

What cyborg chess can teach us about the future of financial planning

Michael Kitces & Derek Tharp | Nerd's Eye View | 08 February 2018

EXECUTIVE SUMMARY

The recent rise (and subsequent decline) of robo-advisers has generated much discussion about the threat (or lack thereof) that technology poses to human advisors. Yet, as discussed previously on this blog, the man versus machine framing of the role that technology will play in the future of delivering financial planning advice may be too narrow. Instead, the combination of man and machine (i.e., the "cyborg adviser") may pose the greatest opportunity to human advisors in the long run - and threat to those who lag behind.

In this guest post, Derek Tharp – our Research Associate at Kitces.com, and a Ph.D. candidate in the financial planning program at Kansas State University – examines how the game of cyborg chess provides support for the idea that human-computer teams will remain superior to either humans or computers on their own (even when the intelligence of computers vastly outweighs that of humans), as well as some of the insights cyborg chess can provide about how the skills of cyborg advisers will differ from the traditional skills of advisers today.

Cyborg chess (or freestyle chess) is a version of chess in which humans can use any resources they want to improve their play - including today's increasingly-sophisticated computer chess software. One interesting fact about cyborg chess, as was previously noted by Tyler Cowen in his book *Average is Over*, is that human-computer duos consistently defeat both the best humans and the best computers. What's even more interesting, though, is that the humans in some of the world's best human-computer duos aren't even all that great at chess themselves. This means the skills that let humans most effectively assist and execute chess software may be different than the knowledge needed to be a great chess player.

In fact, it turns out that to be skilled at cyborg chess, humans have to be good at letting computers do what they do best, and then excel in areas where humans are more effective. And, while there are some obvious applications to financial planning, in areas such as empathy and building client relationships (where humans will certainly remain relevant in the future), the same is even true in technical areas of financial planning as well, where computers are typically thought to have an advantage over humans. Specifically, humans can play an important role in areas such as helping computers know where to look for the best solutions, examining inconsistencies generated by different computer programs, helping computers to be more efficient in their calculations and analyses, and knowing the limitations of various programs and when they may generate recommendations that don't align with the real world. And, of course, as technology becomes even more prevalent in financial planning, Finology-focused soft skills and human aspects of giving financial advice will become increasingly important.

The bottom line, though, is simply to recognise that despite the view that computers will come to dominate certain areas within financial planning, the reality is that there are still ways that computer-human duos can be more effective than computers or humans alone. Additionally, this has some profound implications for the skills and knowledge that are needed to be a great financial adviser in the future, and those skills and knowledge may not

necessarily align with what we think of (and currently teach under the CFP Board's curriculum) as the core competencies of great financial advisers today.

(Michael's Note: This post was written by Derek Tharp, our new Research Associate at Kitces.com. In addition to his work on this site, Derek is finishing up his Ph.D. in the Personal Financial Planning program at Kansas State University, and assists clients through his RIA Conscious Capital. Derek is a Certified Financial Planner.)

MAN VS MACHINE VS. CYBORG

The recent rise (and subsequent decline) of robo-advisers has generated much discussion about the threat (or lack thereof) that technology poses to human advisers. Yet, as was noted previously on this blog, the man versus machine framing of the role that technology will play in the future of delivering financial planning advice may be too narrow. Instead, it is the combination of man and machine (i.e., the cyborg adviser) which poses the greatest opportunity to human advisers in the long run - and threat to those who lag behind.

The reality is that computers really are better at some tasks than humans. In fact, in areas where computers do hold absolute advantages over humans, such as completing long, repetitive tasks in an efficient and error free manner (e.g., assembly line work and long-haul trucking), technology does pose a genuine threat of replacing humans entirely.

Yet financial planning also involves many areas where humans continue to have an advantage over computers, such as unstructured problem-solving and expressing empathy. In these areas, there's little threat of humans being replaced by technology entirely.

Thus, the opportunity is for humans to do what they do best while being supplemented by technology that does what it does best. In other words, the heavily tech-augmented advisor possesses more long-term potential than either human or robo-advisers alone.

