COMPETING FANTASIES OF HUMANS AND MACHINES:

SYMBOLIC CONVERGENCES IN

ARTIFICIAL INTELLIGENCE EVENTS COVERAGE

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The undersigned, appointed by the dean of the Graduate School, have examined the thesis entitled

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Professor Sara Shipley-Hiles
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DEDICATION

This thesis is dedicated to my parents, Anna and Robert, without whom none of this would have been possible, and due to whom I'll always remember not to take myself too seriously — except when you're trying to fool the academy into awarding you a master's degree.

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Due to a general inclination to take inspiration from small and unexpected sources, the sheer scope of the acknowledgements I'd like to recognize as having influenced this thesis far surpasses what would fit on a standard acknowledgements page. So while I'm not normally one to stick to conventions, I'm obliged to keep this page concise and somewhat regrettably vanilla. In short, the completion of this thesis would not have been possible without the undying support of my committee, professors, and everyone else who helped me along this journey. I am particularly indebted to my advisor and thesis chair, Margaret Duffy, whose guidance in steering my thesis focus from the Anthropocene toward artificial intelligence was doubtless a wise reorientation for a nerdy, bookish, existentially obsessed graduate student. I also cannot express enough appreciation for the help of Jon Stemmle who, outside of serving as a premier source of practical and professional advising, gave me the opportunity to help the strategic communications department with all things technical during my time in grad school, effectively opening the door for my first full-time job specializing in artificial intelligence-based marketing technology.

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Abstract

This research analyzes coverage of major artificial intelligence events representing the thematic concept of "man versus machine." Rooted in grounded theory and rhetorical criticism, this research applies symbolic convergence theory and fantasy theme analysis to reporting from *The New York Times*, *The Wall Street Journal* and *The Washington Post* immediately surrounding three cultural and scientific milestones in the development of artificial intelligence technology: IBM Deep Blue's 1997 defeat of chess grandmaster Garry Kasparov; IBM Watson's 2011 defeat of Jeopardy! champions Ken Jennings and Brad Rutter; and Google DeepMind AlphaGo's 2016 defeat of Lee Sedol. This research analyzes how symbolic realities are dramatized in the context of these events such that the competitions themselves represent ideological battles between humanism or technological superiority. This research also demonstrates subtle variations in how fantasy themes and rhetorical visions manifest in coverage from each outlet, amounting to what is effectively a competition for shared consciousness between these two competing ideological constructs.

PREFACE

Throughout this research, I refer to the idea of “man versus machine,” a frequently-used catchphrase. It is somewhat dated and not intended to refer to all people as “male.” In the context of this research, the phrase refers to the belief in humanistic or mechanistic superiority, specifically as it they relate to intelligence. This is to say that someone occupying the shared consciousness of “man” ascribes to humanism, whereas someone occupying the shared consciousness of “machine” is more inclined, due to reasons of employment or personal belief, to support the idea of mechanistic superiority.

Chapter 1: Introduction

Introduction

The history of technology may be interpreted as a series of symbolic conflicts between humans and machines. Similar to how movie franchises such as Terminator and The Matrix center on a base conflict between humanity and technology, such readings portend social implications of new technologies which undermine existing conceptions of the human condition, suggesting that the root of technological innovation entails a trade-off between humanism and mechanistic progress. Beginning in the industrial revolution and continuing today, this concept is present in much literature related to *technological determinism*—the belief that technological innovation drives social and cultural change—which is a field that has received significant interest from scholars across a wide range of disciplines in the latter half of the 20th century (Smith & Marx, 2011).

Recently, this notion has manifested in popular discussions surrounding the anticipated role of artificially intelligent technology in the global economy, as well as societal changes that may result from widespread artificial intelligence in contemporary life. The concept has also surfaced in discussions surrounding the potential existential risks of artificial intelligence. As research into artificial intelligence has advanced over the last two decades, it has birthed a novel and popular phenomenon of the man versus machine event whereby an artificially intelligent machine battles a world-champion human at a game that ostensibly requires human-grade ingenuity. Perhaps most prominent among these are events such as IBM Deep Blue's 1997 defeat of Garry Kasparov in chess, IBM Watson's 2011 defeat of Ken Jennings and Brad Rutter in Jeopardy!;,and Google AlphaGo's 2016 defeat of Lee Sedol in Go. All represent crucial

instances of the man versus machine concept in modern culture. These events were chosen due to their cultural relevance — each received considerable attention from the national media because they represented significant advancements in artificial intelligence capabilities.

This research uses symbolic convergence theory (SCT) as a lens to examine how the man versus machine narrative is communicated through these events in popular media. Using SCT and its accompanying analytical method, fantasy theme analysis, this research analyzes how fantasy themes, characters, and actions are constructed in these three events. This research bears foremost importance to social science and humanities scholars interested in how the man versus machine narrative is manifest in culture (particularly popular media coverage), as well as how its origins relate to perspectives of technological determinism more broadly. This research is also useful for communicators seeking to understand how different news organizations converge on interpretive symbols of the man versus machine concept. Finally, this research contributes to the development of symbolic convergence theory by applying the theory and methodological framework to answer novel questions related to technological determinism and modern culture.

Chapter 2: Literature review

This review begins with a brief examination of technological determinism, focusing on the intellectual basis and tradition of the idea as it has evolved over time. The review transitions into a conceptual analysis of man versus machine as it relates to technological determinism, providing an exploration into some notable events when the concept has appeared and exploring the major discussions surrounding the concept in modern economics. Finally, the review analyzes the role of artificial intelligence in contemporary instances of the man versus machine concept, describes the rise of man versus machine events in popular culture and explicates the theoretical framework that will be used in this research.

Technological determinism

Technological determinism is a sociological theory that examines how society's social structures and cultural values are driven by technological innovation. Rooted in Enlightenment conceptions of technology as a liberating force for human agency and general society, technologically deterministic perspectives of history hold that technology plays a critical role in shaping social structures and cultural values. The intellectual basis for technological determinism can be traced back to Enlightenment writers such as Voltaire (with his enthusiasm towards empirical science in *Candide*), Diderot (with the nature of his *Encyclopedie*), and Watts (in his elucidation of mechanical feedback loop). As well, the common eighteenth-century metaphor of the "clockwork universe" represented a budding societal embrace of mechanistic (and therefore technological) thinking. These ideas and others helped form the foundation for the popular acceptance of

the conception of *progress* in the eighteenth century, which was further rooted in the United States ethos as writers such as Benjamin Franklin and Thomas Jefferson began to view the industrial revolution as a means to achieving the prosperity and virtues of the American Revolution (Smith & Marx, 2011, p. 3).

With an intellectual heritage based in Enlightenment philosophy and the founding virtues of the United States, the conceptual potency of technological determinism has made it fertile ground for academic inquiry related to the multifarious role of technology in shaping history and society. In order to meaningfully discuss differing (and nuanced) conceptions of technological determinism however, perspectives are often classified as either *hard* or *soft*. Soft technological determinism is based on the notion that technology is a primarily contributing cause that shapes social organization and development. In other words, the social and moral consequences of adopting new technologies are possible, but not inevitable once the technology has been introduced into society. For hard technological determinists, the technology determines the shape of society. Soft technological determinism focuses more on pre-existing social and cultural conditions, roughly holding that technology may catalyze or precipitate social change, but that such social change is not necessarily dependent on the technology itself. For the soft technological determinist, the shape of society rests more solidly on pre-existing social conditions (which may or may not have a basis in biology), and is not necessarily dependent on a technology alone (Chandler, 1995).

Taking place at the dawn of the industrial revolution, arguably the first strong technological determinist vision of society was manifest in the motivations behind the Luddite movement in early 19th century England. Fearful of automated textile equipment

such as the cotton gin and the mechanical loom threatening their livelihoods, textile workers organized to destroy weaving machinery as an act of protest (Grint & Woolgar, 1997).[1] Writing later in the century, Marx used the Luddites's strong view of technological determinism (they viewed technology as the source of their woes) as an example of the proletariat's historical misguidedness: For Marx, instead of protesting the machines that were encroaching on workers' livelihoods[2], labor should protest the sociopolitical paradigm which enables such creative destruction[3]. Marx was more focused on the socioeconomic impacts of productive technology under the capitalist state during the industrial revolution, as opposed to the technology itself. Marx's socioeconomic theory rested on a version of weak determinism which posited that the woes of labor and the proletariat class more generally were based on their existence within the capitalist state. Viewing technologies such as the steam engine and cotton mill as tools of capitalist domination that sustain systematic inequality (rather than forces for social good), technological determinism played a role in the Marxist perspective of socioeconomic development. Marxism however is more accurately an economically determinist perspective, centered on the inevitability of the proletariat revolution and what Marx perceived as just shifts in socioeconomic power dynamics.[4] In other words, Marx saw technology as roughly a tool of capitalist domination, rather than an inevitable force.

Media as technologically determinant

Throughout the latter half of the 20th century, technological determinism has been manifest in many discussions surrounding the role of media in society. Writing as one of the first strong technological determinists of the post-war era, Jacques Ellul famously

held in his *The Technological Society* (1964) that due to its essential goal of increasing efficiency, technology dictates which social elements are best suited for societal development. For Ellul, this was akin to a sort of natural selection: Insofar as technology aims to increase efficiency—and humans aim to produce and communicate more seamlessly—technology determines the structure of social interaction because the more efficient the medium, the more widespread it will be. Prognosticating from a perspective of strong technological determinism, Ellul's beliefs amounted to a critique of the virtuous conception of technology as it had historically been considered, particularly insofar as it represented a departure from religious thought (Ellul was also a theologian). Ellul predicted that the spread of technology would ultimately subvert fundamental conceptions of human existence. His vision rested heavily on the idea of *technique*, which encapsulated not just technology but also the variety of ways that technology constrains our modes of discovery, expression and interaction in society. Offering his predictions as one of the first writers of technological determinist thought, Ellul influenced a generation of later perspectives, the strong technological determinist perspectives of Postman (1985, 1993), who believed that the uses and effects of technology are determined by its structure (its functions follows its form).

However, despite arguable evidence of strong technological determinism in the development of some technologies, the concept (strong technological determinism) is generally regarded as an inaccurate view of the interrelation of technology and society (Murphie & Potts, 2003). More accepted among social scientists, weak technological determinism holds that the existence of technology can have a wide range of different effects, but that these effects are not always determined by the nature of technology itself

(i.e. existing cultural values can influence how and whether technology is adopted.) Weak technological determinists have pointed out that while the absence of technology can enable or exacerbate certain social conditions, the presence of technology can constrain social conditions just as well, and either of these effects can lead to opportunities that may or may not become actualized in different social contexts or historical periods. A weak view of technological determinism essentially holds that technology may catalyze, precipitate or nullify social change — but that the actualization of social change is not necessarily dependent on the technology. There are multifarious versions of this more humanistic perspective of technology, but notable conceptions include those of Chandler (1995), who held that the social development of a technology is inevitable once it has been introduced to a society while allowing for the possibility that society can resist fundamental transformation by a singular technology, Murphie and Potts (2003, p. 1), who oppose technological determinism in favor of a field of study called "the social construction of technology". This conception involves a more "intertwining" perspective of how technology impacts society (p. 1).

No examination of the role of personal technology in society would be complete without a brief discussion of the work of communication scholars Harold Innis and Marshall McLuhan. Innis postulated a weak version of technological determinism, contending that different modes of transmitting messages have different consequences for different cultures and societies. Innis held that there are dimensional biases inherit to certain media. He postulated modes of communication based in time (such as stone tablets or parchment paper, which are tend to reach limited people but last for generations), or space (such as television, radio, or widely circulated newspapers which

are more ephemeral). For Innis, time-based mediums favor things like stability, tradition, community and religion, whereas space-based media are associated with rapid change, materialism, secularism and empire. In other words, Innis viewed media as technologically determinant insofar as media operated in different dimensions, tending to engender either stability or change, community or empire depending on spatial or temporal basis.

Central to Innis's perspective of technological determinism was the idea that monopolies of knowledge exist, wherein predominant modes of communication in a certain era align with particular types of knowledge, ultimately serving to empower a class of people who control the medium and exercise the knowledge associated with it. A student of Innis, McLuhan (1963) adhered to a strong interpretation of technological determinism, inverting Innis' conception of technologically determinist media by instead highlighting biases in modes of perception (i.e. visual vs. audible), rather than time and space. Such an idea is perhaps most conveniently described in McLuhan's notion that "the medium is the message," conveying the idea that technologies (whether clothing, books, or the wheel) are messages themselves, insofar as they offer crucial inter- and intra-cultural social cues and serve greater value as cultural artifacts than their substance of the medium. McLuhan extended his view with the play on words "the medium is the massage," suggesting that although society may find modern media (e.g. television) to be pleasant and relaxing, this pleasure is fundamentally deceiving because technological changes are wildly disruptive and effectively contribute to an "age of anxiety". Therefore, whereas Innis represents a relatively weak interpretation of technological determinism,

McLuhan contends that technology is fundamental to the state of our society, ultimately a stronger view.

Historical manifestations of the man versus machine concept

The man versus machine concept is most easily recognizable as a literary theme, however it also commonly appears in discussions surrounding technological determinism. Implying that technological innovation confers tradeoffs between humanism and technological progress, the concept can be broken down into two categories: *occupational* and *existential.* Regarding the former, insofar as the central purpose of technological innovation in industry is to increase efficiency, the history of industrial technology can be construed as a symbolic conflict between humans and machines in terms of employment. By such a reading, machines are used to continually reduce the amount of human labor required in production processes, effectively in constant competition with humans in the labor market.[5] In cases of technological unemployment, it has been suggested that if machines encroach too rapidly on human employment (and humans cannot be re-educated at an equal pace), then technological progress may threaten not only individual livelihoods, but also fundamental social structures[6]. Occupational conceptions of the man versus machine concept are most evident alongside the development of technological processes since the industrial revolution, which centered on the replacement of human *manual* labor and have sparked considerable discussion about the long-term effects of technological unemployment (Bix, 2000).

Representing perhaps the clearest example of the man versus machine concept in a manual occupational context, the Luddite movement sought to destroy automated textile equipment for fear that their jobs would be lost to technological innovation. The

Luddites's preconceptions were not unfounded — indeed, the rise of any new technology naturally makes some portion of jobs insecure.[7] For instance, although automated textile equipment naturally required less labor in order to weave fabrics, many artisan weavers became impoverished due to the invention of the mechanical loom in 18th century England. While many see the industrial revolution as a positive development in the history of the human species, the significance of the Luddite movement is that it represents an early and potent manifestation of the man versus machine concept. As technology has progressed, so has the context in which machines compete with humans. Today, software is more commonly seen to compete against machines in tasks involving *cognitive* labor. This transition from physical to cognitive labor is an important development of the concept, and it can be further evidenced in how the job of secretary increased in popularity throughout the late '70s and early '80s, and later decreased as the widespread adoption of the personal computer took over many secretarial tasks (Bui, 2015). Although there was no mass mobilization of secretarial workers akin to the Luddite movement, the notion that technological unemployment can displace workers fulfilling cognitive tasks and therefore create a latent form of the man versus machine concept represents how the concept is conveyed in both manual and cognitive occupations.

Modern manifestations of the man versus machine concept

More recently, the man versus machine concept has been manifest in the vibrant cultural narrative surrounding the role of autonomous technology in society. Best-selling books in recent year such as *The Rise of the Robots* (Ford, 2016), *Humans Need Not Apply* (Kaplan, 2015), and *The Second Machine Age* (Brynjolfsson & McAfee, 2016),

have sparked a popular dialogue surrounding the role of robots *vis-a-vis* technological unemployment, and have ushered the concept of man versus machine into the talking points of many public intellectuals. The growing ubiquity of conversational interfaces such as Amazon Alexa, Google Allo and Microsoft Cortana also reflect society's growing familiarity with the notion of virtual agency as a manifestation of AI in consumer tech; the gradual prominence of self-driving vehicles further elevates the cultural significance of artificial intelligence in society. Moreover, crucial developments in artificial intelligence technology have contributed to the perceived exigency of this discussion, with artificial intelligence developing at a far more rapid clip than had been previously anticipated. For instance, AlphaGo's defeat of Lee Sedol in the abstract strategy game Go in March 2016 is perhaps the most glaring example of a technology's increasing proficiency at tasks previously considered exclusive to human cognitive faculties. The salience of AlphaGo's victory is particularly notable due to the widespread expert opinion prior to the event that AlphaGo would not defeat Sedol because artificial intelligence technology was not sufficiently advanced, as well as reporting surrounding its seeming ability to simulate human "intuition" or "creative thinking" (Neilsen, 2016; MacFarland, 2016). [8] Similarly, IBM Watson'x 2011 defeat of world-champions Ken Jennings and in Jeopardy, Liberatus' 2017 defeat of four top players of the abstract poker game Texas hold 'em (Spice & Allen, 2017), and researchers' recent efforts to teach computers how to master the canon of early Atari games (Vincent, 2016), all serve as singular manifestations of the man versus machine concept and enhance its symbolic value in modern culture.

Coverage about the incipient socioeconomic effects of artificial intelligence technologies represents another prominent aspect of the emerging cultural discourse surrounding the man versus machine concept in relation to autonomous technologies. In this narrative, many manual and routine professions (as opposed to non-manual and non-routine professions) are predicted to become automated in the near future (Manyika et al., 2017). This notion has also been manifest in reporting by Miller (2016) related to the outcome of the 2016 U.S. Presidential election, whereby working class labor is framed as facing a long-term challenge of battling professional displacement due to autonomous technology (as opposed to the adverse effects of globalization, as promulgated in candidate Trump's campaign messaging). Miller's argument was addressed in a February 2017 New York Times editorial entitled "No, Robots Aren't Killing the American Dream," whereby some elements of Miller's views are addressed and contested. Notably, the article points out that in his January 2017 farewell address, outgoing President Barack Obama claimed that "the next wave of economic dislocations will come… from the relentless pace of automation that makes a lot of good middle-class jobs obsolete" (2017). Although some have expressed skepticism about the incipient sociological effects of technological unemployment related to artificial intelligence, McAfee and Sperling (2017), two widely respected experts on technology, business and economics, have referred to existing and impending job loss as a result of automation as a "significant issue" facing society in the next fifty to one-hundred years (Dreyfuss, 2017).

Finally, one would be remiss not to touch on the existential perspective of the man versus machine concept, which perceives machines (particularly artificially intelligent machines) as posing a significant risk to the very existence of human life.

Though this idea was touched on by British computer scientist Alan Turing in 1951 (Cooper, 2014), it rose to modern intellectual prominence largely due to Bostrom's (2016) work on the computational risks of developing artificial super-intelligence in machines. Recently, much has been written about the existential risks of artificial intelligence, which represents perhaps the most prominent interpretation of the technology. Open AI, a nonprofit founded by Bill Gates and Elon Musk in 2014, is a useful institution through which to analyze the differing conceptions of the concept. As stated in its charter, the purpose of Open AI is to create a network of collaborative industry partners who rely on open-sourced activity in order to protect the human race from the potential negative effects of artificially intelligent machines (Lewontin, 2015). Given this mission statement, it seems clear that Open AI takes a positive approach to AI — that is to say, they ultimately view AI as a boon for society, and view humans as ultimately befitting from machines. However, the institution is not blind in its acceptance of AI: it realizes that there are existential risks inherent to the technology. Such comprises much discussion surrounding the man versus machine concept vis-a-vis artificial intelligence — it is seen to be a technology which will ultimately benefit society, but which will pose two main threats, occupational and existential.

Artificial intelligence

For the purposes of this research and review, artificial intelligence exerts most salience as an intellectual concept, a technology, and a social construct. This section is divided accordingly. Artificial intelligence most commonly refers to any behavior resembling human cognitive intelligence exhibited by machines. such as procedural learning or abstract problem solving.

As the term has evolved, mental capacities that were previously thought to require human intelligence such as optical character recognition and forms of physical intelligence, such as spinning wool, have been removed from the definition (i.e. such tasks are considered tasks which can be automated, but which do not require human intelligence *per se*) (Hauser, 2017). AI can be usefully categorized as either *hard* (sometimes also referred to as *strong* or *general*) or *soft* (also referred to as *weak* or *narrow*). As a general rule, *hard* AI constitutes any problem which is considered central to the field of solving AI—such as how a computer would learn creativity, social intelligence, or natural language processing and is therefore considered hard to solve. Soft AI is any software which is used for a particular task, such as autonomous cars or IBM's Deep Blue which, although bears mastery at the game of chess, could not fulfill any other function (i.e. checkers or other board games). All modern applications of AI fall into the category of soft AI: Products such as Apple's Siri, Microsoft's Cortana, Amazon's Alexa and Google's Aloe are all made for their own specific purposes — the only way in which they "learn" is in progressively adjusting their speech recognition algorithm according to the user's voice.

Despite the understanding that hard AI constitutes any form of AI that is considered technically hard to achieve, numerous tests exist to gauge what should constitute strong artificial intelligence. The first and arguably most influential of these assessments, the Turing test was conceived by Alan Turing in 1950 as an assessment used to gauge AI in machines. The test involves three parties: A human interrogator, a human subject, and a machine subject. Conversing with both subjects, the test dictates that if the interrogator cannot determine the difference between the machine and the

human after five minutes of conversation, then the machine passes and may be considered *hard* AI (Turing, 1950).[9] Turing originally envisioned conversing with a computer via text-based call-and-response — while there are some chat bots which currently exist that can mimic conversation in a textual format, such applications are far from what would be required to pass the Turing test with a competent interrogator. Such AI would be indistinguishable from human intelligence in natural conversation in a social setting (which would entail the convincingly lifelike appearance of a humanoid robot), as well as the ability to convey creativity, emotion and other subjective humanistic attributes.

Since Turing's contributions in the 1950s, significant commercial developments and academic research have advanced the field of AI dramatically.[10] AI coverage in 2016 was said to resemble a "frenzy", and the technology was also at the top of Gartner's Hype Cycle for Emerging Technologies in 2017 (Lohr, 2016; Panetta, 2017). Attention is foremost driven by recent advancements in the field, with AI research progressing much quicker than experts had previously expected (Lohr, 2016). Such advancements can be seen most singularly in AlphaGo's defeat of Lee Sedol at the abstract strategy game Go (Boroweic, 2016). Following IBM Deep Blue's 1997 defeat of Gary Kasparov in chess and IBM Watson's 2011 defeat of Ken Jennings and Brad Rutter in Jeopardy!, AlphaGo's defeat of Lee Sedol in Go represents a particularly significant evolution in the development of artificial intelligence technology because many AI experts did not expect AI mastery of Go for at least another five to ten years (Neilsen, 2016). Moreover, these games (chess, Jeopardy!, and Go) are crucial milestones for AI research because they require modes of thinking traditionally considered exclusive to the cognitive domain of

humans. From a computer science perspective, replicating these complex and mysterious processes of the human brain is eminently difficult; these classic human games are therefore useful tests to gauge the evolution of artificial intelligence in computers.

These advancements can also be seen in growing public and commercial interest in widespread implementation of autonomous driving (Collins, Kaas & Mohr, 2016), and private industry showing increasing interest in incorporating AI agents (such as Alexa and Cortana) into their consumer products (Davenport & Ronanki, 2016).[11] This resurgence of AI technology is largely a result of the increased use of neural networks and is a form of computation loosely analogous to the structure of the human brain (Sample, 2017). Much like how synapses in the brain are strengthened between neurons as humans learn, neural networks are formed by strengthening the connections between "nodes" within the computational architecture by processing a large amount of structured or semi-structured data (e.g. move lists of millions of games of chess). Once this network has been built within the machine, it can be given an objective (e.g. play the game of chess where you are most likely to win), and the computer can be trained to apply probabilistic reasoning and statistics to retrieve the most desirable outcome, continually re-testing and re-optimizing against itself.

Although the previous analogy uses chess as an example, the famous 1997 chess defeat of world champion Garry Kasparov by IBM's Deep Blue did not involve neural networking technology. Rather than process an enormous amount of data about previous chess matches in order to build a flexible algorithm which can be adjusted by the machine to reach a certain objective (which describes neural networking), IBM simply used the most advanced computational hardware at the time to allow Deep Blue to

compute up to 200 million positions per second, reaching the most outcome most likely to lead to victory by sheer brute force (Somers, 2015). Similarly, IBM's Deep Blue was built using massively parallel processing units, whereas modern neural networking employs GPUs to emulate the massive parallelism required to process enormous sets of data, Deep Blue essentially used these units to compute many different game trajectories simultaneously (as opposed to building a probabilistic collection of nodes which would effectually "learn"). In March 2016, Alphago's unexpected defeat of world champion Lee Sudol in a six-round match of the abstract strategy game Go showed how GPUs can be used to rapidly advance the field of AI technology through the creation of neural networks.

Theoretical framework

Grounded theory is a methodologically dynamic tradition that combines elements of sociology and symbolic interactionism (Charmaz, 2006). Developed by sociologists Barney Glaser and Anselm Strauss in the early 1960s, grounded theory is conducted using the *constant comparative method*, with the goal of constructing a theory based on analysis of data. Although grounded theory is "shaped by the desire to discover social and psychological processes," it isn't limited to a one singular discipline or data collection approach; grounded theory focuses on the procedure more than the specific discipline or data collection approach (Gibbs, 2016). This flexibility has allowed grounded theory has been instrumental in research across a wide variety of disciplines, such as sociology, business, and software engineering — and communications research is no exception (Lindlof & Taylor, 2011).

Different from positivist social science research, the constant comparative method entails research that is initiated with a question or even just the collection of qualitative data. As data are collected, repeated concepts, elements or constructs are tagged as *codes*. Once a sufficient number of codes has been established within the research, the data is then re-reviewed and codes are grouped into concepts and categories, which may ultimately form the basis for a theory. For example, in a content analysis of various texts, a researcher would first begin by tagging ideas with associative codes; second, the researcher would organize these codes into concepts and categories; finally, the researcher analyzes her codes and according concepts and categories in order to develop a theory for whatever phenomena she is investigating. Returning to the methodological basis of grounded theory, there are three basic elements that every grounded theory inquiry should include. According to Corbin and Strauss (2008), these include *theoretical sensitive coding*, *theoretical sampling*, and the need to *compare* between phenomena and context in order to afford theoretical strength. Theoretical sensitive coding involves generating strong concepts from data in order to explain phenomenon being researched, whereas theoretical sampling entails deciding what to observe next according to the state of theory generation, implying starting data analysis with the first text and documenting hypotheses early.

