



THE UNIVERSITY OF
MELBOURNE

Countering misinformation about the consensus on climate change

Dr John Cook

Melbourne Centre for Behaviour Change



A brief history of consensus



Quantifying the consensus on anthropogenic global warming in the scientific literature

**John Cook^{1,2,3}, Dana Nuccitelli^{2,4}, Sarah A Green⁵, Mark Richardson⁶,
Bärbel Winkler², Rob Painting², Robert Way⁷, Peter Jacobs⁸ and
Andrew Skuce^{2,9}**

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OPINION

The Myth of the Climate Change '97%'

What is the origin of the false belief—constantly repeated—that almost all scientists agree about global warming?

Email Print 788 Comments



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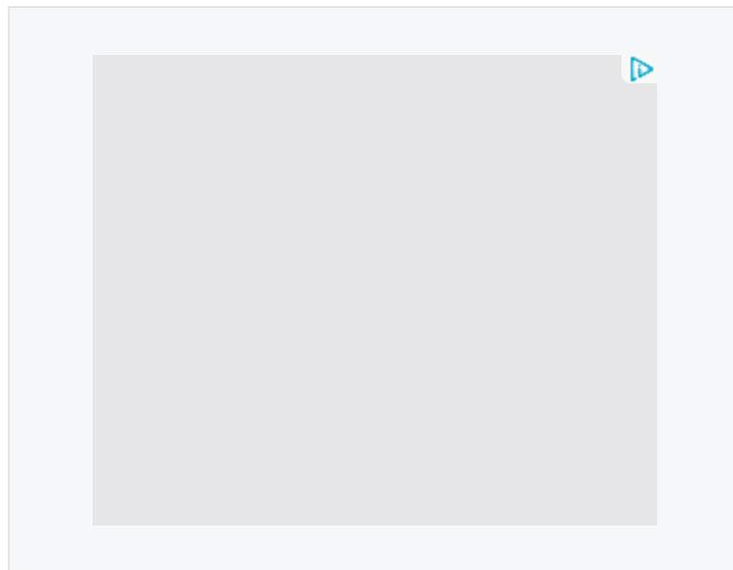
By JOSEPH BAST And ROY SPENCER

May 26, 2014 7:13 p.m. ET

Last week Secretary of State [John Kerry](#) warned graduating students at Boston College of the "crippling consequences" of climate change. "Ninety-seven percent of the world's scientists," he added, "tell us this is urgent."

Where did Mr. Kerry get the 97% figure? Perhaps from his boss, President Obama, who tweeted on May 16 that "Ninety-seven percent of scientists agree: #climate change is real, man-made and dangerous." Or maybe from NASA, which posted (in more measured language) on its [website](#), "Ninety-seven percent of climate scientists agree that climate-warming trends over the past century are very likely due to human activities."

Yet the assertion that 97% of scientists believe that climate change is a man-made, urgent problem is a fiction. The so-called consensus comes from a handful of surveys and abstract-counting exercises that have been contradicted by more reliable



Popular Now

[What's This?](#)

ARTICLES

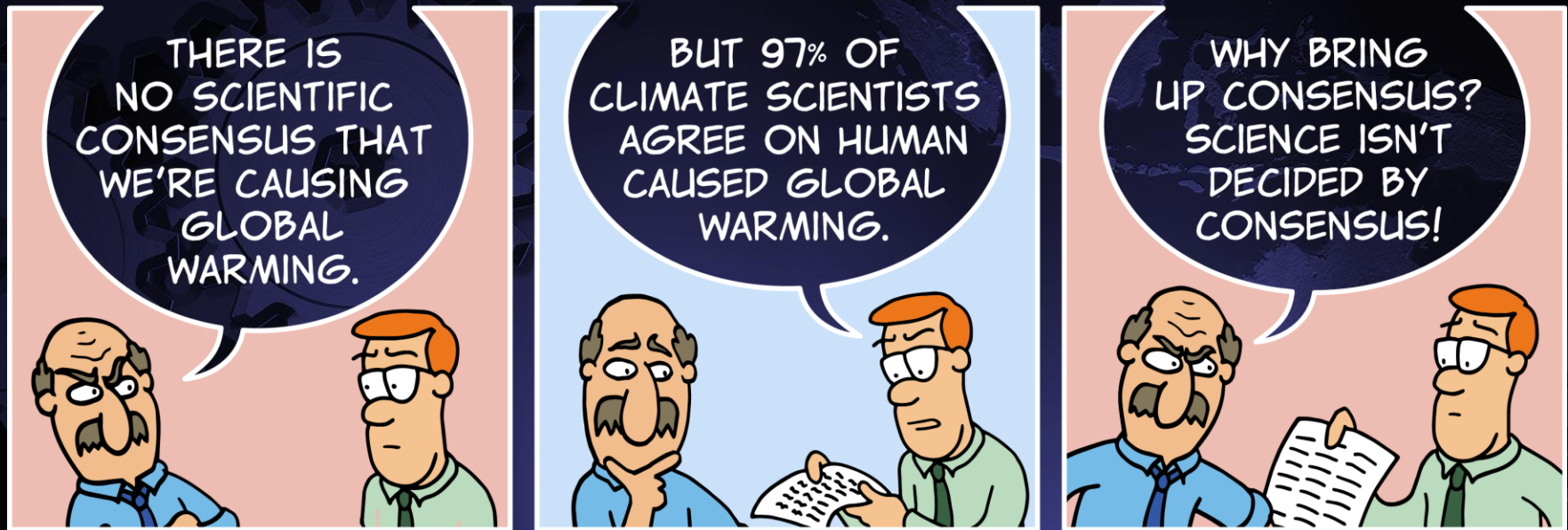
Patti Smith on

might be; and, of course, 200 researchers out of the thousands who have contributed to the climate science debate is not evidence of consensus.