Of course, these dynamics are not unique to the financial planning industry. In chapter 5 of his book, *Average is Over*, George Mason University economics professor, Tyler Cowen, draws interesting insights from the game of cyborg (or freestyle) chess. In contrast to both human chess (which prohibits the use of any computer or other resources to aid the human) and computer chess (which prohibits human interference to aid the computer), cyborg chess allows players to use any resources they would like - human, machine, or otherwise.

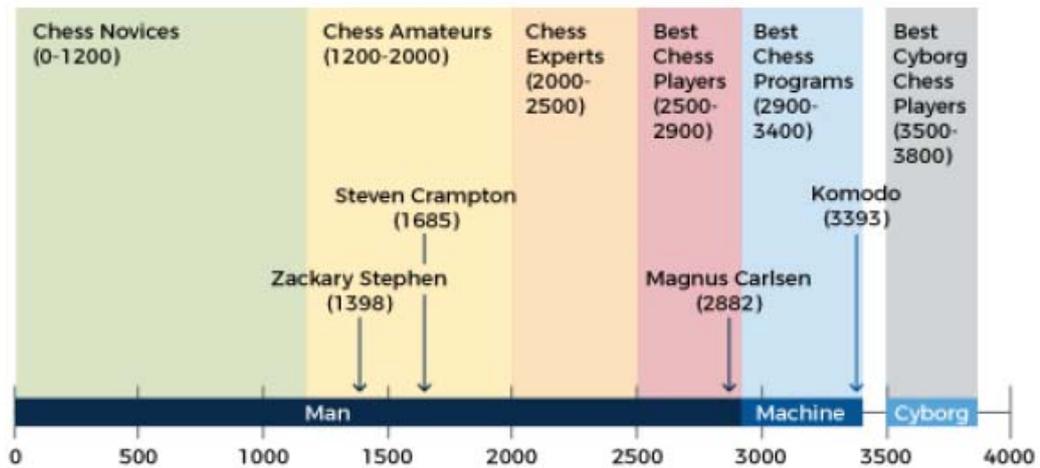
What's notable about this combination is that cyborg chess masters currently beat both the world's most skilled humans and the most skilled computers. In other words, the human helps the computer to be better than any computer alone, and the computer helps the human be better than any other human alone. The combination of each is superior to either alone.

And what's particularly interesting about cyborg chess is that the best cyborg chess players aren't necessarily all that great at being just human chess players themselves. In other words, it's not just that chess grandmasters become even better with computer assistance, but that some amateur chess players paired with a computer can beat the world's best chess players paired with a computer - because it takes a different set of skills to excel at cyborg chess than it does to excel at human chess.

In one famous case, a team of amateur chess players from New Hampshire - Steven Crampton (Elo rating of 1685, which is a method for rating chess players) and Zackary Stephen (1398) - paired with three chess programs (Fritz, Shredder, and Junior and Chess Tiger) to convincingly defeat a series of teams made up of chess grandmasters (often 2500+) and some of the world's best chess programs. While Cowen's book is a bit dated now (2013), he references several top cyborg chess players who estimate that top cyborg chess players

have a 100 to 300 Elo rating point advantage over the world's best computers, which today would be the Komodo chess engine with an Elo rating of 3393. By contrast, the highest human Elo rating ever achieved was 2882 by Magnus Carlsen in 2014. The means the skills needed to be great at chess are not the same as the skills needed to be great at cyborg chess, and that the world's best human chess players don't necessarily have the skills needed to excel at cyborg chess.

Figure 1: ELO RATING SCORES OF MAN VS. MACHINE VS. CYBORG



Source: © Michael Kitces. www.kitces.com.

COLLABORATING WITH MACHINES REQUIRES A DIFFERENT SET OF SKILLS AND KNOWLEDGE TO BE SUCCESSFUL

So how is it that relatively unsophisticated chess players can team up with a computer to defeat the most skilled humans and the most skilled computer chess players in the world? As it turns out, when humans are teaming up with machines, an entirely different set of skills is needed in order to be successful.

