*Inside*OUT

Denver Center
THEATRE
COMPANY
KENT THOMPSON,
ARTISTIC DIRECTOR

ED,
DOWNLOADED

ED, DOWNLOADED
BY MICHAEL MITNICK

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Synopsis

SELENE: *Memories are just information.*
No different than the data on your computer.

—Ed, Downloaded

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Selene is a downloading specialist employed at a "forevertary," a business where memories are downloaded into computers. Selene lives with Edward, a geology museum guide who is terminally ill. Before he dies, Edward decides to download ten memories in an attempt to achieve a kind of immortality. When Selene views Ed's memories (which is against forevertary protocol), she finds a big surprise. This funny, thought-provoking play gets to the root of what makes us all human. ■

THE PLAYWRIGHT, MICHAEL MITNICK

MICHAEL MITNICK's theatre credits include *Sex Lives of Our Parents* (world premiere 2ndStage Uptown), *Fly By Night* (world premiere TheatreWorks Palo Alto, upcoming Dallas Theater Center spring 2013), *Lion.Pig.Wolf. Snake.* (developed at Berkeley Rep and Ars Nova), *Spacebar: A Broadway Play by Kyle Sugarman* (developed by The Lark, The Playwrights Foundation, The Source Festival and Studio 42, upcoming City Lights spring 2013), *Babs the Dodo* (world premiere at Washington Ensemble Theatre), *elijah* (world premiere at LOCAL Theatre Company, Boulder, CO). He also is writing the book of the Broadway bound musical version of the classic film *Animal House* as well as additional lyrics for *King Kong,* which will premiere in Australia in the spring of 2013. His screenplay *The Current War* will be produced by Steve Zaillian (*Moneyball*) and directed by Timur Bekmambetov (*Wanted*). Michael is currently writing commissions for Manhattan Theatre Club and Theatre Masters (from whom he received the 2012 Visionary Playwright Award) in conjunction with The Goodman Theatre. He received his MFA in Playwriting from the Yale School of Drama. He lives in Brooklyn. ■

MYTHOLOGICAL TRACES IN THE PLAY

In Greek mythology Selene, a lunar deity and daughter of Titan, fell madly in love with a young mortal, Endymion, a hunter or shepherd. He was so handsome that Selene asked Zeus to grant him eternal sleep so that he would stay forever young and never leave her. ■

THE HISTORY OF ARTIFICIAL INTELLIGENCE

Artificial Intelligence (AI) is the science of how to get machines to do the things they do in movies.
> —Dr. Astro Teller, director of New Projects for Google 1.

Thinking machines and artificial beings appear in Greek myths, such as Talos, the bronze robot of Hephaestus that protected Crete and Galatea, and the ivory statue carved by Pygmalion that came to life. By the 19th and 20th centuries, artificial beings had become a common feature in fiction such as Mary Shelley's creature in Frankenstein.

Mechanical or "formal" reasoning had been attempted by philosophers and mathematicians since the 19th century. Charles Babbage, in 1821, worked on an "Analytical Engine" with Ada Lovelace, the only legitimate child of George Gordon, Lord Byron, the poet. "Lovelace significantly extended Babbage's ideas and wrote a paper on programming techniques, sample programs and the potential of this technology to emulate intelligent human activities." 2. Sadly, Ada died at the age of 36, leaving Babbage alone to pursue his quest.

In 1940, Great Britain was preparing for an anticipated invasion from Hitler's Germany. The British government organized its best electrical engineers and mathematicians, all under the leadership of Alan Turing, to crack Enigma, the German military code. Turing and his colleagues constructed the world's first operational computer shuffling symbols as simple as "0" and "1" to simulate any conceivable act of mathematical deduction. As the Nazis added to the complexity of the code, Turing replaced the original machine with a larger one called the Colossus built with 2,000 radio tubes.

Babbage's ideas were used in the first American programmable computer, the Mark I, completed in 1944 by Howard Aiken of Harvard University and IBM. The machine was 55 feet long, 8 feet high and weighed 5 tons.

The field of AI research was founded at a conference at Dartmouth University in 1956 by John McCarthy, Marvin Minsky, Allen Newell and Herbert Simon. They and their students wrote programs that were amazing; computers were

solving word problems in algebra, proving logical theorems and speaking English. They were heavily funded by the United States Department of Defense; laboratories were established around the world. The researchers were extremely optimistic about their field predicting "machines will be capable within 20 years of doing any work a man could do." 3. But the scientists had failed to recognize the difficulty of some of the problems they faced. In 1974, in response to growing pressure from the US Congress, both the US and Great Britain cut off all undirected research in AI.

