

Tools for Sceptical Thinking

Excerpt from Carl Sagan's "The Demon-Haunted World"

What sceptical thinking boils down to is **the means to construct, and to understand, a reasoned argument and, especially important, to recognize a fallacious or fraudulent argument.** The question is *not whether we like the conclusion that emerges out of a train of reasoning, but whether the conclusion follows from the premises or starting point and whether that premise is true.* Among the tools:

- Wherever possible there must be **independent confirmation of the 'facts'**.
- Encourage substantive **debate on the evidence** by knowledgeable proponents of all points of view.
- **Arguments from authority carry little weight** - 'authorities' have made mistakes in the past. They will do so again in the future. Perhaps a better way to say it is that **in science there are no authorities**; at most, there are experts.
- **Spin more than one hypothesis.** If there's something to be explained, think of all the different ways in which it could be explained. Then **think of tests by which you might systematically disprove each** of the alternatives. What survives, the hypothesis that resists disproof in this Darwinian selection among 'multiple working hypotheses', has a much better chance of being the right answer than if you had simply run with the first idea that caught your fancy.
- Try **not to get overly attached to a hypothesis just because it's yours.** It's only a way-station in the pursuit of knowledge. Ask yourself why you like the idea. Compare it fairly with the alternatives. **See if you can find reasons for rejecting it.** If you don't, others will.
- **Quantify.** If whatever it is you're explaining has some measure, some numerical quantity attached to it, you'll be much better able to discriminate among competing hypotheses. What is **vague and qualitative is open to many explanations.** Of course there are truths to be sought in the many qualitative issues we are obliged to confront, but finding them is more challenging.
- If there's a chain of argument, **every link in the chain must work** (including the premise) - not just most of them.
- **Occam's Razor.** This convenient rule-of-thumb urges us when faced with two hypotheses that explain the data equally well to **choose the simpler.**
- Always ask whether the hypothesis can be, at least in principle, falsified. **Propositions that are untestable, unfalsifiable are not worth much. ...**