Prebunking and Debunking Misinformation

PSYC481: Psychology of Advertising

Mark Hurlstone

Lancaster University

» Learning Objectives

- Misinformation Damages Society
  - misinformation, disinformation, fake news, fall out from misinformation, illusory truth effect, post-truth world
- Persistence of Misinformation
  - continued-influence effect of misinformation, explanations for continued influence
- Prebunking Misinformation
  - preempting misinformation through “inoculation”
- Debunking Misinformation
  - filling the gap, make misinformation salient during correction, draw attention to deceptive strategies, credibility attack, repeat corrections

Misinformation Damages Society

» Misinformation Damages Society

- Misinformation is false information spread by mistake or with intent to mislead
- When there is intent to mislead, it is called disinformation
- Fake news is disinformation of a sensational nature that mimics news media content
- The spread of misinformation has been ranked one of the 10 most significant global challenges (World Economics Forum, 2013)

With good reason:

- The fallout from misinformation can cause severe harms to individuals and society at large

» Big Tobacco

- Medical scientific link between smoking and lung cancer established as early as the 1950s
- But, the tobacco industry waged a campaign of "manufacturing doubt" about the science (Oreskes & Conway, 2010)
- Using "fake experts", and other disinformation techniques, they successfully delayed regulation for more than 50 years
- The legacy of this campaign is 8 million global deaths per year due to tobacco inhalation alone
- Estimated that by 2030 10% of all global deaths will be accounted for by tobacco (WHO, 2010)

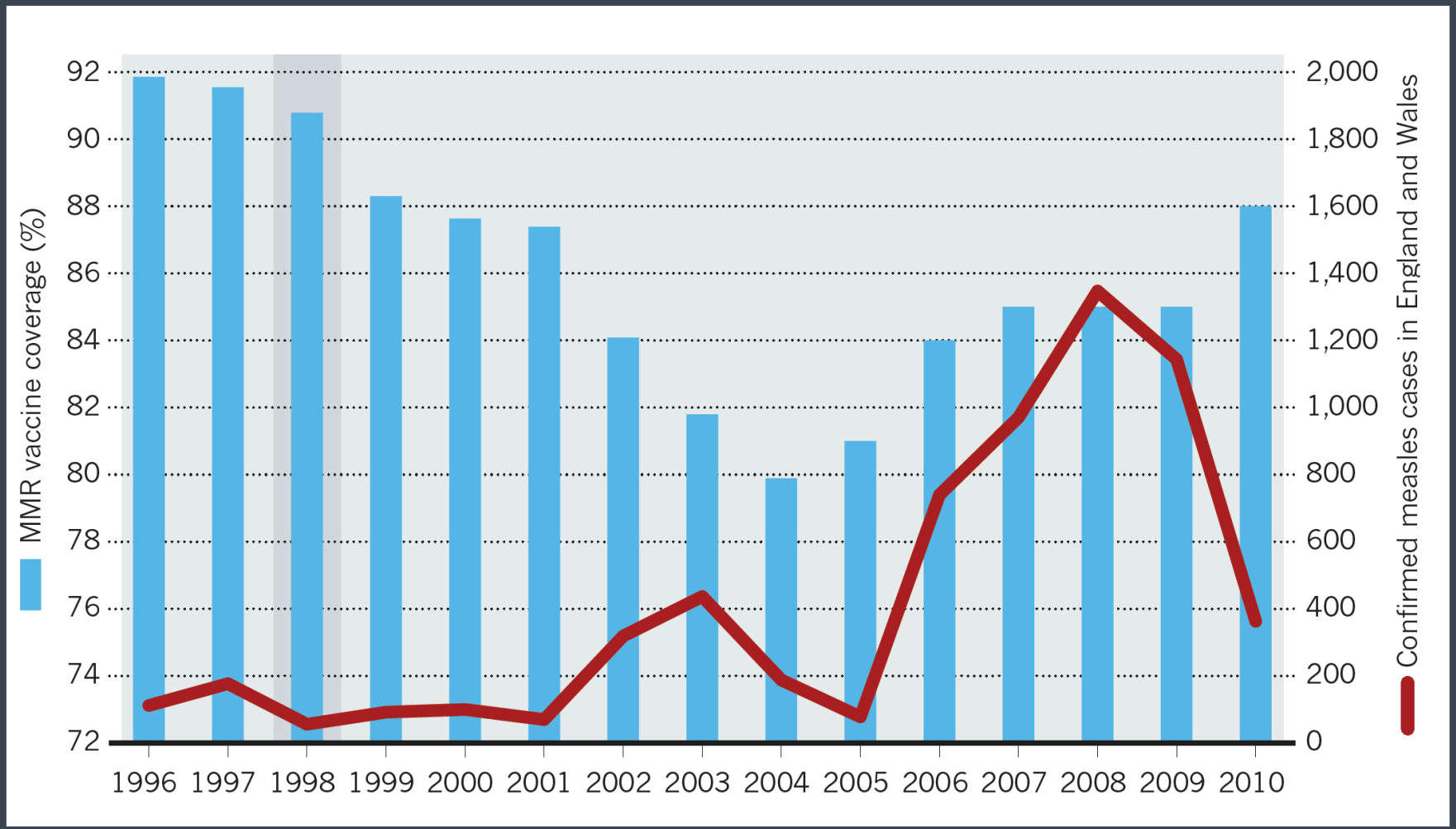
» Climate Change

- In the 1980's, the same small group of scientists that wrote the "tobacco disinformation playbook" turned their attention to another issue—climate change (Oreskes & Conway, 2010)
- They developod a network of conservative/libertarian think tanks and political operatives devoted to "manufacturing doubt" about the established link between human CO_2 emissions and global warming
- The legacy of this campaign, amongst other things, is almost 30 years of international climate inaction
- The cost of this inaction is that there is a $> 11\%$ chance that global warming will exceed 6°C by 2100 (Wagner & Weitzman, 2015)
- This would mark the end of human civilisation as we know it

» Vaccination

- In 1998, Andrew Wakefield and colleagues published an article in *The Lancet* suggesting a link between the measles, mumps, and rubella (MMR) vaccine and autism
- Publicity around the paper caused immunisation rates in the UK to plummet, causing a sharp rise in measles cases
- The original paper was retracted in 2010 after it was revealed the chief author failed to declare a conflict of interest
- He was later found guilty of misconduct and stripped of his medical license
- The legacy of this event was a rise in anti-vaccination sentiment and millions of pounds of taxpayer funds wasted on replication efforts and public health campaigns

» MMR Vaccination Statistics in England and Wales (1996–2010)



» Why Are We Susceptible to Misinformation?

* Our feelings of familiarity and truth are often linked
* We are more likely to believe things we have heard many times than new information
* Known as the illusory truth effect (Fazio et al., 2015)
* The more people encounter a piece of misinformation they do not challenge, the more the misinformation seems true, and the more it "sticks"
* This can occur even if a source is identified as unreliable or is blatantly false

Objective truth is less important than familiarity

* We tend to believe falsehoods when they are repeated sufficiently often

» Why Are We Susceptible to Misinformation?

- The illusory truth effect helps explain why fake news stories have proliferated in recent years
- Pennycook et al. (2008) find repetition of fake news headlines increases perceptions of accuracy:
  - even for highly implausible content
  - with a low level of overall believability
  - and even when stories are labelled as contested by fact checkers
- Thus, familiarity with fakes news stories increases the believability of such stories
- This is a concern given that fake-news stories are often more popular than real news stories (Silverman et al., 2016)

» Are We Living in a Post-Truth World?

