

Writers on Scientific Philosophies and Histories

Since almost the beginning of written history, at least a relation between mathematical and scientific patterns and the course of human history has been evidenced by the field's most prolific writers. Charting the rigorous intersection between such scientific fields and the study of philosophy should be no easy task: the overlap is considerable in the pre-modern and modern periods. Here is a brief sketch of the individuals who I have found particularly compelling with respect to such thought, and note that I have been hard-pressed to find the time to read even these scholars, let alone those who have fallen more severely through the cracks. First, a note on the Enlightenment mathematicians who demonstrated that fierce religious devotion was not only compatible with scientific rigor but in some cases a requisite perspective. Second, a sketch of the overlap between mathematics and philosophy in the case of the nineteenth-century pure logicians. Third, a sketch of the overlap between scientific processes and philosophies of history. Fourth, a brief note on the prevalence of cyclical theories of history and the contemporary place of such doctrines.

Leonhard Euler (Switzerland, 1707-1783)

Euler's name has been lent to so many theorems and formulae that his philosophical thoughts have been scarcely remembered. Considered by many the greatest mathematician of all time, he considers the spiritual world in his *Letters to a German Princess* (his perspective is, perhaps surprisingly, somewhat esoteric). I am unaware of any comprehensive studies on the religious and strictly philosophical doctrines of the Enlightenment mathematicians (particularly those who were not skeptics or atheists) and it seems that such a study would be worth-while in light of their sometimes abrasive interactions with 'secularists' such as Niels Abel, Evariste Galois, and Joseph-Louis Lagrange.

-Euler rejected the philosophies of Leibniz and **Christian Wolff (1679-1754)**, who he viciously attacked as an atheist. His fiercest criticisms of Wolff may be found in his *Letters*, but he does not attack Wolff's doctrines on purely mathematical grounds.

-Another Enlightenment (or post-Enlightenment) mathematician whose religious perspective may be well deserving of study is **Augustin-Louis Cauchy (1789-1857)**. Credited with founding modern Analysis, I had mentioned Cauchy as a fiercely anti-Revolution Catholic, although the vast majority of his publications were purely mathematical and none, to my knowledge, are translated out of French. He and Euler, while professing a fiercely Christian instinct, failed to iterate their religious doctrines with the dynamic methodology that one would expect on the basis of their combined mathematical output. In contrast, logicians of the nineteenth century would furnish rigorous proofs of their philosophy.

George Boole (England, 1815-1864)

In my view, Boole may be one of the most severely overlooked philosophers in human history. His name is lent to fields of computational analysis – see Boolean logic, Boolean algebra, etc. – that are essentially responsible for modern computer science. His philosophical output was relatively limited, but should have been equally consequential. His philosophical principles are embedded in his *magnum opus* on logic and algebra, *The Laws of Thought*, which is mostly remembered for its schema on the relation of statements to mathematical equations. Boole himself envisioned his work in the context not of computer science, which he in no way prefigured, but rather as an amendment to classical

Aristotelian thought. “It would be premature to speak of the value which these methods may possess as an instrument of scientific investigation. I speak here with reference to the theory of reasoning, and to the principle of a true classification of the forms and cases of Logic considered as a Science ... I desire here to express my conviction, that with the advance of our knowledge of all true science, an ever-increasing harmony will be found to prevail among its separate branches” (7, 13). His discussions in the chapters ‘Of Syllogisms’ and ‘Of Hypotheticals’ define algebraic parameters for human discourse and reach for a mathematical rubric for the logic of the Aristotelian forms, which he fully accepted. These conclusions were generally applied in the fields of algebra, pure mathematical logic, and computer science, but have never, to my knowledge, been intensely studied in the equally proper context of pure philosophical logic that Boole himself seems to have intended.

-Boole’s logical propositions should be reviewed in the context of the contributions made by **William of Soissons (12th century)**. He discovered the logical doctrine of Explosion, which is now expressed as a set-algebraic proof that any impossibility may be logically derived from a single impossibility (the study was done by Christopher Martin in *William’s Machine*). Applying the set algebra of Soissons and others to Boole’s algebraic deconstruction of human thought and discourse would, I think, yield significant results in our understanding of thought and logic.

-**Augustus DeMorgan (1806-1871)** worked intensely on the same subject, but was perhaps less ambitious and, unlike Boole, deeply skeptical of Christianity. His personal thoughts, including on religion, are recorded in his *Memoir*, while his *Formal Logic* contains extremely consequential results on logic and algebra. Like Boole, he attempted to recover Aristotle from the Enlightenment: “The philosophers who made the discovery (or what has been allowed to pass for one) that Bacon invented a new species of logic which was to supersede that of Aristotle have succeeded by false history and falser theory in driving out from our system all study of the connection between thought and language” (241). Also like Boole, his work has mostly been received in the purely mathematical context and the full consequences of his proofs on human thought and language have been disregarded. Perhaps Petrarch, who once wrote that “our speech is not a small indicator of our mind, nor is our mind a small controller of our speech” would, although he knew no Aristotle, be appalled by the modern reception of their theories which attempted to organized human speech and discourse on a discretely mathematical basis. Adams may offer an explanation for the lacuna.

