

Denial 101x: Successful Massive Open Online Course (MOOC) on Climate Science & Psychology

Dana Nuccitelli

Skeptical Science

The Guardian



2015 AGU Fall Meeting



THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA



Skeptical **Science**

Getting skeptical about global warming skepticism



Making Sense of Climate Science Denial

Climate change is real, so why the controversy and debate? Learn to make sense of the science and to respond to climate change denial.



- Introductory level massive open online course
- Students are presented with the most common climate myths, e.g.
 - “Global warming stopped in 1998”
 - “Global warming is caused by the sun”
 - “Global warming is nothing to worry about”
- Students learn both the science of climate change and the social science of how people think about climate change.
- Lectures debunk the climate myths
 - Students learn the critical thinking to identify fallacies associated with the myths
 - Students learn the psychology of misinformation.
- Ultimate goal: students learn basic climate science and become expert myth debunkers

The Denial101x Team



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Denial101x Resources

- Videos available on YouTube (search “Denial101x”)
- Videos embedded in relevant Skeptical Science myth rebuttals
- Course currently available in self-paced mode



Home About Arguments Donate Software Resources Comments The Consensus Project Translations

Search... GO



MOST USED Climate Myths

and what the science really says...

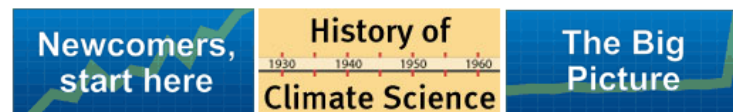
- 1 Climate's changed before
 - 2 It's the sun
 - 3 It's not bad
 - 4 There is no consensus
 - 5 It's cooling
 - 6 Models are unreliable
 - 7 Temp record is unreliable
 - 8 Animals and plants can adapt
 - 9 It hasn't warmed since 1998
 - 10 Antarctica is gaining ice
- [View All Arguments...](#)



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Explaining climate change science & rebutting global warming misinformation

Scientific skepticism is healthy. Scientists should always challenge themselves to improve their understanding. Yet this isn't what happens with [climate change denial](#). Skeptics vigorously criticise any [evidence](#) that supports man-made global warming and yet embrace any argument, op-ed, blog or study that purports to refute global warming. This website gets skeptical about global warming skepticism. Do their arguments have any scientific basis? What does the peer reviewed scientific literature say?



Wind energy is a key climate change solution

Posted on 10 December 2015 by John Abraham

When we think about [climate change](#), it's easy to focus on reducing emissions in order to maintain a healthy global temperature. But any real progress has to be complemented by a significant increase in clean and renewable energy. Fortunately, businesses have plans to build on recent successes and supply the world with the energy we need to grow economies.

A great example is [Vestas](#), a major renewable energy company. I had the pleasure of communicating with the Vestas CEO Mr. [Anders Runevad](#). He has served as CEO since 2013 and prior to that he worked at Ericsson and Sony Mobile. Mr. Runevad combines a technical background and education with business training to chart out pathways for companies to build capacity in the rapidly evolving energy market.

Vestas is a company very familiar to people like me who work in the wind power industry. They are the largest manufacturer of wind turbines in the world. Just this year, they have reached 7 GW of announced orders; their turbines can supply energy to supply the needs of 75 million Europeans.

But providing energy to the developing world is only part of the energy solution. Solving the [climate change](#) problem means we also need to revolutionize the power grids in the developing world. Companies like Vestas are working on that problem too.

Mr. Runevad recently met with India's Prime Minister Modi and...
blades at a new factory in India. They also have plans to inc...



COP21 LiveBlog

FREE COURSE
JULY 1
Making sense of climate science denial
ENROL NOW!



Our climate has accumulated...

