

The Fulfillment Chronicles

Scientific Literacy

2024

Making progress building a self-fulfilling life requires individuals to move from naive preconceptions, prejudice, and acculturation to a more factual knowledge base. This invokes the required System II brain logic functions of Dr. Daniel Kahneman's behavioral psychology. In this discussion we will explore moving our knowledge from subjective and unreliable information to objective and reliable facts based on **Scientific Literacy and the Myth of the Scientific Method**, by Dr. Henry H. Bauer, 1992, herein quotes and summaries are referenced.

All of us have gut feelings, intuition, and System I brain functions working for us from birth. Though they, and the acculturation we receive, serve our childhoods and adolescence, these are too untested, subjective, and unreliable to be used in adulthood. Over time, with education, mentors, and experience, we begin to replace them with fact based reasoning that delivers better insight and outcomes.

The benefits of scientific methods are better decisions, good economics, good national security, declines in superstition, rational behavior based on predictable consequences, and ethical attitudes. It does raise questions about whether Scientific Literacy is education or indoctrination, how much science is right for "everyman", and our tolerance for the uncertain management of ongoing improvements by updates, revisions, and changes. The electronics revolution, modern healthcare, and our trip to the Moon demonstrate its objective power to benefit mankind.

Good science is characterized by adhering to the process,

- Observation, data collection, and analysis
- Making quality conjectures, theories, and hypotheses to test and verify
- Experimentation, testable predictions
- Publishing data, crediting predecessors
- Accepting self correction, rejection, modification
- Avoiding conflict of interest, bias, pseudoscience, error, dishonesty, mistakes, fraud, obsolescence
- Trusting the science until it's untenable
- Transitioning science to technology applications