As is the case with any theoretical development, grounded theory is not without its critics. Perhaps the most common criticism of grounded theory involves a misunderstanding that what is generated may not ultimately be considered “theory,” holding that a theory must necessarily be rooted in positivistic tradition. A common retort to this stance is that it constitutes a dramatic failure to see past the positivist tradition and

conceive interpretive methods of conducting scholarly inquiry (Thomas & James, 2006). Moreover, some interpretations of grounded theory have been criticized as being overly empiricist (e.g relying too heavily on empirical data as opposed to interpretivism), and it has been argued that the approach tacitly asserts a degree of inductive knowledge (insofar as grounded theory entails a developing perspective of phenomena being studied) (Kelle, 2005; Allan, 2003). Grounded theory is an appropriate method of analysis for this research because it involves the study of abstract data for which no existing theory or data is suitable.

Rhetorical criticism

Rhetorical criticism is applied in order to understand symbolic elements of discourse such as words, phrases, images, and gestures that are used to communicate. In rhetorical criticism, a critic identifies communication artifacts and explores how they work, how well they work, and what their function is on an audience. Burke (1960) conceived rhetorical criticism as a method for analyzing human communication as a rhetorical exercise, with prominent initial developments of the theory resulting from Burke's work in analyzing the rhetorical techniques of philosophers, writers and religious texts. For Burke, a crucial aspect of rhetorical criticism was to identify the underlying worldviews and ideologies of texts. More commonly, rhetorical criticism centers on the goal of analyzing how texts influence their audience, identifying artifacts and their rhetorical functions, analyzing how elements work within the text, and assessing how well such artifacts serve their rhetorical function. Rhetorical criticism has been regarded as an art, rather than a science, analyzing and employing subjective methods of argument in order to generate social or scientific knowledge (Kuypers, 2009).

Foss (2009) identifies twelve main types of rhetorical criticism: Cluster, symbolic convergence theory and its associated method of fantasy theme analysis, feminist, generic, ideological, metaphoric, narrative, pentadic, and generative. Each form of rhetorical criticism offers a different mode of rhetorical analysis depending on the text. For the purposes of this research, Symbolic Convergence theory will be used. Applying fantasy theme analysis, the critic seeks to identify characters, actions and settings used by the rhetor in order to construct a worldview. This type of criticism is performed by charting symbols which "cluster" around key signifiers in a rhetorical artifact. Also referred to as *equations*, clusters discovered by a critic are not necessarily conscious to the rhetor, and are therefore used to extract "insights that may not even be known to or conscious to the rhetor" (Foss, 2009, p. 64.) Ideological criticism will also be used in order to analyze how different worldviews emerge from manifestations of the man versus machine reporting. Ideological criticism focuses on identifying patterns in sets of ideas, assumptions, beliefs or values which permeate the rhetorical artifacts. Rhetorical criticism is an applicable method of analysis for this research because it entails the examination of texts as rhetorical artifacts. Since this research aims to evaluate the rhetorical function of a collection of texts, rhetorical criticism is an appropriate approach.

Symbolic convergence theory and fantasy theme analysis

Symbolic convergence theory (SCT) aims to explain how communication can create and sustain group consciousness via the development of communal narratives or fantasies. Described as both an objective and interpretive theory, SCT defines *fantasy* as "the creative and imaginative interpretation of events that fulfills a psychological or rhetorical need" (Griffin, 2006). This definition of fantasy comes in contrast common

usage of the term, which often involves the assumption of a fictional universe or otherworldly essence; under Bormann's definition, a fantasy comprises any communal story serving a rhetorical or psychological purpose.[12] SCT was developed by Bormann (1972) as a means to identify how people share common fantasies, how these collections of individual perspectives are transformed into cohesive groups, and how these groups comprise factions which play out latently in the public sphere. In other words, SCT is used to ascertain competing stories which are being continually developed in modern society; it has been used to analyze communicative factions of various ideologies such as communism during the Cold War, the spirit of the Knights of Columbus, and the ideals of the Puritans. SCT does not allow for prediction or control of human communication. Instead, it aims to discover, describe, and explain the dynamic process by which humans come to share symbolic reality (Olufowote, 2006). Fantasy theme analysis is therefore a central orientation of SCT; as explained by Jackson (2000), fantasy themes may be broken down into the following forms:

1. *Setting themes*, which depict (literally or figuratively) where either the action takes place or where the characters act out their roles
2. *Character themes* describe the agents or actors in the drama, assigning qualities and motives to them, implying that they have certain characteristics
3. *Action themes* chart plot lines which deal with the action of the drama

Taken together, these three forms can be analyzed as representations of a shared consciousness (i.e. convergence) between individuals, the existence of which is the crux of SCT. Whereas many existing usages of SCT have involved examining the convergences between individuals that form groups, for this research it will be used to

ascertain these convergences as depicted by popular news outlets in a certain time period. The concept of a *rhetorical vision*, a composite drama that unifies people under a common fantasy, is also crucial to SCT analysis. For example, it has been used to explain how the rhetorical vision of communism as an evil force was manifest widespread throughout U.S. government communications and popular culture during the Cold War (Bormann, Cragan & Shields, 1996). This analysis is notable for its trenchant extension of how rhetorical visions come to fruition in society, through processes referred to as *consciousness creating*, *consciousness raising*, and *consciousness sustaining.* Under SCT, rhetorical visions serve as key byproducts of fantasy themes evidenced in texts. As elucidated by Cragan, Bormann and Shields (1996), rhetorical visions generally comprise five elements which may extended by symbolic significance:

1. *Dramatis personae* – actors or players who functionally dramatize the rhetorical vision
2. *Plotline* – narrative structure which generates the action of the rhetorical vision
3. *Scene* – the locational details of a rhetorical vision
4. *Sanctioning agent* – offers legitimization of the rhetorical vision
5. *Master analogue* – a reflection of deeper structure within the rhetorical vision

Another key element of SCT is the idea of the *saga*, which is described as the telling and re-telling of accomplishments and events in the life of individuals, groups and organizations. For instance, an American saga may involve the notion of "progress" as associated with positive technological advancement (as opposed to a conception of "progress" that accounts for the negative effects of technological innovation). Under

SCT, sagas are used to generate cohesion under a grander rhetorical vision. SCT has also been used to analyze movements such as the Puritans, the Knights of Columbus, and the Women's movement. SCT and fantasy theme analysis are applicable methods of analysis for this research because they provide a useful framework under which to analyze the construction of rhetorical visions or latent worldview among texts and broader society. Because this research aims to uncover the rhetorical visions of these texts how they contribute to the evolution of the man versus machine concept, these methods prove highly suitable.

Chapter 3: Methods

The digital revolution has birthed a new form of public event for scholars in communications and media studies: The man versus machine event. Serving as a gauge for the anticipated role of artificial intelligence technology in modern society, there have been three main instances of this event:

- The 1997 chess defeat of Garry Kasparov by IBM's Deep Blue;
- The 2011 Jeopardy! defeat of Ken Jennings and Brad Rutter by IBM's Watson;
- The 2016 defeat of world-champion Lee Sedol at the abstract strategy game Go by Google Deepmind's AlphaGo.

Historically, manifestations of the man versus machine concept have been limited to cultural products in television, movies and literature. Frankenstein (1818) offers one of the most popular and earliest depictions of the theme, where Dr. Frankenstein's monster has been interpreted to represent the conflict between society's pursuit of technological ingenuity the technology itself. In modern American cinema, the *Terminator* (1984, 1991, 2003, 2009, 2015) and *The Matrix* (1999, 2003, 2005) franchises serve as key cultural touchstones for the concept's popular development. Today, bolstered by increasingly prominent discussions surrounding the anticipated impacts of artificial intelligence technology, many emerging science fiction narratives aim to explore aspects of moral philosophy associated with artificial intelligence. Movies such as *Ex Machina* (2015) and *Transcendence* (2015) employ artificial intelligence as a theme in order to explore ethical issues surrounding memory, permanence and mortality. As well, TV shows such as HBO's *Westworld*, AMC's *Humans*, and Netflix's *Black Mirror* have used

artificial intelligence as a means to examine human questions surrounding authority, autonomy and human fallibility.

Insofar as these events directly position society and technology in a state of conflict, these events also bear symbolism which is not dissimilar to the notion of technological determinism. This study is guided by two research questions that aim to evaluate how such symbolism is manifest in reporting on these events. The first question involves fantasy theme analysis, whereas the second has its basis in symbolic convergence theory.

Research Questions

RQ1: What fantasy themes are revealed through the characters, actions, and settings manifest in coverage of events representing the man versus machine concept?

RQ2: What rhetorical visions are communicated via the fantasy themes manifest in coverage of events representing the man versus machine concept?

Research plan

Based in symbolic convergence theory, this research analyzed how fantasy themes and rhetorical visions are manifest in coverage of three widely publicized events which represent the man versus machine concept:

- IBM Deep Blue's 1997 chess defeat of grandmaster Garry Kasparov
- IBM Watson's 2011 Jeopardy! defeat of Ken Jennings and Brad Rutter
- Google DeepMind AlphaGo's 2016 Go defeat of world-champion Lee Sedol[13]

Each event was chosen due to the widespread coverage it received, its significance in the development of artificial intelligence technology and its singular representativeness of the man versus machine concept as a public event. As an indicator of the degree to which these events were highly publicized, Factiva and ProQuest Newsstand reports for key terms unique to each event identified hundreds of articles related to each event in their respective timeframes.[14] Coverage from *The New York Times*, *The Wall Street Journal* and *The Washington Post* serve as artifacts, with reporting from the outlets comprising 24 articles in total. These newspapers were chosen due to their cultural prominence as prestige publications. To circumvent the interpretive challenges of cross-medium analysis, text stories were solely analyzed (as opposed to audio or visual formats). This research uses purposive sampling in order to examine articles produced by specific organizations during a specific time. For each event, coverage was not analyzed during the entire duration of the event, but rather coverage was gathered in a timespan ranging from the days before and after the final match in each event. For example, although the competition between Deep Blue and Garry Kasparov comprised seven matches which took place from May 3 to May 11 in 1997, artifacts were only gathered in the specified date range of May 10 through May 12. By this same standard, although the competition between Google AlphaGo and Lee Sedol comprised five matches which took place from March 9 to March 15 in 2016, artifacts were only gathered in the specific date range of March 14 through March 16. In the case of IBM Watson versus Ken Jennings and Brad Rutter, there were only two matches (on February 14 and February 15), and there were only two articles about the event in the aforementioned media outlets during this timeframe; in order to ensure sufficient data

saturation for this event, data gathering parameters were expanded to include the entire week following the first match — from February 14 through February 21, 2011.

In order to gather these artifacts, ProQuest Newsstand reports for key terms unique to the event were conducted and the results were gathered. Queries were structured using the following format: "'[AI name]' AND '[company name' AND '[game name]'"[15], during the aforementioned date ranges. Following an initial query to gauge the amount of coverage of each event, it is clear that each event received a considerable amount of coverage from popular media outlets such as *The New York Times*, *The Washington Post*, and *The Wall Street Journal*, as well as in foreign press. Reporting on the event generally tended to center around a narrative of human vs. machine, with some tangential cultural commentary surrounding predicted social implications for artificial intelligence technology. Although some coverage featured commentary in the form of letters to the editor and opinion pieces, for the sake of clarity and consistency, only news stories were analyzed.

Process

Analysis was conducted by coding each of the articles for fantasy themes and other symbolic or recurrent elements vis-a-vis symbolic convergence theory. The first review, regarded by Strauss and Corbin (1990) as the *initial coding* process, involved identifying instances of the man versus machine concept and coding relevant elements, ideas or constructs that later formed concepts. For this research, the initial coding procedure entailed using fantasy theme analysis to ascertain characters, actions, and settings manifest in coverage of these events. This stage of coding also entailed identifying how these themes communicate differing conceptions of the man versus

machine concept (e.g. positive, negative, humanistic or reductionist). Crucial to grounded theory, this process involved memoing, which formally entails a thorough documentation of the possibilities for concepts and theoretical hypotheses. In the case of this study, memoing entailed analyzing elements of each article via fantasy theme analysis, documenting evidence of fantasy themes in the process. Following the initial coding process, rhetorical criticism entails collecting codes into relevant concepts, which are then named accordingly; for this study, I re-assessed the existing themes, categorizing them based on underlying concepts. After reviewing these relevant concepts and categories, I re-reviewed the existing memos and built upon symbolic convergence theory in order to properly address my findings. For example, to answer RQ1, I analyzed my concepts and categories into constituent components related to fantasy theme analysis (e.g. settings, characters, actions and themes). Similarly, in answering RQ2, I used Burke's dramatistic pentad—analyzing the different aspects of the articles via act, scene, agent, agency, and purpose—to enhance understanding of a rhetorical vision vis-à-vis rhetorical criticism and symbolic convergence theory. Burke's dramatistic framework was useful in illuminating more nuanced variables construed in the reporting of each event. Though his pendatic architecture did not ultimately afford a singular rhetorical vision, the exercise was productive as a procedure through which to ascertain the less obvious machinations of each artifact. Moreover, the dramatistic pentad served to bolster my analysis by illustrating the subtle differences between event narratives.

RQ1:

Fantasy themes

In answering RQ1 concerning fantasy themes, I evaluated how different characters, actions and settings active in these stories served to construct thematic structures familiar to the fantasy genre. Though there were a variety of themes manifest through different newswriting and storytelling methods, the most dominant fantasy theme in this coverage involved that of man versus machine. For instances in which this theme was observed, the computer and its associated characters (the researchers, business executives or otherwise proponents of the machine's victory) represented the shared consciousness of the machine (i.e. mechanistic superiority) whereas the human and its proponents served as the human (i.e. humanistic superiority).[16] On a more granular level, some more detailed concepts manifest as thematic fantasy elements via different literary objects include the notion of technological autonomy, mysticism related to humanistic fallibility, and epistemic transcendentalism associated with conquering logical essentialism or hyper-objectification. These latter themes are most cogently explored in two pieces from *The New York Times* surrounding the Deep Blue event, "Inscrutable conqueror" (McFadden, 1997) and "Kasparov becomes human" (Weber, 1997a).

Characters

Further answering RQ1, I assessed how different characters were manifest in reporting of these man versus machine events. Perhaps unsurprisingly, the most dominant characters in each game were human players (which stood to represent the sum of human intelligence) and a computer (which stood to represent technological progress).[17] The names and attributes of the exact characters naturally varied depending on the events, but

each character nonetheless had symbolic value as a representative of a larger concept, either man or machine. Some humanistic qualities are applied to computers throughout these articles. For instance, in *The Wall Street Journal* article "IBM's winning 'Deep Blue' is still a product of primates" (Ziegler, 1997), Kasparov perceives something "very human" in Deep Blue. However Kasparov is later "overwhelmed by Deep Blue's "computational" ability, ultimately "resigning" in a state of clearly being "distraught". Similarly, in *The New York Times*' article "Inscrutable conqueror" (McFadden, 1997) Deep Blue's character is imbued with a curiously spiritual sensibility, as its silence is described as "monastic" and "intimidating," with an "inscrutable face" atop "featureless black monoliths" which gave nothing away over the course of the match. In addition, the reporting anthropomorphized the machine by imbuing it with human-like personality traits and casting it as a mysterious combatant. *The New York Times* article "Kasparov becomes human" (Weber, 1997a) suggests that Kasparov's failure at the hands of Deep blue may be attributable to the "burden of defending man against machine," or that he was "playing the computer's game" as opposed to his own.

There were no discernible patterns in themes manifest according to their respective publications, however themes were manifest differently based on the outcome of the specific events due to the nature of the sampling (i.e. since some of the Deep Blue and AlphaGo coverage focused on a recent human win as opposed to the ultimate human loss, some reporting naturally painted the human as more of an underdog as opposed to a shoe-in). For example, *The Wall Street Journal* article "In machine matchup, Go champ gets a win" (Gale & Nam, 2016), and *The New York Times* article "Man playing a computer finally wins a game of Go" (Sang-Hun, 2016) were both written about an

individual game which Lee Sedol won against AlphaGo, despite his not having won the entire series. This portrayal of humans as underdogs is notable; it represents how narrative constructions may be more dependent on the context of tournament dynamics than overarching ideas surrounding the historical role of technology in society. For instance, due to AlphaGo's previous wins leading up to Sedol's victory, Sedol was portrayed as an underdog in the context of the event and humans were portrayed as underdogs when matched with computers.

Actions

Though a few articles which involved reporting on a singular human victory (such as *The New York Times*' "Man playing a computer finally wins a game of Go" (Sang-Hun, 2016)) may be conceivably classified as conveying a sense of humanistic triumphalism against the technologically supernatural, the dominant action throughout all these pieces involved contestation and confrontation — by way of narrative, the most significant resultant action was a human losing in a battle against a machine.

Differing terms were used throughout these articles in order to portray the competitions with more dramatic appeal, but a paucity of language lends itself to a fantasy theme other than the dominant theme of man versus machine. As mentioned in the foregoing section, some actions were construed as a means through which characters became more humanistic, taken down a peg from an implied conception of super-humanism. This action is evident in *The New York Times* article "The contest is toe-to-toe and pawn-to-pawn" (Weber, 1997b), wherein Kasparov's loss to Deep Blue effectively "reduced the world champion to the stature of a mere mortal". In addition, descriptions of the machine's actions tended to venture into supernatural domains in terms of cognitive

infallibility, such as in “How you beat one of the best Go players in the world? Use Google” (Bloomberg News, 2016), wherein DeepMind co-founder Demis Hassabis holds that AlphaGo will "never get tired and… never get intimidated.”

Many articles (such as “In machine matchup, Go champ gets a win” (Gale & Nam, 2016), “Man playing a computer finally wins a game of Go” (Sang-Hun, 2016), and “Machine bests man in Go series, winning 4” (Sang-Hun, 2016)) portrayed humans as underdogs in the fight against machines. However this seems to have as much to do with the circumstances surrounding the game at hand as its likelihood as an overt editorial decision. Somewhat similarly, *The Wall Street Journal* article “Computer wins on ‘Jeopardy!’: Trivial, it’s not” (Markoff, 2011) describes Ken Jennings as having “surrendered meekly” to Watson, referencing Jennings’ quotation of an episode of *The Simpsons*, writing “I, for one, welcome our new computer overlords,” on his final jeopardy video screen. Notably, no article portrayed humans as the dominant force in these battles. Instead, articles such as “Machine bests man in Go series, winning 4” (Sang-Hun, 1997) and “Go champion bows to Google software” (Cheng, 2016) were constructed in ways that emphasized the ingenuity inherent to the building of such a powerful machine. The former, for example, includes the line: “The game has been the last remaining great hurdle for computer programmers attempting to make software more adept than humans at board games since the I.B.M.-developed supercomputer Deep Blue routed the world chess champion Garry Kasparov in 1997”. The latter article refers to Go as the “’Mount Everest’ challenge of game-playing for artificial-intelligence developers” (2016).

Settings

Although each of these events took place at highly publicized event venues, not every article noted the exact venue. Moreover, the setting in which these events took place was largely more sociocultural than physical. Instead of describing the physical location of the event venue, the articles devoted a significant amount of coverage to emphasizing the sociocultural implications of the prospect of machines which can outperform humans at cognitive tasks. Such orientations ultimately work to support the fantasy theme of man versus machine by bolstering the imaginative and speculative nature of the articles, framing the potential positive and negative effects of an artificial intelligence-enabled future. These articles also employed some dystopian elements familiar to science fiction. For instance, the article "Computer wins on 'Jeopardy!': Trivial, it's not" (Markoff, 2011) addresses the notion of technological antagonism akin to Hal, the computer that attempted to take over the human's mission in *2001: A Space Odyssey*. The article "Inscrutable conqueror" (McFadden, 1997) presents a portrait of Deep Blue that more closely resembles the mechanistic antagonism in Hollywood films. In addition the article "Swift and slashing, computer topples Kasparov" (Weber, 1997c) holds that the stakes of the match entailed "humanity itself," which IBM "dethroned." Evocative terminology such as "slashing" and "dethroning" elicit visions of violent conflict (1997c).

RQ2:

Rhetorical visions

Just as there were more than two shared consciousness (man and machine) in these articles, there were both differences and similarities in the rhetorical visions used by media outlets to cover these three man versus machine events, as identified through the

lens of symbolic convergence theory (SCT) and the dramatistic pentad. Whereas the dramatistic pentad includes the narrative elements of scene, act, agent, agency and purpose, SCT involves five different analytical categories: dramatis personae, plot, scene, sanctioning agent and master analogue. Rather than analyze the different degrees of emphasis placed on these aspects of the text however (for instance, comparatively examining the ratios of prevalence between agency and purpose, or between dramatic personae and master analogue) this analysis employed SCT in order to assess the more fine-grained themes present in each artifact, only secondarily examining some aspects of the dramatist pentad as an analytical extension.

Findings using SCT reveal that while some aspects of these rhetorical visions were remarkably similar—each article generally involved similar dramatis personae, plot, and scene because they were all artificial intelligence events—the sanctioning agents and master analogues for each article tended to vary depending on the event. Different sanctioning agents also sometimes led to the same master analogues. For instance, many artifacts involved a sanctioning agent relating to the idea of inevitable technological progress. This is perhaps most evident in articles such as articles "IBM's winning 'Deep Blue' is still product of primates" (Ziegler, 1997), wherein computer expert Gary Smaby claims computational evolution is "inevitable," insofar as the game has a "mathematical underpinning". In addition, the article "How do you beat one of the best Go players in the world? Use Google" (Bloomberg News, 2016) paints Google as a company which, at the forefront of technological progress and digital media, stands to serve as a "superhuman" entity. This sanctioning agent is also manifest in "How one champion is chewed up into small bits by another" (Byrne, 1997a), which portrays Kasparov as simply incapable of

surmounting the inevitable computational mastery represented by Deep Blue. As a facilitator of a master analogue, this sanctioning agent of inevitable technological progress was most commonly used in service of the master analogue of man versus machine, such as in the foregoing articles and ones such as “Man playing computer finally wins a game of Go” (Sang-Hun, 2016) and “Swift and slashing, computer topples Kasparov” (Weber, 1997c). However, another master analogue involves man’s superiority to machines, such as in “IBM’s winning ‘Deep Blue’ is still the product of primates”.

While technological progress comprises the most dominant sanctioning agent, the second most prominent sanctioning agent is human fallibility, most clearly evidenced in the article “Kasparov becomes human” (Ziegler, 1997), whereby Kasparov’s own human fallibility led to his defeat — but also led to his humanization. Somewhat curiously, the master analogue here more closely resembles a sense of man’s (read: primates’) superiority over machines — but in this article, the nature of this superiority had more to do with a sense of humanism associated with Kasparov’s fallibility than a sense of creative ingenuity on the part of Deep Blue’s creators. This runs counter to the sanctioning agent in “In machine matchup, Go champ gets a win,” which is best described as Sedol’s own human ingenuity, the master analogue still most evidently being man’s superiority over machines insofar as such ingenuity also entailed the building of AlphaGo. In addition, all three sanctioning agents (human fallibility, human ingenuity and the notion of technological progress) were present in in the article “Inscrutable conqueror” (McFadden, 1997), which contributed to the master analogue of man versus machine.

Taken collectively, the nature of these competing sanctioning agents and diverging master analogues represents competing visions of the man versus machine concept. In one sense, humans are conceived as in constant battle with technological progress (as evidenced by the sanctioning agent of inevitable progress), humans are also sufficiently ingenious to invent these machines in the first place. Moreover, a central reason humans have come to rely so heavily on computers is due to our own built-in cognitive biases and fallibility, with computational rationality helping bolster our inadequate objective cognitive abilities. Complicating things further, insofar as creativity in consumer tech drives technological evolution and adoption, this humanistic capacity for creativity, art, and aesthetics may be seen as complementary to (as opposed to in conflict with) technological progress. These nuances further color the relationship between two competing humanistic perspectives endemic to the man versus machine concept: One side holds humans' infallibility as a foundational and indelible aspect of our condition, leading us to develop computational machinery that makes us less fallible and more rational — but it also holds that computers will never encroach on some fundamental humanistic elements associated with ingenuity, creativity, and adaptability. The other side comprises a belief that our ingeniousness is the true driver of inevitable technological progress, whereby humans are inherently superior to machines due to the sheer ingeniousness that developing new technologies demands.

When it comes to the dramatist pentad, the most notable finding is that machines are sometimes cast as agents similar to people in their actions — meaning, computers are afforded the dramatic faculty to act with agency. Due to the nature of these matches, this happens at a small level in nearly every article, whenever a somewhat personifying action

verb is applied to a computer during a match, such in “For chess world, a Deep Blue Sunday” (Chandrasekaran, 1997), “When computers beat humans on Jeopardy!” (Kurzweil, 2011), and “Machine bests man in Go series, winning 4” (Sang-Hun, 1997). Depending on the piece, this can be more pronounced or nuanced, such as in articles like “Inscrutable conqueror” (McFadden, 1997), wherein Deep Blue is described as having kept its “monastic silence” amid the rise of “ascendant computers” (1997). While it may seem that applying autonomy or agency to machines tacitly challenges the idea of what it means to be human, mainstream science tells us that humans may not have free will. However, we do not know the basis for many biological factors impacting our decision-making behind the scenes. In this context, rather than the notion of autonomous computers affecting our perception of what it mean to be human, our capacity and desire to personify computers and other objects might be perceived as a fundamental human capacity.

