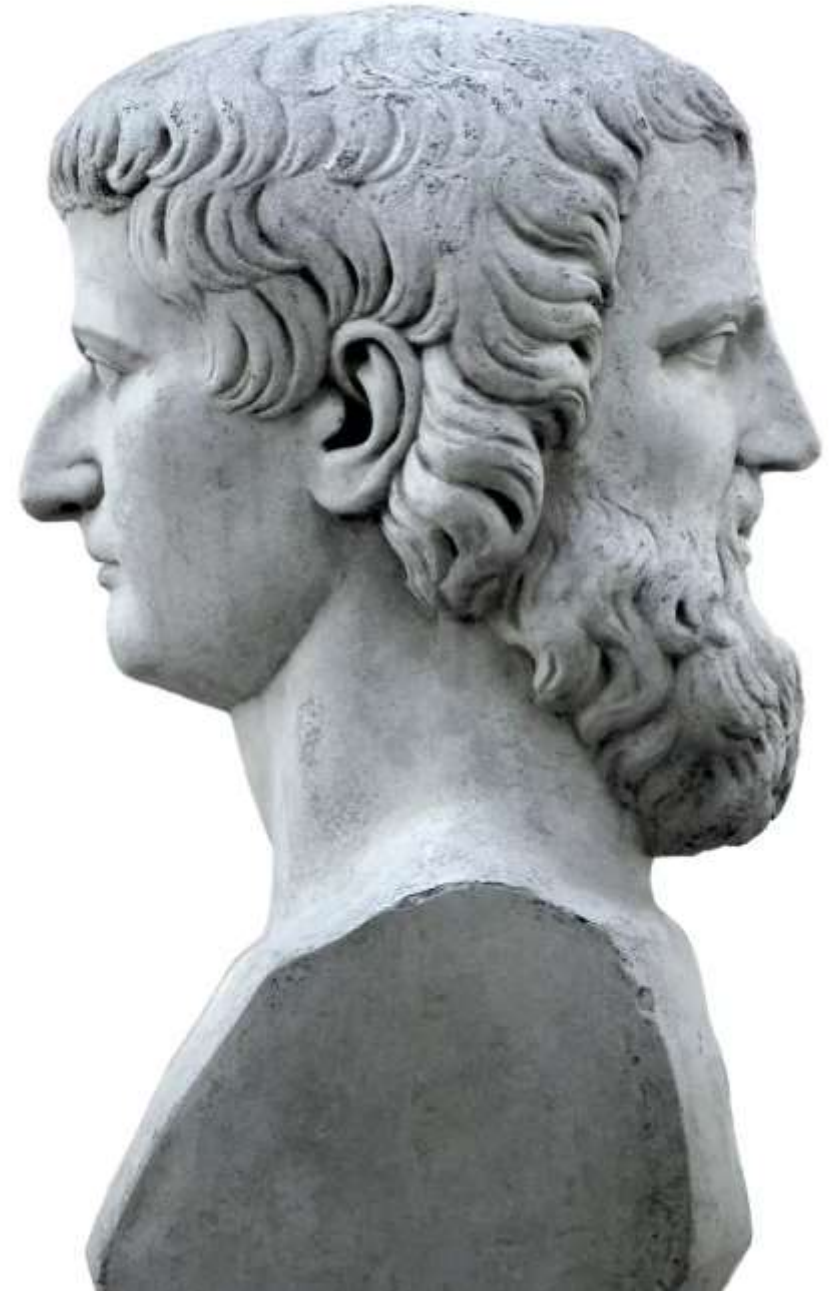


Science, Trust And COVID

A Tale of Two Realities

Greg Poulsen
Senior Vice President
Intermountain Healthcare



For Science, it has been the best of times:

Once China made the SARS-CoV-2 available to the rest of the world:

- The genome of the virus was sequenced in January, 2020
- Within 48 hours, the first vaccine had been designed based on the virus structure
- Vaccines began Phase 1 trials by mid-March
- Vaccines began Phase 3 trials in July
- (At least) Two vaccines achieved 95% efficacy rates and received approval for general administration in December
- This pace is nearly 5 times faster than the previous fastest vaccine development (mumps – 4 years)

Basic preventive techniques were identified early and have withstood the test of time; healthcare workers have been remarkably safe in treating COVID patients

Clinical treatment of the most ill COVID patients has improved dramatically, with mortality rates now 5 times lower than in the first months of the disease

For Science, it has been the worst of times:

Basic preventive medication and *early* treatment of the disease have remained mysterious:

- Some proven methods have been controversial
- Some disproven methods have gained and retained followers
- Most loudly, there have been lots of conflicting messages