- It has been suggested we are living in a post-truth world
- One where objective facts are less influential in shaping public opinion than appeals to emotion and personal belief
- *Not a blemish on the mirror; the mirror is a window into an alternate reality* (Lewandowsky et al., 2017)
- Political drivers have created an "alternative epistemology" that does not conform to traditional standards of evidentiary support
- Explains why a sizeable portion of the US population believes in conspiracy theories (Lewandowsky et al., 2017)

Persistence of Misinformation

* Continued-Influence Effect
* Explanations of The Continued-Influence Effect

Persistence of Misinformation

* Continued-Influence Effect
* Explanations of The Continued-Influence Effect

» Persistence of Misinformation

- How do people respond when given corrections of misinformation?
- Corrections are rarely fully effective
  - despite being corrected
  - despite acknowledging the correction
  - despite pre-exposure warnings (Ecker et al., 2010)
- By and large, people continue to rely on information they know to be false
- Known as the continued-influence effect (Lewandowsky et al., 2012)

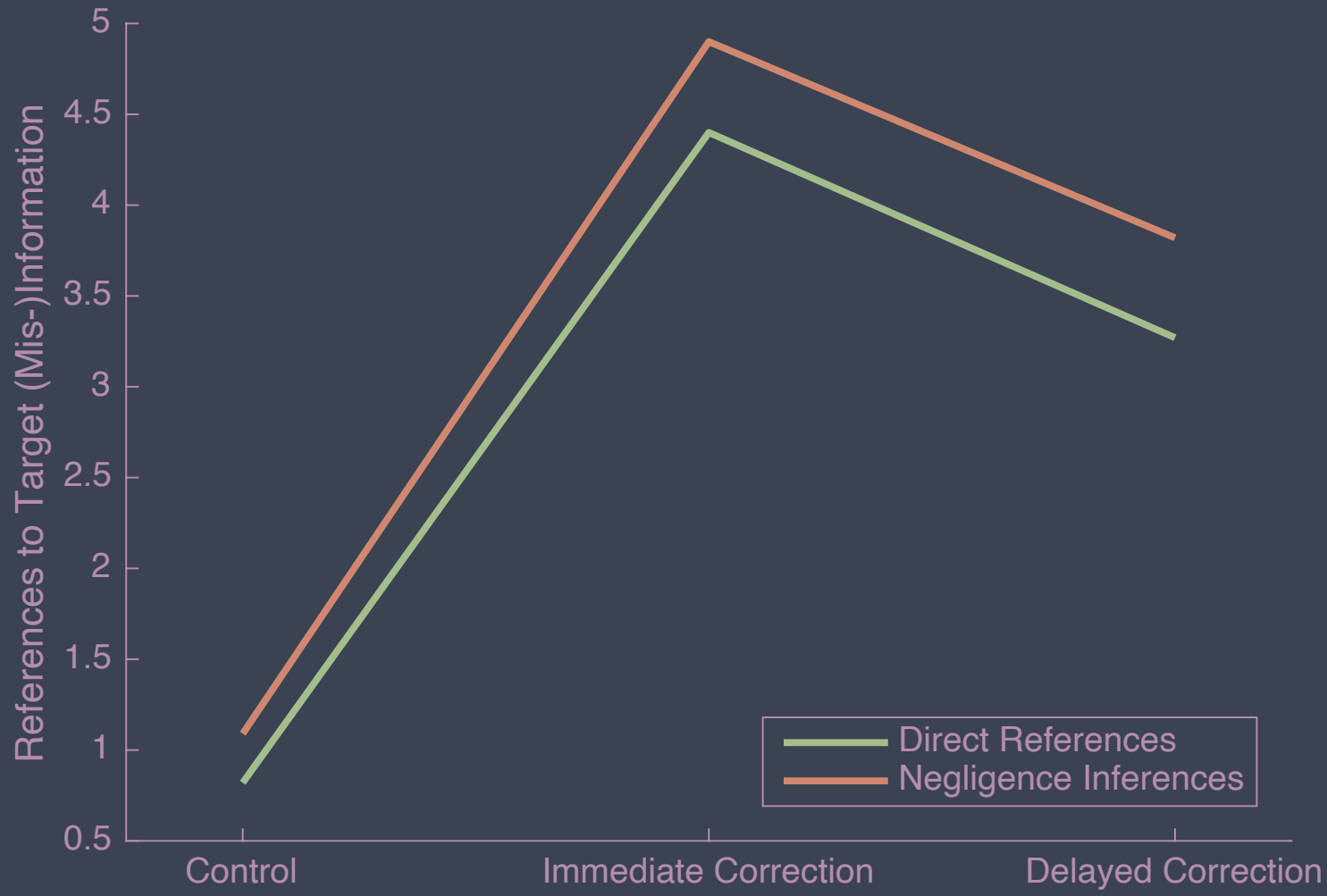
» Continued-Influence Effect

- People presented with a fictitious report of an unfolding event
- Report contains a target piece of information
  - in a correction condition, the target information is retracted
  - in a control condition, no correction occurs
- People's understanding of event assessed via questionnaire
- Number of references to target (mis)information is counted

» Continued-Influence Effect (Johnson & Seifert, 1994)

- A warehouse fire is initially thought to have been caused by gas cylinders and oil paints negligently stored in a closet
- Participants in the correction condition are given a retraction ("the closet was actually empty")
- Participants next asked indirect inferences questions (e.g., "What caused the black smoke") and references to gas and paint counted
- Participants also asked recall some basic facts about the event and indicate whether they noticed any retraction

» Continued-Influence Effect (Johnson & Seifert, 1994)



» Continued-Influence Effect

- The continued-influence effect has been replicated many times
- Corrections can often appear to "work"
- For example, people may report the correction accurately and indicate they no longer believe the original misinformation
- But the misinformation may still influence subsequent indirectly related judgements and decisions

Persistence of Misinformation

* Continued-Influence Effect
* Explanations of The Continued-Influence Effect

» Explanations of The Continued-Influence Effect: Familiarity (Lewandowksy et al., 2012)

- We are more likely to believe information that is familiar
- Problematic: any attempt to correct misinformation requires repeating it, which may further enhance its familiarity
- For example, correcting an earlier account there were no oil paints and gas cylinders requires repetition of "paints and gas were present"
- Repetition of information tends to strengthen that information in memory, which may increase belief in it
- When people reencounter the misinformation, it may be more familiar to them than if no correction had been given

» Explanations of The Continued-Influence Effect: Mental Models (Lewandowksy et al., 2012)

- People build mental models of unfolding events
- For example, factor A (negligence) led to factor B (improper storage of flammable materials), and factor B in conjunction with factor C (an electrical fault) caused outcome X (the fire)
- If a correction invalidates a central piece of information (e.g., factor B), people are left with a gap in their mental models
- The event does not make sense unless they maintain the false assertion
- People may cling to the false assertion to maintain coherence

Prebunking

» Prebunking: Neutralising Misinformation Before it is Encoded

* Misinformation is resistant to correction
* Thus, when possible a good strategy is to neutralise misinformation before it is perceived
* This strategy is known generically as prebunking
* For example, simply warning people that they may be exposed to misinformation at a later point can confer resistance to that misinformation (Ecker et al., 2011)
* An analogy has been made between prebunking and the biomedical concept of “inoculation”

» Inoculation Theory

- In medicine, resistance to a virus can be conferred by exposing someone to a weakened version of the virus (a vaccine) to produce antibodies
- The social-psychological theory of attitudinal inoculation (Papageorgis & McGuire, 1961) follows a similar logic
- A threat is introduced by forewarning people they may be exposed to misinformation
- Then, one or more (weakened) examples of that information are presented and directly refuted
- This equips people with counterarguments (cognitive antibodies) that may convey resistance to future misinformation

» Inoculation Theory

* There are two elements to an inoculation message:
  1. an explicit warning of an impending threat to one's preexisting beliefs
  2. a refutation of an anticipated argument that exposes the imminent fallacy
* For example, an inoculation might include:
  1. a warning of attempts to cast doubt on the scientific consensus smoking causes lung cancer, and
  2. an explanation that one strategy is the use of scientific certainty argumentation methods (SCAMs)
* Exposing the strategy delivers the misinformation in a "weakened" form—providing counterarguments to resist its "strong" form

» Testing Inoculation: The Oregon Global Warming Petition Project

Global Warming Petition Project

31,487 American scientists have signed this petition, including 9,029 with PhDs

Petition

We urge the United States government to reject the global warming agreement that was written in Kyoto, Japan in December, 1997, and any other similar proposals. The proposed limits on greenhouse gases would harm the environment, hinder the advance of science and technology, and damage the health and welfare of mankind.

