The Principle of Simplicity: From Dogmatic Acceptance to Justified Practice

Abstract

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Scientific methodology often relies on simplicity principles, yet their justification frequently rests on shaky foundations of self-evidence or methodological necessity. This paper argues that such justifications are inadequate and can lead to dogmatic adherence to simplifying assumptions, hindering scientific progress. Focusing on the historical sciences, we examine uniformitarianism in geology as a case study, demonstrating how its initial dogmatic formulation resisted evidence for catastrophic events and ultimately evolved into a more nuanced "critical uniformitarianism." Drawing on the work of Norton, Cleland, and Mitchell, we develop a framework for understanding justified simplicity, emphasizing local, context-specific justification over universal claims and advocating for a balance between methodological economy and the recognition of complex, scale-dependent phenomena. The paper concludes that the transition from dogmatic to justified application of simplicity requires explicit justification within specific domains, sensitivity to scale, openness to evidence-based modification, and integration with the recognition of complexity—a framework we term "critical simplicity"— essential for robust scientific practice.