Interogating the "Science of Better"

Christopher Thomas Ryan, February 24, 2026

In these essays I have returned repeatedly to the question: "What exactly is Operations Research (OR)?" Of course, I am not alone in this quandry. The community as a whole has periodically struggled to explain itself to outsiders, producing waves of redefinition, subtle repositioning, and occasional rebranding efforts meant to make the field legible to those beyond its own boundaries.

One of the more memorable of these attempts, popular when I was a PhD student (in the mid-2000s), was the slogan that the Institute for Operations Research and Management Science (INFORMS) used to describe OR: "The Science of Better". It was not merely a slogan; it came with a website — scienceofbetter.org — and the quiet confidence that "the world's most successful executives are making bolder decisions — and running everyday operations — with less risk and better outcomes" because of OR.[1]

I have to admit, I have always been uncomfortable with the notion of the "Science of Better". To say that something is "better" seems to require at least some minimal understanding of the status quo for comparison. Yet much of my training focused on tools for optimization, for proving optimality, for constructing models whose purpose was to be optimized. I learned how to demonstrate improvement within a model far more than how to understand the situation the model represented.

So I found myself asking questions that felt almost impolite in polite OR company. How could I say with any integrity that my approaches were "better"? How could I know that I might not, in some circumstances, make things worse?

But this unease is only the beginning of the problem with the notion of the "Science of Better". The phrase seems to brush against one of the most persistent challenges in the history and philosophy of science: the so-called is–ought divide. On the one hand "science" deals with what "is" and ethics (or the humanities generally) deals with what "ought" to be; that is, what is the directionality of "better". By conflating the two, the "Science of Better" shows either blatant disregard for the "is-ought" challenge or a thoroughgoing ignorance of it.

But you might be thinking, is the "is-ought" thing really that serious? Let's look into a bit of the backstory. David Hume (1711–1776) is the thinker most associated with the distinction. He criticized writers who begin with statements describing what is — axioms, observations, data — and then, almost imperceptibly, shifting toward claims about what ought to be. An opinion about how the world might be made "better" is thus dressed in the language of science, even though science was designed to describe the world as it is. Hume's point was not that values are unimportant, but that the transition from fact to value requires justification rather than assumption. He was far from alone.

Famed mathematician Henri Poincaré wrote in 1905: "There can no more be moral science than a scientific morals".[2] Noted economist and social theorist Thorsten Veblen insisted in 1909 that science "knows nothing of policy or utility, of better or worse,"[3] directly undercutting the premise of any "Science

[1] The website still seems active to this day, although with a decidely early-2000s design aesthetic and mostly broken links.

[2] The Value of Science: Essential Writings of Henri Poincaré (New York: Modern Library, 2001), page 190.

[3] Veblen, Thorstein. "The place of science in modern civilization." American Journal of Sociology 11.5 (1906): 585-609, page 600.

of Better". Even Albert Einstein echoed a similar sentiment in 1914: "For the scientist, there is only 'being', but no wishing, no valuing, no good, no evil, no goal."[4] And immediately after World War II, James Bryant Conant, president of Harvard College, in his celebrated treatise on curricular reform wrote about the difference between natural sciences and the humanities:

> ...the former describe, analyze, and explain: the latter praise, judge, and criticize. In the first, a statement is judged as true or false, in the second, a result is judged as good or bad.[5]

Is OR a subject in the former (a science?) or the latter (a humanity?) Does the "Science of Better" suggest that it's both?

At this point, you might reasonably think I am reading too much into a simple marketing phrase. Perhaps "The Science of Better" was never meant to claim authority over moral judgment. Perhaps it was simply meant to signal that operations researchers help others achieve what they themselves define as "good". You tell us what better means, and we will help you deliver it.

In this telling, OR is ethically neutral. We optimize objective functions, whatever they may be. To judge whether the objective itself is appropriate is not science, and therefore not our role. A more precise, though less elegant, slogan might have been: "A Science for Your Better". This is, I suspect, the dominant understanding of the field. Optimization and stochastic models are neutral tools. We provide the machinery; others provide the goals.

