SPARC Question List

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1. The theory of relativity asserts that no object carrying information can travel as fast as light, yet photons do, and photons are said to have mass! Does this represent a contradiction?

2. Human knowledge is expanding both in breadth and depth. In the 18th century one could make scientific discoveries in one's twenties, but now it's rare to make unprecedented, ground-breaking discoveries before finishing one's PhD or postdoc. Following this trend, in the future, would it take a person such a long time to master the necessary knowledge to mature in one's field that one wouldn't be physically or intellectually able to conduct further, novel research?

3. Will it be possible for physicists to discover a theory that precisely formulates every phenomenon in the universe in the future, or will they only ever be able to approximate?

4. Suppose there is matter in front of me, and then suppose I have the power to remove its property of mass so that it doesn't interact with gravitational fields, to remove its property of temperature so that it neither gives out nor absorbs heat, to remove its property of light reflection and refraction so that it is invisible, and to remove its atomic repulsion so any objects can pass through its body. Suppose I managed to gradually forbid any means in which the matter can interact with the surroundings, making it not perceptible at all. Given that the matter existed in the first place, does it remain in existence now?

5. Does there exist a political system that is centralized but not bureaucratic, efficient but not despotic, open but not divided? Is there an optimal balance between these aspects suitable for all situations, or are political systems' performances contingent on circumstance?

6. In the future, will it be possible to create chemically pure substances with absolutely no impurities?

7. As the Second Law of Thermodynamics states, the entropy of the universe increases with time. In this frame, the passing of time is the cause while the increase of entropy is the effect. However, is it possible that causality is or can be considered in reverse, so that it is the increase in entropy which causes time to pass?

8. Does so-called "IQ" accurately measure one's intelligence? Does there theoretically exist some indicator than can quantify all aspects of one's intelligence with total accuracy?

9. According to Gödel's incompleteness theorems, there exists propositions that can neither be proven or disproven in today's mathematic framework. Thus, will many famous unproven conjectures (the Riemann hypothesis for example) ultimately turn out to be undecidable?

10. If the mass media is already referring to what should have been called “machine learning” as “artificial intelligence,” should real “artificial intelligence” be invented in the future, what will the mass media dub it then?

11. If one could build a Turing machine and differentiate its output with respect to every symbol on its tape and every transition in its memory, could one thus create a “self-programming” machine?

12. What could be “the great filter” in the Fermi Paradox?

13. If a meteor as large as the one that caused the extinction of the dinosaurs were to collide into earth in ten years, could the human race survive it?

14. Will technologies commonly envisioned in sci-fi novels such as teleportation and faster-than-light travel ever be realized?

15. Because of the dramatic quantities of data being produced and stored in today’s world, will historical research be much easier for people centuries down the line?

16. The world has been regionally united in the past. Will this trend continue until one day the whole world is governed by a universal government, as it is in many sci-fi depictions?

17. To what extent has technological progression and social reform interfered with the natural selection process? Will the human race continue to evolve physically?

18. Is technological advancement promoting the emergence of monopolies? Over time, will large firms be able to effectively leverage their accumulated capital along with their power of economic scale, re-investing their gains into R&D, cutting-off would-be competitors and late-comers?

19. To what extent are chemists able to explain the mechanism behind all chemical reactions?

20. If humans were one day to invent real AIs that can pass the Turing test, should they be considered conscious and henceforth granted AI rights along the lines of human rights?

21. If humans were to create artificial creatures that outperformed their creators in every aspect, and such creatures then took over human civilization, could these creatures then be called the “human race?” Should this process be considered one of Darwinian “evolution”, “succession”, “invasion”, or “subversion?”

22. If both Einstein and I say the same sentence that reflects some same philosophy, what makes Einstein’s words sound more “valuable” to people?

23. What is the most efficient language in the world, i.e. the language that can most briefly encode a given amount of information under a given context and indicator?

24. Is the universe bounded with finite volume, boundless with finite volume (like the surface of a sphere), or boundless with infinite volume?

25. Is it paradoxical for humanity to search for extraterrestrial life based on criteria derived from our own experience on Earth?

26. If I interpret the benevolence of a person as arising from his or her pursuit of self-fulfillment, can I fairly conclude that everyone is selfish and motivated by self-interest? That is to say, does one help others not because one puts others above oneself, but in fact because one is seeking self-fulfillment through the principle of selflessness?

27. Are humans now capable of enacting truly substantial and irreversible damage upon the earth?

28. What fundamentally determines the physical laws of the universe? Is this relationship perhaps two-way—will we able to change physical laws by changing the universe?

29. How long will it be until humanity is finally capable of making machinery as intricate as human bodies?

30. Do some features of a language limit impair its users' thoughts, perhaps representing shortcomings in the framework offered by the language? Or is it simply that some thoughts cannot be wholly or accurately expressed regardless of language?