It is also worth noting that despite many articles including characters that acted with agency, none of these actions seemed to contain a purpose outside of their own design — to win a game. Among others, the article “A grandmaster sat at the Chessboard, but the real opponent was Gates” (Zuckerman, 1997) applies agency to Deep Blue insofar as it “defeated” Garry Kasparov and “accomplished” a great feat. However, the purpose of the win seemed more to bolster public perspective of IBM rather than win a game. Another article, “Computer wins on ‘Jeopardy!’: Trivial, it’s not,” describes a future iteration of IBM Watson you can talk to, bearing the ability to “look at all the evidence and try to ask follow-up questions” (Markoff, 2011). Ostensibly, we are then to assume that the purpose of IBM Watson is to serve humans. Despite the public prevalence of

fears about AI safety regarding the risks of unintentionally designing super-intelligent machines, these examples raise the question of responsibility for developing AI. In other words, because we cannot technically embody consciousness but are beginning to build modes of artificial intelligence, these cultural manifestations of autonomous machines with a sole purpose of serving humans prompts new questions about technology in society.

Conclusion

This research used symbolic convergence theory and its accordant method of fantasy theme analysis to examine how different news organizations covered artificial intelligence events in their most immediate surroundings. Through its formalization, this research contributes to symbolic convergence theory and builds on how it may be used to understand narrative constructs as they unfold in the media. Specifically, it suggests that narrative reporting surrounding artificial intelligence events often involves competing visions of the classic man versus machine story structure.

Fantasy theme analysis affords rich insights through which to assess the viability of symbolic convergence theory in human communication. After analyzing the artifacts in this research related to artificial intelligence events, it is clear that in the context of symbolic convergence theory, the man versus machine fantasy theme comprises a common narrative structure through which artificial intelligence events have been construed in popular media outlets. Moreover, this theme serves to represent the convergence of two visions of shared consciousness: the belief that machines will evolve to a point of superhuman intelligence (inevitable technological autonomy), and the belief that humans are unique and supremely dominant beings (humanism). Through the lens of

symbolic convergence theory, the differing sides of this thematic structure can be interpreted as representing two different shared realities: a reality rooted in the concept of humanism as superior to technological progress, and a reality placing technological progress as dominant to humanism. Considering their juxtaposition in the context of symbolic convergence theory, these ideological constructs therefore may be understood as competing forms of shared realities related to the nature of humanism and technological progress. We can also see how the concepts of "soft" and "hard" technological determinism emerge. The humanistic view tends toward the notion of a softer technological determinism wherein human beings retain their special qualities and superiority. The harder view suggests two primary outcomes. The more optimistic view holds that technological progress is inevitable but will ultimately serve to benefit humankind. The dystopian view holds that we are in grave danger from these powerful and inscrutable devices. Dr. Frankenstein loses control of his creation.

By way of analysis, this research also more generally bolsters the central tenet of symbolic convergence theory: Large groups communicate in society by converging on symbolic realities in order to convey meaning. But whereas previous symbolic convergence theory scholarship involved analyzing groups such as the allied and axis powers during the Cold War, the Knights of Columbus and the various groups involved with corporate strategic planning (all of which are explored in the foregoing literature review), I did not locate prior research that has analyzed symbolic convergence theory in the context of artificial intelligence as a cultural phenomenon. Given the ongoing expansion of artificial intelligence as an academic discipline, in enterprise planning and in consumer technology, the identification of shared consciousness related to man versus

machine themes contributes to the ongoing discussion of the role of artificial intelligence in society, particularly insofar as it is predicted to become a more powerful and ubiquitous computational tool in modern society.

Moreover, although this research is of primary significance to the development of symbolic convergence theory, it also bears heavily on existing literature relating to technology and society, particularly how artificial intelligence technology is communicated and conceptualized in the public sphere. As explored in this thesis' literature review, an abundance of literature exists to support the prominence of technological determinism as an area of interest for communications scholars. While this research does not explicitly examine technological determinism, the sense of shared consciousness associated with the man versus machine narrative construct bears directly on the notion of technological determinism, to the extent that both shared realities are centered around concepts regarding technology's role in society.

Some reporting revealed less obvious themes of man versus machine in the treatment of the match. For instance, *The New York Times'* "Fighting on down to the very last volt" (Byrne, 1997b) documented a match in the manner of a play-by-play sporting event. Nevertheless, the action theme in the story is rooted in a "fight" with winners and losers. Machines are assigned human characteristics and "chew up" their human combatants (1997b). The most powerful rhetorical vision is not that humans work *with* machines, but that humans are threatened by machine intelligence. This is also seen in reporting insisting that humans are still superior because ultimately human power and intelligence created the machines. Therefore in many respects, we witness the familiar

Frankenstein and even Promethean themes of human beings unleashing forces that may ultimately undo them.

Limitations

Perhaps the most evident blind spot of this research relates to sampling. Simply put, not every piece of reporting surrounding these events was analyzed — only articles from major news outlets during a specific window immediately surrounding each event were analyzed. In addition, the relative newsworthiness of each event affected the number of articles produced immediately surrounding each event, leading to far fewer article being produced immediately surrounding Google DeepMind AlphaGo and IBM Watson coverage than IBM Deep Blue. Accordingly, this research involved the analysis of far more stories related to Deep Blue vs. Garry Kasparov than IBM Watson vs. Ken Jennings and Brad Rutter.

Directions for Future Research

Despite the noted limitations of this study relating to sample size, relative newsworthiness of different events and some degree of intractable subjectivity on the part of the rhetorical critic, none of these is to say there is any shortage of further avenues for investigating the role and evolution of artificial intelligence as a topic in society. In terms of fantasy theme analysis and symbolic convergence theory, many opportunities exist which may prove fruitful for future communications scholars seeking to examine how artificial intelligence is communicated in society. Perhaps most glaringly, in recent years large tech corporations such as Google, Facebook, Apple and Amazon have been working to rapidly advance the field of artificial intelligence. Knowing this, it seems that

an analysis of the different mission statements for each of these projects may provide novel insight into how these increasingly powerful tech companies are (or are not) differentiated from one another in terms of governing ideologies or shared consciousness vis-à-vis man versus machine.

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Appendix

Memos: IBM Deep Blue vs. Garry Kasparov coverage

The Wall Street Journal — "IBM's winning 'Deep Blue' is still product of primates"

RQ1

- Characters: None of these characters necessarily comprise fantasy characters, but they do take the form of common character archetypes. The most evident characters are computers (as represented by Deep Blue) and humanity (as represented by Garry Kasparov); the lede of the article immediately conveys the man versus machine narrative structure. Secondary characters include the computer's principal creator, C.J. Tan of IBM—whose quotations are used to dispel the idea that Deep Blue functions using anything resembling cognitive reasoning—and spell check software, which was previously considered a form of artificial intelligence but is used in the article to convey the notion that Deep Blue does not make intelligent decisions — it's simply been obsessively programmed to beat Garry Kasparov.[18] Moreover, HAL from the film 2001: A Space Odyssey is mentioned as a form of antagonistic artificial intelligence which has not yet been achieved, and a distinction is made between such a hypothetical general artificial intelligence machine and Deep Blue, which is programmed for a specific purpose.[19] Garry Smaby, a supercomputer consultant who acts as an expert to afford scientific credibility to the story, is also quoted twice.
- Actions: Contestation and confrontation is the most central action narrative of the story, as the contest is constructed as a battle of wits between human and machine. Kasparov perceives something "very human" in Deep Blue, implying

that Deep Blue may bear humanistic qualities, however Kasparov is later "overwhelmed by Deep Blue's "computational" ability, ultimately "resigning" in a state of clearly being "distraught". At the end of the article, Garry Smaby is quoted as saying that Deep Blue's creation was "inevitable," however he posits that "The game of chess is still played by two humans," which essentially suggests that the game of chess is the distinct domain of humans.

- Settings: A highly publicized chess match constitutes the most obvious setting. Although no physical location is stated, more notable is the sociological and technological setting under which this event took place. This construction does not appear until the end of article, wherein the author invokes a quotation by Garry Smaby to illustrate the notion that computational evolution is "inevitable," insofar as the game has a "mathematical underpinning". This construction—as well as its placement, in the article's conclusion—suggests that technological and sociological dynamics operate most saliently as components of setting. Further, this construction affords a curious illustration of how reductionism may be used to distill such events down to battles between man versus machine, while concurrently signaling benefits toward procedural (and arguably humanistic) reductionism vis-à-vis artificial intelligence technology.
- Fantasy themes: The most evident fantasy theme in this story is the conflict between man and machine. The article's lede proposes as much ("One small step for a computer, one giant leap backward for mankind?"), as does its headline which aims to position Deep Blue as a "product of primates" (and therefore humans). By associating Deep Blue's significance with the evolutionary history

of humans, the article bolsters the concept of man versus machine by drawing a parallel between humans and computational evolution. The article's lede also references the famous phrase that Neil Armstrong spoke on the moon, referencing one of mankind's greatest accomplishments; in doing so, the article tacitly positions this event within the broader context of human marvel and achievement, however such grand affectation is tempered by the suggestion of directly competitive machines (who are taking "one step forward") and inept humans (who are taking "a giant leap backward").

RQ2

- Rhetorical vision:
    - Dramatis personae: A chess grandmaster and a supercomputer.
    - Plot line: The chess grandmaster loses to the supercomputer.
    - Scene: A highly publicized chess match.
    - Sanctioning agent: The notion of inevitable technological progress.
    - Master analogue: Man versus machine, man versus technology.

The Washington Post — "No-Brainer; In the Kasparov-Deep Blue Chess battle, only the human has his wits about him"

Opinion piece — this was not analyzed.

The Washington Post — "For chess world, a Deep Blue Sunday"

RQ1

- Characters: The two most prominent characters in this piece are Deep Blue and Kasparov. Secondary characters are perhaps best examined in their relation to the main characters: IBM researchers serve as the explanatory side of Deep Blue, while chess experts accordingly supply analysis of Kasparov's moves. Chess masters also validate the historical significance of the event (such as Daniel Edelman, who is quoted early on as positing the match as "the single most historic event in the history of chess"), as well as provide some brief commentary about Kasparov's comments after the match (such as Patrick Wolff, a grandmaster, who calls Kasparov's claim that humans tampered with the machine "nonsense"), and moves during the match (such as Danny Kopec, a grandmaster and computer science professor, who questions "Why did he do that?")
- Actions: The most significant action in this article is Deep Blue's defeat of Garry Kasparov over the course of a nine-day chess matches. The article goes into significant detail about the specific moves that comprised each win and loss—supplying the reporting with more dramatic appeal—however for the sake of this analysis, it suffices to say that the dominant action was a battle. More notably, the article describes Kasparov as being "unable to maintain his concentration [due to his] resignation in the second game… and the fact that he was force into a draw in the fifth game on Saturday." Further, Kasparov voiced skepticism about the computer's actions in the second game, suggesting that humans may have interfered with the machine (this idea was met with ridicule from IBM researchers and the chess community, with some experts accusing Kasparov of "making excuses"). Kasparov conceded this point later however, positing that there is

probably “no way to prove that Deep Blue is making [one move over another]. Despite being proud of their victory, the article showed IBM researchers as more private than public by their decision not to release logs of the game to Kasparov or the public, although portions of the logs may eventually be published in scientific journals. Wolf and other chess experts agreed that Deep Blue’s steady and unflagging nature was the key to its victory. Experts further speculated that if Kasparov had played a game to a tie, then the remaining games may have turned out differently. Experts were dumbfounded that Kasparov used one of his pawns to eliminate a knight Deep Blue — a move that seemed a perilous misstep.

- Settings: At one point in the article, the match was described as taking place inside of a “skyscraper”. Arguably more important than the physical location of this match, however, is the societal and technological environment in which this event took place — which is to say, the fact that this represented a computer’s defeat of the most accomplished chess grandmaster. The reporting does not reference notions of technological determinism vis-a-vis the match; instead, the focus seemed more on Kasparov’s own human fallibility (in his loss), and his humanistic emotiveness (in the anxiousness which led to his loss, as well as his initial unwillingness to accept the computer’s proficiency, evidenced in his accusations of cheating by IBM.)
- Fantasy themes: The notion of man versus machine comprises the most prominent fantasy theme in this reporting. Indeed, this theme is manifest in the lede of the article — the match is a “stunning showdown between man and machine”. Moreover, while there are no fantastical interpretations of technological

determinism in the reporting, there is a sense of majesty or mystique which is applied to Deep Blue's computational architecture. The piece portrays Deep Blue as being somewhat less "machinelike" due to an "enhancement" which allows it to execute a particular series of moves (as opposed to simply one move at a time). While this isn't necessarily a fantasy theme, it does tacitly differentiate Deep Blue from simply cold and calculating computers, applying a level of fantastical intrigue to the nature of the computer.

RQ2

- Rhetorical vision:
    - Dramatis personae: A chess grandmaster and a supercomputer.
    - Plot line: The chess grandmaster loses to the supercomputer.
    - Scene: A highly publicized chess match in a skyscraper.
    - Sanctioning agent: The notion of human fallibility.
    - Master analogue: Man versus machine, man versus technology.

The New York Times — "Mind over matter"

Opinion piece — this was not analyzed.

The New York Times — "The contest is toe-to-toe and pawn-to-pawn"

RQ1

- Characters: The main characters in this piece are, once again, Deep Blue and Garry Kasparov. Many different supporting characters are used in order to help paint the narrative. Most noteworthy among these secondary characters is a Baptist minister at the beginning of the piece, who supposedly stopped Kasparov

on the street after his defeat in game 2 and assured him that "help was on the way," in the form of "our lord". It's important to note that a Christian god is therefore invoked as another character by the Baptist minister. The minister posits god as a savior for Kasparov (and therefore humanity) in his capacity to allow Kasparov to win; Kasparov retorts that god is actually on the side of Deep Blue (rather than Kasparov), though he does not make any sort of differentiation as to the humanistic agency or existence of god. Like the other articles, there are two main camps of supporting characters: IBM researchers (generally understood as coloring the character of Deep Blue's machinations), and chess grandmasters (generally understood to be standing in for Kasparov's consciousness and a sort of naturalistic humanism). Kasparov is further characterized in a heroic light, with experts believing he will "prevail" due to his "brilliance and his history of responding heroically to desperate straits." Kasparov is also described as "holding the human race on his shoulders," which further paints Kasparov as a hero representative of humanism. Moreover, Kasparov's portrait as a heroic figure is complicated by how his internal dynamics shift when juxtaposed against Deep Blue; Kasparov's "emotions, his psychological wherewithal" are, in effect, turned against him such that his overall humanistic fallibility is once again highlighted.

- Actions: The most dominant actions are moves and chess-match dynamics between Kasparov and Deep Blue. While the exact nature of each one of these actions isn't crucial to delve into for this research, it is important to note how these actions were communicated. In introducing the idea of examining chess moves at the beginning of the piece, the reporter compares IBM researchers' roles

in inspecting Deep Blue's decisions to "Frankenstein at the mercy of his monster." Through this overarching action then, IBM researchers are effectively portrayed as seeking to keep up with the built-in relative autonomy of Deep Blue. What's more, it's worth noting again that Kasparov is said to be "holding the human race on his shoulders."

- Settings: In this piece, the location of the match is disclosed as the Equitable Center in Manhattan. It's further described as Kasparov's "best chance for a breakthrough," as he may move first, can play as white and will have had two days to "formulate his attack".
- Fantasy themes: Man versus machine is the most dominant fantasy theme in this reporting. Later in the piece, Bruce Paldofini, a chess teacher and author, even goes so far as to say that Kasparov's loss represents "the dying of an age," whereby "Man may no longer be the king in this universe." This is a curious notion considering that IBM Watson is essentially a machine built by mankind.

RQ2

- Rhetorical vision:
    - Dramatis personae: A chess grandmaster and a supercomputer.
    - Plot line: The chess grandmaster loses to the supercomputer.
    - Scene: A highly publicized chess match.
    - Sanctioning agent: The notion of human fallibility.
    - Master analogue: Man versus machine, man versus technology.

The New York Times — "Fighting on down to the very last volt"

RQ1

- Characters: IBM's Deep Blue and Garry Kasparov comprise the main characters in this artifact. Since this artifact mostly comprises just straightforward technical reporting of the machinations of a match, there are no characters outside of Deep Blue and Kasparov, although it may be argued that each chess piece constitutes a proxy character insofar as it represents a tactical simulacrum of each character.
- Actions: The exact technical nature of each chess move is not relevant to the purposes of this research; rather, the reporter's descriptions of each move are of significance. That said, there are a handful of interesting descriptors for each main character's respective moves. Mainly comprising battle or warlike imagery, most notable is the introduction of Deep Blue as having "saved its game" in defeating Garry Kasparov. This is significant because it attributes a sense of autonomy and even ownership to the game of chess. Somewhat interestingly, at no point in the artifact did these descriptors also convey moralistic sentiments. Another point of significance in this artifact is that Deep Blue is described as "engineering" a check that would effectively defeat Kasparov; this seems to attribute a sense of technological autonomy to Deep Blue. Moreover, at the end of the piece, Kasparov offers a draw and Deep Blue's "handlers" are said to have "accepted." This strips Deep Blue of some sense of imagined autonomy, but also renews a sense of technological mystique — how much of Deep Blue may be truly autonomous, in light of its having "handlers"?

- Settings: No physical location was established in this artifact, but the stream of chess jargon seemed to convey the sense that the setting was primarily constrained to the chess board itself. Aside from an introductory scene-setter (Deep Blue faced "insuperable odds" in defeating Kasparov, issues relating to sociological and technological gravity of the match did not serve a role in guiding the setting, with the reporting instead focusing on the moves of each player.
- Fantasy themes: The most glaringly manifest instance of a fantasy theme is in Deep Blue's sense of autonomy. Due to the concision and technical nature of this piece, the reporting did not cover the match in the narrative of man versus machine — rather, the dominant fantasy theme was technological autonomy. The clearest example of this is in Byrne's assessment of Deep Blue having "engineered a foolproof perpetual check to insure the draw." As a piece of reporting, this phrase incorrectly attributes a sense of autonomy to Deep Blue, which may be construed as the manifestation of a fantasy theme in order to help illustrate the story. While other pieces in this analysis have focused primarily on the man versus machine narrative as a framing tool, the theme of technological autonomy in this piece is more evident.

RQ2

- Rhetorical vision:
    - Dramatis personae: A chess grandmaster and a supercomputer.
    - Plot line: The chess grandmaster loses to the supercomputer.
    - Scene: A chess board.
    - Sanctioning agent: The notion of technological autonomy.

- Master analogue: Man versus machine, man versus technology.

The New York Times — "Deep Blue escapes with draw to force decisive last game"

RQ1

- Characters: The most prominent characters in this artifact are Deep Blue and Garry Kasparov. Deep Blue is described as cagey due to IBM's reluctance to hand over computer logs of the gameplay. In this piece, Kasparov is described as representing not humanity itself but the "human chess player," which effectively portrays the game as a chess competition between a single human and a single machine (as opposed to a battle between man and machine).[20] Other secondary characters in the piece include Maurice Ashley and Mike Valvo (two international masters who provided commentary during the match), Miguel Illescas (another grandmaster who expressed fear over the implications of Deep Blue's potential victory), as well as IBM Deep Blue team members Jeff Kisseloff, John Fedorovich, Nick DeFirmian and Feng-Hsiung Hsu, all of whom worked for IBM and offered quotes which effectively served as the mouthpiece of Deep Blue's overarching chess strategy. C.J. Tan, the manager of the Deep Blue project, served as the most prominent figure representing Deep Blue's strategy, and Feng-Hsiung Hsu, a research scientist working on Deep Blue, provided the most dramatic explication of what handing over Deep Blue's logs would entail "Here, put your head on a platter."

- Actions: The article begins with a description of Deep Blue as having “outfoxed” Kasparov through strategic expertise. Once again, this demonstrates how agency is attributed to a machine (as opposed to its engineers) in reporting on the event. Throughout the rest of the piece, there are other instances involving actions colored in a way which conveys robotic expertise — for instance, the article describes computers as “showing new ways to play endgames,” and Hsu’s dramatic analoguey comparing the notion of handing over call logs to decapitation.
- Settings: The technological and societal dynamics of the match constitute the most significant aspects of the setting in this piece. Roughly halfway through the article, the exact location of the match is divulged as the Equitable Center in Manhattan, accompanied by the fact that there was a crowd of more than 500 or so spectators (this information was not disclosed in previous pieces of reporting analyzed in this research).
- Fantasy themes: Although the man versus machine narrative structure is used relatively sparingly in this article, the notion of technological autonomy plays a much more potent role in shaping the development of the article. At the beginning of the article, agency is attributed to Deep Blue (as opposed to its engineers), and later in the piece Deep Blue is described as providing the engineers “new ways to play endgames.” However, this is not to say that the man versus machine construct makes no appearance at all — in fact, Maurice Ashley notably describes the stakes of the match as bearing the “future of humanity”.

RQ2

- Rhetorical vision:
    - Dramatis personae: A chess grandmaster and a supercomputer.
    - Plot line: The chess grandmaster loses to the supercomputer.
    - Scene: A highly publicized chess match.
    - Sanctioning agent: The notion of technological autonomy
    - Master analogue: Man versus machine, man versus technology.

The New York Times — "Computers vs Humans: Clashing symbols"

Opinion piece — this was not analyzed.

The New York Times — "Checkmate, Mr. Blue?"

Opinion piece — this was not analyzed.

The New York Times — "Kasparov becomes human"

RQ1

- Characters: The central characters in this artifact are Garry Kasparov and IBM Deep Blue. Kasparov is portrayed as the story's central protagonist, with his defeat at the hands of Deep Blue (the antagonist) serving as a character threshold through which he is able to ascertain a deeper sense of humanism. Moreover, the piece suggests that Kasparov's failure at the hands of Deep blue may be attributable to the "burden of defending man against machine," or that he was "playing the computer's game" as opposed to his own.
- Actions: This artifact basically consists of one macro-action (Kasparov losing to Deep Blue), which comprises a handful of smaller micro-actions, such as Kasparov's inability to ascertain and/or exploit Deep Blue's predilections. Insofar as this lack of ability is an action in and of itself, the reporting suggests two main

reasons for this inaction: Either Kasparov felt overburdened by the symbolic nature of the battle, or Kasparov's nerves were elevated as he slowly realized that he was not in complete control of the game (I.e. He was playing the "computer's game" as opposed to his own.) Overall, the most prominent action in this story is an implicit one — Weber's suggestion that in losing to Deep Blue, Kasparov gains a sort of humanism that he previously lacked. This positions Deep Blue as imbuing Kasparov with a sort of humanizing value, effectually introducing a new fantasy theme of technological humanization. Interestingly, some pugilistic rhetoric is also used to describe the combative nature of the encounter, with Owen Williams (Deep Blue's manager), quoted as saying that the computer "is firing bazookas at [Garry Kasparov]"

- Settings: No physical setting is described in the piece. Instead, the main setting is a personal-psychological one: Kasparov is framed as an emotionally charged man who was unable to defeat his own internal emotional machinations in order to defeat an emotionless machine.
- Fantasy themes: Alongside using the overarching man versus machine dynamic as a framing device, this piece also employs the novel (in the scope of this research) theme of technological humanization. These two themes interact in the following manner: In this reporting, the battle between Kasparov and Deep Blue is one between man versus machine — however, the symbolic gravity of this encounter is such that Kasparov cannot temper his own emotions in order to think clearly about the match at hand. Under such stress, Kasparov ultimately loses to the cold and calculating machine… but in doing so, he becomes more human as a result.

By falling victim to human fallibility, Kasparov—a grandmaster who some had believed was an immeasurably more astute chess player than any computer could ever emulate—essentially showcases his humanity in such a way that makes Deep Blue a humanizing piece of technological equipment.

RQ2

- Rhetorical vision:
  - Dramatis personae: A chess grandmaster and a supercomputer.
  - Plot line: The chess grandmaster loses to the supercomputer.
  - Scene: A highly publicized chess match.
  - Sanctioning agent: The notions of human fallibility and technological humanization.
  - Master analogue: Man versus machine, man versus technology.

The New York Times — "Swift and slashing, computer topples kasparov"

RQ1

- Characters: The central characters in this artifact are Garry Kasparov and IBM Deep Blue. Once again, the former is most recognizably portrayed as the protagonist while the latter serves as an antagonist, with the overall outcome of the match being compared to a "Greek tragedy" in its regrettable outcome. Although Kasparov is portrayed as "dark eyed and brooding [over his loss to Deep Blue after the match], later in the reporting is also described as bearing a sort of techno-futurist clairvoyance: C.J. Tan, Deep Blue's manager, claims that Kasparov "has a brilliant mind, [and is] a brave man. He's a man who sees the future, who understands where technology can take us." This statement suggests

that despite Kasparov's emotionally charged loss, he ultimately realizes that such technology can benefit society in the long run, painting him in a heroic sheen which is furthered by Tan's assertion that Kasparov was "brave" in his willingness to publicly battle Deep Blue. Additional characters emerge throughout the story, including the Grandmasters who were in attendance at the match, who were "stunned into near-speechlessness" at when Kasparov was defeated (notably, this act is described as being a "feat in and of itself," implying that the Grandmasters are a relatively long-winded cohort.). The overall opinion of the Grandmasters seems to have been that Kasparov may not have tried his best — that his failure is ultimately a result of his not being able to handle his own stress related to the event. Patrick Wolff, a two-time American champion and grandmaster, is one character who serves as a sort of vessel through which to deliver this dialogue, attributing Kasparov's failure to a sort of "psychological weakness" that was previously unexpected.

- Actions: Like other reporting on this event, the actions can be understood in terms of macro and micro. Within this article, the dominating macro-action is Kasparov's failure at the hands of IBM's Deep Blue, which is overtly described as enormously symbolic (in the lede: "Deep Blue unseated humanity… as the finest chess playing entity on the planet"). Within this macro-action however, there are a number of micro-actions, starting with Kasparov's overly defiant attitude which was displayed by his conservative opening (the "Caro-Kahn"). This comprised an overly risky series of initial moves, ultimately leading Kasparov to over-rely on something called a "perpetual check," which was based on Kasparov's misguided

belief that the computer would be averse to playing in a material disadvantage. Unfortunately for Kasparov, the computer was revealed as "wanting to win…[not to] play for a draw." The overall outcome left him ultimately embittered and ashamed (his loss was equated to a "blow to the collective ego of the human race," having the impact of "a temporary blow to the collective ego of the human race," and of a "Greek tragedy"). Just as well, it's worth pointing out that the outcome of this game led to the action of changing the opinions of the expert witnesses: Both grandmasters and computer experts transitioned from praising the match as a great experiment to an embarrassing and regretful event due to Kasparov's abrupt and avoidable failure. This dynamic effectively transitions the focus of the piece from an exploration into the implications of Kasparov's loss, more toward an examination of Kasparov's psyche in general; later in the piece, Kasparov defends his defeat as a result of his own humanity, as a result of him being scared due to Deep Blue's expertise ostensibly far exceeding his own.

