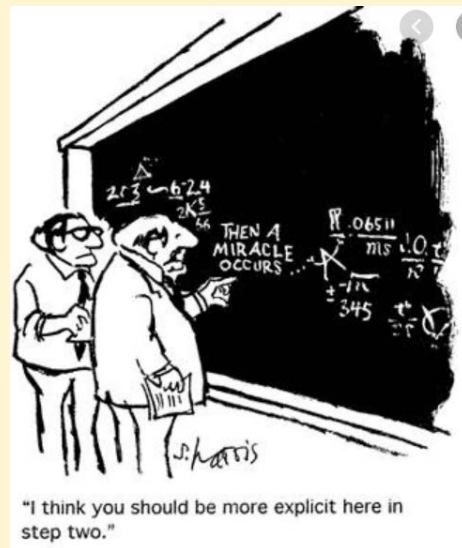# PROOF THAT PANDEMICS ARE NOT FUNNY

It is time to get real about another word: Proof. It has a narrow and technical meaning in logic, philosophy and mathematics. PLEASE do NOT use this word casually. (Note to the media - THIS MEANS YOU!!!) If you do not want to read the rest of this, fine, just promise to never use this word and we will all be better off.

Below you will see a snippet of a formal proof. There are LOTS of pages on the internet which describe this process, obviously some better than others. It is helpful to read pages at Wikipedia for "proof," "deductive reasoning," and "inductive reasoning."

A proper proof is the conclusion of a sequence of irrefutable statements which follow from First Principles (axioms that are not subject to debate). The classic first-day-of-logic-class example is: *True or false: All men are mortal. Socrates is a man. Therefore, Socrates is mortal*. To make a point, let's revise this as follows, *True or false: All men are mortal. MSNBC tells us the coronavirus is spreading. Therefore, we are all going to die of the coronavirus. Tomorrow*.

> Bloomberg spent $500 million on ads. The U.S. population is 327 million. He could have given each American $1 million and still have money left over. I feel like a $1 million check would be life-changing for most people. Yet he wasted it all on ads and STILL LOST.
>
> 11:30 PM · Mar 3, 2020 · Twitter for iPhone

On March 6, 2020 MSNBC anchor Brian Williams and New York Times writer Mara Gay spoke with outrage about this twitter post which they both emphatically represented as true. The video is worth seeing. If the link here is gone just Google the names of the two geniuses with the words "math blunder." I am encouraged that it has been viewed millions of times but depressed that less than a dozen people will read this far to find out why it is wrong. But that is another story.

On March 27, 2020 the President signed a $2 trillion stimulus package. Brian Williams thinks that means everyone in America gets a trillion dollars. OK, now I am just being silly.

Or am I? Let's see if the questionable conclusion that we are all going to die of coronavirus is not just a mistake brought to you by the same brilliant folks but is *in fact also the same mistake*. When did you first hear the word "fraction"? For me it was the 2nd grade. At the same time, I heard the words "numerator" and "denominator" as elements of a fraction. Further, a very determined Nun impressed upon me how important it was to get BOTH elements right in order to get the right answer.

$$FRACTION \leftrightarrow \frac{numerator}{denominator}$$

If Brian Williams had been in school that day his answer would have been closer to $1.50 rather than $1 million for every American. The scale of his mistake is epic. But so what? His reporting was about the mundane matter of politics and money. When he reports on a global health issue the stakes are higher. *True or False: Should we believe him? Ever?*

Hopefully we are not *all* going to die of the coronavirus. What we are all watching – and what we should be watching – is how many people are dying as a percentage of those infected and how that rate changes over time.

$$death\ rate_t = \frac{number\ of\ people\ who\ die\ from\ coronavirus_t}{number\ of\ people\ who\ are\ infected\ with\ coronavirus_t}$$

Brian, if you are listening, pay attention, this is one of those nasty 2nd grade division problems.

The numerator is not perfectly certain. Cause of death may be from interrelated issues, to which the coronavirus makes a contribution. But the actual count is not much in doubt. Death is rarely reported incorrectly (few recover from it) and rarely under-reported (an event hard to miss). So the numerator *can* be fairly accurate. The denominator is another story. Under-reporting of infection is common due to many reasons which vary across countries and cultures. Some have it and do not know it. Some have it and recover without reporting it. Some have it and die from another cause before it manifests itself. The denominator is very hard to nail down. Thus, the fraction is imprecise.

So, do we stop keeping records? Do we just run in all directions screaming? No, flawed and incomplete though they may be, numbers and statistics are useful in dealing with uncertainty. But even with them you still have uncertainty, just perhaps less. Numbers are *evidence*, not proof. We can always question the value of the denominator. That denominator is not an irreducible first principle. Thus, _no proof flows from knowing the value of the fraction of which it is a part_.

Logic demands that, for a proposition to be determined to be *True or False*, a series of simple questions having only "Yes" or "No" answers be asked sequentially. Extending Aristotle a bit *True or False: Socrates is mortal. All mortals die. Therefore, Socrates will die.* Between the time Socrates becomes mortal, presumably at or near birth, and the day he dies many things will happen to Socrates, some of which are fatal, most others not. Each of Socrates choices involve rational, logical yes/no decisions that influence how much time passes between the beginning and end of Socrates life.

The media has an agenda. It has no interest in whether what it broadcasts is true or false. Its only interest is that you see or hear what it broadcasts. It wants your attention and will do or say anything to get and keep it. The media has learned that human nature is such that the disastrous, calamitous, bizarre, tragic, prurient and disgusting fascinates a large portion of the population. It wants to influence that population to maximum alarm to hold it in its spell. It has little interest in refinements such as proof, truth or accuracy. Consequently, it does not deserve our trust.

I promised you a formal proof so here goes. The famous Pythagorean Theorem claims that for every right triangle the sum of the squares of each of the two shortest sides is equal to the square of the longest side (Brian Williams just fainted), or:

$$a^2 + b^2 = c^2$$

Proof: Because I said so.