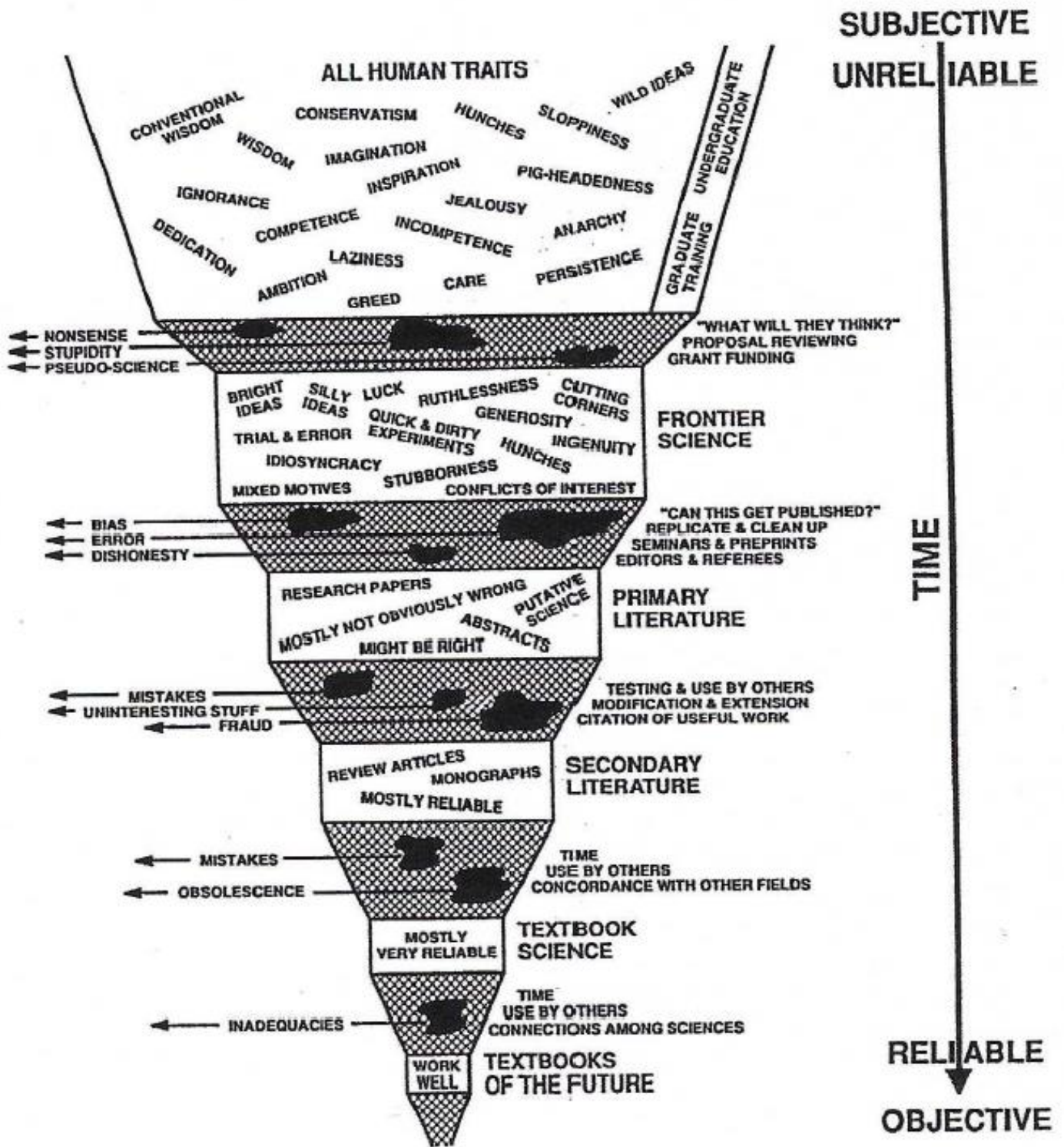


Figure 4. The Knowledge Filter. In stages, deficiencies are eliminated by virtue of the social institutions that science has evolved, peer review in particular. *Scientific Literacy and the Myth of the Scientific Method*, by Dr. Henry H. Bauer

Since 1665 with the advent of the scientific revolution, humankind has build a growing reservoir of objective, reliable, and incisive information, facts if you will, that have improved our longevity, health, security, safety, and potential for fulfillment. Dr. Bauer, a PhD Chemist and professor at Virginia Polytechnic Institute and State University, reviewed the development of scientific methods in his book and discusses the ramifications of **Scientific Literacy** for our human population. Since 1665, information has become exponential in growth, information has become more reliable though short lived, and quality of life has improved.

Estimates are that Scientific Literacy exists in 5% of the population. In 1992, 74% of teenagers believed in angels and 50% in ESP (extrasensory perception). Nearly 36% of the overall population believed astrology is “sort of” or “very” scientific. Continued in this fashion, lack of literacy denies us the opportunity to grow to our potentials.

The Scientific Method is attributed to Sir Francis Bacon who lived 1561 to 1626. He promoted the process as a way to move mankind forward to deliver substantive concepts that advance society and culture. The scientific method hinges on,

- Advancement and falsification of hypotheses (educated conjectures)
- Investigations of hypotheses with open minds and a willingness to consider evidence in determining results
- Experimental and other methods of controlled comparison or systematic observation to determine validity

This process results in a body of knowledge that is objective, reliable, unassailable when mature, but also constantly changing and improving as testing continues and new ideas are proposed. In our time this is done with worldwide public distribution of results, critical reviews by qualified peer professionals, and recantations and revisions to the last best known certainty. Testing, logic, math, statistics, predictive accuracy enhance our faith in scientific method conclusions. It’s a never ending process. If you understand this, you have a basis for Scientific Literacy before engaging in any specific disciplines. Unproven and improbable theories that don’t follow the process show UFOs (unidentified flying objects), ESP (extrasensory perception), Astrology, and Extraterrestrials just don’t qualify as scientifically literate. The scope of scientific information ranges from 1) mature science found in textbooks, 2) to frontier science documented in periodicals as part of the review and verification process, and 3) every thing, everywhere, and every how in between.