There is no convincing scientific evidence that human release of carbon dioxide, methane, or other greenhouse gases is causing or will, in the foreseeable future, cause catastrophic heating of the Earth's atmosphere and disruption of the Earth's climate. Moreover, there is substantial scientific evidence that increases in atmospheric carbon dioxide produce many beneficial effects upon the natural plant and animal environments of the Earth.

Edward Teller
Please sign here

☒ Please send more petition cards for me to distribute.

My academic degree is B.S. ☐ M.S. ☐ Ph.D. ☒ in the field of PHYSICS

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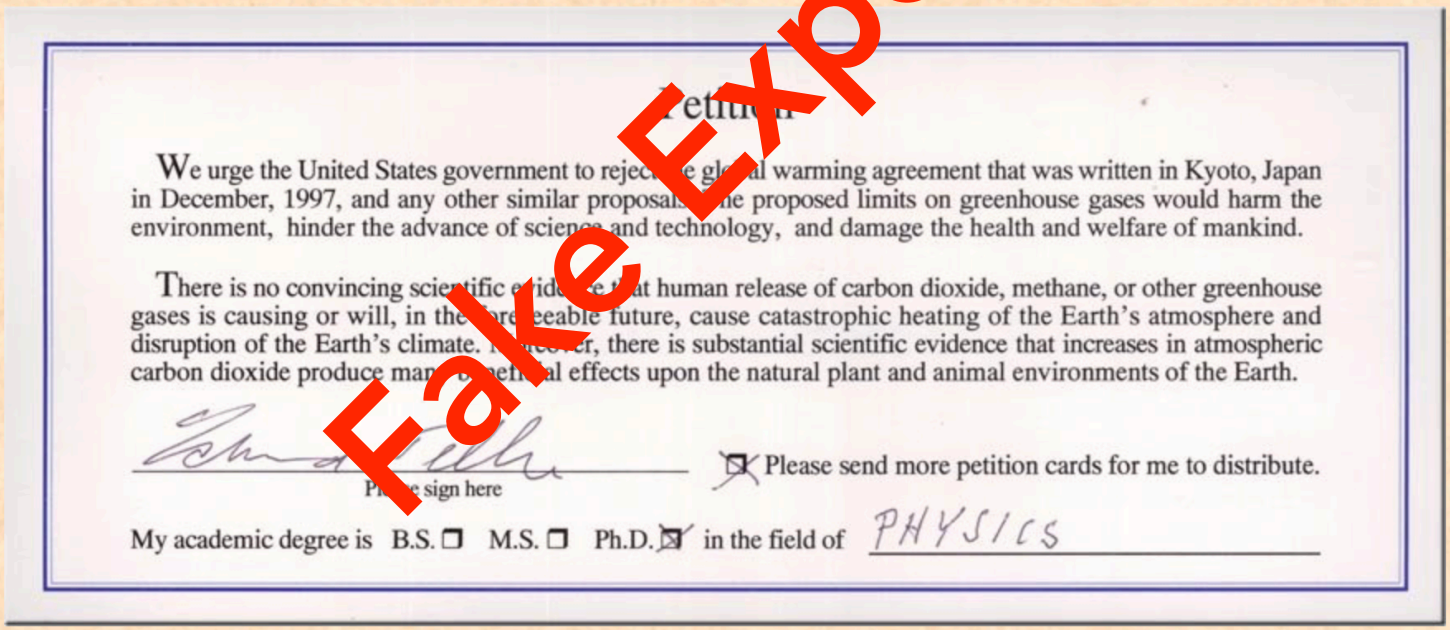

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Fake Experts!

» 97-98% of Climate Scientists Agree Humans are Causing Global Warming

* Anderegg, W. R. L., Prall, J. W., Harold, J., & Schneider, S. H. (2010). Expert credibility in climate change. *Proceedings of the National Academy of Science, 107,* 12107–12109.
* Cook, J., Nuccitelli, D., & Green, S. A. et al. (2013). Quantifying the consensus on anthropogenic global warming in the scientific literature. *Environmental Research Letters, 8(2),* 1–7.
* Doran, P. T., & Zimmerman, M. K. (2009). Examining the scientific consensus on climate change. *Eos, 90 (3),* 21–22.
* Oreskes, N. (2004). Beyond the ivory tower: the scientific consensus on climate change. *Science, 306,* 1686.

» Consensus Messaging Enhances Belief in Human-Caused Global Warming

nature climate change

ARTICLES

PUBLISHED ONLINE: 28 OCTOBER 2012 | DOI: 10.1038/NCLIMATE1720

The pivotal role of perceived scientific consensus in acceptance of science

Stephan Lewandowsky*, Gilles E. Gignac and Samuel Vaughan

Although most experts agree that CO_2 emissions are causing anthropogenic global warming (AGW), public concern has been declining. One reason for this decline is the 'manufacture of doubt' by political and vested interests, which often challenge the existence of the scientific consensus. The role of perceived consensus in shaping public opinion is therefore of considerable interest: in particular, it is unknown whether consensus determines people's beliefs causally. It is also unclear whether perception of consensus can override people's 'worldviews', which are known to foster rejection of AGW. Study 1 shows that acceptance of several scientific propositions—from HIV/AIDS to AGW—is captured by a common factor that is correlated with another factor that captures perceived scientific consensus. Study 2 reveals a causal role of perceived consensus by showing that acceptance of AGW increases when consensus is highlighted. Consensus information also neutralizes the effect of worldview.

In light of the pervasive scientific agreement[1–3] that humanity is facing a risk from climate change, and in light of indications that climate change may be outpacing projections[4], the public's decreasing acceptance of the science in at least some countries[5,6], and people's persistent under-estimation of the scientific consensus[7,8] powerful causal agent in shaping and changing of attitudes, especially those relating to stereotypes and discrimination. Receiving information about the predominant attitudes among one's peer group—viz. their views towards minority groups—tends to shift one's attitudes in the direction of the consensus[15–17]. The effect

» Testing Inoculation (van der Linden et al., 2017)

* Examined whether misinformation about climate change (The Oregon Global Warming Petition Project) removes the positive effect of communicating consensus information
* If so, is it possible to "inoculate" public perceptions of the scientific consensus against this misinformation?

