

Carol Cleland's case for historical science— part 1: devaluing experimental science

John K. Reed and Peter Klevberg

Before uniformitarian geology derailed biblical history, the rails were greased by an unwarranted confidence in scientific history. What is the relationship between science, history, and truth? Carol Cleland, a leading philosopher of science, attempts an answer. Reacting to critics who claim historical science is less valid than experimental science, she defends their epistemic equality with both negative and positive arguments. Her negative argument highlights flaws in both the theory and practice of experimental science. Although her arguments ably undermine some modern distortions, her case against experimental science in this paper relies on the straw man of *positivism*—the idea that science is the arbiter of truth—and is thus less robust than a traditional Christian understanding of the relationship between science and revelation.

Carol Cleland and historical science

Geology has begun to interest philosophers of science. This is notable; for many years, philosophers saw physics as the prototypical science and left philosophizing about geology to geologists (e.g. G.G. Simpson, S.J. Gould). But in recent years, increasing numbers of philosophers have been drawn to geology, to the extent that they authored the first three papers of the 2013 Geological Society of America's *Rethinking the Fabric of Geology*.¹ One is Dr Carol Cleland of the University of Colorado, who has built a strong reputation on her defence of historical science as able to guarantee similar levels of epistemic confidence as experimental science.^{2–6} She has been a consistent advocate for historical science during a time when the optimistic positivism of the 19th and 20th centuries has been deflated.

Cleland is correct to prick the pretension of scientists. Positivism has long sold a false confidence in science. Cleland agrees that experimental science is powerful, but argues that it is not a unique path to truth, nor even unique as 'science'.⁷

Cleland's negative case: experimental science is flawed

Cleland focuses on emphasizing the validity of historical science as a separate science, rather than addressing the root problem of naturalism. Her goal is straightforward:

"I argue that while it is true that there are fundamental differences in methodology between the historical natural sciences and classical experimental sciences, it is a mistake to conclude that the scientific status of the former is inferior to that of the latter."⁸

Her pursuit of that goal follows two paths (figure 1). The first is a negative critique of experimental science, seeking to deflate its perceived superiority. Following her outline, we

first examine her negative case. Her argument for this case is twofold—*theoretical and practical weaknesses inherent to experimental science limit its epistemic value*.

Theoretical weaknesses

Though Cleland directs her attack at experimental science, her critique would be more accurately seen as one on the secular distortion of positivism, showing weaknesses in the prevailing secular *attitude* about science, not science *per se*. Positivism has probably passed its zenith as an intellectual idea, but it remains strong as an emotive attitude:

"The essential point of that doctrine is simply the affirmation of science, and the denial of philosophy and religion."⁹

This attitude twists science; it grants to modern science the position occupied by the Bible in earlier generations. As the pinnacle of truth, science breeds an accompanying arrogance, which animates the dismissive attitude of Henry Gee, a senior editor of *Nature* and Cleland's foil:

"Taking aim at all historiographic research, Gee writes, 'they [historiographic hypotheses] can never be tested by experiment, and so they are unscientific No science can ever be historical' For Gee and fellow travelers a genuine test of a hypothesis requires experimentation. Historiographic hypotheses cannot be tested in this manner. Hence, they are unscientific."¹⁰

Cleland attacks that position with a philosophical jujitsu that highlights theoretical and practical flaws. She starts slowly, by drawing a line between practitioners and philosophers of science:

"Many scientists and most laypersons are still enthralled by this conception of science as a fundamentally experimental enterprise, which helps to explain some of the trenchant criticisms mounted