At a very high level, skilled cyborg chess players are good at knowing when to trust the machine and when intervention can be helpful. Compared to humans, a computer is not going to get fatigued late in a game and make a poor decision. Computers will be consistent, accurate, and effective in simple, logic-based tasks.

However, the complexity of chess and the fact that it hasn't been "solved" yet means that there can be opportunities for humans to intervene. In a 2013 blog post, Cowen notes four specific ways in which humans can add value over a computer alone:

1. Helping the computer to identify which scenarios should be analysed most closely, increasing the computers odds of finding an optimal solution it may not have found on its own.
2. Examining inconsistent results provided by multiple computer programs, and guiding the programs to more carefully analyse those scenarios.
3. Helping the computer more efficiently and effectively manage its time.

4. Understanding the assumptions/limitations of various programs, and how they might be systematically prone to various errors.

What's notable about the four items is that none of them require any deep expertise in chess (though some general knowledge is necessary to understand scenarios that might be disregarded, limitations of assumptions, etc.). In some sense, the human chess player is operating in a management role, helping the computers focus on goals and priorities, analysing scenarios they might not have otherwise considered, managing the computer's time, and using the human's knowledge of the various computer programs' strengths and weaknesses to weigh their recommendations and make an executive decision.

WHERE ADVISERS WILL REMAIN SUPERIOR TO COMPUTERS

While playing a game of chess has a far more narrowly defined objective than providing financial planning services to a client, it's not hard to envision some implications these same concepts might hold for the future of financial planning and how planners will collaborate with computers going forward.

Conceptually, it may be helpful to examine these human strengths within two broad domains: technical financial planning recommendations; and, communication or relationship skills.

Technical Financial Planning

First, we must acknowledge that there are certain tasks in which computers will always hold an absolute advantage over humans. Much like the computer possesses a superior ability to not lose sight of a bishop lurking in a far corner, computers will remain superior at calculating an NPV or running thousands of Monte Carlo iterations without making computational mistakes - so much so, in fact, that most advisers already rely on computers for these purposes (rather than computing Monte Carlo projections by hand).

However, that does not mean that humans cannot add value within the technical planning realm. Much like a human currently manages various computer programs in a game of cyborg chess, a cyborg adviser will play a role in managing various planning software programs.

It's within this technical realm that Cowen's list of ways in which humans can add value to computers applies most directly to financial planning, including:

1. Advisers will always need to help various software tools "prune variations" and more effectively search for optimal recommendations;
2. Advisers must identify discrepancies in recommendations provided by different programs and know when to evaluate those unique client circumstances further;
3. While "time management" generally isn't as big of an issue in financial planning applications relative to chess (because within chess there are an astronomically huge number of variations to consider, which can lead to an effectively "endless" search for a solution), a human must still manage a computer's use of time in the sense of taking a client's subjective goals and translating them into the most effective financial planning topics for the computer to investigate. And, further, as planning software becomes increasingly robust and sophisticated (e.g., dynamic programming methods for financial planning), literal "time management" of a computer's resources may

become more important in a way that it isn't currently for most financial planners; and,

4. Understand the strengths and weakness of various planning methodologies (e.g., historical versus Monte Carlo analysis), as well as the systematic biases they may exhibit.

While it may be the case that chess will one day be a solved game, the presence of uncertainty in many financial planning recommendations (and the fact that clients themselves can and do change their goals over time as they discover new possibilities), means that many financial planning problems are fundamentally unsolvable in a way in which chess is not. As a result, even on the technical side of planning, a cyborg adviser should be able to provide better recommendations than either a human or computer alone for a long time to come.

Relationship and communication skills

While there will still be room for humans to add value on the technical planning side for the foreseeable future, arguably technical financial planning recommendations aren't even the domain in which the human member of the human-computer team adds the most value. Instead, human advisers will continue to play an ever-more-dominant role in the subjective domains of financial planning – such as goal setting, behavior change, and coaching.

