

***Impossibility: The Limits of Science and the Science of Limits* John D. Barrow.
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“Anything that is not forbidden is mandatory.”—Niels Bohr.

‘Everything is permitted’ does not mean that nothing is forbidden.”—Albert Camus.
Just what is, and is not, permitted? Are Bohr and Camus describing two different things—or are they saying something similar? In reality, they are describing two sides of the same coin.

Bohr speaks of the bizarre, counter-intuitive world of quantum physics where, on the most basic level, all events exist only as probability. Thus, given enough matter and energy and space and time, every sub-atomic event that is not forbidden must eventually occur. Camus speaks of the cosmic moral void (“the benign indifference of the universe”) that humanity finds himself in, and from within which it must make its own meaning and moral judgements. So Bohr talks of the physical requirement that anything not forbidden, in theory, must eventually happen; whilst Camus talks of a man-made moral requirement that not everything naturally permitted be allowed to happen. They have one key thing in common: a world view beyond Newtonian determinism, where humanity’s intervention, its very observation, creates reality.

The task of the futurist, it can be argued, is to meld both the physical knowledge of what is possible and moral perspective of what should be permitted, and thereby to steer humanity toward a better tomorrow. The task is daunting. Chaos and quantum theories seem to say to us that Einstein was wrong on one important count: God does play dice. This makes absolute prediction, in any chaotic and complex system, a virtual impossibility. (In respect of the stock market, for example, I have always believed that, at any given time, the hottest Wall Street analyst appearing on all the business shows on TV, is simply the one of thousands who had the most lucky guesses in the last year.) For that reason, the job of the futurist is seen more as that of sorting through possible scenarios of what might happen in order to facilitate a better decision-making process. It is the art of envisioning the possible or probable, rather than or predicting the inevitable. But if one is to sort out the various possibilities into probabilities, it would certainly help to know what is, and is not impossible. It is this question that John Barrow addresses in his insightful volume *Impossibility: The Science of Limits and the Limits of Science*.

It should be noted that in this far-reaching and balanced survey of the subject of limits, Barrow addresses not only the limits of what we can do, but also of what we can perceive and what we can know. From the conundrums of the Heisenberg uncertainty principle and Godel’s incompleteness theorem, to the impenetrable information void beyond a black hole event horizon, Barrow makes it clear that there are demarcation boundaries beyond which it appears we cannot probe and questions that we cannot answer. Some of these limits are purely based on the physical size and shape of our body, and the limits of our sense organs. Others seem to be cosmological or quantum boundaries, while still others seem to be inherent Escher-like contradictions in our formal systems of defining reality.

Of special interest to the futurist is a chapter entitled “Back to the Future” in which Barrow clearly defines four very different potential types of human future.

These futures represent those in which we would find that (1) nature is unlimited and human capability is unlimited; (2) nature is unlimited and human capability is limited; (3) nature is limited and human capability is unlimited; or (4) both nature and human capability are limited. Paradoxically, as Barrow seems to cast his vote in the end for human limits, this means we cannot know whether nature is limited or not, nor can we know the precise limits of our limits. In fact, this might best be expressed in a quote Barrow cites from Ludwig Wittgenstein: “In order to be able to draw a limit to thought, we should have to find both sides of the limit thinkable . . . we would have to be able to think what cannot be thought.”

As thorough as Barrow is, there seem to be two areas of discussion glaringly omitted from *Impossibility*: human imagination and human evolution. While both are given very brief mention, it seems that the author fails fully to appreciate the limit-busting potential they entail.

In the case of human imagination, I personally suspect that the very concept of infinity itself could not exist in a finite universe. *We can always imagine one more*. Of course, this in itself involves contradictions—any finite number of human minds, within a finite framework of time, could never imagine an infinite number of things. It may be that Haldane was not quite right: the Universe is not stranger than we can imagine; it is stranger than we will have time to imagine! And yet, if human imagination is even potentially unlimited, how can nature be otherwise? If reality, on the quantum level, is observer created, then infinite imagination may create an infinite Universe. Certainly, an infinite imagination will always find one more rock to look under, will always think of one more question to ask. So what we *can* know and imagine may be infinite, but what we *do* know and imagine will always remain finite. At any rate, it appears that a finite imagination could not know when it reached nature’s limits, and an infinite imagination might make a finite universe appear infinite.

As for evolution, Barrow makes only fleeting references to his notion that human minds are capable of much more than has been necessary for survival, and seems to imply that it progresses too slowly to have any significant future effect expanding the limits of our minds and perceptions. I disagree on both counts.

While there is no doubt that, left to its natural pace, evolution proceeds too slowly to have any but a marginally expansive effect on our physical and mental limits and our ability to probe of reality and acquire knowledge, Barrow sees the existence of a multitude of “un-computable” problems as proof positive that our machines will only go so far as our evolutionary surrogates. Incredibly, what he fails to see is that the impending completion of the human genome project may soon give us the direct ability to accelerate and control the future pace of our own evolution. Men and machines may become mutually self-enhancing (perhaps in many ways they already are). We will effectively become *self evolving*. Who knows what limits such a scenario might allow us to surpass? It seems that Barrow, in failing fully to consider the implications of human imagination, has failed adequately to use his own in considering how apparent limits might be circumnavigated.

As for the notion that human minds are capable of far more than has been necessary for our evolutionary survival—how pedestrian. While in the most basic sense

this may be true in the past tense, without the ‘unnecessary’ trappings of civilization—music, art, technology, philosophy—we would still be living in caves. Who is to say that we would have survived all this time? Who is to say these capabilities won’t prove essential to our future survival?

These objections aside, Barrow is very thorough and provocative. For those who enjoy the art of the quotation, he is also entertaining. From the sharp wit of Will Rogers (“Nothing you can’t spell will ever work”) to the bold visions of Arthur C. Clark (“If an elderly but distinguished scientist says that something is possible he is almost certainly right, but if he says that it is impossible he is very probably wrong”), and flippant satire of Douglas Adams (“There is a theory which states that if anyone discovers exactly what the universe is for and why it is here, it will disappear and be replaced by something even more bizarre and inexplicable. There is another theory which states that this has already happened”), the author shares the pithy insights of mankind’s greatest thinkers on the notion of what ultimately is and is not possible. But the words of George Bernard Shaw, quoted in the summary of Chapter 2, made the deepest impression on me—as perhaps they should on any futurist: “The reasonable man adapts himself to the world: the unreasonable one persists in trying to adapt the world to himself. Therefore all progress depends on the unreasonable man.” For, as futurists, it is our refusal to accept our fate as inevitable—our very nature to be unreasonable—upon which the foundation of our contribution to human progress rests.

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