» Testing Inoculation (van der Linden et al., 2017)

* Used four different types of messages

1. Consensus message: pie chart communicating the 97% scientific consensus
2. Countermessage: copy of The Oregon Global Warming Petition arguing there is no consensus on human-caused climate change
3. Inoculation messages: *some politically motivated groups use misleading tactics to try to convince the public that there is a lot of disagreement among scientists'* (pre-exposure warning) +
   - 3.1 general version: refuted the notion there is no scientific consensus (general refutation)
   - 3.2 specific version: refuted the Oregon Petition specifically (specific refutation)

» Testing Inoculation (van der Linden et al., 2017)

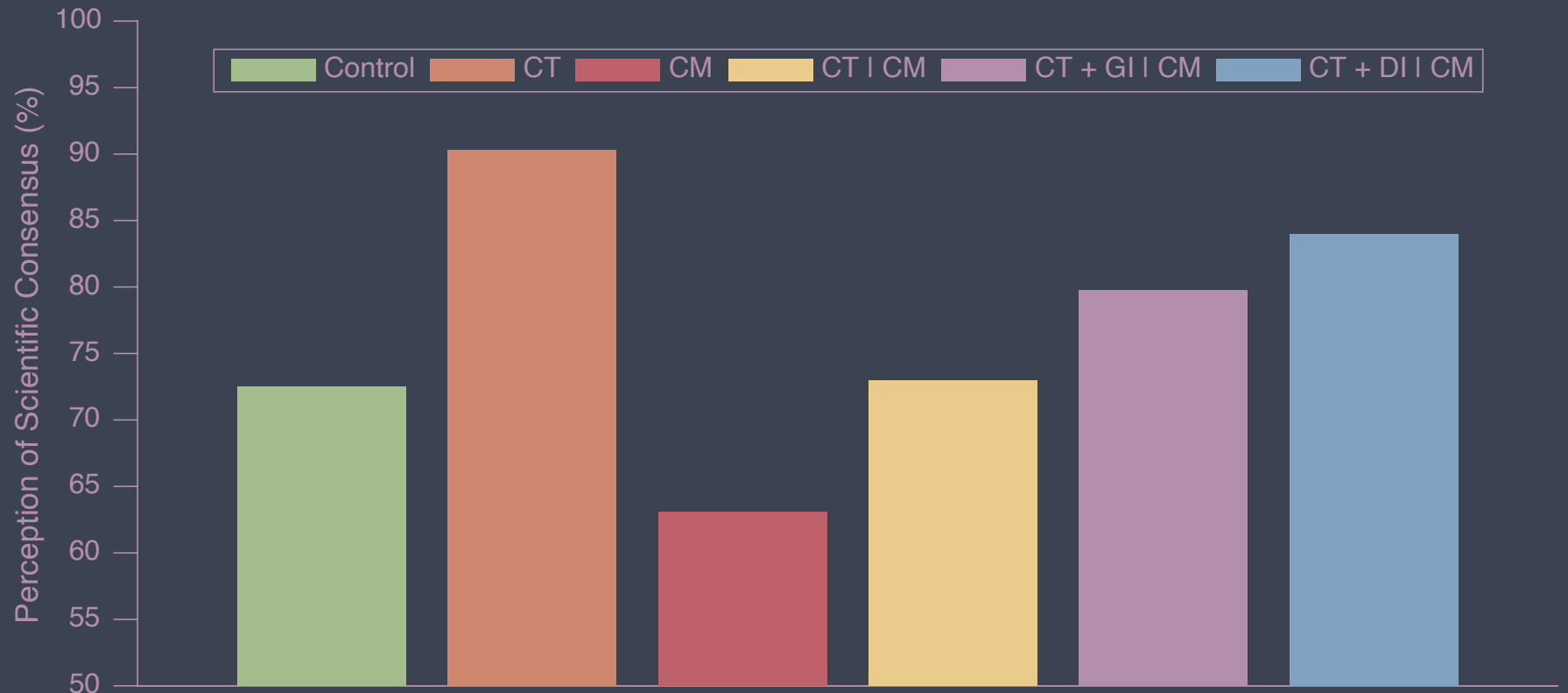
* Participants randomly allocated to one of six different conditions

1. Control
2. Consensus-treatment (CT)
3. Countermessage (CM)
4. Consensus-treatment (CT) | CM
5. CT + general inoculation | CM
6. CT + detailed inoculation | CM

Chief dependent measure:

* Perceptions of scientific consensus

» Testing Inoculation (van der Linden et al., 2017)



» Testing Inoculation (Cook et al., 2017)

* Used three different types of messages

1. Consensus message: textual description of the 97-98% scientific consensus
2. Misinformation: Mock news article that first featured scientists presenting research supporting human-caused climate change, followed by contrarian scientists rejecting this notion and proposing alternative explanations ("false balance" strategy)
3. Inoculation message: textual explanation of the "false balance" strategy used by the tobacco industry to confuse the public about the level of scientific agreement by staging a fake debate

» Testing Inoculation (Cook et al., 2017)

* Participants randomly allocated to one of five different conditions

1. Control
2. Misinformation (M)
3. Consensus (C)
4. Inoculation + Misinformation (I + M)
5. Consensus + Inoculation + Misinformation (C + I + M)

Chief dependent measure:

* Perceptions of scientific consensus

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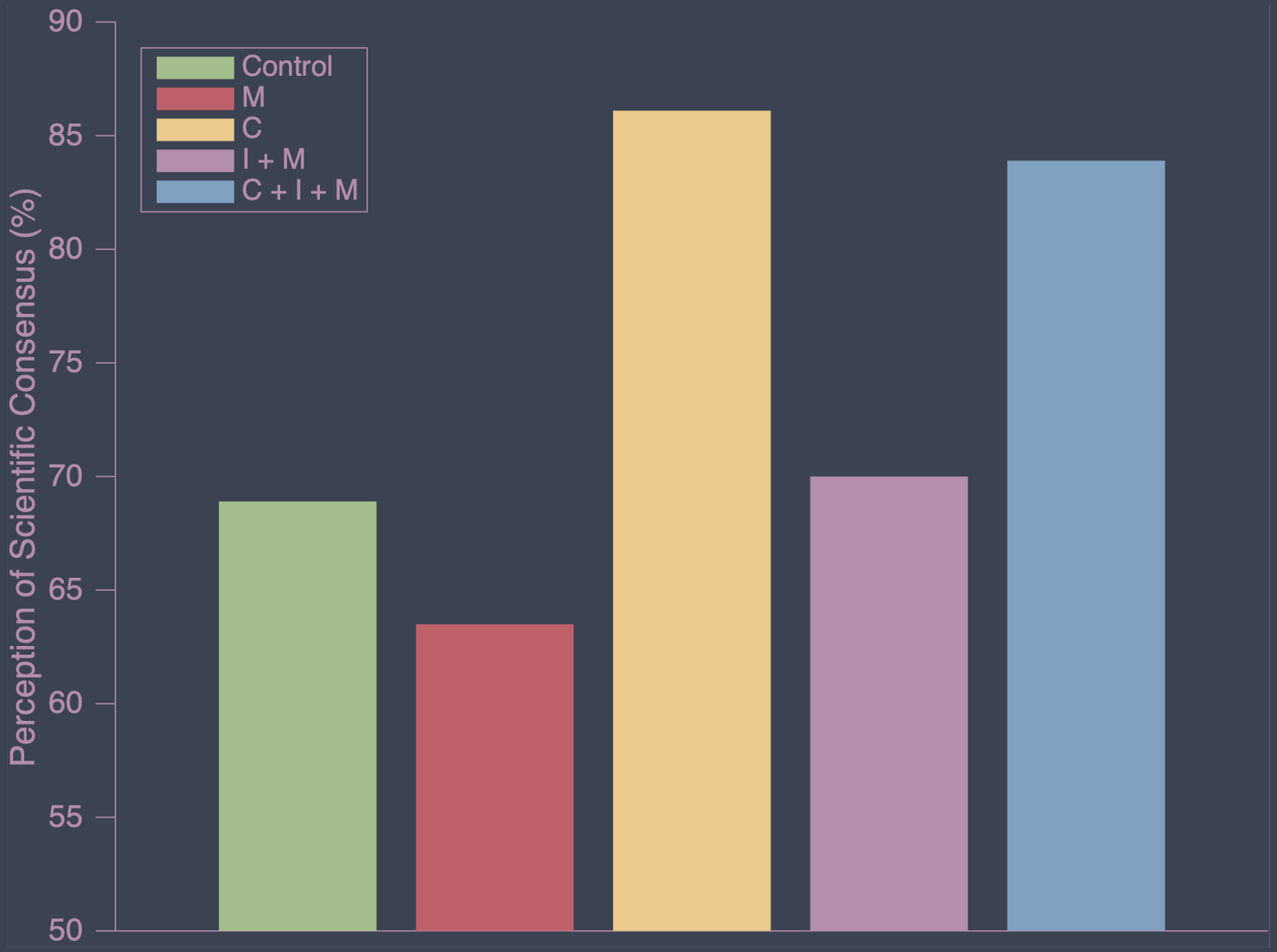