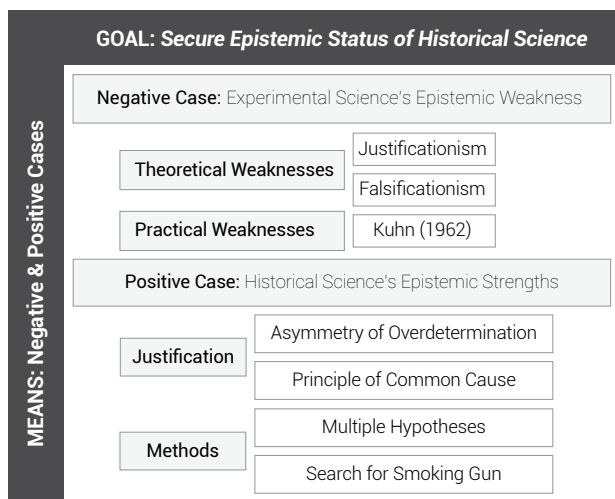


Figure 1. A map of Cleland’s argument for epistemic equality of historical and experimental science. This paper focuses on the negative case against experimental science.

against scientific historiography. However, this view is no longer popular among philosophers of science.”¹⁰

Whether or not a view is popular among philosophers of science says little of its validity, nor should it be assumed that philosophers of science, as such, have a mystic insight into truth denied to ‘scientists and most laypersons’. But she moves to a firmer footing by noting the major theoretical weakness of induction, ironically traced back to David Hume—an early and enthusiastic secularist:

“Unfortunately such inductivism faces David Hume’s ... intractable problems of induction: No finite body of evidence, however varied and extensive, can conclusively establish the truth of a universal generalization applying to unobserved as well as observed cases.”¹¹

She illustrates Hume’s argument by noting that everyone once thought that ‘all swans are white’, until *black* swans were discovered in Australia.

For centuries, science sought to discover truth by testing and confirming hypotheses using what Adler termed *special experience*:

“... experience we have as the result of investigative efforts on our part, and only as the results of such efforts [emphasis in original].”¹²

Confirmation, though tentative, happened when *positive* affirmations of hypotheses were made by controlled observation. Early science avoided Hume’s trap because scientists did not demand absolute truth from their work; that was the task of theology, freeing science to discover valid, piecemeal truths without having to deductively justify each conclusion.¹³ Science was tentative; new information provided new insight. But when secularists sought to replace theology with science (as Hume advocated at the end of *An*

Enquiry Concerning Human Understanding), science had to assume that burden. Unfortunately, it took some time for the implication of Hume’s new view of science to penetrate the Enlightenment euphoria.

Eventually, scientists realized that finding *positive* affirmations of hypotheses (which Cleland calls ‘justificationism’) could not prove them:

“... justificationists argue that while hypotheses cannot be conclusively proven, their probability can nonetheless be raised by enough successful predictions. Unfortunately, theories of justificationism face the probabilistic version of the hoary problem of induction.”¹⁴

To ‘rescue’ science, Karl Popper¹⁵ proposed falsifying, instead of justifying, hypotheses. Hypotheses that survived rigorous testing were considered true. But that solution still does not meet Cleland’s standard:

“Philosophers have known for more than half a century that falsificationism is deeply flawed logically. Falsificationism treats hypotheses as if they were being tested in isolation from nature—as if a prediction involves no assumptions about boundary or initial conditions of the hypothesis. But ... hypotheses and theories never stand alone when tested in real-world scenarios. Whether conducted in a lab or the field, a concrete test of a hypothesis involves an enormous number of auxiliary assumptions ... about instrumentation, pertinent conditions, and the absence of potentially interfering factors, many of which are highly theoretical, poorly understood, or simply unknown.”¹⁶

In other words, scientists are finite and fallible and must rely on assumptions to conduct experimental or historical science. Popper’s view is still popular in some circles, but Cleland is correct in noting that neither justificationism nor falsificationism guarantees the epistemic expectations of autonomous science:

“In summary, traditional accounts of the scientific method (justificationism and falsificationism) are logically flawed and moreover do not provide faithful reconstructions of the evidential reasoning of either experimental or historical scientists. It follows that appeals to the ‘scientific method’ cannot be used to undermine the scientific status of the historical sciences.”¹⁶

Cleland seems to believe that she has won a great victory for historical science, by showing that both kinds of science are equally wrong. Instead of turning to Christianity to rescue truth, scholars prefer to cut off their nose to spite their face.

