

Communicating about Climate Change--attempt 2

INTRODUCTION

This experiment was set out to measure how effectively Georgetown students could be taught to think critically by responding to a highly contested scientific article (<https://www.wsj.com/articles/the-sea-is-rising-but-not-because-of-climate-change-1526423254>). Fred Singer's article was published May 15, 2018, in the opinion section of the Wall Street Journal. According to the Media Bias/Fact Check, the WSJ has a right-center political bias, which supports conservative causes more frequently than liberal causes. <https://mediabiasfactcheck.com/wall-street-journal/>. Fred Singer is an American physicist and emeritus professor of environmental science at the University of Virginia. In 2006, he was named as one of a minority of scientists said to be creating a stand-off on a consensus on climate change by the Canadian Broadcasting Corporation. He has also claimed that there is no evidence that global warming is attributable to human-induced increases in CO₂. The objective of this experiment was to find out whether a student's background and pre-existing biases would affect their capacity to pick out the deceptive elements embedded in the article.

METHODS

Two Georgetown students from very different backgrounds were voluntarily willing and able to help in conducting this experiment. Their identities will not be apparent nor reasonably ascertainable. The two subjects, which shall now be referred to as Subject A and Subject B, differed on gender, age, race, political orientation, and major. Subject A was a female, 20, white (Middle Eastern), liberal-leaning, studying Government. Subject B was a male, 21, black/latino, conservative-leaning, studying Mathematics. Both subjects were asked their opinions and thoughts on global warming and climate change before conducting the experiment and duly noted. Both subjects were given a clean version of the article and were asked to read it with no time restrictions. After that, the subjects were asked to freely make any comments on the article with no questions asked. Their comments were noted. Then, the examiner explained to the subjects the existence of fallacies, post-truth elements and statistical biases, and asked the subjects to analyze the article again. They were asked to highlight the article and indicate whether they were fallacies, statistical biases, or post-truth elements. Their marked copies were retained by the examiner for further examination.

PRELIMINARY FINDINGS

	Subject A	Subject B
Comments before the article was shown	<ul style="list-style-type: none"> - “Climate change is real and is supported by ample scientific evidence.” - “People should do more about global warming, starting with the government.” 	<ul style="list-style-type: none"> - “Climate change is real but it is not as threatening as they make it sound in the news.” - “We have been hearing about global warming for many years but the changes have not really affected the US.”
Observations	The preliminary comments demonstrate a very different worldview by both subjects. Subject A is more receptive to scientific information and global patterns, whereas Subject B is more US-centric and sceptical about the science around global warming.	
Comments after reading the article	<ul style="list-style-type: none"> - Confusing: “glaciers are melting” has to do with global warming, right? - Argument is somewhat contradictory - Title can be sensational or deceptive 	<ul style="list-style-type: none"> - Can’t argue with the data presented. - Factual evidence correlates with his argument. - Understandable - WSJ is a reliable source
Observations	Subject A was more skeptical about the article than Subject B. Their comments were mainly around the argument and its soundness. Their comments did not pick on particular elements of the reading precisely, which suggested the subjects were not thinking too critically about the deceptive reasoning strategies used by the author.	

HELPING THE SUBJECTS THINK MORE CRITICALLY

The preliminary questions served to understand the worldview of both subjects in order to approach them appropriately to help them think more critically and pick apart the argument of the article. Based on Cook & Lewandowsky’s *Debunking Handbook*, the subjects were approached differently to avoid *backfire effects*.

Subject A was identified as a person more willing to accept that the article was misleading. She was given a list of definitions (in the Appendix) and requested to underline examples of such uses in the article. Her annotations were recorded (in the Appendix). She was not requested to identify each type of logical fallacy or statistical bias but only the method of deception.

Subject B, however, was identified as a person who was less receptive about global warming information. According to the *Debunking Handbook*, effective myth-debunking requires three elements:

- The refutation must focus on core facts rather than the myth to avoid the misinformation becoming more familiar.
- Any mention of a myth should be preceded by explicit warnings to notify the reader that the upcoming information is false.
- The refutation should include an alternative explanation that accounts for important qualities in the original misinformation.

Before teaching him the methods of deception, he was encouraged to navigate NASA's website to learn about NASA's results for sea-level rise, and also encouraged to google Fred Singer on his own. By relying on NASA's data, the subject would i) focus on the core facts rather than the myth, ii) was made aware of the author's unreliability by the rest of the scientific community, and iii) NASA's website contains an explanation for sea level rise that accounts for global warming. After that, he was given the same list of definitions and asked to underline examples of the deceptive methods in the article. He was not requested to identify each type of logical fallacy or statistical bias but only the method of deception.

FINDINGS

Subject A identified more deceptions than **Subject B**. The researcher had identified at least 15 examples of deceptions in the article, some of which could count for more than one method of deception. For example, "By 2100 the seas will rise for another 6 inches or so – a far cry from Al Gore's alarming numbers," accounts for both a fallacy (Ad Hominem) and statistical bias, based on different numbers shown on peer-reviewed articles – "Beyond the likely range, a recent review by the US National Oceanic and Atmospheric Administration (NOAA) identifies evidence in support of a physically plausible GMSL rise in the range of 2.0 to 2.7 m by 2100."¹ Despite the overlaps, 15 examples was considered the maximum available. The subjects were asked if their worldview was challenged and were requested to rate how challenging the task was (1-10; 10=very challenging).

