



# The Plausibility Trap

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<http://shipseducation.net/misinfo/plausibility.htm>



How well can you evaluate  
expert scientific claims  
on the internet  
or social media?

*Test yourself!*

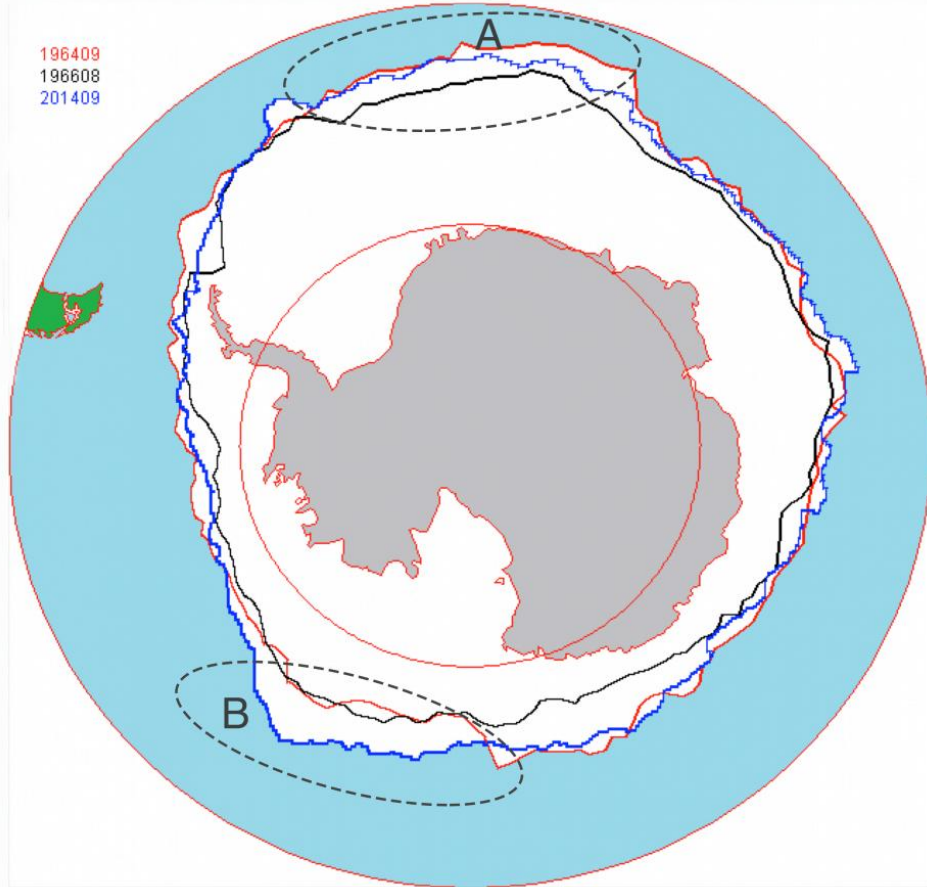
*...Ready?*



*Question #1:* Is global warming real?  
What about contradictory (or "falsifying") evidence?

