

Examining the usage and scope of historical science—a response to Dr Carol Cleland and a defence of terminology

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The important debate over scientific methodology must address the distinction between present and past. One recent idea proposes two realms of science: operational science and historical science. Because historical science addresses hypotheses not open to verification through experimentation, creation scientists have argued that historical science is subordinate to both Scripture and the testable, repeatable results of operational science. Some Darwinists assert that historical science should be considered equal to operational science, such as prominent philosopher of science Dr Carol Cleland. Her arguments will be examined and refuted, while the use of the terminology in question will be explained and defended.

Operational science deals with matters which are susceptible to investigation directly using the scientific method. This method, credited originally to creationist Francis Bacon, involves developing a hypothesis, conducting an experiment to test the hypothesis, and then determining if the result can be repeated in future experiments. This of course depends on our ability to actually witness the phenomenon in question.

On the other hand, historical science deals with investigating clues to determine what events have occurred in the past. Because we lack the ability to directly witness these events and conduct experiments on them, the scientific method does not apply here. Instead, clues are examined and a story is created that seems to plausibly explain the clues we find. This is forensics—exactly the same process used in crime scene investigations. But the fundamental difference here is that we cannot actually observe, test, or repeat past events. This weakness means we must always hold historical science loosely; it is always possible that new clues may come to light that totally change our appraisal. Our conscious and subconscious biases will also sway us in one direction or another as we seek to explain what we find. This is doubly true when we are dealing with questions of ultimate origins—questions having far-reaching and even spiritual ramifications.

On the usage of terms

In the modern intellectual landscape, the above concepts have unfortunately been muddled, and in many cases outright denied. Creationist authors Reed and Klevberg trace the first

usage of the term ‘operation science’ back to the writings of Norman Geisler from the 1980s,¹ a conclusion with which creationist writer Troy Lacey also agrees.² However, Reed and Klevberg incorrectly assume that this basic binary differentiation of terms between past and present is a later creationist corruption of the fourfold distinction proposed by Geisler and Anderson (they abbreviate it OS²)³—in reality instances of this basic binary distinction, even in secular literature, can be traced back at least as far as the 1930s.²

While there is no problem with Reed and Klevberg’s proposal of considering history and science separate fields entirely, with things like historical science being regarded as ‘mixed questions’,⁴ there is no meaningful distinction between this proposal and using the term ‘historical science’, which implies based upon the name that it is indeed a ‘mixed question’ between the fields of history and science.

They may be reading a bit too much into this terminology when they assert it represents a concession to the philosophy of positivism—certainly none of the creationists using the term would want to make any such concession! It seems, if nothing else, a convenient term for the explanation of these concepts to general audiences, without getting into the greater subtleties of Geisler’s OS² or the philosophically driven semantics of Reed and Klevberg. As this binary scheme now has several decades worth of usage behind it, it is this author’s opinion that making a fundamental change here would be more problematic than it would be worth to the creationist community at large.

One could, for example, launch a similar campaign against the usage of the term ‘natural selection’ (and some have done so!) on the grounds that the term implicitly commits

the fallacy of reification and wrongly implies that nature acts as an agent to ‘select’ things. However, by and large the creationist community continues to use this term for simple ease of communication.

Muddying the waters

Even those who do accept this distinction in the secular community will often deny that historical science is untestable; instead claiming that the two types of science are co-equal in terms of their ability to be verified. The motive here could not be clearer, for these individuals would have us believe that to deny Darwinism is no less anti-scientific than to deny operational physics or chemistry. They want to leave no room for discussion or debate on origins science.