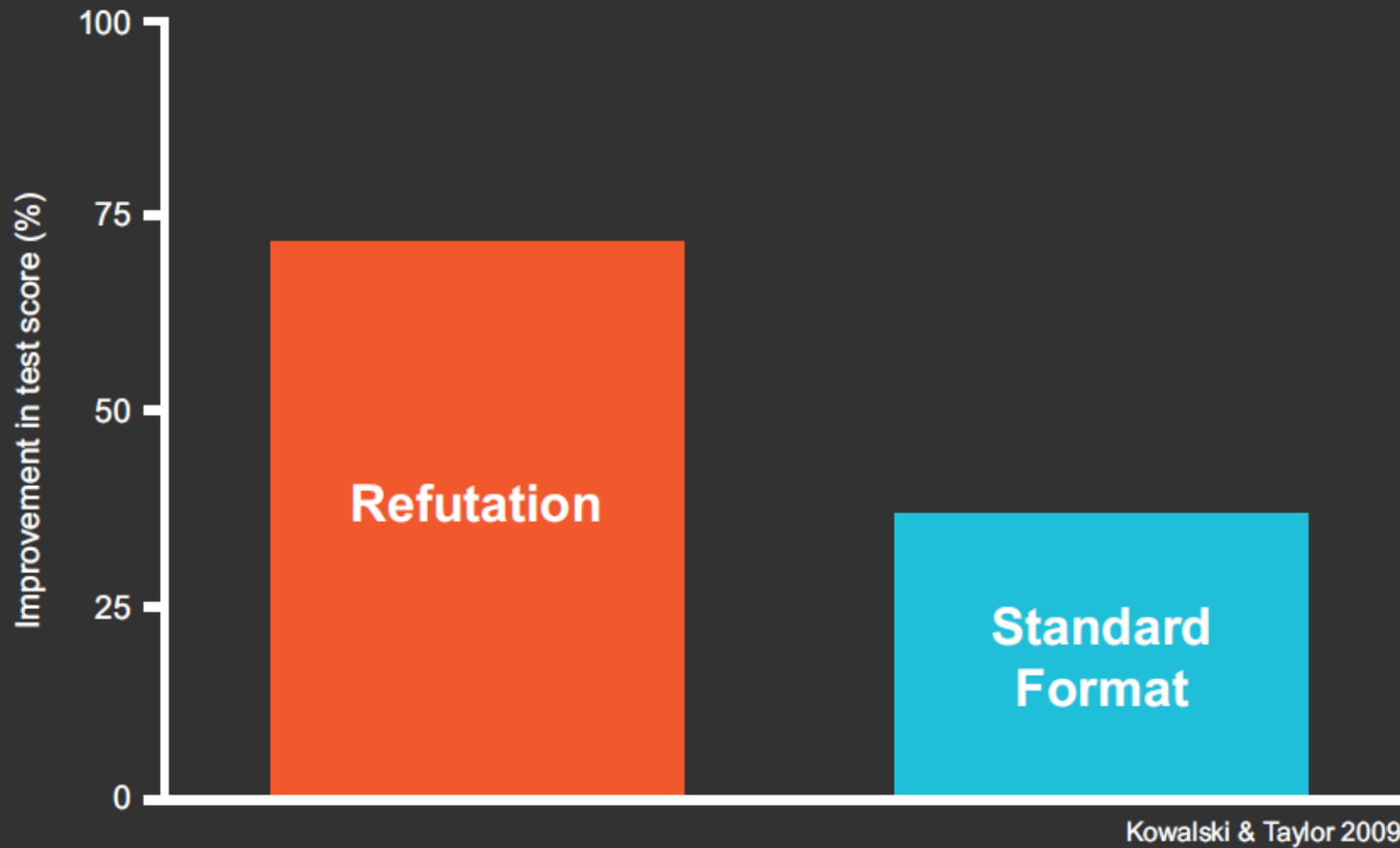
Agnotology-Based Learning

Agnotology: the study of ignorance and how it's produced,
e.g. examining how misinformation can generate misconceptions about climate change

“Comprehending why ideas are wrong matters as much as understanding why some ideas may be right.”

JONATHAN OSBORNE

Stanford Professor of Science Education



Cook, J., Bedford, D., & Mandia, S. (2014). Raising climate literacy through addressing misinformation: Case studies in agnotology-based learning. *Journal of Geoscience Education*, 62(3), 296-306.

