



**Truth or Beauty: Science and the Quest for Order**

David Orrell  
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 Reviewed by Benjamin Eastham



The proliferation of popular science programmes on television has accustomed us to bespectacled men talking breathlessly about the beauty of mathematical formulae. Realising that their audience will be overwhelmed by shameful feelings of inadequacy if asked to follow them through any algebraic proof of Einstein's theory of relativity, these unnervingly jaunty scientists instead invoke the formula's epigrammatic elegance as proof of its truth. The implication is that, as Keats said in a letter that echoes the famous line upon which the title of this book plays, "what the imagination seizes as Beauty must be truth". If you have to take the science behind  $E=MC^2$  on trust, you can none the less grasp its beauty.

The mathematician David Orrell here puts forward a compelling argument that this tendency to conflate truth with beauty is as much a hindrance as a help

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to scientific progress. He presents as an illuminating historical example the tortuous amendments made to early models of the solar system in order to describe its operations in terms of perfect circles. It was a source of disappointment to even Johannes Kepler that the planetary orbits should be discovered to trace less pleasing ellipses.

We assume that such delusions of flawless celestial order are confined to a past in which scientific endeavour was geared towards revealing the workings of a rational god. Yet Orrell contends that many physicists continue to allow a faith in the intrinsic orderliness of underlying principles to blind them to empirical evidence to the contrary (a contention contested by the smattering of engineers and scientists I consulted). The ultimate expression of this tendency is the search for a single rule that will rationalise every action of the universe, a Grand Unified Theory that could "fit on the front of a t-shirt". It is remarkable that, in a society sceptical of grand narratives, the hypothetical ability of physics to formulate a pithy Theory of Everything is tantamount to received wisdom. I found myself worrying, as Orrell took me at walking pace through the paradox of Schrödinger's cat, at how hubristic we might seem to future generations.

The three properties of beauty which "apply to mathematical formulae and scientific theory as well as they apply to art or architecture" are identified by Orrell as "elegance, unity and symmetry". It struck me on reading this that the aesthetic principles to which scientists are so devoted would see them banished to the naughty step at any self-respecting art school. This conception of beauty, wedded to principles pre-dating Socrates, might to anyone even loosely familiar with a century's progress in art, poetry and music seem at best archaic and at worst reactionary.

It is ironic, too, that the artistic insurrections of the last century were in large part conceived to keep step with science. Picasso, Braque, Schoenberg, Dalí and Kandinsky are among those to have pioneered revolutionary aesthetics that drew on new ideas of time and space. Writing about that period, Orrell

acknowledges that "relativity and quantum physics together were pointing the way to an alternative conception of beauty... which artists were more willing to take seriously than most scientists".

Instead, he argues, science continues to play down evidence that contradicts its predilection towards unity and harmony. Among the speculative frameworks to reassert the primacy of those principles is the exceptionally elegant theory of supersymmetry, which posits that every elementary particle possesses an equal and opposite twin, a dark matter doppelgänger. The neatness of the idea is seductive, but experimental evidence remains elusive.

This prompts Orrell to question whether cultural factors are responsible for science's aesthetic conservatism. Such hierarchical, ordered notions of metaphysical beauty might be "a projection of a particular gendered worldview" in a discipline dominated by men, and also bear traces of the military's close links to research institutions. It is thrilling to question the high-minded objectivity of scientific discourse, and Orrell makes a convincing case for the adoption of new aesthetic principles that acknowledge the self-creative and unpredictable nature of "complex systems" – such as the weather and collective economic behaviour – which stubbornly refuse to adhere to predictions based on rational assumptions.

This rallying call for a new approach – "we need to change our aesthetic, from seeing the world as a machine to seeing it as a lived system" – brought to mind the sculptures of Eva Hesse, the performances of Joseph Beuys and John Dewey's *Art as Experience*, which argued (in 1932!) that the "formal conditions of artistic form" are "rooted deep in the world itself". This engrossing book begins by questioning the assumption that truth and beauty are coextensive, but ends with the more exciting proposal that we must formulate new ideals of beauty if we are to advance in our search for the truths that both scientists and artists pursue.

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