Basic science has been politicized or made into articles of faith

- Masking and other preventive techniques have, for some, become political issues
- Vaccine safety and vaccine intent are suspect: more than 1/3 of Americans (and others around the world) currently don't want to be vaccinated. A surprising number assume ill intent in vaccine administration (and not just in one part of the political spectrum)



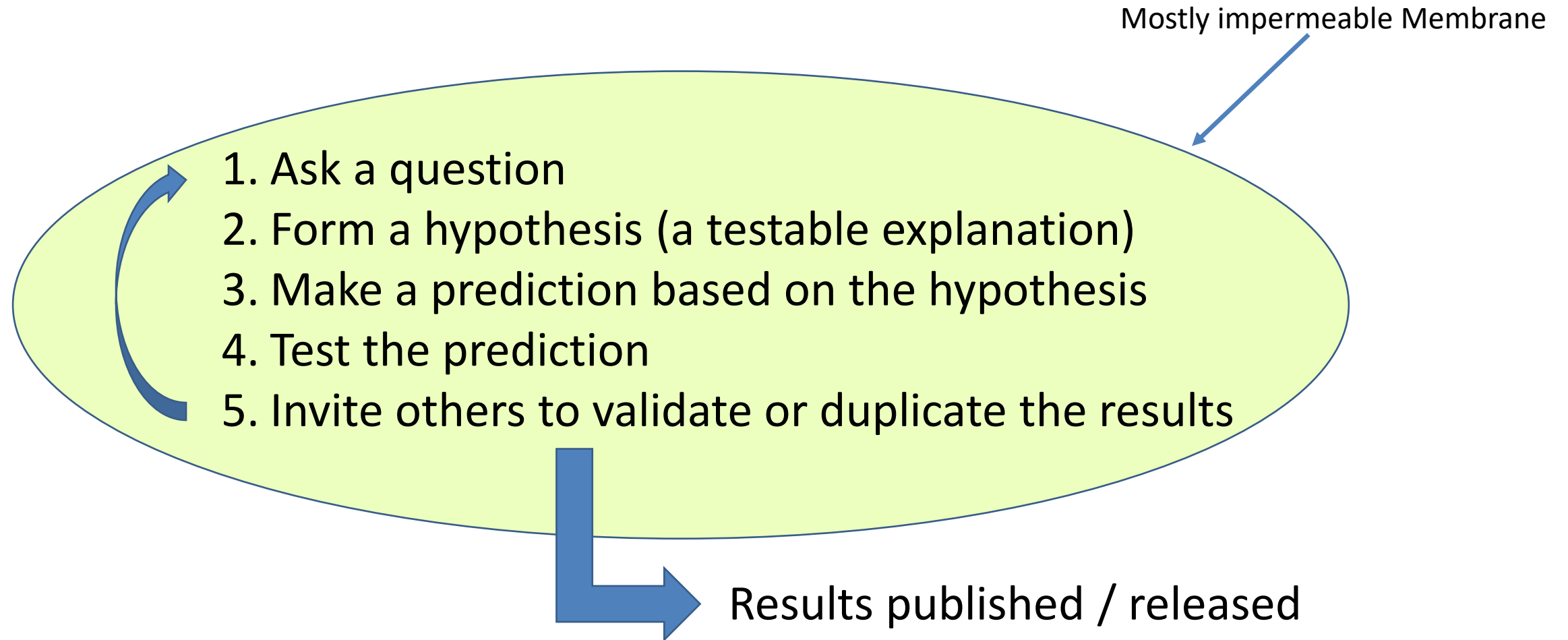
HAPPENING NOW

PROTESTERS TARGET DR. DUNN'S HOME
SALT LAKE CITY