Debunking

* Filling the Gap: Provide an Alternative Narrative
* Make Misinformation Salient During Correction
* Draw Attention to Deceptive Strategies
* Use a Trustworthy Source
* Credibility Attack
* Repeat Corrections

» Debunking: Correcting Misinformation After it is Encoded

- When misinformation cannot be preemptied, then you must debunk!
- Debunking involves correcting the misinformation after it has been encoded
- Debunking rarely removes reliance on misinformation completely
- However, several strategies have been identified that increase the effectiveness of corrections
- We consider some of these strategies next

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» Filling the Gap: Provide an Alternative Narrative

- Corrections can leave a "coherence gap" in people's understanding of an event
- This may promote continued reliance on the misinformation despite a correction ("It wasn't the oil and gas, but what else could it be?")
- Providing an alternative causal explanation of the event fills the gap left by the retracted misinformation
- The continued-influence effect can be eliminated using a correction that explains *why* the misinformation was incorrect (Ecker et al., 2010, 2011)

Alternative Narrative

There were no gas cylinders and oil paints, but arson materials have been found. The initial suspect may not be guilty, as there is an alternative suspect.

» Filling the Gap: Provide an Alternative Narrative (Ecker et al., 2010)

- Participants read a fictitious account of a minibus accident
- The victims were initially said to be elderly people
- This information was revoked in four correction conditions
- The corrections differed according to whether the story contained a warning at the outset or gave an alternative account of who the passengers were

» Filling the Gap: Provide an Alternative Narrative (Ecker et al., 2010)

1. No correction

No correction given

2. Correction only

Police stated that the passengers on the minibus were not elderly people. (All correction conditions)

3. General warning

Participants received a written warning before reading the scenario stating that sometimes reported "facts" are not double-checked before they are released.

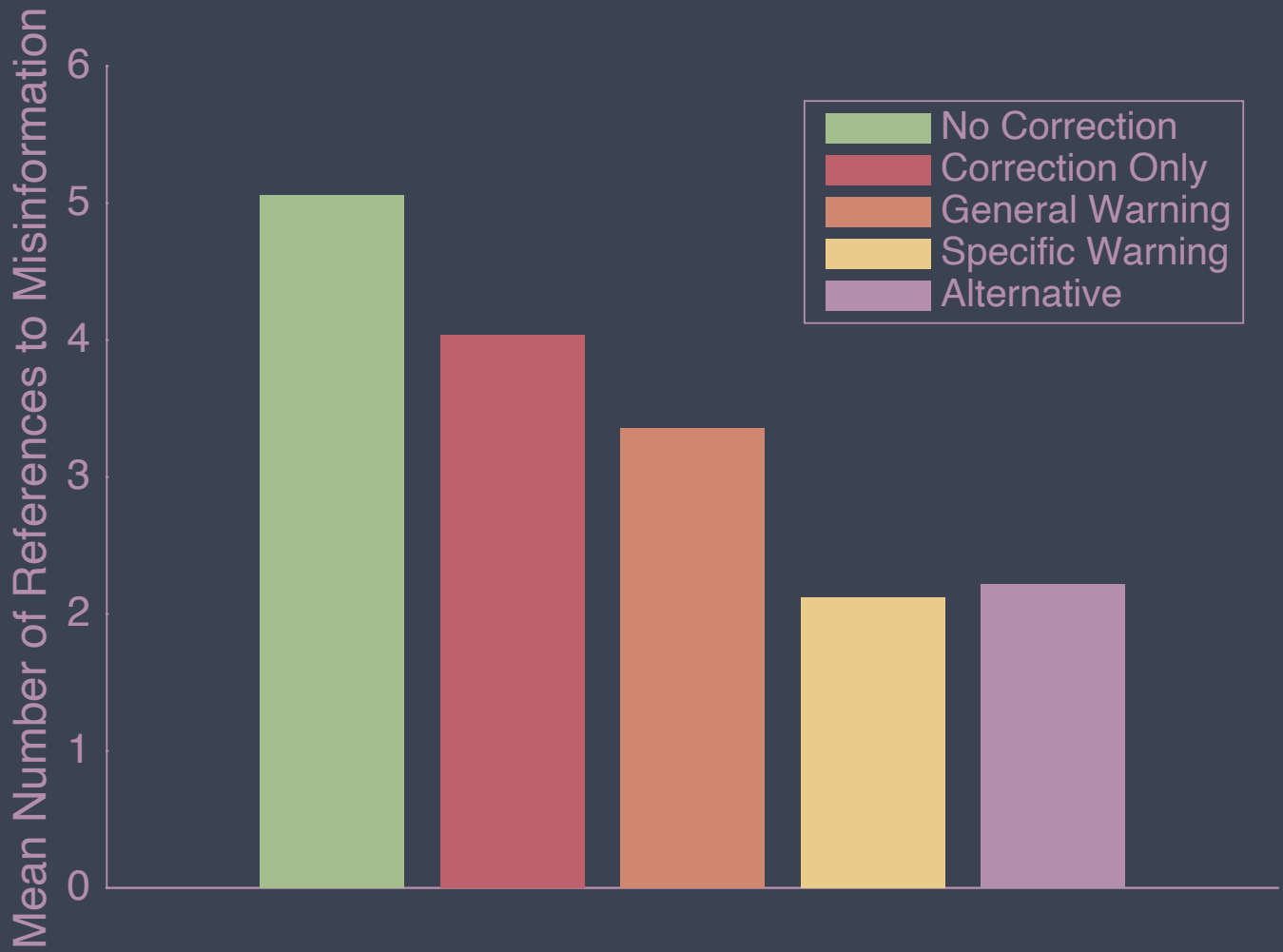
4. Specific warning

Participants received a written warning explaining the continued-influence effect of misinformation very specifically and provided two examples of its operation.

5. Alternative narrative

Passengers on the minibus were not elderly people but college hockey players returning from a victory party.

