



How to tell good climate science from bad

Ruth Sharpe, PhD

27th March 2018



True or Fish?

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How to tell good climate science from bad

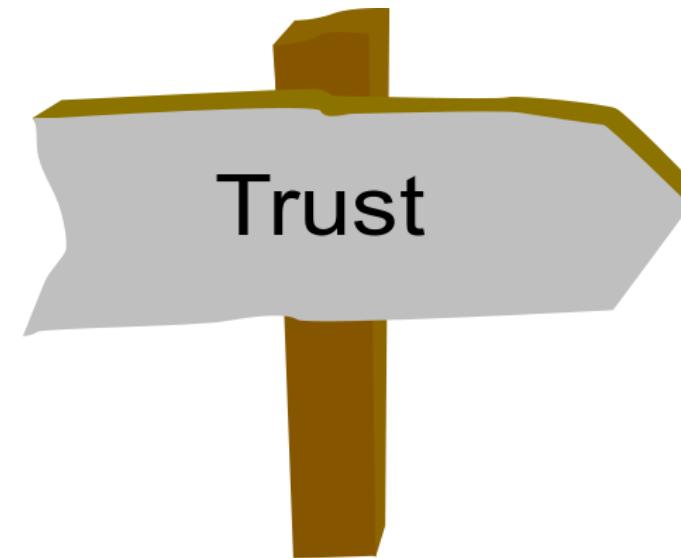
Ruth Sharpe, PhD

27th March 2018



Lecture Aim

Without knowing the science, get some idea what you can trust and what you should ignore.



Why This Is Important



Need to know what we are doing is actually going to help and not make the situation worse



or



?

Scientist: Carbon Dioxide Doesn't Cause Global Warming

Noted geologist says Earth needs more, not less, carbon dioxide to feed plant life.

By Paul Bedard, Staff Writer Oct. 7, 2009, at 4:15 p.m.



HOME **NEWS** **SPORT** **COMMENT** **FINANCE** **TRAVEL**

'Global warming the greatest scam in history' claims founder of Weather Channel

THE debate about climate change is finished - because it has been categorically proved NOT to exist, one of the world's best known climate change sceptic has claimed.

THE WALL STREET JOURNAL. ■ **OPINION**

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?



THE FISCAL TIMES

POLICY + POLITICS

HOME

OPINION

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Keystone Pipeline and the 'Myth' of Global Warming



EXPRESS

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Sunday Express

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EXCLUSIVE: Ice in the Arctic and Antarctic is 'not melting', says global warming expert

THE North and South Poles are "not melting", according to a leading global warming expert.





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Fracking causes as much seismic activity as 'jumping off a ladder': Controversial method for extracting gas is 'extremely unlikely to trigger an earthquake we would feel'

- Fracking is blasting underground rock deposits with water and chemicals
- It releases trapped gas pockets and was blamed for starting earthquakes
- But **study says it's very unlikely we'll feel earthquakes caused by fracking**

By NICK MCDERMOTT

PUBLISHED: 19:39 EST, 9 April 2013





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Fracking could lead to an 'earthquake domino effect' as it weakens fault lines deep in the earth's crust, scientists claim

- Scientists from Columbia University have claimed that earthquakes could be caused by pressure on fault lines created by hydraulic fracturing
- Danger occurs when the activity is agitated by distant earthquakes that can trigger tremors near waste water injection wells, they said
- Seismologists from the university have identified three quakes that were triggered at injection well sites by a major earthquake a long distance away

By SARAH GRIFFITHS

PUBLISHED: 09:22 EST, 12 July 2013



Things can be counterintuitive



Study: Gneezy & Rustichini. Journal of Legal Studies (2000)

Me!



Completed PhD August 2017

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Featured Collection

Local and global dynamics in social spider metapopulations
Sharpe, Ruth Victoria
2017

Local and global dynamics in social spider metapopulations
by
Ruth Victoria Sharpe

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

Executive Coordinator: 2014-2017

let's talk 
science
inspiring discovery

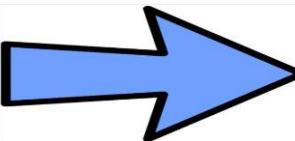
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Academic Research Article

Journal of Animal Ecology



Journal of Animal Ecology 2016, 85, 1401–1410

doi: 10.1111/1365-2656.12559

Prey size and scramble vs. contest competition in a social spider: implications for population dynamics

Ruth V. Sharpe* and Leticia Avilés

Department of Zoology, University of British Columbia, Vancouver, BC, Canada

Summary

1. There are many benefits of group living, but also substantial costs, one of which is competition for resources. How scarce food resources are distributed among different members of a population or social group – whether via scramble or contest competition – can influence not only the variance in individual fitness, but also the stability and therefore survival of the group or population.
2. Attributes of the food resources themselves, such as their size, may influence the type of intraspecific competition that occurs and therefore the intrinsic stability of a group or population.
3. By experimentally manipulating the size of prey fed to artificial colonies of the social spider *Anelosimus eximius*, we investigated whether prey size could alter the degree of scramble vs. contest competition that takes place and, thus, potentially influence colony population dynamics.
4. We found that large prey were shared more evenly than small prey and that individuals in poor condition were more likely to feed when prey were large than when prey were small. Additionally, we show that individuals participating in prey capture are also more likely to feed on the captured prey.
5. We developed a simple mathematical model to explore the prey sizes that would be energetically worth defending, i.e. prey that are ‘economically defendable’. The model shows that neither very small prey, nor prey above a certain size is worth monopolizing, with only intermediate size prey being ‘economically defendable’. We therefore suggest the small and large prey in our experiment corresponds to our model’s intermediate and large prey categories, respectively.
6. As the size of prey captured by social spider colonies increases with colony size, our findings suggest that scramble competition may predominate in large colonies. Scramble competition, combined with the fact that prey biomass per capita declines as colonies grow beyond a certain size, would then explain why extremely large colonies of this social spider may suddenly go extinct. Our project thus illustrates the potential triple link between characteristics of the resources, individual behaviour and population dynamics, a link rarely considered in an empirical setting.

Key-words: environment, extinction, patch size, persistence, resource distribution, sociality, survival

Introduction

The method by which individuals in a population compete for limited resources such as food, mating opportunities or nesting space is known to have a powerful selective influence on individuals (e.g. West-Eberhard 1983; Ishell 1991; Pfennig, Rice & Martin 2007). Less well studied is

how intraspecific competition can affect the stability and long-term persistence of a population, as well as potential links between properties of the resources, individual behaviour and population dynamics. In general, it has been accepted that there are two extreme forms of intraspecific competition – contest and scramble. These were originally proposed by Nicholson (1954) who defined contest competition as occurring when each successful individual gets sufficient access to a limited resource to survive and

*Correspondence author. E-mail: rvsharpe@zoology.ubc.ca

My Research to News



Journal of Animal Ecology

Journal of Animal Ecology 2016, **85**, 1401–1410

doi: 10.1111/1365-2656.12559

Prey size and scramble vs. contest competition in a social spider: implications for population dynamics

Ruth V. Sharpe* and Leticia Aviles

Department of Zoology, University of British Columbia, Vancouver, BC, Canada



The Atlantic

How Sharing Leads to Death

If you're a spider, that is.

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OCT 12, 2016 | SCIENCE

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ANIMALS

Spider Colonies Are Cooperating Themselves To Death

This is why we can't have nice things

By Meaghan Lee Callaghan August 4, 2016



howstuffworks

Animals Wild Animals Pets Animal Facts Endangered Species Extinct Animals

Spiders May Go Extinct From Oversharing

BY LAUREN VOGLBAUM SEP 2, 2016

LAUREN VOGLBAUM VIDEO WRITER / RESEARCHER

A screenshot of a video player showing a woman, Lauren Vogelbaum, speaking. She is wearing a white t-shirt with a cartoon cat and a black cardigan. The video is titled "Spiders May Go Extinct From Oversharing". The player shows a progress bar at 00:05 and a timestamp of 03:00.

Scientists



6-Steps to Tell Good Science from Bad



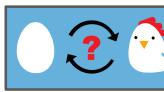
Step 1: Check our biases



Step 2: Is it important?



Step 3: Is it a big number?



Step 4: Is it a correlation?



Step 5: Is it a prediction?



Step 6: Who said it?

Step 1: Is it important? Do you care?





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Government department responsible for the environment has just TWO electric cars in its fleet of 4,000

- Department for Environment Food and Rural Affairs has just two electric cars
- Michael Gove's department has a fleet of 4,000 cars which are mainly diesel

dailymail.co.uk/news/article-5407081/Environment-department-just-TWO-electric-cars.html



Dailymail.co.uk

11/11/2011

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Gove
for the
elect

- Department of Environment, Food and Rural Affairs
- Michael Gove's department has a fleet of 4,000 cars which are mainly diesel

...and this affects me, how?



Science | Mo

coupons

sible

electric cars

dailymail.co.uk/news/article-5407081/Environment-department-just-TWO-electric-cars.html



ocean wise.

Step 2: Understand Our Biases



Brain Shortcuts



A bat and ball cost \$1.10



A bat costs one dollar more than the ball

How much does the ball cost?



Brain Shortcuts



A bat and ball cost \$1.10



The bat costs one dollar more than the ball

How much does the ball cost?



= 10¢ ?



Brain Shortcuts



A bat and ball cost \$1.10

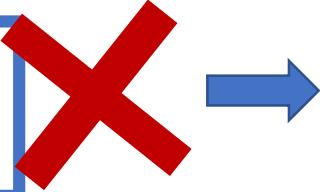


The bat costs one dollar more than the ball

How much does the ball cost?



$$\text{baseball} = 10\text{¢} ?$$



$$\text{bat} = \$1.10$$

$$\text{Total} = \$1.20$$



Brain Shortcuts

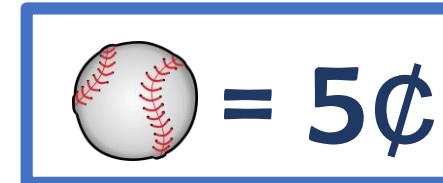


A bat and ball cost \$1.10

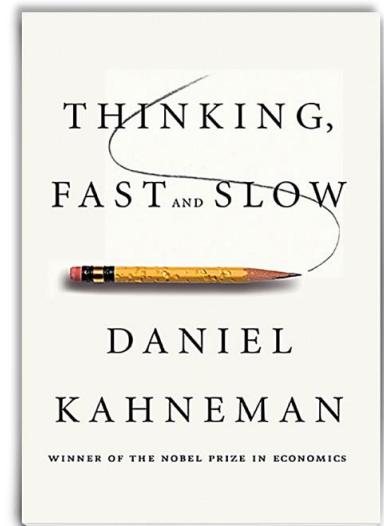
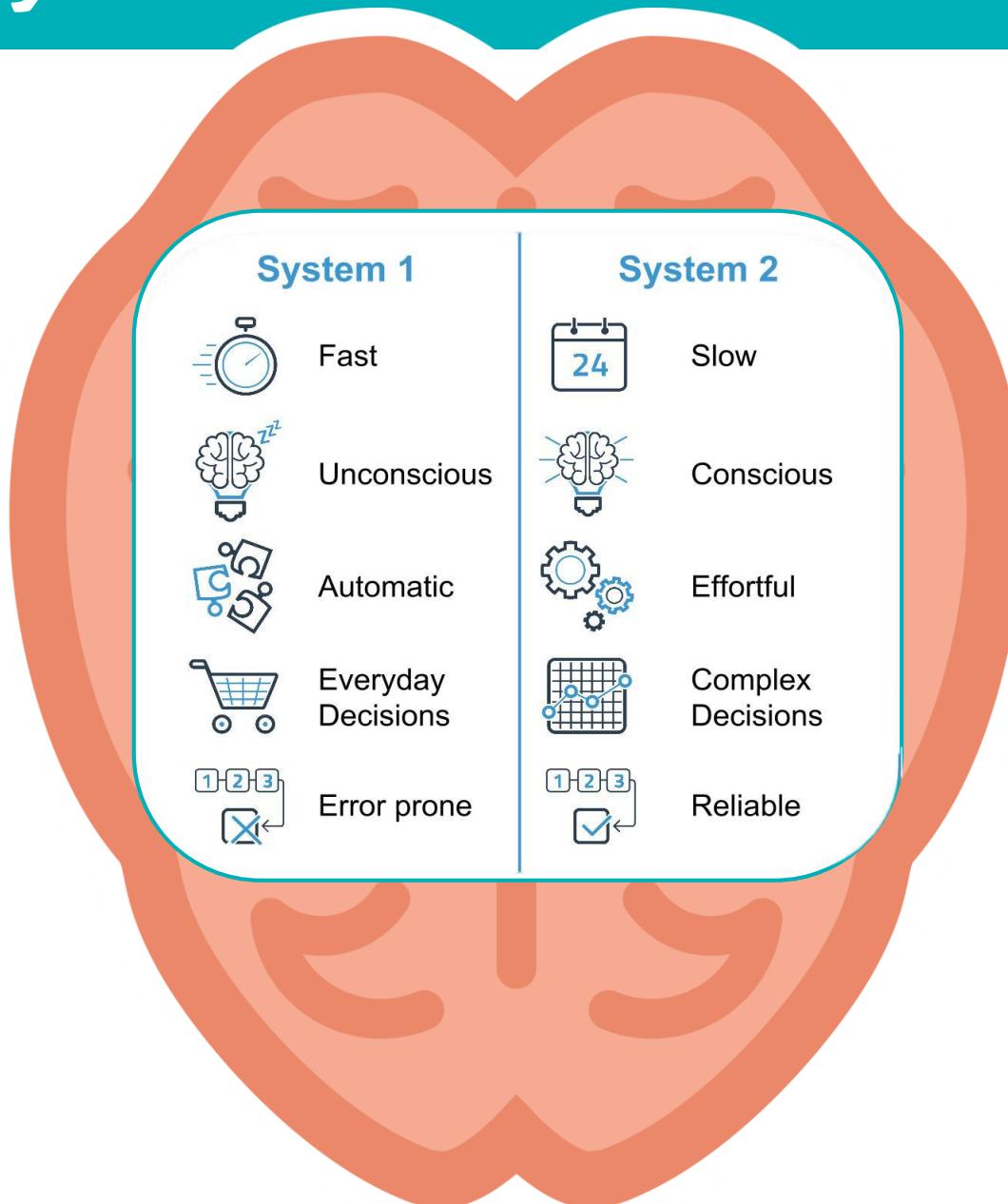


The bat costs one dollar more than the ball

How much does the ball cost?



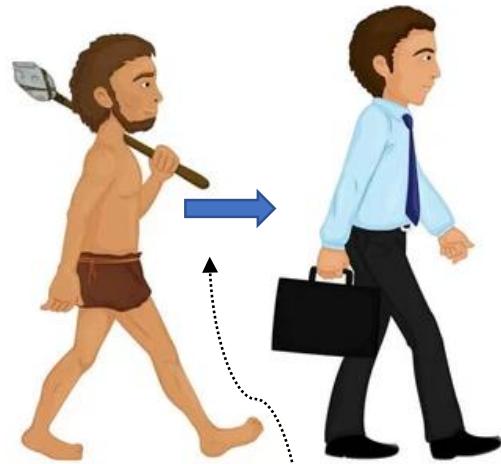
Two Brain 'Systems'



Why our brains use these shortcuts



**Humans Evolved in
Different Environment**

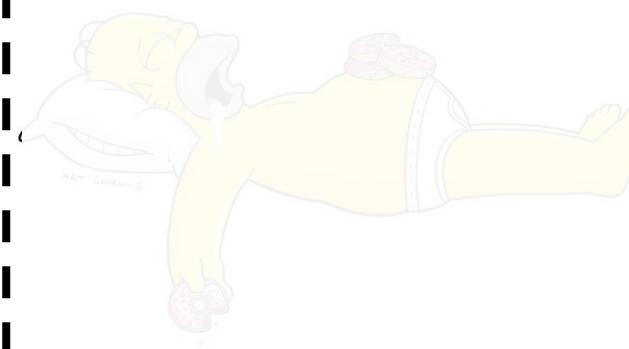


Food (aka energy)
was Scarce

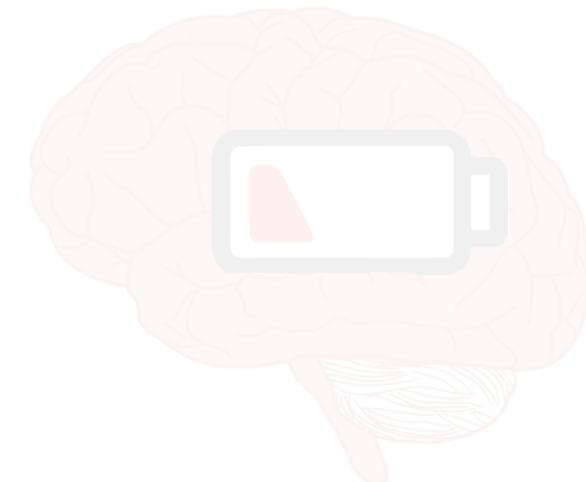
Think it'd be worth
the punishment?