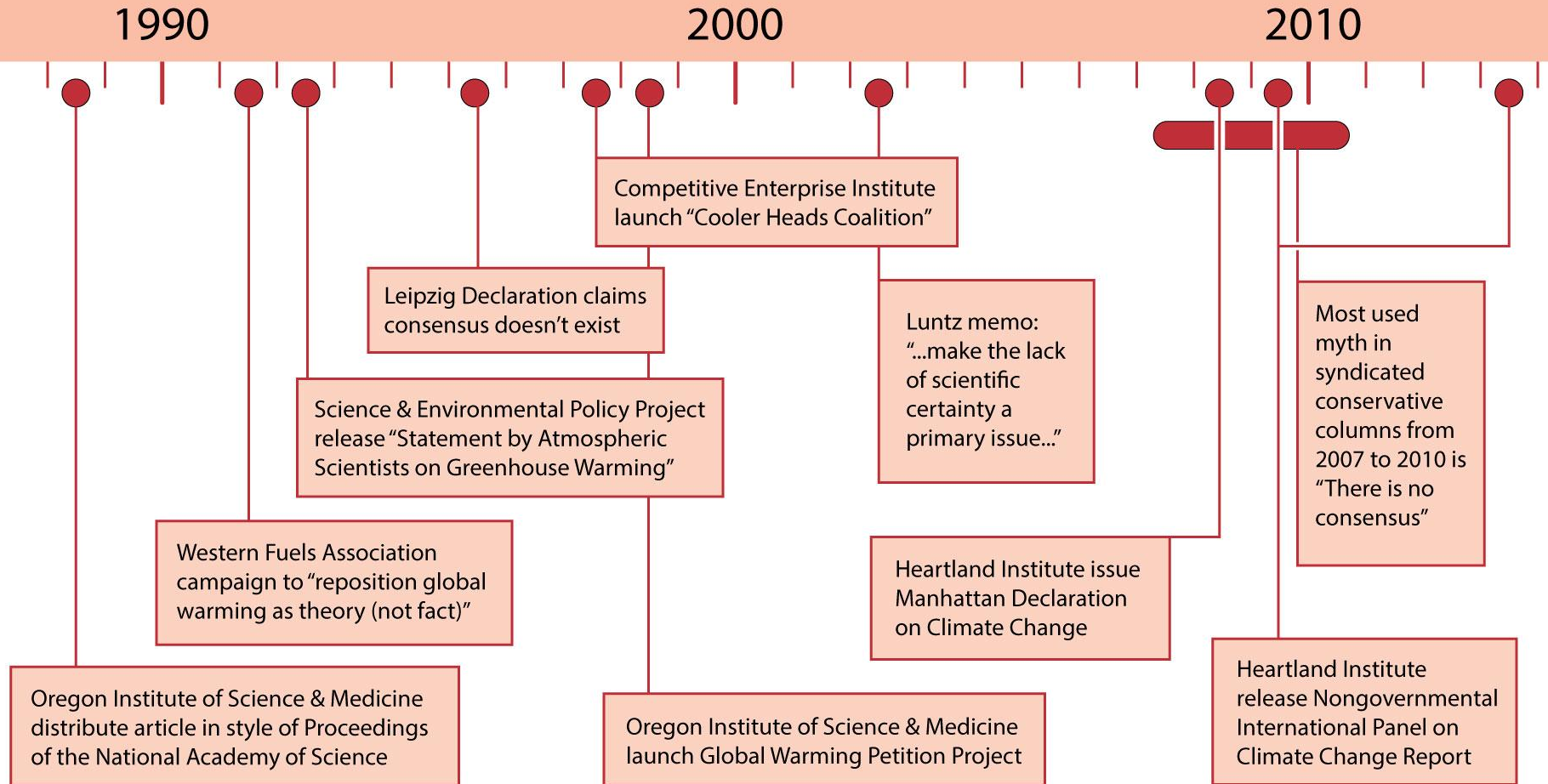
In 2013, John Cook, an Australia-based blogger, and some of his friends reviewed abstracts of peer-reviewed papers published from 1991 to 2011. Mr. Cook reported that 97% of those who stated a position explicitly or implicitly suggest that human activity is responsible for some warming. His findings were published in Environmental Research Letters.

Mr. Cook's work was quickly debunked. In Science and Education in August 2013, for example, David R. Legates (a professor of geography at the University of Delaware and former director of its Center for Climatic Research) and three coauthors reviewed the same papers as did Mr. Cook and found "only 41 papers—0.3 percent of all 11,944 abstracts or 1.0 percent of the 4,014 expressing an opinion, and not 97.1 percent—had been found to endorse" the claim that human activity is causing most of the current warming. Elsewhere, climate scientists including Craig Idso, Nicola Scafetta, Nir J. Shaviv and Nils- Axel Morner, whose research questions the alleged consensus,

A brief history of misinformation about the scientific consensus on climate change



Campaigns Manufacturing Doubt about Scientific Consensus



Campaigns Manufacturing Doubt about Scientific Consensus

1990

2000

2010

Should the public come to believe that the scientific issues are settled, their views about global warming will change accordingly. Therefore, ***you need to continue to make the lack of scientific certainty a primary issue in the debate***

Oregon Institute
distribute article
of the National Academy of Science

launch Global Warming Petition Project

Climate Change Report

FRANK LUNTZ, 2002

It used
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mns from
7 to 2010 is
ere is no
sensus"

