

Thinking Out Loud... Man and Machine, a Likely Partnership

"I think Garry [Kasparov] is gradually realizing that... he is really part of our scientific experiment."

—C.J. Tan, Sr., IBM Senior Team Manager, Deep Blue Project

Elizabeth A. Evans

Elizabeth Evans is CEO of Health Informatics, Inc., Richmond, Virginia, the parent company of AMI Healthcare Systems Group, which has been providing clinical and financial software solutions for dialysis facilities and physician practices since 1981, and of HMG, which provides outsourced billing capabilities to dialysis facilities, physician practices, and emergency rooms.

We thought we were so smart when we dragged our laptop computers to Smith Mountain Lake in Virginia, a pristine body of water nestled in the Blue Ridge Mountains. We wanted to do some work while we played during our vacation. The goal was to electronically connect ourselves to the office's internal e-mail system and the world-at-large through the Internet. The plan was to not miss a business beat from the time we began our vacation until we returned to the office at its end.

Admittedly, it was more fun to cruise the Web than to tap into our business e-mail system, because our e-mail brought us back to the normal business pressures that our vacation was meant to hold at bay.

Nevertheless, our use of digital technology became a daily ritual, similar to our purchase of ice cream every day from the ice cream boat that made its rounds on the lake, playing its carillon-like music to announce its approach. Its music drew us into its sweet net, as did the melodious notes played on our computer when a new e-mail message arrived. Both were too much

fun to give up. However, the latter became a riveting activity in which the world of analog—the long front view of gentle, quiet water with hills and large, mature trees on both sides—and the digital world that presented on the laptop converged and became the conduit for the whole world through my fingertips... so relaxing and stimulating. It was more than we expected.

Check

As is typical during a moment of relaxation such as this, thinking can seamlessly morph into a nonlinear mode. My musing started with the beauty of the scenery and switched to a query about reality. It roamed through questions about the nature of intelligence and swerved to the long-standing conflict between machine and human intelligence. It then shifted to the much publicized competition between Deep Blue, a large and powerful IBM computer mainframe capable of examining and evaluating up to 200,000,000 chess positions per second, vs. Kasparov, the greatest living chess player. It moved to Deep Junior, a personal computer with four 1.9 GHz

Pentium 4 processors that can examine and evaluate up to 3,000,000 chess positions per second, vs. Kasparov, and then Fritz (another personal computer with a similar computational capability as Deep Junior) vs. Kasparov.

Charles Krauthammer planted the seed for these thoughts last November when he wrote an article that chronicled the battle of man against machine.¹ The first battle began with Deep Blue, which lost to Kasparov in 1996. When that happened, the IBM programmers went back to the bench and, as a result of their improvements, Deep Blue beat Kasparov in 1997. Later that year, IBM terminated its program, and reputedly never shared any of its game records.

In January 2003, Kasparov played Deep Junior, the PC-based program, and the computer beat Kasparov. In the next match, in May 2003, Deep Junior won three and drew three against Kasparov. Kasparov had executed some improvements of his own. The other PC, Fritz, came on the scene in November 2003 and played Kasparov. Fritz won one, lost one, and drew two.

Krauthammer wrote: “Kasparov lost Game 2 [against Fritz] because, being human, he [Kasparov] made a tactical error. Computers do not. When it comes to tactics, they [computers] play like God. ...Kasparov [when he won Game 3] is showing that while we can’t outcalculate machines, we can still outsmart them.”

For example, the Kidney Disease Outcomes Quality Initiative (K/DOQI) provides a Dynamic Venous Dialysis Pressure Surveillance Protocol—a series of steps the clinician is advised to perform at each dialysis session in order to detect developing access problems, intervene early, and thereby achieve optimal outcomes. Like a chess move, each step within a clinical

protocol does in its Dialysis Access Monitoring program and others—the computer helps to ensure that the next move the clinician makes is the right move. In a sense, the TIME System makes it easy to do the right thing. As a result, the data, because entered at the time of care, have a better chance of being accurate and complete, so that the resulting trend analysis, which is far more important than any single data point, is likewise more reliable and predictive.

Automated advisories for each step of a clinical protocol represent a systems approach to patient care as do automated chess plays to a master-level chess game. The similarities in approach between the two outnumber their differences.

Kasparov writes this about his match with Deep Junior: “Today, after I play a match with Deep Junior we can reconstruct the computer’s decision-making process with our own copies of the program. Moreover, due to Deep Junior’s public track record of nearly a decade, I can analyze hundreds of its games. All this means we are now in scientific territory.”²

Science vs. Knowledge

Kasparov’s statement is a provocative one about the role of science in the acquisition of knowledge. Science does not recognize knowledge instantaneously. Rather, science advances as we methodically observe a measurable reality in order to evolve an observation into replicable information. In a similar sense, the science of my own profession, medical information technology, incorporates specific, measurable knowledge into the tactics of task performance, evaluates the outcome, then modifies the task’s tactics (that is, the program logic) in order to achieve optimal performance.

cal protocol is a clinical move, so that protocol steps—such as, “Measure venous dialysis pressure from the hemodialysis machine at Qb [blood flow rate] 200 mL/min during the first 2 to 5 minutes of hemodialysis at every hemodialysis session,” or “Pressure must exceed the threshold three times in succession to be significant”—become “plays,” as it were, during the process of care.

Automated advisories for each step of a clinical protocol represent a systems approach to patient care as do automated chess plays to a master-level chess game. The similarities in approach between the two outnumber their differences. Having said this, there is a pivotal advantage to injecting automated protocols into the science of patient care.

Because the computer never forgets and is not distracted, its program will faithfully advise the clinician each step along the way through a protocol. By integrating information technology into the protocols of care at the point of care—such as the HII TIME® Sys-

A Grand Experiment

Ultimately, much of what we see, feel, and think can become part of a scientific experiment. Whether we are a chess player like Garry Kasparov, who methodically pits his intelligence against an intelligent hunk of iron and inadvertently becomes a part of the experiment; or a clinician, who uses the real-time protocol advice provided by a hunk of intelligent iron placed at the point-of-care; or a patient, who just wants to know she is receiving the best clinical care possible and appreciates the advisories that the hunk of iron gives her caregivers; or an administrator of a dialysis facility or a nephrology practice, who recognizes that practicing medicine with precision and safety is nearly impossible without incorporating the practice of information into the process of care... each is, in its own way, a scientific experiment, and each will improve with age.

References

1. “Carbon-Based Life Can Still Beat Silicon, Sometimes,” by Charles Krauthammer. *Richmond Times-Dispatch*, November 24, 2003, p A11.
2. “Jack of One Trade. Master of All,” by Shahar Smooha. Appeared on the Web site, haaretz.com. **D&T**