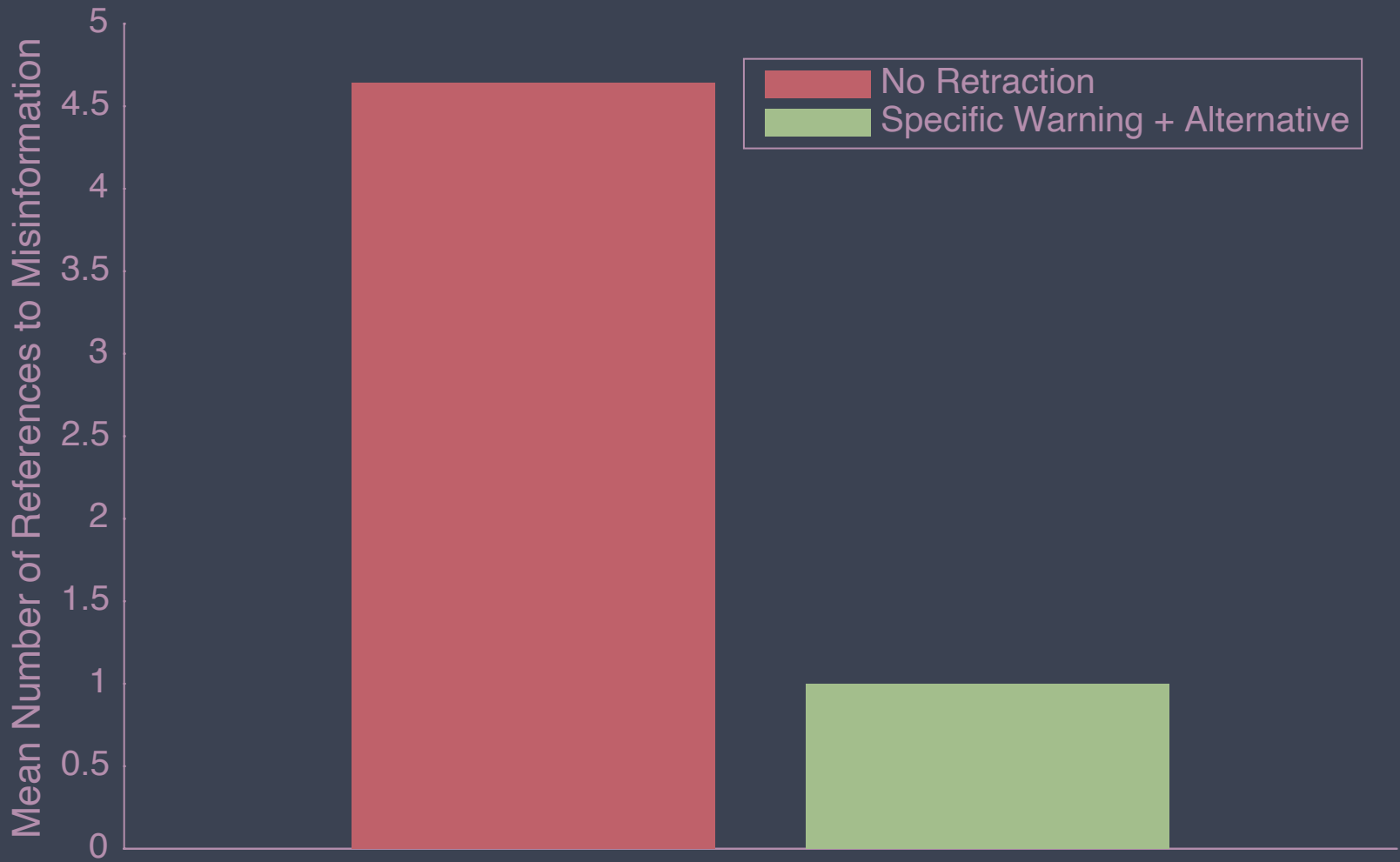
» Filling the Gap: Provide an Alternative Narrative (Ecker et al., 2010)



» Filling the Gap: Provide an Alternative Narrative (Ecker et al., 2010)

* The two most effective corrections are the “specific warning” and “alternative”
* What happens when you combine both corrections?
* Enter Study 2 …

» Filling the Gap: Provide an Alternative Narrative (Ecker et al., 2010)



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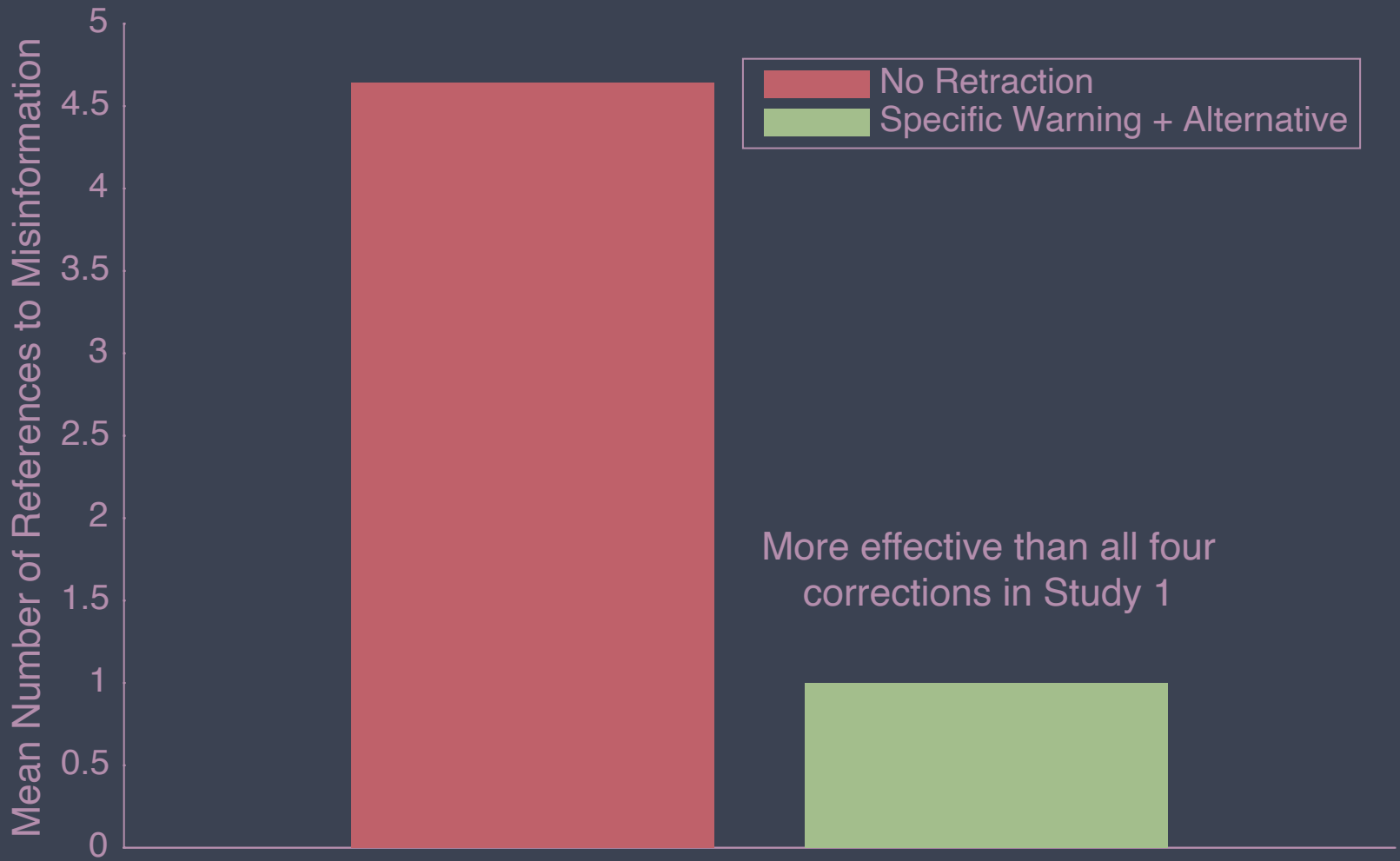

Debunking

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* Credibility Attack
* Repeat Corrections

» Make Misinformation Salient during Correction

- Continued-influence effect is likely partly driven by familiarity with the misinformation
- One initial best-practice recommendation was to avoid repeating misinformation when correcting it
- Repeating the misinformation may inadvertently strengthen the misinformation by making it more familiar
- Recent research suggests repeating misinformation during a correction may be beneficial (Ecker et al., 2017; Kendeou et al., 2014)
- Belief change may require co-activation of invalidated and correct event representations
- This is more likely to occur is misinformation is explicitly repeated during a retraction

» Make Misinformation Salient during Correction (Ecker et al., 2017)

- Participants read six scenarios
- Each scenario comprised two short articles regarding an unfolding news event (e.g., a wildfire)
- First article introduced the scenario and explained what happened
- It contained a critical piece of information serving as potential target for a retraction in the second article (e.g., “the fire had been deliberately lit”)
- Second article contained additional information about the scenarios
- Four versions of the second article manipulating nature of retraction

» Make Misinformation Salient during Correction (Ecker et al., 2017)

1. no-retraction (NR) control

No reminder of the initial misinformation

2. retraction-with-no-reminder (RNR)

After a full investigation and review of witness reports, authorities have concluded that the fire was set off by lightning strikes.