Institute
governmental
Panel on

Most common myths in
conservative op-eds
2007 to 2010

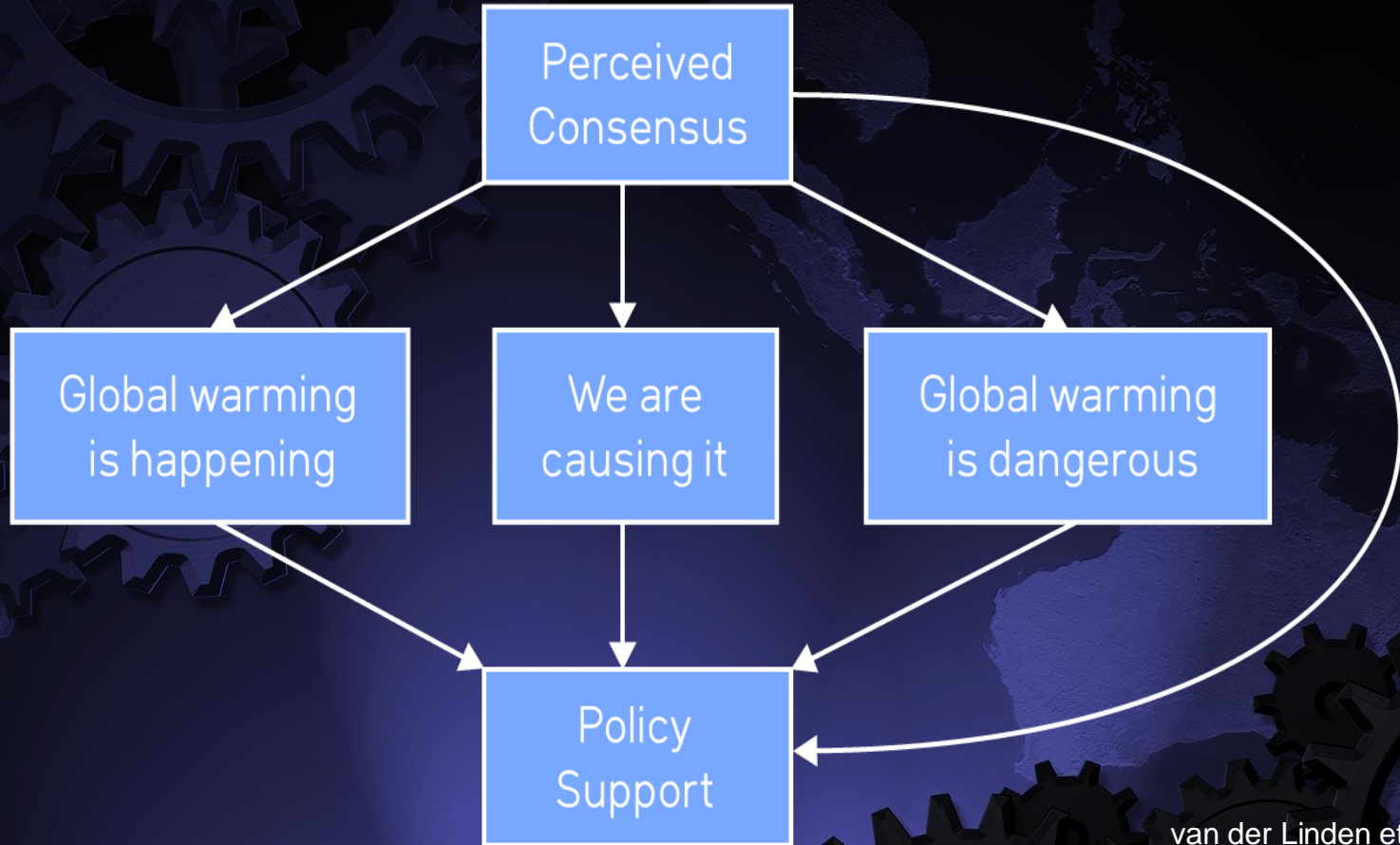
"Climategate
conspiracy"

"Ice isn't
melting"

"It's
cooling"

"There is no
consensus"

Perceived Consensus: a Gateway Belief



Inoculating the Public against Misinformation about Climate Change

Sander van der Linden, Anthony Leiserowitz, Seth Rosenthal, and Edward Maibach*

Effectively addressing climate change requires significant changes in individual and collective human behavior and decision-making. Yet, in light of the increasing politicization of (climate) science, and the attempts of vested-interest groups to undermine the scientific consensus on climate change through organized “disinformation campaigns,” identifying ways to effectively engage with the public about the issue across the political spectrum has proven difficult. A growing body of research suggests that one promising way to counteract the politicization of science is to convey the high level of normative agreement (“consensus”) among experts about the reality of human-caused climate change. Yet, much prior research examining public

Polarization can be amplified when the inherent uncertainty of science itself is used to cast doubt on the existence of a scientific consensus.^[8] For example, ideologically motivated, vested-interest groups known as “Merchants of Doubt” have orchestrated influential “disinformation campaigns” in which they publicly dispute the scientific consensus on various issues, including human-caused climate change.^[9,10] These campaigns have not only successfully undermined public