OH HELL
YEAH!

We Evolved to Use
As Little Energy as
Possible



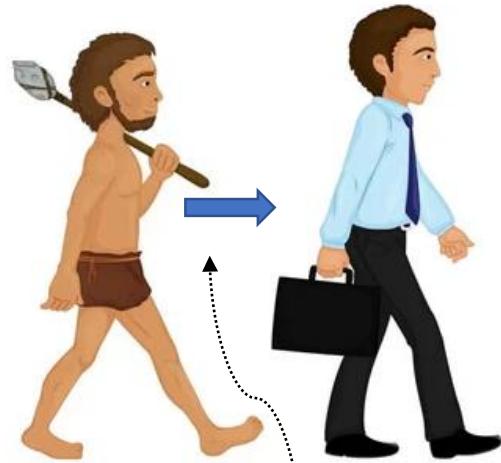
Our brains use a lot
of energy



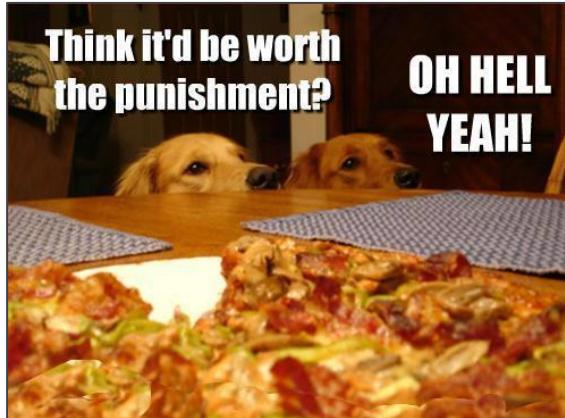
Why our brains use these shortcuts



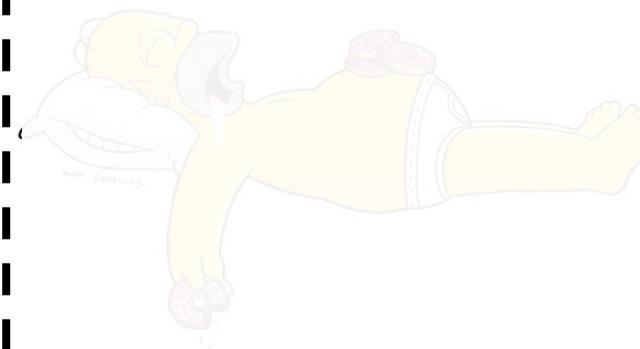
**Humans Evolved in
Different Environment**



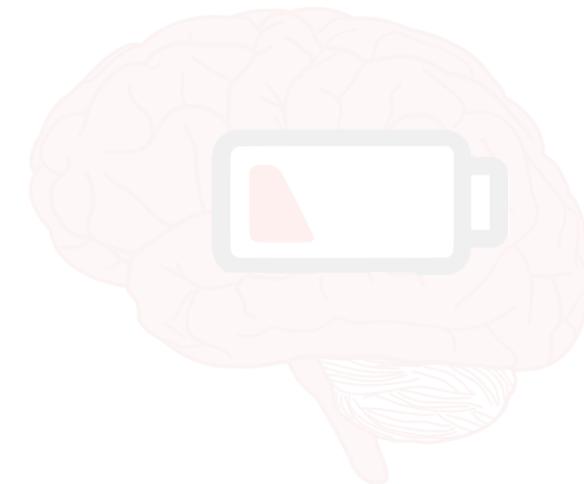
**Food (aka energy)
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We Evolved to Use
As Little Energy as
Possible



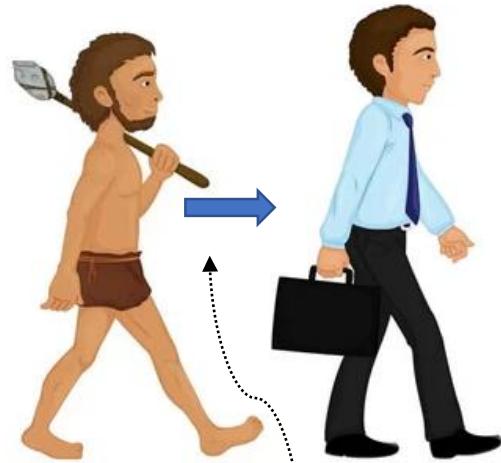
Our brains use a lot
of energy



Why our brains use these shortcuts

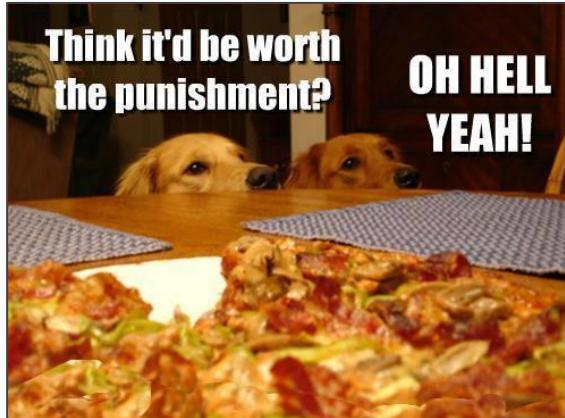


**Humans Evolved in
Different Environment**



short amount of time

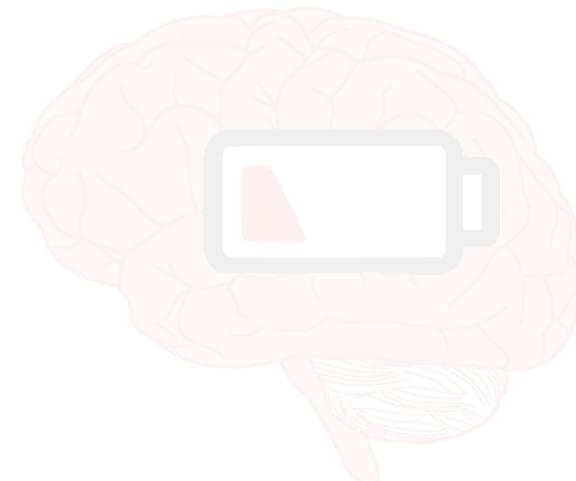
**Food (aka energy)
was Scarce**



**We Evolved to Use
As Little Energy as
Possible**



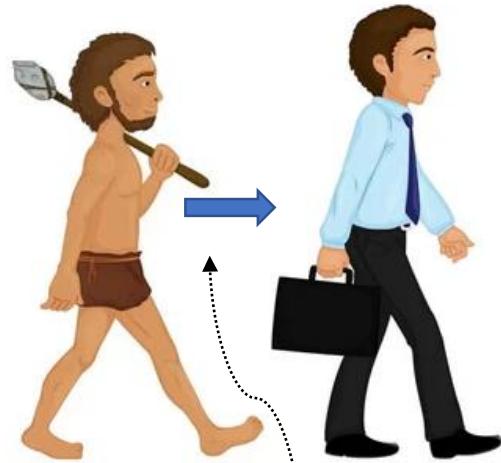
Our brains use a lot
of energy



Why our brains use these shortcuts



Humans Evolved in
Different Environment



short amount of time

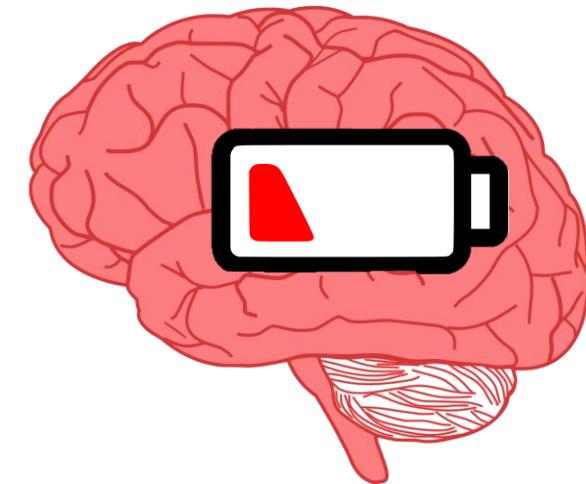
Food (aka energy)
was Scarce



We Evolved to Use
As Little Energy as
Possible



Our brains use a lot
of energy



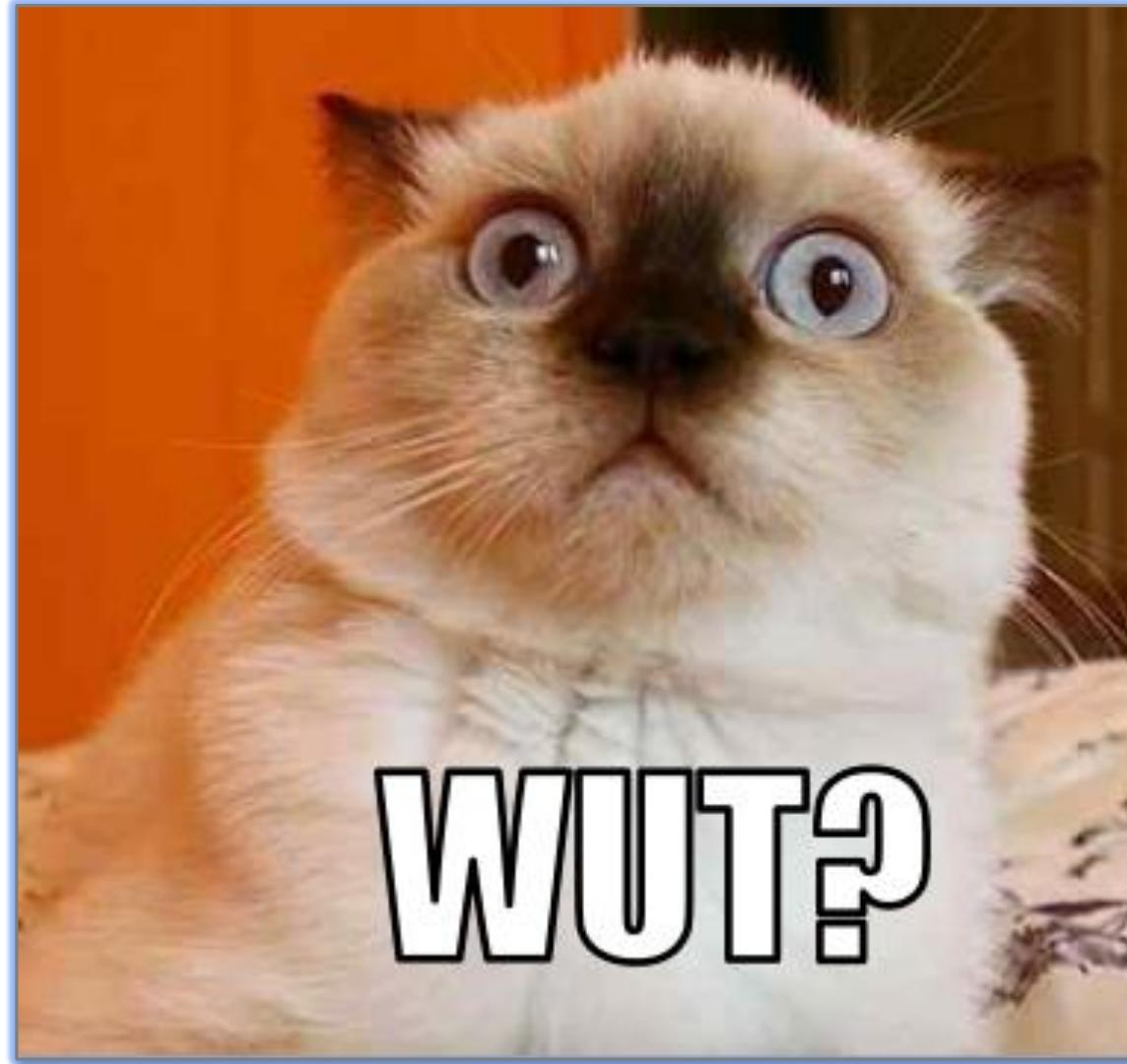
The Truthfulness Bias



BELIEVE!



Aim for this instead!



Conformation bias



Alex Proimos | Wikimedia Commons

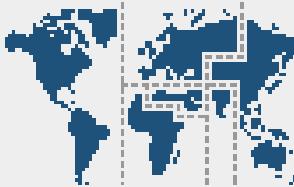


Study: Westen et al, Journal of Cognitive Neuroscience (2006)

Conformation bias

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Organic food 'better' for heart

Organic fruit and vegetables may be better for you than conventionally grown crops, US research suggests.

A ten-year study comparing organic tomatoes with standard produce found almost double the level of flavonoids - a type of antioxidant.



Tomatoes contain compounds which are

Conformation bias

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Health

Organic food 'not any healthier'

🕒 4 September 2012

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Eating organic food will not make you healthier, according to researchers at Stanford University, although it could cut your exposure to pesticides.

They looked at more than 200 studies of the content and associated health gains of organic and non-organic foods.

