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Augmentation or Automation?

By **Thomas H. Davenport**

We are all reading about the risks of automation—smart machines taking the jobs of workers. Many economists are focused on the subject now, [as an article in this newspaper suggested this week](#). I agree with my friend Erik Brynjolfsson, the MIT professor whose concerns were featured in the article, that automation is an extremely worrisome issue. But a much more pleasant and fulfilling outcome for humans would be *augmentation*—a situation in which humans and computers combine to create effective and efficient outcomes. Humans can do what they do best, computers can do what they do best, and together they will be great partners. Humans get to keep (at least some of) their jobs. And the combination of human and computer-based capabilities leads to a better outcome than either could provide on their own.

It's still early days even for the idea of augmentation. We don't have a good list of the things that humans and computers are good at, so we don't know how to combine them within a specific application. Many companies have focused primarily on automation because its benefits are clear—jobs are eliminated, and companies don't have to pay salaries or benefits to computers. The case for augmentation is a little less clear, other than that humans get to keep their jobs. But in order for augmentation to work, we have to also prove that the combination of humans and computers is better than either one working alone. We don't have a lot of examples of that yet, but there are some.

Several writers who have described the augmentation situation have done so with reference to chess. In one-on-one matches, we know the best chess players are computers these days, but there is a role for humans as well. The economist Tyler Cowen in *Average Is Over* (not surprisingly, a chess champion in his youth), as well as *The Second Machine Age* authors Brynjolfsson and Andrew McAfee, use the example of “freestyle chess,” in which human chessplayers are free to use as much help from computers as they wish. I'm not a chessplayer (I like to get paid for thinking that hard), but I gather that Freestyle chess players are quite effective, often rivaling and beating the best computer programs on their own. Unfortunately not many of us make a living at chess, so we need examples outside of that domain.

When I wrote [a book about knowledge workers](#) a decade ago, there were already a few examples of augmentation that were taking shape. I wrote in some detail, for example, about the idea of “computer-aided physician order entry,” particularly focusing on an example of this type of system at Partners Healthcare System, an academic medical center in Boston. When physicians input medical orders (drugs, tests, referrals, etc.) into the system, it checks to see if the order is consistent with what it thinks is best medical practice. If not, it asks the physician if it wants to change the order, although the final decision is up to the doctor. When the system was implemented in two major hospitals at Partners, it led to a 55% reduction in serious medication

errors. Many hospitals use such systems now, and increasingly they will keep track of costs and patient activities as well. Perhaps at some point they will also assist physicians with diagnosis, though this is a much more difficult problem.

Another example of augmentation at work is when I and millions of others use TurboTax (or, I presume, the other computerized tax programs, though I have not used them personally) to file a tax return. I supply a knowledge of my tax situation and the sources of data on it, and TurboTax supplies the rules, points out relevant tax documents throughout the process, evaluates my responses for errors, and tells me how likely I am to be audited by the IRS. There is certainly a lot of intelligence in the computer program, and I would like to think that I bring something to the party as well. For example, I make the decisions about just how charitable a supposed charitable donation is, and TurboTax dutifully deducts the contribution. I remember that I already paid tax on a speaking fee in Brazil, and TurboTax serves up the foreign tax credit form when I request it. While TurboTax could be smarter (and so could I, I suppose), using it provides a better outcome than what I could have done on my own. If I were really smart, I would give my TurboTax-generated return to a tax accountant to make sure that everything makes sense, and to help me with tax planning. A few professionals have made that sort of augmentation their focus, but not enough of them.

Of course, it's a lot of work to succeed at augmentation. If you're a knowledge worker hoping to keep (and prosper at) your job with this approach, you've got to learn a lot, change what you do, and sometimes swallow your pride at the prospect of becoming an adjunct to a machine. And the work is continuous. You've got to continually monitor how the machine is doing, continually check whether there are better approaches, and continually modify your systems. This is no task for the faint-hearted. But putting in this work may well determine whether you keep your job or not.

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