- Settings: The location of the event is mentioned as the Equitable Center in midtown Manhattan. Like other reporting on this event, very little is used to describe the physical location in which the event took place — instead, the article seems to more closely revolve around the personal and psychological traits of the match, as well as the dynamic between Kasparov and his own internal ruminations. One notable instance of setting came during the reporter's description of the post-match press conference, which was "not the exuberant celebration envisioned by [I.B.M.)… but rather, a tense occasion during which Mr. Kasparov griped, apologized and vowed revenge."

- Fantasy themes: This piece of reporting is largely devoid of fantasy themes, save for the fact that the entire piece is centered around the archetype of man versus machine. Although the piece focuses more on the environment of the game and Kasparov's own internal developments, that's not to discount the fact that the man versus machine narrative plays an important role in structuring the reporting overall. For instance, in the lede, Deep Blue is said to have "unseated" humanity as the "finest chess playing entity on the planet" — he is also said to have committed a "temporary blow to the collective ego of the human race." Moreover, Kasaparov is painted as a hero in this battle: C.J. Tan commends him for his bravery and claims that he can see "what technology can do for us"

RQ2

- Rhetorical vision:
    - Dramatis personae: A chess grandmaster and a supercomputer.
    - Plot line: The chess grandmaster loses to the supercomputer.
    - Scene: A highly publicized chess match.
    - Sanctioning agent: The notion of human fallibility.
    - Master analogue: Man versus machine, man versus technology.

The New York Times — "Inscrutable conqueror"

RQ1

- Characters: Deep Blue is once again portrayed as an antagonist, and is referred to by name (Deep Blue) only after first being referred to as RS/6000 SP. Deep Blue's character is imbued with a curiously spiritual sensibility, as its silence is described as "monastic" and "intimidating," with an "inscrutable face" atop

"featureless black monoliths" which gave nothing away over the course of the match. Smooth metal skin and other imagery were used to anthropomorphize the machine, which is described as "almost alive" before conceding that it would be wrong to imagine that the machine can actually "think in the way that humans do". The main secondary character in this artifact is C.J. Tan, Deep Blue's project manager, who claimed that the interest in the match stems from its showing "what technology can do for man and how far we can take it." Most interestingly, this piece assesses Deep Blue in the context of its "ancestors" — meaning, previous inventions which were supposedly going to be able to play chess. Among these ancestors were Baron Wolfgang con Kempelen in the 1760s (who was later revealed to be a charlatan, as his 'machine' was actually just a small person hiding within the apparatus), Alan Turing (who invented a program which could generate simple moves and evaluate positions) and Konrad Zuse, who described a program for chess moves and developed a crude computer as early as 1945. Claude Shannon, a famed Bell Laboratories mathematician and inventor of computer science, is portrayed as Deep Blue's most immediate ancestor, having laid out an early blueprint with a proposal for a chess-playing machine. After describing some more about the history of Deep Thought (the Carnegie Mellon program upon which Deep Blue was based), the artifact explains that it would be incorrect to equate the machine's "thinking" with the sort of thinking that humans do — rather, novel applications of parallel processing technology allows Deep Blue to handle enormous data computations. Moreover, a general purpose version of the computer (a "cousin," as termed in the piece), is estimated to cost around

$2 million. Describing Kasparov's reaction to the defeat, the piece interestingly describes him as offering an "only-too-human" description that a big corporation with unlimited resources had simply dumped their vast resources into developing a machine that could beat him, and that the machine had not truly proved anything yet. In the conclusion, Deep Blue is described as being "beyond praise or criticism," with artful imagery used to convey the idea that the computer cannot really appreciate fundamental naturalistic/humanistic beauty.

- Actions: Whereas Deep Blue "exhibited qualities of scrupulous care, unshakable calm and remarkable powers of concentration and endurance." Kasparov is described as an "emotional Russian" whose frustrations were often on display. Deep Blue evaluated 200 million chess positions a second, flashing moves and evaluations over a small screen, playing grandmaster chess using "both knowledge and speed". The result of the match was that Deep Blue ultimately demolished Kasparov in a "scintillating final game of a deadlocked match," though he notably "never showed joy or disappointment," even though its handlers were "seized with elation or concern" throughout the ordeal. There was "muted joy," and Kasparov reacted with "only-too-human words," amounting to a critique of the deep-pocketed IBM and that the machine had not proved anything substantial yet.
- Settings: The only physical locations mentioned in this piece are Yorktown Heights, where the event took place, and the air-conditioned closet in an office tower in midtown Manhattan where Deep Blue was situated. Like many of the other artifacts in this collection, the setting seemed to exist in both the

overarching sociocultural implications of the match and the physical location in which the match took place.

- Fantasy themes: This artifact mentions man versus machine as a 'hyperbole' in the lede, after which Kasparov is compared to a "last best hope," and computers are referred to as "ascendent". Interestingly, this piece incorporates an artful conclusion which eludes the trappings of empiricism insofar as it stands out from how other pieces in this collection have interpreted the event. By portraying Deep Blue as a machine that was "beyond criticism or praise," the piece seems to suggest that the gravity of Deep Blue's victory derails it from the true epistemological basis of the significance of the event. In other words, by identifying thematic significance in the humanistic elements of existence which Deep Blue is incapable of appreciating, this artifact suggests that there are subtleties inherent to the human condition that bear a sort of sublime potency. This effectively serves to bolster the overarching humanistic narrative of the story, diluting the positivist interpretations of this event as truly "man versus machine" — due to humans' capacity to appreciate art and nuance, the article concludes with an overarching victory for humankind.

RQ2

- Rhetorical vision:
    - Dramatis personae: A chess grandmaster and a supercomputer.
    - Plot line: The chess grandmaster loses to the supercomputer, but the supercomputer lacks fundamental humanistic elements.

- Scene: A highly publicized chess match.
- Sanctioning agent: The notion of inevitable technological progress and the notion of humanism.
- Master analogue: Man versus machine, man versus technology.

The New York Times — "How one champion is chewed up into small bits by another"

RQ1

- Characters: The primary characters in this artifact are Garry Kasparov and Deep Blue. Neither character is portrayed as a protagonist or an antagonist; each is devoid of positive or negative attributes vis-a-vis the character's narrative arch. This was a battle between "the man who knows more moves than anyone" and an "incredible computer" — both of which are presented as having an equal chance of winning, making it at root a game of "top chess… a grand finale of a historic contest" as opposed to bearing more symbolic, socio-technological pertinence. Other characters include C.J. Tan, Deep Blue's project manager, and other spectators and grandmasters who were watching the match take place for their respective sides. Kasparov is portrayed as having committed a foolhardy error at the beginning of the match ("[stunning] the crowd in disbelief"), which Deep Blue took advantage of and which ultimately amounted to a "complete breakdown" by "the standards of top chess." Furthermore, Kasparov was described as being "visibly shaken" after his defeat, pitying himself when the Deep Blue committed an "inspired" and "intrepid" defense.
- Actions: The first action that takes place in this artifact is the notion that Kasparov opened himself yesterday to a foolish attack during his final match with Deep

Blue. To emphasize the uncharacteristically poorly thought-out manner of this move, the piece explains that Kasparov's self-exposed vulnerability was a misstep that most grandmasters never let themselves commit, and that spectators were stunned in disbelief. The artifact continues by explaining that Deep Blue overwhelmed the champion without even "heating up its circuits." Kasparov was ridden with self pity as the machine's "inspired, intrepid defense" transformed into a draw a position Kasparov must have believed he was winning. Afterward Kasparov was visibly shaken as his hopes and confidence "turned to ashes". As mentioned in a previous article, the Caro-Kahn defense is described as a conservative, firmly grounded approach — albeit one which is vulnerable to "a few traps" that "most grandmasters can avoid". The article concludes with a more technical explanation of the moves leading to the end of the match, concluding with the explanation that the match was a "depressing letdown" for Kasparov.

- Settings: Despite not stating the exact physical location of the match, the piece describes the sociocultural dynamics that constituted the significance of the match, as well as the fact that it was attended by "other grandmasters, members of the press, and a big crowd of spectators [who watched] in stunned disbelief." Later on in the artifact, the setting transitions from a physical space to a more abstract one: a chess board. Similar to the article "Fighting On Down to the Very Last Volt," the event is covered in a way which more closely resembles sports commentary than sociocultural commentary; the individual and technical elements provided the bulk of its substance.

- Fantasy themes: The most glaring fantasy theme in this artifact is the general notion of man versus machine. This theme is manifest in multiple subtle instances throughout the artifact. First, the theme appears in the suggestion that Kasparov "looked pitiful when Deep Blue's "inspired, intrepid defense transformed into a draw a position Kasparov must have believed he was winning." By describing Deep Blue's moves as an "inspired, intrepid defense" committed by a "machine," the piece signals the idea that the machine was locked in a high-level battle with Deep Blue — albeit one which Deep Blue didn't even have to "heat up its circuits" to become the victor of. The idea perhaps most evidently appears in a description of the battle where Deep Blue, a "computer," put up a "ferocious resistance" to the likes of Kaaparov.

RQ2

- Rhetorical vision:
    - Dramatis personae: A chess grandmaster and a supercomputer.
    - Plot line: The chess grandmaster loses to the supercomputer.
    - Scene: A highly publicized chess match.
    - Sanctioning agent: The notion of inevitable technological progress.
    - Master analogue: Man versus machine, man versus technology.

The New York Times — "A grandmaster sat at the chessboard, but the real opponent was Gates"

RQ1

- Characters: Examining the match through the lens of the technology industry, this artifact portrays Microsoft and I.B.M. as main characters, although neither is

portrayed as a protagonist or an antagonist. I.B.M. is described as the old incumbent tech company (a "bloated dinosaur" by the "normal" estimation of "many" IBM workers), and the artifact later describes the company as remaining overly dependent on sales of "old-style mainframe and minicomputers," as opposed to "personal computers" and associated software which have risen in popularity. As characters, each one of these companies can be understood as amalgamations of their products, their leaders, and their workers are described. At their helms, Bill Gates is said to personify "the geeky glamour of the computer revolution," which may be surpassed by Deep Blue, which is "even geekier and more glamorous." As a character juxtaposition, during the previous week's momentous matches between Kasparov and Deep Blue, I.B.M. workers were "making a pilgrimage" to Seattle to hear Bill Gates' "vision of the future," suggesting Bill Gates is a vigorous and prophetic leader[21] Other characters included Nathan Myhrvold, Chief Technologist at Microsoft, Mark Andreeson, who holds that young tech entrepreneurs view I.B.M as "their fathers' computer company," that they have "mediocre products" from the perspective of current Silicon Valley folks, but that he is impressed about the "cool technology". Michael D Zisman, an executive vice president Lotus Development Corporation, a company which I.B.M. acquired in a hostile takeover two years ago.

- Actions: Nathan Myhrvold, Chief Technologist at Microsoft gives his "hats off" to IBM. Workers "gathered to watch 30-minute reports of the highlights of each match". Deep Blue "Lifts the curtain" from behind the many crucial but boring things I.B.M. computers do that the general public doesn't realize, such as

running and testing large public utilities. At the article's conclusion, I.B.M.'S chairman and chief executive, took an "indirect shot" at Mr. Gates, explaining that his company is not trying to "create or flog personality here. We are trying to create and propagate technology."

- Settings: Pugilistic atmosphere between Microsoft and IBM, as Mr. Gates is said to lead executives who "normally like to portray IBM as a bloated dinosaur." Also notable is how the setting is manifest in describing the state of the agency: It is a battle for "mind share" — and the invention of Deep Blue is described as boon for a company which "has been losing billions and laying off tens of thousands of workers." Harkens back to "dark days of the early 1990's," when commentary about IBM going bust were more common. Interestingly, the piece makes an attempt to quantify the societal and company-specific salience of the event by explaining that the Deep Blue website received 22 million hits one day last week, while a special internal site only for I.B.M. employees received six million hits."
- Fantasy themes: To the extent that corporate entities are manifest in a fantastical context as brands saturated with symbolism, the most prominent fantasy theme in this artifact centers around Gates' portrayal as a religious figure. In this role, Gates may be understood to be dispensing an allure associated with the idolatry of youth; whereas I.B.M. seeks to regain its dominance in the technology industry through stunts like Deep Blue, Gates seeks to further capture the market by laying out a "vision for the future," which his executives will "pilgrimage" to.

RQ2

- Rhetorical vision:
  - Dramatis personae: I.B.M. and Microsoft
  - Plot line: The old giant (I.B.M.) defends against a young leader with a momentous technological advancement
  - Scene: A hyper-competitive technological marketplace and ominous business/cultural landscape (for I.B.M.)
  - Sanctioning agent: The shift to personal computer hardware/software.
  - Master analogue: Old incumbent battles the idolatry of youth

Memos: IBM Watson vs. Ken Jennings and Brad Rutter coverage

The Wall Street Journal — "When computers Beat humans on Jeopardy!"

Opinion piece — this was not analyzed.

The Washington Post — On 'Jeopardy!,' rise of the machine: Computer competitor rakes in ratings

RQ1

- Characters: The main characters in this piece are Ken Jennings, Brad Rutter and IBM Watson, with the first two representing human contestants and the former one representing technology. Jennings is described as holding the show's record for winning the most consecutive games (74), whereas Rutter is known for earning the most money in the history of the game. Alex Trebek, the show's announcer, also makes an appearance toward the end of the article when commenting on the ingenuity of Watson (as if Watson were a real human). IBM is also referenced passingly, in order to clarify that Watson wouldn't actually take home the $1 million grand price — instead, IBM would be donating the winnings to two charities.
- Actions: Once again, the main action is punctuated by Ken Jennings' "resignedly" writing on his final Jeopardy! screen "I, for one, welcome our robot overlords," and in a new turn of phrase, Watson is said to have "thoroughly stomped" Jennings and "fellow super-geek" Brad Rutter. The next action which took place in this piece was an action that led to the overall win, with Watson displaying its facilities in literary trivia through its delivery of the correct question to an answer

related to Bram Stoker. Later called the match a "walkover" as opposed to a "competition". IBM donated the $1 million prize to two charities. Watson whomped brainiacs. The reporter admits that there was considerable drama in the final scene, whereby Jennings and Rutter had amassed totals $2,400 and $5,400, respectively) which paled in comparison to Watson's winnings: $36,681. Further, both men were correct but were still "hopelessly" behind Watson, who had apparently thought the question was "What is Toronto?". Alex Trek is described as having "cooed" the statement "Oh, you sneak!," after which Watson "winked," the latter being a term notably used to personify Watson as a clever and sneaky being (since computers cannot wink).

- Settings: Outside of the implied fact that the event took place inside the Jeopardy! studios, the main setting involved the socio-cultural drama that the battle entailed. Moreover, the piece describes the salience of the event in the context of TV ratings, explaining that Watson handed Jeopardy! its best single-day rating in four years.
- Fantasy themes: The most definitive fantasy theme was the idea of man versus machine—clearly evident in an introductory mention of Jennings' final Jeopardy! quip—however its worth noting that in the context of this piece, the dynamic is described as not really resembling a battle, but more of a "walkover" or a "stomping". Toward the end of the article, Watson is passingly personified as having "winked" in response to Alex, who called it a "sneak" after not wagering very much in its final response.

RQ2

- Rhetorical vision:
    - Dramatis personae: Two brainiacs (Ken Jennings and Brad Rutter) and a supercomputer (IBM Watson)
    - Plot line: Two brainiacs are summarily defeated by a supercomputer
    - Scene: The set of Jeopardy!
    - Sanctioning agent: The ingenuity of the Watson program
    - Master analogue: Man versus machine, man versus technology.

The New York Times — "Computer wins on 'Jeopardy!': Trivial, it's not"

RQ1

- Characters: The main characters in this artifact were I.B.M.'S Watson, Brad Rutter and Ken Jennings. Jennings is immediately conveyed as the most proficient human at Jeopardy, when he is described as being "famous for winning 74 games in a row." He is also immediately described as having "surrendered meekly" to Watson, as evinced by his quoting a Simpsons episode, writing "I, for one, welcome our new computer overlords," on his final jeopardy video screen. Later, the artifact transitions to examine the salience of Watson's victory in the context of the more general business ambitions of I.B.M., holding that the company has asserted itself as the undisputed leader in artificial intelligence technology. On a more meta level, Watson is portrayed as representing the field of artificial intelligence — a field which had become "the laughingstock" of Silicon Valley in the 1980s, when a series of heavily financed start-up companies went bust.

Watson is also being described as being less than omniscient however, as it got a fairly straightforward question wrong on Tuesday evening; in terms of artificial intelligence however, it's notable that a string of question marks in Watson's answer indicated very low confidence. Another character is David Ferrucci, an I.B.M. researcher who led the development of Watson, who explained that such a lapse of judgment on Watson's behalf is difficult to account for, given the data complexities inherent in the question. One aspect of Watson which made him notably more effective than humans was his programmed ability to discount the "buzzer factor" — due to weighted system, the article explains that Watson can buzz in in as little as 10 milliseconds, which makes it exceptionally difficult for humans to beat.

- Actions: The most notable action in this piece is that humans "surrendered meekly" to Watson's Jeopardy! dominance. Moreover, later in the piece Watson showcases expertise in parsing language, facility with medical diagnosis and even literature. At the end of the match, both players were described as having taken the outcome "philosophically" — internalizing the event as something which can teach us a lesson about human nature Later on, Dr Ferrucci dismisses any ideas from theorists or science fiction writers about the potential for machines to "usurp humans," comparing the computer to "HAL" as a straw man and then summarily knocking it down: "HAL's not the focus; the focus is on the computer on 'Star Trek,' where you have this intelligent information seek dialogue, where you can ask follow-up questions and the computer can look at all the evidence and tries to ask follow-up questions.."

- Settings: Outside of the implied fact that the event took place on the Jeopardy! set in California, the setting for this artifact was mainly socio-technological, with some setting-based context mentioning that the technology will have "a significant impact on the way doctors practice and consumers buy products," and some mention of I.B.M. being in talks with "major consumer electronics retailers" to develop a version of Watson for customers, based around answering questions related to buying decisions and technical support. In quantified terms, Watson tied Brad Rutter at $5,000 at the end of the first day of the two-day match; Ken Jennings trailed them both by $2,000. On the second day, Watson "went on a tear" and eventually grew to command a lead amounting to $35,734, compared to "compared with Mr. Rutter's $10,400 and Mr. Jennings's $4,800."
- Fantasy themes: Man versus machine is the most evident fantasy theme manifest in this text. Mention of this appears most prominently in the opening of the piece, with "humans" being described as "surrendering meekly". While the rest of the article's substance may be understood to describe this theme in latent terms (e.g. Since the event is based around a battle between humans and a machine), such ideas are not explicitly present again until the end of the article, wherein Dr Ferrucci dismisses any idea that machines will "usurp humans," comparing the computer to "HAL" as a straw man and then summarily knocking it down: "HAL's not the focus; the focus is on the computer on 'Star Trek,' where you have this intelligent information seek dialogue, where you can ask follow-up questions and the computer can look at all the evidence and tries to ask follow-up questions.."

RQ2

- Rhetorical vision:
    - Dramatis personae: Humans and a super intelligent machine.
    - Plot line: Humans must face a super intelligent machine in a game of wits
    - Scene: The Jeopardy! stage; a technological society
    - Sanctioning agent: General technological progress (to be clear: no indication of inevitability)
    - Master analogue: Man versus machine, man versus technology.

The New York Times — "Daisy, daisy"

Opinion piece — this was not analyzed.

Memos: Google DeepMind AlphaGo vs. Lee Sedol coverage

The Wall Street Journal — "In machine matchup, Go champ gets a win"

RQ1

- Characters: The main characters in this piece include Lee Sedol and AlphaGo, with journalists playing a minor role. Demis Hassasbis, the creator of AlphaGo, also plays a role; he can be understood as the humanizing force driving AlphaGo's technological prowess. Although neither Lee nor AlphaGo are portrayed as protagonists or antagonists—they are painted as competitors by the reporter, except when making reference to man-versus-machine narratives in the media surrounding the event—Sedol is loosely described as a hero of the Go game in South Korea, where he has two dedicated television channels and a dedicated fan base. Outside of references to man-versus-machine notions, AlphaGo is generally not given human attributes — however, it is portrayed as using a programming model which is based on "biological process," and it can be understood as having technologically fantastical abilities insofar as it can improve its "thinking" by playing millions of games played against itself.
- Actions: The major action of this piece is AlphaGo's win, which "restored some pride" to Lee (since he lost the previous games), as well as a "big smile". After the battle, as an explanation for his victory, Lee comments that AlphaGo appears to have "a weakness in responding to unorthodox moves" and that he "seemed to be weaker when playing with black counters"[22]. In response, Hassabis notes that these failures will ultimately strengthen AlphaGo in the long run, as it will continually improve itself off of different game scenarios.

- Settings: Although no physical location is precisely named, it's important to note that in the first sentence of the piece, the match is described as a "high profile man-versus-machine board-game battle". Later, we learn that the match took place in South Korea, and that—as part of the social setting leading up to the game—artificial intelligence researchers have widely thought the notion of computers challenging top professionals in the game of Go to be out of reach. In addition, bolstering the fantastical or otherwise outlandish nature of the event, the piece elaborates that Go is "roughly 3,000 years old, has a near-infinite number of moves" and is played "with intuition as much as calculation," making it difficult for traditional computers to solve. Indeed, Demis Hassabis compared the challenge to "Mount Everest for computers."
- Fantasy themes: Man versus machine used in the first sentence, as a pop-up message about AlphaGo's resignation delivered humans "some relief" in a "high profile man-versus-machine board-game battle." Moreover, this piece directly addresses the man versus machine narrative structure. It first does this that although the South Korean media had been "full of humor" portraying the notion that humans will gain consciousness and challenge humans Lee "deflected" any suggestions that he "has the weight of mankind on his shoulders".[23] Later, the piece even references the Terminator franchise as a piece of culture that has surfaced in comparison to the battle, and makes note of commentators of the Go tournament, who have "bolstered the story line of rising machine intelligence by referring to AlphaGo as 'he' and describing moves with adjectives such as 'beautiful'". Finally, a loose fantasy theme present in the reporting is the notion of

growing stronger through ones defeats, similar to a hydra or other mythological figures which optimize through their defeats, as AlphaGo is said to "help [the AlphaGo team] learn about AlphaGo's weaknesses to make it stronger."

RQ2

- Rhetorical vision:
    - Dramatis personae: A Go master and a supercomputer.
    - Plot line: The Go master defeats the supercomputer.
    - Scene: A highly publicized Go match.
    - Sanctioning agent: Human ingenuity.
    - Master analogue: Man versus machine, man versus technology.

The Wall Street Journal — "Go champion bows to Google software"

RQ1

- Characters: Once again the two most prominent characters in this piece are Lee Sedol and AlphaGo — however neither are portrayed in a fantastical light. Instead, Lee Sedol serves as a protagonist insofar as he is outwardly described as "representing human intelligence," whereas AlphaGo serves as representative of a sort of vague antagonism associated with rapid technological advancement. Moreover, Sedol's role as a protagonist is bolstered by some details of his background in the article, which describes South Korean fans as having relished in the details of his life story, such as "his childhood on a remote island" as well as "his struggles with a neurological disorder called aphasia."

- Actions: Lee Sedol's ultimate defeat at the hands of AlphaGo formed the piece's central action, with the rest of the reporting largely flowing from there. Elevating the battle-oriented stakes of the event, the article notes that Lee was not "diminished" by the "thrashings" he received from AlphaGo — rather, he tried to play down the implications of his loss, reiterating that his defeat was not a defeat for humanity. Aside from this central battle-action of man-versus-machine, there are no more fantasty-related actions present in this reporting.
- Settings: Although no physical location was mentioned in the article, the piece takes an artful approach to constructing the battle between Lee Sedol and AlphaGo, describing how the "swift progress" of artificial intelligence was effectively juxtaposed against "the backdrop of a slow-moving ancient game that hasn't changed much in millennia." Indeed, the article describes the event as being portrayed as a "showdown of the century" in the South Korean press, and Hassabis described the game as "the deepest and most profound game that mankind has ever devised."
- Fantasy themes: The most immediate fantasy theme in this piece is the notion of man versus machine ,which is explicated at the beginning of the piece. Most notable about this piece is how the fantasy theme of man versus machine actually comprises the locus of the article itself. Starting with the hook that "Humanity didn't stand a chance," Lee Sedol is literally described as "representing human intelligence," and the end of the article notes that Mr Lee did not see his defeat as a defeat for humanity (with the implication being that this had been an idea in the minds of some of the game's audience.

RQ2

- Rhetorical vision:
    - Dramatis personae: A Go master and a supercomputer.
    - Plot line: The supercomputer defeats the Go master.
    - Scene: A highly publicized Go match.
    - Sanctioning agent: The inevitability of technological progression.
    - Master analogue: Man versus machine, man versus technology.

The Washington Post — "How you beat one of the best Go players in the world? Use Google"

RQ1

- Characters: The main character in this reporting is Lee Sedol, who is immediately conveyed with a sense of representing human ingenuity vis-a-vis the game of Go, being described as "the top-ranked Go player of the past decade". Contrary to Sedol however, Dennis Hassabis (CEO of Google DeepMind and creator of AlphaGo) describes Go's main advantages as being that it will "never get tired" or "intimidated". Another invention which is described as bolstering DeepMind's approach is the use of a technology called a neural network, which "lets computers learn from experience, rather than specific programming". In addition, AlphaGo is described as partly comprising a more traditional technique called a "Monte Carlo Tree Search". This resulted in AlphaGo having the ability to "play the game perfectly," in the words of Lee Sedol.