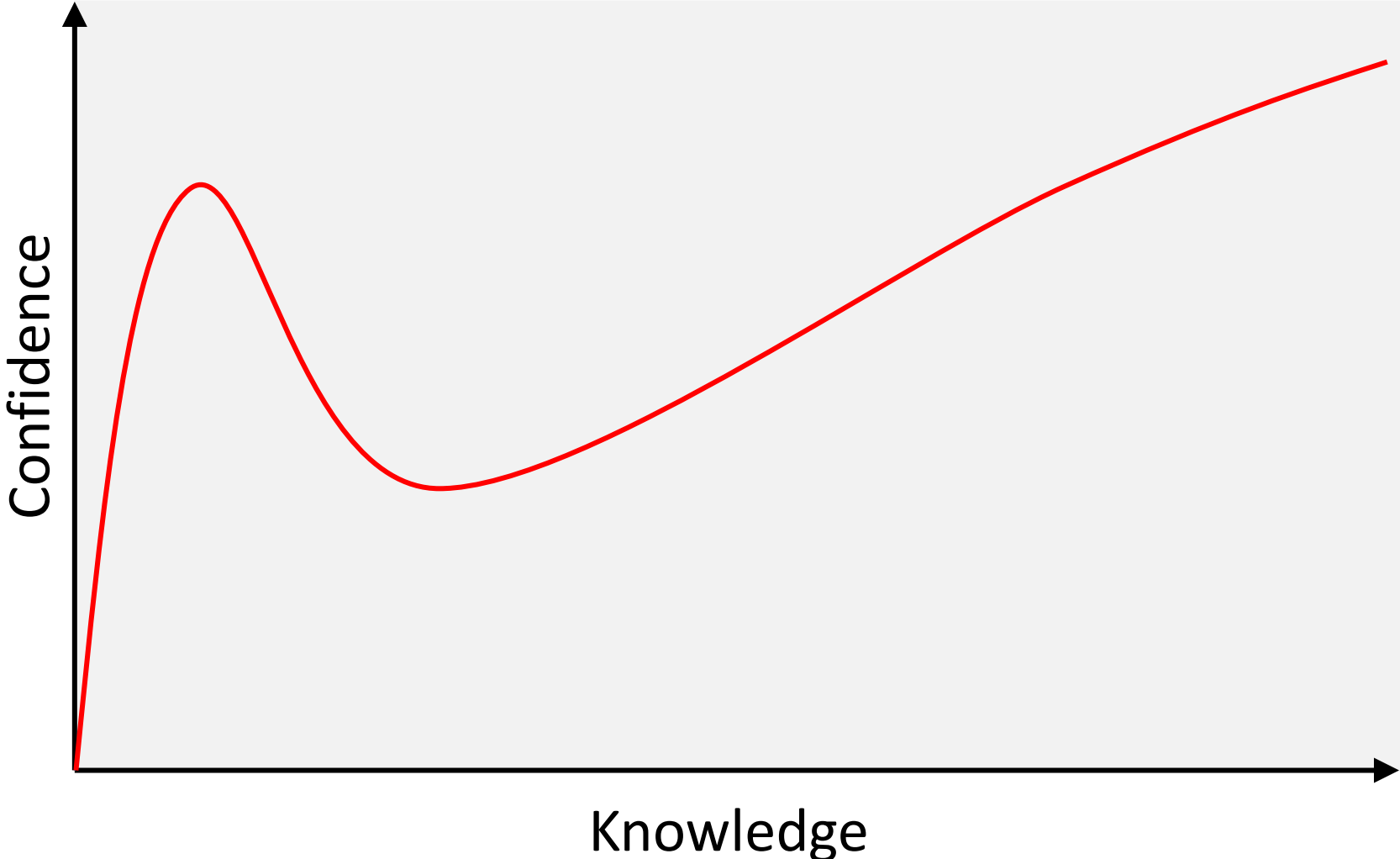


KSLTV.COM

The Scientific Method – Ideal Historical Approach

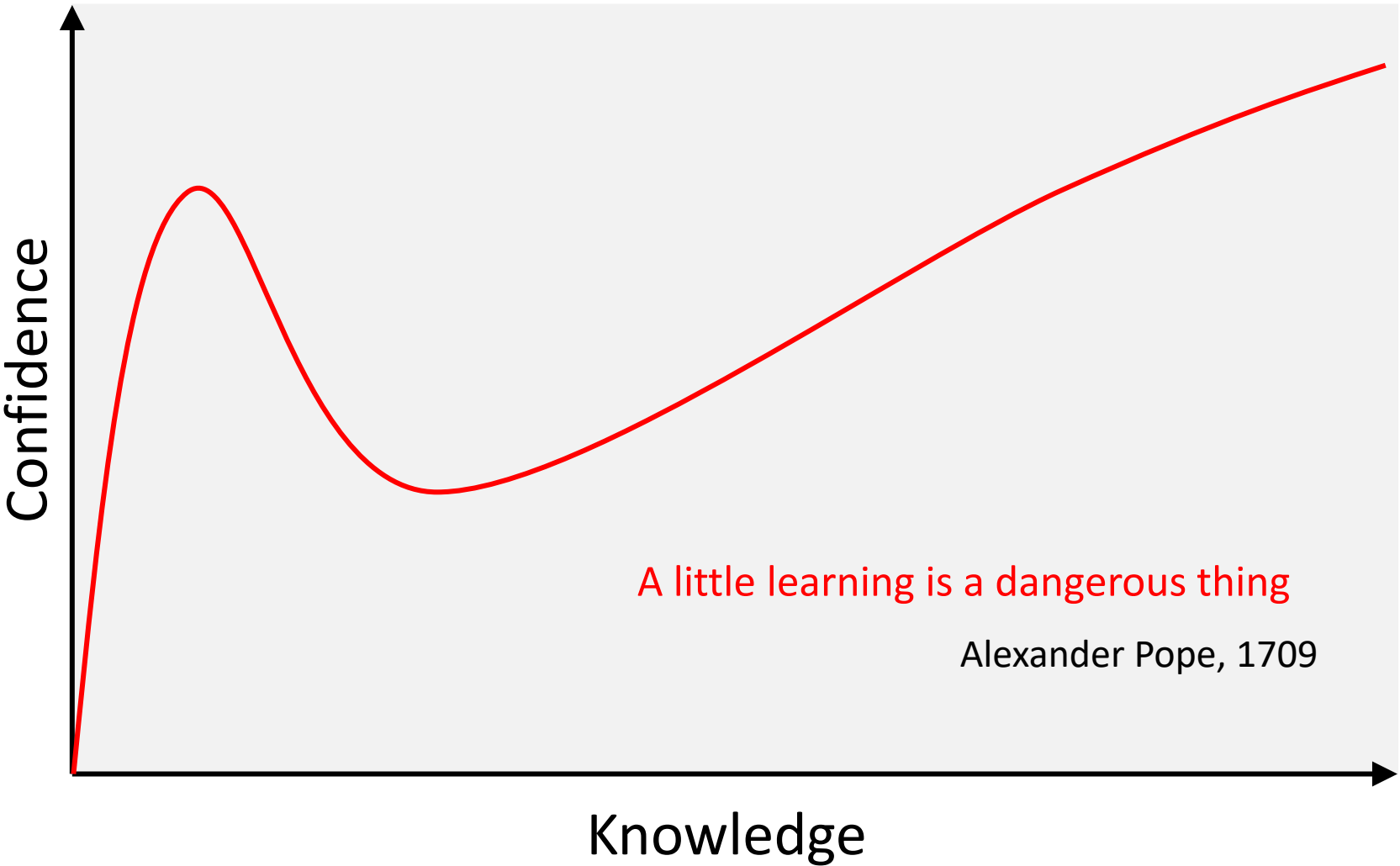


The Dunning-Kruger Effect



Source: Unskilled and unaware of it: how difficulties in recognizing one's own incompetence lead to inflated self-assessments, J Pers Soc Psychol. 1999 Dec;77(6):1121-34. doi: 10.1037//0022-3514.77.6.1121

The Dunning-Kruger Effect



A little learning is a dangerous thing

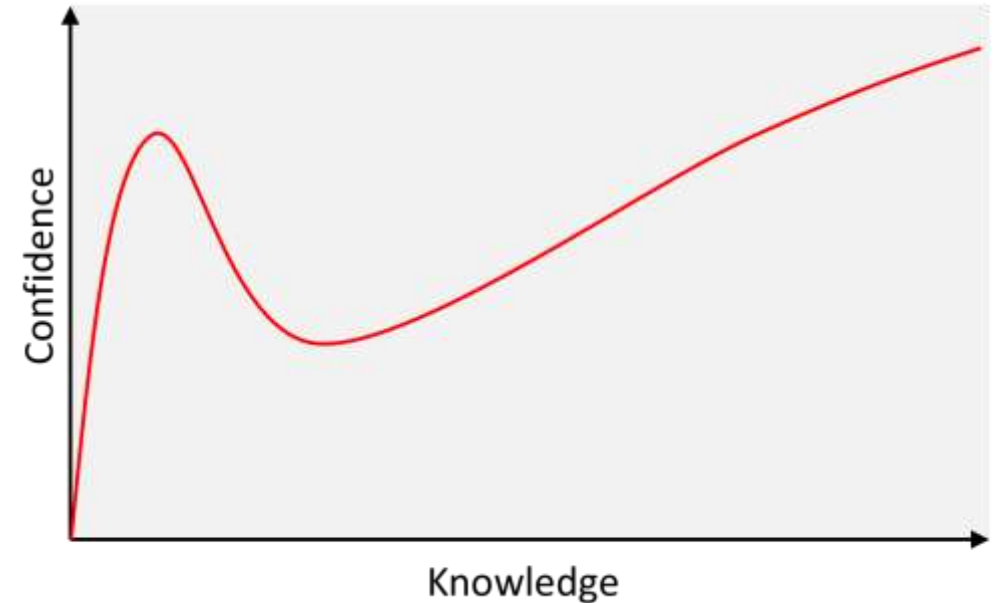
Alexander Pope, 1709

Source: Unskilled and unaware of it: how difficulties in recognizing one's own incompetence lead to inflated self-assessments, J Pers Soc Psychol. 1999 Dec;77(6):1121-34. doi: 10.1037//0022-3514.77.6.1121

The Dunning-Kruger Effect

“Researchers surveyed 2,800 teens about their driving attitudes and behaviors...77 percent said they were safer drivers than others on the road.”

“Per mile driven, teen drivers in this age group are nearly three times more likely than drivers aged 20 and older to be in a fatal crash.”