# Antarctic Sea Ice Extent

September 2014 vs. September 1964 and August 1966



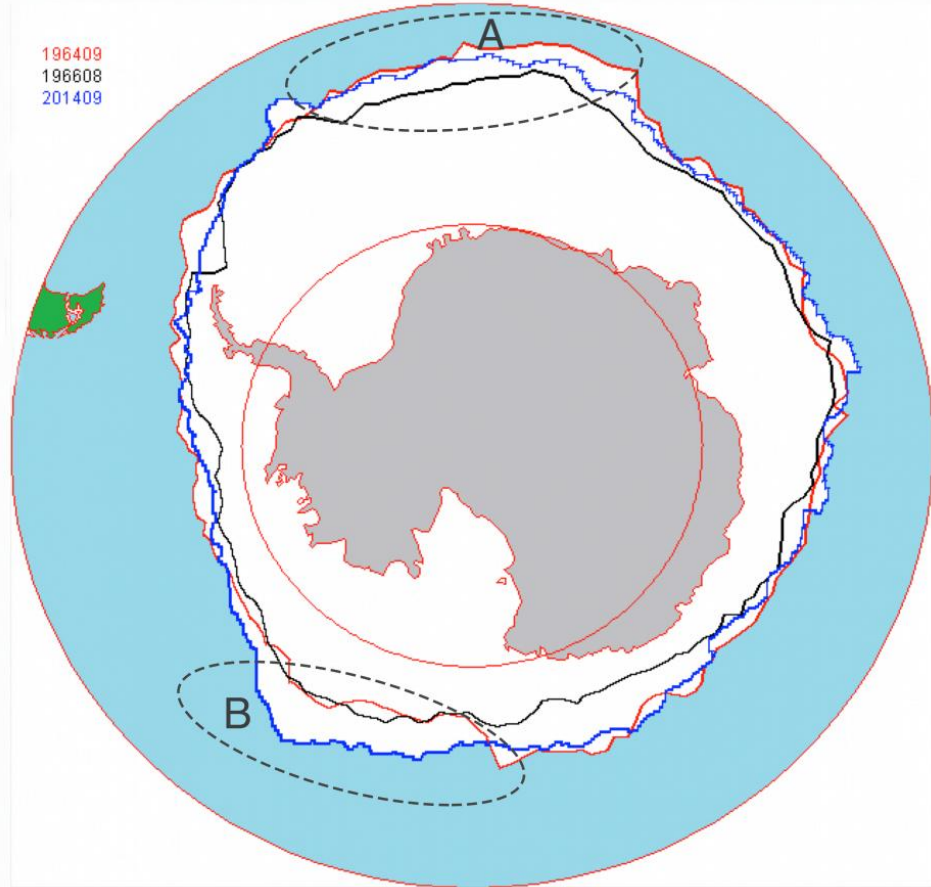
Comparison of historic maps shows that the extent of sea ice has *grown* in some cases (A and B in figure).

The planet can't really be warming if sea ice is *increasing!*

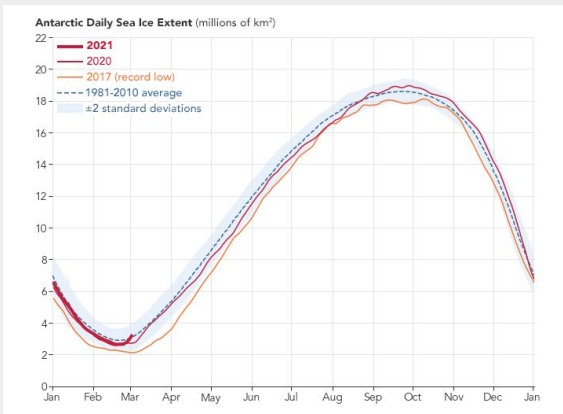
*Discuss?*

# Antarctic Sea Ice Extent

September 2014 vs. September 1964 and August 1966



Share your thoughts.

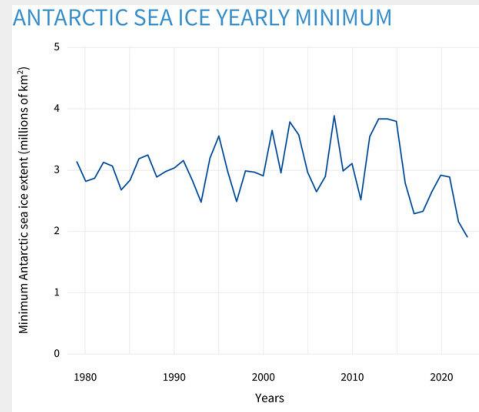


multi-year data: record lows

Here's what the expert climatologists say.

They do not rely on a few isolated comparisons. They look at the *overall pattern* of the data.

Looking across many years, the recent years show record lows in the extent of sea ice.



long-term trends

Nor do the experts compare only two different points in time. They analyze *trends*.