- Actions: The piece notes that Sedol managed to win a game on Sunday despite having already lost the tournament after Tuesday's game. The "breakthrough" is described as having "astounded experts," who previously thought it would be five to ten years before an artificially intelligent machine to be proficient enough to play Go. In addition, a key action that took place as a result of the match is that it is said to position Google "as a leader in the next generation of computing."[24] Moreover, AlphaGo's dominance is said to serve as further confirmation of the power of DeepMind's program, including its overall goal of seeking to make machines which "can outsmart humans".
- Settings: Although no physical location for the match is involved in the reporting, the piece does explain that the competition took place over the course of a five-match tournament against Lee Sedol. In large part, the piece centers on the scientific context in which this game took place, noting that for scientists and researchers in artificial intelligence, "Go had been the game to conquer since IBM's supercomputer Deep Blue beat Garry Kasparov in 1997. Emphasizing the difficulty of the game also serves as an important part of the setting: "On a 19-by-19 Go grid, there are more possible board configurations than there are atoms in the universe."
- Fantasy themes: In the most immediate suggestion of the man versus machine theme, the piece features a suggestion in its introduction that the company's software may be able to imbue it with superhuman status, challenging the 2,500-year-old strategy contest which had been previously thought to be five to ten years from development. Despite plenty of use of competitive language (which

should be expected in any kind of reporting on an event), the reporting doesn't focus on the sociological perspective of man versus machine — rather, the piece seems to focus on the salience of the development from a scientific and technological perspective. As opposed to painting the achievement in the context of possible human-threatening artificial intelligence, the piece explains the contest more in terms of what it means for the evolution of science and technology. In doing so, the piece is largely devoid of man versus machine themes and instead pivots to a theme of man *and* machine working together to advancing the field of computer science.

RQ2

- Rhetorical vision:
    - Dramatis personae: A Go world-champion (Lee Sedol) and a supercomputer (AlphaGo).
    - Plot line: The Go world-champion loses to a supercomputer in an astounding computer science development.
    - Scene: A publicized five-game match.
    - Sanctioning agent: The notion of technological progress.
    - Master analogue: Man *and* machine.

The New York Times — "Man playing a computer finally wins a game of Go"

RQ1

- Characters: Lee Sedol and Google Deepmind AlphaGo comprise the two main characters in this article. Lee Sedol is described as a “boyish” “expert” who was “all smiles” as he “rallied” to defeat a Google computer program in a single game of “Go,” “the most complex board game ever invented”. This was considered a dramatic comeback for Sedol, as he had already lost the first three games in the five-game match, and therefore would not be able to win the competition outright; this effectively gives Sedol a sort of underdog status, despite his going into the game as the expert and computer science experts considering an artificially intelligent Go-playing machine to be at least five-to-ten away. Sedol is also described as being “defiant” in his explanation that “it was Lee Sedol, not humans, who lost the matches.”
- Actions: Although the competition took place over the course of five matches, it’s important to note that the perception of each participant changed as the context evolved. For instance, this reporting describes computer scientists doubting the proficiency of Go at the outset of the tournament, convinced that such a technological advance was at least five to ten years away. Once Go defeated Sedol in the first three games however, Sedol became the underdog who would simply “do his best” to defeat the machine in the remaining two games. Ultimately, Sedol did defeat AlphaGo in Sunday’s game — but not before he “defiantly” declared that “it was Lee Sedol, not humans, who lost the matches.”
- Settings: Although no physical location is mentioned in the piece, the sociological context in which the matches took place mainly comprises the setting. For instance, perhaps most notable is the widely held perception among computer

scientists that artificial intelligence was not sufficiently advanced to master the complex game of Go. In trouncing the expert Go player Lee Sedol, a major part of the setting becomes the astonishment that the field of artificial intelligence is indeed making strides quicker than had been previously thought. As the story advanced, the setting evolved to one in which Lee Sedol (and by proxy, human ingenuity) was the underdog.

- Fantasy themes: The most evident fantasy theme in this piece of reporting is the notion of man versus machine. Although this idea does not form the crux of the story's narrative arch, it does make such a prominent appearance that Lee Sedol himself has to "defiantly" explain that it was him, not humans, who lost the initial three matches. In addition, it's worth further elaborating that this theme is expressed as Sedol lost the first three matches — after which, the stakes seemed to be raised for Sedol to at least win one of the five matches, heightening the gravity of the man versus machine concept.

RQ2

- Rhetorical vision:
    - Dramatis personae: A strategy expert and a supercomputer
    - Plot line: The supercomputer makes the expert an underdog; the underdog has a symbolic victory
    - Scene: A highly publicized series of Go Matches.
    - Sanctioning agent: The notion of technological progress.
    - Master analogue: Man versus machine, man versus technology.

The New York Times — "A computer wins by learning like humans"

- *Opinion piece — this was not analyzed.*

The New York Times — "Machine bests man in Go series, winning 4"

RQ1

- Characters: Once again, Lee Sedol and AlphaGo comprise the main characters in this article, with Dennis Hassabis playing a secondary role as AlphaGo's inventor. There is a relative paucity of physical or emotional descriptors attributed to Lee Sedol, outside of his expertise in the game Go.
- Actions: The central action of this article was that AlphaGo defeated Go champion Lee Sedol in a 4-1 competition that was consequently described as a "historic stride" for computer scientists, particularly artificial intelligence researchers who had been trying to create software that can outwit humans in board games. One of the most startling outcomes of the entire event was Lee Sedol's declaration that AlphaGo made Lee Sedol "question human creativity." At the end of the match, the head of the Korean national Go association awarded AlphaGo the certificate of an "honorary Go degree of Nine Dan, the highest granted." This symbolic gesture technically places AlphaGo at the same level of recognized expertise as Lee Sedol, who also holds a Nine Dan degree.
- Settings: The piece starts out by stating that Lee Sedol and AlphaGo's competition was the "match of the century". The historic significance of the match is also bolstered by reporting's description of Go as a game devised in China "more than 3,000 years ago," as well as tis standing as the "great remaining hurdle" for computer programmers attempting to make software "more adept than

humans." Later, the gravity of the match is heightened by the notion that artificial intelligence had previously predicted that computers needed at least 10 more years of development work before they would be able to defeat a Go master such as Lee Sedol. The match was also described as bearing tension that was "clearly acute" toward the end of the game.

- Fantasy themes: The fantasy theme of man versus machine is once again manifest in this article, although it is not as pronounced as it has been in other pieces. One way in which the notion is more subtly manifest is in Dennis Hassabis's statement that Go is the "most profound game humankind has devised." In making such a statement, the subtext is that machines are now capable of mastering the most profound games that humans can create; this ultimately elevates the significance of the battle of man versus machine. In addition, the theme is manifest in Sedol's concession that AlphaGo made Sedol "question human creativity," which suggests that through the win, computers have punctured a realm which has been previously considered a strictly human domain: Creativity. Although there is a sentence in the article which states that this technology could "one day be used in all sorts of problems, from health care to science," the ultimate theme is one of man versus machine in a battle of strategic wits.

RQ2

- Rhetorical vision:
    - Dramatis personae: A strategy expert and a supercomputer
    - Plot line: The supercomputer makes the expert an underdog; the underdog has a symbolic victory

- Scene: A highly publicized series of Go Matches.
- Sanctioning agent: The notion of scientific progress.
- Master analogue: Man versus machine, man versus technology.

Articles:

IBM Deep Blue vs. Garry Kasparov

IBM's winning 'Deep Blue' is still product of primates

Category: Reporting

Author: Bart Ziegler (staff reporter)

Published: 5/12/1997

One small step for a computer, one giant leap backward for mankind?

That's the way some view yesterday's defeat of the world's greatest chess player, Garry Kasparov, by the Deep Blue supercomputer from International Business Machines Corp. But that reading of the dramatic conclusion of the weeklong rematch may give too much credit to the computer and not enough to the humans.

After all, Deep Blue was a product of scores of humans working feverishly to give it the smarts to compete with Mr. Kasparov. Though the Russian chess master has said he saw something "very human" in the computer, the machine was just a bunch of dumb silicon chips until people gave it some semblance of intelligence through programming.

IBM hired a number of the world's best chess players to imbue it with knowledge of how chess is played and with the gamesmanship used in past chess tournaments.

"You really had teams of people who were playing Kasparov," says supercomputer consultant Garry Smaby of Smaby Group Inc. in Minneapolis. "They can pour in all the great games of the past and all the chess strategy and layer that on top of this machine's computational capability."

In yesterday's game, Mr. Kasparov resigned after the computer's 19th move. He appeared to be overwhelmed only an hour into the last of six games by Deep Blue's computational

ability. The computer won the match by 3 1/2 points to the Russian's 2 1/2 points. Last year, Mr. Kasparov defeated a less-powerful IBM computer, 4-2.

A clearly distraught Mr. Kasparov accused IBM of programming Deep Blue specifically to beat him. "It was nothing to do about science. . . . It was one zeal to beat Garry Kasparov," he said. His defeat was the first time a computer beat a world chess champion.

Yet Deep Blue is no more the world's chess champion than the spell-check software in a word-processing program is the world's greatest speller.

The computer, of course, usually finds misspelled words or the best chess move much faster than a human. But it isn't thinking, at least not as scientists define the term.

"It makes intelligent decisions -- it's not doing any type of cognitive reasoning at all," said C.J. Tan, the IBM researcher who led the Deep Blue team. Mr. Tan denied that IBM had targeted Mr. Kasparov in programming the computer, adding that since Mr. Kasparov didn't play in his normal style such programming would have been a mistake.

Deep Blue, a modified version of an IBM RS/6000 SP supercomputer used for commercial purposes, isn't an "artificial intelligence" machine. That technology was the goal of computer scientists for several decades but hasn't ever been achieved, although a fictional version of it caused terror in the form of the computer HAL in the film "2001: a Space Odyssey."

Instead, Deep Blue is enormously fast at examining millions of variables, be they chess moves or airline reservations or customer orders, and finding relationships among them. It can consider more than 200 million chess positions a second.

The machine contains 32 processing nodes, each in effect a small computer, which are linked so each can work on one part of a tough problem simultaneously. Such "parallel processing" machines have all but replaced the supercomputers of the past that contained one big processor that worked by brute force.

"It was inevitable that computers would reach a point in a game that has a mathematical underpinning that they would better the human counterpart," Mr. Smaby said. "To my mind it doesn't change the game of chess. The game of chess is still played by two humans."

No-Brainer; In the Kasparov-Deep Blue chess battle, only the human has his wits about him

Category: Reporting

Author: Joel Achenbach (Staff Reporter)

Published: 5/10/1997

The greatest chess player the world has ever known is struggling to defeat a machine. It's another wonderful opportunity for the human race, as a species, to engage in collective self-loathing.

When astronomers discovered the true vastness of the universe it became intellectually fashionable to ridicule our planet as an unimportant and infinitesimal speck of schmutz, upon which our own eye-blink existence was unworthy of mention in the glorious narrative of the cosmos.

Furrow-browed Darwinists are equally emphatic in their insistence that humans are not superior to other creatures, that our brain-to-body ratio is not the end result of a progressive evolutionary trend, but rather one of billions of freakish mutations that have allowed different species to adapt to, or thrive in, disparate environmental niches -- humans no more special in that regard than cockroaches.

Now comes IBM's chess-playing computer, Deep Blue, to inspire fear and groveling among people who otherwise would be described as highly intelligent. We are to believe that only Garry Kasparov, the brilliant Russian grandmaster, can save humanity from second-class cognitive citizenship.

The Guardian newspaper of Great Britain said Kasparov's job was to "defend humankind from the inexorable advance of artificial intelligence." Kasparov himself referred to his

match last year with an earlier version of Deep Blue as "species-defining." Newsweek's May 5 cover story on the match set new records of portentousness with the headline "The Brain's Last Stand." The magazine declared, "How well Kasparov does in outwitting IBM's monster might be an early indication of how well our species might maintain its identity, let alone its superiority, in the years and centuries to come."

With more mushy-brained thinking like that, the human race doesn't stand a chance.

The truth of the matter is that Deep Blue isn't so smart. It does not for a moment function in the manner of a human brain. It is just a brute-force computational device. Deep Blue is unaware that it is playing the game of chess. It is unconscious, unaware, literally thoughtless. It is not even stupid.

"It's just like an adding machine. Or a pocket calculator," says John Searle, a philosopher who studies consciousness at the University of California at Berkeley. No one, he says, thinks of an adding machine as intelligent or conscious or as a thinking device.

"It's just a hunk of junk, it's just a device that manipulates symbols. Everyone thinks this has deep significance. I don't think it does. It's a nice programming achievement."

IBM can be proud of its accomplishment. For decades, the artificial intelligence (AI) community has dreamed of designing a machine that can beat the best human chess player. Many skeptics said it could never be done. Kasparov may not be defending the dignity of the species but he does provide an excellent benchmark for the progress of supercomputing technology.

This new version of Deep Blue -- a 1.4-ton RS/6000 SP supercomputer -- is clearly superior to the one that Kasparov decisively beat in February 1996. Kasparov, to the world's dismay, lost the first game of that match, saying afterward that unlike a human

opponent, Deep Blue failed to become rattled when its king was under attack. But Kasparov quickly decoded the flaws and weaknesses of Deep Blue, and the machine never won another game. The new Deep Blue can perform at least twice as many calculations per second, however, and has been instilled with more chess history, carefully tutored by a grandmaster.

Kasparov won the first match last Saturday, but then stunningly lost the second on Sunday when, in the estimation of chess experts, he was "psyched out" by the machine's virtuosity. Kasparov resigned unnecessarily -- there was an obvious route by which he could have forced a draw, and maintained his lead.

Kasparov's failings were the mark of his humanity. He was unnerved and mentally exhausted by the skills of his silicon opponent. In the third game, with the advantage of the white pieces and the first move of the game, he seemed to have the computer beat, but Deep Blue countered tirelessly and forced a draw.

The fourth game Wednesday ended in another draw even though Kasparov appeared for a while to have the advantage. Now the match is tied 2-2 (draws are worth half a point), with two games to play, today and tomorrow. Experts wonder if Kasparov is too drained already to win the match. After Wednesday's draw he said: "I didn't manage well. I was very tired, and I couldn't figure it out."

So this is clear: Kasparov is not a machine. Deep Blue can't get tired, strung out, harried, nervous or zapped. The flip side is that Deep Blue won't be able to celebrate if it wins the match. It feels about this match as a thermometer feels about the weather.

Deep Blue manipulates 0s and 1s. It can analyze 200 million positions per second, compared with something like two a second for the average grandmaster. But the genius

of someone like Kasparov is that he doesn't have to calculate all the possible permutations of a given game of chess. He knows what to ignore. He can draw on all his experience and intuit the best avenues of attack or defense.

Moreover, Kasparov not only plays chess, he also knows he's playing chess, and knows he is playing a machine, whereas Deep Blue neither knows it is a machine nor knows that Kasparov is a human. Kasparov can create a model in his head of Deep Blue's "personality" -- he can figure out the machine's bad habits. Then he can adapt. Machines aren't nearly as flexible and crafty as humans.

They never learn.

"For those of us who work in pattern recognition, machine learning or various fields allied with artificial intelligence, it is the weaknesses of Deep Blue that are the most interesting," writes computer scientist David G. Stork of Stanford University in an article posted on IBM's Kasparov vs. Deep Blue Web site, www.chess.ibm.com.

"The public should understand one of the central lessons of the last 40 years in AI research: that problems we thought were hard turned out to be fairly easy, and that problems we thought were easy have turned out to be profoundly difficult. Chess is far easier than innumerable tasks performed by an infant, such as understanding a simple story, recognizing objects and their relationships, understanding speech, and so forth. For these and nearly all realistic AI problems, the brute force methods in Deep Blue are hopelessly inadequate," Stork writes.

Humans still can outwit any computer when it comes to recognizing patterns, like familiar faces or voices. Gerald Edelman, author of "Bright Air, Brilliant Fire: On the Matter of the Mind," poses the question of what would a hunter prefer to take on a foray

into the woods: an extremely advanced military computer that is easy to use and speaks English, or a dog? The hunter would prefer a dog. "The reason is that the dog has the ability to recognize pattern and novelty," Edelman said.

Deep Blue plays chess better than a dog, but only because human beings have carefully programmed Deep Blue to play chess. Left on its own, Deep Blue wouldn't even know to come in out of the rain, much less how to track a fox.

Hubert Dreyfus, a philosopher at Berkeley and author of the 1971 book "What Computers Can't Do" (an updated version is called "What Computers Still Can't Do"), argues that the old-fashioned, classical version of artificial intelligence never panned out. Computers can't become truly intelligent simply through advances in processing speed. You can't just fill up a machine with facts and declare it smart. What computers lack is what we call common sense -- the realization, for example, that it is easier to take a step forward than back, or that big things are harder to pick up than little things. A human learns all this from infancy, through trial and error, and it is not "knowledge" so much as a basic understanding of the world around us.

"A computer would have to be told explicitly all the stuff that we understand just because of the kind of beings that we are," says Dreyfus. "They don't have even the intelligence of a 3-year-old."

No one knows really how the brain works. Hardly anyone is a "dualist" anymore, arguing that the mind is independent of the brain. Instead most neuroscientists are "materialists," believing that everything we associate with the mind, including our most powerful emotions, is simply the product of the functioning of neurons. Within that framework, though, remains an enormous Romper Room in which scientists furiously debate how the

brain operates. There are reductionists and anti-reductionists, pragmatists and mysterians. There are a few mavericks who argue for panpsychism, the theory that all matter contains some element of consciousness (which might mean a thermometer is not entirely unconcerned about the weather).

Everyone agrees that there is no one part of the brain that is conscious or intelligent. The brain is a raucous, untempered environment with a million things happening at once, consciousness emerging from the mix in the same way that wetness is an emergent property of a whole bunch of water molecules linked together.

An artificial brain -- a truly smart version of Deep Blue -- may be intrinsically impossible to build. The very question that everyone asks -- "Can we build a machine that thinks?" -- hints at the obstacle to such an achievement. A human brain builds itself.

A human brain may follow certain genetic blueprints, but it fundamentally is a self-designed, self-constructing system that interacts with its environment and rebuilds itself over and over in the first years of a person's life. For example, children with too little stimulation do not develop the mental wiring that they might otherwise.

The challenge for AI researchers is to build an environment from which a thinking machine can pull itself together, and become an evolving, learning, adaptive entity.

"We're pretty far from that right now. We're dealing with the A's, B's and C's of how the sensory information is organized in the brain," says Terrence Sejnowski, a computational neuroscientist at the Salk Institute in La Jolla, Calif.

Researchers now talk about designing "neural networks" rather than number-crunching supercomputers. A neural network is leaner and meaner. It is designed to recognize

patterns, and figure out which pattern is good and which is bad -- the same kind of process a child goes through in learning how to walk, talk and interact with the world.

Far away though such a time may be, we might ask ourselves what civilization would be like if machines could really think. How would machines regard human beings? Would machines try to conquer the world? Would humans find themselves enslaved by the technology to which they had bequeathed consciousness?

One possibility is that the machines, in seeking world domination, would learn to be sneaky, just like humans. They'd learn to hide their true intentions. They might even write newspaper stories under human pseudonyms.

You know what the stories would say: Relax, don't worry, machines can't think.

For chess world, a Deep Blue Sunday

Category: Reporting

Author: Rajiv Ch and rasekaran (sic) (unspecified affiliations)

Published: 5/12/1997

In a stunning showdown between man and machine, the IBM supercomputer Deep Blue decisively beat world chess champion Garry Kasparov today, the first time a computer has been able to defeat the best human player in a match.

A visibly upset Kasparov stormed out of the small match room after only about an hour of play, effectively resigning the sixth -- and final -- game with a scant 19 moves played.

Most chess experts here said Kasparov, who appeared frustrated from the start of today's game, likely would have been conquered by the computer within a few moves.

"This was the single most historic event in the history of chess," said Daniel Edelman, a grandmaster and an editor of the American Chess Journal.

"We have a machine here that is truly remarkable," said David Levy, the vice president of the International Computer Chess Association. "This was an amazing victory."

Kasparov, in a postgame news conference, accused International Business Machines Corp. of building a machine specifically to defeat him. "It was nothing to do about science. . . . It was zeal to beat Garry Kasparov," he said. "And when a big corporation with unlimited resources would like to do so, there are many ways to achieve the result. And the result was achieved."

Kasparov, who had never lost a match until today, said he "cracked under the pressure" of playing the computer. He apologized for his performance and his hasty exit, saying he felt "ashamed by what I did at the end of this match." At the same time, he said his loss "has nothing to do with the computer being unbeatable."

Other computer and chess experts here disagreed, predicting Deep Blue and its progeny will regularly be able to defeat the world's top players. Deep Blue's strong performance surprised many of them, who expected Kasparov to be able to trick the computer by playing unconventional moves.

But exactly the opposite happened. Deep Blue, which can evaluate 200 million possible moves each second, was expected to play a brute-force sort of game, like a tennis player smashing only powerful shots across the court. Instead, the computer dazzled spectators -- and Kasparov himself -- with its ability to develop strategies as a human player would. It was akin to surprising Kasparov with volleys and drop-shots across the chessboard.

To make matters worse for him, Kasparov said his efforts to change his playing style -- sometimes trying to trick the computer and other times substituting his usual aggressive style for a more measured approach -- essentially backfired. "I was playing against myself and something I couldn't recognize," he said.

Deep Blue won the match 3 1/2-2 1/2. Kasparov won the first game, Deep Blue the second, and the two agreed upon draws in the third, fourth and fifth.

Kasparov said he was unable to maintain his concentration today because of his resignation in the second game on May 4 and the fact he was forced into a draw in the fifth game on Saturday. In the latter game he had the advantage of playing with the white pieces, which allowed him to move first.

"I faced a machine that had no comparison and that made moves beyond anyone's mind," said a scowling Kasparov, 34. "Game 2 had dramatic consequences, and I never recovered."

Kasparov also introduced an element of controversy tonight when he questioned the origin of several of Deep Blue's moves and pointedly voiced skepticism about the computer's actions in the second game. In that game, Deep Blue made a series of brilliant moves but then failed to anticipate one Kasparov could have made -- but didn't -- to force a tie. Kasparov, who didn't notice the possible move until it was pointed out to him after the game, said: "I still don't understand how the machine couldn't see that."

When directly asked if he was accusing the IBM team of cheating, Kasparov responded: "I suggested that there were things in this match well beyond my understanding. . . . There's probably no way to prove that Deep Blue is making this move or that move."

IBM researcher Chung-Jen Tan, the leader of the Deep Blue team, said the computer received no human assistance during the games. He said his team was "very proud" of the match's outcome.

Kasparov, who has complained that he hasn't been able to study the computer's behavior more fully, today renewed his request that the IBM researchers provide a printout of the computer's log from the previous games, particularly Game 2. On Saturday, IBM officials agreed to place a copy of the logs with a neutral party, but tonight they said they would not release them to Kasparov or the public. Tan said portions might eventually be published in scientific journals.

Some chess experts here suggested that Kasparov's comments about Deep Blue's playing were sour grapes.

"I think it's nonsense," said Patrick Wolff, a grandmaster who watched today's game, held in a skyscraper here. "I don't think there's any evidence that IBM tampered with the machine. He's just making excuses."

Wolff and other chess experts agree that Deep Blue's unflappability and its ability to conceive of and execute moves unanticipated by Kasparov were the keys to its victory. If Kasparov, who admitted to being distraught after the second game, had played that game to a tie, the remaining games might have turned out differently, the experts speculated.

The nine-day match began with a riveting game on May 3 in which Deep Blue, playing black, attempted an aggressive series of moves in mid-game. But Kasparov skillfully used the opportunity to mount a bold counterattack, forcing the computer to concede defeat after nearly four hours.

The next day, however, the computer, showing a finesse never before seen in a chess-playing machine, rallied to force a Kasparov resignation. It was only the second time a computer had defeated the top world champion; the first occurred at the first meeting of Kasparov and Deep Blue last February in Philadelphia, when the computer won the first game but went on to lose the match, 4-2.

In today's game, in which the computer played with the white pieces, Kasparov fell prey to a knight Deep Blue injected into his territory. By using one of his pawns to eliminate the knight, Kasparov opened himself up to attack.

Many observers here were dumbfounded Kasparov could make such a misstep. "Why did he do that?" asked Danny Kopec, a grandmaster and computer science professor who watched the match. "That's what everyone wants to know."

The 1.4-ton supercomputer relies on thousands of lines of complex mathematical equations and logic expressions to find the best move. Deep Blue was designed with the help of several grandmasters to play strategically. It has been programmed not to just make the best immediate move, but to execute a particular series of moves, an enhancement that makes its play appear much less machinelike.

Kasparov received $400,000 from IBM for his participation. IBM said it would devote the $700,000 winner's purse to further computer chess research.

Mind over matter

Category: Opinion (not analyzed)

Published: 5/10/1997

Author: New York Times editorial board

The epic struggle between Garry Kasparov and Deep Blue has brought more than the usual hand-wringing over whether computers can be considered "intelligent," a trait usually thought of as the defining characteristic of humanity. Mr. Kasparov is clearly awed by the powers of his implacable opponent. Last year, when he dropped the opening game to a lesser version of Deep Blue, he exclaimed: "I could feel -- I could smell -- a new kind of intelligence across the table." This year he is so spooked he has abandoned his usual slashing style, complained of mental fatigue, implied that the computer's handlers are cheating and blundered badly once or twice, apparently because he overestimated what the computer knew. The man who claims to be championing the human intellect seems to be falling apart under the pressure of a machine.

No one much cared when computers mastered backgammon and checkers or clobbered lesser grandmasters in chess. But now that we have sent the greatest chess champion in human history into battle, the prospect of defeat seems unnerving. Still, before mere mortals sink too deeply into despair, it is important to recognize several comforting alibis that may apply here.

Deep Blue is not thinking the way humans do. It is using its immense number-crunching power to explore millions of moves per second and applying a set of rules provided by its human masters to pick the strongest. This gives it tremendous powers to play chess, a narrow, circumscribed pursuit that is red meat for high-speed computation but hardly the

supreme measure of intelligence its practitioners like to pretend. Besides, Deep Blue doesn't owe its prowess to itself, but to a team of human programmers. It is nothing more than the latest tool devised by humankind, a fancier version of the calculator that a student might take to a mathematics exam without worrying that his humanity had been diminished.