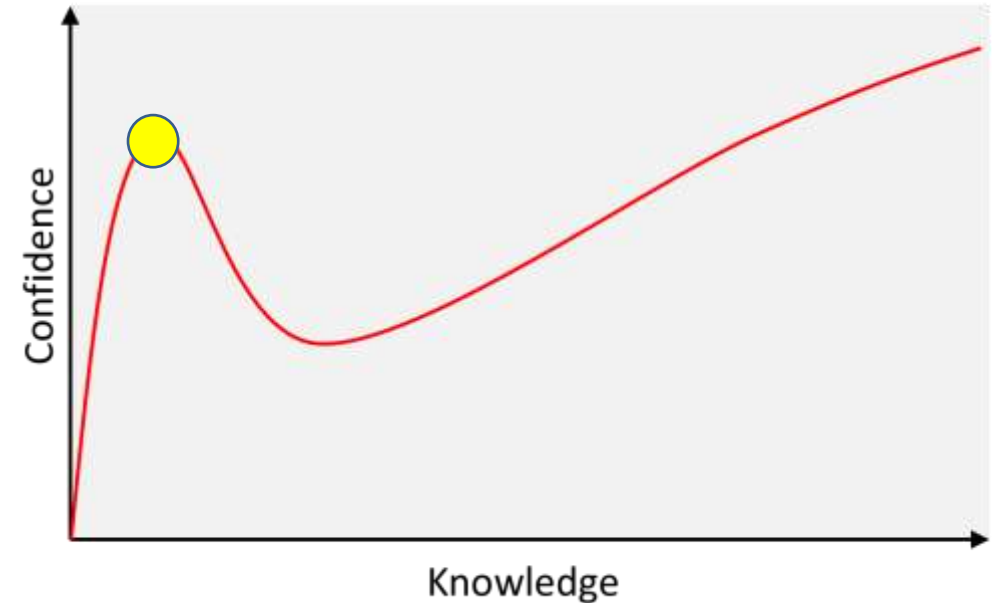


The Dunning-Kruger Effect – Confusing Subsequence with Consequence (Coincidental Rare Events Can Lead To Assumed Causality)

“I have hiked in this slot canyon 20 times after a rainstorm and never had a problem.”

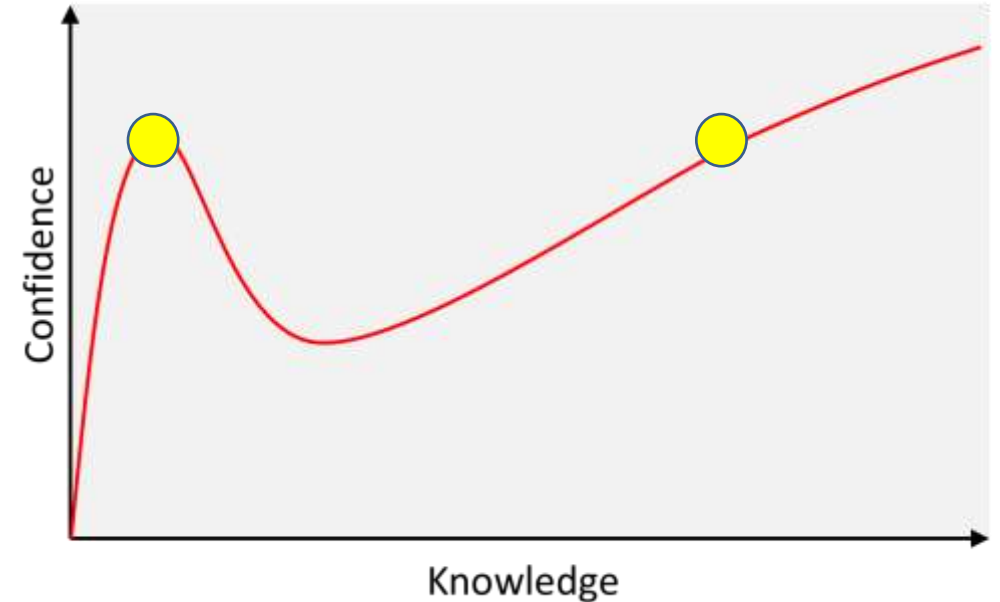
“The only time I ever had lightning strike close by is when I was wearing this cowboy hat.”

“I take two calcium pills every morning, and I have not developed COVID. My sister doesn’t take calcium, and she got COVID and got really sick.”



