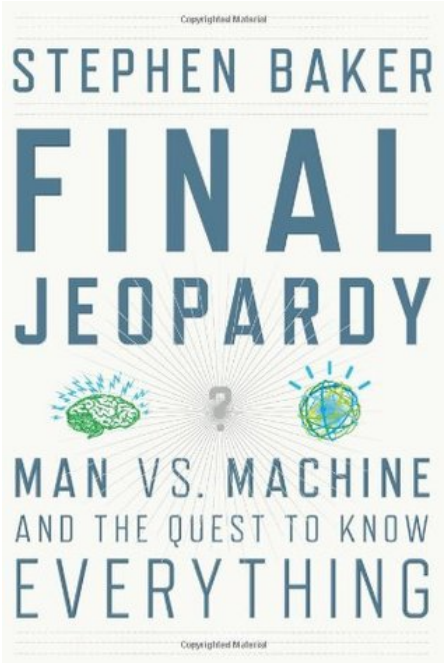

Final Jeopardy: Man vs. Machine and the Quest to Know Everything

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The thrilling story of the computer that can play Jeopardy! Alex Trebek: Meet Watson.

For centuries, people have dreamed of creating a machine that thinks like a human. Scientists have made progress: computers can now beat chess grandmasters and help prevent terrorist attacks. Yet we still await a machine that exhibits the rich complexity of human thought — one that doesn't just crunch numbers, or take us to a relevant Web page, but understands us and gives us what we need.

That vision has driven a team of engineers at IBM. Over three years, they created "Watson" and prepared it for a showdown on *Jeopardy!*, where it would take on two of the game's all-time champions, Ken Jennings and Brad Rutter, in a nationally televised event. *Final Jeopardy* is the entertaining, illuminating story of that computer and that epic match.

It's a classic tale of Man vs. Machine. Like its human competitors, Watson has to understand language, including puns and irony, and master everything from history, literature, and science to arts, entertainment, and game strategy. After years of training, Watson can find the scrambled state capital in "Hair Gel" ("What is Raleigh?") and even come up with the facial accessory that made Moshe Dayan recognizable worldwide ("What is an eye patch?"). Watson may just be the smartest machine on earth.

Final Jeopardy traces the arc of Watson's "life," from its birth in the IBM labs to its big night on the podium. We meet Hollywood moguls and *Jeopardy!* masters, genius computer programmers and ambitious scientists, including Watson's eccentric creator, David Ferrucci. We gain access to Ferrucci's War Room, where the IBM team works tirelessly to boost Watson's speed to the buzzer, improve its performance in "train wreck" categories (such as "Books in Español"), and fix glitches like the speech defect Watson developed during its testing phase, when it started adding a d to words ending in n ("What is Pakistand?").

Much is at stake, especially for IBM. A new generation of Watsons could transform medicine, the law, marketing, even science itself, as machines process huge amounts of data at lightning speed, answer our questions, and possibly come up with new hypotheses.

Showdown aside, it's clear that the future has arrived. But with it come questions: Where does it leave humans? What will Watson's heirs be capable of in ten or twenty years? Is it time to declare defeat in the realm of facts? What should we teach our children? And what should we carry around in our own heads?

Final Jeopardy takes on these questions and more in a narrative that's as fast and fun as the game itself. Baker shows us how smart machines will fit into our world — and how they'll disrupt it.

www.finaljeopardy.net

Final Jeopardy: Man vs. Machine and the Quest to Know Everything Details

Date	:	Published February 17th 2011 by Houghton Mifflin Harcourt (first published January 1st 2011)
ISBN	:	9780547483160
Author	:	Stephen Baker
Format	:	Hardcover 288 pages
Genre	:	Artificial Intelligence, Business

From Reader Review Final Jeopardy: Man vs. Machine and the Quest to Know Everything for online ebook

Gregg says

It was interesting to read about the inter workings of the team who created one of the most practical AI systems on the planet. The interesting thing about AI is that we have to understand ourselves to use as a model, and it is this awaking that is AI's true benefit. As we evolve it, it evolves us. The real holy grail of AI is to get it to take over its own evolution, and act upon its interpretation of reality. I don't think any AI system will show us anything that we don't already know in latent form. All learning is really remembering called evolution. It will be a mnemonic system for reminding us of what we already knew at some point in our past. The type of system that was developed was really for information and database retrieval. I see this as the next upgrade to our current search engines. Imagine being able to find just "one" piece of information out of all the information on the internet. This will be AI's greatest inroad into the lives of the masses. The book does a good job in outlining the hurdles that had to be overcome to bring this software to the point that it could find one piece of information from terabytes of data. There will be no more just finding us hundreds of webpages to look through, now we can search for (and find single) concepts.
I think the next generation of Watson will be to develop a whole society of Watsons that functions like an ant colony, the 3rd coming.