31. Why do English, Chinese and many other languages share the concept of north, south east and west? Is this a result of cultural exchange or simply a coincidence?

32. We refer to a type of virus that infects just a minority of people as a "virus". However, if this virus spreads so successfully that it infects everyone on earth and causes no particular harm, should we consider it a part of us, a "feature" or a "body mechanism?" Did such events happen in the past?

33. Is technology nowadays evolving slower or faster than expected?

34. Is it true that the development of physics is at its bottleneck? If so, to what extent is this true?

35. Is stratification an inevitable consequence of social development?

36. In the future, will there be an efficient way of data storage and computation in which no precision is lost at all? This is speaking of course in exclusion to symbolic calculus, which is too slow to be practical.

37. Will technology progress to a level at which ordinary people will eventually have absolutely no idea how their surroundings work? That is to say, will "common sense" fall far enough behind

technological development so as to become useless?

38. If an asteroid were set to collide with Earth in a week and the government knew so in advance yet could do nothing to halt it, would it then be moral for the government to suppress information about this apocalyptic event?

39. Are physical laws so closely related that even if I just invert the sign of a single term in a single equation, the whole system would tangle in contradiction?

40. What is the greatest contributor to historical progress, elites, the people, or simply events beyond our control?

41. Is it unrealistic and/ impossible to have perfectly objective statements?

42. Have there recently been any new connections between neurology and "artificial intelligence," apart from the term "neural network?"

43. Is general $O(n^2)$ matrix multiplication possible?

44. How would WWII have ended if the atomic bomb hadn't yet been invented?

45. Why can a banana taped on a wall be deemed "art?" Is it possible to posit a comprehensive, all-encompassing definition or criteria set for art?

46. Will humanity first find complete treatments to cancer, or will humanity first achieve controlled, energy-surplus nuclear fusion? Both targets were claimed to be achievable "within decades" decades ago.

47. Why does the expression of "the Lagrangian of the standard model?"
contain so many terms? What do they represent respectively?

48. To my knowledge, theoretical physics studies the behavior of microscopic particles. What is its impact, then, on macroscopic physics?

49. Is the Internet gradually impairing our ability to patiently ponder a problem individually?

50. How is abstract algebra related to physics?

51. Are there any other linear bases that can express all square-integrable functions apart from sinusoidal waves used in Fourier Transform?

52. Given that PID controllers, invented in the 1940s, remain the most prevalent controllers used by, is modern control theory, which produces more complex and theoretically 'ideal' controllers, in fact "overdone?"

53. Can an astral body have a donut-like shape?

54. What keeps a bicycle stable while in motion?

55. Why are “bullet comments,” comments which are overlaid on video streams and associated with their timeline rather than static embeds beneath the footage, only popular on Chinese & Japanese video websites? Will this format of user interaction spread beyond Asia, or is its popularity in Asia attributable to cultural preferences?

56. How can one most effectively and convincingly refute a conspiracy theorist?

57. If a genie were to ask me to make three wishes, how would the genie respond if I responded, “allow me to make infinite wishes?” Is this somehow a paradox?

58. I know that Robinson Arithmetic is weaker than Peano Arithmetic. Are there any other types of arithmetic stronger than Peano Arithmetic?

59. What contributes more to the formation of people’s aesthetic standards, inherent sensibilities or social influence?

60. While protecting intellectual property, do patents, at the same time, impede late-comers’ catch up in cases where the use of a patented technology cannot be avoided? Do patents encourage the formation of monopolies? Is there an optimal balance for all times and circumstances between patents’ strength and longevity and the interests of the system as a whole?

61. If the entropy of the universe always increases with time, why does the universe allow the appearance of objects that sustain partial negative entropy?

62. Is it possible to encode a language itself into a self-explanatory message such that even aliens with no knowledge of the language could recover and understand the information divorced of context?

63. Is the difficulty of a language purely subjective? Or can it be said that one language is more difficult to learn than another for people generally?

64. Why do mathematicians call elliptic curves “elliptic curves” while the figures of such curves contain no ellipses at all?

65. How can we model a circuit without lumped-element simplification?

66. Is our predisposition to stereotype a result of evolution economizing our brain’s resources? If this is the case, does it follow that stereotypes are inevitable?

67. Will Vim continue to be the best text editor for the next decade?

68. What are the real-world applications of Category theory?

69. Is the claim that 99% of the math knowledge undergrads learn in college was thoroughly studied by people like Riemann, Euler, Gauss etc. two centuries ago in fact true?

70. How would a civilization develop if $a^{2.001} + b^{2.001} = c^{2.001}$ were to be the Pythagorean Theorem in its universe, assuming this was the only difference between the civilization and early humanity initially?