One of the most interesting implications of Cleland’s argument is that the *method* of science is not singular:

“In addition, the dogmatic view that the success of science must be attributable to some as yet unspecified

universal scientific method for which experimental science provides the prototype, is undermined by studies showing that even experimental scientists employ a variety of different methods in their research practice.”¹⁷

She later argues that a single scientific method is unrealistic. Instead, each ‘kind’ of science should have its own method:

“In the first place ... many doubts about the scientific status of historical research are rooted in a one-size-fits-all account of the methodology of science that is deeply flawed, both logically and as an account of the actual practices of scientists (including experimentalists).”¹⁸

If this is true, how is ‘science’ defined? Is it a meaningless ‘feel-good’ qualifier? Dimly perceiving this problem, Cleland insists that it retains an essential unity by virtue of the same goal—relating hypotheses to explanations and predictions via empirical evidence. In that sense:

“Most historiographic hypotheses are supported or ‘confirmed’ by evidence in virtue of the power of the hypothesis to *explain* (vs *predict*) the evidence.”¹⁹

The process is not as neat in historical science as it is in experimental science because:

“Experience suggests, however, that if there are regularities relating particular evidential traces to their long past causes they are extremely messy and rough, riddled with exceptions and contingencies, and thus not at all like the stereotypical laws of physics.”²⁰

She brushes aside these problems as the price of doing business, admitting that scientists like Gee may have a small case if their understanding of historical science is correct:

“The central problem with narrative accounts of scientific historiographic explanation is the stress placed upon formulating a coherent story over empirically validating it ... This conflicts with the traditional emphasis in natural science on evidential warrant. ... If the main reason for accepting a historiographic hypothesis is its explanatory power and it draws its explanatory power primarily from the coherence and continuity of a quasi-fictional story, then scientific historiography really does seem inferior to experimental science.”²¹

She insists, however, that this is not a problem because science is not about an experimental method, but:

“... the central focus of historians of nature is on securing empirically well-founded connections between evidence and hypothesis ... they emphasize more direct inferential strategies for inferring long past common causes from present-day effects.”²²

Thus, it is not the traditional scientific method that defines ‘science’, but the ability to empirically establish links between hypotheses and evidence. In her view,

experimental science does that in terms of *prediction*; historical science does it in terms of *retrodiction*. At root, Cleland insists that scientists of all stripes are simply linking empirical evidence to hypothesis:

“I conclude that the putatively problematic differences in research strategies between historical scientists and experimentalists reflect pervasive causal differences in their evidential situations; the methodology of each domain is designed to accommodate and exploit causal, as well as logical characteristics of the evidential relation between hypothesis and observation. The view that historical science is somehow inferior to experimental science is based upon a mistaken account of scientific methodology that reconstructs scientific reasoning entirely in terms of purely formal, logico-mathematical considerations.”¹⁴

Practical weaknesses

After highlighting some theoretical weaknesses of experimental science, making assertions that historical and experimental science have distinct methods, and redefining ‘science’ as ‘linking evidence to hypothesis’, she proceeds to the second aspect of her argument—experimental science also fails in practice. She leans heavily on Kuhn:²³

“The ‘logic’ of the methodology of science was not the only victim of post-positivist critiques of science. Hanson ... and Kuhn ... attacked the idea that observation, however carefully conducted, is unbiased, establishing that all evidence is irrevocably contaminated by theory; in order to count as evidence, observations must be interpreted and interpretation inevitably utilizes theoretical concepts and assumptions. ... In short, experimental science had failed to live up to its early promise as a model for all science.”²⁴

In other words, scientists are not AI (artificial intelligence) truth machines. We all know that scientists are fallible, not always virtuous, and driven by paradigmatic commitments stemming from their worldview, their politics, greed, or passion. Her insight is valid, but early scientists (thanks to Christianity) understood human nature better than moral relativists. They were realists, expecting man’s fallen nature to produce ‘better’, not ‘perfect’, because that was for the next world.²⁵ But as secularists like Hume displaced Christianity with mathematics and science, and later optimists preached science as a panacea for perfectible humans, the early ethical framework began to crumble. Events have shown its failure and illustrated the truth of Christian doctrine—men cannot attain perfect behaviour any more than they can attain perfect truth.

