Communicating about Climate Change--attempt 4

Introduction and Methods:

This paper will report on a statistically insignificant experiment I conducted with two willing participants. In this experiment, I wanted to observe how my subjects would critically analyze a controversial graph (figure 1) that exhibited weak data representation. I chose this graph not only because the data is misrepresented but also because climate change is one of the most pressing issues that humanity is facing, and will continue to face in the coming years. I thought that while educating my subjects on proper data usage I could also debunk a common climate change deniers' myth. To test their understanding, I asked them simply "what do you think about the story this graph is try to tell? Is it successful and is it correct?". The correct interpretation is that the graph should not have the y-axis scaled from 0 to 100, as it makes it difficult to interpret single degree temperature changes, which can have large climatological impact.

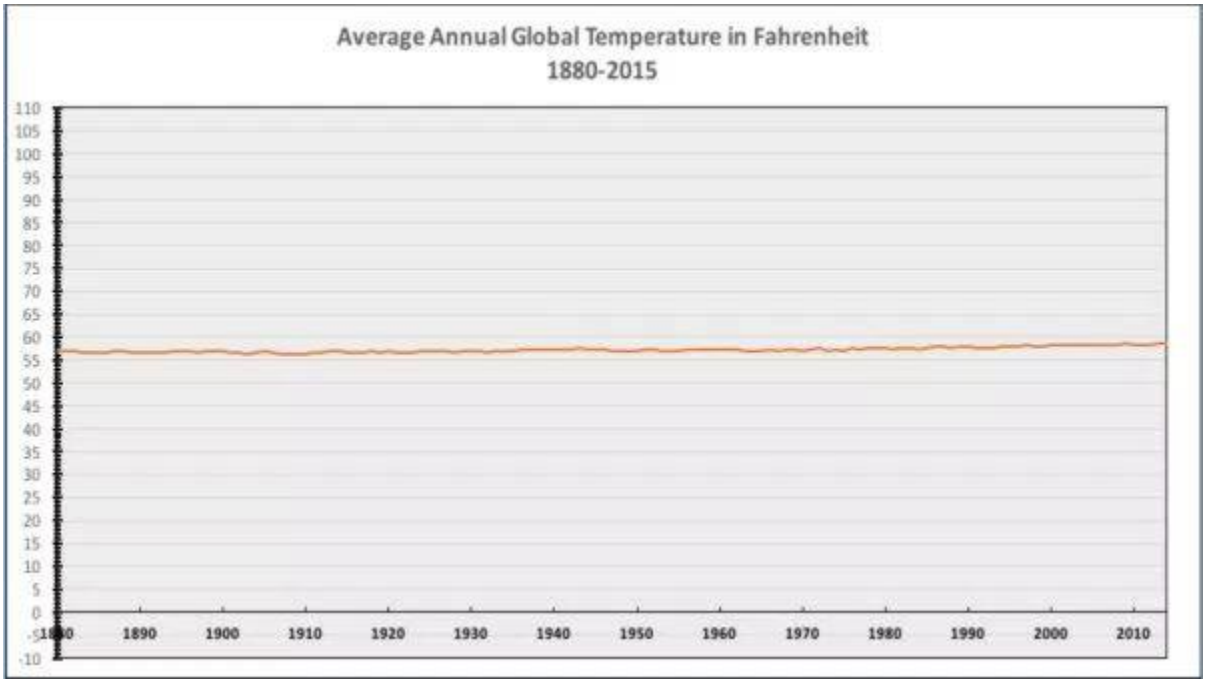

Figure 1. NASA global temperature data graphed by Power Line blogger.

Results

Person #1

- Male, 56 years old, republican, surgeon.
- Thought this was a good representation of the data
- Proof of how media lies to us about climate change
- They wanted to see data extending even further back in time
- Went on a rant about how scientists lie for money all the time

Person #2

- Female, 52 years old, democrat, social worker.
- Thought this representation seemed wrong but didn't know why
- Noticed very slight upwards trend near the end of the graph
- Thought this graph was trying to deceive people
- As they thought about it they realized that the graph should zoom in to show finer deviation from average temp
- They knew that 5 degrees of warming was severe, so that should should be the upper bound above average

Discussion:

I made a similar graph (figure 2) that they might be more familiar with to see if they could recognize the issue with this one. I asked them if they thought the patient would be sick, and if this graph was useful to doctors.

