

On 15 November, 1998, I attended a public lecture by Steven W. Hawking, in San Jose, California, on science in the next millennium. Hawking is perhaps the most celebrated physicist of the late twentieth century. His scholarly achievements and decades-long battle with amyotrophic lateral sclerosis ("Lou Gherig's Disease") have captured public imagination and enthusiasm: The lecture was sold out, and Hawking got a standing ovation on entrance.

My professional training is mostly in physics. For many years, my substitute for a life was general relativity and quantum field theory. I therefore have had the great honor of being able to understand some of Hawking's work, and thereby to appreciate the intellectual ability it took to establish that "black holes are not forever". I remember videotapes of Hawking, made when he could still speak in a manner some could understand. Those days are gone. During his hour and a half on stage, I am not certain I saw him move a muscle. His communication with the audience was via speech synthesis, under control of a personal computer, with some subtle interface that remained unknown to me. His presentation seemed much the equivalent of reading from a prepared text -- he cued sentences and phrases sequentially, and used a screen behind him to present graphs, stills and video sequences.

Hawking's literary style featured parsimonious use of precisely correct words. He was a superb speaker, reading the audience well and cuing his synthesizer with excellent timing. He kept us attentive and wide awake, and made us laugh at his jokes.

He challenged several popular conceptions of the future, notably that it would be peopled with folks just like us, who had achieved a level of science, culture, and politics that was notably better than ours, but that remained essentially static -- though he did say that getting political organization better than ours would not be difficult.

Describing the exponential rise of human population during the last several hundred years, he asserted that it clearly could not go on indefinitely without big changes. Noting that the rate of modification of the human genome had probably been about one bit per year during the existence of *Homo sapiens*, he suggested that genetic engineering would permit more rapid changes and a more complex genome, so that what might in some sense be described as our biological descendants would not necessarily be anything like us -- certainly, not in the manner in which we resemble the human beings of a thousand years ago. He was careful to state that he did not necessarily advocate genetic engineering, rather that he merely thought it unavoidable that someone would try it out. Hawking also suggested that electronic systems would also be subject to increasingly rapid changes and enlargements of complexity.

After a brief review of the history of physics, he asserted that physicists would probably achieve a successful unified field theory, based on supersymmetry principles, some time during the next century: He offered 50/50 odds of that happening during the next twenty years, though only after pointing out that he seemed on the verge of losing the same bet as made originally in 1980. He described one of the big issues of this theory -- subtracting two infinities in the calculation of the vacuum-state energy of the universe, in such a way that the result is sensible -- as rather like balancing the federal budget, in which an enormous tax return cancels out an equally enormous gross expenditure so as to leave a small surplus, at least until the next election.

On the ever popular subject of alien encounters, Hawking -- an admitted "Star Trek" fan and one-time guest actor on a "Next Generation" show -- rapidly developed the Fermi paradox, which may be summed up as "If life is common in the universe, why aren't there aliens already here?" He suggested that maybe they already were here, and there was a government conspiracy to keep things hush-hush, but commented that if so, the conspirators were doing a better job than with certain other matters. Hawking's explanation for the Fermi Paradox was either that life itself was uncommon, or that intelligence had less survival value than we supposed, and therefore did not occur often.

After the end of the main talk, Hawking took questions, passed up from the audience and read by an assistant. Asked whether time-travel was impossible, he did not say it was, but suggested that history had to be consistent. For the consequences of neutrinos having mass, he speculated that perhaps the universe would thus be found to be closed, so as to end in a "big crunch", tens of billions of years in the future.

The next question may have made him smile. Could he recommend a science-fiction movie that showed the future developing as he anticipated? His answer was "Dark Star", which surely startled the half of the audience that had heard of it. He elaborated, that the movie featured a smart bomb that started asking existential questions, and that was exactly what he was afraid of -- machines taking over.

The final question was more philosophical. Sir Isaac Newton was once asked whether he believed in god, and replied that he believed in a first cause. Did Hawking believe in a first cause, and if so, what did he call it? His reply, paraphrased, was that in the higher dimensional space of supersymmetry and general relativity, the universe did not have a beginning and an end, it merely was; therefore it did not require a first cause, because it had no first point.

Yet I have saved one of the best parts of the evening for last. Earlier that same day, Hawking had met with disabled youngsters, some of whom were as restricted in physical abilities as he himself, for conversation and discussion. Before his evening lecture, we were shown some video footage from this encounter. The kids all knew who he was, and the screen dumps and voice synthesizer audio of their interaction made it unforgettably clear that behind the expressionless faces and distorted postures that stem from neuromuscular dysfunction, were minds the equal of any bright teenager's. One youth asked if Hawking had ever encountered any prejudice based on his own disability, and by the way, which came first, the chicken or the egg? Hawking replied that yes, he had encountered prejudice based on his disability, but when he did, he always made sure it didn't happen again, and as for the chicken and the egg, it was definitely the egg.

Such meetings and such dialog go far to make sure that indeed, it won't happen again. Nor should it. After all, it is no longer true that if you are a disabled person, you have to be put with a bowl to beg. Today, there is another choice. Today, you can be Steven Hawking.