Einstein's Culture Club: The Future of Physics, Science, & Politics

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Abstract: This article is a philosophical dialogue concerning Einstein and the directions of science. Einstein is celebrated. Einstein's biography is discussed, and instead of traditional and conventional portrayals of Einstein in terms of psycho-biography, Einstein is portrayed as participating in several cultural and social movements in Europe: Kant and Kantianism; socialism, Marxism, and positivism; Poincare and French conventionalism; as being steeped in traditional or 'conservative' European cultural patterns, like philosophy and music; as being steeped in cutting edge European ideas of the late 19th and early 20th centuries of the "Olympia Academy," Einstein's student reading circle or Culture Club. The philosophical dialogue discusses how, contra classic social scientific and Marxist interpretations, Einstein and Heisenberg were culturally and socially polar opposites, though both theoretical physicists were willing to pursue the 'holy grail' of unifying all of the forces of physics, like contemporary String Theorists. The dialogue discusses alternatives to String Theory and its attempt to unify all of the forces of physics.
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1. Einstein and the Directions of Science: a philosophical dialogue on the future of physics, science, & politics

Eva: Is there a direction of science? What is the direction of science?

Andrea: What do you mean? Science doesn't follow directions. Discovery doesn't follow directions. Discovery isn't directional, is it?

Eva: The SuperString Theorists, Albert Einstein, and Werner Heisenberg, and others claim there is a direction of science. The idea is that all of the forces of physics, electromagnetism, gravity, the strong and weak forces at the level of the atom and sub-atomic particles, the four forces that physicists use to explain the universe, can and should be unified in a single theory. It has been described as the 'holy grail' of physics, that Einstein and Heisenberg endorse unifying the forces of physics in a single theory. It gives String Theorists tremendous prestige and recognition even if String Theory is criticized as all abstraction and no empirical physics.

Andrea: Unifying all the forces of physics, that's a tall order. It's fascinating that Einstein and Heisenberg both believed in unifying all the forces of physics. Heisenberg led a respectable life and was a Nazi in Germany, Einstein was a socialist and a Marxist that was nearly a Communist. He had problems in the US over his socialist leanings. So much for Marx's theory and Wittfogel's theory that the social structure of the scholar and scientist predict their intellectual labor production. Heisenberg and Einstein could not have been more different.

Eva: That's right! Heisenberg and Einstein disprove the classic Marxist ideas of the political economy of intellectual labor production. Lewis Feuer in the 1960s wrote a heady biography of Einstein that portrayed Einstein as a rebellious secular Jew, an intellectual rebel in science and a rebel in politics with his socialist and Marxist tendencies. The 1960s gave way to cultural and intellectual ferment: Woodstock and the 60s, Jimi Hendrix and Santana, or earlier, Coltrane and Miles Davis, were cultural release valves. It was possible for Feuer to portray Einstein as a rebellious secular Jew that was a socialist and and a sometime Marxist. One of Einstein's friends was a Marxist who killed the owner of a large industrial business for his cruelty to his fellows in firing employees during a severe recession. There was no social safety net. Einstein wrote letters to his friend and wrote letters

asking the authorities to show lenience to his friend that had murdered the owner of an industrial house.

Andrea: Yes, it was a different time. Lyndon Johnson put leftist intellectuals on the CIA payroll. French and American intellectuals that might have been viewed as anti-American were bankrolled by the CIA to make the US appear more attractive during the Vietnam war period.

Eva: Nixon did the same thing, bankrolling leftist and Marxist intellectuals at college campuses to portray the US in a more positive light for China and Vietnam. Talk about freedom of speech and religion.

Andrea: Ironically, Feuer's book contradicted Marx's ideas and followers like Wittfogel on there being a common social structure for the creation of intellectual labor. . . What was Einstein's social structure?

Eva: Yes, what was Einstein's social structure? By contrast, many of his biographers like psycho-biography, including even Freudian psycho-biography . . . maybe they can find some naughty bits to include in Einstein's biography that explain something of his creative work. . . Einstein participated in many different social and intellectual movements in Europe. His socialism, near Communism and Marxism overlaps with the intellectual social movement of positivism. Positivism emerged in France in the 19th century with Auguste Comte and others and spread to other regions of Europe. There were strong positivist movements in Austria and Switzerland with figures like Ernst Mach and the logical positivists of Vienna, Austria. Mach was such a positivist that he questioned the existence of the atom, that physicists could not explain the existence of atoms since they could not directly observe them. Marxism was also a kind of positivism compared to the Idealist philosophies of Hegel and Kant. Einstein thus participated in socialist movements including Marxism and this related to his positivist empiricism: Einstein and Poincare' were the only physicists that were prepared to give up on the aether, the aether that supposedly all mass and energy traversed in the Universe but that was not observable by physicists or astronomers. Einstein and Poincare were the only physicists that were prepared to say that through the 19th century and the beginning of the 20th century physical theory was "metaphysical" in that it universally proposed the existence of the aether. Can you imagine that only two physicists in the world were prepared to give up on the aether?