Removing Misconceptions

- ▶ People build a mental model of the world



Removing Misconceptions

- ▶ People build a mental model of the world
- ▶ Debunking leaves a gap in the model



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- ▶ People prefer a false, complete model to a true, incomplete model



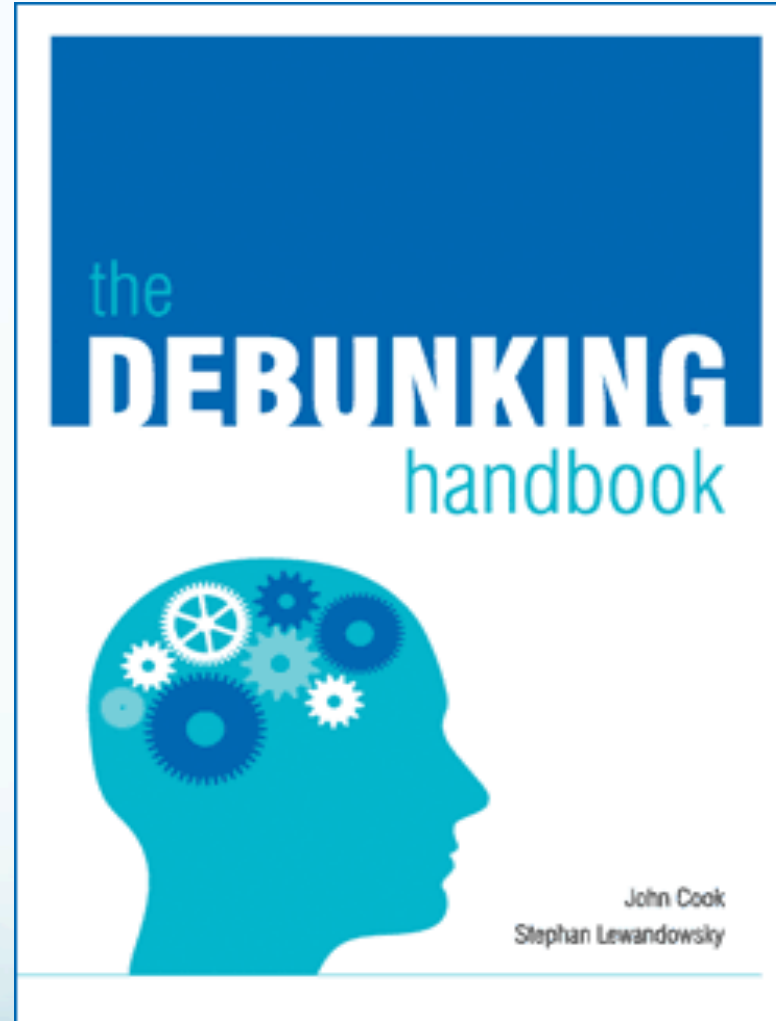
Removing Misconceptions

- ▶ People build a mental model of the world
- ▶ Debunking leaves a gap in the model
- ▶ People prefer a false, complete model to a true, incomplete model
- ▶ Fill the gap with an alternative fact



Removing Misconceptions

- ▶ The Debunking Handbook
<http://sks.to/debunk>



Unique Course Structure

- Each week's structure followed a similar pattern:
 - Video lecture on climate myth and science
 - Fact/Myth/Fallacy “Myth Sandwich” structure
 - Video interviews with experts on the subject
 - Quizzes/Polls/Discussion Forums/Other Activities
- Expert interviews enhanced student understanding and added credibility to the course content.
- Climate contrarians signed up for the course; their discussion forum participation gave students practice in debunking common climate myths.

5 CHARACTERISTICS OF SCIENCE DENIAL

F



Fake
Experts

L



Logical
Fallacies

I



Impossible
Expectations

C



Cherry
Picking

C



Conspiracy
Theories



Magnified
Minority



Red
Herring



Misrepresentation



Jumping to
Conclusions



False
Dichotomy

Example Lecture

Myth: 'Hide The Decline'

<https://www.youtube.com/watch?v=dc8A6SIJijs>

1 Factual Alternative

It's not enough to show the myth is wrong. You need to replace it with an alternative that meets all the causal requirements left by the myth:

Fight sticky myths with stickier facts

2 Explicit Warning before the myth

Cue the reader that you're about to mention the myth. This puts them cognitively on guard so they're less likely to be influenced by the misinformation.

3 Myth

Mentioning the myth makes people more familiar with the myth, which risks a *Familiarity Backfire Effect*. Nevertheless, you do have to mention the myth. Reduce the risk of the backfire effect by warning before mentioning the myth and putting the emphasis

4 Explanation of how myth distorts facts

Once you've presented the factual alternative and the myth, your audience holds two contradictory ideas. You resolve this contradiction by showing how the myth distorts the facts or how the myth came about in the first place. For example, this might involve explaining the logical fallacy within the myth.