By the 1990s AI made great strides with machines of sharply focused intelligence in such fields as logistics, data mining and medical diagnosis. For example, the EKG (electrocardiogram) has come complete with the computer's diagnosis of one's cardiac health. Magnetic resonance imaging or MRI programs enable doctors to peer deep into our bodies and brains. Computerized bioengineering technology enables drugs to be designed by biochemical simulations, so that patients receive medications specifically suited to their blood types, cellular structure, etc. Finally, in the Gulf War of 1991 we saw the first effective examples of machine intelligence with surface-to-air missiles, code-breaking protocol and airborne warning and control systems.

In May 1997, Deep Blue became the first computer chess-playing system to beat the reigning world chess champion, Garry Gasparov. In 2005, a Stanford robot won the DARPA Grand Challenge, a race for driverless vehicles, by driving autonomously for 131 miles along a desert trail. In February 2011, in a "Jeopardy!" quiz show exhibition, IBM's question answering system, Watson, defeated the two greatest "Jeopardy!" champions, Brad Rutter and Ken Jennings.

Despite these successes, AI still needs to develop successful methods for dealing with uncertain or incomplete information. ∎

1. Kurzwiel, p. 66.
2. Ibid, p. 67.
3. en.wikipedia.org

Kurzweil, Raymond. The Age of Spiritual Machines. New York: Viking Press, 1999.

http://en.wikipedia.org/wiki/Artificial_Intelligence

MIND DOWNLOADING

Will robots inherit the earth? Yes, but they will be our children.
—Marvin Minsky, 1995. One of the founders of AI, Professor at MIT.

Mind downloading is defined as "hypothetical process of transferring or copying a conscious mind from a brain to a non-biological substrate by scanning and mapping a biological brain in detail and copying its state into a computer system or another computational device." [1.]

It is discussed in AI publications and is an important part of life extension technology. While some scientists are skeptical, research and development is being done in such areas as faster supercomputers, virtual reality, animal brain mapping and connectomics (the science of studying the connectomes in the brain.)

According to Ian Pearson, chief of British Telecom's futurology unit, "it will be possible to download your brain to a supercomputer by the middle of the 21st century." [2.] Pearson points to the Sony PlayStation 3, introduced in 2005, a machine 35 times more powerful than the model it replaced. The new PlayStation is 1% as powerful as the human brain. In ten years the PlayStation will be as powerful as the human brain. Pearson believes mind downloading will be realistically available by 2050, "so when you die it's not a major career problem." [3.]

Futurists are looking at how one can structure a computer that could become conscious. Information comes in from the outside world and each part of the brain processes it; consciousness is just another sense of the brain, which is what futurists are now trying to design in a computer. In other words, there could come a day when computers will become more intelligent than humans. "When that happens, humanity—our bodies, our minds, our civilization—will be completely and irreversibly transformed." [4.]

In fiction there are many examples of mind downloading. For example, in Arthur C. Clarke's novel *The City and the Stars* (1956) in a city named Diaspar the minds of the inhabitants are stored as patterns of information in the city's Central Computer. Many critics consider this story as one of the first to deal with mind uploading and computerized immortality. In Robert Silverberg's To Live Again (1969) an entire world economy revolves around the buying and selling of "souls" (persons that have been tape-recorded

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at six month intervals) allowing the very wealthy the opportunity to spend millions on a medical treatment that downloads the most recent recordings of "archived personalities into the minds of the buyers." [5.] In the 1982 novel *Software* by Rudy Rucker, the main character has his mind downloaded and his body replaced; the robots that persuaded him to undergo this procedure tell him he will become immortal. The 2009 movie *Avatar* by James Cameron has so far been the most commercially successful work of fiction that features a form of mind downloading. Throughout most of the movie the hero's mind has not been downloaded, but is simply controlling his body from a distance, a form of telepresence. However, at the end of the movie the hero's mind is downloaded into Eywa, the mind of the planet and then back into his Avatar body. ■

1. en.wikipedia.org.
2. Cnn.com
3. www.guardian.co.uk
4. www. time.com
5. en.wikipedia.org

http://en.wikipedia.org/wiki/Mind_uploading

http://www.time.com/time/magazine/article/0,9171,2048299,00.html

http://www.guardian.co.uk/science/2005/may/22/theobserver.

http://edition.cnn.com/2005/TECH/05/23/brain.download/

BELIEFS ABOUT THE BRAIN

The brain is truly wonderful and complex, seamlessly and apparently effortlessly able to attend to multiple tasks at the same time. However, the human brain, via religion or science, art or technology, has yet to figure itself out.