Andrea: Yes. Physicists still believe in SuperString Theory. . . However, Einstein participated in other intellectual movements as well. When he was a teenager he and his relatives were Kantians. They believed that only Greeks and Europeans had the a priori knowledge of logical relationships that allowed the early Greeks or Copernicus or Galileo or Newton or Andreas Vesalius to have scientific advances and discoveries. This was Kantianism. Ironically, against Nietzsche's and Hitler's beer-hall proto-Nazis, this gave Einstein intellectual confidence since he and his Jewish relatives believed that they were culturally and biologically assimilated to Europe to the degree that they could understand science and contribute discoveries to science. Kantianism was dominant in Germany at the time. Kant was claimed to be an "enlightenment" thinker that endorsed the French and American revolutionary constitutions; however, surprisingly, Kant was the premiere ethnocentric and racist thinker, dominant in Germany, and Jews assimilated Kant's work and propounded Kantian doctrines. Kant's work may have made Einstein less creative since Kantians, years later, questioned Einstein's work on a priori grounds – that Einstein's work on special relativity and general relativity, before the facts, that is, a priori, had to be wrong. Kantians did not question the aether like Einstein and Poincare'. . .

Einstein traveled to Switzerland and attended the Swiss Polytechnic and was put in contact with French theorists, particularly Poincare, that are sometimes called Conventionalists. This made Einstein question the doctrinaires of Kantianism. For the Conventionalists, a priori objects of logic and mathematics are conventions, that there is no a priori set of absolute logical and mathematical objects that are the subjects of science and mathematics, and that are wired into European brains, possibly by contact with the Latin and Greek alphabets and numerical systems over thousands of years. French Conventionalism and British Empiricism are less ethnocentric and racist than Kantianism and Schopenhauer's version of Kantianism. Einstein

especially drew on French conventionalism. Einstein's intellectual social and cultural structure, then, was a wild array of socialism and positivism, Kantian strictures on the nature of science and logic and French conventionalism that undermined strict versions of Kantianism and positivism. Kantianism and positivism were viewed as antithetical by the followers of Comte, Poincare, or Betrand Russel across the Channel. Positivists questioned Kant's psychology that the inner workings of the mind had to include a priori logic and scientific and mathematical objects. None of this could be observed directly. However, Einstein was able to draw on both movements in his intellectual development.

Eva: Yes, Einstein's biographers relate the complexity of Einstein's "milieu." Another layer of Einstein's social and cultural structure was that Einstein was a kind of cultural conservative, steeped in the classical culture of Europe, its classical music and its many philosophies and intellectual movements. However, by the 18th and 19th centuries the philosophies that people had to grapple with included abrasive positivism, popular racist and ethnocentric Kantianism, and then French Conventionalism of Poincare' and others that was a sophisticated response to both Kantianism and positivism. Logic and mathematics were not absolutes that had to be wired into the brains of Europeans so that they could have science and scientific discoveries. Conventionalism treated logic and mathematics as free conventions that could be used for different purposes and uses in different branches and sub-branches of science.

Andrea: We have spoken of a different Einstein biography with different points of emphasis. Einstein and socialism and Marxism; Einstein and positivism; Einstein and German Kantianism; Einstein and French Conventionalism; Einstein and classical music and classical European culture. Einstein also had his Culture Club, the Olympia Academy where these subjects were discussed and debated by his reading club at the Swiss Polytechnic. The Olympia Academy aspired to be a Greek philosophy club in which great books and ideas of the day were discussed and debated.

Eva: Einstein and Heisenberg retained the idea that all of the forces of physics should be unified in a single theory.

Andrea: Is that right? Physicists when they describe the history of invention need to use more than the four forces of physics to describe why and how the inventions work. And when physicists try to explain why and how inventions work they need more than four forces of physics to explain why the inventions work.

Eva: More than four forces? Why do physicists claim there are only four forces?

Andrea: Because these physicists try to be like Einstein and want to simplify everything. Four forces might be able to be combined into two forces or one force from the point of view of mathematics. But when physicists describe the history of invention they need more than four forces to explain why and how all sorts of inventions work. Thus, for example, computer scientist and inventor John Graham-Cumming writes that, "In 1782, William Watts patented a method of making lead shot that involved pouring molten lead through a copper sieve and letting it fall a long distance before being cooled in a pool of water . . . Watts was less concerned with the science than with the result. But if he asked, 'How does this work?' the answers would have covered surface tension, intramolecular forces, and terminal velocity." Graham-Cumming also explains the nature of Watts invention with gravity and upward drag: "How fast is the lead shot going when it hits the water? . . . Gravity is acting on the falling body, but this is balanced by the drag from the air. . . Bodies falling through the air experience an upward force caused by drag, which is proportional to the square of their velocity. The force is defined by the equation $F = -½ CpAv^2$." Other physicists and engineers, such as Jearl Walker, the author of the "*Flying Circus of Physics*," when they analyze and seek to explain how specific technologies work, or the basis of complex interactions of "everyday" physical phenomena, use more than four forces in their explanations.

Eva: That makes sense. Modern physics has its own "aether" – four forces – instead of many forces to explain phenomena. Why won't physicists admit that there are more than four forces of physics? It's as if they're saying there are only two forces at the macroscopic level, electromagnetism and gravity.

