Simon Newcomb: Astronomer with an Attitude

SIMON NEWCOMB’S investigations of the stars and planets lifted classical, positional astronomy to a new level of refinement and helped to make him one of the most well-known astronomers of the late 19th century. But developments in the field of physics and astronomy during the 20th century—namely, new spectroscopic observations and the theory of relativity—overshadowed his contributions. Nevertheless, Albert Einstein would judge Newcomb’s lifework to be “of monumental importance to astronomy,” calling him “the last of the great masters” of classical astronomy.
The next time you hear someone appeal to the authority of the "scientific method" to prove a point, think of Simon Newcomb. Although this 19th-century astronomer is not well known today, in the decades following the Civil War, he became the era’s most acclaimed American scientist. He first achieved recognition through his comprehensive studies of the motions and positions of the sun, moon, planets and stars, which helped to resolve many lingering problems in classical astronomy.

But, convinced of the value to human progress of both science and its seemingly unfaltering method, Newcomb also gained prominence in the U.S. as a commentator bent on wider social and cultural reforms. Outspoken and often openly partisan, he eagerly discussed science’s place in American life and its relation to politics, economics, religion and even studies of the paranormal. In the slang of our era, Simon Newcomb had an attitude. He doggedly refused to accept the status quo in any investigative arena.

By all accounts, Newcomb was a congenial, energetic and inquisitive person. American social reformer Frederic Howe described him as “a big, lusty, joyous man.” After meeting the astronomer in 1876, prominent British physicist William Thomson (later Lord Kelvin) commented that Newcomb was a “first-rate man—full of go.” Another colleague, William Alvord, president of the Astronomical Society of the Pacific, found him to be “ruggedly independent in thought and in speech,” adding that the “essential quality of his mind is that of a philosopher, rather than that of a mathematician or an astronomer merely… In his treatment of all questions, it is the philosophical habit of his mind which is the most remarkable and the most valuable.”

Newcomb was born in 1835 in Wallace, Nova Scotia, the oldest of seven siblings. His father was a teacher who traveled from school to school, while his mother—a woman of strong Calvinistic convictions—tended the home. At the age of 18, young Newcomb left his native Maritime Provinces for Maryland to work as a teacher. In his spare time, he visited the Smithsonian Institution’s library in Washington, D.C., where he gradually gained the respect of its distinguished director, noted American physicist Joseph Henry. In late 1856
one of Henry’s contacts found a position for Newcomb at the Nautical Almanac Office in Cambridge, Mass., an agency of the U.S. Navy responsible for creating astronomical tables used in navigation. While there, Newcomb enrolled at Harvard University’s Lawrence Scientific School, where he studied under Benjamin Peirce—at the time, the nation’s leading mathematician and mathematical astronomer. After two years, Newcomb graduated summa cum laude with a bachelor of science degree.

Newcomb first captured the attention of the international scientific community with a convincing mathematical demonstration, presented in 1860, showing that the asteroid belt did not result from the breakup of a former planet between Mars and Jupiter—then a commonly held belief. In 1861, having made rapid strides in astronomy, mathematics and physics, he accepted the position of professor at the U.S. Naval Observatory in Washington, D.C., continuing what would evolve into a lifelong affiliation with the navy. Three years later he became a naturalized U.S. citizen.

Although he had been hired at the Naval Observatory as an observational astronomer, Newcomb managed to squeeze in further studies in mathematical astronomy. In 1877 he parlayed this research into a position of authority, winning an appointment as superintendent of the more mathematically inclined Nautical Almanac Office, by then located in Washington, D.C. The same year, thanks to a burgeoning reputation as a researcher and administrator, Newcomb served as president of the American Association for the Advancement of Science (AAAS). He followed this with a six-year stint as vice president of the National Academy of Sciences. Also, beginning in the 1870s, he taught various courses at nearby Columbian (later George Washington) University and at the new Johns Hopkins University.

To be sure, Newcomb performed credibly as an observational astronomer. He raised the quality of work at the Naval Observatory, initially by eliminating systematic errors that tainted past values of stars’ right ascensions (longitudinal positions on an imaginary celestial sphere encasing Earth) and later by taking charge of the observatory’s new telescope, then the nation’s largest.

Newcomb’s true calling, however, was theoretical, mathematical analysis of the orbital motions of the planets and the moon in relation to each other and to the sun. In 1874 his painstaking planetary and lunar studies earned the 39-year-old Newcomb the prestigious gold medal of London’s Royal Astronomical Society. As head of the Almanac Office, he charted an even more challenging course of reform: a multidecade reevaluation of commonly accepted positions of the planets, moon and sun, coupled with a recasting of the corresponding mathematical formulas and the construction of associated tables. With support from talented assistants, he completed the bulk of this reevaluation by the mid-1890s and published his “preliminary results” in the monograph The Elements of the Four Inner Planets and the Fundamental Constants of Astronomy.

