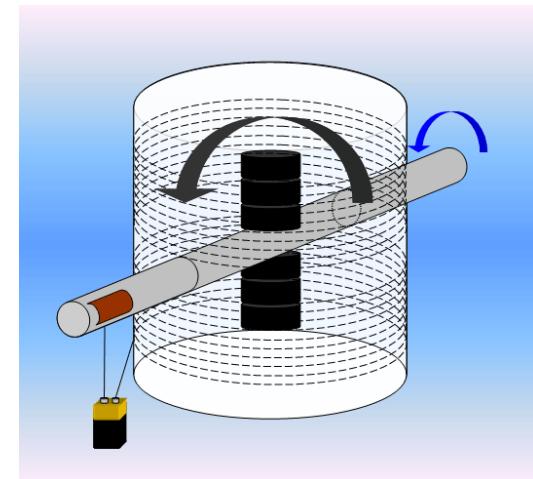


Eric Prebys
FRS-003-009



Following up on Mr. Newman

- Joe Newman claimed to have developed a motor that put out more mechanical power than it required in electrical power
 - If true, he could have run it “closed” loop by having it drive a generator, but he never did this
- Claimed it wasn’t “perpetual motion” because it was somehow extracting energy from the copper coils.
- He became very popular in the media, as evidenced by the video I asked you to watch.
- He spent a decade fighting for a patent, even bringing the matter before congress.
- In 1989, a judge ordered NBS (now NIST) to test the device.
 - They determined it was actually a very *inefficient* motor and the patent was denied.
- He died in 2015, still claiming his device worked.





The News Report that Got Me Started...

- Variations of this story were reported in multiple news sites in 2006





What is Media?

- Once it meant:
 - Newspapers (one or two a day)
 - Television (major networks had two newscasts a day)
 - Radio (there have always been all news radio stations)
- Now it includes
 - Websites
 - YouTube
 - Podcasts
 - TikTok
 - Social media
 - etc
- Literally anyone with a smartphone can publish content that's available to the entire world.
- I'm going to stick to “mainstream media”