Scientific consensus



97%

OF CLIMATE SCIENTISTS
AGREE ON GLOBAL
WARMING

Global Warming Petition Project

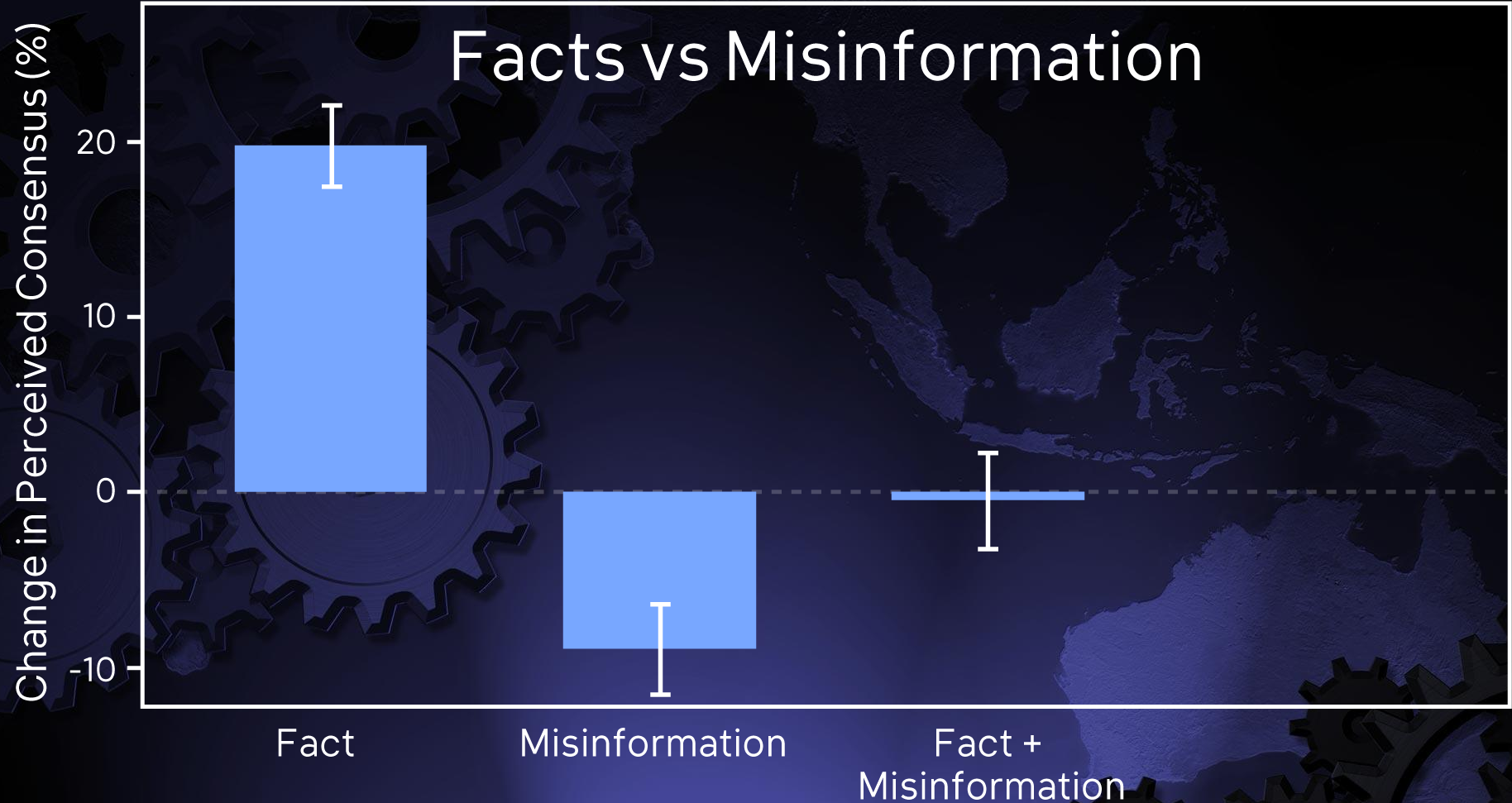
*31,487 American scientists have signed this petition,
including 9,029 with PhDs*

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.

Facts vs Misinformation







INOCULATION THEORY

**Warning
of threat**

+

**Counter-
arguments**

Warning Before Misinformation

... several independent investigations have concluded that the “Petition Project” is extremely misleading. For instance, many of the signatures on the petition are fake (for example, past signatories have included the long deceased Charles Darwin, members of the Spice Girls, and fictional characters from Star Wars). Also, although 31,000 may seem like a large number, it actually represents less than 0.3% of all US science graduates (a tiny fraction). Further, nearly all of the legitimate signers have no expertise in climate science at all.

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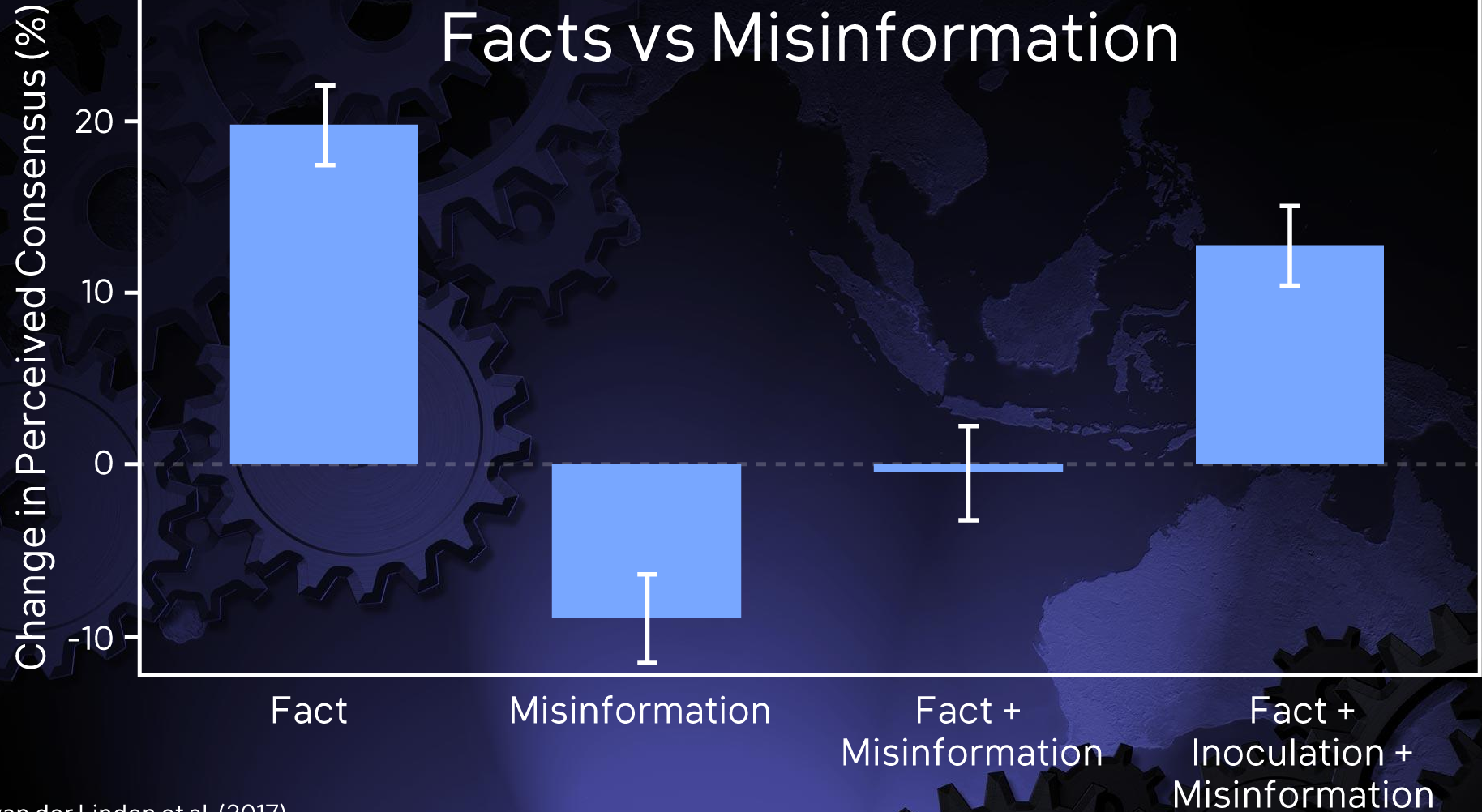
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Facts vs Misinformation



