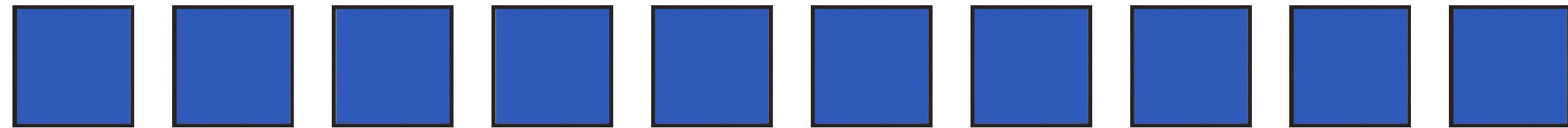
No fear

Blue square no longer predicts electric shock

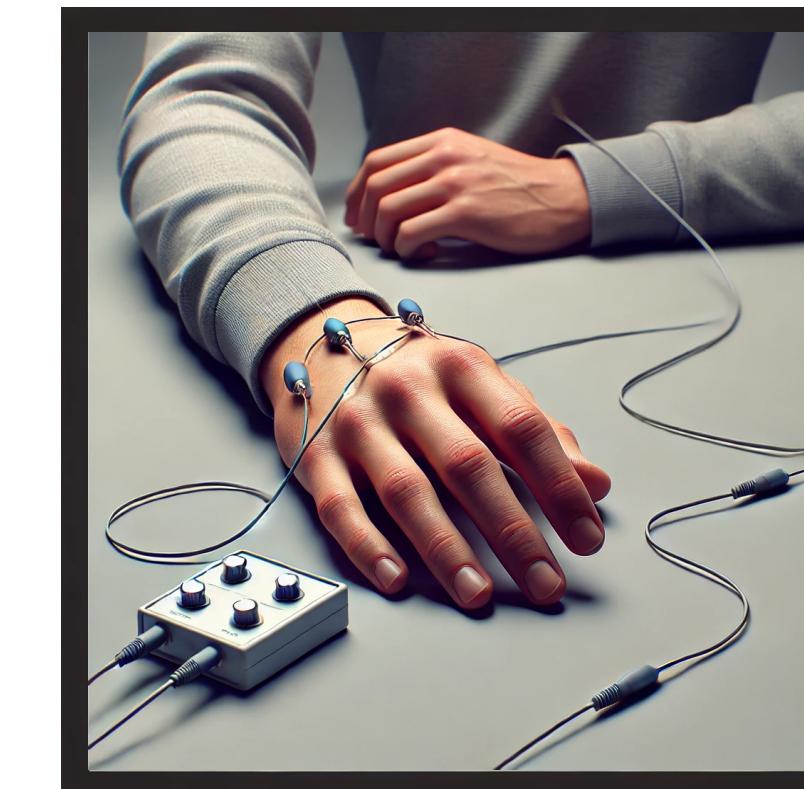
[Extinction phase - 24 hours later]

Stimulus but no shock

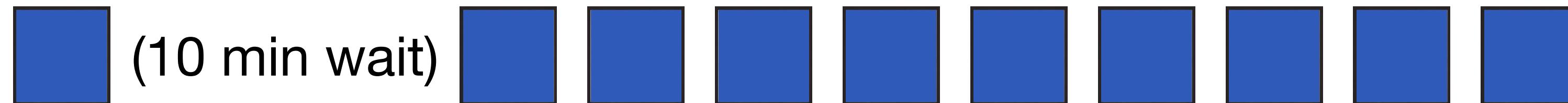
Standard extinction: 10 trials



Reduced
Skin Response



Reactivation enhanced extinction



Blue square no longer predicts electric shock

So it's just extinction

We've known this since 1924

**Extinction doesn't cause
forgetting**

**Did you ask them if they
remembered being shocked?
(No)**

Reprinted from Vol. 31, No. 4, 308-315

1924

**A LABORATORY STUDY OF FEAR:
THE CASE OF PETER**

MARY COVER JONES

As part of a genetic study of emotions¹, a number of children were observed in order to determine the most effective methods of removing fear responses.