Social reciprocity of human engagement creates motivational forces that machines simply cannot replicate. After all, even if a machine can tell someone they are failing at something, that person still has options to ignore it, avoid it, get rid of the program, or physically destroy the machine (or, in most cases, simply turn it off). But we don't have that same luxury with people. We are social creatures who spend a lot of time trying to view ourselves through the eyes of others. And as we do so, our failures take a different form. The desire to not be seen as a "failure" (or, more positively, to be seen as "good", "virtuous", etc.) makes us accountable to other people in a way that we aren't necessarily accountable to ourselves or a machine. These social components of motivation leave little reason to believe machines will ever overtake this domain.

However, we can continue to see many ways in which a cyborg adviser can surpass the ability of just a human to enact behavior change within a client. Whether it is providing better data, faster and more relevant feedback, more effectively introduce new ideas, or even just the human's ability to translate the computer's recommendations into communication that is more meaningful to clients, there are many ways in which tech-augmented human advisers can leverage technology to help clients to make better financial decisions.

For instance, it's not hard to imagine some ways in which a cyborg adviser may be able to more effectively empathize with clients and build deeper relationships than a human could alone. Some companies are already developing emotion recognition software that can read facial-micro expressions in real-time. Similar software could one day be integrated into video conferencing software, or expanded into technology that can apply to face-to-face communication – perhaps cuing the adviser in a discreet manner or giving feedback after a meeting to improve their empathetic skills.

Or, perhaps as our understanding of the relationships between things like personality characteristics and behavioral biases continues to improve, software will be able to help guide us on various strategies that may be most effective to help a given client implement in light of their unique personality profile. For instance, suppose we knew that a particular coaching intervention was more powerful for clients with a certain personality profile. Rather than needing to rely on an adviser to make that insight themselves, intelligent software which

"knows" an advisor's client base well enough could steer an adviser to a particular method based on that client's profile.

And, delving into the potentially creepier side of the future communication potential of cyborg advisers, the client's ability to distinguish adviser from machine will continue to diminish. These lines have already begun to blur, with technology such as auto-generated emails addressed to the client as if it came directly from the advisor. Though oftentimes people can still identify auto-generated emails for what they are, consider the future implications of the continuing merging and development of human voice emulation, video emulation, and conversational artificial intelligence. A cyborg adviser could one day program a computer to have video or audio conversations with clients in a manner that clients cannot tell whether they are speaking with their adviser or a computer – potentially enabling clients to receive greater levels of coaching than a single adviser can currently provide.

Of course, these are just a few ideas of how technology can continue to enhance an adviser's ability to help them enact positive behavior change. A recent *Journal of Financial Planning* [article](#) by Derek Lawson and Brad Klontz examines ways in which behavioral finance, financial psychology, and financial therapy can be integrating into each of the 6-steps in the financial planning process. This article, paired with a little imagination, can generate all sorts of interesting ideas for how computers will continue to help cyborg advisers within the domain of relationship and communication skills.

THE DIFFERENT SKILLS NEEDED TO BE A GOOD CYBORG ADVISER

The fact that the skills needed to be a good chess player are radically different than the skills needed to be a good cyborg chess player has some profound implications when applied in a financial planning context, including and especially with regards to how future financial planners are trained (and whether the CFP Board's topic list and curriculum will effectively train financial planner of the future).

First, the technical competencies needed to traditionally be a skilled financial planner will almost certainly change. Consider a domain like tax planning. With enough quality data being automatically fed into an AI tax planning program, it's not hard to envision a tax planning program which generates equal-or-better recommendations compared to what any one human can come up with (and in fact, H&R Block and IBM's Watson are already working on it). As a result, beyond the need to know how to explain and communicate the recommendation to the client (which can presumably be teed up for the adviser by the AI program anyway), the majority of tax planning knowledge currently included in the CFP Examination might become of little value to the human member of the cyborg team once computers are far more intelligent (akin to learning how to do financial calculations manually, in the age of calculators and spreadsheets).

