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I, Robot

A robot may not injure a human being or, through inaction, allow a human being to come to harm. Thus reads the first law of robotics as formulated by Isaac Asimov in his classic book of science fiction short stories, *I, Robot*. That book, first published in 1950, defined the popular view of robotics for many. To this day, it is still in print and is ranked by Amazon.com. In Asimov's world, robots were self-aware entities capable of thought, word, and deed. They self-replicated and were available, servantlike, for the comfort and service of humanity. Indeed, the descendants of this book's view can be seen in the popular culture in movies ranging from *Forbidden Planet* to *Star Wars* and *Terminator II*. But robots haven't quite worked out the way movies portray them, have they?

There is no question that robots and automation are an integral part of today's economy, but robots aren't sentient. They do what we design and program them to do, and they make us more efficient. Modern automobile manufacturing and circuit board assembly could not exist without robots, which today are really a subset of automation devices that encompass everything from telephone switching (no Lily Tomlin character asking for a "number please") to chemical manufacturing, satellite operation, and package delivery. Not surprisingly, both automation and robotics are dramatically affecting drug discovery.

And well they must, for we have far too many targets. Once, drug candidates came opportunistically. Scientists heard of ancient herb remedies and investigated the components. Or, as with Alexander Fleming and his discovery of penicillin, physiological effects serendipitously occurred and were observed by trained scientists. Now we're trying to be much more encompassing. We've decoded, at least for the most part, the human genome. We're working on deciphering the role of all the proteins generated by genes, looking for targets where we can intervene medicinally. But much of what we have now is information without structure. To be candid, we're awash in data, and much of it is noise. Only automation and high-throughput screening can lead us from drug discovery by serendipity to drug discovery by strategy.

Senior Associate Editor Mark Lesney's article on page 30, "HTS: Seeking signals through the noise", discusses new opportunities in drug discovery that focus on G-protein coupled receptors. These proteins are a superfamily of receptors for protein–protein interactions that include a number of the most important drug targets found to date. They are part of the group of proteins that help regulate everything from individual enzymes to cell differentiation to cancerous growth. But characterizing these entities has been at best difficult and, as Lesney shows, only recently have a new series of tools become available that permit us to automate and, yes, even robotize, these analyses.

In the robot world that Isaac Asimov described, robots looked like people and took jobs that people didn't want to do. Today, robots are part of an automation revolution, and they take on jobs that we can't do. But the spirit of the first law of robotics still holds: Robots are working to ensure that humans are not allowed to come to harm.