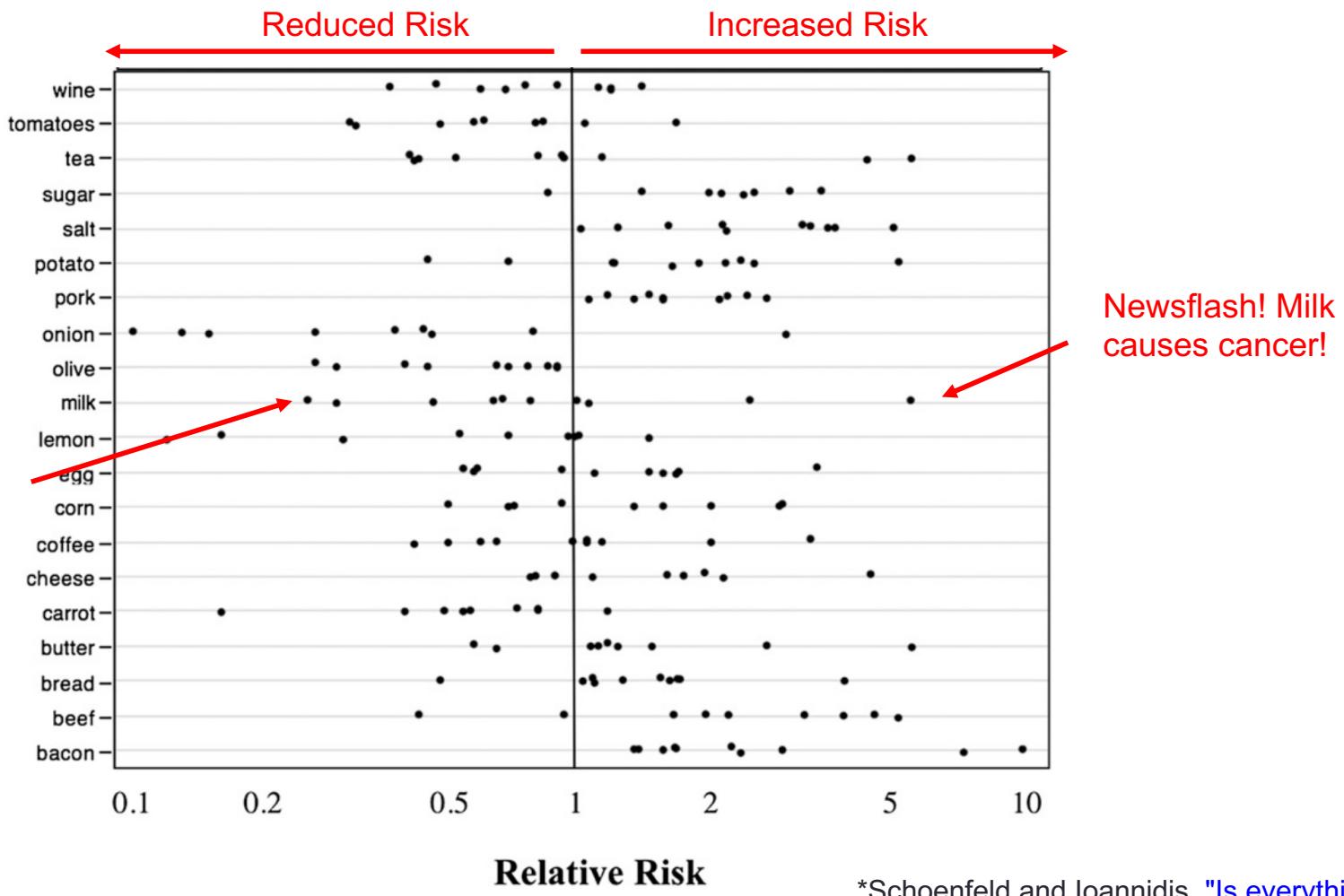
Problems with Media and Science

- Even exciting science doesn't *sound* exciting.
 - Too much technical jargon
 - Temptation to simplify and/or sensationalize it can sometimes change the meaning entirely
- Poor grasp of basic statistics and statistical significance.
 - Preliminary results reported as fact
- Not understanding the difference between “science” and “technology”
 - We keep coming back to that
- Not everything has two sides!
- The only “scoop” in science is a scandal
 - See examples from last lecture
 - **No significant scientific result has ever been reported first in the media.**
- Not understanding problems inherent in particular fields.



Particularly Hard for Medical Science

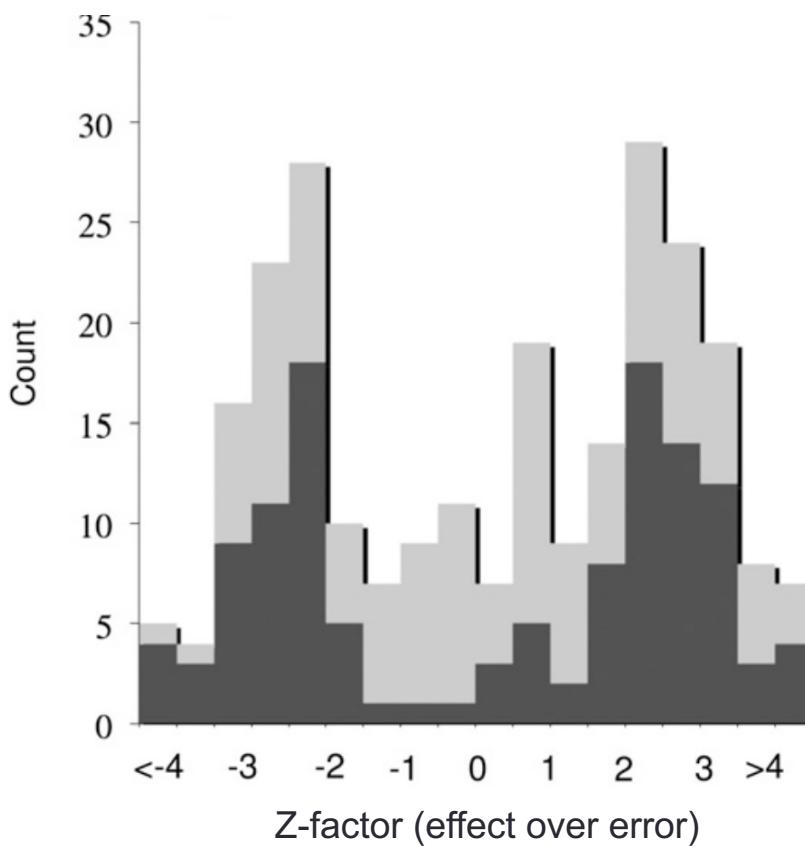
- An interesting study in 2013* showed the inconsistency of various studies on cancer risks associated with foods.



*Schoenfeld and Ioannidis, "[Is everything we eat associated with cancer?](#)" (2013)



This Also Showed a Strong Publication Bias



- Consistent results would be on one side or the other.
- Statically distributed null results would peak in the middle.
- The only explanation for this is that these are mostly statistically varying results, bu they didn't publish the null ones.



Simplifying Science....into Nonsense

- In 2014, the Journal Medical Chemical Communications published an [article](#) with the confusing title

The synthesis and functional evaluation of a mitochondria-targeted hydrogen sulfide donor, (10-oxo-10-(4-(3-thioxo-3H-1,2-dithiol-5-yl)phenoxy)decyl)triphenylphosphonium bromide (AP39)

- The researchers exposed mitochondria from cells to hydrogen sulfid
 - They found evidence it could protect them from damage, which is a factor in cancer, stroke, and dementia
- How this was *widely* reported in the media...
 - This [example](#) is from The Guardian!

