

Chapter Three

INFERENCE TO THE BEST EXPLANATION

The historian must collect, interpret, and then explain his evidence by methods which are not greatly different from those techniques employed by the detective, or at least the detective of fiction. . . . Evidence means different things to different people, of course. The historian tends to think mainly in terms of documents. A lawyer will mean something rather different by the word, as will a sociologist, or a physicist, or a geologist, or a police officer at the moment of making an arrest. For certain problems, evidence must be "hard," while for others it may be "soft." Even if no acceptable list of agreed-upon definitions of evidence may be given, most of us recognize intuitively what we mean when we use the word.

Robin Winks

INFERENCE TO THE BEST EXPLANATION

We will be treating the expression "inference to the best explanation" as technical jargon. It will be a way of looking at evidence, or at least purported evidence, in an inductive argument. If we look at the component words in this expression, we will discover quite a lot. First of all, we are dealing with an **inference**. For most purposes, we can

consider that just another way of saying that we have an argument to be considered. This inference is to an **explanation**. Now it turns out that the nature of an explanation is a very controversial topic in academic philosophy. We will provisionally treat explanations as **stories** (or models) of what might be going on. The data or evidence is surprising, mysterious, or maybe just curious. What the heck is going on? Explanations will be answers to this “what’s going on?” question — they will try to **make sense** things.

We are also dealing with some implied comparison. This isn’t just an inference to an explanation, but to the **best** explanation. This implies two very important things. First, there must be other possible explanations of the data in the argument, **rival explanations**. And, the argument is also committed to this original explanation being better than all of these rivals. Therefore, there seems to be some **rank ordering** of the explanatory candidates, even if this is not explicitly stated.

I will use all of this as a way of articulating a test of the quality of evidence within an argument. This test will be most straightforward when you are a consumer of an argument. Someone defends a controversial theory — that global warming is real, or that President Obama was not a “native born” citizen. Inference to the best explanation (for short **IBE**) gives you a tool for assessing the quality the evidence they present.

Inference to the Best Explanation Recipe

1. Schematize the argument
2. List some serious (hopefully challenging) rival explanations
3. Rank order all of the explanations – the original along with the rivals
4. Based on the rank order see if the original is the best explanation. If it is, the evidence has passed the test and looks pretty good.

If it isn't, it's failed the test, and the evidence is weak, maybe nonexistent.

Let's apply the test or recipe to a neat little argument.

NAOMI ORESKES' STUDY

There is an interesting segment in Al Gore's movie, *An Inconvenient Truth*, where he cites a scholarly study of peer-reviewed articles on climate change.

A University of California at San Diego scientist, Dr. Naomi Oreskes, published in *Science* magazine a massive study of every peer-reviewed science journal article on global warming from the previous 10 years. She and her team selected a large random sample of 928 articles representing almost 10% of that total, and carefully analyzed how many of the articles agreed or disagreed with the prevailing consensus view. About a quarter of the articles in the sample dealt with aspects of global warming that did not involve any discussion of the central elements of the consensus. Of the three-quarters that did address these main points, the percentage that disagreed with the consensus? Zero.¹

Here we have, a little bit second hand, an incredibly interesting, and potentially quite important, sample. The argument leaves the conclusion unstated, but still quite obvious -- almost all natural scientists publishing on climate change endorse the consensus view about climate change.

e₁. In a sample of 928 peer-reviewed articles dealing with climate change, zero percent disagreed with the consensus view.

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t₀. Virtually all peer-reviewed research on climate change endorses the consensus view.

Mr. Gore is quite right that Dr. Oreske published a short, but very influential, article, "Beyond the Ivory Tower: The Scientific Consensus on Climate Change," in a prestigious journal, *Science*, in December of 2004.² She begins by reminding her readers that policy makers and the mass

media often suggest that great scientific uncertainty about “anthropogenic” climate change, but states flatly, “[t]his is not the case.”³

In defense of her thesis, she offers a fairly elaborate study she has conducted. She offers a working definition of what she will call “the consensus view,” from reports by the Intergovernmental Panel on Climate Change.

Human activities ... are modifying the concentration of atmospheric constituents ... that absorb or scatter radiant energy. ... [M]ost of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas concentrations.⁴

Notice the challenge she faces. She is making a claim about a very large, and not that well-defined, population -- science (“great scientific uncertainty”). To make matters worse, policy makers and the media dispute her claim.