However, the importance of human technical knowledge isn't likely to be eliminated entirely, as the types of technical knowledge needed will simply change. For instance, suppose Program A recommends a client contribute to one plan, while Program B recommends another. The human now needs to be able to reconcile those different recommendations and advise a client accordingly. Do the programs assume different future tax rates? Do assumptions of other factors influence either recommendation (e.g., probability of future tax changes or premature death)? Does one program have a quirk that is going to favor one approach over the other?

Notably, these aren't financial planning questions *per se*. Instead, they are methodological questions or questions related to the operation of various programs, which requires critical

thinking skills to analyse. Certainly, some such questions will still require underlying technical knowledge to understand and address, but like the cyborg chess players who gain an upper hand through an understanding of the strengths and weaknesses of different programs, a different type of technical knowledge will be needed for cyborg advisers to evaluate large amounts of easily available information.

Further, extremely deep technical knowledge within some financial planning domains (as we think of them now) may still yield important planning opportunities in specialised scenarios. For instance, knowledge which hasn't been incorporated into tax planning software - e.g., knowledge of specific circumstances which aren't captured by tax planning software, knowledge of proposed tax changes, or knowledge of recent (or potentially upcoming) tax department rulings - may create tax planning opportunities not identified by software, even though mainstream tax knowledge will not. This will diminish the value of tax planning (and other knowledge domains) as is traditionally practiced by advisers (and tested by certifying organisations like the CFP Board), while increasing the value of niche forms of advice. And, of course, for some deep niche specialisations, the expert adviser may still literally know more than the computer about that particular type of client and their needs (such that the human would be the one needed to program the computer to do that type of planning in the first place).

Additionally, procedural knowledge will continue to be important, and arguably more so. This will be particularly true of knowledge which is hard to capture through artificial intelligence. For instance, as advisers communicate Social Security claiming recommendations to clients, they will still need to be able to help guide clients on how to claim their benefits. This could be advice such as what to say when the client is at the Social Security Administration's offices, what time of day it is usually best to go, or who is the best person to talk to at SSA. Yet, while related to financial planning, these are again not financial planning questions, *per se*. They are more akin to customer service recommendations, based on an adviser's experience and unique knowledge of information that would be hard for machines to accumulate.

In fact, customer services skills will likely increase in value across the board in a cyborg-driven future. Similar to the ways in which social reciprocity can allow humans to motivate other humans in ways that technology cannot, certain aspects of customer service also derive their power primarily from the fact that they are performed by another human. For instance, being warmly greeted by a receptionist and provided a beverage before a review meeting provides much of its charm because a human is delivering the service. The same greeting from a robot is simply not going to be as powerful. From helping clients set and articulate goals, to helping them get the systems in place to monitor and evaluate their progress and, ultimately, aiding them in accomplishing those goals, it's the skills related to the client service experience that are most impactful, because they are delivered by a human (regardless of how much else is technology-driven).

Sales skills are another area which will only increase in value as cyborg advisers compete against one another. In some respects, once the technical financial planning skills of the computer become sophisticated enough, every adviser will have a super-powered robo-paraplanner at their disposal at all times. With the diminished value-add that can be provided through planning expertise (unless in a niche that goes beyond what the technology can then-currently solve), advisers will compete amongst one another based on who can best communicate those insights to clients, motivate clients to take positive actions, and convince clients to hire an adviser in the first place.

Of course, the increased ability of cyborg advisers to help clients make behavioral change is a double-edged sword. Anything that can be used to nudge clients in a positive direction can be used for manipulative purposes as well. But the key here is to recognise that, consistent with Cowen's insight in *Average is Over*, the skills needed to be a great human

chess player differ from those that are needed to be a great cyborg chess player, the skills needed to be a great human financial adviser are different than the skills needed to be a great cyborg adviser. This means that while the Finology-focused soft skills and human aspects of giving financial advice are already incredibly important (given that these are the areas in which humans have the strongest advantages over computers), they will only increase as the rise of the cyborg adviser continues.



[Michael Kitces](#) is Partner & Director of Wealth Management with Pinnacle Advisory Group (Washington DC). [Derek Tharp](#) is a Research Associate at [Kitces.com](#)