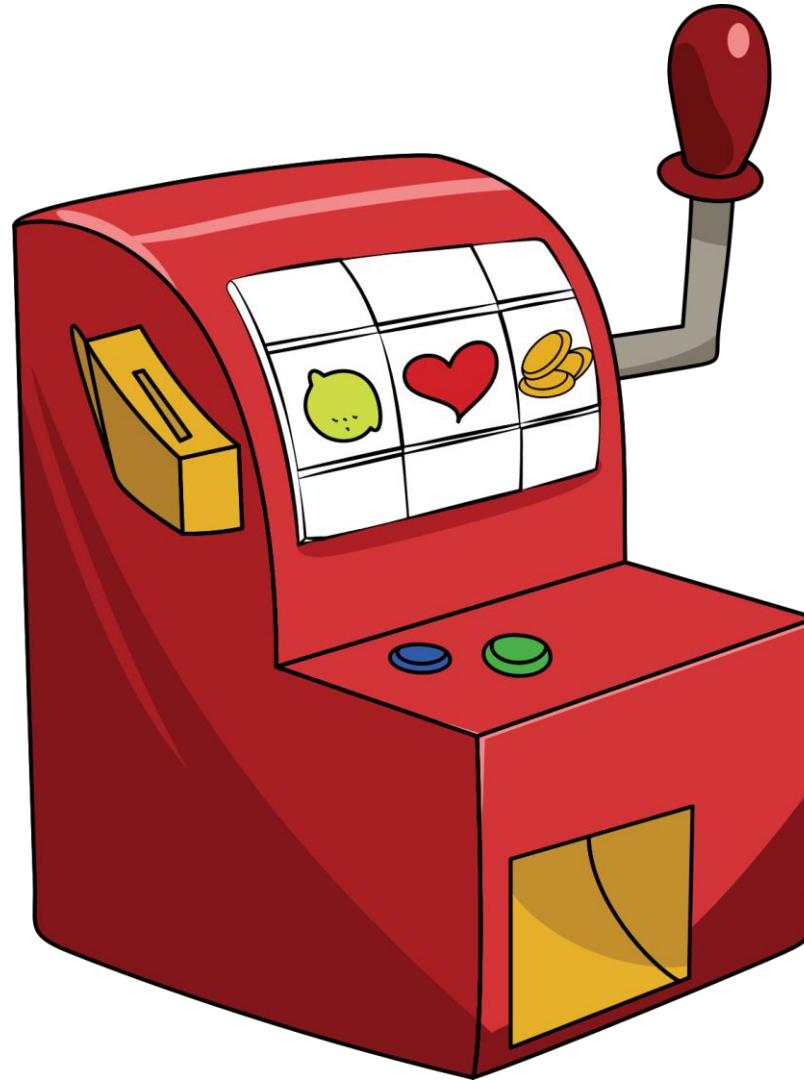


Food labelled as organic must meet certain standards

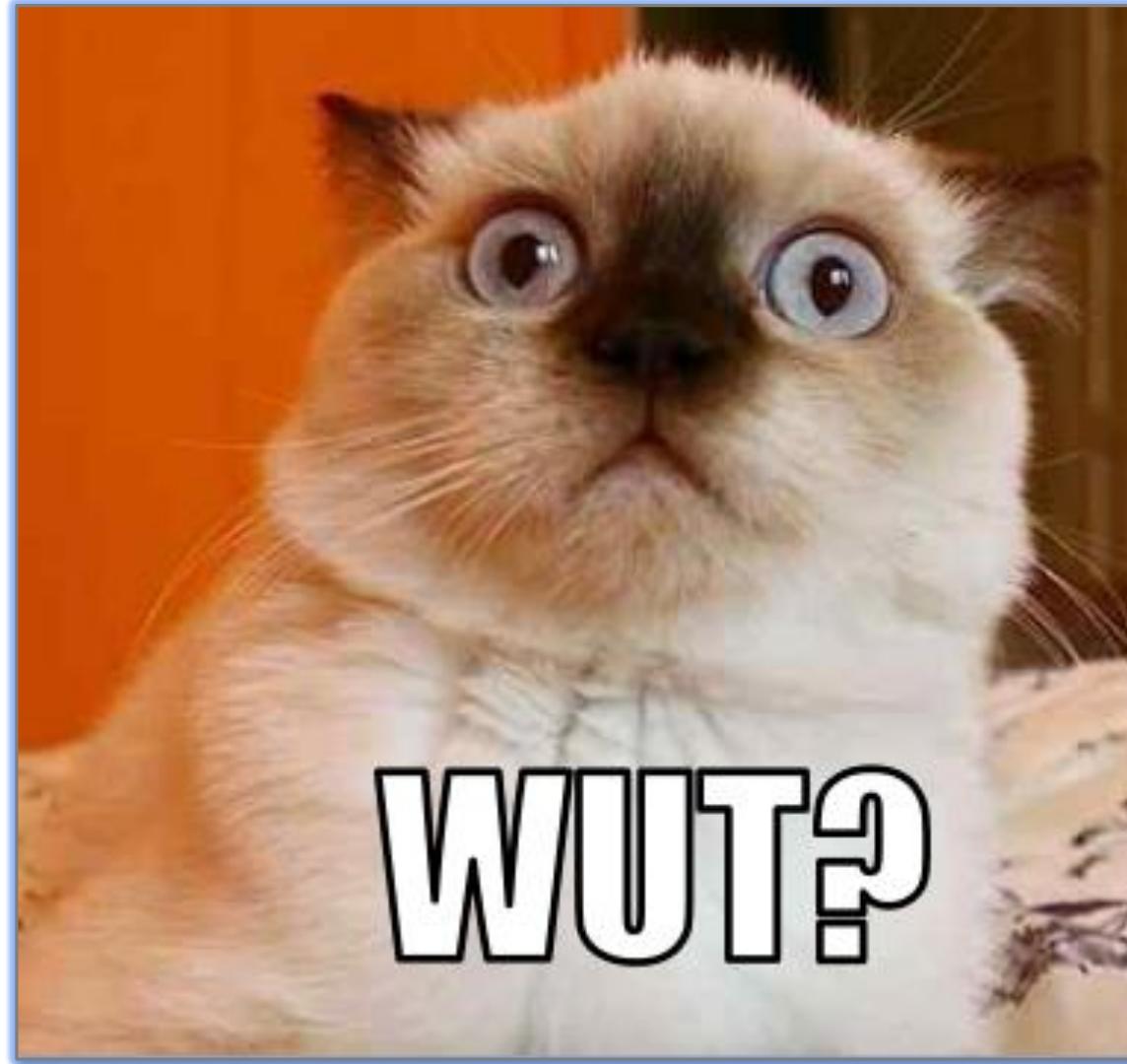


www.bbc.com/news/health-19465692

Zero-Risk Bias



Step 2: Conclusion



Step 3: What do the numbers mean?



Put the numbers in context!



'The clothing industry creates carbon emissions of 1.2 billion tonnes...'

New Scientist 24th Feb 2018



Put the numbers in context!



'The clothing industry creates carbon emissions of 1.2 billion tonnes..'

New Scientist 24th Feb 2018

'The clothing industry creates carbon emissions of 1.2 billion tonnes a year..'

New Scientist 24th Feb 2018



Put the numbers in context!



'The clothing industry creates carbon emissions of 1.2 billion tonnes...'

New Scientist 24th Feb 2018

'The clothing industry creates carbon emissions of 1.2 billion tonnes a year.'

New Scientist 24th Feb 2018

'The clothing industry creates carbon emissions of 1.2 million tonnes a year.'



Put the numbers in context!



'The clothing industry creates carbon emissions of 1.2 billion tonnes a year.'

New Scientist 24th Feb 2018



World emits 36 billion tonnes of carbon per year

As of 2015: Neatherlands Environmental Assessment Agency



Put the numbers in context!



'The clothing industry creates carbon emissions of 1.2 billion tonnes a year.'

New Scientist 24th Feb 2018



World emits 36 billion tonnes of carbon per year

As of 2015: Neatherlands Environmental Assessment Agency



Clothing industry creates 3.3% of global carbon emissions

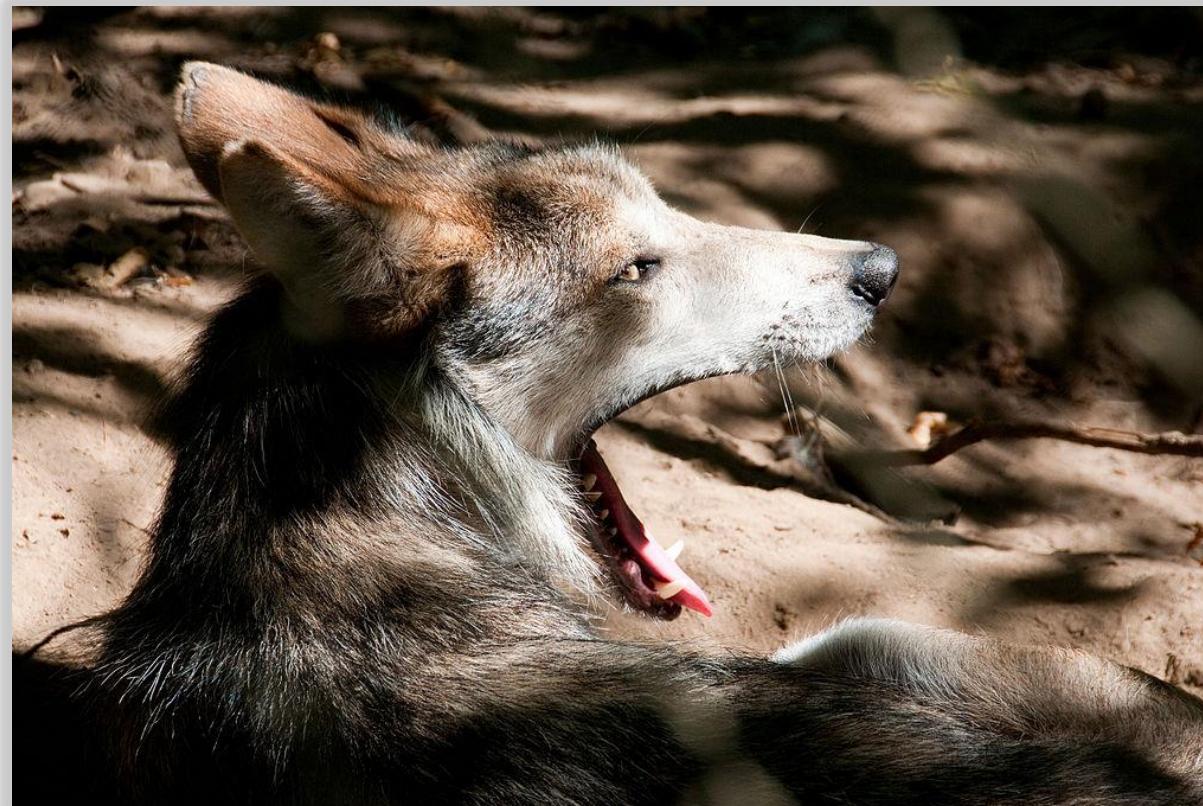
Calculation by Ruth!



Put the numbers in context!

'France will let its wolf population grow by 40%....'

New Scientist 24th Feb 2018



Put the numbers in context!



'France will let its wolf population grow by 40%....'

New Scientist 24th Feb 2018



But.... currently only 360 wolves in France!



140 more wolves!



Lamb from New Zealand



688 kg of the CO² is released for each tonne of New Zealand lamb for sale in Britain.

CM Saunders (2007)



Lamb from New Zealand



688 kg of the CO² is released for each tonne of New Zealand lamb for sale in Britain.

CM Saunders (2007)

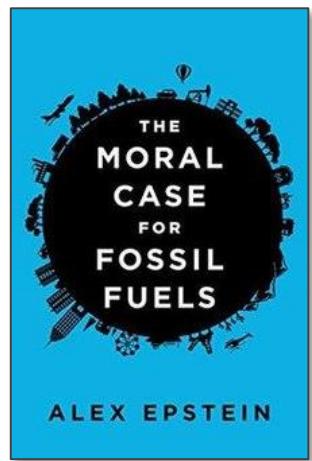
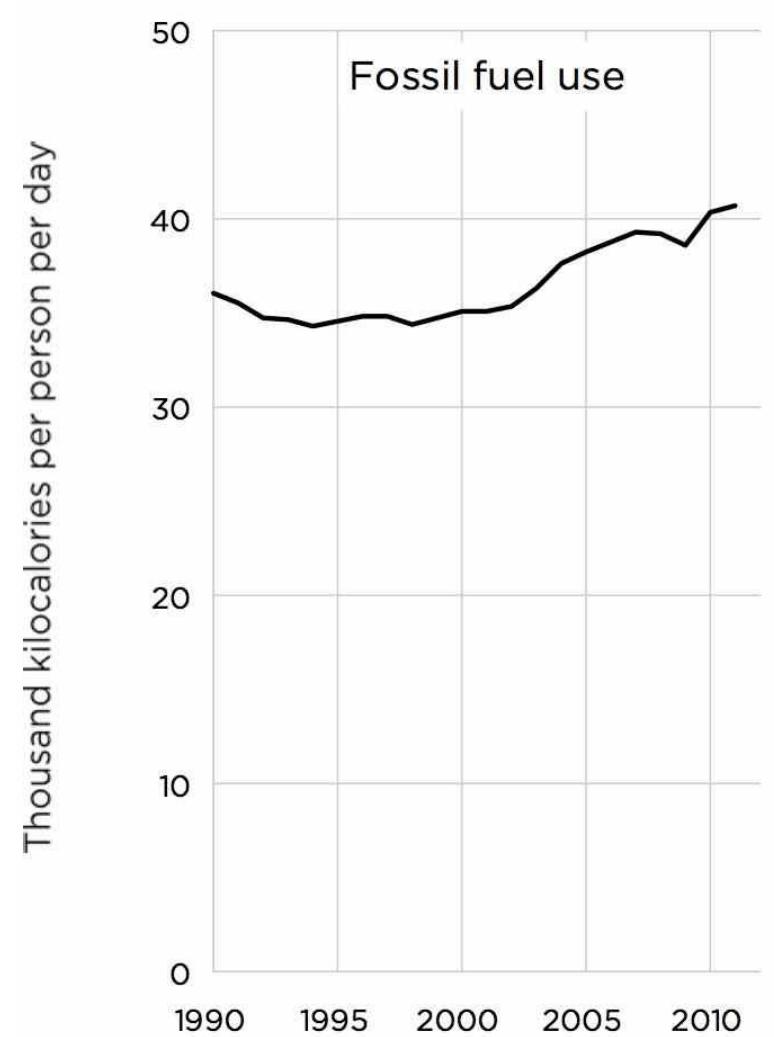


2,849 kg of the CO² is released for each tonne of New Zealand lamb raised and sold in Britain.

CM Saunders (2007)



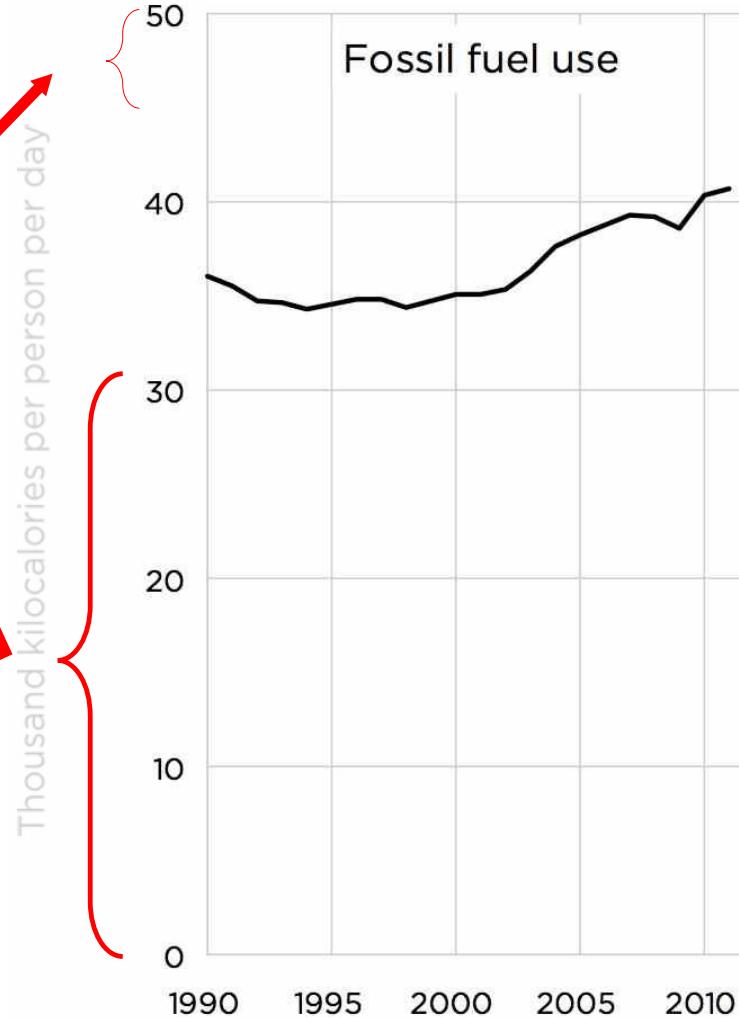
Graph Scales Can Be Misleading



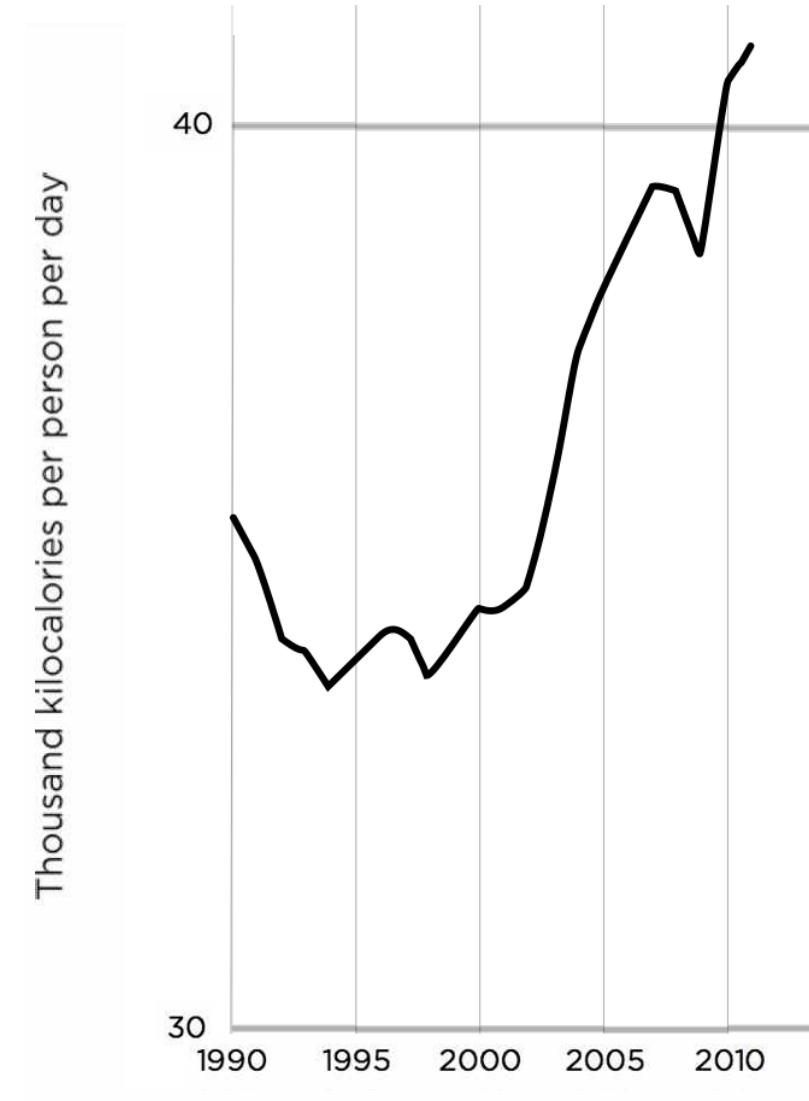
Graph Scales Can Be Misleading



WUT?