The comforting thing about computers is how dumb they often are. When anything goes wrong with today's computers, they either grind to a halt or spew out nonsense. The human brain is far more resourceful, flexible, adaptable. The truth is, the whole decades-long effort to develop "artificial intelligence" has been a crashing disappointment, as even its boosters acknowledge.

True, there are expert programs that can diagnose ailing humans or automobiles as well as the average doctor or mechanic, but only by applying rules based on what humans have already learned. Computer programs are also great at spotting unexpected trends in great masses of indigestible data, as when one discovered that the guys who purchase diapers after work on Friday often want to buy beer at the same time, a marketing tip that surely merited an Employee of the Month award. But no computer can yet translate a foreign language well or speak English as well as a child. Just try conversing with one through a keyboard and see how soon it flies off on a weird tangent.

The real significance of this over-hyped chess match is that it is forcing us to ponder just what, if anything, is uniquely human. We prefer to believe that something sets us apart from the machines we devise. Perhaps it is found in such concepts as creativity, intuition, consciousness, esthetic or moral judgment, courage or even the ability to be intimidated

by Deep Blue. Nobody knows enough about such characteristics to know if they are truly beyond machines in the very long run, but it is nice to think that they are.

Unfortunately, the computer visionaries just won't stop dreaming about their ultimate triumph. Some boldly predict that computers will evolve far beyond humans. Others, possibly concerned at the limitations of humanity, suggest that tiny computers might some day be implanted to "augment" the human brain. So 50 years from now, if chess is still deemed difficult enough to play, you might just see a truly superhuman computer on one side of the board and a human with a microchip-enhanced brain on the other. That will be the time for some hand-wringing over what it means to be human.

The contest is toe-to-toe and pawn-to-pawn

Category: Reporting

Published: 5/10/1997

Author: Bruce Weber (staff reporter)

After the I.B.M. computer, Deep Blue, won Game 2 against Garry Kasparov, the world chess champion told friends he had been stopped on the street by a Baptist minister who told him to buck up, that help was on the way.

"Really?" Mr. Kasparov said. "From who?"

"From our Lord."

"Well," Mr. Kasparov replied, "Currently He seems to be helping my opponent."

Three days later, Mr. Kasparov probably needs all the help he can get. For him, today is D-Day, and maybe for everyone else as well.

After four games -- a victory for each side followed by two grueling draws -- the score is 2-2 with two games to play, and the uncertainty about the outcome is profound. The champion has clearly been shaken and at times irritated by his opponent.

"I think he's still angry that he didn't have any of Deep Blue's games to study," said Owen Williams, Mr. Kasparov's manager. "He's got to sit there at the table figuring out how the computer thinks as the game is going on."

On the other hand, the Deep Blue side is showing great confidence, though not necessarily during the games. In fact, to watch the programmers and their chess advisers hovering over a chess board and analyzing the moves that are being made without them is more or less to witness Dr. Frankenstein at the mercy of his monster. Asked during the fourth game how Deep Blue was faring, Joel Benjamin, a grandmaster who assisted in the programming, shrugged.

"The proof of the pudding is in the eating," he said. "If we win, we'll know it played well."

Meanwhile, as the chess world waits for the decisive weekend, it is bracing for a comeuppance.

"There's a tragic sense here; it's the dying of an age," said Bruce Pandolfini, a chess teacher and the author of dozens of chess books. "Man may no longer be the king of this universe. That's clear, and this is really the last stand."

The drama is especially high because Game 5, which begins at 3 P.M. today at the Equitable Center in Manhattan, is Mr. Kasparov's best chance for a breakthrough. Not only will he have the advantage of playing White and moving first, he will also have had

two days to formulate his attack. If he wins, then he will only have to draw in Sunday's final game to win the match.

Most experts, familiar with Mr. Kasparov's brilliance and his history of responding heroically to desperate straits, believe he will prevail today. But the pressure is certainly on. If he draws, then he will be staring down heavy odds on Sunday, having to win as Black against a formidable foe, a task on the order of having to break serve against Pete Sampras.

"It's completely stunning," said Yasser Seirawan, a grandmaster. "Garry needs Game Five if he's to win the match. If Deep Blue can hold him to a draw, the advantage slips into its favor."

Even if the match itself ends in a draw, Mr. Seirawan said, "that would be extraordinary."

Even those who believe Mr. Kasparov has fared well thus far sense that danger is nigh and that Deep Blue has done what few, if any men, have -- reduced the world chess champion to the stature of a mere mortal. The strength of the computer is such that it has turned Mr. Kasparov's chief advantages -- his will, his emotions, his psychological wherewithal -- against him. He has admitted it is wearing him down.

"I think Garry is dominating the match," said Ken Thompson, a computer chess expert. "He was close to winning the last two games, but he is freaked out. If he loses or draws as White, the pressure will be on him in the last round, and he may have to attack when there just aren't attacking chances. And he could lose pushing something that isn't there."

Is Mr. Kasparov really holding the human race on his shoulders? In a sense, he is. Chess players have taken to lamenting that they have been singled out for obsolescence.

Already, all the classically forceful chess openings -- out to 10, 15 or even more moves --

have been programmed into Deep Blue, and a database exists that can tell a computer how to play perfectly in every possible endgame with six pieces left on the board. (That's about three billion possibilities.)

"What we're seeing is chess getting squeezed," Mr. Seirawan said, "so that more and more the original moves are all occurring in a window of opportunity called the middle game."

Anyone other than a chess player might say, so what? After all, no one thinks the computer is intelligent, at least according to the conventional definitions of intelligence, which encompasses creativity and learning from experience, things that humans use to play chess. But Deep Blue's behavior has been intelligent; that is, it has been achieving results by calculations that are similar to what a human might do by thinking.

"What we are seeing in this match is a real experiment that is illustrating the evolution of computing power," said Monty Newborn, the chairman of the chess committee for the Association for Computing, and the author of a book about the first Kasparov-Deep Blue match. "Chess has been chosen to raise the issue of whether complex problems are issues of intelligence."

The next step is to ask: If chess expertise can be replicated by a machine, what else can? If you calculate long enough, are abstractions reducible to pure numbers?

"That's a good question," Mr. Newborn said.

Indeed, many people have suggested that after chess, other fields of endeavor -- architecture? economics? (gasp) newspaper reporting? -- are sure to follow.

"Composing symphonies, for example," said Frederick Friedel, who is Mr. Kasparov's computer adviser.

Computers already compose in a rudimentary fashion, he said, "but what if you've got every single piece of music by every composer mapped out in little chunks and the computer is putting them together in different ways, and what if you couldn't tell these from the works of Beethoven or Mozart?"

Would it matter? Beautiful music is beautiful music, and people will not stop composing it because a computer can, any more than chess players are going to stop playing chess. "The point is," said Mr. Friedel, who has a degree in philosophy, "in the future, we're going to have computers performing like the best human beings in all sorts of ways. We're going to know they're doing something incredibly primitive to achieve this result. But we're going to have to deal with it."

Dealing with it is what the Deep Blue team does in the war room, a cramped television control booth with a couple of video screens and the detritus of a never-ending lunch scattered around. During every game, the programmers, along with Mr. Benjamin and Miguel Illescas, another grandmaster, mostly spend their time trying out the moves that Deep Blue tells them it is mulling over.

The computer itself is in an adjoining room, but its thought processes are being reproduced on a screen in the corner, lines and lines of minute, coded numbers incessantly scrolling upward. The process it follows is to look ahead in the game three or four moves, analyze all the possibilities numerically, and select the one with the highest score. And though this is only an initial suggestion, it tends to send the programmers into nervous, hand-wringing action, moving pieces around the chessboard, often accompanied by head scratching and mumbling.

Meanwhile, Deep Blue has begun to look further into the game along the trees of possibility suggested by the selected move. And sometimes, the initially selected move shrinks in appeal as the search proceeds deeper. In that case, it will return to the beginning and look for a move that will yield a better result. This can take up to a few minutes, but the computer is programmed not to take more than a third of its remaining time for any one move.

So if initially, taking a Kasparov pawn with a rook yields a rating of say, 50, and that number shrinks to 27 by the time Deep Blue has examined its consequences 10 moves hence, it would try other possibilities.

(A pawn advantage for Deep Blue would register as 100, so a score of 50 would indicate Deep Blue's advantage is the equivalent of half a pawn.)

In any case, the trying of various moves and the resulting scores appearing on screen naturally heats up the human activity in the room.

"I don't like that," Mr. Illescas said, at one point, to himself. "Garry has chances." A few moments later, he reversed himself.

"We have better chances," he said.

All of this lends the match a palpable eerieness, which is perhaps most evident watching the champion himself in the match room. During each game, Mr. Kasparov has engaged in his customary brow-furrowing, chin-clenching, eyebrow-raising, jaw muscle-bunching and occasional nervous pacing that has unnerved many a human opponent.

The discombobulating element is that against Deep Blue, his fierce combativeness has no target. Across the board sits someone with a placid expression, a calmness that has to be infuriating. He is not a chess expert; he is just doing what he's told, a robot's robot.

Joe Hoane, one of the three I.B.M. researchers who have been the arms of Deep Blue in this match, said the three hours he spent sitting across from Mr. Kasparov on Tuesday gave him the first chance he had had in months to think about chess, and not computers.

"I don't play well," Mr. Hoane said, "but this was a real chance to observe the beauty of what was going on."

And how did he feel out there, not only across from the legendary champion in the champion's milieu, but, in some sense, on the frontier?

"For some reason," Mr. Hoane said, "I was terrified."

Fighting on down to the very last volt

Category: Reporting

Published: 5/11/1997

Author: Robert Byrne (reporter)

Against what seemed to be insuperable odds, Deep Blue brilliantly saved its game yesterday with a hair-raising finish.

Facing an unstoppable passed pawn marching down the board to make a queen for Kasparov, the machine stopped defending and went for a counterattack against its opponent's king.

While Kasparov's pawn stood ready to promote, the incredible computer engineered a foolproof perpetual check to insure the draw.

Earlier, after a close struggle in the endgame, the world champion was beginning to look like a shoo-in. But then Deep Blue made its move, and a crestfallen Kasparov had to concede he was stymied.

In this game, the last of his three with the white pieces, Kasparov once again started with the hypermodern Reti Opening, a leisurely approach that he had used in Game 1.

Against 4 h3, Deep Blue chose the ready-to-hand 4 . . . Bf3 5 Bf3, saving the time a retreat would have cost but giving Kasparov the bishop pair. This is not an immediate advantage, but as the great theoretician Siegbert Tarrasch said, "He who has the bishops has the future."

Deep Blue's 11 . . . h5!?, after 12 Qe2 Qc7 13 c3 Be7 14 d4 Ng6, forced Kasparov to choose between allowing the advance 15 . . . h4, with an assault on the dark squares of the kingside, or preventing this by 15 h4 and thereby slightly weakening the g4 square, which could eventually become a strong outpost for a knight.

Deep Blue advanced spiritedly in the center with 15 . . . e5 and soon developed good piece play.

On 22 . . . N6e5, Kasparov had to reject the opportunity for the gain of a pawn with 23 Rh5?! because 23 . . . c5 24 Nb5 Qe7 25 Rd8 Rd8 26 f4? Ne3 would have been too strong for Black.

Deep Blue's 23 . . . c5 was energetic, yet after 24 Nf3 Rd1 25 Rd1 Nc4 26 Qa4 Rd8 27 Re1 Nb6 28 Qc2 Qd6, Kasparov cut down the scope of the b6 knight by 29 c4.

In playing 29 . . . Qg6, Deep Blue may have overestimated the quick gain of a pawn after 30 Qg6 fg 31 b3! Nf2. Kasparov recovered the pawn with 32 Re6 Kc7 33 Rg6, and after 33 . . . Rd7 34 Nh4 Nc8 35 Bd5, he had obtained the more active pieces.

After 48 g6, it looked as though the passed g pawn would win the game, but then 48 . . . Kb5! 49 g7 Kb4! negated Kasparov's efforts. On 50 g8/Q, there would follow 50 . . . Rd1 51 Kc2 Rd2 with a draw by perpetual check.

And 50 Rb3? is not playable because 50 . . . Kb3 threatens immediate checkmate. So Kasparov offered a draw and Deep Blue's handlers accepted.

Deep Blue escapes with draw to force decisive last game

Category: Reporting

Published: 5/11/1997

Author: Bruce Weber

Outfoxed by a cagey computer in a complex endgame, Garry Kasparov was held to a draw yesterday by the I.B.M. computer Deep Blue, keeping their match tied but forcing Mr. Kasparov into a difficult position if he is to successfully defend the supremacy of the human chess player in the final game of the match today.

The computer's innovative play in yesterday's game took the experts monitoring the match by surprise. Deep into the game, many chess experts thought Mr. Kasparov had winning chances, with a pawn poised to become a queen, the most powerful piece on the board. But instead of blocking what seemed an eventuality, Deep Blue chose instead to attack Mr. Kasparov's king, forcing a perpetual check and thus a draw.

"This is astonishing wizardry from Deep Blue," said Maurice Ashley, an international master who was providing commentary on the match.

"This is fantastic," said Mike Valvo, another commentator who is also an international master. "The computer is showing us new ways to play these endgames."

After five games, a victory for each side and then three consecutive draws, the score is 2 1/2-2 1/2. In today's sixth game, Mr. Kasparov will have to win with the black pieces -- a disadvantage because White moves first -- if he is to prevail.

"In that game, $300,000 is on the line," Mr. Valvo said, referring to the difference between the $700,000 winner's share of the prize fund and the $400,000 that will go to the loser.

"Forget the $300,000," Mr. Ashley said. "The future of humanity is on the line."

Mr. Kasparov, who was visibly angry at the end of the game and renewed his request to see a printout of the computer log from previous games, was welcomed with an ovation afterward by the 500 or so spectators at the Equitable Center in Manhattan.

"That was a very exciting game and probably the cleanest one of the match," Mr. Kasparov said. "In a match like this, there are many discoveries, and one of them is that sometimes the computer plays very human moves. We have to praise the machine for understanding positional factors very, very deeply."

Referring to a statement by Miguel Illescas, a grandmaster, that he is playing as if he is afraid, Mr. Kasparov said: "I'm not afraid to admit I am afraid, and I'm not afraid to say why I am afraid. It goes beyond any chess computer in the world."

As for the import of today's contest, he said, "It is important more for the outside world than for me." Asked if he would be particularly aggressive to go for the victory, Mr. Kasparov added, "I will try to play the best moves."

The Deep Blue team also appeared on stage after the game, and it was met with catcalls and boos.

Because the game was one that most people felt was Mr. Kasparov's best chance to clinch the match, tensions were high all afternoon. And one clear signal that the match had reached a crucial stage was the evident sensitivity on both sides over the guarding of strategy.

For the first time during the match, the Deep Blue team was given crib sheets by the I.B.M. public relations department for its daily news conference during the game. And one reporter, Jeff Kisseloff, who had been hired by I.B.M. to report on the Kasparov team for the match Web site, lost his reporting privileges after he included damning comments about Deep Blue from the champion's supporters in his report.

I.B.M. also engaged grandmasters John Fedorovich and Nick DeFirmian to work on openings with Deep Blue, though no one on the Deep Blue side has said so publicly, even when asked directly in a news conference about additional help. It was Mr. DeFirmian who confirmed his involvement and that of Mr. Fedorovich, but declined to discuss it, he said, because I.B.M. had insisted he sign a secrecy agreement.

Meanwhile, Owen Williams, Mr. Kasparov's manager, said during Wednesday's game that the Deep Blue team had promised to honor the champion's request to see the computer logs for the games played thus far, an extension of Mr. Kasparov's complaint that all relevant information about how Deep Blue plays -- including its previously played games -- has been kept from him.

Yesterday, for their part, the Deep Blue team members said no promise had ever been made to reveal the logs before the match was over.

"Under no circumstances would we give him the log," said C.J. Tan, the manager of I.B.M.'s Deep Blue project. "That would be giving away all our strategy."

"Here, put your head on a platter," said an arch Feng-Hsiung Hsu, a research scientist on the Deep Blue team.

Yesterday's game, like many in the match, was one of shifting fortunes. Mr. Kasparov, employing the Reti opening, pressed the natural advantage of playing White, and, ahead early, pushed Deep Blue into an unexpected bishop exchange and several other moves that many experts considered ineffective.

"A lemon," one of the commentators, Maurice Ashley, said after Deep Blue moved a knight on its seventh move.

Indeed, all through the game, Deep Blue elicited raised eyebrows, not least from Mr. Kasparov, who betrayed his surprise frequently with looks askance at the board. At one point, Mr. Ashley described a reaction by the champion: "Like, what's up with that?"

Nonetheless, Deep Blue made up ground, and by the 20th move found itself in the kind of position it likes, with many evident possibilities, lots of potential for captures and other clear objectives. "It's the sharpest position of the entire match," said Joel Benjamin, a grandmaster advising the Deep Blue team.

Computers vs. Humans: Clashing symbols

Category: Letter (not analyzed)

Published: 5/11/1997

Author: Richard Ten Dyke

To the Editor:

Regarding John Horgan's Op-Ed piece about the disappointment of artificial intelligence ("Smarter Than Us? Who's Us?" May 4), it is clear to me that the researcher Marvin Minsky has based his work on a flawed premise: that since the human mind reasons with symbols, and a computer also reasons with symbols, then the computer can replicate the processes of the human mind.

It is true that humans use symbols to reason, but we are trained to do so, making symbols out of images. Fundamentally, the human mind is a processor of images which it combines with other information. The computer, on the other hand, is fundamentally a processor of symbols, and it creates images out of symbols.

Until we have a computer design that is primarily an image processor, it will continue to lag far behind the human mind in all aspects of what we call thinking. The computer can win the game of tic-tac-toe because playing the game can be reduced to the use of symbolic logic. The game of chess differs from tic-tac-toe only in its complexity, and for the computer to play it well says little about its capability to think like a human.

RICHARD TEN DYKE

Pound Ridge, N.Y., May 4, 1997

The writer studies artificial intelligence.

Checkmate, Mr.Blue?

Category: Letter (not analyzed)

Published: 5/12/1997

Author: Christopher P Foley

To the Editor:

Re "After a New Gamble, a Fiery Counterattack" (news article, May 8): It was with great relief that I learned that Deep Blue, the I.B.M. computer doing battle in the chess match with Garry Kasparov, was a member of the male gender: "But only two moves later, he could not avoid trading his stronger bishop for Kasparov's bishop." Thus far, all attempts to ascertain the sex of my personal computer have been unraveling.

CHRISTOPHER P. FOLEY

Larchmont, N.Y., May 9, 1997

Kasparov becomes human

Category: Reporting

Published: 5/11/1997

Author: Bruce Weber

Playing an uncharacteristically passive brand of chess that he apparently has deemed his best strategy against a mechanical foe, Garry Kasparov expressed frustration and fatigue after a week of games against the I.B.M. computer, Deep Blue. Perhaps this is because he has the burden of defending man against machine; or perhaps it's because he knows that by playing the computer's game instead of his own, he has already, in some sense, yielded.

"I'll tell you this," said his manager, Owen Williams. "He's sweating it. The computer is firing bazookas at him."

The match, whose sixth and decisive game is today, has surprised chess experts. Unlike last year, when Mr. Kasparov defeated a previous version of Deep Blue by exploiting its weaknesses, this time he has had a tough time figuring out the machine's predilections.

After the fourth game was called a draw on Wednesday, when Mr. Kasparov confessed to being too tired to work out the complexities of a difficult endgame, it became clear that the computer had already humanized the champion in a way that his living, breathing opponents have not.

Swift and slashing, computer topples Kasparov

Category: Reporting

Published: 5/12/1997

Author: Bruce Weber

In brisk and brutal fashion, the I.B.M. computer Deep Blue unseated humanity, at least temporarily, as the finest chess playing entity on the planet yesterday, when Garry Kasparov, the world chess champion, resigned the sixth and final game of the match after just 19 moves, saying, "I lost my fighting spirit."

The unexpectedly swift denouement to the bitterly fought contest came as a surprise, because until yesterday Mr. Kasparov had been able to summon the wherewithal to match Deep Blue gambit for gambit.

The manner of the conclusion overshadowed the debate over the meaning of the computer's success. Grandmasters and computer experts alike went from praising the match as a great experiment, invaluable to both science and chess (if a temporary blow to the collective ego of the human race) to smacking their foreheads in amazement at the champion's abrupt crumpling.

"It had the impact of a Greek tragedy," said Monty Newborn, chairman of the chess committee for the Association for Computing, which was responsible for officiating the match.

It was the second victory of the match for the computer -- there were three draws -- making the final score 3 1/2 to 2 1/2, the first time any chess champion has been beaten by a machine in a traditional match. Mr. Kasparov, 34, retains his title, which he has held since 1985, but the loss was nonetheless unprecedented in his career; he has never before lost a multigame match against an individual opponent.

Afterward, he was both bitter at what he perceived to be unfair advantages enjoyed by the computer and, in his word, ashamed of his poor performance yesterday.

"I was not in the mood of playing at all," he said, adding that after Game 5 on Saturday, he had become so dispirited that he felt the match was already over. Asked why, he said: "I'm a human being. When I see something that is well beyond my understanding, I'm afraid."

Grandmasters at the match, at the Equitable Center in midtown Manhattan, were stunned into near-speechlessness, a feat in itself, amazed not just by the resignation but by Mr. Kasparov's poor play in the game.

"I think he didn't try his best," said Susan Polgar, the women's world champion, who after the game issued her own challenge to I.B.M. to play against Deep Blue.

The game itself was problematic for Mr. Kasparov from the start. Playing black and needing a victory to capture the match, he was perhaps too defiant in the early going, pursuing a risky sequence of moves in a conservative opening called the Caro-Kann. He encouraged Deep Blue to sacrifice a knight, resulting in a position that left his own king exposed, and many chess experts wondered if he hadn't made a simple blunder.

It was all over not too much later. Having lost his queen and with his king dangerously exposed, Mr. Kasparov abruptly stood up to resign.

"It was a gamble," said Michael Khodarkovsky, a close adviser to Mr. Kasparov, before the strategy collapsed. He said Mr. Kasparov was trying to capitalize on the computer's aversion to playing with a material disadvantage. "But the computer doesn't like to play in an unbalanced position," Mr. Khodarkovsky said. "He wants to win. He didn't come to play for a draw."

Perhaps most surprising was Mr. Kasparov's performance at the postgame news conference, which was not the exuberant celebration envisioned by the tournament sponsor, I.B.M., but rather a tense occasion in which Mr. Kasparov's griped, apologized and vowed revenge.

"I think it is time for Deep Blue to prove this was not a single event," he said, suggesting that the computer enter into regular match play with top chess players. "I personally assure you that, if it starts to play competitive chess, put it in a fair contest and I personally guarantee you I will tear it to pieces."

Patrick Wolff, a grandmaster who is a two-time American champion, was among those experts who were nonplussed by the champion's behavior. "His resignation was probably premature, but he was probably lost," Mr. Wolff said. "I think he was terrified at the prospect of losing an honest competition, and he gave himself an excuse, that this is not real chess. Well, I have news for him. This is real chess. What we've seen today is psychological weakness of the sort I'd never expect from him."

Mr. Kasparov had his supporters, particularly among those who thought this was a spectacle staged by I.B.M. for the good of I.B.M.

“This was not a serious chess match," said Lev Alburt, a former United States champion who has said there are 100 grandmasters in the world who could beat Deep Blue. "This was a show. If they want to prove it was more than a show, let them play anyone but Garry. If it would play against, say, Grandmaster Boris Gulko, who is not even among the top 50, I am willing to bet $10,000 the computer would lose."

At the news conference after the game, a dark-eyed and brooding champion said that his problems began after the second game, won by Deep Blue after Mr. Kasparov had resigned what was eventually shown to be a drawn position. Mr. Kasparov said he had missed the draw because the computer had played so brilliantly that he thought it would have obviated the possibility of the draw known as perpetual check.

"I do not understand how the most powerful chess machine in the world could not see simple perpetual check," he said. He added he was frustrated by I.B.M.'s resistance to allowing him to see the printouts of the computer's thought processes so he could understand how it made its decisions, and implied again that there was some untoward behavior by the Deep Blue team.

Asked if he was accusing I.B.M. of cheating, he said: "I have no idea what's happening behind the curtain. Maybe it was an outstanding accomplishment by the computer. But I don't think this machine is unbeatable."

Mr. Kasparov, who defeated a predecessor of Deep Blue a year ago, won the first game of this year's match, but it was his last triumph, a signal that the computer's pattern of thought had eluded him. He couldn't figure out what its weaknesses were, or if he did, how to exploit them.

He said if there were another match, he would insist it not be sponsored by I.B.M., that it should be at least 10 games and 20 days long ("You have to give a human a chance to rest") and that the previous games played by the computer must be available. He also said he would abandon the anticomputer strategy of playing flaccid openings and return to his normal game.

"I played a friendly match," he said. "I was sure I would win because I was sure the computer would make certain kinds of mistakes, and I was correct in Game 1. But after that the computer stopped making those mistakes. Game 2 had dramatic consequences, and I never recovered."

The I.B.M. team denied there had been any hanky-panky, and the team leader, C. J. Tan, said the computer logs would be published in appropriate journals in the near future.

"We are proud to have played a role in this historic event," he said, in a statement at the news conference. "Garry has a brilliant mind, and he's a very brave man. He's a man who sees the future, who understands where technology can take us."

He said he found Mr. Kasparov's suggestion that Deep Blue engage in regular match play against top grandmasters interesting enough to consider, and that consideration would be given to a third match with Mr. Kasparov.

What Mr. Kasparov does have that the computer doesn't, said Mr. Newborn, is a pulse. Which may be both humanity's boon and its curse, as far as chess is concerned.

"One of the lessons here is that we all underestimated the physiological and psychological aspects of the match," Mr. Newborn said.