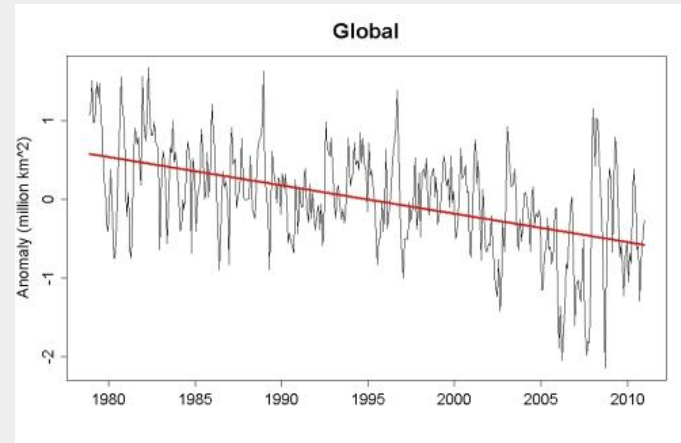
While the yearly minimum of sea ice varies from year to year, the overall trend is a decrease.



Climatologists do not limit themselves to observations from a few isolated locations.

They consider more complete, *global* data.

The trend of sea ice coverage around the world is decreasing.



more complete (global) data



Experts were curious about the puzzling increase in sea ice in particular years.

They considered *alternative explanations*.



Sea ice floats, and they learned that this can sometimes lead to more sea ice in some locations.

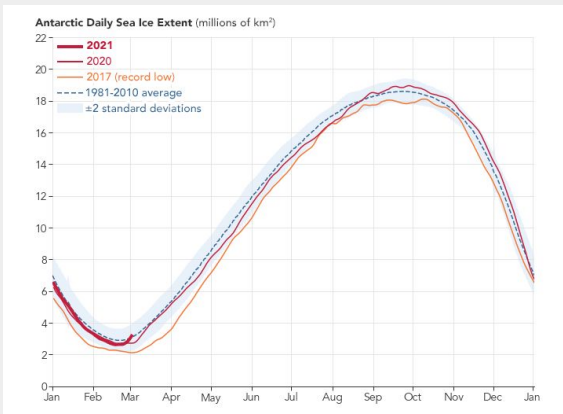
sea ice floats—feedback loops

Most importantly, scientists realized that surface coverage only allowed them to approximate the total sea ice (and thus of the true effects of temperature).

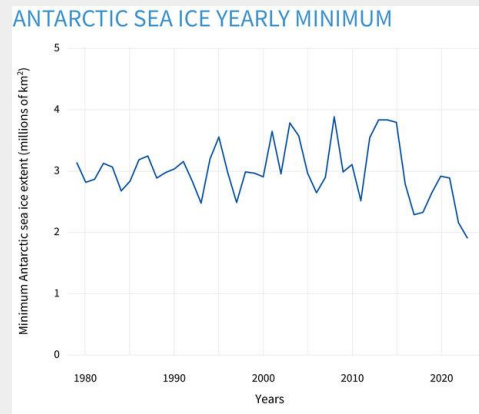
By studying *volume* (not area), they found loss of sea ice was more consistent.



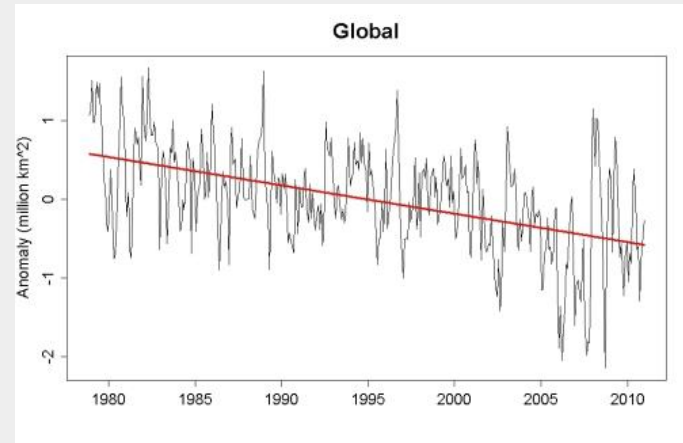
varied thickness (volume, not area)



multi-year data: record lows



long-term trends



more complete (global) data

Experts agree.



sea ice floats—feedback loops



varied thickness (volume, not area)

All this diverse evidence concurs.