RESEARCH ARTICLE

Neutralizing misinformation through inoculation: Exposing misleading argumentation techniques reduces their influence

John Cook^{1,2*}, Stephan Lewandowsky^{2,3}, Ullrich K. H. Ecker²

Abstract

Misinformation can undermine a well-functioning democracy. For example, public misconceptions about climate change can lead to lowered acceptance of the reality of climate change and lowered support for mitigation policies. This study experimentally explored the impact of misinformation about climate change and tested several pre-emptive interventions designed to reduce the influence of misinformation. We found that false-balance

Global Warming Petition Project

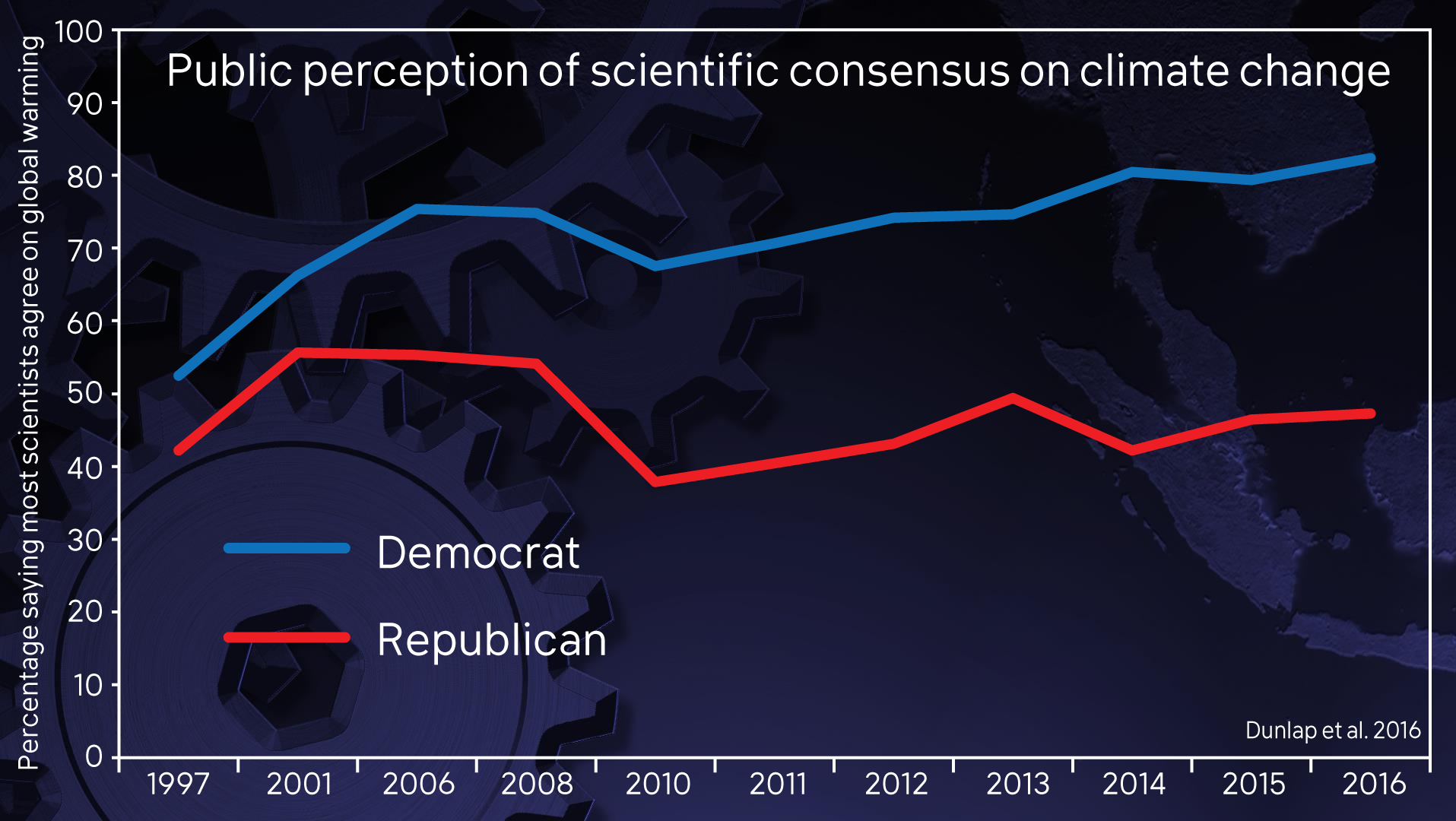
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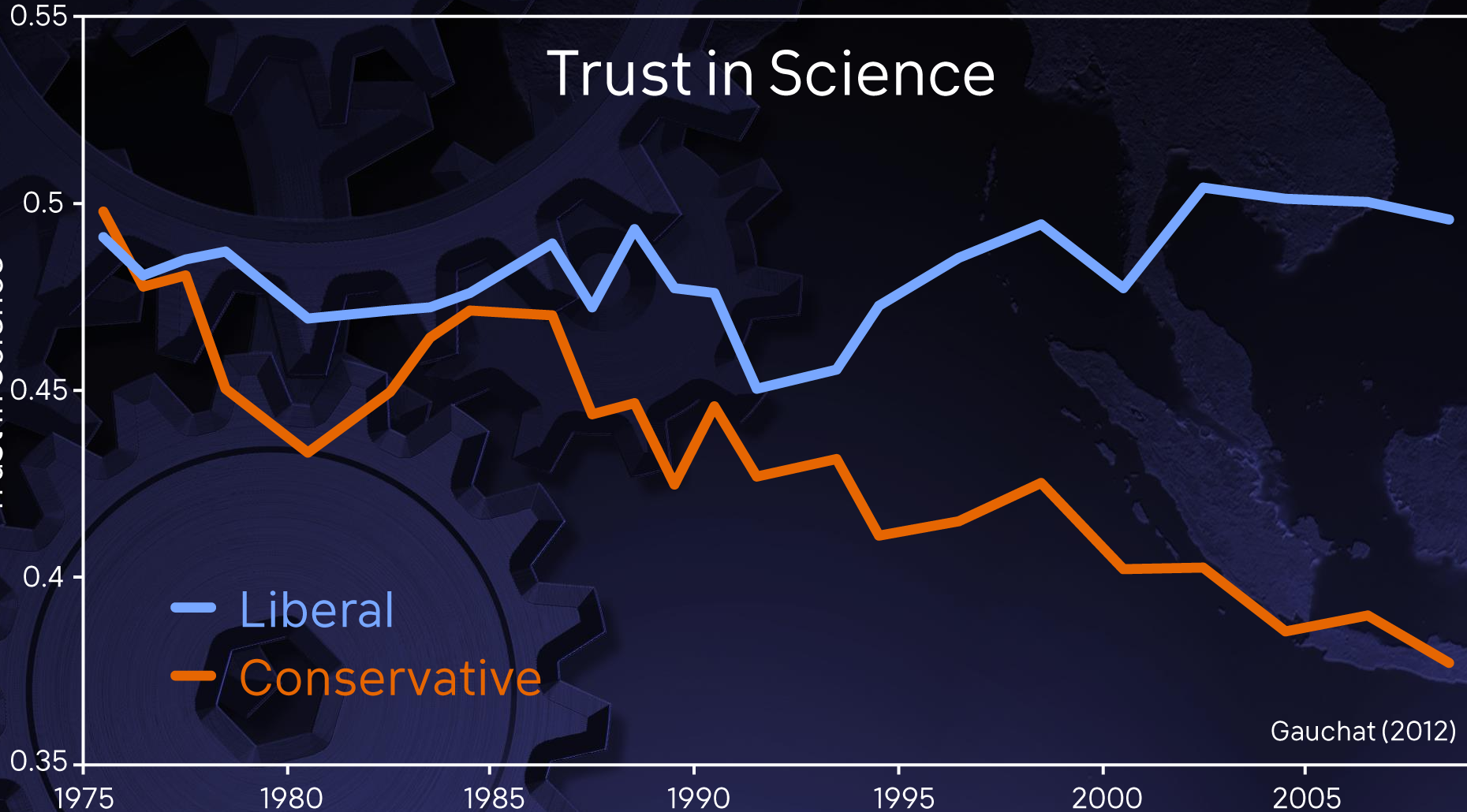