—John S. Allen, *The Lives of the Brain*, 2009

Raymond Kurzweil, a futurist and a researcher in Artificial Intelligence, acknowledges that computers are becoming better and faster; therefore, there might come a time when they are capable of something close to human intelligence. He calls this era the Age of Spirituality when Artificial Intelligence and superintelligent machines will become the dominant forms of life.

Kurzweil bases his predictions on much research on the brain. For one, many of the brain's characteristic methods of organization can be simulated using conventional computing. [1] The brain constantly rewires itself; while most of the details in the brain are random, not every dendrite and axiom has to be explored to reproduce it. Highly advanced technologies will arrive sooner than most people think; the creation of the Internet and the completion of the Human Genome Project are examples of these advances. In addition, society's acceptance of new technologies such as cell phones and computer games has increased.

Kurzweil also knows that the brain can hold multiple viewpoints because it has an architecture of regions such as the corpus callosum, the limbic system, the hypothalamus, etc. The brain is deeply connected with its dendrites, neurons and axioms in ways that are analogous to the interconnectivity of the Internet.

"Based on current trends, brain scans should give us a sound understanding of how the human brain works by the 2020s." [2] Therefore, Kurzweil believes that computers will become superintelligent, far smarter than human beings. He insists that medical advancements will help his generation live long enough for the growth of technology to intersect and surpass the processing of the human brain. By that time scientists should be able to create a simulated human brain inside a computer. The only factor Kurzweil and company can't comprehend is the operating process of the brain.

Naturally, Kurzweil's speculative reasoning and predictions have been heavily debated and challenged. For example, Carl Zimmer in the article "Can You Live Forever? Maybe Not—But You Can Have Fun Trying" in *Scientific American* , December 22, 2010, writes, "Computer Scientists don't understand how the brain works. They think it's just a piece of hardware and that all we have to do is replicate it, write out our code and *voilà*!" [3.] In *IEEE Spectrum*, John Horgan in his article "The Consciousness Conundrum" says, "Neuroscientists still do not understand at all how a brain… makes a conscious mind (the intangible entity that enables one to fall in love, find irony in a novel and appreciate the elegance of a design." [4.] Furthermore, a typical human brain has synaptic connections that constantly form, strengthen, weaken and dissolve. According to Glenn Zorpette, *Scientific American* staffer, "consciousness as it occurs in human brains is something that is the result of physical processes and biological processes and chemical processes." [5.] Consciousness is different from intelligence; it's what happens in one's brain as a result of sensation, memory and other stuff. All these neuroscientists admit that the brain is the most complicated object science has ever confronted.

According to Dan Hurley in *Discover* Magazine (April 2012), memories are stored in engrams which "exist in vast webs of connections, not in a particular place but in distributed neural networks running through the brain." [6.] This is good news for Alzheimer patients because memories could be directed to the sections of the brain that remain strong. According to Alcino Silva, co-director of UCLA Integrative Center for Learning and Memory, "We are the entire set of memories that we acquire. Everyone of our memories changes who we are." [7.]

Enter young Sebastian Seung, a well-regarded computational neuroscientist from MIT. He believes our identities lie in a pattern of connections between brain neurons that change slowly over time as we learn and grow. These connections are called connectomes. He cites the fact that connectomes learn and grow by change. "Without them, your uploaded self would not be able to store new memories or learn new skills." [8.] At present, it's difficult to simulate all the molecules in the brain because our computational power is limited as well as "the difficulty of obtaining information to begin to initialize the simulation." [9.] However, computers have forced us to reexamine the issue of mechanism.

Seung compares uploading to ascension to Heaven. "Heaven is a really powerful computer." [10.] After all, the direction is right and

perhaps all that's necessary is to wait for computers to become more powerful. Video games are positive proof that computers can imitate the physical world. Seung writes, "Eventually these technologies will become so powerful that we will use them to know ourselves—and to change ourselves for the better." [11.] ■

1. Kurzweil, p. 149.
2. en.wikipedia.org
3. www.scientificamerican.com
4. spectrum.ieee.org
5. www.scientificamerican.com
6. Hurley, p. 32.
7. Ibid, p. 34.
8. Seung, p. 268.
9. Ibid, p. 269.
10. Ibid, p. 254.
11. Ibid, p. 276.

Hurley, Dan. "Where Memory Lives in Your Brain." *Discover.* April 2012.

Kurzweil, Raymond. *The Singularity is Near.* New York: Viking, 2005.

Seung, Sebastian. *Connectome: How the Brain's Wiring Makes Us Who We Are.* Boston: Houghton Miflin, 2012.

http://en.wikipedia.org/wiki/The_Singularity _ is_Near.
http://wwwscientificamerican.com/article.cfm?id=e-zimmer-can-you-live-forever&page=5

http://spectrum.ieee.org/biomedical/imaging/the-consciousness-conundrum

http://www.scientificamerican.com/podcast/episode.cfm?id=99DBC638-fef6-00F4-Fc311CB737SCC44F

PARTICIPATE

Free events designed to spark dialogue between actors,
experts and audiences.