Global warming is indeed real,  
based on multiple forms of evidence,  
as reflected in the consensus of the relevant experts.





But you are not an expert climatologist.  
When presented with the initial evidence about sea ice,  
how would you know to question it?



What do we learn from this case about plausibility, evidence, and expertise?



*Question #2:*

Are masks effective protection against the covid virus?



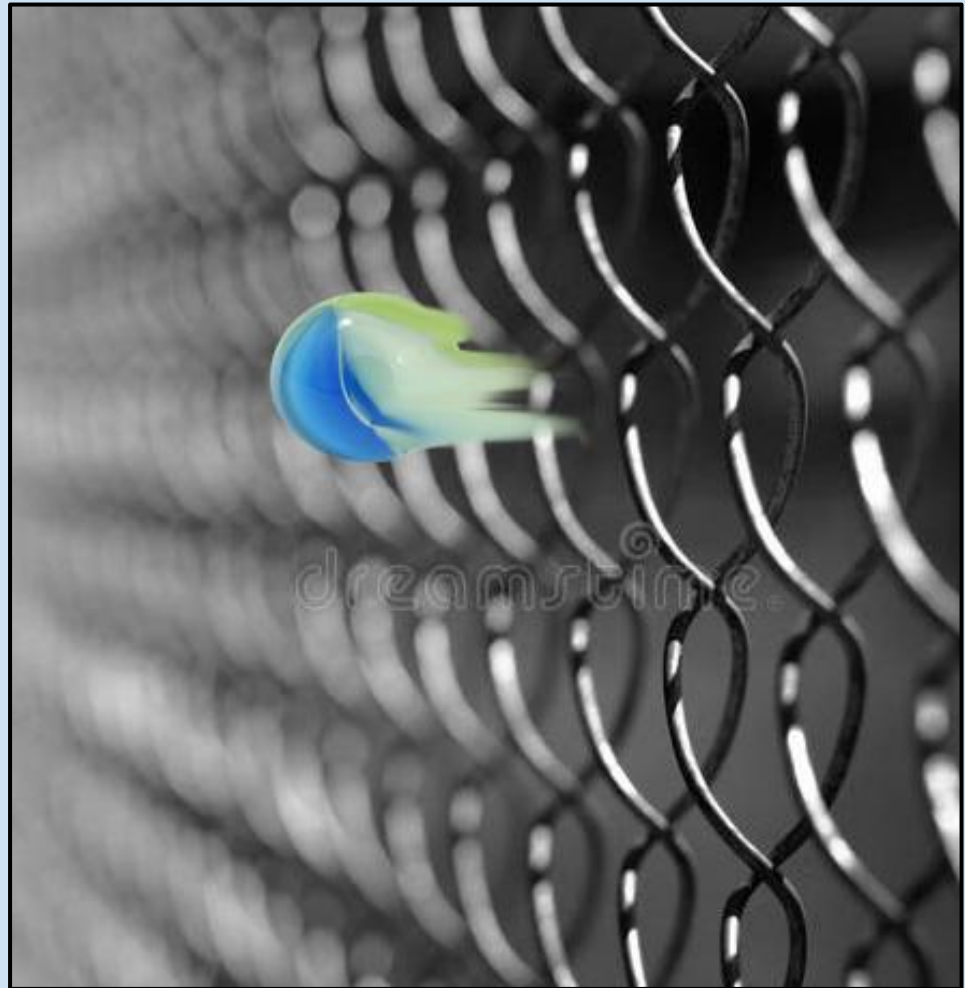
The virus size is  $<0.1$  micron.

The holes in an N95 mask are  $\sim 0.3$  microns.