Trust in Science

Trust in Science

— Liberal
— Conservative

Gauchat (2012)



Promoting “fake experts” to manufacture doubt about science

Sometimes, inconvenient scientific facts threaten the interests of industry groups and organisations. For example, the scientific evidence linking smoking with lung cancer threatened the profits of the tobacco industry. Similarly, scientific evidence linking fossil fuel emissions with global warming threatens the profits of the fossil fuel industry.

According to a recent nationwide survey:

MORE DOCTORS SMOKE CAMELS THAN ANY OTHER CIGARETTE

YOUR “T-ZONE” WILL TELL YOU...

T for Taste...
T for Throat...

that's your proving ground for any cigarette. See if Camels don't suit your "T-Zone" to a "T."



● Not a single branch of medicine was overlooked in this nationwide survey made by three leading independent research organizations. To 113,597 doctors from Canada to Mexico, from the Atlantic to the Pacific went the query — *What cigarette do you smoke, Doctor?*
The brand named most was Camel.
Like anyone else, a doctor smokes for pleasure. He appreciates rich, full flavor and cool mildness just as any other smoker. If you don't happen to be a Camel smoker now, try Camels. Let your “T-Zone” give you the answer.

Camels

Costlier
Tobaccos

In these cases, a common tactic for industry groups and organisations is to manufacture doubt about the science through the promotion of “**fake experts**”. Fake experts are spokespeople who convey the impression of expertise in a given area without possessing actual relevant experience. Groups wishing to cast doubt on science often use fake experts to convince the public that the science isn't settled.