Inscrutable conqueror

Category: Reporting

Published: 5/12/1997

Author: Robert D McFadden

When it was all over yesterday, when the greatest chess player in history had been crushed, the machine that had done it -- I.B.M.'s RS/ 6000 SP, alias Deep Blue -- did the magnanimous thing: it kept its monastic silence. After days of Man-versus-Machine hyperbole, those who had looked to Garry Kasparov as the last best hope could now only bemoan the coming days of ascendant computers.

But after a hard day of oscillating among billions of terrible options, RS/6000 SP -- a pair of featureless black monoliths, each an intimidating 6 feet 5 inches tall and resembling nothing so much as twin amplifiers at a rock concert -- remained unmoved and all but unattended in its air-conditioned closet high up in an office tower in midtown Manhattan.

Its inscrutable face gave nothing away. There were no rows of little lights to blink exuberance, no rich beery voice to gloat. Under its smooth metal skin, the chips, wires and electronic circuits were tightly packed and almost alive with invisible blips, but there was not even a radiator's clank or gurgle to whisper sympathy, nothing to show a caring or a cruel heart.

It would be wrong, of course, to imagine that RS/6000 SP has no personality. Throughout its six-game match with Mr. Kasparov over the last 10 days -- indeed, for most of its four-year existence -- it has exhibited qualities of scrupulous care, unshakable calm and remarkable powers of concentration and endurance.

Unlike its opponent, an emotional Russian whose frustrations over the board were often on display, RS/6000 SP never agonized, was never tired, never showed joy or disappointment, though its handlers were seized with elation or concern as it evaluated 200 million chess positions a second and flashed its moves and evaluations over a small screen in a room off the playing venue.

"Why is there such global interest in this match?" Dr. C. J. Tan, the Deep Blue project manager, said at a news conference after the game. "Because it shows what technology can do for man and how far we can take it. The computer played grandmaster chess using both knowledge and speed."

Deep Blue's ancestry can be traced back centuries to dreamers and charlatans who envisioned machines that could beat humans at the ancient game of chess. One gimmick, invented by Baron Wolfgang von Kempelen in the 1760's, toured Europe as the Maezal Chess Automaton, nicknamed the Turk for the turbaned marionette in a cabinet that made the moves. Inside, it later turned out, was a tiny chess master.

A century later, Alan M. Turing, the British mathematician and computer scientist, developed a program that could generate simple moves and evaluate positions. And in 1945, Konrad Zuse, a German scientist, described a program for chess moves and even developed a crude computer.

The modern ancestors of Deep Blue, however, date at least to 1950, when Claude Shannon, a Bell Laboratories mathematician and one of the inventors of computer science, laid down an early blueprint with a proposal for a chess-playing machine. But significant progress in computer chess did not occur until 1973, when well-engineered programs that used brute-force calculation were developed.

Deep Thought, developed by Carnegie-Mellon University researchers in the 1980's, combined enormous speed and computational power with sophisticated analysis of positions, and became the first machine to defeat a grandmaster in tournament play: Bent Larsen of Denmark in 1988.

The first Deep Blue was produced by I.B.M. scientists working under Dr. Tan in the late 1980's, and it quickly became the world's best chess-playing machine.

The second, improved version, the one that beat Mr. Kasparov yesterday, was born in 1993 at I.B.M.'s Thomas J. Watson Research Center in Yorktown Heights, N.Y. It was big and loaded with potential: 2,800-pound twin towers that were featureless on the outside, except for an on-off switch near the base and an electrical cord to plug it into a wall outlet.

But on the inside were 516 chess processors capable of examining 50 billion positions every three minutes, and it used its enormous calculating ability to find its way through the maze of chess games. It was not able to "think" in the way humans do, with flashes of

insight, and had a limited capacity to focus on only the few promising lines of play, as the best human players do.

Moreover, though Deep Blue's specialty was chess, it was, I.B.M. stressed, a general-purpose computer that used parallel processing technology to handle enormous data computations in such diverse fields as molecular and fluid dynamics, air traffic control and financial analysis. A cousin would cost about $2 million.

What is it like to play against Deep Blue? Robert Byrne, a grandmaster who is the chess columnist for *The New York Times* and a former United States champion, recalled feelings of growing concern after playing many games against the ever-improving computer.

"No longer do you wonder if the machine will surprise you, but whether it will sweep you off the board," he said yesterday. "I would not quit challenging it, but I would not expect to win or even make a draw anymore. Not in 50 games. It's a desolate thought."

In February 1996, Deep Blue was put to its toughest test to date -- a match with Mr. Kasparov. Despite its capacity to look at 100 million positions a second, it lost, 4 to 2, to the man who had been world champion since 1985. But Mr. Kasparov paid it a compliment, saying he had felt the stirrings of genuine thought in his opponent, at least in the way the results mimicked thought.

And, as usual, despair was not part of Deep Blue's makeup. Back in Yorktown Heights, preparations for a rematch began. There were almost daily brainstorming sessions with a research team: Murray Campbell, Joseph Hoane Jr., Jerry Brody and Feng-Hsiung Hsu, among others, and with Joel Benjamin, a grandmaster and former United States champion.

While the scientists boosted Deep Blue's over-the-board capacity to 200 million positions a second, Mr. Benjamin helped the programmers to refine its knowledge of chess: to recognize positional weaknesses and to understand long-range strategy as well as short-range tactics.

Yesterday, the results were in: Deep Blue had demolished Mr. Kasparov in a scintillating final game of a deadlocked match. There was muted joy among Deep Blue's handlers, while Mr. Kasparov reacted with only-too-human words about a big corporation with unlimited resources and a machine that had not proved anything, yet.

But Deep Blue was beyond praise or criticisms. Indeed, in its windowless bare closet high over the city, there was no way to appreciate yesterday's lilac-and-burgundy sunset, no way to glimpse the city lights coming on, or the great Hudson flickering like mercury in the dusk.

How one champion is chewed up into small bits by another

Category: Reporting

Published: 5/12/1997

Author: Robert Byrne

By the standards of top chess, it was a complete breakdown. As the grand finale of a historic contest, it was just no contest.

Garry Kasparov opened himself yesterday to an attack that no leading player ever lets himself fall into. As other grandmasters, members of the press and a big crowd of

spectators watched in stunned disbelief, Deep Blue overwhelmed the world champion without even heating up its circuits.

Some of the assembled grandmasters believed that the man who knows more openings than anyone had forgotten the correct way to play the opening he himself chose for this important battle.

Others speculated that when he made the move that everyone else rejects, he must have wrongly thought he had worked out a way in his pregame preparation to hold off the brutal attack it invites.

Perhaps the cause of the final debacle can be found in the ferocious resistance that the incredible computer had been putting up against him.

In Game 5, on Saturday, Kasparov looked pitiful when the machine's inspired, intrepid defense transformed into a draw a position Kasparov must have believed he was winning. Afterward, he was visibly shaken. Perhaps with that draw, his hopes -- his self-confidence -- turned to ashes.

In yesterday's game, Kasparov chose an opening, the Caro-Kann Defense, that he rarely plays. It is a conservative, firmly grounded approach, but it is vulnerable to a few traps that most grandmasters know how to avoid. The variation Kasparov selected exchanges off the main center pawn with 3 . . . de 4 Ne4 and prepares a solid, slightly cramped formation that is difficult to break through.

The wandering knight after 5 Ng5 anticipates 5 . . . Ngf6, after which it can no longer be exchanged on e4, thus easing the pressure on the black position.

For some time now, Caro-Kann players have adopted 7 . . . Bd6 to gain more development before trying to drive off the advanced white knight with . . . h6.

But Kasparov either forgot the main line of this analysis or played the fatal 7 . . . h6 to taunt the computer and lure it into sacrificing a knight with 8 Ne6!?

After 10 . . . Kd8 11 Bf4, the black king was caught in the center where the attacking white pieces could get at it. Kasparov prepared some development with 11 . . . b5, but this let Deep Blue play to open more lines with 12 a4.

Deep Blue's 17 Bf5! simply threatened to cruise through the black position. The best Kasparov could do was 17 . . . ef 18 Re7 Be7, but that was as useless as anything else. It was not a question of material, which was approximately even.

But Deep Blue's 19 c4! forced the opening of more lines in the neighborhood of the black king and Kasparov could not organize a defense. On 19 . . . Nb4, there could have followed 20 Qf5 bc 21 Ne5 Bb5 22 Ng6. Kasparov had had enough.

In Saturday's game, Kasparov followed his regular match strategy of playing subtle hypermodern openings whose laid-back early moves would create situations without pronounced features where the machine might lose its way. It didn't. Yes, it conceded the bishop pair to Kasparov as early as 4 . . . Bf3 5 Bf3, but it mobilized very efficiently and after 18 . . . Ng4 had an even game.

Deep Blue might have been too optimistic in playing 25 . . . Nc4, and Kasparov obtained the better piece play after 33 Rg6. Yet in the end, the I.B.M. powerhouse brilliantly brought up its king to save itself from what seemed like certain defeat.

Kasparov's g pawn was heading toward the queening square when 48 . . . Kb5! 49 g7 Kb4! stopped it cold. On 50 g8/Q, there would follow 50 . . . Rd1 51 Kc2 Rd2 with a draw by perpetual check.

And if Kasparov had tried 50 Rb3? instead, he have would faced immediate checkmate.

Thus came the draw and what must have been a depressing letdown. Surely, 24 hours later, Kasparov had not shaken off its effects.

A grandmaster sat at the chessboard, but the real opponent was Gates

Category: Reporting

Published: 5/12/1997

Author: Laurence Zuckerman

Now that it has defeated the chess champion Garry Kasparov, can Deep Blue beat Bill Gates?

Everywhere I.B.M. executives look, it seems -- on television, magazine covers, and at industry trade shows -- the bespectacled face of William H. Gates 3d, the chairman of the Microsoft Corporation, stares back at them, personifying the geeky glamour of the computer revolution.

But the stodgy old computer company has now come up with its own media star, even geekier and more glamorous: Deep Blue, its 1.4 ton chess computer.

In the course of defeating Mr. Kasparov in a six-game match that ended yesterday, Deep Blue accomplished a feat that computer scientists have dreamed of for decades and have captured the imaginations of millions of people around the world, including some at Microsoft.

"It's an I.B.M. team that did it," said Nathan Myhrvold, the chief technologist at Microsoft, where executives led by Mr. Gates himself normally like to portray I.B.M. as a bloated dinosaur. "My hat is off to them."

Executives at the International Business Machines Corporation said it was hard to determine how Deep Blue's celebrity would translate into increased sales, though the company's marketers are no doubt conjuring up advertising campaigns featuring the electronic grand master.

But in an industry where the battle for "mind share," as perception is known in techie parlance, is critical to success, Deep Blue is a huge lift for a company that has most recently been known for losing billions of dollars and laying off tens of thousands of workers.

The attention also comes as I.B.M.'s overall business appears to have recovered from the dark days of the early 1990's when many believed that the computer giant would go bust. I.B.M. still has many problems that even Deep Blue's ability to contemplate 200 million chess moves a second will not solve. The company is still too dependent on sales of old-style mainframe and minicomputers for its profits and it trails its competitors in personal computers and the software that runs on them.

Even as Deep Blue was making headlines and being satirized on late-night television last week, dozens of the country's top corporate executives made a pilgrimage to Seattle to hear Mr. Gates's "vision of the future" and be feted at a lavish dinner at his 21st-century Xanadu on Lake Washington. Not too long ago, such titans would never have dreamed of looking anywhere but I.B.M.'s headquarters in Armonk, N.Y., to learn how technology would affect their businesses.

To the young entrepreneurs who populate California's Silicon Valley, I.B.M. is still seen as their fathers' computer company. "Looking at I.B.M. from the perspective of living in the valley, they have a bunch of mediocre products," said Marc Andreessen, the co-

founder of the Netscape Communications Corporation, the maker of the Navigator Web browser and the fastest-growing software company in history.

Still, Mr. Andreessen admitted to being impressed by Deep Blue, proving that if there are two things that people in Silicon Valley respect, it is a high stock price and cool technology. "It's a great way for them to show leadership in high-performance computing," he said.

Deep Blue was topic A in the halls of I.B.M.'s far-flung offices around the world last week. Many workers gathered to watch 30-minute reports of the highlights of each match on the company's internal television network. The Deep Blue site on the Internet's World Wide Web received 22 million hits one day last week; a special internal site available only to employees received six million hits.

"It puts a whole different image on the company," said Michael D. Zisman, an executive vice president at Lotus Development Corporation, which I.B.M. acquired in a hostile takeover two years ago. "It's part of a real transition internally with people feeling that they are not part of the downtrodden."

That change is critically important as I.B.M. competes with other companies for the best minds in computer science. For example, Mr. Andreessen worked as a software developer at I.B.M. in 1990, when he was still a college student. But he decided not to work for the company when he graduated because he felt it was too bureaucratic.

"Microsoft is in the position that I.B.M. used to be in," said Richard A. Shaffer, president of Technologic Partners, a New York consulting firm. "If you pay $100,000 for the kid's education, you hope he calls up one day and says, 'I got a job at Microsoft.' "

Deep Blue gives I.B.M. something sexy to counter Mr. Gates's siren song. C. J. Tan, head of the Deep Blue team, recalled that a researcher who recently joined I.B.M. from a rival company said that one of the things that attracted him was Deep Blue.

Deep Blue also helps lift the curtain from behind the many critical but mundane things I.B.M. computers do that the general public takes for granted, like running airline reservation systems. The same type of computer that battled Mr. Kasparov is also being used by the Department of Energy to simulate nuclear explosions and by pharmaceutical companies to design new drugs.

"Deep Blue isn't a person," said Louis V. Gerstner Jr., I.B.M.'s chairman and chief executive, in an interview on Friday. "It's a massively parallel computer that sits in a box."

Unable to resist an indirect shot at Mr. Gates, he added: "We're not trying to create or flog a personality here. We are trying to create and propagate technology."

IBM Watson vs. Ken Jennings and Brad Rutter coverage

Computer wins on 'Jeopardy!': Trivial, it's not

Category: Reporting

Published: 2/16/2011

Author: John Markoff

In the end, the humans on "Jeopardy!" surrendered meekly.

Facing certain defeat at the hands of a room-size I.B.M. computer on Wednesday evening, Ken Jennings, famous for winning 74 games in a row on the TV quiz show, acknowledged the obvious. "I, for one, welcome our new computer overlords," he wrote on his video screen, borrowing a line from a "Simpsons" episode.

From now on, if the answer is "the computer champion on "Jeopardy!," the question will be, "What is Watson?"

For I.B.M., the showdown was not merely a well-publicized stunt and a $1 million prize, but proof that the company has taken a big step toward a world in which intelligent machines will understand and respond to humans, and perhaps inevitably, replace some of them.

Watson, specifically, is a "question answering machine" of a type that artificial intelligence researchers have struggled with for decades — a computer akin to the one on "Star Trek" that can understand questions posed in natural language and answer them.

Watson showed itself to be imperfect, but researchers at I.B.M. and other companies are already developing uses for Watson's technologies that could have a significant impact on the way doctors practice and consumers buy products.

"Cast your mind back 20 years and who would have thought this was possible?" said Edward Feigenbaum, a Stanford University computer scientist and a pioneer in the field. In its "Jeopardy!" project, I.B.M. researchers were tackling a game that requires not only encyclopedic recall, but also the ability to untangle convoluted and often opaque statements, a modicum of luck, and quick, strategic button pressing.

The contest, which was taped in January here at the company's T. J. Watson Research Laboratory before an audience of I.B.M. executives and company clients, played out in three televised episodes concluding Wednesday. At the end of the first day, Watson was in a tie with Brad Rutter, another ace human player, at $5,000 each, with Mr. Jennings trailing with $2,000.

But on the second day, Watson went on a tear. By night's end, Watson had a commanding lead with a total of $35,734, compared with Mr. Rutter's $10,400 and Mr. Jennings's $4,800.

Victory was not cemented until late in the third match, when Watson was in Nonfiction. "Same category for $1,200," it said in a manufactured tenor, and lucked into a Daily Double. Mr. Jennings grimaced.

Even later in the match, however, had Mr. Jennings won another key Daily Double it might have come down to Final Jeopardy, I.B.M. researchers acknowledged.

The final tally was $77,147 to Mr. Jennings's $24,000 and Mr. Rutter's $21,600.

More than anything, the contest was a vindication for the academic field of artificial intelligence, which began with great promise in the 1960s with the vision of creating a thinking machine and which became the laughingstock of Silicon Valley in the 1980s, when a series of heavily financed start-up companies went bankrupt.

Despite its intellectual prowess, Watson was by no means omniscient. On Tuesday evening during Final Jeopardy, the category was U.S. Cities and the clue was: “Its largest airport is named for a World War II hero; its second largest for a World War II battle.” Watson drew guffaws from many in the television audience when it responded “What is Toronto?????”

The string of question marks indicated that the system had very low confidence in its response, I.B.M. researchers said, but because it was Final Jeopardy, it was forced to give a response. The machine did not suffer much damage. It had wagered just $947 on its result. (The correct answer is, "What is Chicago?")

“We failed to deeply understand what was going on there,” said David Ferrucci, an I.B.M. researcher who led the development of Watson. “The reality is that there’s lots of data where the title is U.S. cities and the answers are countries, European cities, people, mayors. Even though it says U.S. cities, we had very little confidence that that’s the distinguishing feature.”

The researchers also acknowledged that the machine had benefited from the “buzzer factor.”

Both Mr. Jennings and Mr. Rutter are accomplished at anticipating the light that signals it is possible to “buzz in,” and can sometimes get in with virtually zero lag time. The danger is to buzz too early, in which case the contestant is penalized and “locked out” for roughly a quarter of a second.

Watson, on the other hand, does not anticipate the light, but has a weighted scheme that allows it, when it is highly confident, to hit the buzzer in as little as 10 milliseconds, making it very hard for humans to beat. When it was less confident, it took longer to

buzz in. In the second round, Watson beat the others to the buzzer in 24 out of 30 Double Jeopardy questions.

"It sort of wants to get beaten when it doesn't have high confidence," Dr. Ferrucci said. "It doesn't want to look stupid."

Both human players said that Watson's button pushing skill was not necessarily an unfair advantage. "I beat Watson a couple of times," Mr. Rutter said.

When Watson did buzz in, it made the most of it. Showing the ability to parse language, it responded to, "A recent best seller by Muriel Barbery is called 'This of the Hedgehog,' " with "What is Elegance?"

It showed its facility with medical diagnosis. With the answer: "You just need a nap. You don't have this sleep disorder that can make sufferers nod off while standing up," Watson replied, "What is narcolepsy?"

The coup de grâce came with the answer, "William Wilkenson's 'An Account of the Principalities of Wallachia and Moldavia' inspired this author's most famous novel." Mr. Jennings wrote, correctly, Bram Stoker, but realized that he could not catch up with Watson's winnings and wrote out his surrender.

Both players took the contest and its outcome philosophically.

"I had a great time and I would do it again in a heartbeat," said Mr. Jennings. "It's not about the results; this is about being part of the future."

For I.B.M., the future will happen very quickly, company executives said. On Thursday it plans to announce that it will collaborate with Columbia University and the University of Maryland to create a physician's assistant service that will allow doctors to query a cybernetic assistant. The company also plans to work with Nuance Communications Inc.

to add voice recognition to the physician's assistant, possibly making the service available in as little as 18 months.

"I have been in medical education for 40 years and we're still a very memory-based curriculum," said Dr. Herbert Chase, a professor of clinical medicine at Columbia University who is working with I.B.M. on the physician's assistant. "The power of Watson- like tools will cause us to reconsider what it is we want students to do."

I.B.M. executives also said they are in discussions with a major consumer electronics retailer to develop a version of Watson, named after I.B.M.'s founder, Thomas J. Watson, that would be able to interact with consumers on a variety of subjects like buying decisions and technical support.

Dr. Ferrucci sees none of the fears that have been expressed by theorists and science fiction writers about the potential of computers to usurp humans.

"People ask me if this is HAL," he said, referring to the computer in "2001: A Space Odyssey." "HAL's not the focus; the focus is on the computer on 'Star Trek,' where you have this intelligent information seek dialogue, where you can ask follow-up questions and the computer can look at all the evidence and tries to ask follow-up questions. That's very cool."

Daisy, daisy

Category: Opinion

Published: 2/17/2011

Author: New York Times editorial board

The most charming moments from Watson, the I.B.M. computer that clobbered two brilliant human champions on “Jeopardy!” were when Watson wasn’t certain or failed. Those moments did not come often, but virtual humanity seemed most at hand when they did. Then his/her/its wagers on the answers would turn cautious and Watson even flashed question marks of self-doubt, as if to acknowledge the lack of a brow to furrow.

The audience groaned and laughed sympathetically as the room-size computer — a discreet graphic presence on stage — showed some fallibility. Watson could not Google for forgotten minutiae like the rest of us at home. All there was was what the engineers put inside.

That was impressive enough food for human thought. Is Watson the precursor, the true ancestor, of the super-intelligence machines that futurists have long been predicting will some day be full partners, even superiors, at helping humans labor and create?

In a three-program contest, Watson was at first surprising for being only tied for the lead with one of the humans at the end of Day 1. Just when viewers thought, hey, we can handle this guy, Watson took off, adapting with ever keener competitiveness — buzzing in with the right answers at warp speed in showdown rounds.

Watson finished with the crown and a 3-to-1 advantage for quickness and correctness over the nearest rival, who scored prodigious success on past shows. Watson didn’t preen; not in the programming.

It’s a pity the moderator could not indulge the ultimate TV cliché and ask how it felt to win. The closest Watson could come to feeling before us was when he muffed a city question — the clue: “Its largest airport is named for a World War II hero; its second

largest for a World War II battle." His two competitors answered correctly: Chicago. Watson flashed, "What is Toronto?????" as if doubt — personal doubt — lurked within.

When computers beat humans on Jeopardy

Category: Opinion (not reported)

Published: 2/17/2011

Author: Ray Kurzweil[25]

Over the past three days, the TV show "Jeopardy!" featured a showdown between a clever IBM computer system called Watson and the two greatest "Jeopardy!" champions. Watson won handily. It won the preliminary practice round, tied Monday's opening round, and won by large margins on Tuesday and Wednesday. The point has been made: Watson can compete at the championship level—and is making it more difficult for anyone to argue that there are human tasks that computers will never achieve. "Jeopardy!" involves understanding complexities of humor, puns, metaphors, analogueies, ironies and other subtleties. Elsewhere, computers are advancing on many other fronts, from driverless cars (Google's cars have driven 140,000 miles through California cities and towns without human intervention) to the diagnosis of disease. Watson runs on 90 computer servers, although it does not go out to the Internet. When will this capability be available on your PC? The ratio of computer price to performance is now doubling in less than a year, so 90 servers would become the equivalent of one server in about seven years, and the equivalent of one personal computer within a decade.

However, with the growth in cloud computing—in which supercomputer capability is increasingly available to anyone via the Internet—Watson-like capability will actually be available to you much sooner.

Given this, I expect Watson-like "natural language processing" (the ability to "understand" ordinary English) to show up in Google, Bing and other search engines over the next five years.

With computers demonstrating a basic ability to understand human language, it's only a matter of time before they pass the famous "Turing test," in which "chatbot" programs compete to fool human judges into believing that they are human.

If Watson's underlying technology were applied to the Turing test, it would likely do pretty well. Consider the annual Loebner Prize competition, one version of the Turing test. Last year, the best chatbot contestant fooled the human judges 25% of the time.

Perhaps counterintuitively, Watson would have to dumb itself down in order to pass a Turing test. After all, if you were talking to someone over instant messaging and they seemed to know every detail of everything, you'd realize it was an artificial intelligence (AI).

A computer passing a properly designed Turing test would be operating at human levels. I, for one, would then regard it as human.

I expect this to happen within two decades, but I also expect that when we first get reports that a computer has passed the Turing test, observers (probably including myself) will argue that the rules for the test were not stringent enough. By the time the controversy dies down and it becomes clear that nonbiological machine intelligence has

become equal to biological human intelligence, the AIs will already be thousands of times smarter than us.

But keep in mind that this is not an alien invasion from Mars. We're creating these technologies to extend our reach. The fact that millions of farmers in China can access most of human knowledge with devices they carry in their pockets is a testament to the fact that we are doing this already.

Ultimately, we will vastly extend and expand our own intelligence by merging with these tools of our own creation.

On 'Jeopardy!,' rise of the machine: Computer competitor rakes in ratings

Category: Reporting

Published: 2/17/2011

Author: Lisa de Moraes

"I for one welcome our new computer overlords," "Jeopardy!" competitor Ken Jennings wrote resignedly on his screen, as Watson the IBM computer thoroughly stomped on him and fellow super-geek Brad Rutter during Watson's final appearance on the syndicated game show.

Watson racked up a total of $77,147 during competition after wagering $17,973 that "Who is Bram Stoker?" was the correct question to the clue: "William Wilkinson's 'An Account of the Principalities of Wallachia and Moldavia' inspired this author's most famous novel."

Jennings and Rutter got it right, too. But when the dust settled at the end of Wednesday's competition, Jennings (with a total of $24,000) and Rutter (total of $21,600) were so many laps behind Watson's $77,147, it was as if they were running in the next race.

In Wednesday's final match, Watson competed - if you could call this walkover a competition - against Rutter and Jennings in a full game of "Jeopardy!" The winning Watson took home the $1 million grand prize. Actually, IBM donated it to two lucky charities.

Heading into its final night of stealing every scene on "Jeopardy!" Watson had pretty thoroughly whomped the two brainiacs.

After hitting both Daily Doubles on Tuesday's show - the middle of a three-episode competition arc for Watson - the IBM computer was leading with a commanding total of $35,734. Rutter's pot stood at $10,400. And Jennings had to be wishing he'd never agreed to participate in this man-vs.-machine February-sweep stunt, 'cause he was holding an embarrassingly low $4,800.

Jennings holds the show's record for winning the most consecutive games (74), and Rutter is known for earning the most money in "Jeopardy!" history. Watson was not impressed.

That is not to say Tuesday's edition of "Jeopardy!" was lacking in drama. Quite the contrary. When the second night of play got to the "Final Jeopardy!" category - "U.S. Cities" - the situation was thus:

Jennings looked a delicate shade of green on the left, with just $2,400 in his pot. Rutter, looking stricken on the right, had $5,400 to his credit. In the middle: Watson, looking smug, had amassed $36,681.