For example, renowned evolutionist Dr Ernst Mayr once said in a lecture:

“For example, Darwin introduced historicity into science. Evolutionary biology, in contrast with physics and chemistry, is a historical science—the evolutionist attempts to explain events and processes that have already taken place. Laws and experiments are inappropriate techniques for the explication of such events and processes. Instead one constructs a historical narrative, consisting of a tentative reconstruction of the particular scenario that led to the events one is trying to explain.”⁵

This is a straightforward appraisal that no creation scientist would likely take issue with. But Mayr continues shortly afterward in the same address:

“The testing of historical narratives implies that the wide gap between science and the humanities that so troubled physicist C.P. Snow is actually nonexistent—by virtue of its methodology and its acceptance of the time factor that makes change possible, evolutionary biology serves as a bridge.”⁵

So, while Mayr clearly understood the distinction between operational and historical science, he deliberately muddied that distinction in the same breath by claiming that we can ‘test’ historical narratives, and that therefore there is no gap between these two methodologies.

Another such individual is Dr Carol Cleland, a Professor of Philosophy and Director of the Center for the Study of Origins at the University of Colorado, Boulder (figure 1). Like Mayr, Cleland also clearly recognizes this binary distinction:

“Historiographic [historical] science differs in important ways from experimental [operational] science. The hypotheses of experimental science typically postulate regularities among kinds or types of events In contrast, the hypotheses of scientific historiography typically postulate particular events”⁶

And also like Mayr, Cleland wishes to dispute the idea that historical science is less trustworthy and reliable than experimental science. In 2001, Cleland had a paper published in the journal *Geology* entitled ‘Historical science, experimental science, and the scientific method’.⁷ After mentioning that experimental scientists sometimes denigrate the ‘just-so stories’ given in historical science, she makes the following rather candid and surprising admission:

“The startling number of physicists and chemists who attack the scientific status of neo-Darwinian evolution provides telling examples of this phenomenon.”⁸

The reason I say this admission is both candid and surprising is that it is overwhelmingly common for Darwinists to employ the intimidation tactic of claiming that no ‘real scientists’ question the validity of evolution (employing a ‘No True Scotsman’ fallacy in the process). But here we see that they do, albeit apparently in private.

Cleland spends some time setting the stage for this debate by explaining the history of the scientific method, as well as the limitations imposed on experimental science by the



Figure 1. Dr Carol Cleland, philosopher of science

problem of induction: no finite number of examples can ever conclusively prove a universal generalization. It is for this reason that ‘falsificationism’ has been generally embraced by the experimental scientific community, following the work of Karl Popper, who utilized the logical principle of *Modus Tollens*, or denying the consequent: “If P, then Q. Not Q. Therefore, not P.” Using sequent notation:

$$P \rightarrow Q, \neg Q \vdash \neg P$$

In other words, a universal generalization is false if one can find at least one genuine example where it does not apply.⁸ Using this methodology, we never seek to *confirm* a hypothesis; instead we seek to prove it wrong by finding an example where it fails. If no one can produce any such example, it is held to be plausibly correct, and the more times it has been tested, the greater the degree of confidence becomes. Proponents of this methodology of science sometimes go so far as to proclaim that anything failing to apply it is not science at all—Dr Cleland quotes Henry Gee, an editor of *Nature*, as saying, “[Historical hypotheses] can never be tested by experiment, and so they are unscientific No science can ever be historical.”⁹

Cleland’s rebuttal to falsificationism

Interestingly, Cleland chooses in her response not to prop up historical science, but to attempt to chop down empirical science, bringing them both down to the same level. As Reed and Kleverberg note:

“Cleland raises an immediate red flag in her decision to critique experimental science. Why not simply present a positive case for historical science? It seems uncomfortably like an emotive appeal to those victimized by the unbridled arrogance of secular scientists.”¹⁰

Cleland’s response to falsificationism is to claim it is ‘deeply flawed’, citing two lines of reasoning: 1) real-world experiments involve a variety of auxiliary assumptions such that a failed repetition need not signify a falsified hypothesis, and 2) scientists do not routinely practise falsificationism when dealing with their own hypotheses.¹¹ While it is worthwhile to address both of these claims in more depth, it bears noting right away that neither of these statements, even if they are fully accurate, entail that historical science is trustworthy! This appears to be a fatal blow at the outset for Cleland’s attempted defence of historical science.