The Dunning-Kruger Effect – Today Everyone Has a Megaphone

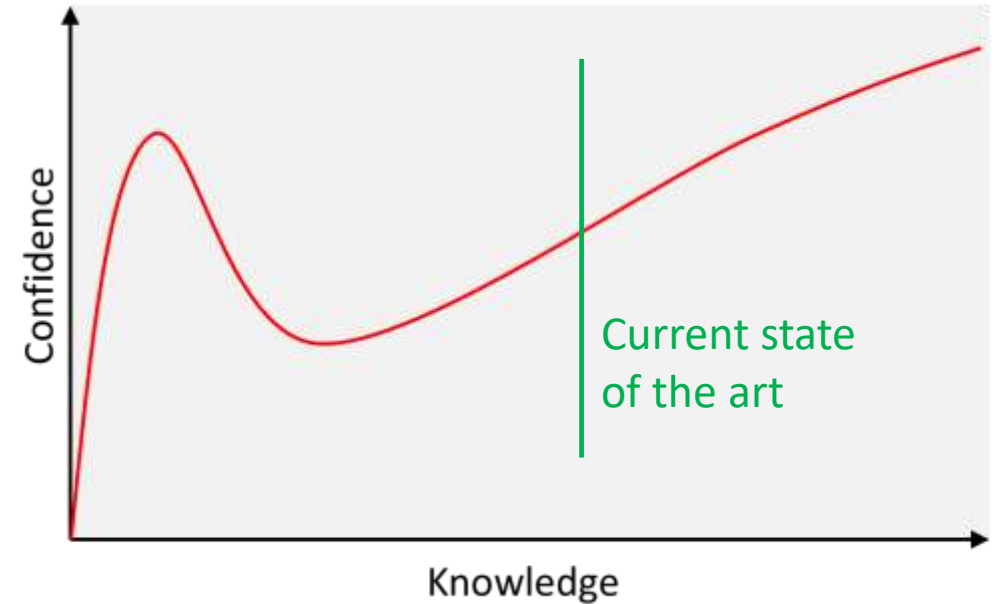
In some ways the dramatically broadened access to media is a boon for freedom, but it also makes it much harder to know where truth lies. A Google search or Wikipedia article may turn up information from someone with deep knowledge; but it may also turn up information from someone low on knowledge, but high on confidence (or even intentionally misleading).



The Dunning-Kruger Effect – COVID is a New Disease

While we have learned a lot, COVID continues to surprise us, and there are many mysteries remaining...

And the issues mean life or death to some!



When Urgency Short-Circuits the Scientific Method

1. Ask a question
2. Form a hypothesis (a testable explanation)
3. Make a prediction based on the hypothesis
4. Test the prediction
5. Others validate or duplicate the results

Alcohol kills viral particles so drinking whisky reduces COVID

Tobacco appears to reduce COVID attachment to cells; smokers should have lower infection rates

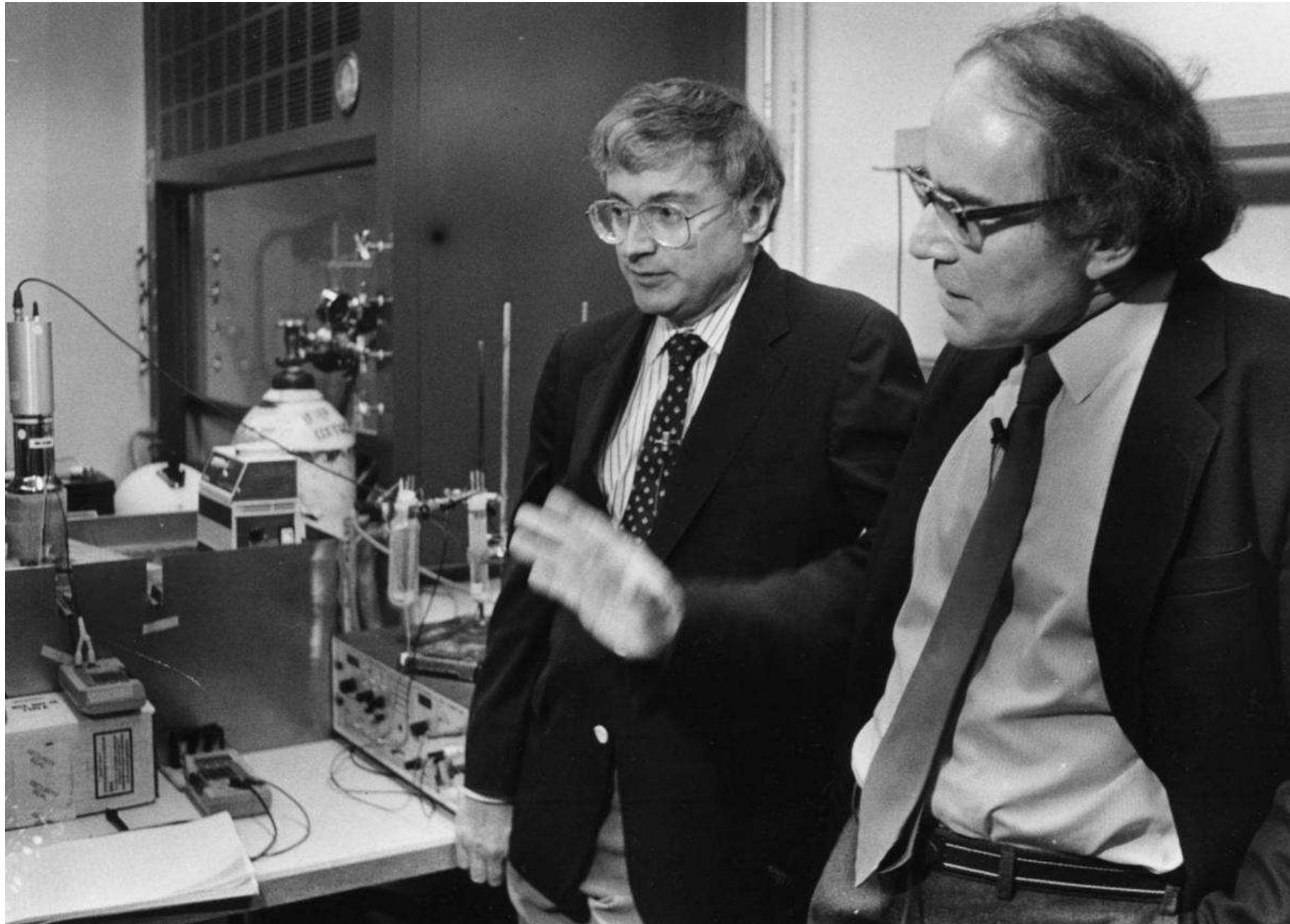
Ibuprofen and cortisone aggravate COVID infections in one study

