The idea and the experiment

Sir—In his provocative piece, John Martin (Sept 9, p 984)[1] uses as a strong argument for his hypothesis the example of Jenner and vaccination. He views Jenner's vaccination of a neighbour's child as the most obvious manifestation of the idea outweighing the experiment.

Martin implies that Jenner had simply applied his notion directly and so produced medicine's greatest advance. But this was not the case. If Martin reads Jenner's unpublished report, which was made widely available in a verbatim publication to commemorate the bicentenary of Jenner's death,[2] he will discover that Jenner was experimenting.

Jenner had seen the protective effect of natural cowpox infection in twelve people. For the thirteenth, "The more accurately to observe the progress of the infection, I selected a healthy Boy about eight years old for the purpose of inoculation for the Cow-Pox". Jenner inserted the cowpox on May 14, 1796, and observed the evolution of the lesion. "On the 1st of July following, this Boy was inoculated-with Matter immediately taken from a smallpox Pustule." Several punctures and incisions were made but no disease followed. The boy, who was James Phippe, was variolated with smallpox many times to prove his freedom from smallpox.

Jenner had followed the lessons of his former teacher and colleague, John Hunter, who, in their correspondence on the habits of hedghogs, had written "but why think, why not trie the Expt." (sic).[3]

Ideas remain ephemeral until the experiment establishes their existence.

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1 Martin J. The idea is more important than the experiment. *Lancet* 2000; 356: 934–37.
2 Edward Jenner. Born May 17th, 1749- died Jan 26th, 1823. *Lancet* 1923; 1: 137–42.
3 Royal College of Surgeons. Letters from the past: from John Hunter to Edward Jenner. London: Dorriston, 1976.

Sir—Whoever believes that "the expression of fantasy in abstract painting and music is superior to those in science", as John Martin does[1] should think again.

The leaps in abstract thinking by an Einstein, Planck, Bohr, or Feynman[2] represent an intellectual activity few are capable of, since it requires an intimate knowledge of higher mathematics and physics that not many can muster. Besides, the flights of their imagination were unique and you wonder, would someone else ever have come up with the same solutions?

The major breakthroughs in science, especially in modern science, are no less than any artistic innovations by a Debussy, Stravinsky, or Schoenberg, or paintings by Manet, Cezanne, Picasso, or David Smith. In fact, modern art has benefited from more science, as Picasso and Braque were the first to admit, rather than the other way around. For the lesser contributions Ortega y Gasset noted that experimental science has progressed thanks mainly to the work of men who are astoundingly mediocre and even less than mediocre.[3]

Art is generally subjectively oriented, whereas science is mostly motivated by a desire to understand the world, even if the two disciplines make use of the same intuitive thinking. And, just as we would do as well without certain paintings (as an art and antiques dealer for the past 15 years I have become convinced that many are over-rated) and presumably many poems, novels, or musical compositions as well, in second-rank science someone else eventually will be there to make the same discoveries that keep rekindling the priority issue.

Contemporary physics or cosmology speak mostly to a small intellectual elite, but art is far more democratic in its appeal and its audience is commonly less discerning or discriminating. The rewards of both flights of fancy is in the beauty of the solutions they offer. As one tubercular doctor and poet once put it: A thing of beauty is a joy forever . . ! (Don't you wonder what Beethoven might have done with Endymion?)

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1 Martin J. The idea is more important than the experiment. *Lancet* 2000; 356: 934–37.
2 Kleppner D, Jackiw R. One hundred years of quantum physics. *Science* 2000; 289: 893–98.
3 Ortega Y Gasse J. The rebellion of the masses. Norton, 1932.

Author's reply

Sir—Peter Warren maintains that when Jenner vaccinated and later challenged a healthy boy with cow pox, he was experimenting. I maintain he was not experimenting but was applying his idea, directly as a therapeutic. The origin of the difference between the two viewpoints probably lies not in an historical analysis of Jenner's actions but in the definition of the nature of experimentation.

Jenner had observed horse handlers transfer a pox infection to cows when they helped with the milking. Milkers infected with pustules from the cows were protected against smallpox. He conceived the idea that vaccination with cowpox would protect against smallpox. I believe that an essential part of the nature of experimentation is that the result is uncertain, otherwise the experiment would not be performed. This is in contrast to the development of, for example, a therapeutic, for which the result is predictable. Jenner vaccinated the boy with cowpox and later inoculated him with smallpox. If this process had been an experiment, Jenner would have been exposing the child to the possibility of death from smallpox. I believe he acted as though he was undertaking a demonstration of the correctness of his idea. John Hunter did indeed say to Jenner ". . . trie the Expt", but he was referring to studies on the digestion and hibernation of hedgehogs; studies the outcome of which was unsure and, therefore, experimentation was needed.

I did not argue against the absolute necessity for rigorous experimentation in medical science. I underlined the importance of the idea in creating the right experiment and the direction of the experimentation.

Henry Gans says I should think again if I believe "the expression of fantasy in abstract painting and music is superior to its expression in science", but I actually said "If fantasy is a play of ideas, then I find the expression of fantasy in abstract painting superior to science for two reasons". First, art is superior because it is a tool of self-analysis—of the artist or of the observer. Knowledge of self is qualitatively more important (to the human being) than science, since the role of science is simply the measurement of nature in a way that nature can be predicted. Furthermore the work of the artist is unique, whereas many scientists would be capable of making any important discovery. We probably inappropriately honour the one that gets there first. If the artist's work is of value, then his or her honour is probably appropriate, since without that particular artist the work would never have existed.

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