In response to the first point we potentially agree: it is difficult to isolate all the variables involved in real-world experimentation, and as such, science as a means of arriving at ‘truth’ will always be a ‘leaky bucket’. This is exactly why we need Scripture to give us a ground from which to conduct

our science! And to the second: what relevance does it have to point out that most scientists routinely act hypocritically by failing to live up to their own stated standards? How does that in any way invalidate the standards themselves?

Controlling for confounding variables

Cleland writes:

“The falsity of an auxiliary assumption (versus the target hypothesis) could be responsible for a failed prediction. Every science student is implicitly aware of this because repetitions of classical experiments in laboratory exercises often go wrong not because the hypothesis being tested is false, but because, for example, equipment malfunctions or the sample is contaminated. Moreover, this difficulty *cannot be circumvented* by varying the conditions under which a hypothesis is tested, given that the number of auxiliary conditions involved in any real-world situation is unknown and potentially infinite; it is impossible to control for them all. The famous Popperian directive to bite the bullet and reject the hypothesis in the face of a failed prediction has no logical force [emphasis added].”¹¹

Now on the one hand, there are many methods for controlling for confounding variables or auxiliary assumptions in experimental design, and also for separating them out after the fact using statistical analysis.¹²

On the other hand, however, it may well be true that in the real world of scientific testing, it is simply impossible to separate all the variables from the one being tested. Cleland alludes to this:

“Karl Popper’s highly influential alternative to inductivism, falsificationism, was undermined by the discovery that theoretical and background assumptions play integral roles in the rejection of hypotheses (the Quine-Duhem thesis), as well as in their acceptance (Gooding 2001).”⁶

In other words, your interpretations are guided by your interpretive filter (your worldview or starting assumptions). This is what we in the creationist community have been striving to point out. This means that, absent a foundation in Scripture to guide us in our basic worldview, it becomes hard to justify drawing *any* solid conclusions from science, even in the present. It is always possible there could be some unknown confounding variable we had failed to account for in our experiments. This problem is greatly reduced if we start from Scripture as the revealed word of God and move out from there, using falsifiable predictions to attempt to fill in gaps of knowledge that we cannot obtain from Scripture alone.

The real-world practice of falsificationism (or lack thereof)

As mentioned above, Cleland's second objection to falsificationism is that it is often not practised in the real world of science. She writes:

"Furthermore, as Kuhn (1970) pointed out, scientists almost never practice falsificationism. In the face of a failed prediction, they mount a sustained search for conditions other than C that might be responsible. This amounts to exercising the logically permissible option of salvaging a hypothesis by rejecting an auxiliary assumption."¹¹

As an example, she cites the incident of nineteenth century astronomers discovering the planet Neptune after finding that the orbit of the planet Uranus failed to conform to the predictions of Newtonian physics. Rather than rejecting Newtonian physics altogether, as Cleland states they *should have done* in accordance with falsificationism, they stuck with Newtonian physics and searched for a confounding factor. It turned out that factor was a new planet! But wait: would anyone really object to this, even under strict falsificationism? It seems that Cleland has set up a strawman by implying that falsificationism, in principle, does not allow for the presence of confounding variables in experiments. Apparently, Cleland would have us believe that the only correct response to a failed prediction, *on falsificationism*, is to utterly reject the hypothesis, admitting no room for the pitfalls of experimental methodology in the real world. This is clearly a strawman because it does not fairly represent Popper's ideas:

"Popper has always drawn a clear distinction between the logic of falsifiability and its applied methodology. The logic of his theory is utterly simple: if a single ferrous metal is unaffected by a magnetic field it cannot be the case that all ferrous metals are affected by magnetic fields. Logically speaking, a scientific law is conclusively falsifiable although it is not conclusively verifiable. Methodologically, however, the situation is much more complex: no observation is free from the possibility of error—consequently we may question whether our experimental result was what it appeared to be.