Early modernists spent the accrued Christian capital, not realizing it was vanishing. Dostoevsky wrote: “If God does

not exist, then everything is permitted”, and scientists are no less exempt from the moral consequences of atheism. Postmodern man is learning that while being the lone atheist in a tolerant, ethical society may be fun, ruling in one of evil and despair is not. Kuhn highlighted relatively minor issues of fallibility; recent events would shock him. We see the political corruption of science,^{26,27} and the persecution of dissidents in academia is now reaching politically incorrect secularists as well as Christians.^{28,29} We are even seeing falsified research results.³⁰ Today’s science needs Christian ethics as well as Christian truth.

So Cleland correctly notes that the theory and practice of science cannot bear the weight of absolute truth. Science minimizes the unknowns and maximizes confidence, but confidence in its results and truth was historically undergirded by faith in the absolute truth of revelation and in man’s ability to comprehend it. Secular man is finally seeing that science’s biblical foundation was not displaced without consequences.

In light of these problems, can the status of historical science be advanced by devaluing experimental science? If ‘justificationism’ fails the test of induction and ‘falsificationism’ does not account for all of the variables in the equation, then science, doomed to uncertainty, certainly has no room for the arrogance of positivism. In Cleland’s opinion, comments by those like Henry Gee are the pot calling the kettle black.

Discussion

Renewed assessments of historical science, whether from philosophers or scientists, should prove beneficial to a brand mired in early 19th century positivism. As such, Cleland’s work is a welcome contrast to the ideological ideas of the mid-20th century. But her work also highlights the failure of Christians to retake this valuable ground.

Many orthodox Christian ideas seem archaic to the postmodern generation. For example, the foundational nature of special revelation to any human truth seems preposterous, because ‘everyone’ knows truth is relative. It is hard then to acknowledge that human knowledge is epistemically inferior to God’s simply because humans are metaphysically inferior to God. The epistemological hierarchy inherent in Christianity (figure 2) has been forgotten. Positivism has been unable to provide a viable substitute, and epistemological egalitarianism contributes to the confusion Cleland seeks to dispel. To make things worse, postmodernists cling to positivism, but as a presupposition, not an intellectual proposition. Thus, they continue to conflate science and history, just as Cleland does.

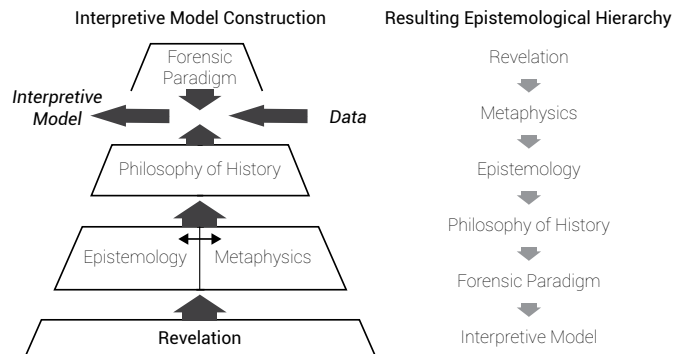


Figure 2. In Christianity, interpretive forensic models are constructed from data shaped by forensic paradigms, which in turn are shaped by philosophical and theological assumptions. For that reason, an epistemological hierarchy is affirmed. Positions are determined by any step’s need for presupposition supplied by another. Metaphysical truth presupposes revelation, defining their relative positions. Forensic models of Earth history occupy the end of a hierarchical chain, depending on a chain of presuppositions.

Cleland raises an immediate red flag in her decision to critique experimental science. Why not simply present a positive case for historical science? Why diminish another discipline? It seems uncomfortably like an emotive appeal to those victimized by the unbridled arrogance of secular scientists. Truth, not equality, should be the objective.

Her negative case exhibits several problems. First and foremost, most of her arguments against experimental science also apply to historical science. Are experimental scientists unable to overcome Hume’s challenge? Historical scientists rely on induction too. Are experimental scientists prone to ignorance, error, bias, dishonesty, greed, or pettiness? Historical scientists are people too. Do unknown or uncontrolled variables preclude absolute certainty in experimental science? Historical science is worse—its uncertainties are much greater, and cannot be reduced by controlled, repetitive experiments. At root, her fundamental error is building a straw man of science as the arbiter of truth.