Her first move is to more carefully define the population she is interested in. She utilizes a standard reference tool in the natural sciences, the Institute for Scientific Information data base. In this data base authors are asked to identify certain “key words,” really topics, that their articles address. Professor Oreske searched for the key word “climate change.” Her team then considered 928 articles.

Obviously not every article is going to explicitly endorse or disagree with the consensus view, so Oreske and her team had to read and “code” the articles. They broke them down into six categories.

The 928 papers were divided into six categories: explicit endorsement of the consensus position, evaluation of impacts, mitigation proposals, methods, paleoclimate analysis, and rejection of the consensus position. Of all the papers, 75% fell into the first three categories, either explicitly or implicitly accepting the consensus view; 25% dealt with methods or paleoclimate, taking no position on current anthropogenic climate change. Remarkably, none of the papers disagreed with the consensus position.⁵

She is also quite candid that a certain amount of judgment and editing of the sample was required.

Some abstracts were deleted from our analysis because, although the authors had put "climate change" in their key words, the paper was not about climate change.⁶

So, what do we, none of us trained climate scientists, think of Professor Oreske's evidence? We possess the tools to make some sort of evaluation.

We have a fair amount of data that is being offered as evidence.

- e1. Definition of the "consensus view."
- e2. ISI data base
- e3. Key word: climate change
- e4. 928 articles
- e5. Some articles did not really address climate change, and were removed.
- e6. Six potential categories.
- e7. 75% "implicitly or explicitly" endorsed the consensus view.
- e8. 25% took no stand.
- e9. Not one article disagreed with the consensus view.
- =====
- t0. Almost all scientists working and publishing on climate change endorse the consensus view.

RIVAL EXPLANATIONS OF THE SAMPLE

Perhaps it was just a fluke that all 928 articles either endorsed the consensus view, or took no position on it. Certainly this sort of mathematical coincidence is possible.

- t₁. It was a fluke that the 928 articles showed no skepticism about the consensus view; the ISI data base contained many articles that were.

Such a rival is logically possible. But I want to insist, however, that it is very improbable. Professor Oreskes' sample has an accuracy of, conservatively, $\pm 4\%$. For a statistician adopting a 95% confidence level, there is only a 5% chance that the population falls outside of the $\pm 4\%$ margin of error. Could it happen, yes. Is it likely at all, no.⁷

Much more interesting rivals will have to do with the problem of bias, either intentional, or more likely, unintentional. I suspect that some of you have already wondered if there might be a bias in the ISI data base. Maybe they only list "green" articles. Again, the following rival explanation is possible.

- t₂. The ISI data base is biased in favor of the consensus view.

A very different sort of bias is possible because of Oreskes' methodology. It is highly unlikely that most of the articles in sample came right out and said where they stood on the consensus view. Indeed, she tells us that some of the endorsement was implicit. That must mean that her team had to "code" or otherwise interpret that article's intention and subsequent endorsement or non-endorsement. Perhaps her team was so unconsciously wedded to the consensus view that they misinterpreted many of the articles as endorsing, or taking no stand, when in fact the authors of those articles intended a rejection of the consensus view. Thus, another possible rival explanation focuses on the coding of the articles.

- t₃. Oreskey, because of her biases, misinterpreted many of the articles as favorable, or neutral, when in fact the authors were arguing against the consensus view.

A final rival explanation centers on the possible bias of the entire scientific community. One might argue, as some have in defense of "creation science," that there is a kind of conspiracy that effectively censors articles that challenge the consensus view (not just of climate change, but any accepted scientific theory) from being published in peer-reviewed journals in the first place. Here the rival does not really challenge the population of peer-reviewed publications, but rather the implied attitude of endorsement by working scientists.

t₄. Respectable scientists arguing against the consensus view cannot get their articles published in peer reviewed journals.

THE BEST EXPLANATION?

In the case of the rival focusing on statistical fluke, I could argue against its plausibility by focusing on its mathematical improbability. No such technique exists for dealing with the rivals t₂, t₃, and t₄. Nevertheless, I want to argue that they are all implausible, at least when compared to the original explanation that there exists practically universal endorsement of the consensus view among trained climate scientists.