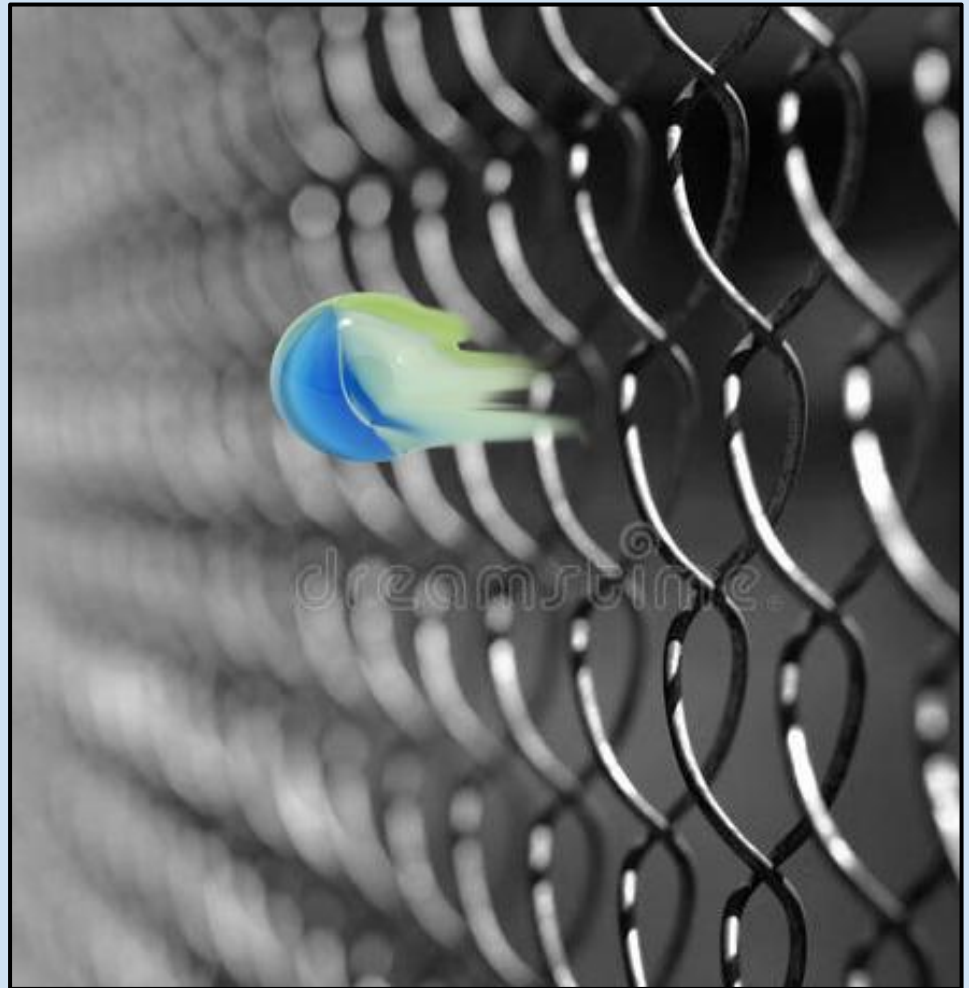
Therefore, the virus "will sail through the mask like a marble through a chain-link fence."

Safety claims by health officials are bogus, false reassurance!

*Discuss.*



Share your thoughts.





Experts, however, note that:

- The mask is a mesh, not a flat filter.
- N95 masks have electrostatic charge that attracts virus particles.
- There is turbulence.
- The virus is carried on (larger) fluid particles.



Yes, masks are effective protection against the covid virus, as reflected in the recommendations of health experts.





But you are not an expert in microphysics.  
When presented with the plausible argument,  
how can you even suspect that it is wrong?



What do we learn from this case about plausibility and expertise?



*Question #3:* How "green" are lawns?  
How do they contribute to the environment?



# ENVIRONMENTAL LAWN BENEFITS



## FRESH OXYGEN

A 5,000 sq ft grass lawn can produce enough fresh oxygen daily for 14-34 people.



## COOLING POTENTIAL

Lawns can be up to 60 degrees cooler than surrounding hardscapes.



## ABOVE GROUND BENEFITS

## BELOW GROUND BENEFITS

## SOIL ARTHROPODS

Managed lawns can host as many as 52 different arthropod families with over half of them representing beneficial insects.