Graph Scales Can Be Misleading



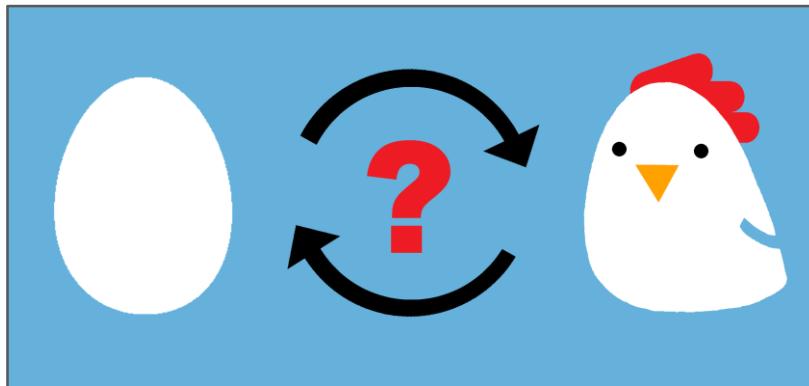
Step 3: Conclusion



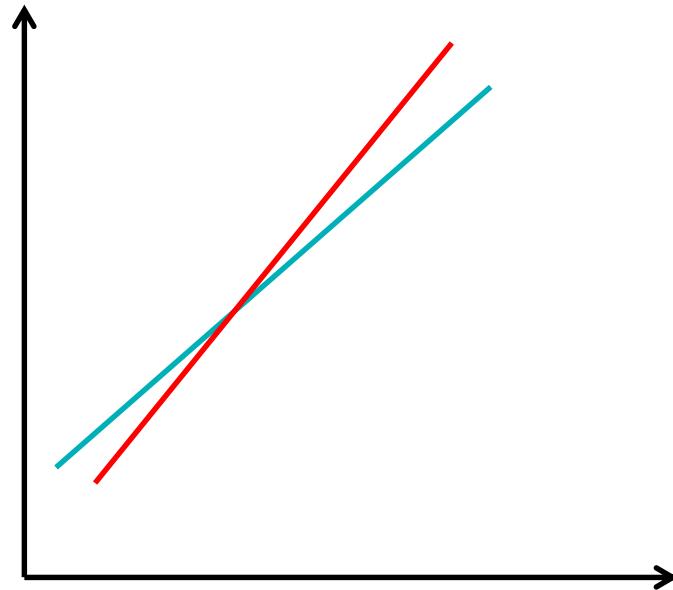
Put numbers in context



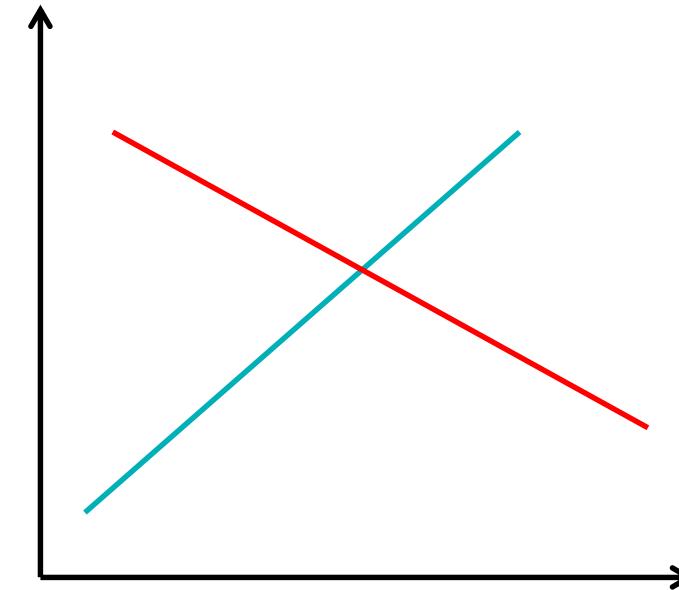
Step 4: Is it a correlation?



What is correlation?



One thing increases
with another thing



One thing decreases as
another one increases



But



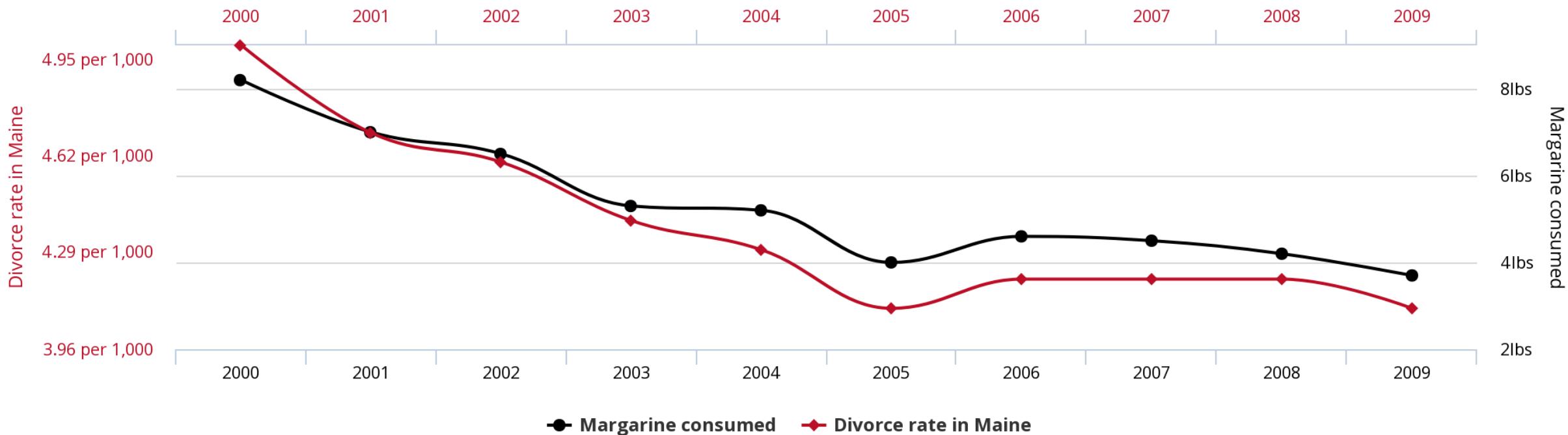
**Correlation does
not mean causation**



Sometimes it's just a coincidence...



Divorce Rates in Maine *correlates with* Per Capita Consumption of Margarine!

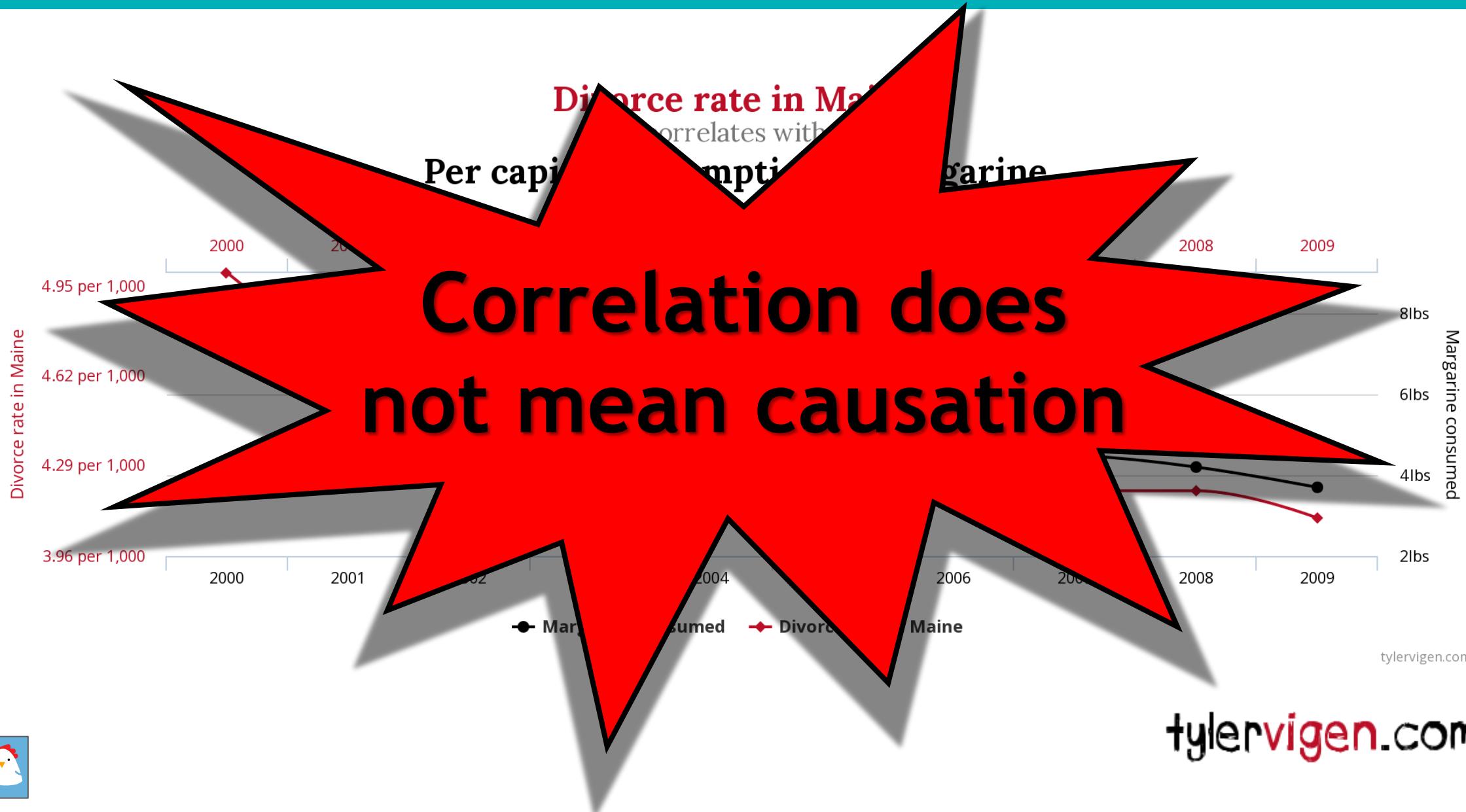


tylervigen.com

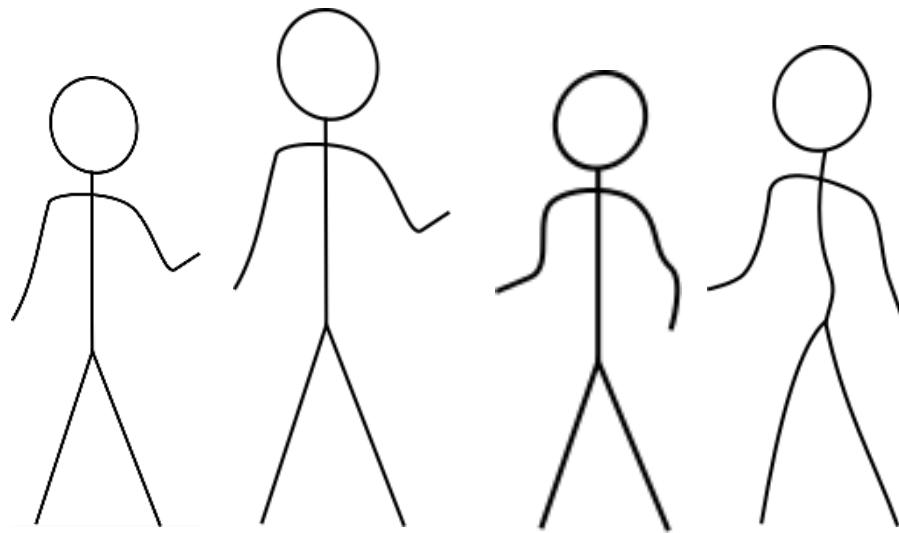


tylervigen.com

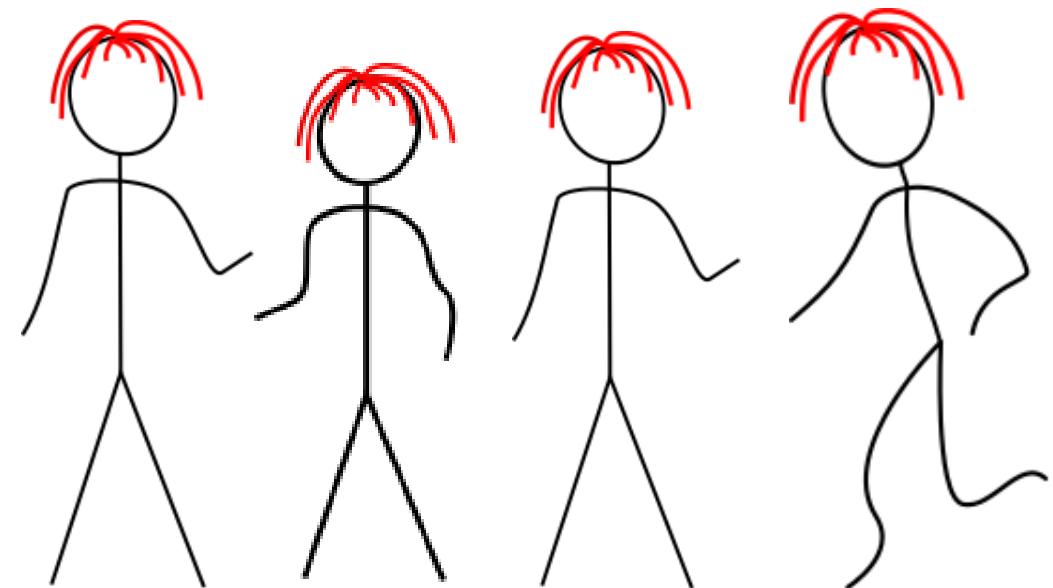
Sometimes it's just a coincidence



Other things cause the pattern



vs



Other things cause the pattern

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Wednesday, May 12, 1999 Published at 19:11 GMT 20:11 UK

Health

Night light 'damages children's eyes'