Thus, while advocating falsifiability as the criterion of demarcation for science, Popper explicitly allows for the fact that in practice a single conflicting or counter-instance is never sufficient methodologically to falsify a theory, and that scientific theories are often retained even though much of the available evidence conflicts with them, or is anomalous with respect to them."¹³

But what about the cases where scientists really do fail to apply falsificationism in practice? One need look no further than the example of Pasteur's refutation of

spontaneous generation a.k.a. abiogenesis. In spite of the fact that abiogenesis has been repeatedly falsified experimentally (though technically one can never prove a universal negative, so the term must be employed loosely here), the mainstream scientific community continues to cling to a belief that life began spontaneously from non-living matter—a belief that Dr Cleland would seem to also share.¹⁴ Since there is no scientific basis for this belief, we would be right to refer to their belief in abiogenesis as *blind faith*.

In any case, Dr Cleland is obviously right that scientists do not consistently apply falsificationism in real-world practice; but this says nothing of the usefulness of the methodology. It shows that scientists are human beings with worldviews and pet theories they seek to protect—even when it conflicts with known scientific results.

A 'smoking gun'?

The alternative Cleland seems to propose to falsificationism is the search for a so-called smoking gun:

"A look at the actual practices of historical researchers, however, reveals that the main emphasis is on finding positive evidence—a smoking gun. A smoking gun is a trace that picks out one of the competing hypotheses as providing a better causal explanation for the currently available traces than the others."¹¹

There is a major problem with this methodology that goes completely unaddressed: what counts as a 'smoking gun' in the minds of scientists is ultimately arbitrary, being dependent upon the types of causes they are able to conceive of at the time. Not only that, but the scope of competing hypotheses researchers are willing to consider is subjective; it is known all too well by members of the creation science community that unfavoured explanations (such as biblical creation, for example!) are ostracized and refused consideration by the secular mainstream scientific community. As geneticist Richard Lewontin famously put it, they don't want to "allow a Divine Foot in the door"¹⁵ In other words, the 'smokiness of the gun' is in the eye of the beholder. This does absolutely nothing to remove the subjective element from historical science.

To take one of Cleland's examples as a case in point:

"Prior to 1980 there were many different explanations for the demise of the dinosaurs, including disease, climate change, volcanism, and meteorite impact. The discovery of extensive deposits of iridium in the K-T boundary focused attention on the impact of a meteor; iridium is rare at Earth's surface, but high concentrations exist in Earth's interior and in meteors. The subsequent discovery of shocked quartz in the K-T boundary cinched [*sic*] the case for the impact of a

large meteorite, because there was no known volcanic mechanism for producing that much shocked quartz.”¹¹

If the discovery of shocked quartz in the K-T boundary is to be regarded as a smoking gun piece of evidence that decides the case in favour of the meteorite-impact hypothesis (figure 2), then we should at a bare minimum expect that today, there is nearly universal consensus on this topic among mainstream scientists. This is not the case. In fact, it does not take much searching to come up with the following statement from a mainstream source (*National Geographic*):

“The cause of the mass extinction that marks the end of the Cretaceous and the beginning of the Paleogene is a scientific mystery.”¹⁶

So, if this event is still being regarded as a mystery up to the present day, how can Cleland claim that any particular piece of evidence was a smoking gun? This is of course all an in-house debate among scientists that accept deep time and Darwinian evolution. If one jettisons the assumption of millions of years, and understands that the fossil record is largely not a record of gradual change but of global catastrophe over the span of around one year, then the discovery of evidence of meteorite impacts in the fossil record has no bearing any longer on the question of how the dinosaurs died out.

We have evidence from artefacts that strongly suggests humans and dinosaurs have coexisted in the past.¹⁷ Why is this not considered a smoking gun by evolutionists, falsifying the entire notion that dinosaurs died out millions of years ago? Simply put, it is because they refuse to consider this evidence, because to do so would force them to reconsider their worldview. This serves to underscore the point: evidence is always filtered through the starting assumptions of our worldview—it doesn’t speak for itself.¹⁸

The asymmetry of overdetermination

Cleland appeals to the ‘asymmetry of overdetermination’ to explain the methodological differences between historical and operational science:

“Localized events tend to be causally connected in time in an asymmetric manner. As an example, the eruption of a volcano has many different effects (e.g. ash, pumice, masses of basalt, clouds of gases), but only a small fraction of this material is required in order to infer that it occurred; put dramatically, one doesn’t need every minute particle of ash. Indeed, any one of an enormous number of remarkably small subcollections of these effects will do. Running things in the other direction of time, however, produces strikingly different results. Predicting the occurrence of an eruption is much more difficult than inferring that one has already occurred The asymmetry of overdetermination explains the reputedly problematic differences between historical and experimental science *vis-a-vis* the testing of hypotheses. Just as there are many different possibilities (subcollections of traces) for catching criminals, so there are many different possibilities for establishing what caused the extinction of the dinosaurs . . . [Scientists] postulate differing causal etiologies for the traces they observe, and then try to discriminate from among them by searching for a smoking gun—a trace that will identify the culprit beyond a reasonable doubt.”¹⁹

There is little doubt that the asymmetry of overdetermination is a valid observation about the facts of reality available to us as human beings, limited by the factor of time and what we are able to observe and understand. It is indeed harder to predict future events than it is to infer past events—just as it is harder to say exactly when and where a storm will occur in the future than it is to infer one has just passed by looking at clues such as the ground being wet and covered with hailstones.

However, what Cleland fails to consider is that our inferences about past events are all based upon our experiences; we see phenomena occur, and we witness the clues they leave behind. When coming across those same clues again in the future, we will tend to infer the same causes that we observed causing those clues the last time. We see storms happen, and we witness them producing hailstones. This is actually empirical and observational. But this also serves to highlight the central weakness of all historical science: we are limited in our explanations to the types of causes with which we are already familiar from our own experience. We are inherently unable to infer causes that we have never witnessed ourselves. Looking into the past, this puts us at a disadvantage: we will always tend to try to shoehorn the available evidence into fitting with



Image courtesy of NASA/JPL-Caltech

Figure 2. Cleland believes that ‘smoking gun’ evidence has been found for the hypothesis that a major asteroid impact caused the extinction of the dinosaurs.

Image by Sémhur/CC BY-SA 4.0

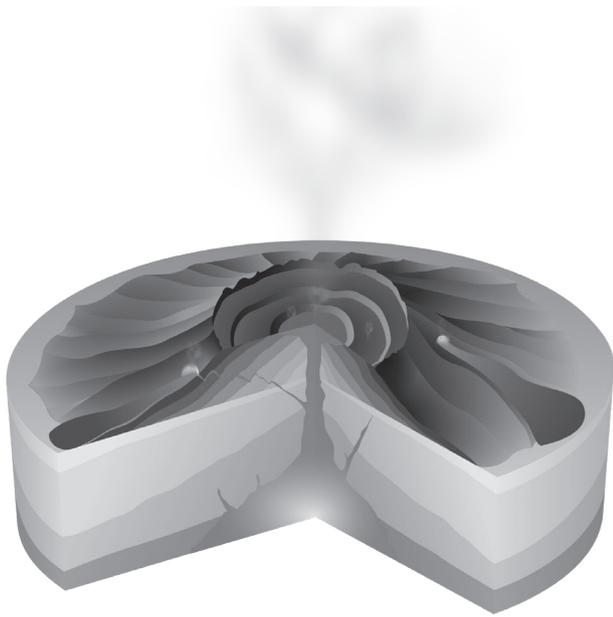


Figure 3. The ‘asymmetry of overdetermination’ can be illustrated by the fact that it is easier to infer the past eruption of a volcano (based on any of a great number of possible clues) than it is to predict its future eruption. Cleland claims this fact fully accounts for the differences in methodology between historical and operational science.

known types of phenomena as potential causes. It is exactly this tendency that perhaps led us to the widespread practice of uniformitarianism in mainstream historical science: the maxim that *the present is the key to the past* is really our only option for attempting to decipher history if we have rejected the inspired testimony of Scripture!