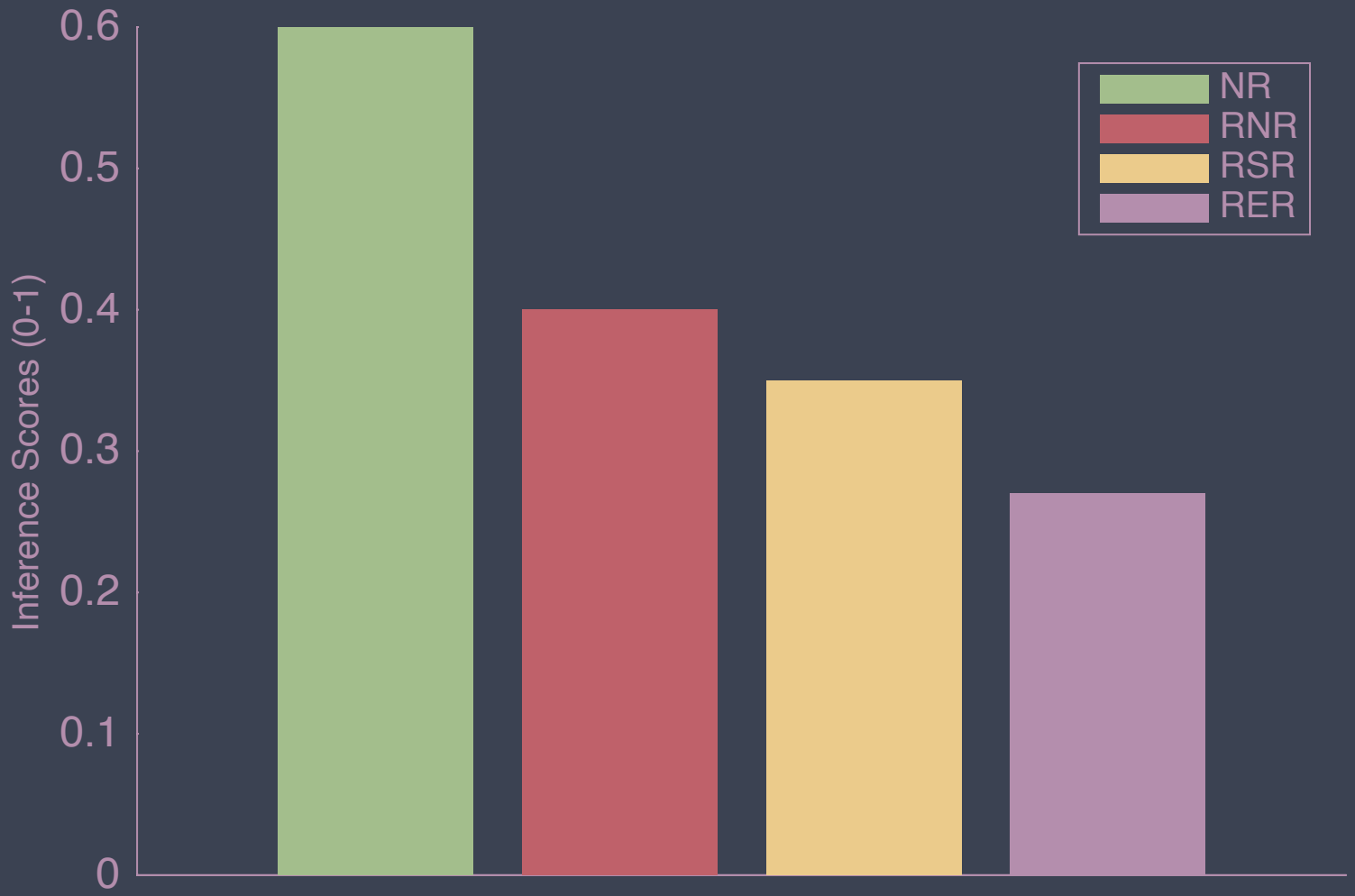
3. retraction-with-subtle-reminder (RSR)

After a full investigation and review of witness reports, authorities have concluded that original reports were incorrect, and that the fire was set off by lightning strikes

4. retraction-with-explicit-reminder (RER)

It was originally reported that the fire had been deliberately lit, but authorities have now ruled out this possibility. After a full investigation and review of witness reports, it has been concluded that the fire was set off by lightning strikes

» Make Misinformation Salient during Correction (Ecker et al., 2017)



Debunking

- Filling the Gap: Provide an Alternative Narrative
- Make Misinformation Salient During Correction
- Draw Attention to Deceptive Strategies
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» Draw Attention to Deceptive Strategies

* Disinformants use a common set of misleading strategies to misinform
  1. Fake experts: presenting an unqualified person or institution as a source of credible information
  2. Impossible expectation: demanding unrealistic standards of certainty before acting on science
  3. Cherry picking: pointing to individual data that support a position, while ignoring the larger body of data that contradicts that position
  4. Red Herring: deliberately diverting attention to an irrelevant point to distract from a more important point
* Such strategies have been employed across a range of different domains (e.g., climate change, tobacco, vaccination)

» Draw Attention to Deceptive Strategies

- Exposing these deceptive strategies is an effective method for correcting misinformation (Schmid & Betsch, 2020)
- As disinformants use the same rhetoric across domains, exposing their rhetroical techniques in one domain may "innoculate" against disinformation in other domains
- For example, once you know climate misinformation relies on "cherry picking", you may detect similar argumentation among anti-vaccination activists