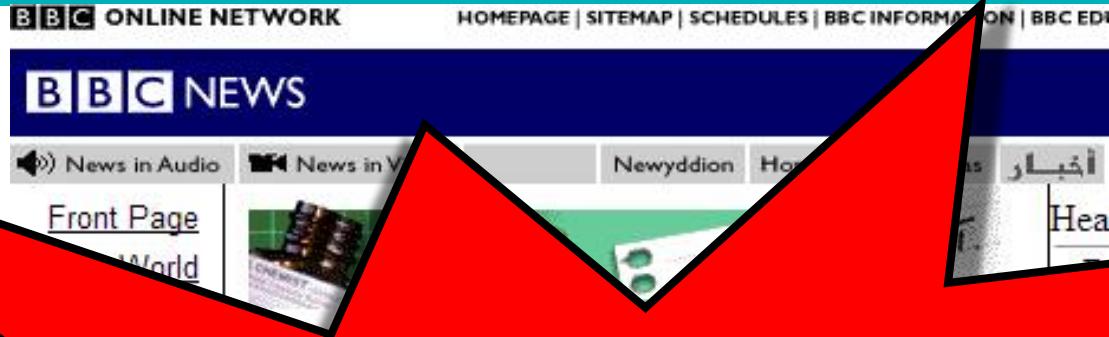
Children should sleep in the dark
Children who sleep with a light on during the night could

Hea
B
M
R
29
Big
do
22
Ec
17
Ey
ag
18
Big
ey

In
Th
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Ey



Other things cause the pattern



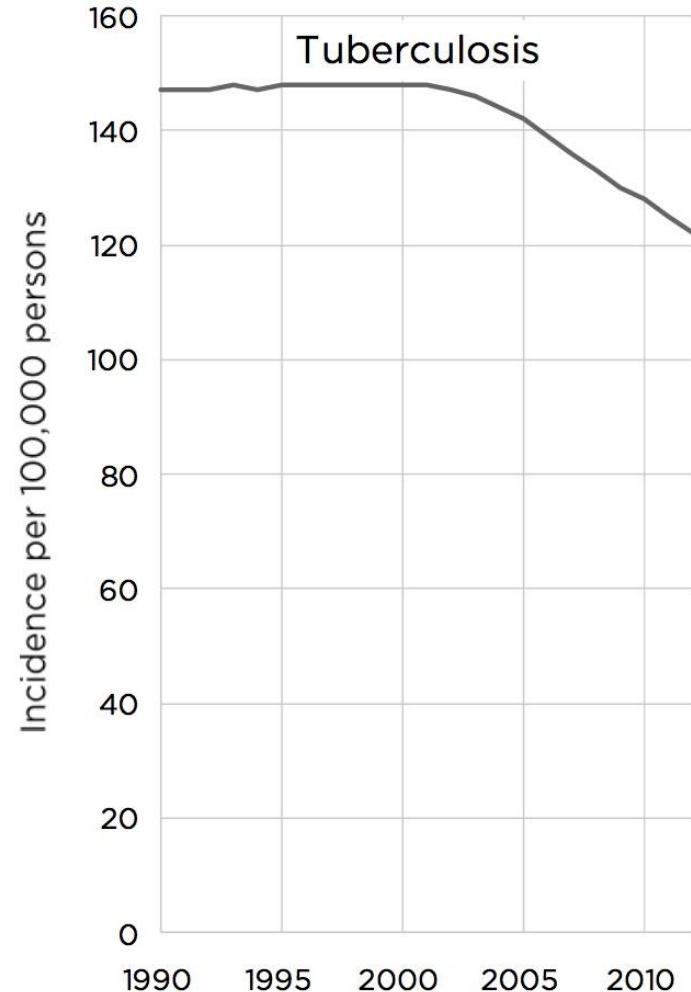
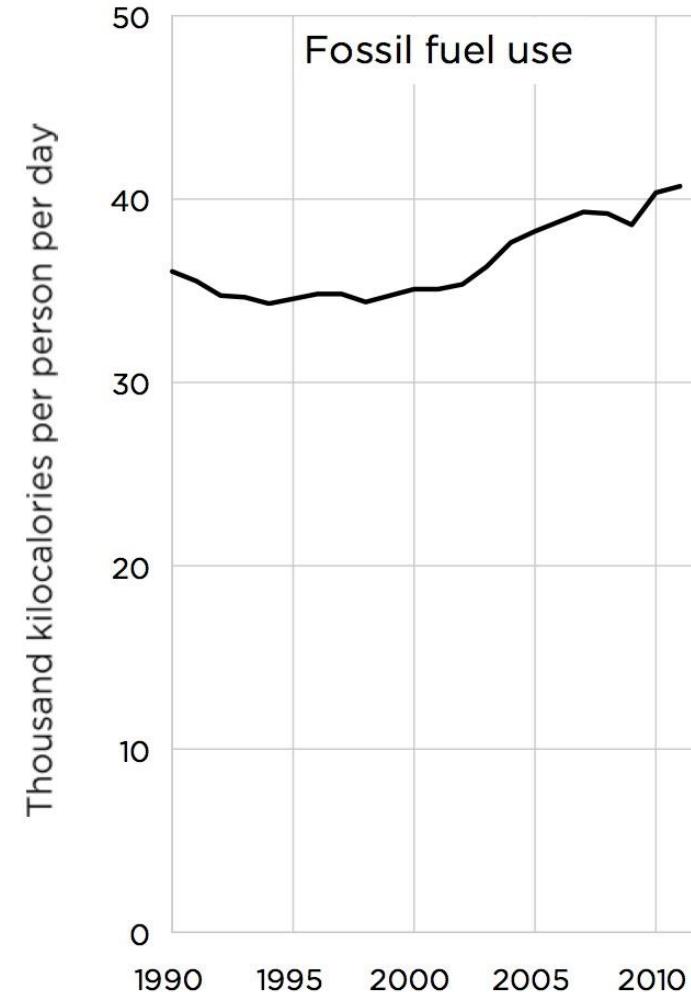
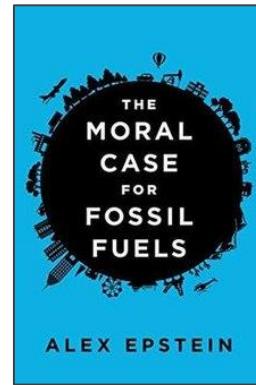
Correlation does
not mean causation



In
Th
dis
Ey



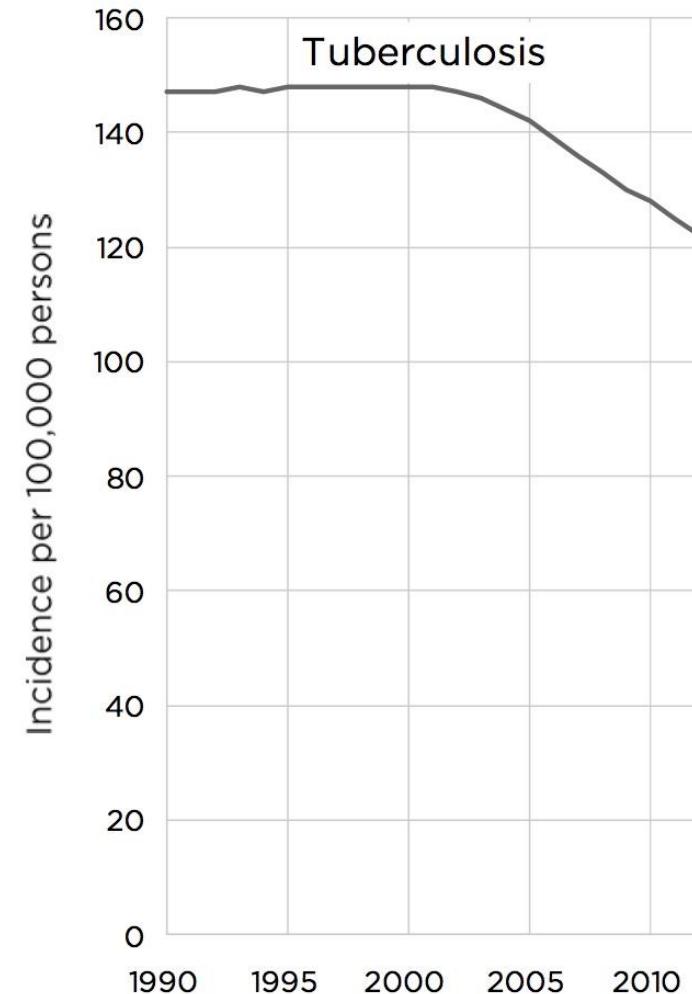
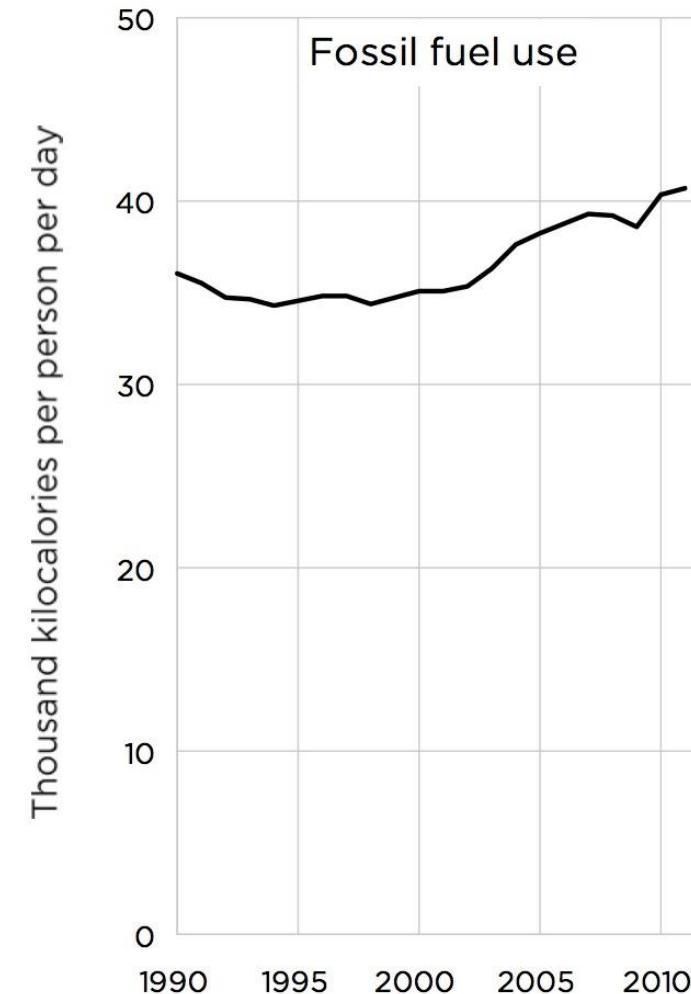
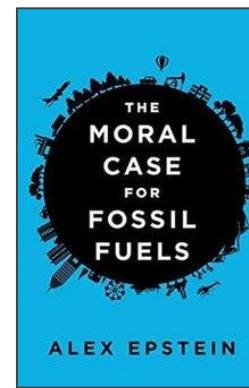
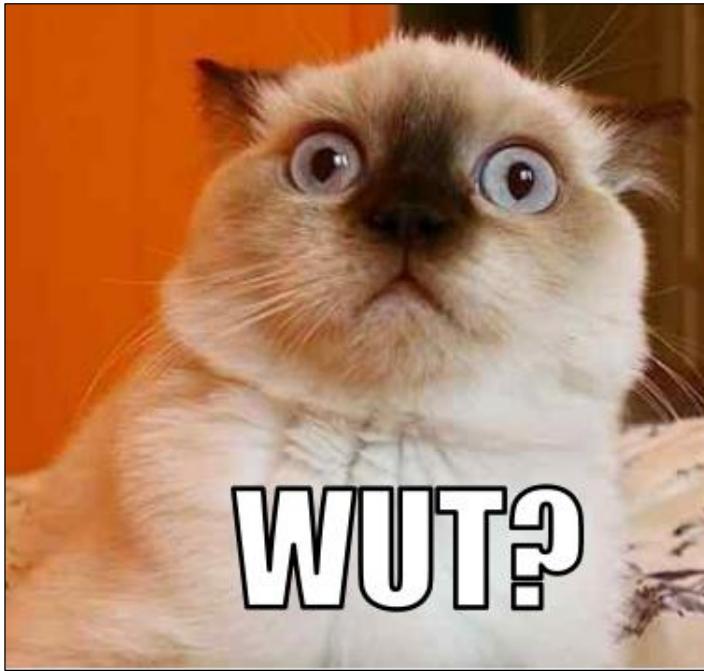
Correlation.....



Sources: BP Statistical Review of World Energy, Historical data workbook
World Bank, World Development Indicators (WDI)



Correlation does NOT mean causation!



Sources: BP Statistical Review of World Energy, Historical data workbook
World Bank, World Development Indicators (WDI)



Step 4: Conclusion



**Correlation does
not mean causation**

Step 5: Is it a predication?



The Future



**Where Does The Prediction
Come From?**

**Guess or
opinion**

Computer model

If trends continue...



Where Does The Prediction Come From?

Guess or opinion

Computer model

If trends continue...



Where Does The Prediction Come From?

Probably Not Science!

Guest
opinion

Computer model

If trends continue...



Where Does The Prediction Come From?

Guess or opinion

Computer model

If trends continue...



Extrapolation



The image shows a screenshot of the CTV News website. At the top left is the CTV News logo. To the right, there is a "HOT TOPICS" section with links to "Mexico" and "Disruptive pass". Below the logo is a navigation bar with links to "NEWS", "VIDEO", "LOCAL", "SHOWS", and "CTV NEWS CHANNEL". The main headline reads "UN report: Loss of plants, animals making a lonelier planet". Below the headline is the author's name, "Seth Borenstein, The Associated Press", and the publication date, "Published Friday, March 23, 2018 9:27AM EDT". The text also notes the last update, "Last Updated Friday, March 23, 2018 12:09PM EDT". A red box highlights the sentence: "If current trends continue by the year 2050 the Americas will have 15 per cent fewer plants and animals than now. That means there will be 40 per cent fewer plants and animals in the Americas than in the early 1700s."

UN report: Loss of plants, animals making a lonelier planet

Seth Borenstein, The Associated Press

Published Friday, March 23, 2018 9:27AM EDT

Last Updated Friday, March 23, 2018 12:09PM EDT

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Where Does The Prediction Come From?

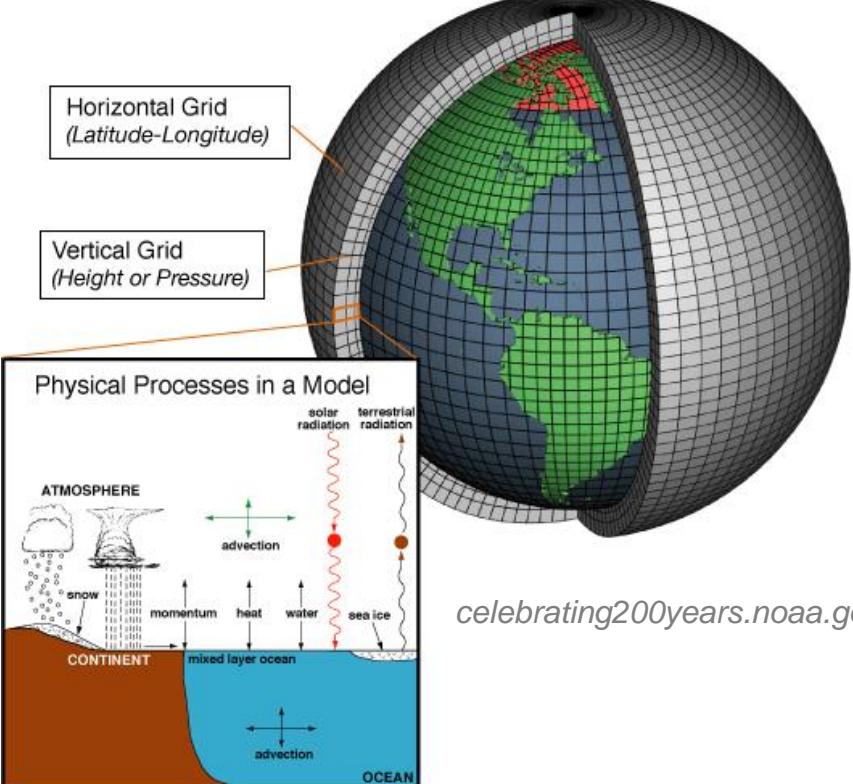
Guess or opinion

Computer model

If trends continue...



