

Ferrucci envisioned a *Jeopardy* machine spawning a host of specialized know-it-alls. With the right training, a technology that could understand everyday language and retrieve answers in a matter of seconds could fit just about anywhere. Its first job would likely be in call centers. It could answer tax questions, provide details about bus schedules, ask about the symptoms of a laptop on the fritz and walk a customer through a software update. That stuff was obvious. But there were plenty of other jobs. Consider publicly traded companies, Ferrucci said. They had to comply with a dizzying assortment of rules and regulations, everything from leaks of inside information in e-mails to the timely disclosure of earnings surprises or product failures to regulators and investors. A machine with Watson's skills could stay on top of these compliance matters, pointing to possible infractions and answering questions posed in ordinary English. A law firm could call on such a machine to track down the legal precedent for every imaginable crime, complaint, or trademark.

Perhaps the most intriguing opportunity was in medicine. While IBM was creating the *Jeopardy* machine, one of the top medical shows on television featured a nasty genius named Gregory House. In the beginning of most episodes a character would collapse, tumbling to the ground during a dance performance, a lovers' spat, or a kindergarten class. Each one suffered from a different set of symptoms, many of them gruesome. In the course of the following hour, amid the medical team's social and sexual dramas, House and his colleagues would review the patient's worsening condition. There had to be a pattern. Who could find it and match it to a disease, ideally before the patient died? Drawing from their own experience, the doctors each mastered a diverse set of data. The challenge was to correlate that information to the ever-changing list of symptoms on the white board in House's office. Toward the end of the show, House would often notice some detail—perhaps a lyric in a song or an unlikely bruise. And that would lead his magnificent mind straight to a case he remembered or a research paper he'd read about bee stings or tribal

rites in New Guinea. By the end of the show, the patient was headed toward recovery.

An advanced question-answering machine could serve as a bionic Dr. House. Unlike humans, it could stay on top of the tens of thousands of medical research papers published every year. And, just as in *Jeopardy*, it could come up with lists of potential answers, or diagnoses, for each patient's ills. It could also direct doctors toward the evidence it had considered and provide its reasoning. The machine, lacking common sense, would be far from perfect. Just as the *Jeopardy* computer was certain to botch a fair number of clues, the diagnoses coming from a digital Dr. House would sometimes be silly. So people would still run the show, but they'd be assisted by a powerful analytical tool.

In those early days, only a handful of researchers took part in *fat Jeopardy* project at IBM. They could fit easily into Ferrucci's office at the research center in Hawthorne, New York, about thirty-five miles north of New York City (and a fifteen-minute drive from corporate headquarters, in Armonk). But to build a knowledge machine, Ferrucci knew, would require extensive research and development. In a sense, a *Jeopardy* machine would represent an entire section of the human brain. To build it, he would need specialists in many aspects of cognition. Some would be experts in language, others in the retrieval of information. Some would attempt to program the machine with judgment, writing algorithms to steer it toward answers. Others would guide it in so-called machine learning, so that it could train itself to pick the most statistically promising combinations of words and pay more attention to trustworthy sources. Experts in hardware, meanwhile, would have to build a massive computer, or a network of them, to process all of this work. Assembling these efforts on a three-year timetable amounted to a daunting management challenge. The cost of failure would be humiliation, for both the researchers and their company.

Other complications came from the West Coast, specifically the Robert Young building on the Sony lot in Culver City, a neighborhood just south of Hollywood. Unlike chess, a treasure we all share, the *Jeopardy* franchise belonged to Sony