Yet this position would likely have struck many founders of the OR profession as precarious. Especially those who experienced, in the words Norbert Wiener, "the world of Belsen and Hiroshima" and the realized possibility of powerful technologies falling into the hands of "the most irresponsible and most venal of our engineers".[6] The twentieth century demonstrated that methodological neutrality does not guarantee moral neutrality.

The atomic scientists themselves struggled with this tension. While later thinkers like Feynman celebrated the "social irresponsibility" in the pursuit of knowledge for its own sake displayed by the scientists who developed the Atomic bomb during the Manhattan Project,[7] its leader, J. Robert Oppenheimer, reflected on his involvement with the haunting words, "I am become death, the destroyer of worlds", [8] which many observers take as an expression of remorse.

How would you feel if an optimization algorithm you developed was used to help dispense Agent Orange to "efficiently" wipe out an ecosystem? What if some of the results you brought to game theory were invoked to justify a pre-emptive nuclear strike — proposals that were not hypothetical at the RAND Corporation of the 1950s?[9]

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[4]Einstein, Albert. Out of my later years: The scientist, philosopher, and man portrayed through his own words. Open Road Media, 2011, page 114

[5]Conant, James Bryant. "General education in a free society: Report of the Harvard Committee." (1946), p. 59

[6]Wiener, known to many in OR via the naming of the Wiener process, was an influential scientist during World War II and the postwar era, founding "Cybernetics", the contemporary and sister field of OR. The quotation is taken from Norbert Wiener (1948) *Cybernetics: or Control and Communication in the Animal and the Machine*, The MIT Press, Cambridge, Massachusetts. p. 29

[7]Feynman, Richard P. *The Meaning of It All: Thoughts of a Citizen-Scientist*. Perseus Books, 1998, p. 16.

[8]Quoted by Oppeheimer from the Bhagavad-Gita, as documented in Bird, Kai, and Martin J. Sherwin. *American Prometheus: The Triumph and Tragedy of J. Robert Oppenheimer*. Alfred A. Knopf, 2005, page 321.

[9]See, for instance, Emery, John R. "Moral choices without moral language: 1950s political-military wargaming at the RAND Corporation." Texas National Security Review 4.4 (2021): 11-31.

One potential balm to the conscience of scientists involved in these morally-wrought efforts was the knowledge that an even more nefarious actor (real or imagined) might have come to these technologies before us to wreak even greater havoc. We are justified in developing technologies and learning how to apply them precisely because we get *our* hands on them first. Under this lens, the slogan might have more accurately been phrased "The Science of *Our* Better — or Else Suffer Catastrophe."

Indeed, the neutrality of OR—of all sciences—seems particularly problematic. Operations Research is not physics or chemistry. Its subject matter is organized human activity — large-scale undertakings in which values seem inseparable from decision making. The very formulation of a "Science of Better" seems to prevent the field from enjoying the luxury of "social irresponsibility".

The unavoidable question becomes: whose "better" do we choose to further? And if we fail to choose, is the default "better" up for grabs to the highest bidder? Is it a coincidence that some of the hottest topics in OR in recent years — dynamic pricing, assortment planning, algorithmic auctions, online matching on platforms — seem perfectly attuned to the problems of some of our largest and most powerful corporations? This struck me particularly hard one year when at the INFORMS Annual Meeting, the password to the conference Wi-Fi connection was unabashedly and simply: "amazon".