What is a model?

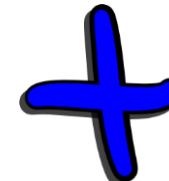


celebrating200years.noaa.gov

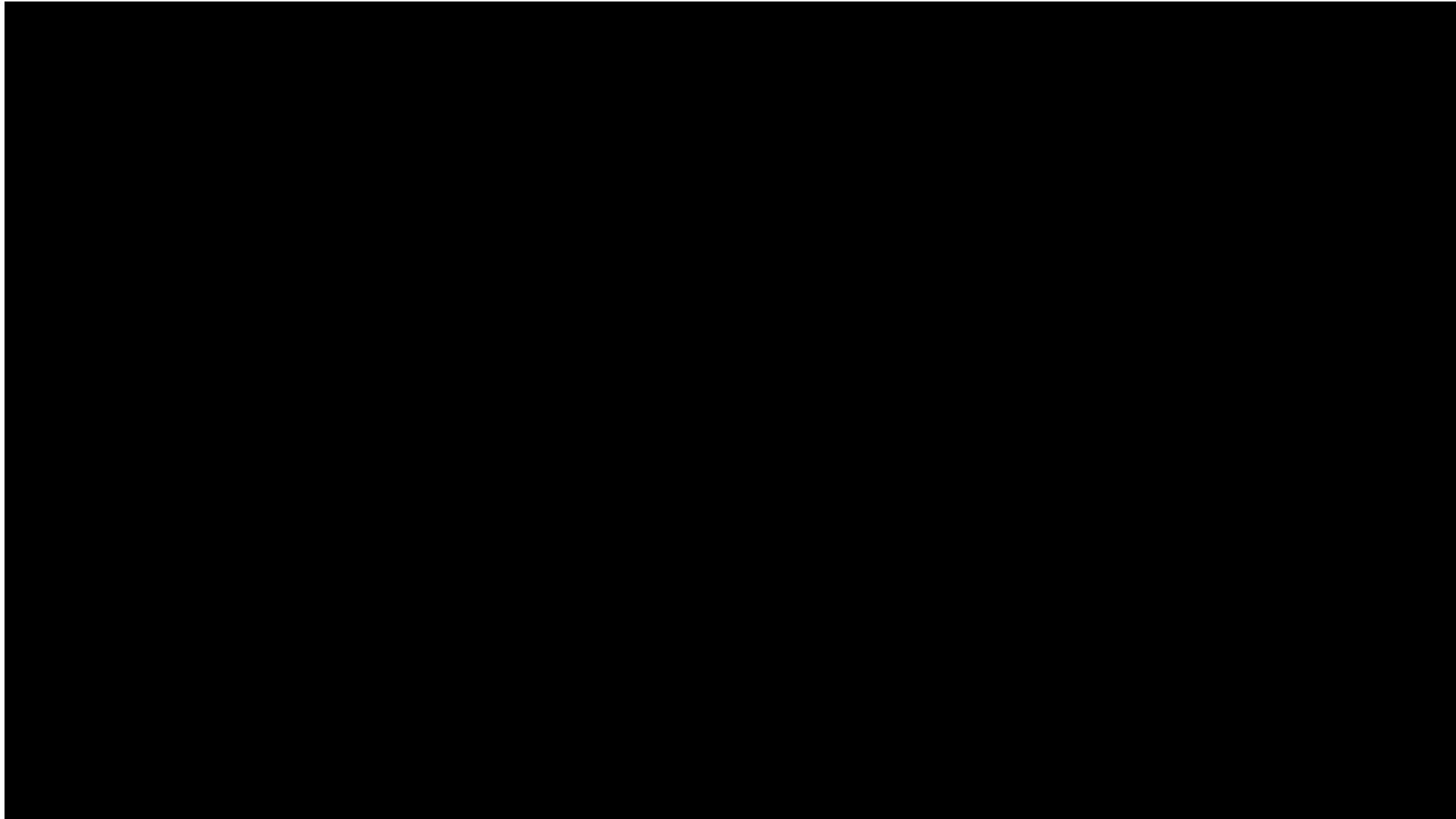


$$\int = \frac{a+b}{4} + \frac{32}{11} \left(\sqrt{\frac{acd}{8}} \right)^{1/4} (a-d)^{1/2}$$

$$U - Y^2 = \sqrt{\frac{(s-s')^{1/2}}{\frac{17}{12} - \frac{7}{12} \frac{(a+b+c)^2}{(s+s')}}}$$

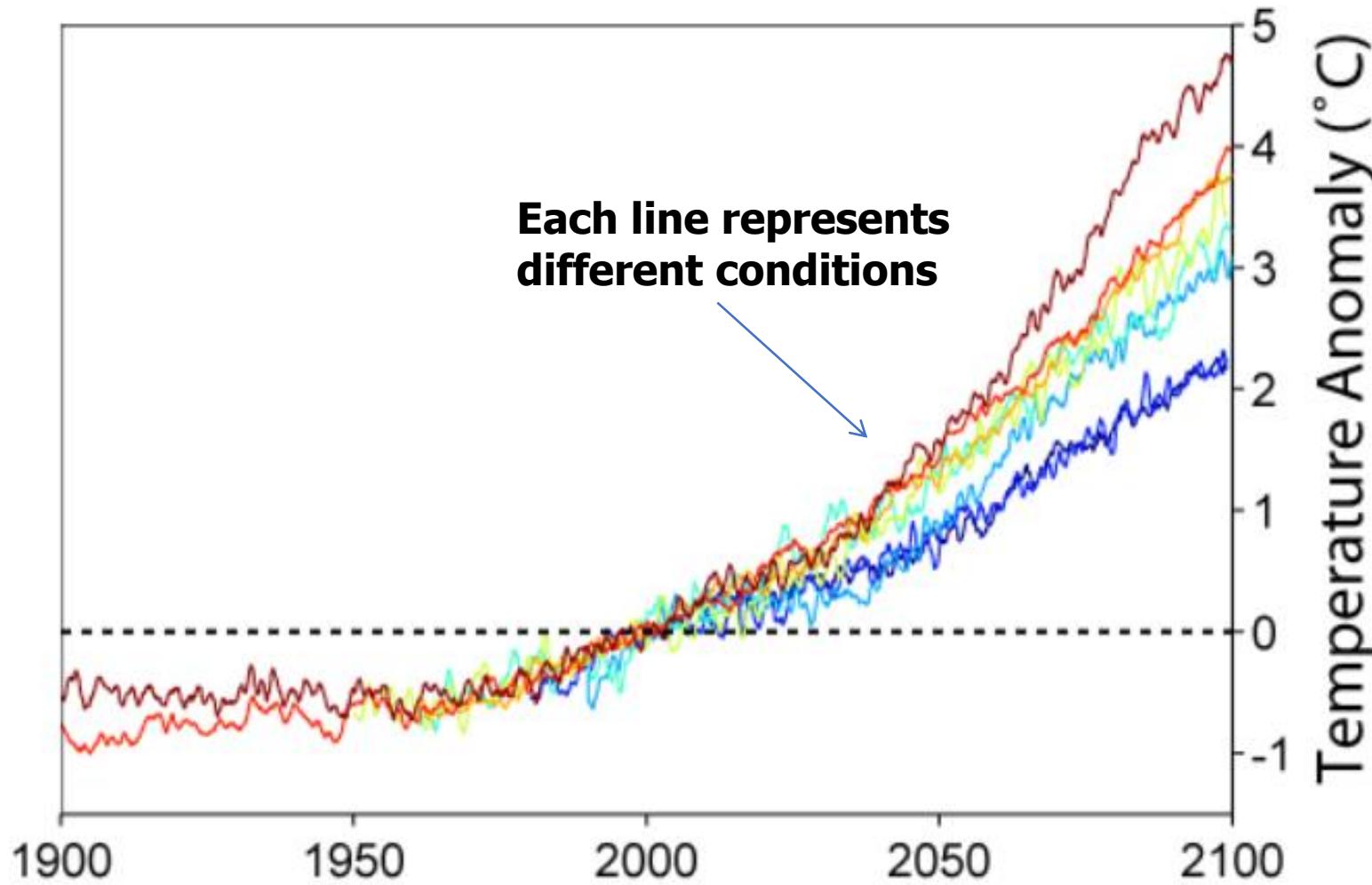


Model Example: Arctic Ice



NCAR climate model: www.youtube.com/watch?v=3v9aRQpumPA

Example: Temperature Predictions



Step 6: Who said it?



Google it!



Try to Find The
Original Source



Can be easy to google!

Google



What is the source?

Who Said It?

Peer-reviewed paper

NGO or government
report

Person(s)

Newspaper, website
or other

Most Reliable



Least Reliable



Peer-review



Who Said It?

Peer-reviewed paper

NGO or government
report

Person(s)

Newspaper, website
or other



Peer-review



Who Said It?

Peer-reviewed paper

NGO or government

Person(s)

Newspaper, website
or other

What is peer-review?



What is peer review?

Collect data



Do statistics and write paper



Send to journal editor



Published article!

Journal of Animal Ecology

Journal of Animal Ecology 2016, **85**, 1401–1410



doi: 10.1111/1365-2656.12559

Prey size and scramble vs. contest competition in a social spider: implications for population dynamics

Ruth V. Sharpe* and Leticia Aviles

Department of Zoology, University of British Columbia, Vancouver, BC, Canada

Corrections



Anonymous reviews



What is peer review?

Collect data



Do statistics and write paper



Send to journal editor



Published article!

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Corrections



Anonymous reviews



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Health

Organic food 'not any healthier'

4 September 2012

f t m Share

Eating organic food will not make you healthier, according to researchers at **Stanford University**, although it could cut your exposure to pesticides.

They looked at more than 200 studies of the content and associated health gains of organic and non-organic foods.



Food labelled as organic must meet certain standards

<http://www.bbc.com/news/health-19465692>



Find The Original Source (if you can)

stanford university organic food health

All News Images Maps Videos More Settings Tools

About 734,000 results (1.05 seconds)

[Little evidence of health benefits from organic foods, Stanford study ...](#)
<https://med.stanford.edu/.../little-evidence-of-health-benefits-from-organic-foods-stud...> ▾
 Sep 3, 2012 - You figure you've just made the healthier decision by choosing the organic product — but new findings from Stanford University cast some doubt on your thinking. "There isn't much difference between organic and conventional foods, if you're an adult and making a decision based solely on your health," ...

[Stanford study on the health benefits of organic food: What people are ...](#)
scopeblog.stanford.edu/.../stanford-study-on-the-health-benefits-of-organic-food-wha... ▾
 Sep 4, 2012 | (In case you missed it: Researchers here found little evidence of health benefits from organic foods. Senior author ... Together, the results are too inconclusive and disparate to draw any



Stanford MEDICINE

SCOPE
Published by Stanford Medicine

LATEST POPULAR TOPICS ▾

Stanford study on the health benefits of organic food: What people are saying

Michelle Brandt
September 4, 2012

I've worked in the medical school's news office for more than a decade, and I recall only a handful of studies getting the type of media attention that our [organic-food one](#) has gotten. (In case you missed it: Researchers here [found](#) little evidence of health benefits from organic foods. Senior author [Dena Bravata, MD, MS](#)




Annals of Internal Medicine®

LATEST ISSUES CHANNELS CME/MOC IN THE CLINIC JOURNAL CLUB WEB EXCLUSIVES AUTHOR INFO

◀ PREV ARTICLE | THIS ISSUE | NEXT ARTICLE ▶
 REVIEWS | 4 SEPTEMBER 2012

Are Organic Foods Safer or Healthier Than Conventional Alternatives?: A Systematic Review

Crystal Smith-Spangler, MD, MS; Margaret L. Brandeau, PhD; Grace E. Hunter, BA; J. Clay Bavinger, BA; Maren Pearson, BS; Paul J. Eschbach; Vandana Sundaram, MPH; Hau Liu, MD, MS, MBA, MPH; Patricia Schirmer, MD; Christopher Stave, MLS; Ingram Olkin, PhD; Dena M. Bravata, MD, MS



Peer Reviewed Paper



Annals of Internal Medicine®

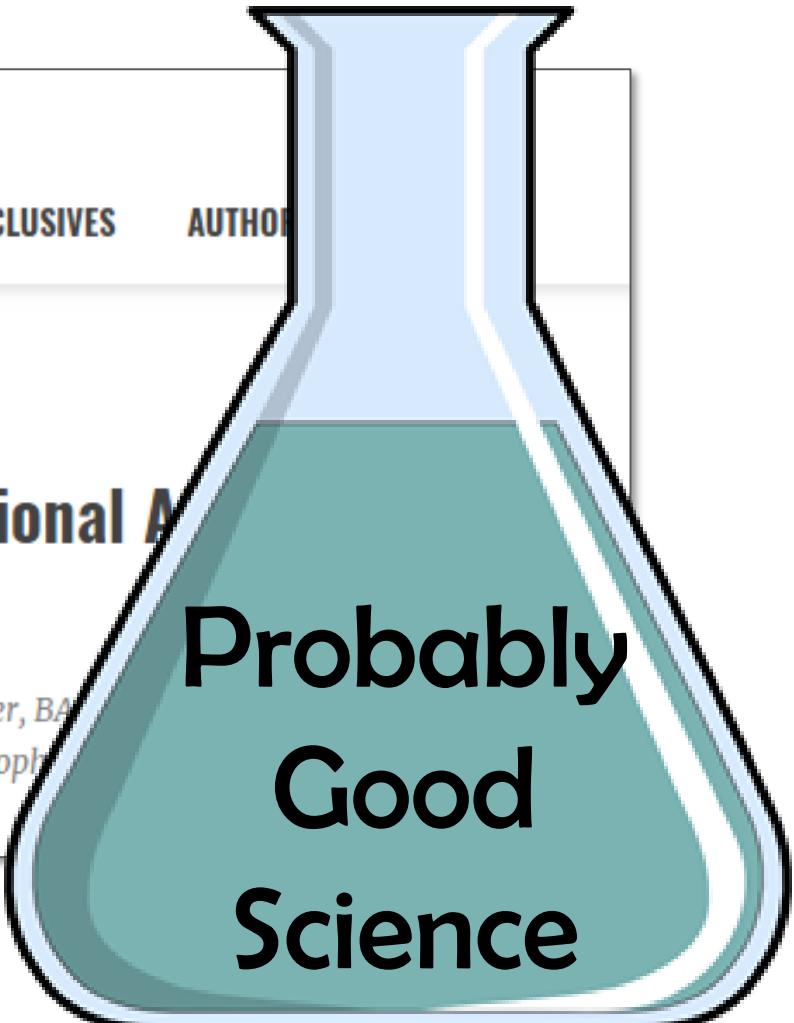
LATEST ISSUES CHANNELS CME/MOC IN THE CLINIC JOURNAL CLUB WEB EXCLUSIVES AUTHOR CENTER

< PREV ARTICLE | THIS ISSUE | NEXT ARTICLE >

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Peer Reviewed Paper



The screenshot shows the homepage of the **Annals of Internal Medicine**. At the top, there is a navigation bar with links: LATEST, ISSUES, CHANNELS, CME/MOC, IN THE CLINIC, JOURNAL CLUB, WEB EXCLUSIVES, and AUTHOR INFO. Below the navigation, there is a large, bold, black text overlay that reads: "Remember...check what the study actually says!". In the background, through the text overlay, you can see the title of an article: "Are Organic Foods Safer or Healthier Than Conventional Alternatives?: A Systematic Review". The authors' names listed at the bottom of the article are: Crystal Smith-Spangler, MD, MS; Margaret L. Brandeau, PhD; Grace E. Hunter, BA; J. Clay Bavinger, BA; Maren Pearson, BS; Paul J. Eschbach; Vandana Sundaram, MPH; Hau Liu, MD, MS, MBA, MPH; Patricia Schirmer, MD; Christopher Stave, MLS; Ingram Olkin, PhD; Dena M. Bravata, MD, MS.