As the 20th century dawned, Newcomb found his work becoming the standard in positional astronomy—a status it would hold for decades to come. Furthermore, he found himself in possession of top honors from around the nation and the world, including the award of the Copley Medal of the Royal Society in London and election as one of eight Foreign Associates of the Academy of Sciences in Paris. William W. Campbell, a fellow astronomer from Lick Observatory, later described Newcomb’s research program to be “of herculean and monumental proportions.”

Commentators from the 20th century would look back, for example, at his exhaustive treatment of Mercury’s orbit, noticing that he had pinpointed the modern value of a slight orbital anomaly (known as precession of the perihelion and first detected earlier in the 19th century). This anomaly, which Newcomb suspected defied conventional Newtonian gravitational explanations, would become intelligible only through Albert Einstein’s general theory of relativity. Indeed, Einstein would judge Newcomb’s lifework to be “of monumental importance to astronomy,” labeling him “the last of the great masters” of classical positional astronomy.

**A Popular Advocate of Science**

In addition to his prominence among astronomers, Newcomb also had a large following among the general public. His writings, including the widely reprinted and translated book Popular Astronomy and a successful series of mathematical textbooks, made him a household name among educated people. He also gained public attention by taking part in an intensifying national dialogue concerning science’s place in American culture.

A particular image of science colored Newcomb’s view of its relation to other areas of life and inquiry. Influenced by European scientific commentators such as British political philosopher John Stuart Mill (whom he met in 1870), Newcomb felt that the power of science derived mainly from the scientific method. That is, the successes of science occurred because scientists carried out their studies using well-established procedural rules. The foremost rule, in Newcomb’s opinion, was to employ only those concepts that could be defined by reference to concrete experiences—an emphasis on precise meanings he called “the scientific use of language.”

Newcomb expected that comparable successes awaited anyone who chose to apply the same readily accessible rules to investigations outside natural science. Scientific method was as useful in the halls of Congress as in the laboratory. As Newcomb promoted this idea in his speeches and magazine articles, he not only sparked popular support for science in the U.S. but also promoted an idea of science in the public mind as reliable, practical, even democratic. Indeed, his vision of the scientific method as dependable and accessible helped to catalyze the intellectual movement later known as American pragmatism—a cluster of cultural aspirations and philosophical predilections that developed at
1877. While there, Newcomb had authority over what was then the nation’s largest tele-
U.S. NAVAL OBSERVATORY served as Newcomb’s base of operations from 1861 to
American party at the Naval Observatory; he is standing toward the left in the foreground.
and the sun more accurately. In the picture above, Newcomb is shown speaking to the
stream of books, articles and speeches,
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the end of the 19th century (and in many
ways continues to this day).

Pronouncements about scientific meth-
method provided Newcomb and the pragmatists with powerful tools of persuasion. For instance, in the 1870s Newcomb’s
torical dependence on method quickly came to the fore when he began to
call attention to the deficiencies of physical science and mathematics in the U.S.
In various public forums he complained about inadequate educational programs, technical journals and professional so-
cieties. If this institutional framework were to gain strength in a nation dedi-
cated to democratic doctrines, there needed to be fuller public support of ba-
sic research. Such support, he felt, would be forthcoming if educated citizens could be convinced of the social value of the scientific method. “I make bold to say,” he asserted in an 1880 speech, “that the
greatest want of the day, from a purely practical point of view, is the more gen-
eral introduction of the scientific method and the scientific spirit into the discus-
sion of those political and social problems which we encounter on our road to a higher plane of public well-being.”

Newcomb did more than merely extol
the use of scientific method to attack social problems. He himself developed into
a political economist of wide repute, publishing technical and popular ex-
positions on finance, trade, taxation, currency and labor. Through a steady stream of books, articles and speeches,
he sought to provide a dispassionate analysis of political and economic issues, thus demonstrating—rather than merely touting—the social utility of the scientific method. Indeed, his stated goal was to reform the discipline of economics by giving it a more logical, mathematical and scientific structure. But it appears that Newcomb’s unstated and perhaps unconscious goal was not only to enhance science’s image but also to use its method to promote a particular political and economic platform.

