of glass. These were the hackers of the first optical revolution. (p. 22)

As more and more people tinkered with curved pieces of glass, this eventually led to the development of the microscope and telescope.

Johnson refers to many of the developers of technology as time travelers, for they could see beyond the present day of their era. Sometimes they also had to be stubborn to keep working on something when no one else saw a purpose in it. An example of this is the story of Frederic Tudor. In the early 1800s, he saw many cargo ships coming into Boston harbor filled with goods from the West Indies. However, they were going back there empty. He had the idea to take ice from New England and ship it to the West Indies in what would have been the empty ships. He eventually became a very wealthy man from this business. However, it had a difficult start as most people in the West Indies had never experienced anything cold and saw no use for this strange material called ice. He had to work hard to create a demand for his product. Many people develop technologies that are eventually popular, but which people initially have no desire to purchase. The creators of the technology may have to work to help create a demand for its use.

This is an excellent book written for an intelligent lay audience. Since many of us in ASA are really lay people when it comes to anything outside our individual areas of expertise, I think most members would enjoy the book. In addition to having creative content, Steven Johnson is an excellent writer. Reading this book has motivated me to obtain and read some of his other books dealing with technology and culture.

Reviewed by William Jordan, Professor and Department Chair, Mechanical Engineering, Baylor University, Waco, TX 76798.

AND WEST IS WEST by Ron Childress. Chapel Hill, NC: Algonquin Books, 2015. 320 pages. Hardcover; \$26.95. ISBN: 9781616205232.

For some time, I held a popular view that tools and technologies are neutral: they have no moral value in and of themselves, apart from how we use them. This was an empowering way for me to think about my own use of computing technologies, and perhaps helpful to the extent that it caused me to evaluate the directions of my research.

One of my close friends, however, holds a degree in philosophy and has the troubling habit of asking challenging questions and inviting me to think carefully about my assumptions and their implications. He likes to point out that tools and technology actually change a person. Yes, a hammer can be used for good purposes, or for bad ones, and it is up to the person holding that hammer to determine what use she will put it to. In that sense, we may call it neutral. But a person who picks up a hammer becomes a different person.

Or, to use a more poignant example, a person becomes a different person by picking up a gun. Not only in many circumstances might I act very differently with the gun in my hand, but equally importantly I would think of myself differently. The tools and technologies we use change us.

Childress's new novel *And West Is West* provides a fascinating exploration of how the technologies we use change us. The tale follows two protagonists on opposite sides of the country: Jessica, a drone pilot who carries out missile strikes on suspected terrorists, and Ethan, a quant or programmer who designs algorithms that enable his bank to profit off high-speed currency exchanges based on the market fluctuations caused by terrorist activities. Both protagonists wrestle with moral qualms about their work and the suffering it causes or exploits.

I had some doubts when I picked up the book and saw it had won a prize for "socially engaged fiction." Socially engaged is good. But I feared the writing would be didactic: a sermon thinly veiled as a story. While the author does not leave the reader with many doubts about his view of drone strikes, or of algorithmic trading that profits off human suffering, the much more interesting and subtle exploration describing the seemingly "neutral" technologies the protagonists make use of, and the isolating impact and depersonalizing nature of those technologies. It is not only what the technologies are used for that change the user, but also the nature of the technologies themselves.

Jessica sits thousands of miles away from her targets, flying her drone from a military base in the Nevada desert. She launches missiles (euphemistically called "angels") at blurry images on a computer screen. Sometimes the missiles take innocent lives. She and her colleagues escape the monotony, and perhaps also the feelings of guilt, through overeating, gambling machines, and nicotine. "On the base they call it Operation Expanding Waistline, partly because covert snacking is the main pastime during shifts at a drone monitor."

Ethan is a quant; he works seven-day weeks in the Wall Street trading world, sitting alone behind a computer monitor writing code, keeping himself going

## **Book Reviews**

with drugs and energy drinks. "Basically he works all the time." When not at the office he is still at the call of the bank, constantly chained to mobile computing technologies. He seems unable to maintain healthy human relationships. There is no mention of his family until the end of the book. He loses two girlfriends. He has only one friend.