The case of Peter illustrates how a fear may be removed under laboratory conditions. His case was selected from a number of others for the following reasons:

1. Progress in combating the fear reactions was so marked that many of the details of the process could be observed easily.

2. It was possible to continue the study over a period of more than three months.

3. The notes of a running diary show the characteristics of a healthy, normal, interesting child, well adjusted, except for his exaggerated fear reactions. A few descriptive notes show something of his personality:

Remarkably active, easily interested, capable of prolonged endeavor A favorite with the children as well as with the nurses and matrons . . . Peter has a healthy passion for possessions. Everything that he lays his hands on is his. As this is frequently disputed by some other child, there are occasional violent scenes of protest. These disturbances are not more frequent than might be expected in a three-year-old, in view of the fact that he is continually forced to adjust to a large group of children, nor are they more marked in Peter's case than in others of his age. Peter's I. Q. at the age of 2 years and 10 months was 102 on the Kuhlmann Revision of the Binet. At the same time he passed 5 of the 3 year tests on the Stanford Revision. In initiative and constructive ability, however, he is superior to his companions of the same mental age.

Response:

“We never claimed to remove memories, just to break the link between the fear learning and the current experience of fear”

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How the Brain Learns to Forget - The Neural Signature of Fear Memory Erasure

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Forget - The Neural Signature of Fear Memory Erasure

ations Events News CLEP 2019 MEETING

Learns to Forget

Response:

“We never claimed to remove memories, just to break the link between the fear learning and the current experience of fear”

Initial Signature of Fear Memory Erasure

s CLEP 2019 MEETING

Response:

“We never claimed to remove memories, just to break the link between the fear learning and the current experience of fear”

re of Fear Memory Erasure

2019 MEETING

Response:

“We never claimed to remove memories, just to break the link between the fear learning and the current experience of fear”

Fear Memory Erasure

MEETING

Response:

“We never claimed to remove memories, just to break the link between the fear learning and the current experience of fear”

memory erasure

Response:

“We never claimed to remove memories, just to break the link between the fear learning and the current experience of fear”

€ 2'000'000 funding

100 year old idea



To Chalkia & Beckers' credit:

Published a high quality **replication** of Schiller et al. (2010)

- Null results

Published a **Verification Report** of Schiller et al. (2010)

- Obtained the raw data and reconstructed their analyses + results
- Discovered unreported ‘qualitative’ exclusions
- Original study: $N = 77$ with 6 excluded
- Verification report: 50 additional unreported participants excluded
- Effect disappears under any principled exclusion strategy

Schiller & LeDoux's reply:

A comment on the editorial process

There are a few **disturbing issues** here: **1)** publishing a verification report without the original authors' response does not allow the scientific community to weigh the evidence and see the whole picture; **2)** the publication process for this verification report involved collaboration between the authors and the editors throughout, which has the potential to influence editorial objectivity; **3)** while data debates are welcomed, the editors crossed the line to derogatory editorials that failed to acknowledge the extensive vetting of our finding, and launched a social media campaign lauding the efforts of the editors and authors that are irrelevant to scientific discourse.