Furthermore, her ‘epistemic competition’ between experimental and historical science misses the point. Why do *all* empirical disciplines have to be ‘science’? This is a category error; science is a *part* of empirical knowledge, not its sum (figure 3). Adler’s³¹ classification of natural history as a ‘mixed question’—in which philosophy, science, history, theology, and revelation all play a part—is a better description both in theory and in practice.³² That subtlety of an inherent positivism has led us to reject the ‘origin/operation’ model; it repeats this error by labelling origins, history, and even the supernatural, as ‘science’. This view also denigrates history, which is a valid empirical discipline that does not need the appellation ‘science’. Modernists are like a compass needle; they always point to science

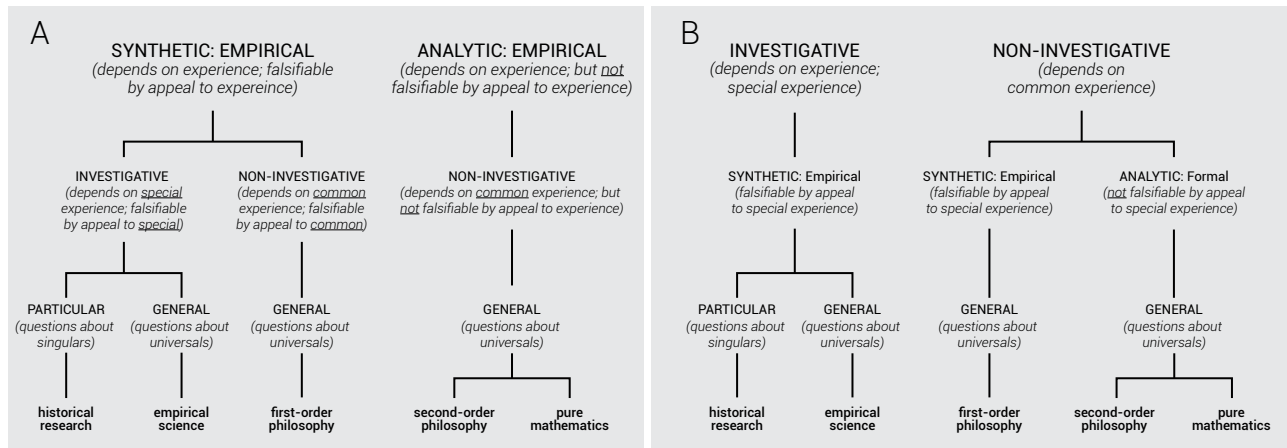


Figure 3. Adler's classification of disciplines based on the dual dichotomies of empirical vs formal and investigative vs non-investigative. Science is more than just 'empirical' and is distinguished from other empirical disciplines by its objects of inquiry, which are questions about universal principles of nature.

for validation. Today, history sells its noble tradition for whatever crumbs science deigns to toss its way.^{33,34}

What about her case against experimental science due to its practical problems? She references those described by Kuhn in the 1960s. We believe they are more problematic today because of inroads made by relativist views about truth and ethics. Apart from God, scientists cannot maintain a consistent intellectual and ethical framework for science. Their practice puts the lie to both. Worse, the coming wave of nihilists won't do science; they will only scavenge its technology. Cleland admits that secular scientists have professional shortcomings, but is not curious about the reasons. Christianity could answer her questions; both epistemological and ethical (figure 4). Cleland is trapped in the world of positivism. This is the major weakness of her case (figure 1).

One way to understand the difference between answers from Christianity and naturalism was described by Adler. He drew a distinction between the absolute truth of *epistēmē* and the contingent, partial, and evolving knowledge of *doxa*. Science belongs to the latter. He looked beyond the binary option of 'knowledge' vs 'opinion' to a trinity of options: (1) private (subjective) opinion, (2) public (objective) opinion, and (3) certain truth (figure 5). Science, like any other valid discipline, provides predominantly public opinion that ranges along a scale of certainty. Error is therefore not catastrophic, because the truths affirmed are largely contingent.

