

# Annotated Bibliography Harry Luo

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**Revised Proposal:** “Principle of Simplicity” is a fundamental principle in science, and on which we have justified many scientific methodologies like uniformitarianism. However, it is interesting to ask whether our belief in fundamental principles like simplicity is different from being dogmatic. Using the historical development of uniformitarianism in geological sciences as a case study, I investigate how the principle of simplicity functions as an ultimate justification for scientific methodologies.

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1. Quine, W. V. O. (1951). Two dogmas of empiricism. **The Philosophical Review**, 60(1), 20–43.

## Summary

Quine argues that all beliefs, including scientific ones, exist within an interconnected web where no single belief can be fully isolated for verification. Crucially, he demonstrates that even seemingly fundamental principles (like simplicity) cannot be justified in isolation but derive their validity from their role in the broader theoretical framework. His argument that “no statement is immune to revision” challenges the notion that scientific principles are fundamentally different from other beliefs, as all are subject to potential revision within the total system of knowledge.

## Relevance

This directly addresses our core question about whether scientific principles (like simplicity) are fundamentally different from religious beliefs in three ways:

1. It suggests that scientific principles, like religious beliefs, cannot be justified in isolation
  2. It shows that the justification of simplicity might be circular within the scientific framework, similar to how religious beliefs are justified within their theological frameworks
  3. It provides a philosophical framework for understanding how principles like simplicity can be both fundamental and revisable
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2. Kuhn, T. S. (1962). **The Structure of Scientific Revolutions**. University of Chicago Press.

## Summary

Kuhn’s analysis of paradigms reveals how scientific communities treat certain principles as unquestionable during periods of “normal science.” Particularly relevant is his discussion of how these fundamental assumptions (like simplicity) are maintained not purely through empirical validation but through community consensus and practical utility. He shows how resistance to changing these fundamental principles mirrors religious communities’ resistance to doctrinal changes, yet scientific paradigms ultimately can shift when sufficient pressure accumulates.

## Relevance

This work is crucial for our analysis because:

1. It demonstrates how scientific principles like simplicity function as quasi-religious doctrines during normal science
  2. It shows how scientific communities resist changing fundamental principles, similar to religious communities
  3. Yet it also reveals a key difference: scientific principles can ultimately change through paradigm shifts, suggesting a potential distinction from religious beliefs
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3. Sober, E. (2001). **Ockham’s Razors: A User’s Manual**. Cambridge University Press.

## Summary

Sober specifically examines the principle of simplicity, distinguishing between its use as a practical tool and as a truth-conducive principle. He argues that simplicity’s justification varies across contexts and

cannot be universally defended as truth-conducive. Crucially, he shows how simplicity often functions as an assumed principle in scientific reasoning, similar to how foundational beliefs function in religious thinking, yet attempts to ground its justification in pragmatic success rather than faith.

### Relevance

This source is central to our argument because:

1. It directly addresses how simplicity functions as a fundamental assumption in science
  2. It examines whether simplicity's justification is circular (like religious beliefs) or grounded in empirical success
  3. It helps us understand whether accepting simplicity as a scientific principle is fundamentally different from accepting religious beliefs
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4. Dresow, M. (2022). Uniformitarianism re-examined... **Perspectives on Science**, 1–52.

### Summary

Dresow examines how uniformitarianism evolved from a rigid principle (akin to religious doctrine) to a flexible methodological guideline. He specifically shows how the principle of simplicity underlies uniformitarian thinking: scientists prefer simple, uniform explanations of geological phenomena but can abandon this preference when evidence demands. This evolution demonstrates how scientific principles can maintain their fundamental status while remaining open to modification.

### Relevance

This case study is vital because:

1. It shows how a scientific principle backed by simplicity can evolve, unlike religious dogma
  2. It demonstrates how scientific principles can be both fundamental and flexible
  3. It provides concrete examples of how scientific communities balance maintaining fundamental principles with responding to evidence
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5. Page, M. D. (2021). The role of historical science... **Philosophy of Science**, 88(3), 461–482.

### Summary

Page analyzes methodological actualism as a more nuanced version of uniformitarianism, showing how scientific principles can be fundamental without being absolute. He specifically addresses how simplicity functions in historical sciences: it serves as a default assumption but can be overridden by evidence. This demonstrates how scientific principles can maintain their foundational status while remaining empirically responsive.

### Relevance

This work is crucial because:

1. It shows how modern science handles fundamental principles differently from religious doctrine
  2. It provides a framework for understanding how simplicity can be both fundamental and flexible
  3. It helps distinguish between religious-style absolute beliefs and scientific methodological assumptions
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### Synthesis Note:

Together, these sources create a progression from theoretical frameworks (Quine, Kuhn) to specific analysis of simplicity (Sober) to concrete examples in geological sciences (Dresow, Page). This progression allows us to examine how simplicity functions as a fundamental principle in science and whether its justification and application truly differ from religious beliefs.