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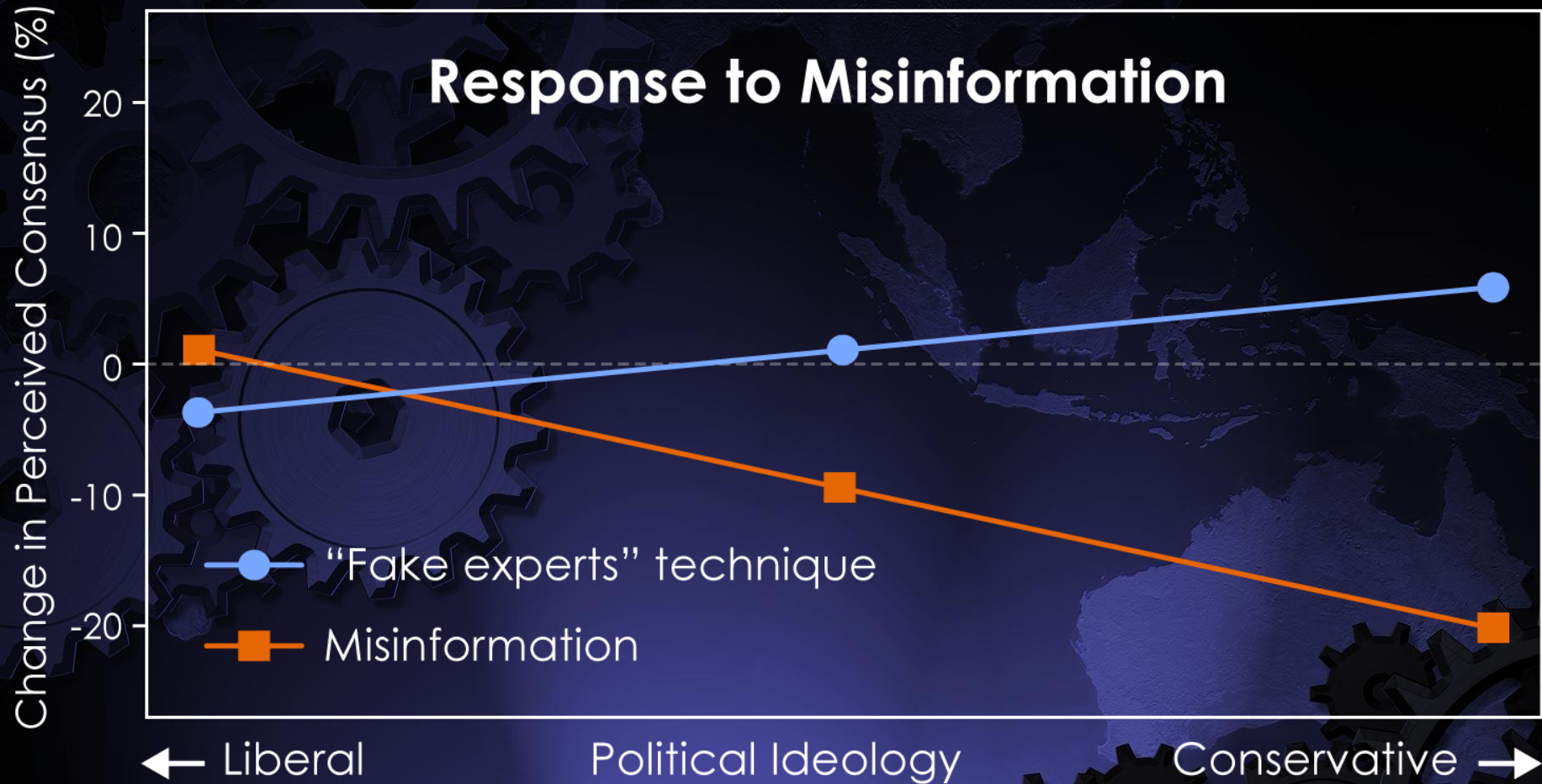
T for Taste...
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Camels

Costlier
Tobaccos

Response to Misinformation



Techniques of Science Denial

F



Fake
Experts

L



Logical
Fallacies

I



Impossible
Expectations

C



Cherry
Picking

C



Conspiracy
Theories



Fake Experts



Logical Fallacies



Impossible Expectations



Cherry Picking



Conspiracy Theories



Bulk Fake Experts



Magnified Minority



Fake Debate



Moving Goalposts



Lowered Expectations



Anecdote



Slothful Induction



Quote Mining



Wishful Thinking



Ad Hominem



Ambiguity



Slippery Slope



Anchoring



Contradictory



Overriding suspicion



Nefarious Intent



Something Must Be Wrong



Misrepresentation



Oversimplification



Red Herring



False Equivalence



Persecuted Victim



Immune to Evidence



Re-interpreting Randomness



Straw Man



False Choice



Single Cause



Blowfish



Apples vs. Oranges



False Analogy



False Balance

**"One of the reasons
why the climate is
changing is climate
has always been
changing."**

MARCO RUBIO



One of the
reasons why
the climate is
changing...



...is climate
has always
been
changing.

This person
died of
natural
causes...



...because
people have
always died of
natural causes.

**"It's a snowball...
It's very, very cold out."**

JAMES INHOFE





IT'S
DARK...

...THE
SUN DOESN'T
EXIST!



Fake Experts



Logical Fallacies



Impossible Expectations



Cherry Picking



Conspiracy Theories



Bulk Fake Experts



Magnified Minority



Fake Debate



Moving Goalposts



Lowered Expectations



Anecdote



Slothful Induction



Quote Mining



Wishful Thinking



Ad Hominem



Ambiguity



Slippery Slope



Anchoring



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Misrepresentation



Oversimplification



Red Herring



False Equivalence



Persecuted Victim



Immune to Evidence



Re-interpreting Randomness



Straw Man



False Choice



Single Cause



Blowfish



Apples vs. Oranges



False Analogy



False Balance

THE NEW YORK TIMES BESTSELLER

THINKING, FAST AND SLOW



DANIEL
KAHNEMAN

WINNER OF THE NOBEL PRIZE IN ECONOMICS

"[A] masterpiece . . . This is one of the greatest and most engaging collections of insights into the human mind I have read." —WILLIAM EASTERLY, *Financial Times*