The "clue," as show host Alex Trebek read: "Its largest airport is named for a World War II hero. Its second largest for a World War II battle."

Jennings bet his entire kitty that the correct reply was "What is Chicago?" Rutter wagered $5,000 that the question was "What is Chicago?" Apparently Rutter planned to console himself with $400 if he got it wrong.

Both men were correct! That put them both . . . still hopelessly behind Watson.

Watson thought the question was: "What is Toronto?" On the other hand, Watson had wagered only $947.

"Oh, you sneak!" Trebek cooed.

Watson winked.

The $1 million prize is money well spent for the syndicated game show's producers. In its TV debut Monday, Watson handed "Jeopardy!" its best single-day rating in four years. The next night the show broke that record, clocking its biggest rating in nearly six years, according to preliminary stats from Nielsen Media Research.

Lee Sedol vs. AlphaGo coverage

How you beat one of the best Go players in the world? Use Google

Category: Reporting

Published: 3/16/2016

Author: Bloomberg News

Go figure: Artificial intelligence by Google wins complex strategy game

Google's artificial intelligence system beat a top-ranked player of the board game Go in three straight games in South Korea last week, providing the first evidence that the company's software may attain superhuman status at a challenging 2,500-year-old strategy contest.

To show off the capabilities developed by its London-based AI subsidiary DeepMind, the technology company arranged a five-match tournament against Lee Sedol, who Google said has been the top-ranked Go player of the past decade.

"It'll never get tired and it'll never get intimidated," said DeepMind co-founder Demis Hassabis at a news conference ahead of the first match. "These are the main advantages."

Sedol managed to win a game Sunday, though he had already lost the tournament. The last game was scheduled for Tuesday.

The breakthrough astounded experts, who had previously thought it would be five to 10 years before AI would be good enough to play Go, and it positions Google as a leader in the next generation of super-smart computing. The search giant already uses AI in a range of products -- automatically writing emails, recommending YouTube videos, helping cars drive themselves, etc.

The wins against Lee were further confirmation of the power of DeepMind's system and its progress in seeking to make machines that can outsmart humans. For scientists and researchers in AI, Go has been the game to conquer since IBM's supercomputer Deep Blue beat world chess champion Garry Kasparov in 1997.

What sets DeepMind's approach apart from traditional Go-playing software is its use of a technology called a neural network, which lets computers learn from experience, rather than specific programming. This enables it to learn by studying example games, then playing millions of games against itself, inferring the rules and, eventually, developing long-term strategies. The system also uses a more traditional computing technique called Monte Carlo Tree Search.

Go, also known as Baduk, is a game played widely in Asia that sees players battle to take territory on a board by taking turns placing stones on the intersections of a grid. There is only one type of piece, and players choose to play as either white or black. On a 19-by-19 Go grid, there are more possible board configurations than there are atoms in the universe.

"I'm somewhat shocked," Lee told reporters after the first match. "I didn't really imagine I'd lose. I didn't foresee AlphaGo would play Go so perfectly."

Man playing a computer finally wins a game of Go

Digital headline: South Korean Gets ‘Priceless’ Victory Over Computer in Go Match

Category: Reporting

Published: 3/14/2016

Author: Choe Sang-Hun

After three straight losses, a South Korean expert rallied on Sunday for his first victory against a Google computer program playing Go, an ancient board game known as the most complex ever invented.

Lee Se-dol, 33, a boyish South Korean Go master, was all smiles after a brilliant move forced the Google program, AlphaGo, to surrender the match in the middle of the contest. Hundreds of local Go enthusiasts and reporters who were gathered at the Four Seasons Hotel in downtown Seoul burst into applause over the human Go master's dramatic comeback against the machine.

"You know, I have played many, many Go games, but I don't think I have ever been as happy with one single victory as with this one," Mr. Lee said. "This is priceless."

Demis Hassabis, the chief executive of Google DeepMind, Google's artificial intelligence company, said Mr. Lee's victory was a reminder that AlphaGo still had room for improvement. A "creative genius" like Mr. Lee tests the limits of the machine, he said.

Go has been seen as the last great challenge in computer programmers' efforts to create software that can outwit humans in board games. Go is such a complex game, with an almost infinite possible sequence of moves, that artificial-intelligence experts had predicted that computer programs needed more than 10 more years before they would be able to beat Go legends like Mr. Lee, who has 18 international titles.

Before the best-of-five series began on Wednesday, Mr. Lee had been upbeat. But the mood quickly sank after he lost the first three matches.

After losing his third match -- and $1 million in prize money -- on Saturday, Mr. Lee admitted that the psychological pressure he felt in facing a nonhuman foe was a big handicap.

But Mr. Lee also said AlphaGo was not perfect.

"It was Lee Se-dol, not humans, who lost the matches," he said defiantly on Saturday, adding that he would do his best to beat the machine in the remaining two games.

On Sunday, Mr. Lee delivered.

Go is a two-person strategy board game said to have been created in China more than 3,000 years ago. The players compete for territory by placing black and white stones on intersections of a board of 19 horizontal and 19 vertical lines. The first player in a match uses black stones; the other, white. On Sunday, AlphaGo held the black stone.

During the post-match news conference on Sunday, Mr. Lee said he had found some weaknesses of AlphaGo.

When he made a surprise move, AlphaGo acted as if it had "a bug," he said. He also said AlphaGo seemed to do better when it held the white stone.

Mr. Lee then offered to let AlphaGo play the white stone in the last match, scheduled for Tuesday.

"I beat it with the white stone," Mr. Lee said. "Now, I want to see if I can beat it with black."

Google's DeepMind team accepted the offer.

This is a more complete version of the story than the one that appeared in print.

A computer wins by learning like humans

Digital headline: “Where Computers Defeat Humans, and Where They Can’t”

Category: Opinion (not analyzed)

Published: 3/16/2017

Authors: Andrew McAfee and Erik Brynjolfsson[26]

CORRECTION APPENDED. ALPHAGO, the artificial intelligence system built by the Google subsidiary DeepMind, has just defeated the human champion, Lee Se-dol, four games to one in the tournament of the strategy game of Go. Why does this matter? After all, computers surpassed humans in chess in 1997, when IBM's Deep Blue beat Garry Kasparov. So why is AlphaGo's victory significant?

Like chess, Go is a hugely complex strategy game in which chance and luck play no role. Two players take turns placing white or black stones on a 19-by-19 grid; when stones are surrounded on all four sides by those of the other color they are removed from the board, and the player with more surrounded territory and captured stone at the game's end wins. Unlike the case with chess, however, no human can explain how to play Go at the highest levels. The top players, it turns out, can't fully access their own knowledge about how they're able to perform so well. This self-ignorance is common to many human abilities, from driving a car in traffic to recognizing a face. This strange state of affairs was beautifully summarized by the philosopher and scientist Michael Polanyi, who said, "We know more than we can tell." It's a phenomenon that has come to be known as "Polanyi's Paradox."

Polanyi's Paradox hasn't prevented us from using computers to accomplish complicated tasks, like processing payrolls, optimizing flight schedules, routing telephone calls and

calculating taxes. But as anyone who's written a traditional computer program can tell you, automating these activities has required painstaking precision to explain exactly what the computer is supposed to do.

This approach to programming computers is severely limited; it can't be used in the many domains, like Go, where we know more than we can tell, or other tasks like recognizing common objects in photos, translating between human languages and diagnosing diseases -- all tasks where the rules-based approach to programming has failed badly over the years.

Deep Blue achieved its superhuman performance almost by sheer computing power: It sifted through millions of possible chess moves to determine the optimal move. The problem is that there are many more possible Go games than there are atoms in the universe, so even the fastest computers can't simulate a meaningful fraction of them. To make matters worse, it's usually far from clear which possible moves to even start exploring.

What changed? The AlphaGo victories vividly illustrate the power of a new approach in which instead of trying to program smart strategies into a computer, we instead build systems that can learn winning strategies almost entirely on their own, by seeing examples of successes and failures.

Since these systems don't rely on human knowledge about the task at hand, they're not limited by the fact that we know more than we can tell.

AlphaGo does use simulations and traditional search algorithms to help it decide on some moves, but its real breakthrough is its ability to overcome Polanyi's Paradox. It did this by figuring out winning strategies for itself, both by example and from experience. The

examples came from huge libraries of Go matches between top players amassed over the game's 2,500-year history. To understand the strategies that led to victory in these games, the system made use of an approach known as deep learning, which has demonstrated remarkable abilities to tease out patterns and understand what's important in large pools of information.

Learning in our brains is a process of forming and strengthening connections among neurons. Deep learning systems take an analogueous approach, so much so that they used to be called "neural nets." They set up billions of nodes and connections in software, use "training sets" of examples to strengthen connections among stimuli (a Go game in process) and responses (the next move), then expose the system to a new stimulus and see what its response is. AlphaGo also played millions of games against itself, using another technique called reinforcement learning to remember the moves and strategies that worked well.

Deep learning and reinforcement learning have both been around for a while, but until recently it was not at all clear how powerful they were, and how far they could be extended. In fact, it's still not, but applications are improving at a gallop, with no end in sight. And the applications are broad, including speech recognition, credit card fraud detection, and radiology and pathology. Machines can now recognize faces and drive cars, two of the examples that Polanyi himself noted as areas where we know more than we can tell.

We still have a long way to go, but the implications are profound. As when James Watt introduced his steam engine 240 years ago, technology-fueled changes will ripple throughout our economy in the years ahead, but there is no guarantee that everyone will

benefit equally. Understanding and addressing the societal challenges brought on by rapid technological progress remain tasks that no machine can do for us.

Correction: March 30, 2016, Wednesday

This article has been revised to reflect the following correction: An Op-Ed essay on March 16 about the game-playing computer called AlphaGo mischaracterized the strategy game Go, in which players place colored stones on a grid. Stones are removed from the board when they are surrounded by the other color, and the player with more territory and captured stones wins; the winner is not the player with more captured stones alone. The article also misstated how Deep Blue, a chess-playing computer, learned to make optimal moves. It sifted through millions of possibilities that it created; it was not fed chess games by programmers.

Machine bests man in Go series, winning 4

Digital headline: Google's Computer Program Beats Lee Se-dol in Go Tournament

Category: Reporting

Published: 3/16/2017

Author: Choe Sang-Hun

Ending what was billed as the match of the century, a Google computer program defeated a South Korean master of Go, an ancient board game renowned for its complexity, in their last face-off on Tuesday.

The program AlphaGo's 4-1 victory was a historic stride for computer programmers and artificial intelligence researchers trying to create software that can outwit humans in board games.

"It made me question human creativity. When I saw AlphaGo's moves, I wondered whether the Go moves I have known were the right ones," the human competitor, Lee Sedol, 33, said during a postmatch news conference. "Its style was different, and it was such an unusual experience that it took time for me to adjust."

"AlphaGo made me realize that I must study Go more," said Mr. Lee, one of the world's most accomplished players.

Go is a two-person game of strategy said to have been created in China more than 3,000 years ago.

The players compete for territory by placing black and white stones on intersections of a board of 19 horizontal and 19 vertical lines.

The game has been the last remaining great hurdle for computer programmers attempting to make software more adept than humans at board games since the I.B.M.-developed supercomputer Deep Blue routed the world chess champion Garry Kasparov in 1997.

Artificial intelligence experts had predicted that a computer program needed at least 10 more years of development before it would be able to beat Go masters like Mr. Lee.

But AlphaGo, created by Google's artificial intelligence company DeepMind, had already surprised the Go community when it trounced the three-time European Go champion Fan Hui in October, 5-0.

It then challenged Mr. Lee, a much stronger opponent with 18 international titles under his belt.

AlphaGo quickly decided the best-of-five series, winning the first three matches.

Google has said it plans to donate the $1 million prize to Unicef and other charities.

But Mr. Lee staged a dramatic comeback and demonstrated a human resilience on Sunday, when he defeated AlphaGo in the fourth game.

Millions of Go fans in Northeast Asia, where the game is especially popular, watched intently during the match on Tuesday. It lasted the longest of the series: five hours.

Although many viewers did not understand the intricate play, the tension was clearly acute toward the end of the game. Each player was given one minute to deliberate and foresee complex moves and countermoves before placing a stone.

During a post-match ceremony, Hong Seok-hyun, head of the Korean national Go association, awarded the AlphaGo team the certificate of an honorary Go degree of Nine Dan, the highest granted. Mr. Lee also holds that degree.

Demis Hassabis, the chief executive of Google DeepMind, said playing Mr. Lee had exposed several weaknesses of AlphaGo that his team would try to address.

Computer algorithms used for AlphaGo "one day can be used in all sorts of problems, from health care to science," he said.

More than 100 million people watched the AlphaGo-Lee matches, Mr. Hassabis said.

He said he hoped that the attention would encourage more people to learn Go, the "most profound game humankind has devised."

Mr. Lee said AlphaGo was unlike any human opponent he had faced.

"It remained unfazed psychologically and stayed focused," he said. "In that regard, I don't think humans can beat it, even though I hesitate to admit that AlphaGo is above humans in Go skills yet."

Until the matches with AlphaGo, Mr. Lee said he had begun wondering whether he was enjoying the game anymore.

But he said the games had renewed his enthusiasm for Go, which he began playing professionally at age 12.

"I have some regrets about the matches I have played against AlphaGo," he said. "But I could not have enjoyed them more."

In machine matchup, Go champ gets a win

Digital headline: Go Champion Beats AlphaGo Software on Fourth Try

Category: Reporting

Published: 3/14/2016

Authors: Alastair Gale and In-Soo Nam

A simple computer pop-up message gave humans some relief in a high-profile man-versus-machine board-game battle: "AlphaGo resigns."

With those words, South Korean Go grandmaster Lee Se-dol on Sunday claimed his first victory in a best-of-five series against AlphaGo, an artificial-intelligence project developed by Alphabet Inc.'s Google. The win in the ancient chess-like game restored some pride to Mr. Lee, as well as big smile across his face.

He had been well beaten in the opening three games after predicting he would win the series easily.

"I couldn't be happier today. . .this victory is priceless. I wouldn't trade it for the world," Mr. Lee said after the game at a news conference, where journalists greeted him with cheers and applause.

The matchup has been billed as an important moment in gauging the progress of artificial intelligence because Go had been widely thought of as still out of reach for computers to challenge top professionals.

The game, which has its origins about 3,000 years ago in China, has a near-infinite number of moves and is played with intuition as much as calculation. That has made it hard to crack for computers that rely on brute-force number crunching.

AlphaGo uses programming modeled on biological processes to replicate human instincts, as well as self-learning through millions of games against itself.

Demis Hassabis, the head of the U.K.-based team that developed AlphaGo, has described it as a "Mount Everest" challenge for computers. All other board games have been mastered by computers to the level of grandmasters.

Mr. Hassabis congratulated Mr. Lee on his win, which he said would help his team learn about AlphaGo's weaknesses to make it stronger. "This is why we came here: to test AlphaGo to its limits," he said.

The matchup has enthralled South Korea, where Mr. Lee is by far the most successful player of a game that has two dedicated television channels and a dedicated fan base.

Mr. Lee has deflected suggestions that he has the weight of mankind on his shoulders, but newspaper, TV and social-media commentary has been full of humor about computers gaining consciousness and challenging humans. Some observers have made references to movies such as the "Terminator" series, in which machines try to wipe out humans.

Commentators at the Go tournament, which has been streamed live online, have bolstered the story line of rising machine intelligence by referring to AlphaGo as "he" and describing moves with adjectives such as "beautiful."

"[Mr. Lee] finally won. This is touching. I don't want to see humans succumb to machines someday," Lee Oi-soo, a Korean novelist with more than two million followers on Twitter wrote on the microblogging service soon after the latest game. He is unrelated to Lee Se-dol.

Mr. Lee, the Go champion, said after the game that AlphaGo appeared to have a weakness in responding to unorthodox moves. "It might be a bug. I don't know if I can call it that," he said.

He also said AlphaGo seemed to be weaker when playing with black counters, which make the first move of the game against an opponent playing with white counters. After winning on Sunday while using white counters, Mr. Lee said he wanted to play with black in the final game to test his theory. Mr. Hassabis agreed to the proposal.

Commentators on the latest game said Mr. Lee's victory largely stemmed from a decisive attack on the middle of the board. The Go board consists of a 19-by-19 grid of lines, on which players place counters on each intersection and try to claim the most territory.

Toward the end of the game, AlphaGo played desperate moves similar to those of humans facing defeat, commentators said. AlphaGo resigns by displaying a pop-up message when it calculates that its probability of winning falls below a preset threshold, Mr. Hassabis said.

"Congratulations! [Mr. Lee] was too good for us today and pressured AlphaGo into a mistake that it couldn't recover from," Mr. Hassabis tweeted immediately after the game.

Go champion bows to Google software

Category: Reporting

Published: 3/16/2016

Author: Jonathan Cheng

Humanity didn't stand a chance.

South Korean Go grandmaster Lee Se-dol on Tuesday lost the final round of the chess-like game -- and the match -- to AlphaGo, an artificial-intelligence machine developed by Alphabet Inc.'s Google.

Mr. Lee, the 33-year-old representing human intelligence, had on Sunday mustered his first victory in the five-game match, which gripped many in Asia by juxtaposing the swift progress of computer intelligence and humanity's struggles to outwit advancing technology against the backdrop of a slow-moving ancient game that hasn't changed much in millennia. But despite high hopes, he was unable to record another win.

Go, hugely popular in China, Korea and Japan, where most of the board game's 40 million players live, was in many ways an ideal testing ground for artificial intelligence. Played on a 19-by-19 grid, players place stones on each intersection and try to claim the most territory.

Experts say the game relies as much on intuition as on calculation, putting it beyond the reach of supercomputers that attempt to overwhelm their human opponents with brute-force computing power.

AlphaGo uses programming modeled on neural processes to replicate human instincts, and has also learned through millions of matches against itself.

Mr. Lee's loss Tuesday capped a humbling week for the player, who came into the $1 million match last Wednesday confidently predicting a 5-0 victory over the machine. The prize money is earmarked for charities and Go organizations.

Instead, Mr. Lee eked out just one win, and joined Russian chess legend Garry Kasparov -- who was bested by International Business Machines Corp.'s Deep Blue computer in the closely watched 1997 chess match -- in the annals of artificial intelligence's advance.

Demis Hassabis, the head of the U.K.-based team that developed AlphaGo, earlier described Go as the "Mount Everest" challenge of game-playing for artificial-intelligence developers. Facebook Inc. has been developing its own artificial intelligence program for playing Go.

Unlike chess, which has a finite number of possible moves at any given moment that a computer can quickly crunch, Go presents a nearly boundless range of possible moves. "It's the deepest and most profound game that mankind has devised," Mr. Hassabis said on Tuesday.

As Mr. Lee struggled to scratch out a victory, he attracted viewers in South Korea and in neighboring China and Japan for his determination against a faceless opponent. Go fans had believed a victory of machine over human was perhaps a decade away.

"I don't think Google realized how much of a shock wave that this was for a massive cultural institution out here in Asia," said Andy Okun, the American Go Association's president, who was in Seoul to watch the match. "Google thought they were beating a hobby game, like 'Snakes and Ladders.'"

The match, dubbed "the showdown of the century" by the South Korean press, adorned the front pages of almost all of the country's newspapers for most of the past week, with some of them featuring move-by-move recaps of the games, while the country's major television networks devoted hours of live news coverage to the match. In all, more than 100 million people tuned into the match, Google said.

Mr. Lee didn't emerge diminished by the thrashing he received from AlphaGo. The weeklong match has turned Mr. Lee, already a legend among Go players, into a household name in South Korea. Fans relished details of his life story, including his

childhood on a remote island and his struggles with a neurological disorder called aphasia.

As the shock of AlphaGo's victories sank in among the Go community, Mr. Lee tried to play down the implications of his loss.

"I wasn't able to win, but I don't think my defeat is a defeat for humanity," Mr. Lee told a packed ballroom of reporters after the final game. "It's my weakness, not the weakness of humanity."

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[1] There is some debate about whether the Luddites were more driven by the harsh economic conditions of the Napoleonic Wars than the spread of automated technology. The former view would entail a reading of history more aligned to weak technological determinism; whereas the latter is a strong technological determinist vision. Regardless the accuracy of either reading, it's important to make the distinction that the main objective of the Luddites—destroying technology due to its natural perceived role in society—was a strong determinist perspective toward technology.

[2] It's important to clarify that Marx was using this reference to bolster his larger point: That it is only a matter of time before labor learns to resentment not toward machines which are taking their jobs — but toward the form of society which uses such machinery. In Marx's view, communism was superior to capitalism in its capacity to systematically avoid such conflicts. Moreover, it is also important to note that some scholars contend that Marx was not a determinist (Chandler, 1997).

[3] The term "creative destruction" was not used by Marx, but he broadly referred to these ideas in *Das Capital*.

[4] It's worth noting that, although democratic capitalism has grown to be the dominant global political economic paradigm, Marx's idea of technological determinism remains fundamental to perspectives of technology in general, due to its role in Marxist political economic thought and insofar as the rapid pace of technological advancement shapes society.

[5] This is, of course, not to say that society doesn't ultimately benefit from technological progress. Rather, the significance is in the symbolic value of the conflict as a cultural narrative.

[6] There is currently no shortage of vibrant discussion in economics literature regarding universal basic income vis-a-vis technological unemployment. See (BIEN, 2017; de Rugy, 2016).

[7] Such is part of structural unemployment, and forms the basis of *creative destruction* in economics literature. Creative destruction focuses on the incessancy of process innovation mechanisms, particularly the extent to which they outdate existing technologies (Schumpeter, 1942). This concept may be applied directly to human labor, insofar as technologies powered by human labor have evolved to require less (or different) labor.

[8] Comprising a 17x17 grid, there are more possible configurations of Go boards than there are atoms in the universe (Borowiec, 2016).

[9] Although there is no shortage of discussion about the nature of and limitations to the Turing test, for the purposes of this review it's most important to clarify that no modern software has been able to pass the Turing test

[10] It's worth noting that these developments have not been without their setbacks — most notably, the AI "winters" (from 1974 to 1980, and from 1980 to 1987, respectively). Following a familiar pattern of economic boom and bust cycles, these periods of decreased enthusiasm included technical challenges as well, among them limitations in computing power and the lack of robust languages to handle advanced artificial intelligence properties (such as applying the concept of inheritance on frames).

[11] At CES 2016, many reporters regarded the ubiquity of Alexa in automobile models and other household items as the biggest takeaway: Industry is seeking to help build the Internet of Things.

[12] It has been argued that all social structures and ideologies are basically "fantasies" under this definition, insofar as they do not really "exist" anywhere but our minds — we simply bring them into reality through our own actions. Scholars of history and psychology such as Harari (2017, p. 27) and Peterson (1999, p. 13) posit that such 'fantasies' or 'fictions' serve a fundamental role in the shaping of the self and society, ultimately constituting a crucial function of psycho-social development.

[13] Go is an abstract strategy game similar to chess but with more complexity. Invented in China more than 2,500 years ago, Go is the oldest known board game, considered one of the four essential arts of the aristocratic caste in Chinese antiquity. Playing Go involves two players, each placing stones to acquire territory on a 19x19 grid. There are more possible Go board configurations than atoms in the universe.

[14] Queries for "'IBM' AND 'Deep Blue'" AND "chess" throughout the month of May 1997; "'IBM' AND 'Watson" AND 'Jeopardy!" throughout March 2011; and 'AlphaGo'AND 'Deepmind'" AND "Go" throughout the month of March 2016, all yielded hundreds of results.

[15] For instance, "'IBM' AND 'Deep Blue'" AND 'chess'; "'IBM' AND 'Watson" AND 'Jeopardy!'"; "AlphaGo" AND 'Google' AND 'Go'".

[16] For instance, for articles related to the Deep Blue vs. Garry Kasparov match, IBM researchers and executives served as extensions of the Deep Blue character insofar as they sought the defeat of Garry Kasparov. Conversely, grandmasters rooting for Kasparov were extensions of the human insofar as they worked to construct the fantasy theme of man versus machine.

[17] A notable distinction here is that, although each supercomputer was essentially a feat of human cognition, it served as an antagonist of human intelligence in its role as an opponent in each game. This effectively situates a paradox in the construction of the man versus machine concept.

[18] It seems that the author may have been trying to imply that because spell check software was previously considered artificial intelligence, the technology that built Deep Blue may likewise be beneficial for society. By invoking spell check as a character foil for Deep Blue's perceived antagonism, the author may have been seeking to transform the man versus machine concept into man and machine.

[19] By mentioning that general "artificial intelligence" *was* a goal for computer scientists, he author implies that it is no longer a goal. This is probably due to the fact that, in the early to mid 1990s, artificial intelligence research had been languishing amid an artificial

intelligence “winter,” due to various hardware and software limitations. It’s worth noting that modern artificial intelligence research has progressed past this stagnate stage.

[20] This definition is later disregarded however, as Maurice Ashley, an international master who provided commentary, proclaimed the scope of the match entailed the “future of humanity” was on the line.

[21] Interestingly, this portrayal of Gates as a messianic figure is colored by its relative nascency: “Not too long ago, such titans would never have dreamed of looking anywhere but I.B.M.'s headquarters in Armonk, N.Y., to learn how technology would affect their businesses.”

[22] As the article point out, “black counters make the first move of the game against an opponent playing with white counters” — meaning that black counters have an intrinsic strategic advantage.

[23] Although it’s unclear what computers may be challenging humans for exactly, worldly dominance does not seem far off.

[24] Indeed, the article notes, Google “already uses AI in a range of products -- automatically writing emails, recommending YouTube videos, helping cars drive themselves, etc.”

[25] Appended to the bottom of this story: “Mr. Kurzweil, a recipient of the National Medal of Technology, invented the CCD flat bed scanner and works on artificial intelligence technologies. He is the author of the best-selling book "The Singularity is Near" (Viking, 2005)”

[26] Appended to the bottom of this story: “Andrew McAfee is a principal research scientist at M.I.T., where Erik Brynjolfsson is a professor of management. They are the co-

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founders of the M.I.T. Initiative on the Digital Economy and the authors of "The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies.""