There is nothing logical or scientific about assuming that no unique causes have acted in the past which we do not observe in the present day. It is entirely conceivable that such is the case, and Scripture testifies that it really is the case. The Great Flood was unlike anything that anyone has ever witnessed, before or since. The only way to know what happened in the past for sure is to have a reliable eyewitness report from those who were there. Ironically, Cleland writes in a response to criticism:

“... when it comes to accruing evidence for a hypothesis, scientists do not have a God’s-eye perspective from outside of time. They are irrevocably situated in the flow of time, and the evidential position of the historian is fundamentally different from that of the experimentalist.”²⁰

Exactly! But with Scripture, a God’s-eye perspective is available to us! This is a perspective that Cleland ignores without so much as a mention. Cleland’s admission that the evidential position of historians is ‘fundamentally different’ from experimentalists serves to undercut her primary thesis that, ‘historical science is not inferior to classical experimental science’.⁸ Saying one is not inferior to the other is just like

saying that it is no better to *witness a crime as it happens* than it is to attempt to piece together what happened after the fact using the available clues. What forensic investigator would agree to such a statement?

In yet another piece of very rich irony, Cleland also says the following:

“... it is much easier to find a smoking gun for unusual catastrophic historical events having global consequences than for complex, ordinary historical processes and events having local consequences because the former, but not the latter, will typically leave traces ... that stand out in the stratigraphic record as noteworthy.”²¹

Hey, how about the presence of the whole stratigraphic record itself? Could that be a ‘smoking gun’ that there was a global flood? What about the fact that we find millions of fossils all over the planet, many showing evidence of rapid burial and submersion in water? What about finding marine fossils on the highest mountain peaks? The secular community manages to overlook all these things in order to maintain their belief in gradualism and the denial of the global flood. The ‘smoking gun’ is there, but people refuse to see it because they are willingly ignorant (as predicted in 2 Peter 3).

Conclusion

Dr Cleland has attempted to rescue historical science from the criticisms of those in the scientific community who recognize the superiority of empirical (operational) science to unfalsifiable stories about the past. Unfortunately, her attempts all end in failure because they all ultimately boil down to an attack on empirical, observational science, rather than a demonstration of the reliability of historical science.

In Cleland’s own words:

“The findings of historical science are just as tentative and subject to revision as those of experimental science Ideally, this process converges upon a single hypothesis. But there are no guarantees ... it is important to keep in mind that the correct hypothesis may not be among those being entertained and indeed may never be entertained by humans; historical scientists are just as limited by their imaginations as experimentalists.

Moreover, even supposing that the correct explanation is among those under consideration, there are no guarantees that a smoking gun for it will be found even supposing that one exists.”²²

Cleland may be praised here for her honesty, but this worldview is bleak and hopeless. We can never be sure of knowing anything if we are dependent on human science alone, and Cleland appears to embrace this skeptical, agnostic attitude, but only up to a point; she is never skeptical of the overall

secular dogma concerning the past: millions of years and evolution are *always* taken for granted in Cleland's writings.

Just like most other secular scientists, Cleland does not consider the weight of divine Scripture as a guide to what has occurred in earth's past, as well as a foundation from which we can draw conclusions about the present regular workings of the universe. Neither experimental nor historical science are of much value without Scripture, and Cleland is almost hilariously blind to her own anti-creationist biases even while going out of her way to point out how much biases really do influence the conclusions of scientists.

For example, Cleland in multiple publications devotes much time to the asteroid-impact theory of dinosaur extinction, but never once does she consider the possibility that the dinosaurs died out relatively recently, despite the presence of soft tissue in dinosaur bones (another 'smoking gun' that neo-Darwinists like Cleland must intentionally overlook).²³ This simultaneously shows Cleland is right about the power of biases to control scientific conclusions, yet wrong about the conclusions she herself draws.

Falsifiability remains as a powerful demarcation between operational and historical science (despite the practical limitations scientists often face), and Cleland's attack on the methodology of falsification was based upon a mischaracterization. Because we are highly limited in the amount of evidence we are practically able to collect about the past, as well as in our ability to conceive of all possible causes of a given piece of evidence, eyewitness testimony will always be preferable to speculative reconstructions.

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