Perspectives - Denver Center theatre Company's own "Creative
Team" and community experts host interactive, topical discussions
with attendees that provide a unique perspective on the production.
This provides an in-depth connection that makes the stage
experience even more rewarding. Free.
1/11, 6pm, Jones Theatre

Talkbacks - Perhaps the best way to fully appreciate a production is
by engaging in a stimulating dialogue with your fellow audience
members and the actors who bring it to life.
1/20, Post-show

Theatre & Theology - In our continued partnership with Pastor Dan
Bollman with the Rocky Mountain Evangelical Lutheran Synod and
cast members, this discussion examines the relevant connections to
the productions through a theological lens. Free.
1/22, Post-show

Higher Education Advisory Discussions - Audience members gain
scholarly insight into the productions through discussions,
facilitated by faculty members from regional colleges and
universities.
1/27, Post-show

DCTC@The TC: The Art of Making Art - Discover the secrets
behind the art and the artist at the DCTC. Gain deeper insight into
the artist's journey in the creation and development of their work.
Join Eden Lane (of channel 12's In Focus with Eden Lane) as she
interviews beloved DCTC veteran actors Kathleen M. Brady and
John Hutton.
1/29, second floor of the Tattered Cover LoDo (1628 16th St.)

QUESTIONS

PRE PERFORMANCE QUESTIONS

1. How do we store, categorize and prioritize our memories? How can memory be manipulated?

2. What do you think the future will look like? How close are we to being able to download our memories?

POST PERFORMANCE QUESTIONS

1. On the stage, how is technology used to convey the idea of a memory? How are scenes in the play shown as memories?

2. How is the future portrayed in the play? How do the set, projections and staging enhance the production?

3. How would you describe the relationship between Ed and Selene? How is their relationship different from Ed's relationship with Ruby?

4. Who would make a better long-term partner for Ed: Selene or Ruby? Why do you feel that way?

5. Why do you think Ed selects the memories that he does? How do his choices affect Selene and how does she react?

6. Explain how you would react to Ed's memory selections if you were Selene. Is she justified in her reaction?

7. How is memory manipulated in the play? What steps are taken?

8. Ed asks, "What do memories look like?" What do you think memories look like?

9. What role does music play in this production?

10. How would you describe a "Forevertery?" Explain why you would or would not have your memories downloaed?

PERSONAL NARRATIVES FROM THE FOREVERTERY

1. Create a list of five important memories of your life. Prioritize your memories for inclusion in a ForeverBox. If you were only able to choose three memories, which ones would you hold on to?

2. For these three memories, write a paragraph (or two) describing the each moment from your perspective. Be sure to include as many details as needed to paint a vibrant picture.

3. Make sure the moment is appropriate for school and that you are willing to share with the rest of the class.

4. Discuss which memories you chose to keep and why. Was it easy or difficult to choose which memories to discard?

5. Once you have written a longer version of these memories, edit them to a single sentence of no more than ten words. Challenge yourself to keep the important qualities of the memory intact and include some of the details.

6. Discuss what you needed to do to abridge your memory. Did your editing change the memory in content or detail? Does the edited sentence hold the same emotional weight as the original paragraph? What information is lost?

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Writing PG: Articulate the position of self and others using experiential and material logic.

Writing PG: Write with clear focus, coherent organization, sufficient elaboration, and detail.

THE EDUCATION DEPARTMENT

at the Denver Center Theatre Company
also offers the following programs:

Denver Center Theatre Academy On-Site Classes: affordable, high-quality theatre classes for children, teens and adults taught by industry professionals. Classes are offered on-site four times a year. Classes are available for all interest and skill levels for ages 3-103. Scholarships are available. Call 303/446-4892 for information.

Dramatic Learning: Teaching Artists from the Academy bring the creative process into classrooms to support and enhance core curriculum. Workshops and residencies in any discipline are tailored for each classroom. Dramatic Learning benefits more than 90 schools and 5,000 students annually. Call 303/446-4897 for more information.

Family Fun Forum: This event is FREE. Families juggle, sing opera, and hula-hoop on the tightrope. These are just a sampling of the zany and fun things families learn in this two-hour skills hunt presented by Denver Theatre Academy teaching artists. Families will rotate from classroom to classroom, learning news skills and winning tokens for the entire family. Families spend their "earnings" on face painting, balloon animals, fun food and much more. Call 303/446-4892 for more information.

For more information also check out our website at

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