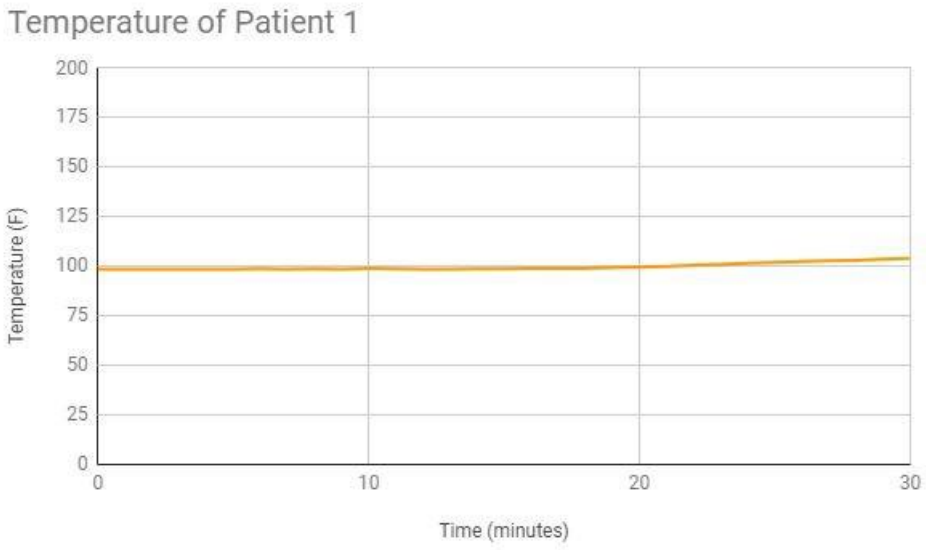

Figure 2. Graph made showing a made-up patient's temperature rise critically over the course of 30 minutes

Both saw the issue with graph and remarked that small changes in body temperature can be fatal and that it is hard to see on the graph how high the patient's fever is. I stated (based on our data visualization lesson) that line graphs do not need to show 0 on the y axis, especially if small changes in value denote big effects to the system. I then showed them a better graph (figure 3) and asked if they could see why it was better.

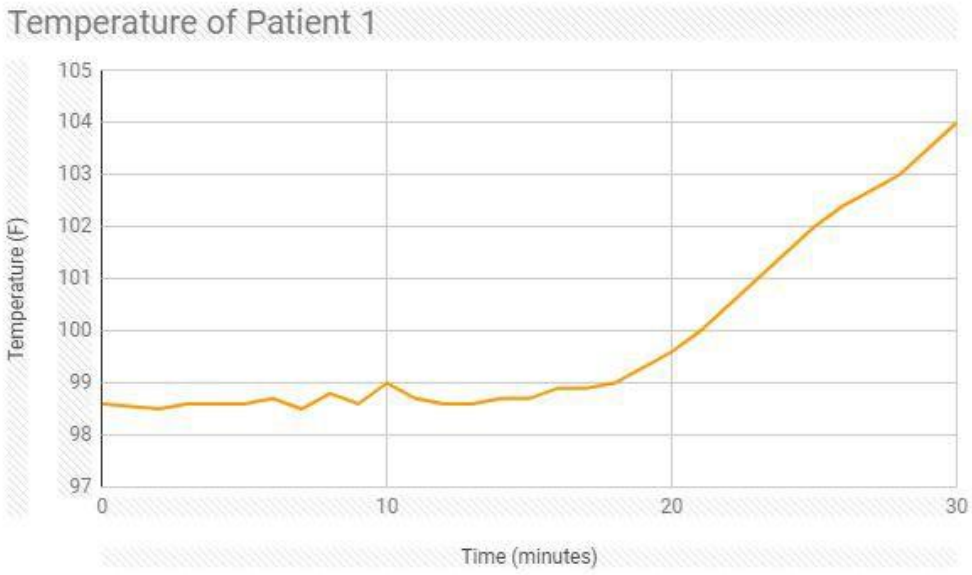

Figure 3. Graph showing the same data as figure 2, with more appropriate y axis scaling.

Both understood that the figure 3 showed finer changes in body temperature. Person 2 already saw the flaws with the figure 1, but subject 1 only seemed to understand after I had shown them this example. He still had trouble verbally admitting that figure 1 was an example of bad visual representation however. He was aware that figure 3 was better than figure 2, but when the conversation came back to figure 1 he would get sidetracked questions about data collection or anecdotes about scientific faults in the past. I remarked to both people that it is important to accept data only after we have critically thought about what it is saying and how it is portrayed. When we interpret data we are acting as scientists, and the job of a scientist is to prove everything wrong that you possibly can. Ask the hardest possible questions you can of what is being presented, and only then can you think about accepting it. Subject 2 was completely convinced and it seemed the use of figure 2 and 3 helped her solidify her critical analysis of line graphs. Subject 1 on the other hand kept walking back and forth between accepting the conclusion and doubting scientists. At the end of the night he had completely reversed all gains made, and asserted that the lower bound on the y axis should always be 0, regardless of the data set.

Conclusion:

While this is not a statistically significant experiment and no conclusions should be taken away from it, it is still interesting how difficult it can be to change a person's mind once they had accepted a premise. Subject 2 immediately knew something was wrong with figure 1 even before she had scrutinized it. Why? Subject 1 had trouble accepting a fundamentally logical conclusion about data visualization even after being presented with strong, unbiased evidence. Why? When people have worldview, and their lives are built around it, it is not easy to change even when the facts demand that change.