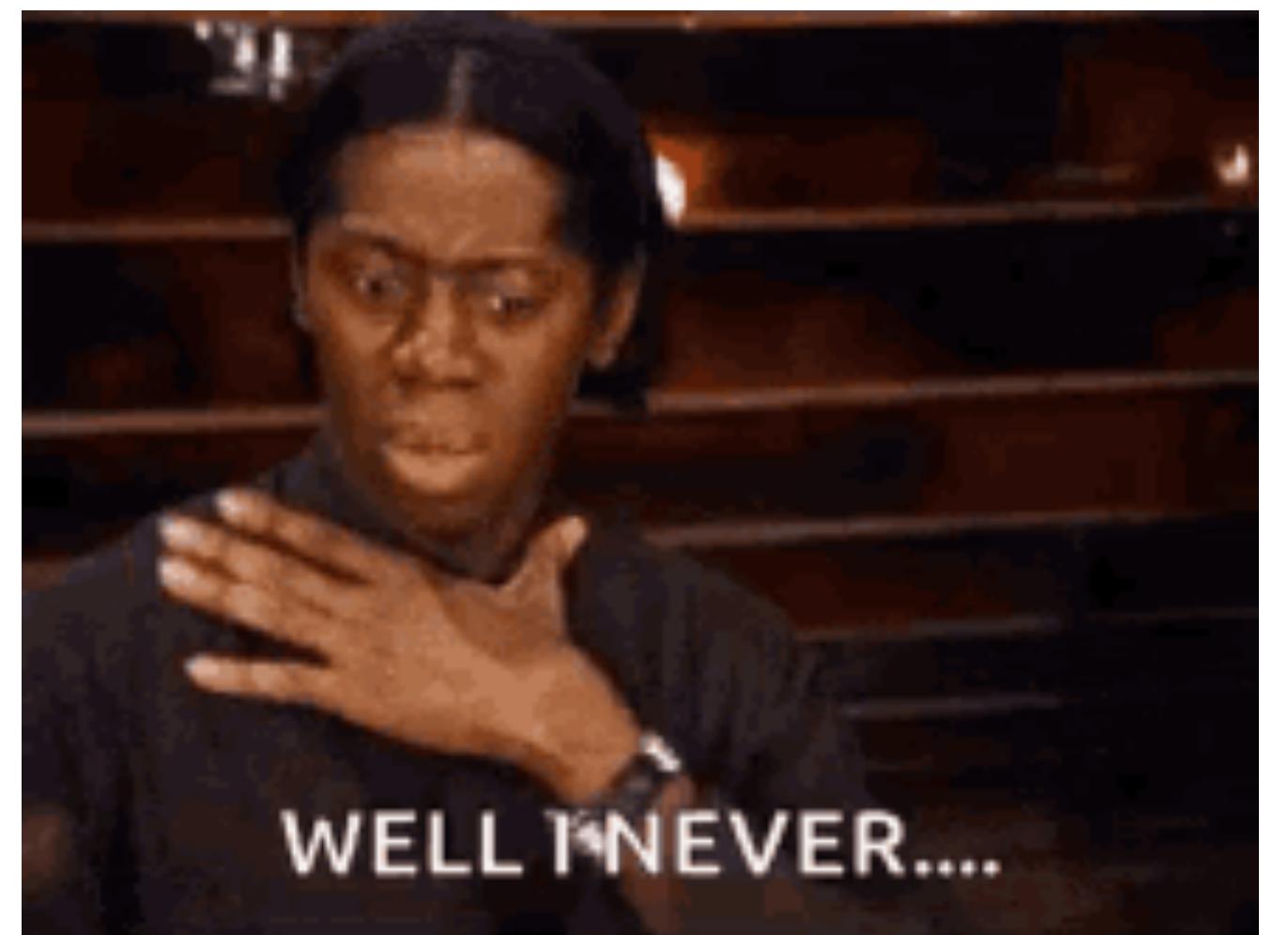
By having an opaque publication process, along with a social media campaign, while failing to provide the authors of the original study the opportunity for a concurrent public response, ***the editorial team maintains full control of the narrative, and the unchecked power to attack any random paper or scientist.*** This is a **dangerous weapon** in the name of transparency and open science.

Schiller & LeDoux's reply:

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By having an opaque publication process, along with a social media campaign, while failing to provide the authors of the original study the opportunity for a concurrent public response, ***the editorial team maintains full control of the narrative, and the unchecked power to attack any random paper or scientist.*** This is a **dangerous weapon** in the name of transparency and open science.



When reading papers, ask yourself:

- Not even wrong
 - What is the theory/hypothesis?
- Strategic ambiguity
 - Could the ambiguity be an advantage?
- Would it be tight
 - Would it be very cool if the theory/hypothesis was right?