Not far into the novel both Jessica and Ethan lose their jobs. Jessica makes the mistake of confessing feelings of guilt to her biological father, who happens to be in prison. That she had to confess via letter to a biological father she does not even know is symptomatic of her isolation. Since her guilt involves a drone strike with civilian casualties, the confession is a security breach resulting in her discharge. Ethan, in a moment of physical and emotional fatigue also brought about from guilt and failed relationships, makes a decimal point error that causes his bank to lose a few hundred thousand dollars. This is presumably a fraction of the money his algorithms have actually earned the bank, but since Ethan also made the mistake of being unshackled from his technologies for twenty-four hours, it provides an excuse for his boss to fire him.

Then the real drama begins. Having been conditioned to isolation, both struggle to adjust to life away from that work, and in particular to build real human relationships not mediated, restricted, or distracted by technology. The struggles are not easy, and are compounded by the secretive—and immoral—nature of their former jobs. Jessica, with her knowledge of sensitive military secrets, becomes a wanted fugitive. Ethan winds up in a legal battle with his former employer.

Interestingly, the paths of the two protagonists never cross. The only connection is the fact that Ethan's algorithms enabled his bank to profit off the drone strikes carried out by Jessica. Not until the very end of the novel does Childress reveal the thin thread that unites their personal lives, and leaves the reader with the possibility that they might meet in person. But Childress provides a fascinating cast of other characters ranging from an FBI agent who once interrogated (or tortured) Al Qaeda suspects in Afghanistan (thus weaving in another aspect of social concern), to a weed-smoking tattoo artist, to a bisexual painter who goes from a struggling to a wildly successful artist, to a Russian billionaire, to a suicidal father of an ex-girlfriend.

The book raised a number of interesting questions about my own views of technologies and how I use them, and I found myself pondering some of these after closing the pages. The pacing of the novel is excellent, switching back and forth between numerous scenes in the two separate storylines, and now and then jumping to the point of view of one of the minor characters. My primary critique is that many of the characters are one dimensional: caricatures or types rather than fleshed-out persons. Even the protagonists do not really grow or change until the very end, and the change is seen then in only one short scene. Nonetheless, Childress succeeded at the most important level in that I found myself caring what happened to both Ethan and Jessica, even if at points I did not like the former very much. That, and the well-crafted suspense, kept me reading and made it a book I would recommend.

Reviewed by Matthew Dickerson, Professor of Computer Science, Middlebury College, Middlebury, VT 05753.

THE MASTER ALGORITHM: How the Quest for the Ultimate Learning Machine Will Remake Our World by Pedro Domingos. New York: Basic Books, 2015. 311 pages, index. Hardcover; \$29.99. ISBN: 9780465065707.

Pedro Domingos is a professor of computer science at the University of Washington and a leading researcher in the area of machine learning. The central thesis of this book is, as he states it, that "all knowledge—past, present, and future—can be derived from data by a single, universal learning algorithm" (p. 26). He calls that algorithm, yet to be discovered, the "Master Algorithm"—hence the title of the book.

The book begins by discussing the ubiquity of machine learning in the present day. Email spam filters, recommendation systems used by companies such as Amazon and Netflix, selection of stocks by mutual funds, the layout of goods in a supermarket, credit card fraud detection, and loan application approval—among many others—make heavy use of machine learning. According to Domingos, even the result of the 2012 presidential election was heavily influenced by machine learning: "the candidate with the best voter model wins, like Obama versus Romney" (p. xiv).

The author classifies workers in the field into five rival schools, which he often refers to as tribes. The Master Algorithm would unify these five approaches into a single algorithm that draws on the strengths of all five. Domingos claims that

if such an algorithm is possible, inventing it would be one of the greatest scientific achievements of all time. In fact, the Master Algorithm is the last thing we'll ever have to invent because, once we let it loose, it will go on to invent everything else that can be invented. (p. 25)