In that construct, Hume's argument is not fatal, because science does not carry the burden of *epistēmē*. God's truth undergirds human knowledge. It also provides the ethical framework needed for science, including the inherent value of people created in God's image. In all these ways, it validates the presuppositions of science, supports its methods, and ethically regulates its practitioners. It does the

Cleland's Critique of Experimental Science	Christian Response
Hume's argument against induction invalidates both justification and falsification	Bible and man in God's image justifies induction as a source of valid but contingent truth
Falsification can never reach truth; too many possibilities to eliminate to reach truth	Since science does not validate itself, it works well discovering contingent truth about nature
Scientists affirm falsification, but do not follow Popper's strategy of 'risky tests'	Scientific method reduces, but does not eliminate human fallibility
All lab variables can never be perfectly reproduced, thus scientific method invalid	Experimentation minimizes uncertainty, does not guarantee absolute truth
Experiments are hard to reproduce for a variety of reasons, thus method invalid	Most sufficiently reproducible; demonstrated by past success; most problems are ethical
Philosophers of science reject justifications by scientists of scientific method	Like scientists, philosophers are not the benchmark of truth; shows need for revelation
Scientists do not follow their own methods all the time; subjective variables exist	Human fallibility expected by Christians; method <i>minimizes</i> , does not eliminate, problems
Research driven by external paradigms; generates a bias in research results	Shows importance of Christian worldview to understanding nature, man and ethics

Figure 4. Christian response to Cleland's negative case. Her points are valid when applied to positivism, but much less so in the context of the Christian worldview.

same for history and any other valid discipline. Differences are not measured in epistemological superiority or inferiority, but by the subjects, questions, and methods each uses. Science may have an advantage in its own domain, but ultimately the contingent truths of any discipline are

measured against the absolute truth of God’s knowledge, not each other.

The creation trials of the 1980s forced both Christians and secularists to question the reigning positivist view of science. The cases turned on distinguishing ‘science’ from ‘religion’. Although the judges assigned secular geohistory and biohistory to ‘science’, and creationism to ‘religion’, their confidence was not shared by some philosophers. Laudan³⁵ questioned the demarcation criteria assumed during the trials. By 1992, Bauer was questioning whether there was such a thing as the ‘scientific method’.³⁶

Christians belatedly addressed these questions, but did not reassert the uniquely Christian foundations of science. Instead they looked for a resolution *within* positivism, typically inventing multiple kinds of science.^{37–39} Others ignored the question:

“... most contemporary philosophers of science regard the question, ‘What methods distinguish science from nonscience?’ as both intractable and uninteresting.”⁴⁰

But creationists should address the nature and practice of science. Liberating it from both modernist positivism and postmodernist relativism can only be done by Christianity.

Cleland’s main failing is having no foundation for unified, absolute truth. Empiricism demands the possibility of ongoing revision. Creationists are best placed to see the damage to science and history caused by modernism⁴¹ and postmodernism.^{42,43} Biblical Christianity created the intellectual conditions for science, and only biblical

Christianity can save science, since science cannot survive the collapse of normative truth and ethics. The challenge for creationists has moved from justifying biblical history to rescuing both science and history from the abyss of relativistic views of truth and ethics. The damage is already great; recent decades have seen an accelerating subordination of truth to ideology—most obvious in the climate wars—and that loss of truth (and derivative ethics) echoes through science:

“It is simply no longer possible to believe much of the clinical research that is published, or to rely on the judgment of trusted physicians or authoritative medical guidelines. I take no pleasure in this conclusion, which I reached slowly and reluctantly over my two decades as an editor of the *New England Journal of Medicine*.”⁴⁴

Conclusion

Secularists and Christians alike are confused about the nature of science, thanks to years of distortion. Both appear to approve of multiple kinds of science, although that raises the question of which kinds are more ‘scientific’ than others. Cleland attempts to justify the equality of experimental and historical science by first pointing to theoretical and practical problems with experimental science as an indication that their perceived superiority is misplaced. But her negative case depends on several assumptions. The first is the category error of conflating empiricism and science, which shows up as defining ‘science’ as nothing more than empirically

linking hypotheses to evidence. The second is the presuppositional error of positivism, which places a burden on science (of any kind) that cannot be borne. Experimental science and natural history are epistemic equals only in the sense that both are unique, empirical disciplines able to find truth *within* the Christian worldview. They are *not* epistemic equals in the sense of certainty, because the experimental method allows a reduction in subjective elements that the forensic methods of natural history do not.