Emmeline Joy says

Not a bad book. IBM built a computer that mastered the game of Jeopardy, including accessing trivia and using strategy in order to win. I feel the book missed out a bit, as the author skipped a lot of the technical details. It would have been over my head probably, but still interesting to me to see the technical importance of creating a computer than can play Jeopardy. I think the author knew if he made it too tech-oriented he would lose a large chunk of his audience, so he erred on caution and made it an anecdotal light story.

It is interesting to see proof of how quickly computers are evolving. Watson (the computer) kicks butt at Jeopardy, and I love that humans are capable of creating it. We are able to do more and more with technology, and it's exciting to think about how to practically apply a computer with Watson's intelligence in our lives.

Of course, I read science fiction and watch Star Trek, so it's not hard to see why I would get excited about these things...

Scarlett Sims says

My last book for the Read Harder Challenge, just under the wire. Baker details the team of experts that designed IBM's Watson computer and how they managed to take it from being an easily-beatable below-average player to a supercomputer capable of beating two of Jeopardy!'s most storied champions.

The most interesting parts to me were finding out what Watson's weaknesses were: clues with puns or odd constructions, mostly. I also liked that it made it clear Watson wasn't an intelligence. It was a machine programmed to do a specific task pretty well. There were a few examples of ways this could be modified to

perform other tasks. Basically, Watson was a machine engineered to be good at Jeopardy!, not an intelligence in and of itself.

Mysteryfan says

I read "Final Jeopardy: Man vs Machine and the Quest to Know Everything" by Stephen Baker. Researchers at IBM spent years and over a billion dollars developing a machine that could compete on Jeopardy!. It was interesting reading how they analyzed the questions so they could teach the machine to recognize puns and irony and even how to use the buzzer. Ultimately the project was pointless. They had to find ways to repurpose the machine after the contest was over. I hope the algorithms were useful in writing other software. Otherwise it was one of the most expensive PR stunts in history.

The book was good though. There are a lot of scientific studies out there based on Jeopardy!. Gaming theory, sex discrimination, all sorts. If you go on Google Scholar, they are easy to find. Our brains automatically make connections that the machine has to be taught to make. I learned a lot about how I process information.

And how could I resist the title? I do need to know everything :)

Carl says

An interesting book, though not quite what I expected. The book is about IBM’s Watson computer, which was constructed to play on the Jeopardy TV program. In early 2011 Watson had a big match on TV with two of the best Jeopardy players, and won. I had thought that the book would be about the AI techniques used for Watson. The book did talk about the technical side of the machine, but only in a general way. Most of the book was about the human interest side of the project: some of the rules of Jeopardy, stories about the contestants and the project engineers, the negotiations between IBM and the producers of Jeopardy.

The TV program Wheel of Fortune is produced by the same company that produces Jeopardy. I learned that Vanna White has showcased 4000 gowns during her career on Wheel – which shows how far afield the book wanders.

I ended up being very impressed by IBM’s effort. Watson has over 2000 processors, and has a natural language understanding that is phenomenal. It can still make goofy mistakes, but its ability is still amazing.

Gary Lang says

The book tells the story well. It shows how early we are in terms of creating truly intelligent computing systems, and how far we've come in automating narrow forms of human intelligence which can take nearly infinite computing power. But, we have nearly infinite computing power, so there are task-focused domains that require intelligence we can tackle with computing today.

The dance between the producers of Jeopardy and IBM to make sure that each of them were presented correctly owed a lot to the impedance mismatch of each others’ expectations. The Jeopardy team wanted to protect their franchise by any potential image damage owing to machines having an unfair advantage. And

yet the IBM people wanted to make sure that the machine’s ability to win didn’t suffer owing to unusual protections disrupting the format of the game. This back and forth, and the human compromise that solved the problem – for now - was more interesting than anything else in the book.

All of this enables some pretty severe disruptions in the labor market. That's what I want to read about next.