Consider first the journal that Oreskes' article appeared in, *Science*. The journal is one of the most highly respected academic journals in the world. They have a huge interest in policing themselves, since their name is on the cover of every article they publish. We saw in an earlier chapter that a journal like *The Supreme Court Economic Review*, takes the responsibility so seriously that it will publicly retract an article, even when this means embarrassing themselves, and a prominent scholar and public figure.

Next, we must face the charge that the Institute for Scientific Information is somehow biased. Again, we are dealing with a very prestigious and widely used reference tool, that is now operated by a for profit corporation. The ISI has a huge stake, both its reputation, but also financial,

in being regarded absolutely trustworthy. Thus, they too, can be expected to police themselves.

The same may be argued for Professor Oreskes herself. She is a highly respected scholar, educator, and university administrator. Her own professional reputation is on the line. She would be insane not to carefully ensure the accuracy of an article in a major journal that was guaranteed to be read and debated by a wide audience of scientists, and indeed those outside of the sciences.

Finally we come to perhaps the most serious of the charges in our rivals. Perhaps all of climate science is biased against critics of the consensus view. As I said, above, these sorts of conscious or unconscious conspiracy theories are offered by critics of natural selection. I want to concede that something like that can happen, and the history of science tells us that it has happened on occasion. But this sort of this is very, very rare. Most natural scientists respect the need for skepticism from their peers. Studies challenging the consensus view, in one sense have a better chance of being published, if for no other reason than that they are saying something new. Furthermore, we live in the age of information. Much more is being published, and many more venues for peer-reviewed academic publishing exist now. Thus, the fact that the ICI data base did not include even one skeptical defense leads me to believe that that there just aren't many skeptics out there, at least not within mainstream climate science.

EXPLANATORY VIRTUE

Consider the thoughts of one of the philosophers most responsible for championing the importance of inference to the best explanation, Professor Gilbert Harman.

There is, of course, a problem about how one is to judge that one hypothesis is sufficiently better than another hypothesis. Presumably

such a judgment will be based on considerations such as which hypothesis is simpler, which is more plausible, which explains more, which is less ad hoc, and so forth.⁸

Harman tells us we should value four characteristics in explanations.

- Simplicity
- Plausibility
- Completeness
- Not ad hoc

I think you would agree with me that these criteria are abstract, kind of technical, and ultimately very vague. None of this means that they are not useful in the task of rank ordering the differing accounts of the Oreskes findings.

Let me simply assert some factors that do not count in rank ordering explanations. The **best explanation** is not necessarily the one we like the best, nor the one that best accords with our politics, religion, or moral perspectives. **It is the one that is most plausible.** But what the heck is this? The truth is, I fear, that this criterion is the most abstract and vague of all of the ones on Professor Harman's little list. Here are the thoughts of another champion of inference to the best explanation, my teacher, Professor Larry Wright.

[T]he only very general thing we can say about what we do when we evaluate evidence is rather coarse-grained. When we do prefer one member of the list of rivals to the others, we do so simply because it comports best with the data we have, against the background of our relevant knowledge. Some rivals score better in some ways, others in others. We weigh the tugs in all directions and judge one rival to 'fit' better than the others, all things considered. ...

So at bottom it is always a complex judgment of fit: which one fits most easily with everything we know about the matter.⁹

Here comes a scary fact! **You** have to make the judgment about which explanation is best. There is no "objective," "reliable" test or formula you can utilize that automatically identifies the best explanation. The whole recipe, therefore, rests on a step that is candidly, unavoidably, **subjective**. When it comes to flavors of ice cream, or styles of beer, being subjective means that people's preferences are relative to who they are, and, consequently, all over the place. If evidence evaluation is the same, we're done for, and I can stop writing my book, and teaching my courses as I do. Fortunately, I believe, explanatory plausibility is very different from beer preferences. Even though each of us, individual subjects, must rank order alternative accounts for ourselves, it turns out that in a great number of contexts -- courts of law, the natural sciences, and even stories about very similar passages in law journals -- **subjective** judgments about plausibility can turn out to be **inter-subjective**. When all is said and done, when we think about it as free from prejudice and bias as we can be, we discover widespread agreement about what the best explanation is. We are the most intelligent species that has ever existed, and part of being intelligent is being darn good at spotting the best explanation of what's happening around us.

