Cybernetics and the Birth of Computer Ethics

BY DAVID KALAT

With the aggressive pace of technological change and the onslaught of news regarding data breaches, cyber-attacks, and technological threats to privacy and security, it is easy to assume these are fundamentally new threats. The pace of technological change is slower than it feels, and many seemingly new categories of threats have been with us longer than we remember.

Nervous System is a monthly series that approaches issues of data privacy and cybersecurity from the context of history—to look to the past for clues about how to interpret the present and prepare for the future.

The story of modern computer ethics begins, strangely enough, in wartime. As Nazi Germany escalated its bombing raids on England, American mathematician and physicist Norbert Wiener volunteered his services to help develop defensive technologies. Wiener was an early pioneer of the field of information theory. His focus on the feedback loops between information systems and their users led him to become an outspoken proponent of the ethical and moral considerations of computer science, even as computers themselves were in their infancy. His propitious undertaking led to the concept of cybernetics—indeed the very word "cyber" itself.

Calling Wiener a "mathematician and physicist," though, is an understatement. He completed his bachelor's degree in mathematics at Tufts College when he was only fourteen, after which he pursued graduate studies in biology at Harvard, philosophy at Cornell, and symbolic logic at Cambridge. By the time Wiener joined the war effort, he had been a professor of mathematics at the Massachusetts Institute of Technology for almost a decade. He was both a prodigy and a genius. More importantly for what was about to happen, though, Wiener was a committed interdisciplinarian. He believed key insights were best uncovered by cross-pollinating findings across different sciences, and he was about to prove it.

Wiener's World War II–era research focused on the challenge of anti-aircraft guns. The basic problem with such weapons was that the missiles took approximately twenty seconds to reach their targets, so any effective use of them would require the gunner to aim not where the enemy aircraft is now, but where it will be in the future. Such predictions were notoriously difficult.

Wiener approached the problem by compiling data about the enemy plane's past and present actions, and then applying complex statistical modeling to that data to make a prediction about what would happen next. As a practical battlefield tool, the system was too complicated to deploy in an era before widespread access to computers. However, the predictor worked well enough to rattle Wiener. Although some of what his predictor modeled were aspects of the machinery of the

aircraft, the system was **also** modeling aspects of the pilot's frame of mind and intentionality. More striking, the predictor did not differentiate between modeling the aircraft versus modeling the pilot. For all intents and purposes, they were the same.

Wiener's interdisciplinary mindset started to kick in. He recognized that what he saw in terms of how airplanes fly through the sky could apply to what otherwise appeared to be wholly unrelated research into nervous disorders. Physics and psychology were appearing to be interrelated.

Wiener saw that his predictor was not strictly a wartime tool limited to shooting down planes. Any system—be it machine or animal—that had a self-regulating feedback loop could be modeled in this way. Feedback was the critical element and could lead a system into runaway chaos (ask anyone holding a microphone too close to a loudspeaker) or into stable equilibrium (ask a steam engineer).

Looking for a handy way to refer to this discovery, Wiener went back to the ancient Greeks, who used the word kybernetikos ("good at steering") to describe helmsmanship. Wiener coined the term "cybernetics" to encompass his theories of how complex systems are controlled through informational feedback channels. The word has since entered the lexicon so thoroughly that its prefix "cyber" is often invoked—clumsily—to refer to almost any information system.

To the surprise of all concerned, Wiener's 1948 publication of **Cybernetics: or Control and Communication in the Animal and the Machine** became a widely popular and deeply influential work on the larger culture, despite being a densely written book about mathematics.

Having essentially invented the science of cybernetics, Wiener turned his thoughts to the moral implications of the dawning Information Age. He presciently foresaw the coming "automatic age," which he described as a "second Industrial Revolution." He worried about the new ethical challenges that a world of thinking machines inevitably would bring.

Wiener's writings in 1948, 1950, and 1963 formed the basis of what is now known as information ethics or computer ethics. Wiener did not think of himself as founding a new field of ethics, but rather bringing existing ethical frameworks to bear on new questions raised by information technology. His book **The Human Use of Human Beings** (1950), for example, explored the impact of information technology on key value systems and human happiness. For Wiener, the goal of computer ethics was to advance the positive aspects of information and communication technology while minimizing the harmful aspects.

Using the framework of his thoughts about cybernetics, Wiener opined that a good life would be one where a human could fulfill his or her promise as an information-processing agent, and where other information-processing agents in the shared environment (people, machines, computers, robots) allowed that promise to be fulfilled. In Wiener's view, that promise could only be truly fulfilled where freedom, equality, and compassion flourished.

Pointedly, Wiener's notions describe a generalized human social ideal, without restricting that ideal to a singular ideology, religion, or cultural norm. His ethics welcome cultural diversity. This is a vital and enduring message for an understanding of universal human ethics that extends beyond the sphere of computer ethics.

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