Source:

<https://7news.com.au/lifestyle/health-wellbeing/german-health-expert-claims-drinking-alcohol-can-protect-against-coronavirus-c-948116>

<https://www.mirror.co.uk/science/smoking-may-lower-your-risk-21913607>

Anti-inflammatories may aggravate Covid-19, France advises | World news | The Guardian



Examples of News Stories From (Mostly) Legitimate BUT INCOMPLETE Science

“A top German virologist claims that drinking whisky can protect against COVID-19 Infection”

- “Alcohol increases the risk of severe COVID infections”

“New study by researchers in Paris suggests that a substance in tobacco may stop smokers from catching COVID”

- “Smokers are more likely to develop COVID disease”

“Cannabis could stop COVID-19 Infections”

- “Inhaling or vaping cannabis in the face of COVID is NOT recommended”

“Mouthwash may reduce COVID infections”

- “Mouthwash use shows no reduction in infection rates”

“Camel urine is effective at reducing COVID frequency and severity”

- “The WHO recommends against the ingestion of camel urine”

And, of course, the hydroxychloroquine discussion is a remarkable media (and political) saga

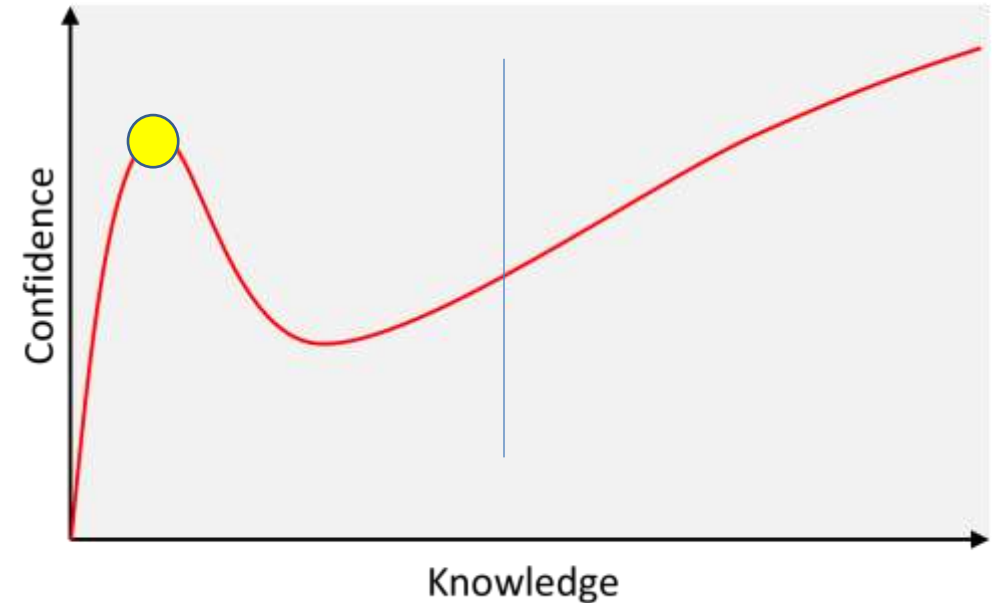
Wikipedia now lists over 100 advocated COVID prophylactics or therapeutics that have been published in a legitimate news outlet, that are currently either unproven or disproven

How can the public adjudicate conflicting “expert” assertions?