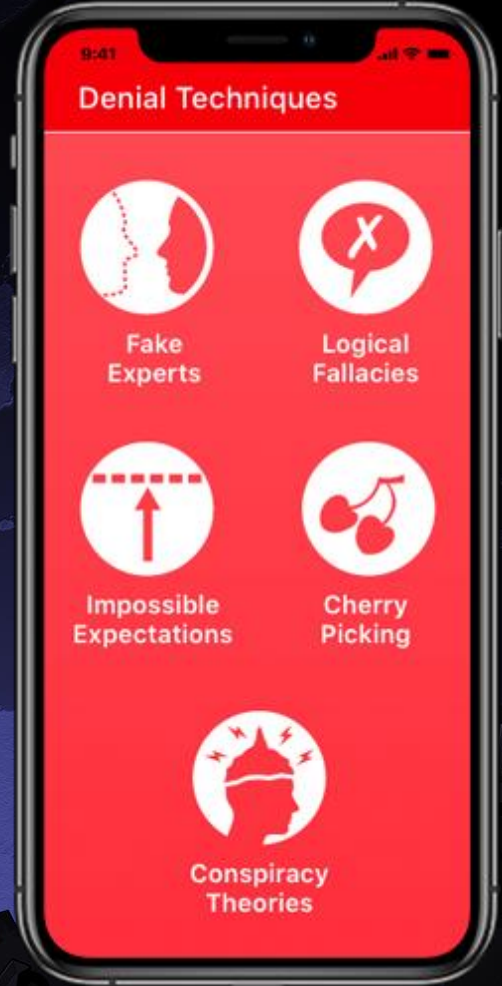
Types of thinking

1. Fast thinking
2. Slow thinking
3. Expert heuristics

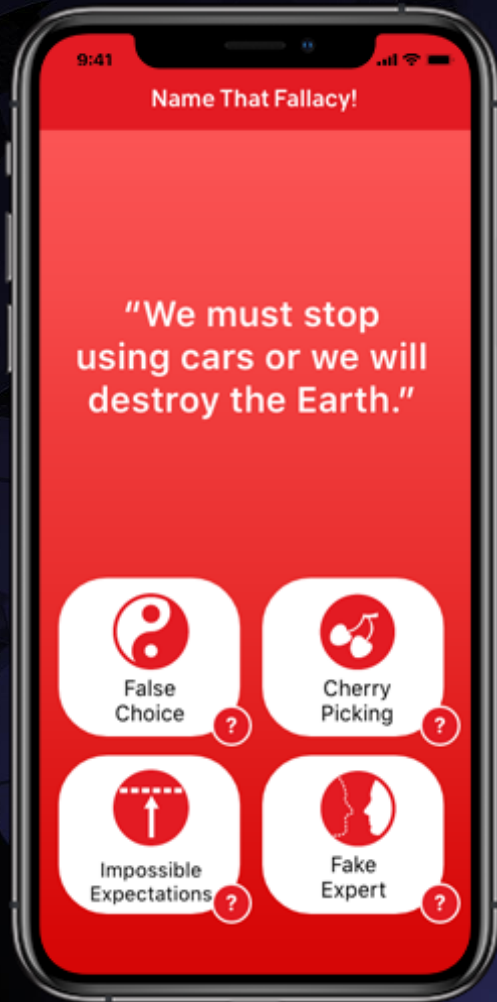
Cranky Uncle

Digital game using
active inoculation to
immunize players
against misinformation
techniques.

<http://crankyuncle.com>







<http://sks.to/db2020>

FACT

Lead with the fact if it's clear, pithy, and sticky—make it simple, concrete, and plausible. It must “fit” with the story.

WARN ABOUT THE MYTH

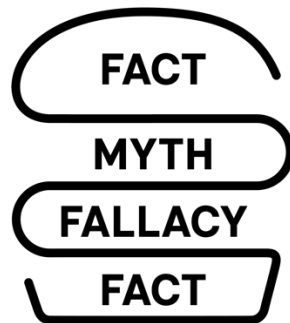
Warn beforehand that a myth is coming... mention it once only.

EXPLAIN FALLACY

Explain how the myth misleads.

FACT

Finish by reinforcing the fact—multiple times if possible. Make sure it provides an alternative causal explanation.




Have a pressing question about climate change? Don't know what to believe?
Ask below to have it resolved!

Try one of these examples:

Climate policies will limit
peoples' freedoms.

There is no evidence that
greenhouse warming is
driving climate change.

Global warming is caused
by natural cycles. 

Climate policies are
ineffective at preventing
climate change.

Inquiry

Enter your climate misinformation inquiry

Submit

Generative Debunking of Climate Misinformation

Francisco Zanartu Yulia Otmakhova John Cook Lea Frermann

The University of Melbourne, Australia

{francisco.zanartu, y.otmakhova, jocook, lea.frermann}@unimelb.edu.au

Abstract

Misinformation about climate change causes numerous negative impacts, necessitating corrective responses. Psychological research has offered various strategies for reducing the influence of climate misinformation, such as the fact-myth-fallacy-fact-structure. However, practically implementing corrective interventions at scale represents a challenge. Automatic detection and correction of misinformation offers a solution to the misinformation problem. This study documents the development of large language models that accept as input a climate myth and produce a debunking that adheres to the fact-myth-fallacy-fact (“truth sandwich”) structure, by incorporating contrarian claim classification and fallacy detection into an LLM prompting framework. We combine open (Mixtral, Palm2) and proprietary (GPT-4) LLMs with prompting strategies of varying complex-

As far as green plants are concerned, CO₂ is not a pollutant, but part of their daily breadlike water, sunlight, nitrogen, and other essential elements.

Fact While increased CO₂ levels can enhance plant growth, they also have negative impacts on ecosystems, such as promoting the spread of invasive species and increasing the severity of plant diseases. Moreover, elevated CO₂ levels contribute to climate change, leading to record high temperatures, ocean heat, and sea level rise.

Myth Green plants require CO₂ for growth, similar to how humans need water and food. Plants thrive at higher CO₂ levels, which existed in the past and are reproduced in some greenhouses, resulting in improved growth and yields.

Fallacy This argument oversimplifies the complex relationship between CO₂ and plant growth, ignoring the negative impacts of increased CO₂ levels on ecosystems and the overall climate system. While it’s true that CO₂ is essential for plant growth, artificially elevating its levels in greenhouses does not account for the broader consequences of climate change, such as heat stress, drought, and extreme weather events, which have negative impacts on agriculture and ecosystems.



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Bluesky [@johnfocook.bsky.social](https://bsky.app/@johnfocook)

97% consensus paper	http://sks.to/cook2013
van der Linden 2017	http://sks.to/vanderlinden2017
Cook et al 2017	http://sks.to/inoculation
More info on FLICC	http://sks.to/flicc
Cranky Uncle	http://crankyuncle.com
Generative debunking	http://sks.to/gendebunk
Skeptical Science	http://skepticalscience.com