Can you always trust peer-reviewed articles?



Peer-reviewed paper?



Can you always trust peer-reviewed articles?



Peer-reviewed paper?



Fake Journal?



Fake Journals

A screenshot of the English Wikipedia homepage. At the top, there is a navigation bar with links for "Main Page", "Talk", "Read", "View source", and "View history". A search bar contains the query "annals of internal medicine", which is highlighted with a red rectangle. In the center, there is a welcome message: "Welcome to Wikipedia, the free encyclopedia that anyone can edit". Below the message are several categories: "Arts", "History", "Society", "Biography", "Mathematics", and "Technology".

Not logged in Talk Contributions Create account Log in

Main Page Talk Read View source View history annals of internal medicine

Welcome to Wikipedia,
the free encyclopedia that anyone can edit

- Arts
- Biography
- History
- Mathematics
- Society
- Technology

Not in Wikipedia → probably fake!

Can you always trust peer-reviewed articles?



Peer-reviewed paper?



Fake Journal?



Some reasons things may go wrong



- Graduate students and profs wanting to publish ⇒ “publish or perish”
- Research Funding Sources
- Difficulty getting ‘negative’ studies published



THE ORIGIN OF THE THESES

WWW.PHDCOMICS.COM

JORGE CHAM © 2009



Can you always trust peer-reviewed articles?



Peer-reviewed paper?



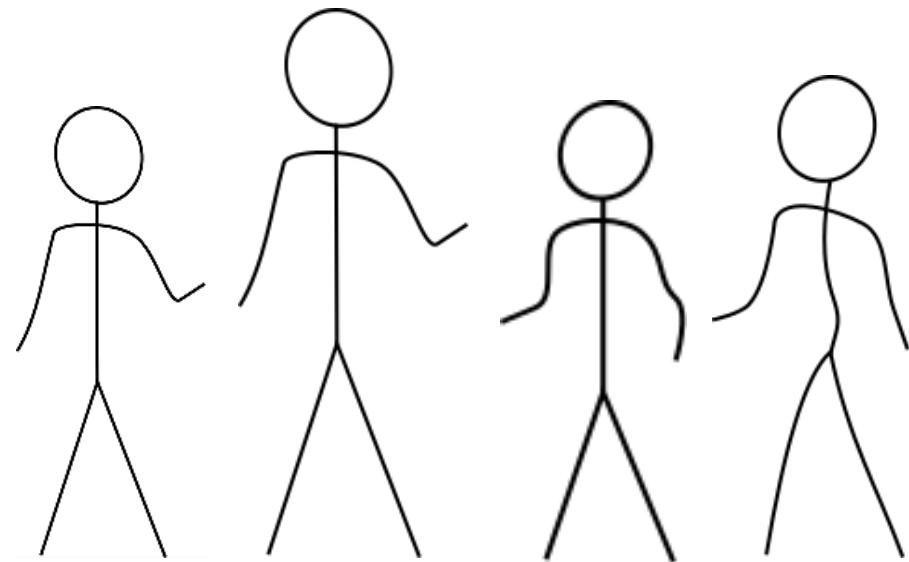
Fake Journal?



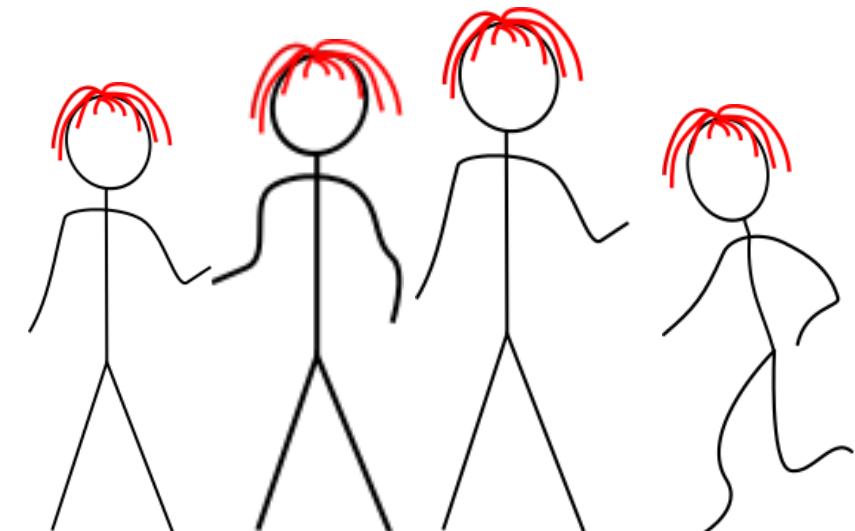
Meta-Analysis?
(study of studies)



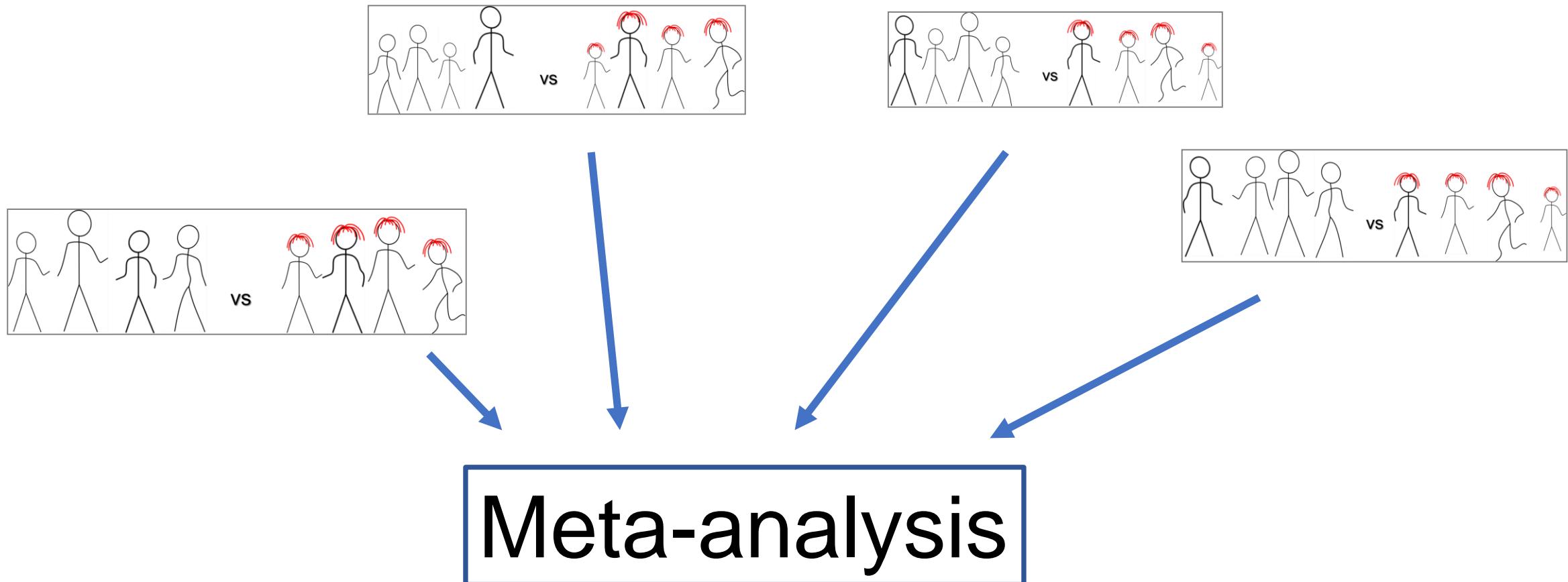
Meta-analysis: Example Study



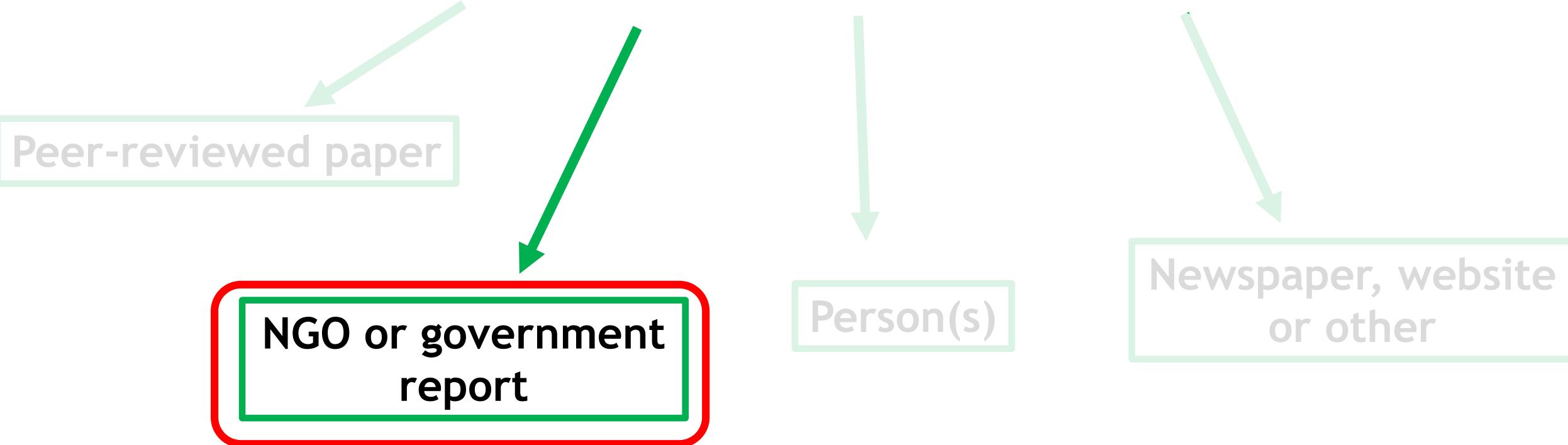
vs



Meta-analysis: Example Study



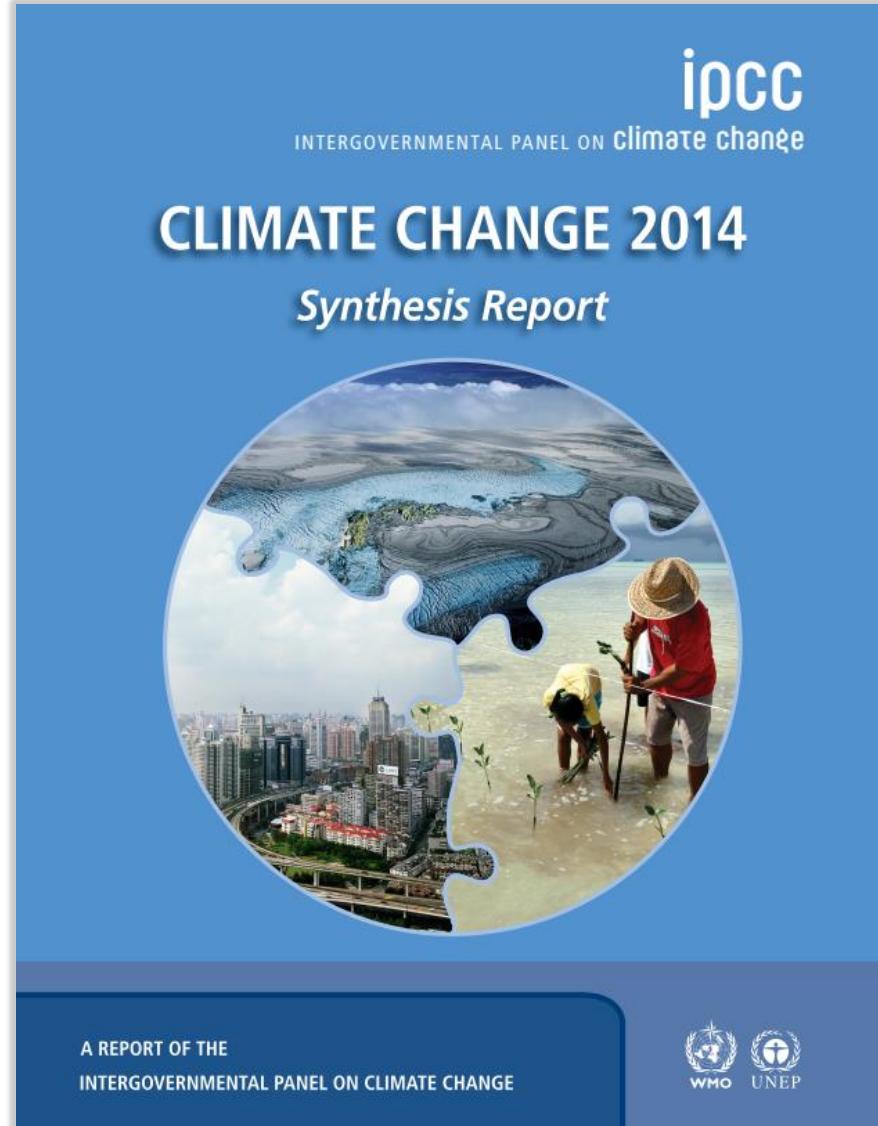
Who Said It?



Not peer-reviewed



IPCC Report



www.ipcc.ch/report/ar5/syr/



Reports



Report



Who said it?



Report



Are the authors experts?



IPCC Report: Who wrote it?



Climate Change 2014 Synthesis Report

Edited by

The Core Writing Team

Synthesis Report
IPCC

Rajendra K. Pachauri

Chairman
IPCC

Leo Meyer

Head, Technical Support Unit
IPCC

Core Writing Team

Rajendra K. Pachauri (Chair), Myles R. Allen (United Kingdom), Vicente R. Barros (Argentina), John Broome (United Kingdom), Wolfgang Cramer (Germany/France), Renate Christ (Austria/WMO), John A. Church (Australia), Leon Clarke (USA), Qin Dahe (China), Purnamita Dasgupta (India), Navroz K. Dubash (India), Ottmar Edenhofer (Germany), Ismail Elgizouli (Sudan), Christopher B. Field (USA), Piers Forster (United Kingdom), Pierre Friedlingstein (United Kingdom/Belgium), Jan Fuglestvedt (Norway), Luis Gomez-Echeverri (Colombia), Stephane Hallegatte (France/World Bank), Gabriele Hegerl (United Kingdom/Germany), Mark Howden (Australia), Kejun Jiang (China), Blanca Jimenez Cisneros (Mexico/UNESCO), Vladimir Kattsov (Russian Federation), Hoesung Lee (Republic of Korea), Katharine J. Mach (USA), Jochem Marotzke (Germany), Michael D. Mastrandrea (USA), Leo Meyer (The Netherlands), Jan Minx (Germany), Yacob Mulugetta (Ethiopia), Karen O'Brien (Norway), Michael Oppenheimer (USA), Joy J. Pereira (Malaysia), Ramón Pichs-Madruga (Cuba), Gian-Kasper Plattner (Switzerland), Hans-Otto Pörtner (Germany), Scott B. Power (Australia), Benjamin Preston (USA), N.H. Ravindranath (India), Andy Reisinger (New Zealand), Keywan Riahi (Austria), Matilde Rusticucci (Argentina), Robert Scholes (South Africa), Kristin Seyboth (USA), Youba Sokona (Mali), Robert Stavins (USA), Thomas F. Stocker (Switzerland), Petra Tschakert (USA), Detlef van Vuuren (The Netherlands), Jean-Pascal van Ypersele (Belgium)

www.ipcc.ch/report/ar5/syr/

dge.carnegiescience.edu/people/cfield



IPCC Report: Who wrote it?



