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The Gravity of Weight

In the Company of Scientists

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KEY POINTS

- **The so-called iron rule of science is a singular focus on gathering empirical evidence.**
- **Scientific knowledge is part of the public domain, with transparency and data sharing as essentials.**
- **What distinguishes science from other disciplines is not so much an emphasis on generating new theories but rigorously eliminating old ones.**

"The Research," by Joaquin Sorolla, 1897. Museo Sorolla, Madrid.

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If Descartes were a university, it would be "a rambunctious and vibrant place, spilling into the hallways…." Faculty members would read each other's work and share ideas.

If Isaac Newton were a university, "you would not hear a sound." Faculty members, isolated in their labs or offices, would concentrate on their research, and the common room "would be thick with dust," writes philosophy of science professor Michael Strevens in his book *The Knowledge Machine* (2020).

We might assume that an open-minded and humanistic approach would be the greater institution. Still, it is the Newtonian environment of narrow specialization and "lean scientific spirit" that is the "better route to knowledge," claimed Strevens.

Strevens described what he calls the *iron rule of science*, namely a singular focus on empirical evidence. This rule provides an "etiquette for argument" and a set of ground rules that compel scientists to resolve differences among colleagues by observation and experimentation, rather than by "shouting or fighting or philosophizing or moralizing..." he said.

What distinguishes scientific thought from philosophy is not an emphasis on generating new theories so much as one that focuses on rigorously refuting old theories. This was Karl Popper's doctrine of falsification in which weaknesses and errors are systematically criticized and eventually corrected, said Popper (1963).

A scientific worldview involves clear thinking, combined with respect for evidence that is "inconvenient," "unwanted," and that "challenges our preconceptions" (Sokal, 2008). Above all, there is a commitment to continued scrutiny and a search for truth.

"Scientists in Chemistry Lab," American School, 20th Century, 1925. Private Collection.

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Back in the early 1940s, American sociologist Robert Merton emphasized that science involved "social collaboration." Science creates a "powerful web of interlocking evidence" (Sokal, 2008). Rarely does everything rest on one "crucial experiment" (Sokal, 2008).

Merton recognized that scientific achievement was cumulative, as evidenced by Newton's classic remark, "If I have seen farther, it is by standing on the shoulders of giants."

The only intellectual property rights that scientists should expect are recognition and esteem. Further, scientific knowledge is part of the public domain—"common proper-

ty," as it were, with secrecy the antithesis of that norm (Merton, 1942).

Merton was far ahead of his time in that efforts for transparency, rigor, and replication have been a major focus for researchers in recent years, particularly among Allison and his colleagues (Brown et al., 2014; Brown et al., 2021; Richardson et al., 2017; Valdez et al., 2020; Vorland et al., 2021; Vorland et al., 2020). Scientists, therefore, have an ethical obligation to disclose all information concerning their research, particularly since only they have access to all the raw data and unpublished calculations. They have, as well, a further obligation not to misrepresent the *strength* of their evidence (Sokal, 2008).

"Scientists Around a Table," by French artist Raoul Dufy, 1937. Musee des Beaux-Arts, Nantes, France.

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Any "trust-based system, as science is," though, is potentially open to exploitation and not necessarily self-correcting (Stroebe et al., 2012). For science to be self-correcting, scientists must be accountable to their peers, with an "organized skepticism" and willingness to suspend judgment (Merton, 1942).

The peer-review system, typically a watchdog for evaluating scientific research pre-publication (Stroebe et al., 2012), failed miserably in a hoax perpetuated by Sokal, a professor of physics. Troubled by the declining standards in the humanities journals, Sokal tried his own "modest experiment" of submitting a paper "liberally salted with nonsense" and "fundamental silliness" to the prestigious journal *Social Text* (1996). His article was "a mélange of truths, half-truths, quarter-truths, falsehoods, nonsequiturs, and syntactically correct sentences that have no meaning whatsoever" (Sokal, 1996).

Among his preposterous claims, Sokal proclaimed that science had obliterated the concept of objective reality, quantum field studies had confirmed Lacan's psychoana-

lytic speculations, and quantum gravity has “profound political implications.” Surprisingly, and to Sokal’s disappointment, the article, meant as a parody, was accepted for publication.

No physicist had been consulted during the editorial process. But “even nonscientists might well wonder what quantum field theory has to do with psychoanalysis,” said Sokal. He concluded that the article’s publication “exemplifies the intellectual arrogance of Theory” such that “incomprehensibility becomes a virtue” and is “lauded as the height of scholarly achievement.”

Perhaps Sokal's hoax remained undetected because of the generally high regard for scientists: there was the assumption that even something incomprehensible must be profound. “When I find myself in the company of scientists,” wrote W.H. Auden, “I feel like a shabby curate who has strayed by mistake into a drawing-room full of dukes (1989).

The word “scientist” is of recent origin, unlike the word “science,” which came to signify knowledge by the Middle Ages, or the word “scientific” that came into use by the late 18th century to mean *knowledge acquired by observation or experiment.*

William Whewell, a 19th-century English philosopher, theologian, and polymath, is credited with coining the term *scientist*. “We need a name very much to describe a cultivator of science in general. I should call him a *scientist* (Whewell, 1840). The new designation “immeasurably strengthened” the position of science (Ross, 1962). This high regard, though, has not always been universal.

"Man of Science," by unknown American artist, 1839.

Source: Photo credit: National Gallery of Art, Washington, DC/Everett Collection/Bridgeman Images. Used with permission.

For example, the present assault on science from some today, as evidenced, for example, by the politicization of vaccine mandates, is not unique. There had developed "local contagions of anti-intellectualism threatening to become epidemic" back in the early 1940s (Merton, 1942). Whereas previously scientists could be independent of society, this "frontal assault on the autonomy of science" demanded a change from "sanguine isolationism" to engaging with society, said Merton.

"Municipal Chemistry Laboratory," by French artist Ferdinand Gueldry, 1887. Illustration from a French newspaper.

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The code of *public behavior* for scientists, though, is stringent. It excludes philosophy, religion, and beauty. "The iron rule imposes narrowness on scientific argument and dialogue but puts no constraints on a scientist's *private* thoughts," wrote Strevens.

Romantic poet John Keats' concept of *negative capability* comes to mind. Keats, who succumbed to tuberculosis at age 25, was trained and licensed as a physician though he much preferred poetry and never practiced medicine.

In a letter to his brothers, Keats suggested that a "Man of Achievement" is one "who is capable of being in uncertainties, mysteries, and doubts, without any irritable reaching after fact and reason" (Keats, 1817).

Keats singled out Shakespeare as his quintessential "Man of Achievement," though his one passing reference to negative capability has spawned considerable multi-disciplinary scholarship throughout the years. The concept has been applied, for example, to *leadership* that supports "reflective inaction" (Simpson et al., 2002); to the *psychotherapeutic process* that emphasizes an acceptance of uncertainty, ambiguity, and doubt (Eisen, 1979); and to *clinical practice,* where it reflects an intellectual and emotional openness (Coulehan, 2017).

This ability of scientists in their private moments to “function imaginatively in the face of incomplete knowledge” (Coulehan, 2017) may be what sustains them during those solitary periods when they require the intense concentration necessary for that “lean scientific spirit.”

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"The Student of Chemistry and Pharmacy," by 19th-century Austrian artist Karl Joseph Litschaur. Josef Mensing Gallery, Hamm-Rhynern, Germany.

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