Edward says

This book is about the story behind the famous Jeopardy! match between IBM Watson and two human champions and the preparation of the IBM team leading up to it. The author follows the team behind Watson and provides a detail account of the development and the training of this machine contestant that ultimately beat the two human champion on national TV. You will learn about the state the technology at the time and how team worked hard to improve the machine for the contest. There was the back and forth between the producers of Jeopardy! and the IBM team in putting together a game that is a fair competition between human and machine (is there such a thing?).

This competition marks another milestone in the development of intelligent machine. The story reminds us that while the machine are in no way near becoming a truly intelligent machine, it is now in a position to quickly outperform human being in many narrow complex tasks. These are the tasks which a few years ago people would think it is impossible for a computer to achieve and out-perform a human. I expect to see more and more of such feats to appear in the coming years and the resulting discussions about what are the remaining values humans are bringing to the table.

Webajeb says

One of the most fascinating books I've ever read.

Marvin says

This book was a selection for my philosophy book group. After reading it, I can only ask "why?" But as retired computer professor Dr. Geek I welcomed this book. I watched the TV show where Watson - the IBM-built computer - played against the two excellent humans from the Jeopardy TV show. I had hoped that the book would discuss something about the inner workings of what made Watson "tick."

But this was not a book that told that story. It was really the human drama that followed three groups of individuals and their interactions - the group of computer professionals at IBM Yorktown and Hawthorne Labs who built and programmed Watson who wanted a follow-on to their earlier Deep Blue that beat the world master in Chess years earlier without losing in a way that hurt IBM's image, the producers of the Jeopardy TV show who saw this challenge as a way to attract an audience and their primary goal was to produce good TV drama, and various Jeopardy winners who had to battle against this machine challenger.

For me the most important point of the book was the repeated statement by the author that Watson in no way

represents an artificial intelligence solution to the problem. Its search algorithm is based upon one similar to that used by Google in choosing answers that used many of the same or similar words as in the Jeopardy clues, along with a few new algorithms to help in deciphering the intent of the question.

One weakness in the book is that the author wrote this from the perspective of IBM. I don't know how much Baker knows about computer science or artificial intelligence, but most of the book is firmly from the perspective of IBM. While IBM certainly is important in this story and has done fundamental research in solving many of the problems required to build Watson, other groups of people outside of IBM had a profound influence on what eventually became Watson. The story of the development of the PC was weak, and the influence of Xerox Palo Alto Research Center (PARC), Apple's role in the Apple II, ubiquitous computing, the semantic web, and others were all relevant to solving this AI problem and were developed by non-IBM entities.

However, in summary, I enjoyed reading this book, but as I said above, it had very little to do with my book group's original purpose as a book on philosophy. (If it really did discuss AI it would have been more relevant).

Charles says

It’s more than five years since a computer called Watson beat two quiz champs on Jeopardy, the American TV game show. The achievement of that day, witnessed by millions, seems, if anything, more interesting today as developments in artificial intelligence have moved centre-stage.

The spectre of middle-class jobs lost to AI has become part of conventional wisdom. As people spend more and more time exchanging data with distant computer servers, knowing little about what happens between their keystrokes and the results they study onscreen, the systems which control information, whether classified as AI or not, are ever more sophisticated and central to our lives.

The Watson experiment on Jeopardy was both a triumph of scientific and technological research and a kind of homage to the great tradition of computers in the States. Watson was built by IBM’s research team and named after the company founder. Thomas J. Watson and his son, between them, turned the company from a cash register business in Chicago to the epitome of corporate modernity, selling mainframe computers to customers who first had to learn what a computer was.

On a shorter timescale, Watson was the follow-up to another IBM triumph, when its computer Big Blue beat world chess champ Gary Kasparov in 1997. That was an extraordinary feat, but at least chess is a game with a limited number of possible moves – albeit a very large number.

But how could they make a machine that could deal with the natural language used in Jeopardy questions? Especially since the tradition of Jeopardy was to ask witty, punning questions, a bit like crossword clues? To make it more difficult, as a result of the game show scandals of the 1950s, where popular contestants were given the answers to keep them on shows and improve ratings, Jeopardy had been designed to prevent such a possibility by giving the contestant ‘the answer’, and requiring them to formulate the right question.

So that was the challenge IBM’s research team took on, less than four years before the show in which their computer won. It was partly a question of speed: even if Watson knew the answer, it had to be able to produce it before the human champions that were its opponents. These winners dealt in split seconds, hitting the buzzer often, apparently, before their conscious minds had an answer. As one put it “you find your thumb pressing the buzzer while the brain races to catch up.”