There are more than two forces at the macroscopic level.

Andrea: They're still addicted to the idea that the direction of science is to reduce the number of forces. Is that right? Maybe it's wrong.

Eva: It will be difficult to get physicists to give up on the idea of four forces. There are scientists that have speculated that, since science involves abstraction, generalizations across facts, and the generalization of causes and theories across empirical phenomena, the direction of science is to increasingly unify forces and causes until there is a single general theory unifying all of the forces of nature. Most famous among these are Einstein and Heisenberg, and the most prominent contemporary example of this strategy is String Theory. String Theory or Superstring Theory attempts to unify all of the forces of physics, electromagnetism, gravity, and the strong and weak forces, in a single unified theory, and String Theory attempts to attach String Theory to particle physics.

Andrea: There are more than four forces of physics. Early science of the Greeks and Arabs sought to generalize or unify in a way disparate concepts and findings. However, this does not imply that the direction of science is to unify all of the forces of physics into one theory. Early science may simply have been reducing the number of causes, concepts, and findings from the earliest science that had to be disparate causes that were spread geographically. The point is that physicists use more than four forces to explain how inventions work. Instead of String Theory unifying all of the forces of physics, another strategy would be to rank the forces of physics by the capacity to generate branching patterns or other fundamental patterns.

Eva: That's different than String Theory. . . String Theory, while potentially highly general, has been criticized by many physicists, scientists, and philosophers of science for not having any explicitly empirical or testable results: String theory has been described as a "potential unified theory of nature . . . string theory not only reconciles quantum mechanics and gravity, but can also contain within it electrons, protons, photons, and all the other observed particles and forces, and hence is a viable candidate for a complete unified theory of nature." (3) However, the *American Physical Society* comments that, "String theory has not yet made any testable predictions, and some scientists worry that string theorists have . . . strayed too far from physical reality in their obsession with . . . mathematics." (4) Nobel prize-winning physicist Sheldon Glashow has similarly commented that String Theory has not made "even one teeny-tiny experimental prediction." Mathematical physicist Peter Woit, formerly a participant in String Theory, has evaluated the *oeuvre* of String Theory as "not even wrong," (5) in his book *Not Even Wrong: The Failure of String Theory and the Search for Unity in Physical Law*. (In this, Woit uses Wolfgang Pauli's famous characterization of theories in physics that are testable and wrong as more valuable than theories that are untestable). Woit argues that String theory is not empirically testable, is "post-empiricist" from the standpoint of empirical science, and argues that String Theory has failed in its attempts to unify the forces of physics or to successfully attach String Theory to particle physics. There is another criticism of String Theory and "theories of everything": there are no important inventions, technologies, feats of engineering, or industrial or post-industrial revolutions that are explicitly derivable or at least related to the Theory of String Theory.

Andrea: That's a fascinating point. String Theory is a Theory that does not have technological implications. It's fun to beat up String Theory. But what are the alternatives. One alternative is to rank the forces of physics by their capacity to generate branching patterns. Consider it. Electromagnetism has a greater capacity to generate wavelengths than gravity. At or near the surface of the earth, chemical bonds may have a greater capacity to generate branching patterns than gravity, and, at or near the surface of the earth, electromagnetism also may have a greater capacity to generate wavelengths than gravity. Moreover, at or near the surface of the earth or other planets, chemical bonds have a greater capacity for generating branching patterns (such as in crystals, minerals, and solids) than the strong and weak forces. At or near the surface of the sun or other stars, electromagnetism may have a greater capacity to generate wavelengths than gravity. Organic chemical bonds have a greater capacity to generate branching patterns of characteristics and adaptive properties in living systems than inorganic

chemical bonds. Inorganic chemical bonds have a greater capacity to generate branching patterns in non-living matter than organic chemical bonds. Light and electromagnetic spectra have a greater capacity to generate wavelengths than organic and inorganic chemical bonds; electromagnetism has a greater capacity to generate wavelengths in interstellar space than organic and inorganic chemical bonds.

Electromagnetic waves have a greater capacity to transmit music, computer software, and other analog or digital media and information than gravity, chemical bonds, or other forces of nature. In the evolution of human culture and technology, computer software is a kind of translation of symbolic culture into material culture or technology, and computer software as a force of nature increases the capacity for humans and human societies to use electromagnetism to increase the size, distribution, and branching geometries of interconnected computers, devices, technologies, and even humans and other organisms (i.e., computer software has a greater capacity to generate branching patterns, networks, and branching geometries of computers and electronic devices than gravity, chemical bonds, or silicon computer chips or other "hardware").

Thus, instead of attempting to unify all of the forces of nature in a single 'theory of everything,' it is possible to classify and separate the forces of nature in relation to each other, and order and rank the forces of nature by their capacity to generate branching patterns. Ranking forces by their capacity to generate branching patterns, in the biological sciences or in the physical sciences, is more positivist and testable than attempts to unify all of the forces of nature in a single theory. Thus, it is possible to rank and order forces of nature by their capacity to generate branching patterns or other fundamental shapes or patterns. Consider it. These statements can be tested, unlike String Theory.

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