## SOIL MICROBIOME

Grass lawns enhance soil microbial diversity when compared to bare soil and helps regulate microbial community composition.



## RAINFALL CAPTURE

A 5,000 sq ft grass lawn can capture between 2,000 and 27,000 gallons of water depending on soil type.

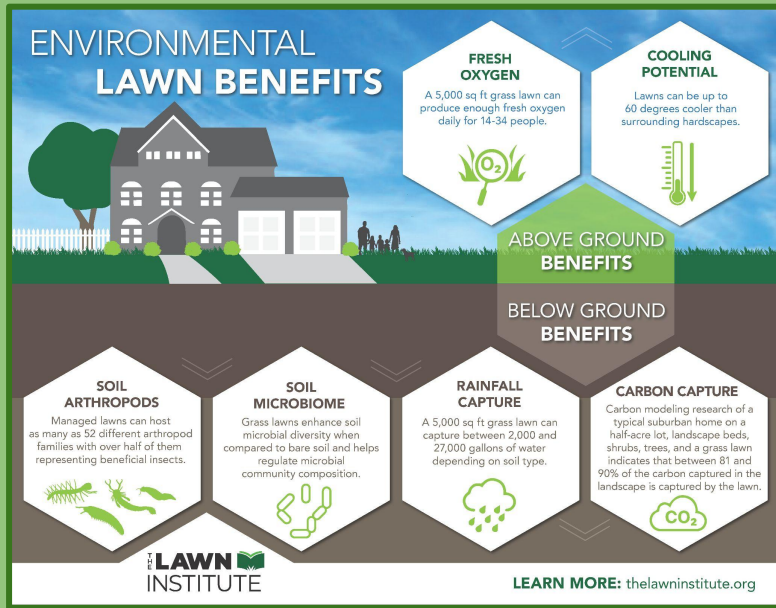


## CARBON CAPTURE

Carbon modeling research of a typical suburban home on a half-acre lot, landscape beds, shrubs, trees, and a grass lawn indicates that between 81 and 90% of the carbon captured in the landscape is captured by the lawn.

