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Lies, Statistics, Mathematics and the Truth

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Lies, Statistics, Mathematics and the Truth

Abstract

"Recognizing a key distinction between mathematics and statistics is helpful in understanding how we know if a statement is true."

Posting about deductive and inductive reasoning from *In All Things* - an online hub committed to the claim that the life, death, and resurrection of Jesus Christ has implications for the entire world.

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Comments

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Lies, Statistics, Mathematics and the Truth

Nathan Tintle

At the root of much of the ongoing "science vs. faith" debate is a fundamental question that has plagued humankind for millennia– how do we know whether something is true? As Christians, recognizing Scripture as God-breathed is a good place to start. Quickly, however, we get into questions that Scripture does not address explicitly – "Is it true that there are black holes in distant galaxies?" "Is it true that DNA is the building block of all life?" "Is it true that smoking causes lung cancer?"

Science often relies on logical, mathematical, and/or statistical arguments to help make claims about what it believes to be true. Yet, recognizing a key distinction between mathematics and statistics is helpful in understanding how we know if a statement is true.

For example, mathematics is primarily focused on deductive reasoning. This is the kind of reasoning or logic that says, "If A is true, then B must be true." These are the kind of truths that God has woven into the tapestry of the universe. Truths like "if I want to get from my house to yours, then the shortest distance is a straight line" or "if I drop a ball from my hand, then gravity will pull it towards the ground."

In contrast, statistics is primarily focused on inductive reasoning. This is the kind of reasoning that says, "If I observe A, then B is *likely* true." Just like science, in our day-to-day life we use inductive reasoning all the time. God provided us five senses to observe the world around us and draw conclusions about it. Without inductive reasoning, even with incomplete observations and uncertain conclusions, we are paralyzed to action. If I observe that it's sunny outside, but I know that it's winter and I see snow on the ground, I will likely conclude that it's cold out and put on my coat before I walk out the door. If I see my son with chocolate on his lips and cookie crumbs on the counter, I might conclude that he probably snuck a cookie from the cookie jar.

Things that may impact our inductively reasoned conclusions include the potential consequences of a wrong conclusion and our prior belief about how likely B would have been before I observed A. The consequences of putting my coat on when it's actually warm outside aren't so big. On the other hand, giving a punishment to a child based on uncertain information – if you are wrong – could be a bigger problem. How likely I think it is to be warm in winter or how often my child takes cookies from the cookie jar without asking are key things that might also impact how quickly I "jump to conclusions".

So, where can mathematical and statistical reasoning get into trouble in their quest for truth? For mathematics and deductive reasoning, the problems lie more with the premises: that is, what you assume to be true first ("If A…"). Whether or not you assume God exists can lead to fundamentally different conclusions about how a person chooses to live their life. Thus, as in mathematics, we see that people will generally agree on conclusions *if they agree on premises*.

For statistics and inductive reasoning, the trouble is typically less about what we've observed. The issue is more about how different people can look at the same observations (data) and conclude different things. Statistics attempts to lay out accepted rules for how to systematically evaluate observed evidence and draw conclusions that quantify uncertainty (for example, "I see strong evidence for this" instead of "This is 100% true").

When we see apparent contrasts between the truth we believe and what science claims to be true, it can be helpful to think about where the conflict lies. Is the conflict due to differences in the premises? For instance, is science making a claim which, even if logical, starts with an assumption that there is no God? Or, is science making a statement based on observations with which we can agree, but conclusions that we might not?

How then should we vet the claims of science when they challenge our own beliefs as Christians? I would argue that it is healthy to ask a few simple questions when confronted with these challenging situations: (1) *Deductive questions:* What premises is this claim based on? How do these premises align or not with my own beliefs? (2) *Inductive questions*: What observations have been made? Do I agree that these observations are true? What level of uncertainty has science placed on their conclusions based on those observations? (3) *Overarching questions:* Is it possible that my view of God is too "small" if I can't believe that my initial position is wrong after being presented with new information/data/conclusions? Can I carefully articulate whether my differing conclusions are due to different premises or different interpretations of observation?

For example, in the climate change debate, we might ask questions like: (a) How likely is it that we would see recent changes in global average temperatures if climate change *is* being impacted by human activity? is *not* being impacted by human activity? (b) What are areas of general agreement and disagreement about observations of global temperature changes? its root cause(s)? (c) What assumptions are made about current human activities over the next decades when projections are made regarding our world's ecology in 50 or 100 years? (d) How does my belief in a sovereign God who ascribed the cultural mandate (Genesis 1:28) to all of humankind impact my personal actions and activities regardless of the causes of climate change? How might this be different for a non-Christian?

Recognizing that God has given all humans the ability to draw both deductive (mathematical) and inductive (statistical) conclusions is one way that we all participate daily in the continued unfolding of God's creation. Humbly approaching perceived inconsistencies with confidence in a sovereign God, and with humility about the sinful lenses with which we view the world, may help us continue to be salt and light in a world that often pits science against faith and tries to force us to "take sides" in a hostile and combative war of words.