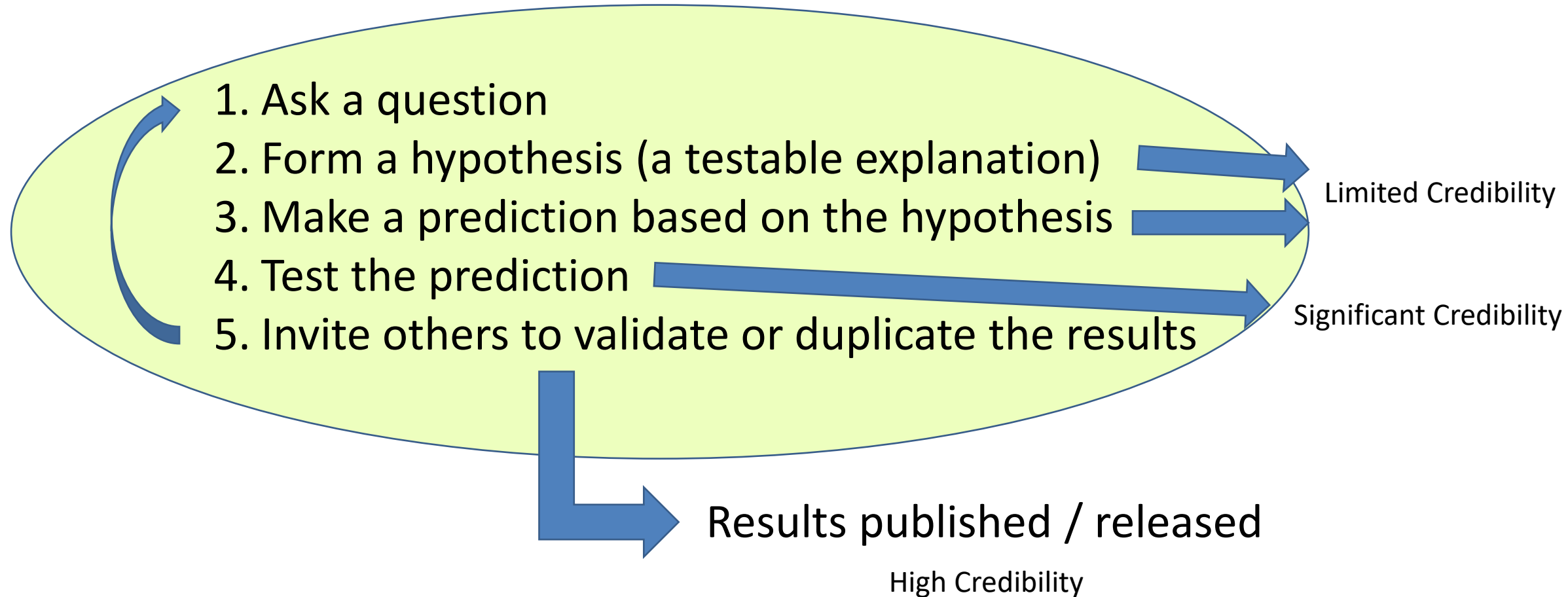
A web article, Facebook page or tweet puts people on the exactly wrong part of the Dunning-Kruger curve

Most people have neither the time nor expertise to effectively move further on their own

We should expect credible news organizations to help us



Not all studies or statements should be accorded the same attention or credibility



Headlines seeking attention can be technically accurate by devastatingly misleading

Daily **Mail**
.com

CDC reveals at least 21 Americans have suffered life threatening allergic reactions to Pfizer's COVID vaccine

Headlines seeking attention can be technically accurate by devastatingly misleading



CDC reveals at least 21 Americans have suffered life threatening allergic reactions to Pfizer's COVID vaccine

- These 21 were out of 1,900,000 injections
- FOUR people were hospitalized; all patients have fully recovered
- NOBODY DIED
- During the same week that this article came out, 20,000 Americans died of COVID

Lessons we should learn

Scientific practitioners should provide an expectation that the scientific method should be followed to completion *whenever possible*

When not possible (as in emergent situations such as the current pandemic), legitimate researchers, clinicians and academics should clarify the confidence (and lack of confidence) that should be applied to the theory or hypothesis; replication and peer input should be maximized

Credible news organization should make reasonable efforts to provide additional expert perspectives when reporting on hypotheses that have not completed peer review (not necessarily opposing perspectives, but informed commentary)

Credible news organizations should make reasonable efforts to provide context in headlines and articles; avoid *inappropriately* sensationalizing issues