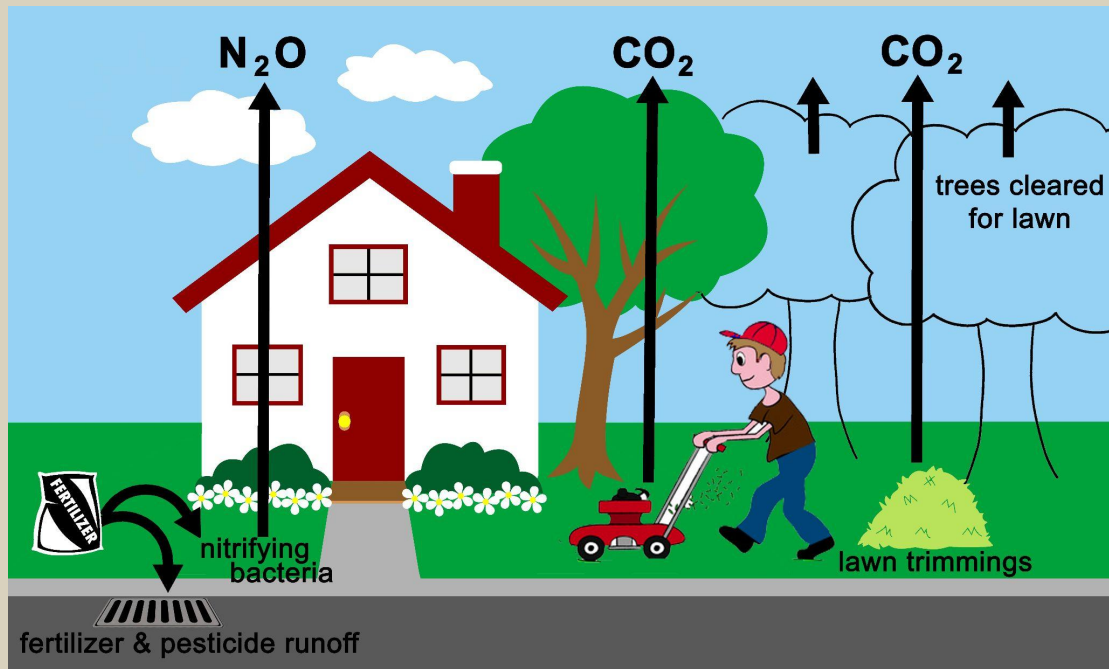


***Discuss.***



*Were you persuaded?*

- *Did you also consider **possible harms** (unstated)?  
– pesticides? weed-killers? lawn waste?*
- *Did you consider other landscaping **alternatives**?*
- *Did you consider asking "**who is the Lawn Institute**"?*



Experts note that *greenhouse gases* are produced by:

- rotting of lawn clippings & thatch
- loss of trees/shrubs cleared for the lawn
- lawn mower & other power equipment
- nitrifying bacteria from excess fertilizer (300X)



Grass lawns actually *contribute* to climate change.  
(They are *not* very "green," ecologists would say.)  
But if you are not an expert, how would you know that?

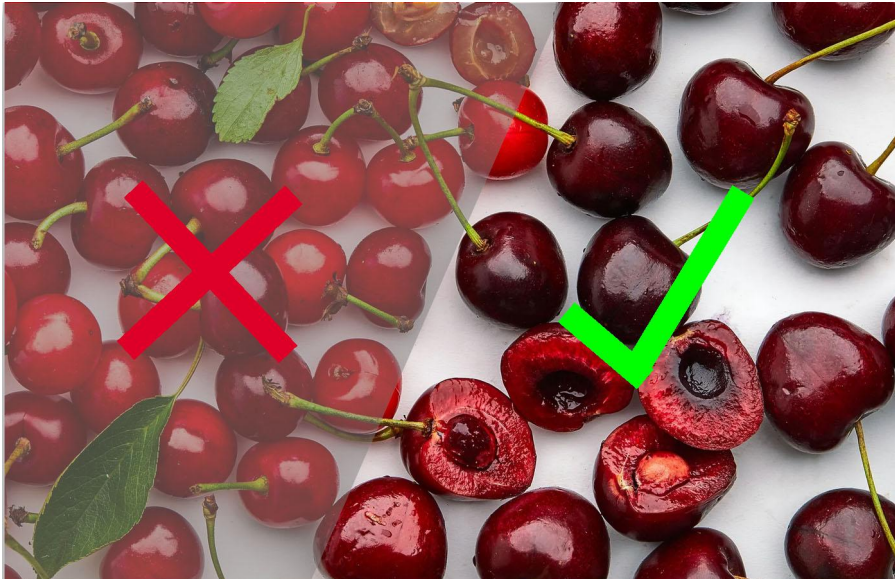


*Who is the Lawn Institute?* — an organization funded by the turfgrass industry. The "research" they fund is typically about marketing or turf production, not ecology. All the claims they presented here were selected from research by others.





What do we learn from this case about plausibility, evidence, and expertise?



Beautiful, but not much flavor



Dark red, good flavor



Dark purple/black, excellent flavor

Data can be  
***"cherry-picked"***

– and thus incomplete  
and misleading.

\*But only experts know  
about the missing evidence  
and can detect its absence.





Daniel Kahneman  
2002 Nobel Prize winner

Our brains are not ideal.  
One thinking tendency is:

**WYSIATI**

***"What You See Is All There Is"***

(Namely, we tend to only think about what is currently presented to us. We don't look for exceptions or imagine contrary examples.)