His personal agenda stands out most
explicitly in an article written in 1870 and incorporated 15 years later as a
chapter in his massive textbook Principles of Political Economy. (John May-
nard Keynes would look back at Principles and term it “one of those original
works which a fresh scientific mind, not
perverted by having read too much of the orthodox stuff, is able to produce from
time to time in a half-formed subject like Economics.”) The article’s title
encapsulates Newcomb’s ideology; he tagged it “The Let-Alone Principle,” a
phrase that harks back to the hands-off policy of Adam Smith. Reflecting the
British and American tradition of political and economic liberalism fostered by Smith, Mill and David Ricardo, Newcomb stated that the government should not interfere with the freedom of individuals to follow their own eco-
nomic interests. (Of course, the mean-
ing of the term “liberalism” is quite dif-
Science and Religion

Newcomb applied the scientific method to other human issues as well. In his 1878 address as retiring
president of the AAAS, he discussed the relation between natural science and the
Christian religion, calling for the separa-
tion of scientific reasoning and theo-
logical arguments. The speech was re-
printed in several magazines and dis-
tributed widely, resulting in a nationwide discussion on the topic. Christians who
still endorsed the central claims of “nat-
ural theology” were particularly upset. They believed that science augmented
religion and that the study of “design” in nature could reveal God’s existence.

In his arguments, Newcomb used the
scientific method as a criterion by which to
differentiate scientific knowledge from
religious belief, portraying the two as

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In the mid-1880s, he became the first liberative but iconoclastic outlook when, soul and the unceasing progress of spir-
will tend to the elevation of the human belief, confident that the ultimate result
sion of any and every form of doctrinal phenomena, Newcomb felt that scientists should at least review the evidence for the pur-
ported effects.

The ASPR took shape in late 1884, when a group of distinguished British scientists who had recently founded their own psychical society visited North America. They convinced an equally respected group of American scientists and educators to organize their own group. Harvard psychologist William James, a prime mover of this unorthodox but fashionable society, felt that Newcomb gave the organization credibility, or as he expressed it to a colleague, “I think Newcomb, for President, was an uncommon hit.”

James had a practical reason for wanting Newcomb as president, but why did Newcomb accept? Certainly, the enthusiasm of the British visitors, the flattery of being asked and the challenge of the research problem all swayed him. In spite of being an avowed skeptic, he found intriguing the possibility of mental telepathy. But he had a deeper motive. He felt a moral imperative to weigh the evidence concerning psychic effects. Specifically, his objective was to sort out what, if anything, was scientifically defensible and what must be debunked as socially dangerous fraud. Indeed, an editorial in *Science* portrayed the scientists in the ASPR as possessing the proper moral qualities to deliver the nation from the evils of raw spiritualism and substitute in its place a systematic study of phenomena such as telepathy.

Never one to investigate a topic halfheartedly, Newcomb threw himself into the thick of research on paranormal events, poring over the literature and attempting to witness occurrences firsthand. With colleagues from Johns Hopkins, he observed mediums and other masters of the paranormal in Washington, D.C., Philadelphia and New York City. By the end of his first term as president, however, Newcomb’s skepticism had hardened. This became evident in his formal presidential address to the ASPR. Throughout this forceful discourse, he used elementary canons of scientific method to question claims about paranormal incidents. He targeted the British researchers, accusing them of inferring new laws of mental action without being able to replicate the relevant phenomena. James, who inclined toward belief in psychic effects, objected to Newcomb’s speech and initiated a friendly skirmish with Newcomb through an exchange of published letters in *Science* and in personal notes.

Newcomb’s doubt was not enough to remove him from the presidency of the ASPR, many members of which shared his skepticism. Although he offered to step down after his first term, he won reelection. And when he declined reelection at the end of a second term, he continued on the governing council until the society began to fade and the British organization absorbed it in 1889. Through these final years, he remained a dissenter. He was convinced and hoped to convince others that, on methodological grounds, psychical research was a scientific dead end.

**Retirement, then Back to Work**

Forced by law to leave his naval post at age 62, Newcomb stepped down from the Nautical Almanac Office on his birthday—March 12, 1897. Retirement simply meant a realignment of work, not an end or even slackening of research, writing and public speaking. A modest congressional appropriation and then, beginning in 1903, generous grants from the new Carnegie Institution in Washington, D.C., enabled the distinguished retiree to maintain his intense schedule of research and professional chores. Building on his previous contributions to positional astronomy, he assumed the lead in a major international campaign to bring further order to astronomical computations and tables through the adoption of uniform constants and consistent data. Newcomb did his job so well that many of his numerical values remained in official use until the arrival of electronic computers and artificial satellites in the 1950s.

Continuing to display great drive, he also helped to organize and, in 1899, became the first president of what is now the American Astronomical Society. The creation of this society exemplifies the professional gains that the scientific community had made in the U.S. during the quarter of a century since Newcomb’s first article calling attention to the nation’s deficiencies in physical science.