IDEAL AGNOSTICS

I want to share with you an idea that I am very taken with these days. It comes from a contemporary philosopher, as it turns out a very candid Christian philosopher, named Peter van Inwagen. He proposes an audience for arguments (at least those that occur in philosophical debates) that is psychologically impossible, but is useful to imagine, nonetheless.

The audience is composed of what we might call ideal agnostics. That is, they are agnostic as regards the subject-matter of the debate. ... [E]ach member of the of the audience will have no initial opinion about [the subject of the debate]. ... My imaginary agnostics ... would very much like to come to some reasoned opinion [on the debate] ... indeed to achieve knowledge on that matter if it were possible. ... They don't care which position ... they end up accepting, but they very much want to end up accepting one or the other.¹⁰

Ideal agnostics are absolutely indifferent -- intellectually, personally, and in every way that might bias them -- about what the best explanation is. But that doesn't mean they don't care. They are also passionately committed to figuring out which explanation is the strongest.

I'm no ideal agnostic, and neither are you. But I think we are both well-served in our discussions and investigations, to pretend that we are. Indeed, I am suggesting that anytime we evaluate another's potential evidence, we try as hard as possible to adopt the position of the ideal agnostic, knowing all along that we will fail in certain respects. When we are presenting our own argument, I would also suggest that we pretend our audience is not composed of partisans, but rather ideal agnostics.

This whole little subsection might strike you as a tedious distraction. I am belaboring all of this because we all carry with us biases that will inevitably affect some of our rank ordering of explanations, especially when two competing accounts are very close to one another. That is the position I find myself in with the current argument. I care very deeply about environmental ethics. I have very strong

30 **INFERRING AND EXPLAINING**

opinions about global warming and the general opinions of climate scientists. And, as you're going to find out anyway, I am a political liberal.

WHAT ABOUT TIES?

Suppose, in your best ideal agnostic frame of mind, you came to the conclusion that the plagiarism hypothesis and the poor record keeping rival were equally plausible explanations of all the data you had? What happens in the recipe when the original and one of the rivals are tied for first place?

This is a classic half-full, half-empty kind of dilemma. You might say that since the original is tied as the **best explanation**, there's some evidence for that conclusion. You might also say, however, that since there's rival explanation that's tied as the best explanation, the evidence is not so hot. I think either way we go the message is really the same. The original's being tied for first place allows us to see why someone would offer the argument in its defense in the first place, and why there is some evidence that seems to support it. A rival being tied for first place tells us that the evidence is far from conclusive. Ideally, in such a case, we go out and do a little more investigating, and see if we could discover some new data that would help break the tie. And, indeed, the whole subject of new data is the topic for our next chapter. But, before heading there, let's do a review exercise.

A MAGICAL ENCORE?

Quite by accident I discovered a glitch in the iPod software. On a Saturday night several years my wife and I went to a banquet for the League of Oregon Cities. The entertainment was Pink Martini, a Portland band I like a lot. I had already planned that I was going to ask for two

songs when they came back for an encore – “Lilly” and “Que Sera Sera.” As it turned out they did “Que Sera Sera” as part of their concert, and there was no chance to ask for a particular song when they did their encore. On Sunday as we drove back from Portland I plugged in my ipod to listen to them again. I set the settings to “All” and to “Shuffle Songs.” This meant that my ipod searched through both of their albums that I then owned, found all 36 songs and played them in “random” order. That’s the glitch! The last two songs were “Lilly” and “Que Sera Sera.” The exact encore I had imagined the night before! What are the odds of this? My theory is that these two songs came up last, not randomly, but because of all the Pink Martini songs, I listen to these two the most often.

This crazy philosopher has a theory that there is a glitch in the ipod software. For practice, and to make sure you’ve got the IBE recipe down pat, take a few minutes, and using all four steps in the inference to the best explanation recipe. assess the quality of evidence he has for this theory.

¹ Gore, p. 262.

² <http://www.sciencemag.org/cgi/content/full/306/5702/1686>

³ Ibid.

⁴ Ibid.

⁵ Ibid.

⁶ Ibid.

⁷ Steve’s comment

⁸ Gilbert Harman, “The inference to the best explanation,” *Philosophical Review* 74 (1965) pp. 88-95.

⁹ Larry Wright, “Induction and Explanation,” *Philosophical Inquiry*, Vol. 4, No. 1, 1982, 1-16.

¹⁰ Peter van Inwagen, *The Problem of Evil* (New York: Oxford, 2006), p. 44.