Example Expert Interview

<https://www.youtube.com/watch?v=yP6N9nbmS54>

- 16,861 enrollments
- 160 countries
- 13,155 (78%) accessed content
- 3,958 (23%) accessed at least half of the chapters in the courseware

Country Distribution

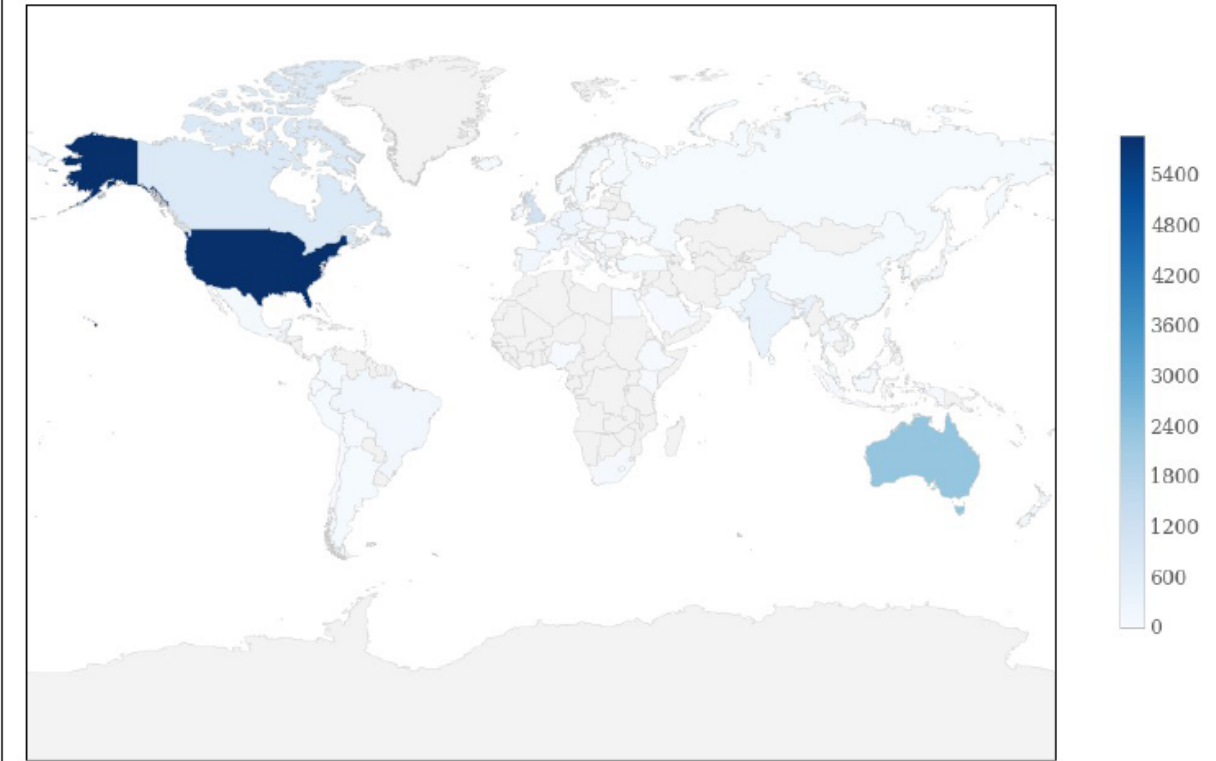


Figure 8. Country Distribution (per enrolment) 160 countries with registered users

United States
(6201 registrations)

India
(395 registrations)

New Zealand
(186 registrations)

Australia
(2443 registrations)

Germany
(292 registrations)

Brazil
(171 registrations)

United Kingdom
(1147 registrations)

France
(210 registrations)

Canada
(842 registrations)

Netherlands
(192 registrations)

Course Feedback

- Psychology lectures received the strongest student feedback
- Many students requested more psychology content in future course iterations
- Expert interviews provided quality content, humanized scientists
- Accounts of attacks on scientists made a strong impression on students
- A number of students are themselves educators
 - Report using Denial101x content in their classes
 - Have redesigned their lectures based on the psychological research presented

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