An early version of the computer was so slow that the programmers would ask it a question and then go to lunch, hoping it might have produced something (usually the wrong answer) by the time they returned.

Stephen Baker, an experienced business and technology journalist, was given privileged access to IBM's team as they tackled their audacious challenge. The result is a technology thriller, with no shortage of intriguing characters, incidents and, well, jeopardy. The story brings together the East coast world of IBM, and the West coast world of network television – another venerable US institution harking back to the innocent days when home entertainment meant sitting as a family, choosing between the three networks and maybe a local station.

Network television, as much as IBM, was on a difficult journey to adapt to the modern world – a world in which TV was one of many choices of screen entertainment beckoning from a variety of devices. To lose Jeopardy's academic fustiness, its producer Harry Friedman had broadened its agenda. Now, as well as the traditional, fact-based questions, there were many that required a knowledge of pop culture or just ordinary life. When weaved into tricky 'answers' by the show's writers, they made Watson's life harder. How could a computer possibly get this right?

Answer (question): "Here are the rules: if the soda container stops rotating and faces you, it's time to pucker up."
Question (answer): "What is Spin the Bottle?"

Baker's account gives enough detail to appreciate at least the principles with which the IBM team approached their challenge. For instance, they broke it down into sub-tasks: understanding the question, assembling a massive library of information, creating a list of candidate answers and assigning a level of confidence to each. The latter because a Jeopardy contestant is also required to gamble money on its chance of getting an answer right, and must even take a view on how its opponent will bet.

The story raises the question of how intelligent machines should be presented to human beings. What sort of 'character' should Watson be given? After thinking about tones of voice, visual representation and physical form, the team decided to create a screen into Watson's brain: activity in the computer would produce a display that would show Watson 'thinking'. But there would be no attempt to turn the computer into humanoid form, as that might encourage fears of computers taking people's jobs. It would have a calm male voice and wouldn't attempt to mimic emotion – triumph, frustration or disappointment. That might produce an unintentionally comic effect. Instead, Watson would remain "relentlessly upbeat", whatever was going on in the game.

As well as giving IBM some good publicity – and risking the opposite if it had failed – the Watson project had serious business potential. Not only could a Watson-related machine master huge libraries of information, it could also analyse all the online information being produced every second. As Baker puts it:

"A new generation of computers can understand ordinary English, hunt down answers in vast archives of documents, analyse them, and come up with hypotheses. This has the potential to turn entire industries on their heads."

Medicine might be one of the first fields to benefit, but it won't just be the limitations of technology that determines how it goes; it will also be human foibles, especially pride. As one doctor put it: "Doctors like the idea of having information available. Where things get more psychologically fraught is when a damned machine tells them what to do."

Usha says

Another fascinating read - a journey from the conceptual, through the execution to deliverance. More so was how as Watson evolved, so did the philosophical/moral/ethical questions of accepting a machine in the human dominated world of cognition and knowledge(in the real sense of the word)

Even after watching the man vs. machine showdown live on TV and rewatching it on Youtube, reading the final chapter showed the actual workings of the mind behind the scenes. Kudos to Jennings and Rutter for taking it all in stride, although at times Rutter seemed to be mean to Watson. Ah, that brings out how easily we identify a machine with its anthropomorphic alter ego, or force one upon it and make it more personable.

At the end of 4yrs of work though, Watson is still not more than a highly sophisticated search engine like Google. For Watson to actually develop the capacity to 'understand' and 'make sense' still seems a long way.

Seth Heasley says

I love trivia games, to the point that I've been accused of having a trivial mind. I love having one-on-one Trivial Pursuit matches against my dad, and generally losing. And of course, I love playing along with Jeopardy! at home. If I could avoid getting penalized for all the wrong answers I blurt out and the buzzer wasn't an issue, I could totally take those people. Yeah, right. (I'm a fair hand at Wheel of Fortune, too.)

[Interestingly, Ken Jennings (of the 74-game winning streak on Jeopardy!) subtitles his blog "Confessions of a Trivial Mind." So I'm not sure my paltry trivia-bufferiness rises to the level of "trivial."]

When I became aware of an impending match between Jennings, fellow big-winner Brad Rutter, and a computer called Watson (from IBM), I was pretty jazzed about it. Having seen the match and now having read Stephen Baker's Final Jeopardy: Man Vs. Machine and the Quest to Know Everything, I'm even more fascinated by the whole thing.