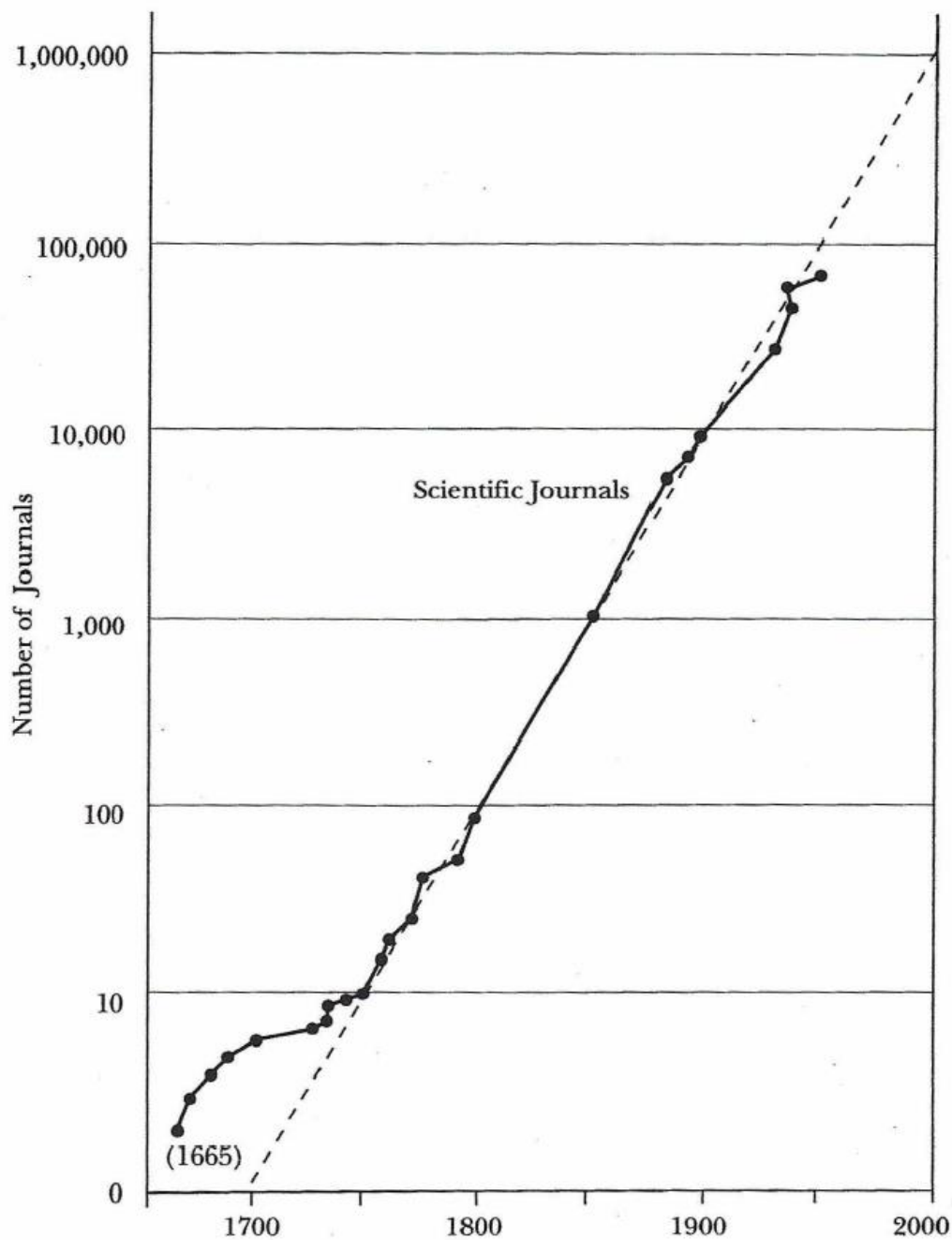
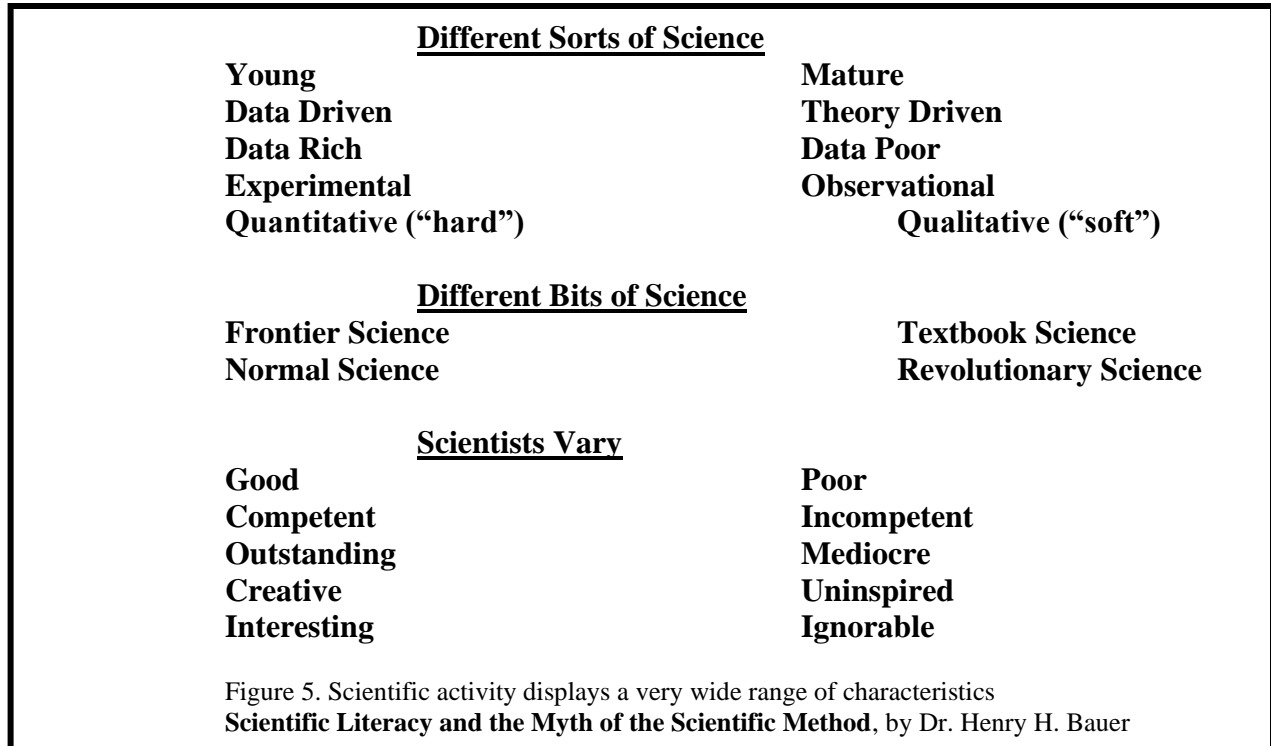