Silent, not deadly; how farts cure diseases

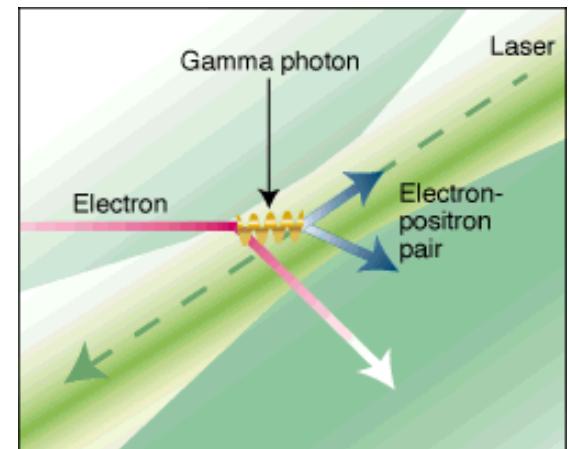
A recent study from the University of Exeter has been reported as showing that smelling farts can cure cancer, as well as many other diseases. Although the study itself doesn't actually say this at any point, if farts do have healing powers it would have numerous wide-reaching implications





Game of Telephone

- Many news articles are based on other articles.
 - They will usually add material to avoid copyright issues.
 - This can often change the meaning of the original article.
- A personal example...
 - In the mid-1990s, I was part of a [small group working at Stanford](#) that produced electron-positron pairs by bouncing a powerful laser off of the SLAC electron beam and then allowing it to re-interact with the laser*.
 - While fully consistent with the laws of physics this was the first time matter had been created from pure light.
 - That's kind of cool, so it generated an unusual amount of interest in the popular press, including an excellent [article in the New York Times](#).
 - To this day, this is my fourth most cited paper (1248), behind three others from huge collaborations.

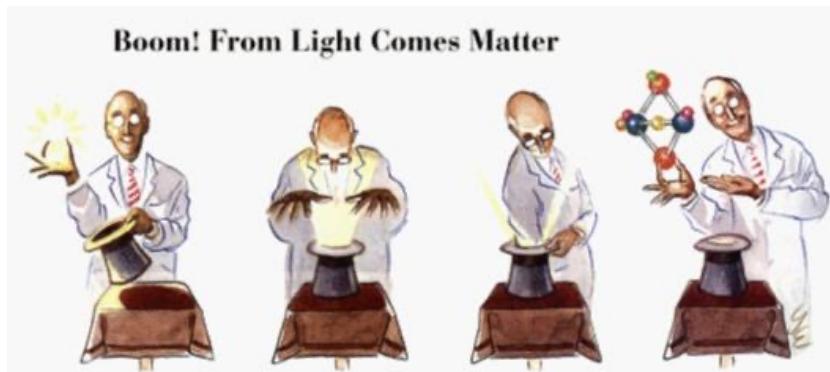


*Phys. Rev. Lett., Vol. 79, p. 1626 (1997)



Where it went...

- The NYT article inspired MANY other articles, all of which tweaked it a bit.
- It finally arrived at [this article](#) in the Photonics Spectra trade magazine, which gets a whole lot wrong.
- The lesson: Always find the original source!



KATHLEEN G. TATTERSON

PALO ALTO, Calif. -- In Physics 101, our instructors drilled us on the Law of Matter Conservation "Thou shalt not create matter from nothing." However, a team of 20 physicists/lawbreakers has done just that, by converting light into matter.

The team, composed of scientists from Stanford University, the University of Rochester in Rochester, N.Y., Princeton University in Princeton, N.J., and the University of Tennessee at Knoxville, bumped a 46.6-GeV electron beam from the 2-mile-long Stanford Linear Accelerator in a photon beam at 527 nm from a "tabletop terawatt" Nd:glass laser developed at Rochester's Laboratory for Laser Energetics. The result was what researchers call the first electron-positron pairs created via a "light by light" process.

During the two-step process, a high-energy electron travels through laser-focusing optics, then "kicks" one of the photons at nearly 30 GeV of energy. That photon reacts with the other photons to produce particles of matter.

According to team representative Adrian Melissinos, professor of physics at Rochester, the significance of the experiment was the production of matter using real photons, as opposed to "virtual photons" that appear for a fleeting moment and disappear in the vacuum.

Melissinos acknowledges that practical applications are very limited. Apparently, for this team of rogue physicists, just knowing that they have broken a fundamental law in physics is enough.



Being an Expert in One Field Doesn't Make you an Expert in All

- As second definition of “Stockholm Syndrome” is that when someone wins a Nobel Prize in Physics, Chemistry, or Medicine, they start to share their opinion on everything. Examples:
 - Brian Josephson, who shared the 1973 Nobel Prize in Physics for the discovery of revolutionary quantum effects believed in homeopathy and ESP.
 - William Shockley, who shared the 1956 Nobel Prize for the invention of the transistor devoted the later years of his life to pushing his White Supremacist and Eugenics views.
 - Kary Banks Mullis, who shared the 1993 Nobel Prize for the polymerase chain reaction, crucial to DNA testing went on to push climate change denial and HIV/AIDS “skepticism”.
 - Linus Pauling, who won a Nobel Prize in Chemistry in 1954 and a Nobel Peace Prize in 1962 (for nuclear activism) pushed (with no evidence) his theory that massive doses of vitamin C can cure anything.
- Obviously, when people like this talk, the press listens!



Parting Words

- As always, when you hear something on the news, do your best to find the original sources.
- If it sounds too good to be true, it probably is.