Climate Change 2014 Synthesis Report

Edited by

The Core Writing Team

Synthesis Report
IPCC

Rajendra K. Pachauri

Chairman
IPCC

Leo Meyer

Head, Technical Support Unit
IPCC

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www.ipcc.ch/report/ar5/syr/

The screenshot shows the Carnegie Science Global Ecology website. At the top, there's a navigation bar with links for Home, About, News, People, Labs, Research, Calendars, Publications, and Supporting DGE. Below the navigation is a banner featuring three images of researchers in various settings: one in an office, one in a field, and one in a lab. To the right of the banner, the word "People" is written. Underneath the banner, there's a section titled "DGE Researcher Profile" with a photo of a man (Chris Field) and his contact information: Title: Director, Lab: Field, Phone: 650-319-8024, Email: cfield@ciw.edu, Curriculum Vitae. Below this is a "Research Summary" section containing a paragraph about Chris Field's research and career.

CARNEGIE SCIENCE | Global Ecology

Search Site:

Home About News People Labs Research Calendars Publications Supporting DGE

People

DGE Researcher Profile

 **CHRIS FIELD**

Title: Director
Lab: Field
Phone: 650-319-8024
Email: cfield@ciw.edu
[curriculum vitae](#)

Research Summary

Chris Field is the founding director of the Carnegie Institution's Department of Global Ecology and Melvin and Joan Lane Professor for Interdisciplinary Environmental Studies at Stanford University. Field's research emphasizes field and laboratory studies of impacts of climate change, from the molecular to the global scale. He was, from 2008 to 2015, co-chair of Working Group II of the Intergovernmental Panel on Climate Change, which led the effort on the IPCC Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (2012) and Working Group II contribution to the IPCC Fifth Assessment Report (2014). Field's research has been recognized with several American and international awards, including the Max Planck Research Award and the Roger Revelle Medal, and with election to learned societies, including the US National Academy of Sciences (2001). Field received his PhD from Stanford in 1981 and has been at the Carnegie Institution for Science since 1984.

dge.carnegiescience.edu/people/cfield





Report



Are the authors experts?





Report



Are the authors experts?



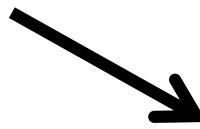
**Are they experts in
this topic?**



Scientific Experts



**The Whole Of
Science!**



**A Scientist's
expertise**





Report



Are the authors experts?



**Are they experts in
this topic?**



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www.ipcc.ch/report/ar5/syr/

The screenshot shows the Carnegie Science Global Ecology website. At the top, there's a navigation bar with links for Home, About, News, People, Labs, and Research. Below the navigation, there are two small images: one of a man in a striped shirt and another of a woman in a white lab coat. The main content area is titled "DGE Researcher Profile" and features a large photo of a man with a beard and glasses, identified as "CHRIS FIELD". To the right of the photo, his title is listed as "Title: Interdisciplinary Environmental Scientist" and his name is "CHRIS FIELD". Below the photo, there's a "Research Summary" section with a short bio. To the right of the bio, a large blue flask contains the text "Probably Good Science". On the far right, there's a sidebar with a "People" section and a "Supporting DGE" section.

Search Site:

Home | About | News | People | Labs | Research

DGE Researcher Profile

CHRIS FIELD

Title: Interdisciplinary Environmental Scientist

Lab: Climate and Ecosystem Sciences Division

Phone: (412) 268-2947

Email: cfield@carnegiescience.org

Research Summary

Chris Field is the founding Director of the Interdisciplinary Environmental Sciences Division at Carnegie Mellon University. He is a climate scientist whose research focuses on the role of climate change, from the physical system to society, in the Earth system. He is a member of the Intergovernmental Panel on Climate Change, and a lead author of the Fifth Assessment Report. His research has been recognized with the National Medal of Science, the Revelle Medal, and with election to the National Academy of Sciences and the American Academy of Arts and Sciences. He received his Ph.D. from Stanford in 1981 and has been a faculty member at Carnegie Mellon since 1985.

Probably Good Science

Search Site:

Home | About | News | People | Supporting DGE

People

Supporting DGE

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probablygoodscience.com/people/cfield



Who Said It?

Peer-reviewed paper

NGO or government report

Person(s)

Newspaper or website

Other



Who is this ‘scientist’?

U.S. News A WORLD REPORT NEWS » Sections Photos Best Countries Best States Healthiest Communities The Report

HOME / NEWS / POLITICS

Scientist: Carbon Dioxide Doesn't Cause Global Warming

Noted geologist says Earth needs more, not less, carbon dioxide to feed plant life.

By Paul Bedard, Staff Writer Oct. 7, 2009, at 4:15 p.m.

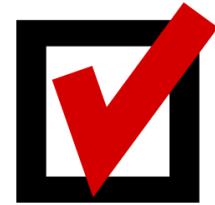
BY PAUL BEDARD, Washington Whispers

A noted geologist who coauthored the *New York Times* bestseller *Sugar Busters* has turned his attention to convincing Congress that carbon dioxide emissions are good for the Earth and don't cause global warming. **Leighton Steward** is on Capitol Hill this week armed with studies and his book *Fire, Ice and Paradise* in a bid to show senators working on the energy bill that the carbon dioxide cap-and-trade scheme could actually hurt the environment by reducing CO₂ levels.

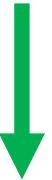
www.usnews.com/news/blogs/washington-whispers/2009/10/07/scientist-carbon-dioxide-doesnt-cause-global-warming



Who is this ‘scientist’?



Person(s)



Is he/she an expert?



USNEWS NEWS > Sections Photos Best Countries Best States Healthiest Communities The Report

HOME / NEWS / POLITICS

Scientist: Carbon Dioxide Doesn't Cause Global Warming

Noted geologist says Earth needs more, not less, carbon dioxide to feed plant life.

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H. Leighton Steward

Credentials

- Master of Science (Geology). [1]

Background

H. Leighton Steward is the President and Chairman of [Plants Need CO₂](#), a group founded in 2009 with the mission "to educate the public on the positive effects of additional atmospheric CO₂ and help prevent the inadvertent negative impact to human, plant and animal life if we reduce CO₂."

Plants Need CO₂ was listed as Number four among *Mother Jones's "Dirty Dozen of Climate Change Denial"* in December, 2009. [2]

He is the [Chairman](#) of the Institute for the Study of Earth and Man (ISEM) Board of Trustees, and was Vice Chairman of the American oil and gas company Burlington Resources, Inc. until his retirement in 2000.



Who is this ‘scientist’?

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Scientist: Carbon Dioxide Doesn't Cause Global Warming

Noted geologist says Earth needs more, not less, carbon dioxide to feed plant life.

By Paul Bedard, Staff Writer Oct. 7, 2009, at 4:15 p.m.

BY PAUL BEDARD, Washington Whispers

A noted geologist who coauthored the *New York Times* bestseller *Sugar Busters* has turned his attention to convincing Congress that carbon dioxide emissions are good for the Earth and don't cause global warming. **Leighton Steward** is on Capitol Hill this week armed with studies and his book *Fire, Ice and Paradise* in a bid to show senators voting on the energy bill that the carbon dioxide cap-and-trade scheme could actually hurt the environment by reducing CO₂ levels.



H. Leighton Steward

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- Master of Science (Geology) [1]

Not important

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Who is this ‘scientist’?



Person(s)



Is he/she an expert?

Who is this ‘scientist’?

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And ...has an agenda



Who is this ‘scientist’?

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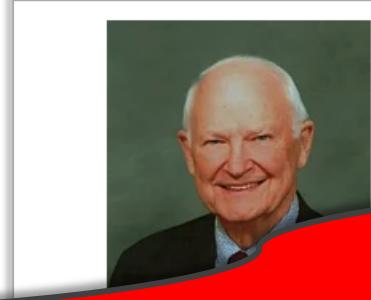
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Probably Bad Science!

of Science (Geology). [1]

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And ...has an agenda



Another Example



The Washington Post
Democracy Dies in Darkness

Energy and Environment

Trump meets with Princeton physicist who says global warming is good for us

By Chris Mooney January 13, 2017 [Email the author](#)

Yes, Donald Trump met with Al Gore. But on Friday, according to the Trump transition team, the president-elect also met with [William Happer](#), a Princeton professor of physics who has been a prominent voice in questioning whether we should be concerned about human-caused climate change.



Another Example



Person(s)



Is he/she an expert?

Another Example



Person(s)



Is he/she an expert?



Is this his/her
research field?



Expert in the correct field?

The Washington Post
Democracy Dies in Darkness

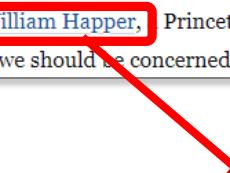
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**NOT AN EXPERT
in *this* field**



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William Happer

From Wikipedia, the free encyclopedia

This article is about the physicist. For the pro-wrestler, see William Murray Happer.

William "Will" Happer (born July 27, 1939^[1]) is an American physicist who has specialized in the study of atomic physics, optics and spectroscopy.^[2] He is the Cyrus Fogg Brackett^[3] Professor of Physics, Emeritus, at Princeton University,^[2] and a long-term member of the JASON advisory group,^[1] where he pioneered the development of adaptive optics. From 1991 to 1993, Happer served as director of the Department of Energy's Office of Science as part of the George HW Bush administration.





Person(s)



Is he/she an expert?



**Is this his/her
research field?**



Expert in the correct field?



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NOT AN EXPERT
in *this* field



Who Said It?

Peer-reviewed paper

NGO or government
report

Person(s)

Newspaper, website
or other



Agenda?



- Campaigning organization
- Political Party
- Newspaper
- Non-profit
- Company
- NGO

The screenshot shows the Greenpeace International website. The header is green with the "GREENPEACE" logo and "Greenpeace International" text. Below the header is a navigation bar with links for Home, About Us, What we do, News, Get involved, and a "Donate" button. A breadcrumb navigation path is visible below the navigation bar, showing Home > Publications > Campaign reports > Climate > Global Shift. The main content area features a large green title "Global Shift" followed by a green subtitle: "Countries and subnational entities phasing out existing coal power plants and shrinking the proposed coal power pipeline". At the bottom of the content area, the text "Publication - 18 October, 2017" is visible.



6-Steps to Tell Good Science from Bad



Step 1: Check our biases



Step 2: Is it important?



Step 3: Is it a big number?



Step 4: Is it a correlation?

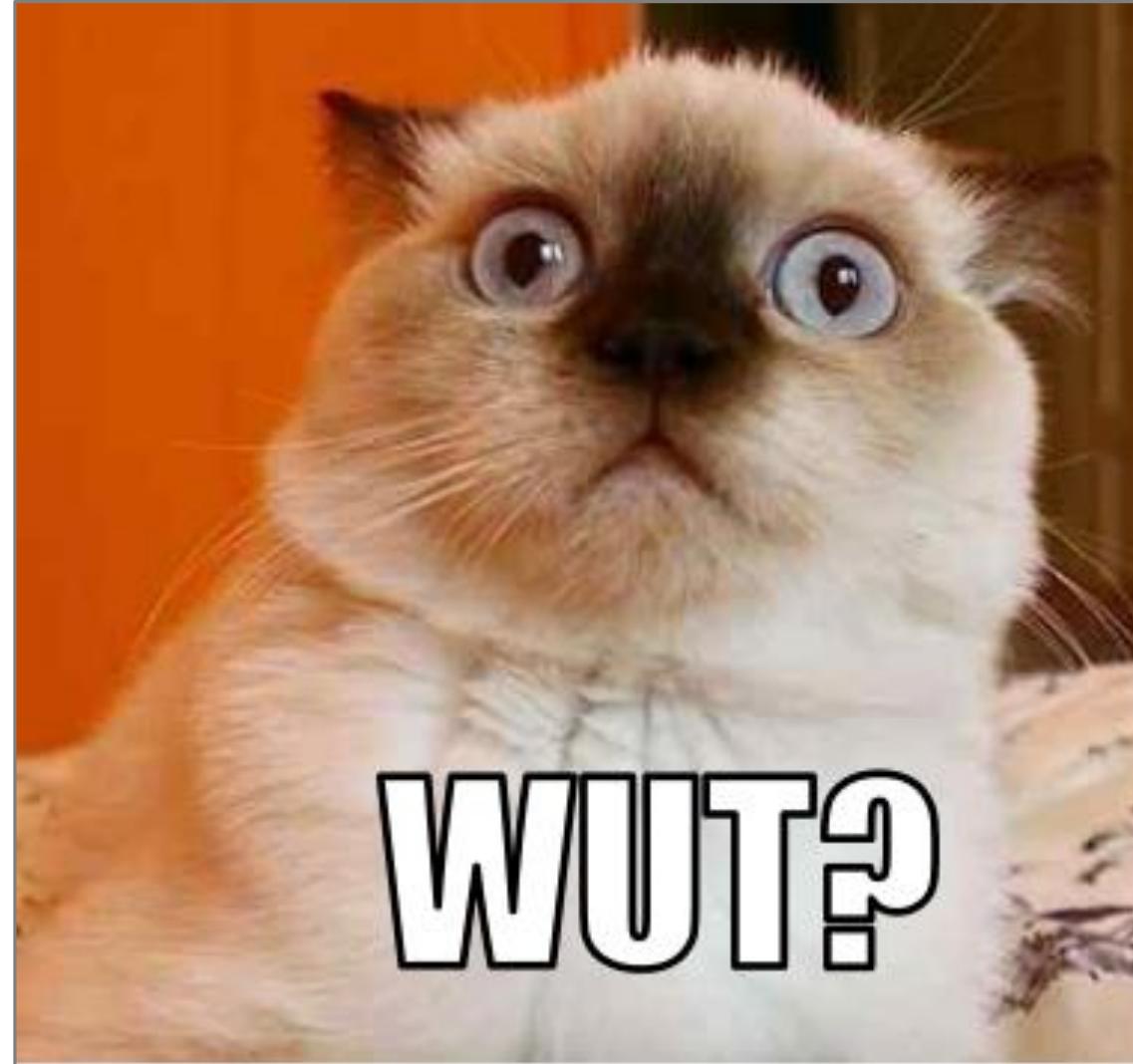


Step 5: Is it a prediction?

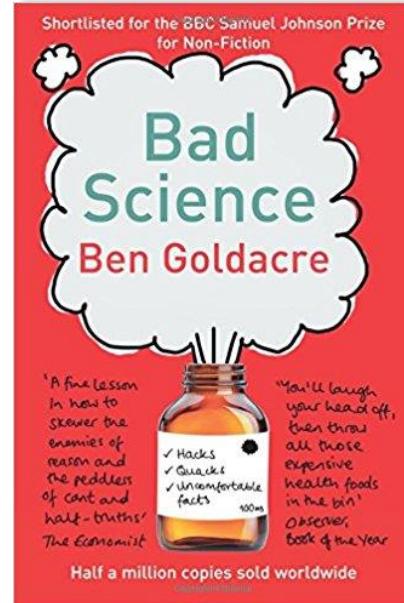
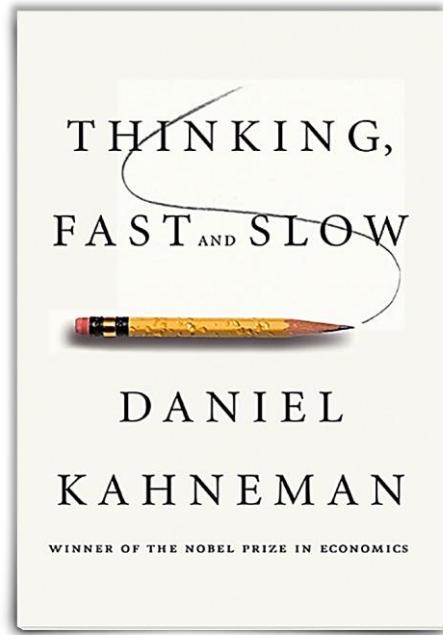


Step 6: Who said it?

Take Home Message!



Further Reading!



Podcasts!!

- More or Less: Behind The Stats (BBC)
- Science Vs. (Gimlet)
- Hidden Brain (NPR)

For more see: rvsharpe.github.io



Thanks to:
Ocean Wise Team
Stephanie Chong
Ladies Learning Code!
Terry McLeod (awesome volunteer!)

Remember:



Contact me!

ruth.sharpe@ocean.org
rvsharpe.github.io