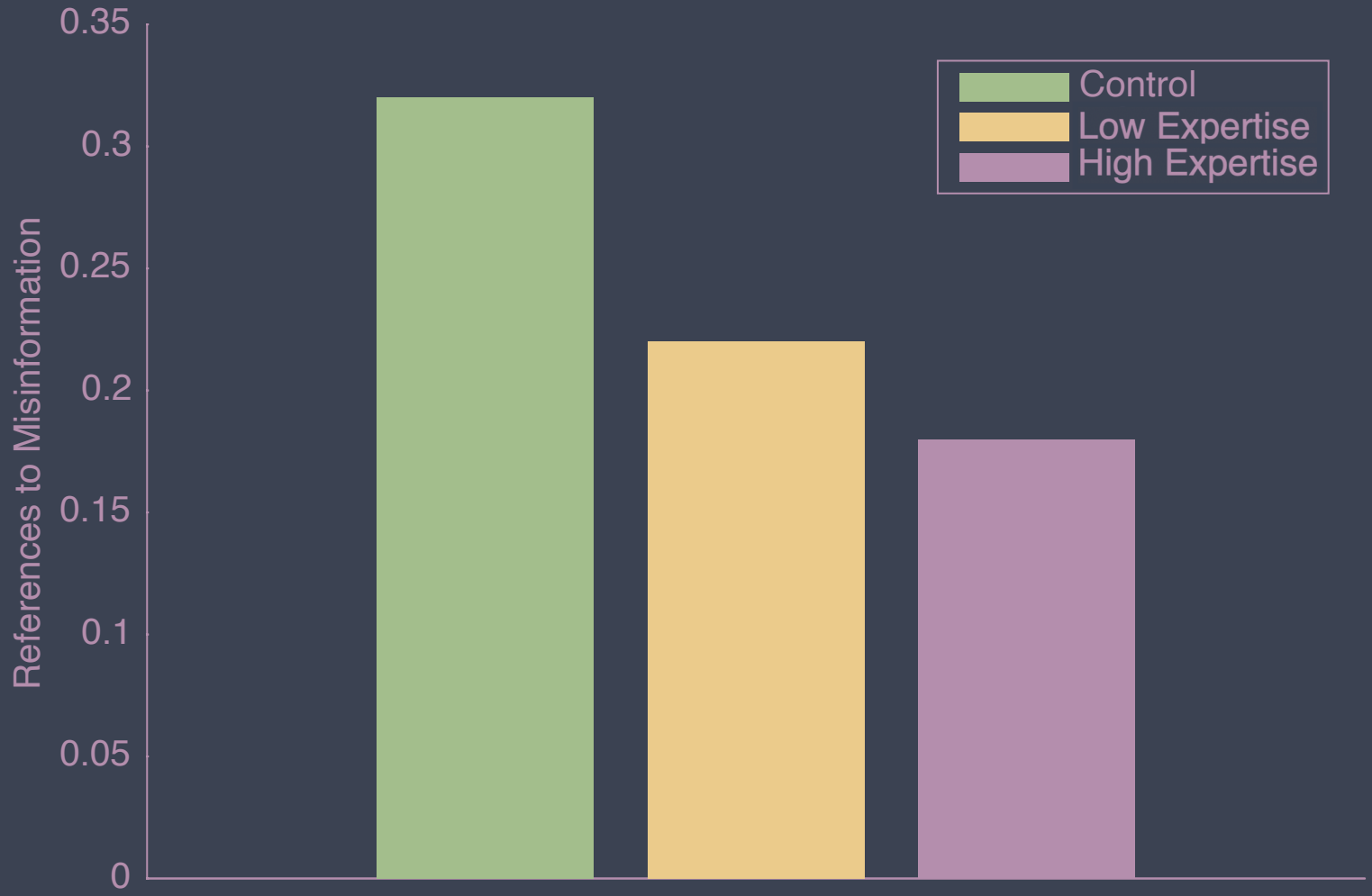
Debunking

* Filling the Gap: Provide an Alternative Narrative
* Make Misinformation Salient During Correction
* Draw Attention to Deceptive Strategies
* **Use a Trustworthy Source**
* Credibility Attack
* Repeat Corrections

» Use a Trustworthy Source

- Successful communication depends on the perceived credibility of the communicator
- Corrections are more likely to be effective if they come from a credible source (Walter & Tukachinsky, 2020)
- Two sources of credibility are trustworthiness and expertise
- Perceived trustworthiness of a debunking source appears to matter more perceived expertise (Guillory & Geraci, 2013)

» Use a Trustworthy Source (Guillory & Geraci, 2013)



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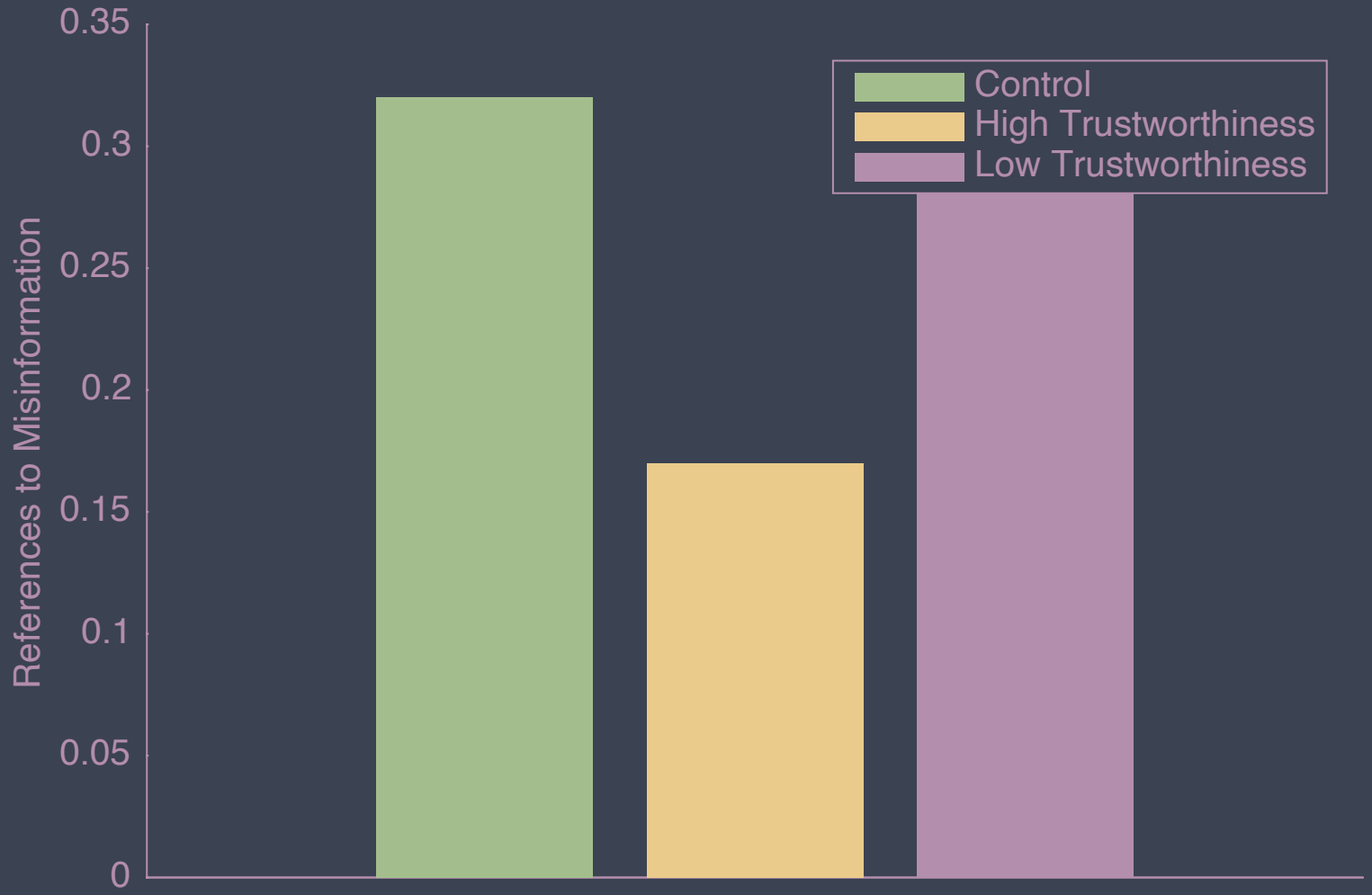

» Use a Trustworthy Source

- Sources with high credibility on both dimensions (e.g., health professionals or trusted health organisations) may be ideal choices
- The credibility of a source will matter more to some groups than others, depending on content and context
- For example, people with negative attitudes toward vaccines distrust formal sources of vaccine-related information
- Tailor the message to the audience and use a messenger trusted by the target group

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» Credibility Attack

- Corrections should criticise and raise suspicion regarding the misinformation and its source (Fein et al., 1997; Walter & Tukachinsky, 2020)
- For example, rather than emphasising the knowledge of a climate expert, highlight the lack of expertise of climate skeptics
- Questioning the credibility of the misinformation source also enhances the "coherence" of the correction
- For example, discrediting the source as biased due to a vested interest explains the spread of the misinformation
- This makes it easier for message recipients to maintain a coherent mental model that dismisses the misinformation

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» Repeat Corrections

- Even with detailed corrections, the effects will wear off over time (Swire et al., 2017; Paynter et al., 2019)
- Repeating corrections can increase the likelihood that they will "stick" (Ecker et al., 2011)
- However, repeating corrections is not as powerful as repeating misinformation
- When repetition of the misinformation is prevalent (e.g., social media) repeated corrections will be of limited utility
- Increasing the strength of the correction may be more effective than simply repeating the same correction

» Summary

1. Misinformation can do damage to society
2. Misinformation can be sticky
3. Prevent misinformation from sticking if you can
4. Debunk often using best-practice insights

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