The book gives a nice background both to Jeopardy! and IBM, and delves just a bit into the world of Artificial Intelligence, all while chronicling the concept, development, and refining of Watson from very dumb to extremely bright. And of course, the match between man and machine is retold in exciting style. (I was surprised to find myself pulling for Jennings and Rutter even though I already knew the outcome. I guess that's the mark of a good storyteller.)

Full review on my blog>.

Wulan Suci Maria says

A story about how group of IBM researchers develop a machine (name Watson) or computer system that is able to answer every questions (very knowledgeable) and win quiz (Jeopardy). Quite slow story book, but okay to add knowledge that the robot development is real. Somewhere, some people are working on the next level of robot, that is not only able to answer questions, but also able to come up with theory post learning things and even smarter than human brain. This book was published 7 years ago, with story of computer that already has high smartness level, imagine how smart this machine now. Isn’t it scary?

In another note, I always know I don’t like fiction or story book, but I took risk to read this book. All because of its interesting title, which I thought the whole story will be as interesting. But reading a book that is not my type, helps me to understand my self better. Also makes me even more realize that rating/ judgement that ones give to something (book, movie, people) really depend on their own perspective and interest. Reading a book that I don’t like make me realize that it is very hard to push myself to finish until end when I already know (or create strong perception in my mind) that I don’t like it. Anyhow, at least I learn those things, and try to be very positive about the book. It is me who don’t like the subject, not the book that is very boring.

Phyllis says

Somehow, I missed seeing Watson perform on *Jeopardy!*. Yeah, I don't know how that happened. But the whole issue of how one sets up a computer to take on the task fascinates me. (Nerd, yes. Geek, no.) Stephen Baker walks the reader through the process without using technical language so complex that no one outside of the field could follow it.

I enjoyed reading the book. It's well written. Mr. Baker walks us through the whole process from off-the-cuff idea, admitting that no one is absolutely sure of the exact moment of conception, to the game show itself. In itself, that might have made a good feature-length article in a fat Sunday paper. But, above and beyond that, we see just how hard it is to do the job.

How do we know what we know? Why is it that we can recognize puns and how do we teach a computer to do so? How much knowledge of a subject is too much knowledge of a subject? (For example, adding the contents of famous novels was nixed because it was felt the computer would have trouble distinguishing between fact and fiction.)

This book me helped to appreciate just how very difficult computer programming can be and to remind me just how wonderfully flexible and complex the human brain is. And to note that our coming electronic overlords may not understand us very well. After all, they're only computers.

Julie says

A few months ago, I watched the first man-machine *Jeopardy* match, between Ken Jennings, Brad Rutter, and IBM's brainchild Watson. So when I discovered this book by Stephen Baker at my library, purporting to describe the development of Watson from idea to reality, I figured I'd pick it up and see how Watson came to beat two of the greatest *Jeopardy* champions ever.

Baker charts Watson from mere suggestion -- back around 2006 -- to the final version that played on the show. The perspective is mostly that of David Ferrucci and his team at IBM, the group that turned Watson from the long-shot idea that could never work into reality. Through it all, he charts the tension, frustration, excitement, and inspiration as the project progressed. For a book all about a machine, Baker lends the narrative a very human feel. While *Final Jeopardy* is about Watson, it's equally about the people who brought him to "life."

Final Jeopardy is also about the larger questions surrounding Watson: what's the current state of artificial intelligence and question-answering programs, and where can we expect it to lead over the next decade or two? Watson can answer natural-language questions (even tricky syntactical ones like *Jeopardy* clues), but even Ferrucci will claim that the machine is stupid. It doesn't know what its responses mean, not like a

human being would know. It doesn't generate ideas or create connections. Some computer scientists believe that this is the correct course to pursue in AI, while others argue that we should be striving towards a more human-like intelligence for our machines.

The ultimate question, of course, is what do we do with Watson now that its *Jeopardy* match is over. What will IBM use this technology for, and will others (like Google) supplant it from an entirely different direction? Obviously, the ability to survey vast streams of natural language and come up with plausible answers could be a windfall in many professions: medicine, law, science, and all fields where knowing expands more quickly than any one person can keep track of. But whether question-answer programs like Watson creep into our lives in the near future remains to be seen.

I'll admit that this book isn't for everyone. It's well-written and Baker ensures that even difficult concepts are easy to understand. But if you're not interested in AI or the Watson computer, you're probably not going to get any thrills from *Final Jeopardy*. That said, if AI and the future of computing *do* interest you, I recommend it.