Henry Adams (United States, 1838-1918)

Mostly known for his famous histories on the Jeffersonian republic, Henry Adams had a prolific and highly controversial literary output. In 1910, he wrote *A Letter to American Teachers of History*, in which he introduced his position that the study of history is a science in the classical sense. In the first chapter (‘The Problem’) he discusses contemporary studies on the applications of physical science to the field of history, especially with respect to the Second Law of Thermodynamics, which deals with entropy and the dissipation of energy. The literature he discusses is sometimes urgent and apocalyptic, and while some points have weakened with time, others have strengthened: Adams laments that historians have “turned to the collection of facts as the geologists turned to the collection of fossils” (14) and were thus wholly unaware of relevant developments in science. “Since the Church has lost its authority, the historian’s field had shrunk into narrow limits of rigorously human action ... [the historian] was clear that the energy with which history had to deal could not be reduced directly to a mechanical or physicochemical process” (11-12). Such trends seem only to have become more potent and widespread since Adams’ death – pure historians have, in my view, produced fewer and fewer

consequential results over the last century. His views seem to place him among the Victorian Darwinists, a party that became thoroughly eradicated by mid-century. Nonetheless, he identified a critical trend in the popular humanities (the intense segregation of fields), especially in America, which may offer an explanation as to why the logics of Boole and DeMorgan were largely ignored by the philosophers and why the thermodynamic innovations were largely ignored by the historians.

-**Hans Driesch (1867-1941)** may be cited for further studies on philosophy and biology, but, as far as I am aware, he is not very well-known or widely read. His *History and Theory of Vitalism* offers a potentially fascinating history of the doctrine, beginning with an intense study of Aristotle's biology. Driesch moves through the Enlightenment and nineteenth century with discussions on Kant, Schopenhauer, and 'the Materialist-Darwinist Tendency'.

-The subject of thermodynamic entropy and human life was last approached with philosophical consideration, as far as I am aware, in *What is Life?* by the famous biologist **Erwin Schrodinger (1887-1961)**. His analysis there prefigures the future of the subject: he focused intensely not on philosophy of history but rather on human biology, on the minute individual rather than the macroscopic civilization: "a living organism continually increases its entropy ... and thus tends to approach the dangerous state of maximum entropy, which is death ... it can only keep aloof, i.e. alive, by continually drawing from its environment negative entropy" (71). Schrodinger's work ends with notes on philosophy that express a fiercely deterministic outlook and theories of entropy in history have thus been scarcely evoked or evolved since. While such positions on chemical thermodynamics and entropy have been largely abandoned, generic theories of historical cyclicism seem to remain relatively popular, albeit not among the traditional intellectual circles they tended to populate.

Cyclicism

The philosophy of cyclicism has had provenance in the study of history since antiquity and has thus been among the most consistently popular historical programmes of all time and perhaps deserves its own study. It was recognized rather sharply by the Islamic philosopher ibn Khaldun in the fourteenth century, especially in his *Muqaddimah*. The degrees to which the sciences have been applied to such cyclical themes has varied: some authors were relatively focused on establishing a scientific basis, others have merely recognized the patterns – it is, in its generic form, a rather tired or even trivial trope that has, in and of itself, been thoroughly explored. The intersection between cyclical doctrines and strict mathematics and science is relatively questionable, though, and no rigorous attempt at synthesis between the generic cyclical and the entropic theories has, as far as I know, been attempted.

-**Oswald Spengler (1880-1936)** likely produced the most polished form of the scientifically cyclical view of human history. He briefly discusses chemistry and entropy in *The Decline of the West*, but arrives at the (for me) uninteresting, integrated conclusion that historical theories of entropy are merely secularized forms of the Germanic Ragnarok. Spengler does anticipate Schrodinger's approach when he conceptualizes Ragnarok-Entropy as a theory of the 'world's end as completion of an inwardly necessary evolution' (424) to the extent that he envisions a wedding of the entropic development of the individual to (and this is his 'contribution') a cosmic decline of the universe. Such theories have generally been abandoned, as has philosophy of history altogether. In many ways, the catastrophic ideological devolution of orthodox Marxism has, I believe, engendered a deep pessimism regarding philosophies of history among the intellectual elite of western universities where it is now more common than not to reject the notion of order in history.

-The Mexican philosopher **Manuel DeLanda (1952-)** completely deconstructed the cyclical theories in *A Thousand Years of Nonlinear History*, which attempts to work at a history of science itself as an expression of human developments. While DeLanda may be more so a historian of science than a scientific historian, his work points to the potential rehabilitation of an intense synthesis between science and history in the context of the intellectual decline of classical cyclicism. Whether or not such a synthesis will remain, in the minds of the intellectual elite, nondetachable from the unpopular generic cyclical theories remains to be seen.