**NEWLYWEDS** Simon and Mary Newcomb were photographed in 1863. The couple eventually had three daughters, Anita, Emily and Anna. The oldest, Anita Newcomb McGee, went on to become a well-known physician and founder of the Army Nurse Corps.

Limit on the freedom of human thought, and views with perfect calm the subver-
sion of any and every form of doctrinal belief, confident that the ultimate result will tend to the elevation of the human soul and the unceasing progress of spir-
itual development.”

Newcomb displayed a similarly deliberative but iconoclastic outlook when, in the mid-1880s, he became the first president of the newly organized American Society for Psychical Research (ASPR). Though skeptical of extrasen-
sory perception, mental telepathy and other alleged paranormal phenomena, Newcomb was careful to avoid direct
domination without, he hoped, Newcomb to claim a province for science in American culture without, he hoped, alienating the Christians who generally dominated the culture.

In the public debate that followed, Newcomb was careful to avoid direct references to his personal religious be-
liefs. In private, however, he held that Christianity was an untenable, dying religion. In anonymous articles written during the time, he expressed his low esteem for Christianity and argued for the adoption of a new, humanist reli-
gion founded on personal virtue and duty to others. “Such a faith,” he sug-
gested, “fears no false teaching, sets no
Having a bit more leisure time, the new retiree also indulged in autobiographical reflections and even tried his hand at fiction, publishing two short stories and a science-fiction novel. Set in the distant year of 1941, his novel traces the successful quest of a Harvard physics professor to disarm the armies and navies of the world by building airships propelled by a new substance that nullifies gravity. Tongue in cheek, Newcomb included a British character named “W. K. Constant,” who was the fictional counterpart of Lord Kelvin. (At least one character based on Newcomb may have appeared in fiction as well: evidence suggests that Arthur Conan Doyle picked him as the model for particular biographical features of Professor James Moriarty, the canny arch rival of Sherlock Holmes.)

Newcomb’s final projects included the closing parts of his long-standing study of the moon’s motion—conclusions he dictated to stenographers in 1909 as he faced imminent death from cancer of the bladder. Around the same time, he drafted a chapter on his religious views that he intended to add to a new edition of his autobiography. He had remained convinced that scientific inquiry must be kept distinct from traditional natural theology. But toward the end of the manuscript, this dying 74-year-old religious skeptic acknowledged that he had always allowed for the possibility of a “Great First Cause.”

RELIGIOUS AUTOBIOGRAPHY was written by Newcomb between 1879 and 1880. It was his attempt to sort out his ideas on Christianity following a controversial speech he gave in 1878 on science and religion at the American Association for the Advancement of Science. The unpublished manuscript begins, “I was born in the country before the leaven of ‘liberalism’ had been felt far outside the great cities, and bred in a church which took hold and persists within American culture to this day. To promote pre-conception, to mark advantageous boundaries, people…"

True to form, Newcomb clarified this position by returning to a critique of language. “But if I am asked whether I regard this cause as an intelligent one I am unable to answer until the word ‘intelligent’ is defined. This term implies a certain mental quality belonging to the human race and it seems to me a belittling of a great universal cause to apply any such term to it.”

“All we can say,” he added in his final words on the subject, “is that the cause exists and must be capable of pre-dating the result, which is the universe as we find it to be. But I have never indulged in vain speculation on subjects which I found it impossible to form a clear and definite conception, and so shall not pursue the subject further.” Newcomb died a few weeks later, on July 11, 1909.

Throughout the U.S. and beyond, newspapers and professional journals announced the eminent astronomer’s death. President William H. Taft joined other national and international dignitaries at his elaborate state funeral. Holding the relative rank of rear admiral in the navy, Newcomb was buried with full military honors in Arlington National Cemetery. The U.S. Marine Band, three companies of marines and one company of U.S. Navy bluejackets led the funeral procession from the family church to the graveside. A detail from an artillery regiment drove Newcomb’s flag-draped, black caisson. A long file of carriages followed.

Although the mourners remembered Newcomb as a reform-minded astronomer and to a lesser extent as a political economist, they overlooked his broader contribution to American thought, culture and society: promoting a popular faith in science and the scientific method. For better or for worse, that faith took hold and persists within American culture to this day. To promote preferred positions, to justify pet points or to mark advantageous boundaries, people still appeal to the supposed authority of the scientific method.

The Author

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Further Reading


A SCIENTIST’S VOICE IN AMERICAN CULTURE: SIMON NEWCOMB AND THE RHETORIC OF SCIENTIFIC METHOD. Albert E. Moyer. University of California Press, 1992. (Material from this book, the preceding article’s main source, is used with permission of University of California Press.)