Christians have been heavily influenced by positivism and fall prey to the same trap. Geisler,³⁷ Geisler and Anderson,³⁸ and Thaxton *et al.*³⁹ illustrated this with their scheme of expanding science to include: ‘operation science’, ‘historical science’, ‘origin science’, and ‘supranormal science’, which perpetuated positivism. Creationists

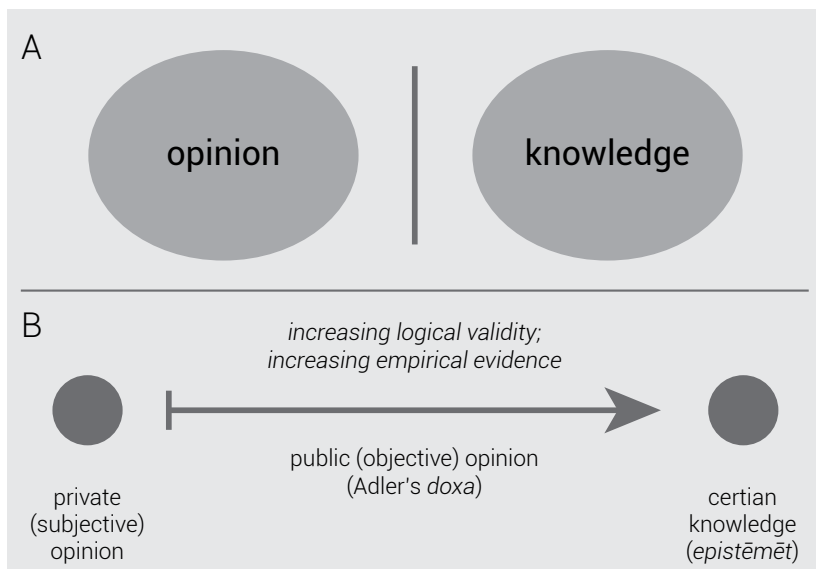


Figure 5. Instead of a binary division between opinion and knowledge (A), Adler recognized a distinction between private and public opinion (B). Public opinion, *doxa*, can increase in certainty along a scale of increasing logical validity and increasing empirical confirmation. Absolute knowledge, *epistēmē*, is the limited set of indubitable truth. If science is not *epistēmē*, then Cleland’s critique loses much of its urgency.

often abridge this idea to the dualistic ‘origins’ and ‘operations’ science. But language is always critical to thought, and so we encourage more careful use of language and the re-evaluation of both science and history within the worldview of the Bible.

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- As an aside, there is irony in Cleland’s case. Charles Lyell caught a 19th century wave of scientific euphoria, and built uniformitarian natural history as an extension of Newton’s physics, linking the two through his deceptive ‘uniformity principle’. He succeeded in riding Newton’s coat-tails to an exalted height. Now that the positivist wave is receding, Cleland advances a high view of geology by denigrating physics! See Laudan, R., *From Mineralogy to Geology: The foundations of a science, 1650–1830*, University of Chicago Press, Chicago, IL, 1987.
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John K. Reed earned B.S., M.S., and Ph.D. degrees in geology. He worked for several decades as a professional geologist in industry and academia. In 1998, John became the geology editor of the *Creation Research Society Quarterly*, and was subsequently elected to the CRS Board of Directors. He has written and edited numerous books and articles about creation and natural history.

Peter Klevberg obtained a Bachelor of Science in Engineering Science from Montana College of Mineral Science and Technology in 1988, and is a registered Civil Engineer. Peter is a PE registered in 6 states. He has worked in precious metals and industrial mineral exploration and development as well as in geotechnical, environmental and hydrogeological consulting.