Some influential figures believed that the "Science of Better" should have as much thought put into the "Better" as the "Science". Instead of taking someone else's objective function, we should think carefully about what our own our objectives, or even what are the "right" objectives. For instance, C. West Churchman treated the objective function as conceptually prior to optimization, describing it as a "basic ingredient of the system"[10] and arguing that optimality is only made meaningful by choosing a meaningful criterion. Churchman wrote a whole book,[11] about how to bring our "values" into our measured objectives. But the objectives that matter most are often difficult to measure. We optimize profit because we can measure it. As W. Edwards Deming, acknowledged luminary of the Total Quality Management (TQM) movement, noted: "the most important figures that one needs for management are unknown or unknowable".[12]

If "improvement" cannot be easily specified in advance, it must be discovered in practice. The direction of improvement emerges through negotiation among those involved rather than through top-down declaration. George Box captured this spirit when he described TQM as "the democratization of the scientific method".[13] What counts as better is not decided by a small group of analysts but a whole "community of scientists" experiencing the system.[14]

Tolstoy, writing in a very different context, takes some of these implications even further. He writes:

> "People must live. But in order to live they must know how to live. And all men always obtained this knowledge— well or ill — and in conformity with it have lived, and progressed ; and this knowledge of how men should live has from the days of Moses, Solon, and Confucius been always considered a science — the very essence of science. And only in our time

[10] Churchman, C. West. *Challenge to reason*. New York: McGraw-Hill, 1968, p. 223)

[11] Churchman, C. West. *Prediction and Optimal Decision: Philosophical Issues of a Science of Values*. Prentice—Hall." Englewood Cliffs, New Jersey: Prentice-Hall, 1961

[12] W. Edwards Deming, *Out of the Crisis*, p. 121, quoting Lloyd S. Nelson

[13] Box George, *Improving Almost Anything*. Wiley, 2006, page xi.

[14] Spear, Steven, and H. Kent Bowen. "Decoding the DNA of the Toyota production system." *Harvard Business Review* 77.5 (1999)

> has it come to be considered that the science telling us how to live, is not a science at all, but that only experimental science — commencing with Mathematics and ending in Sociology — is real science....[we] must return to the only reasonable and fruitful conception of science, which is, that the object of science is to show how people ought to live." [15]

The last few quotes of Churchman and Tolstoy reminds of a research paper I co-authored that explored some of the mathematics of particular graphs associated with the real-life phenomenon of live-donor kidney exchange. It is one paper in a long line of work art of a line of work developed most prominently by Nobel laureate Al Roth and his many collaborators.[16] Roth and others discovered the immense potential in kidney exchange for altruistic donors—those willing to donate a kidney to someone in need with no expectation of getting anything in return—to unlock long "chains" of transplant after transplant.

But to me, the most important feature of kidney exchange was not the mathematics; it was these altruistic donors themselves. These rare individuals unlocked possibilities the models could only ever formalize, but never explain. What person is willing to donate a kidney ... to a total stranger? In my paper (and all others I know of written by operations researchers), we studied the value of altruistic donors mathematically, but the deeper question to me is how to create more of them, isn't it? Isn't the right objective here to maximize the number of altruistic donors? But this inevitably involves interrogating the motivation, ethics, and meaning of such a sacrificial act. All of this sits uncomfortably outside the traditional boundaries of OR, even though it is arguably the first-order problem in kidney exchange.

The implication is not that OR should abandon mathematical rigor, but that it might reconsider what it means by "Science". Maybe something closer to wisdom than method alone. A morally honest and intellectually sophisticated embrace of the phrase "The Science of Better" might require precisely this expansion. Could part of the training of operations researchers include philosophy, spirituality, even religion — not as replacement for mathematics but as contexts for its use? Might Tolstoy's provocation offer a way to reinterpret the slogan, not as a boast of technical superiority but as an aspiration toward a better way to live?

[15] Tolstoy, Leo. "Essays & Letters, trans." New York: Funk and Wagnalls Company (1904), p. 221-2

[16] For a summary of these developments see Sönmez, Tayfun, and M. Utku Ünver. "Market design for kidney exchange." *The Handbook of Market Design*, 2013. Al Roth also writes about the context in his book Roth, Alvin E. *Who gets what–and why: the new economics of matchmaking and market design*. Houghton Mifflin Harcourt, 2015.