Figure 7. The size of the primary literature of science has grown exponentially, from essentially zero in the seventeenth century. Reproduced by permission of Yale University Press from Derek de Solla Price, *Science since Babylon* (New Haven: Yale University Press, 1975), p. 166.

Scientific Literacy and the Myth of the Scientific Method, by Dr. Henry H. Bauer

Physics is data rich, tested when possible, mathematically bound, and considered dependable hard science; it's a very mature endeavor. Disciplines like biology are more oriented to observation, sampling, testing, statistical analysis, and considered more fluid. The younger disciplines of psychology and sociology use scientific methodologies with observation, hypotheses, testing, contextualizing, and frontiering theory as new information becomes available. Each discipline adheres to scientific methodology within the bounds and capabilities of their fields. Their work results in a **filtering of truths over time**. Think about Newton's $F=ma$ (force equals mass times acceleration) circa the mid 1700s; it is mature science that still works 250 years later. However, the

concept of parallel universes is still in development and as yet remains untested and unproven. The goal is to move the subjective, unreliable, and nascent sciences towards objective, reliable, and mature information we can trust. To achieve this end, science is done to exacting standards to the best of a scientist's ability and available process capabilities by individuals, teams, industries, educational institutions, publications, governments, and nonprofits.



From the perspective of Lifelong Fulfillment, Dr. Bauer's discussion of Scientific Literacy is essential and revealing; it comes highly recommended. Though rated 4.2 on Amazon, 7 reviews is hardly noteworthy.

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