**If we are not experts,  
we are vulnerable to  
plausible arguments and  
cherry-picked evidence.**

**Just because it's plausible,  
*doesn't mean it's true.***

**That's:  
*The Plausibility Trap***

Image: Andy Moore cc2



**What strategies can you  
imagine to defend against  
The Plausibility Trap?**



Image: Andy Moore cc2



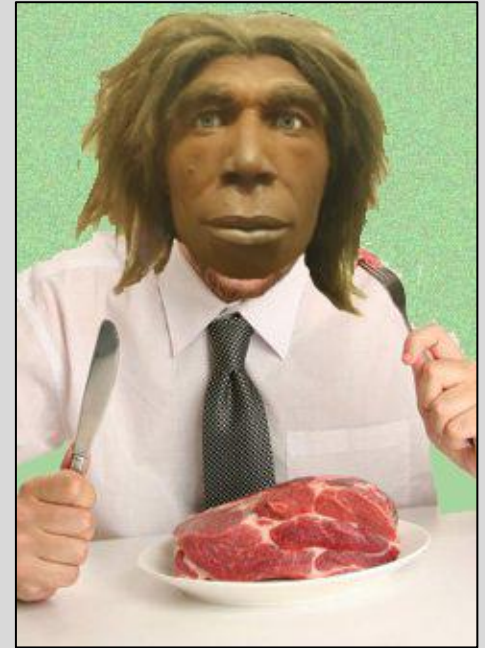


*Question #4:* What is the healthiest diet?



# Reasons for the "Paleo Diet"

- Our Paleolithic (Stone Age) ancestors were adapted to their environment – eating meat and fresh fruits and vegetables.
- Our enzymes have not had time to adapt to modern diets – based on cultivated grains and dairy products.

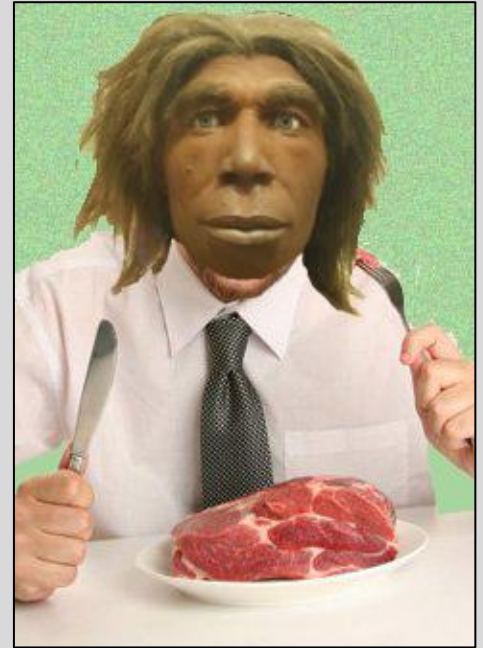


- We suffer from gluten & lactose intolerances and obesity, for example.
- Thus, an ancient diet is most "natural."

***Discuss.***

*Take some time:*

- *Imagine alternative explanations?*
- *Suggest how the evidence might be misleading?*



# PALEOFANTASY

WHAT EVOLUTION REALLY TELLS US  
ABOUT SEX, DIET, and HOW WE LIVE

MARLENE ZUK



What the expert researchers say:

- Ancestral diets varied.
- Each reflected the local environment.
- Enzyme regulation can evolve rapidly.
- Meat diets foster heart disease.
- Meat diets also contribute to climate change.





Verdict?: The Paleo Diet is an example of the naturalizing error – an effort to make a cultural value look "natural" and endorsed by science.

*But you need expertise to detect that.*

**To defend yourself against  
the Plausibility Trap,  
*you need expertise!***

Image: Andy Moore cc2







***Should you "Do Your Own Research" (DYOR) of scientific claims?***



*Discuss how each case shows that expertise is more important than stray bits of evidence or plausible arguments.*



**Who then should you trust, if not yourself?**





**the consensus of  
the relevant experts**



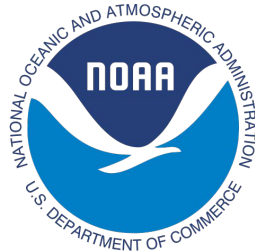
**scientific institutions that embody consensus**





World Health Organization

NATIONAL ACADEMY OF SCIENCES



National Institute of Allergy and Infectious Diseases



*Which scientific institutions do you know?*

***What have you learned  
about  
the Plausibility Trap?***

Image: Andy Moore cc2



# ***Escape the Plausibility Trap***

Find the trustworthy  
scientific institutions,  
and  
trust the consensus  
of the relevant experts.

Image: Andy Moore cc2