Subject A identified 10 examples correctly. She rated the task with a 3/10, an "easy" measurement. It could be implied that because her worldview was not challenged and she was inclined to look for examples that confirm her worldview, she performed better.

¹ <https://www.nature.com/articles/s41598-018-25410-y>

Subject B identified 6 examples correctly. He rated the task 4/10, a “fairly easy” measurement. It could be implied that Subject B was a bit more challenged to go against his pre-existing beliefs and was less inclined to find more examples that disagree with his worldview.

CONCLUSION

The experiment showed that Subject A was more capable of picking out examples of deception from the article than Subject B. It was also shown that both subjects were capable of using some critical thinking tools to re-analyze the article. Both subjects found it easy to undertake this task. Given the uncontrolled variables in this experiment, it is impossible to attribute Subject A’s success over Subject B to any of the identity traits such as gender, age, major, and political orientation with a significant level of certainty. Nevertheless, given the nature of the article and the politicization of global warming, it is possible that the political orientation carries more weight than, for example, the major studied in a bivariate analysis. Further research should look more closely into the relationship between political orientation and the quick learning capacity to effectively pin-point deceptions in an argument. This research should definitely involve more than two subjects and control the variables better (!).

APPENDIX

1. Article

- [OPINION](#)
- [COMMENTARY](#)

The Sea Is Rising, but Not Because of Climate Change

There is nothing we can do about it, except to build dikes and sea walls a little bit higher.

[772 Comments](#)

By

Fred Singer

May 15, 2018 6:27 p.m. ET



Ice crevasses near the coast of West Antarctica. PHOTO: MARIO TAMA/GETTY IMAGES

Of all known and imagined consequences of climate change, many people fear sea-level rise most. But efforts to determine what causes seas to rise are marred by poor data and disagreements about methodology. The noted oceanographer Walter Munk referred to sea-level rise as an “enigma”; it has also been called a riddle and a puzzle.

It is generally thought that sea-level rise accelerates mainly by thermal expansion of sea water, the so-called steric component. But by studying a very short time interval, it is possible to sidestep most of the complications, like “isostatic adjustment” of the shoreline (as continents rise after the overlying ice has melted) and “subsidence” of the shoreline (as ground water and minerals are extracted).

I chose to assess the sea-level trend from 1915-45, when a genuine, independently confirmed warming of approximately 0.5 degree Celsius occurred. I note particularly that sea-level rise is not affected by the warming; it continues at the same rate, 1.8 millimeters a year, according to a 1990 review by Andrew S. Trupin and John Wahr. I therefore conclude—contrary to the general wisdom—that the temperature of sea water has no direct effect on sea-level rise. That means neither does the atmospheric content of carbon dioxide.

This conclusion is worth highlighting: It shows that sea-level rise does not depend on the use of fossil fuels. The evidence should allay fear that the release of additional CO₂ will increase sea-level rise.

But there is also good data showing sea levels are in fact rising at a constant rate. The trend has been measured by a network of tidal gauges, many of which have been collecting data for over a century.

The cause of the trend is a puzzle. Physics demands that water expand as its temperature increases. But to keep the rate of rise constant, as observed, expansion of sea water evidently must be offset by something else. What could that be? I conclude that it must be ice accumulation, through evaporation of ocean water, and subsequent precipitation turning into ice. Evidence suggests that accumulation of ice on the Antarctic continent has been offsetting the steric effect for at least several centuries.

It is difficult to explain why evaporation of seawater produces approximately 100% cancellation of expansion. My method of analysis considers two related physical phenomena: thermal expansion of water and evaporation of water molecules. But if

evaporation offsets thermal expansion, the net effect is of course close to zero. What then is the real cause of sea-level rise of 1 to 2 millimeters a year?

Melting of glaciers and ice sheets adds water to the ocean and causes sea levels to rise. (Recall though that the melting of floating sea ice adds no water to the oceans, and hence does not affect the sea level.) After the rapid melting away of northern ice sheets, the slow melting of Antarctic ice at the periphery of the continent may be the main cause of current sea-level rise.

All this, because it is much warmer now than 12,000 years ago, at the end of the most recent glaciation. Yet there is little heat available in the Antarctic to support melting.

We can see melting happening right now at the Ross Ice Shelf of the West Antarctic Ice Sheet. Geologists have tracked Ross's slow disappearance, and glaciologist Robert Bindschadler predicts the ice shelf will melt completely within about 7,000 years, gradually raising the sea level as it goes.

Of course, a lot can happen in 7,000 years. The onset of a new glaciation could cause the sea level to stop rising. It could even fall 400 feet, to the level at the last glaciation maximum 18,000 years ago.

Currently, sea-level rise does not seem to depend on ocean temperature, and certainly not on CO₂. We can expect the sea to continue rising at about the present rate for the foreseeable future. By 2100 the seas will rise another 6 inches or so—a far cry from Al Gore's alarming numbers. There is nothing we can do about rising sea levels in the meantime. We'd better build dikes and sea walls a little bit higher.

Mr. Singer is a professor emeritus of environmental science at the University of Virginia. He founded the Science and Environmental Policy Project and the Nongovernmental International Panel on Climate Change.

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2. Definition list available to subjects:

Statistical Bias:

A statistical method where a measured value over- or under-estimates a population parameter. There are several types of statistical bias, some of them are:

- Selection bias: where the sample selected is unrepresentative of the whole population.
- Observer bias: when the scientist or researcher involves his or her expectations into the research, like “cherry picking” data.

Post-truth (according to Cambridge Dictionary): relating to a situation in which people are more likely to accept an argument based on their emotions and beliefs, rather than one based on facts.

Fallacies:

A logical fallacy is a mistake in reasoning that makes an argument invalid. This is a shortlist of common informal fallacies:

- Appeal to ignorance: The argument tries to assert that because we do not know something, then there is a chance of it being true.
- Hasty Generalization: General statements that lack enough evidence to support them
- Red Herring: A distraction from an argument that seems relevant but is not.
- Ad Hominem: It is an insult against the source of information based on something not directly related to their credentials. For example, their worldview or physical appearance.
- Appeal to authority: Authorities are misused and cited to support a claim.

3. Page 1 of Subject A's annotations

The Sea Is Rising, but Not Because of Climate Change
There is nothing we can do about it, except to build dikes and sea walls a little bit higher.

By Fred Singer
May 15, 2018 6:27 pm ET

Of all known and imagined consequences of climate change, **many people fear sea level rise most**. But efforts to determine what causes seas to rise are marred by poor data and disagreements about methodology. **Therefore, oceanographic water level** referred to sea level rise as an **illusion that has been called a riddle and a puzzle**.

It is generally thought that sea-level rise accelerates mainly by thermal expansion of sea water, the so-called steric component. But **by studying a very short time interval**, it is possible to sidestep most of the complications, like “isostatic adjustment” of the shoreline (as continents rise after the overlying ice has melted) and “subsidence” of the shoreline (as ground water and minerals are extracted).

In line to assess the sea-level trend from 1915-45, when a genuine, independently confirmed warming of approximately 1.5 degrees Celsius occurred, I note particularly that sea-level rise is not affected by the warming; it continues at the same rate, 1.8 millimeters a year, **according to a 1964 review by Andrew S. Tomlin and John White**. **Therefore conclude—contrary to the general wisdom—that the temperature of sea water has no direct effect on sea-level rise**. That means neither does the atmospheric content of carbon dioxide.

This conclusion is worth highlighting: **it shows that sea-level rise does not depend on the use of fossil fuels**. The evidence should allay fear that the release of additional CO2 will increase sea-level rise.

Handwritten annotations:
→ post-truth (pointing to "many people fear sea level rise most")
→ fallacy (pointing to "Therefore, oceanographic water level")
→ fallacy (pointing to "referred to sea level rise as an illusion that has been called a riddle and a puzzle")
→ s. bias (pointing to "by studying a very short time interval")
→ s. bias (pointing to "according to a 1964 review by Andrew S. Tomlin and John White")
→ fallacy (pointing to "Therefore conclude—contrary to the general wisdom—that the temperature of sea water has no direct effect on sea-level rise")
→ fallacy (pointing to "it shows that sea-level rise does not depend on the use of fossil fuels")

4. Page 1 of Subject B's annotations


This story is for your pleasure, not enlightenment. See why on www.dailymail.com
http://www.dailymail.com
https://www.wsj.com/articles/the-sea-is-rising-but-not-because-of-climate-change-1526423254

OPINION | COMMENTARY

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ICE SHELVES NEAR THE COAST OF WEST ANTARCTICA. PHOTO: MARIO TAMAGUETTY/IMAGES

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It is generally thought that sea-level rise accelerates mainly by thermal expansion of sea water, the so-called steric component. But by studying a very short time interval, it is possible to sidestep most of the complications, like "isostatic adjustment" of the shoreline (as continents rise after the overlying ice has melted) and "subsidence" of the shoreline (as ground water and minerals are extracted).

I chose to assess the sea-level trend from 1915-45, when a genuine, independently confirmed warming of approximately 0.5 degree Celsius occurred. I note particularly that sea-level rise is not affected by the warming; it continues at the same rate, 1.8 millimeters a year, according to a 1990 review by Andrew S. Trupin and John Wahr. I therefore conclude—contrary to the general wisdom—that the temperature of sea water has no direct effect on sea-level rise. That means neither does the atmospheric content of carbon dioxide.

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<https://www.wsj.com/articles/the-sea-is-rising-but-not-because-of-climate-change-1526423254>

Handwritten annotations:
- "very short time interval" is possible to sidestep most of the complications... (circled)
- "fallacy" with an arrow pointing to "methodology"
- "steric" with an arrow pointing to "steric component"
- "sea level rise" with an arrow pointing to "sea-level rise"
- "1.8 millimeters a year" with an arrow pointing to "1.8 millimeters a year"