TEACHING TO THE TURING TEST WITH CLEVERBOT

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What does it mean to be human in a time of smart phones, complex algorithms, and artificial intelligence? Everyday life appears to imitate science fiction film and television. Siri, the iPhone's voice-activated assistant, brings to life the techno-fantasies of *Star Trek* and *Battlestar Galactica*: a computer is at your command. Google, Amazon, Facebook, and Microsoft systems regularly anticipate our thoughts as we're typing them, offering suggested searches, other products we will like, new friends, and the correct way to phrase something. Advances in neural nets and real-time algorithms now allow for even greater fusions of animals, humans, and machines than Donna Haraway or, for that matter, Philip K. Dick imagined in their prescient writings (Chapin et al.; Carmena et al.). We live in a time when a book such as David Levy's *Love and Sex With Robots* gets serious attention in the popular and academic press. In sum, algorithms, handheld computers, artificial intelligence, and software are constitutive of day-to-day life for people in the developed world; such technologies are part of popular culture because they (almost) automatically and invisibly shape aesthetics, space, work life, perception, and consumption (Fuller; Kitchin and Dodge).

Many college students are immersed in this culture of technology. Although I have serious reservations about the technological determinism in the theory of the "digital natives," which posits that children born after roughly 1990 are fundamentally different than previous generations due to their lifelong engagements with networked technologies, it's hard to argue with the sheer empirical and anecdotal evidence that college students are giving more of their attention to networked devices – especially, it seems, when professors are trying to conduct class (Prensky). Setting aside moral panics about "these kids today," I do want to take seriously an ontological anxiety that I would argue many of our students feel: it's hard to draw the line between themselves and technology (Bennett, Maton, and Kervin). Where do the mind and body end and the smart phone, network, and artificial intelligence begin? Anxiety is a wonderful teaching opportunity. To address students' anxiety, I have developed an undergraduate course called The Culture of Computing, which mixes together science fiction, computer science, and history to explore the question: "What does it mean to be human in a time of smart technologies?" In this course, we draw on a wide range of texts, from science fiction classics such as Ambrose Bierce's

"Moxon's Master," E.M. Forster's "The Machine Stops," and Isaac Asimov's "The Machine That Won the War" to more contemporary books such as Marge Piercy's *He, She, and It* and films such as Duncan Jones' *Moon*. Students also read scientific writing by Norbert Weiner, Vannevar Bush, Joseph Weizenbaum, Steve Lukasik, and, as I will explore below, Alan Turing. Reading science fiction alongside science writing shows the role of narrative, imagination, speculation, and subjectivity in both genres; as Bruno Latour argues in *Science in Action*, it's especially important to notice how narrative functions in the seemingly non-narrative genre of science writing. To add a critical element, we read the work of cultural critics such as Donna Haraway, Alex Galloway, Jennifer Light, Sherry Turkle, and Fred Turner. This literature helps reveal the often elided aspects of power inherent in science and science fiction, especially in constructions of race, class, or gender. Each of these works offers a key question for students to explore: how can we be human in a time of smart machines? Students were invited to explore this question and related issues in class discussions, essays, their own science fiction stories, and research papers.

This article describes how I used a popular online technology, Cleverbot, in a unit of the Culture of Computing.[1] Cleverbot is a "chatterbot," which—or who—has conversations with users via text. Using Cleverbot ties in well with science fiction fantasies and nightmares of intelligent machines found in stories such as Asimov's "Bicentennial Man" and films such as Stanley Kubrick's *2001: A Space Odyssey*, not to mention increasingly day-to-day technologies such as Apple's Siri and the algorithms of interaction found within social media. Thinking about Cleverbot also provides undergraduates with a window into the computer science field of artificial intelligence research, especially the famous Turing Test of machine intelligence (Turing, "Computing Machinery and Intelligence"). The Turing Test continues the overall class discussion about the ontological status of human-ness.[2]

Alan Turing's Famous Test

Alan Turing (1912-1954) was a mathematician whose work is important in cryptanalysis, artificial intelligence, and theoretical computer science. During World War II, he led a team of British cryptanalysts to break highly complex German code systems—work that contributed to Allied victory in Europe. After the war, Turing helped design the Automatic Computing Engine, a very early implementation of a stored-program electronic computer and thus a forerunner for the vast majority of today's computers and related devices, including smartphones, tablets, and modern PCs.

Turing first described his test of machine intelligence in his 1950 essay "Computing Machinery and Intelligence." That essay built on his earlier mathematical work on computable numbers which included an early description of "the universal machine," a device we would now call a digital computer ("On Computable Numbers"). The earlier work used

1 . Cleverbot is available at http://www.cleverbot.com/

2 This course was a junior/senior undergraduate course taught in the Department of Communication at the University of Utah, a selective public research university that draws students from across the Intermountain West. This section of the Culture of Computing had an equal number of male and female, traditional-age students.

the metaphysical universal machine—a machine that could imitate any process so long as that process is broken down into discrete steps that can be described algorithmically—to demonstrate a way to think about computable numbers without relying on the abstract properties of intelligence (Webb 219–225). This process led Turing to think about human thought as machine-like and thus open to replication by digital computers; mainframe computers were of course available by 1950.

Turing asked: if a machine can imitate the human mind, can it be said to have intelligence? To answer this question, he proposed an experiment. The inspiration for Turing's test was a parlor game played with a male subject and a female subject, with the jury trying to guess their genders based on responses in a text-based conversation (Turing, "Computing Machinery" 433). He explained in a 1952 BBC interview:

> The idea of the test is that the machine has to try and pretend to be a man [sic], by answering questions put to it, and it will only pass if the pretence is reasonably convincing. A considerable proportion of a jury, who should not be expert about machines, must be taken in by the pretence. They aren't allowed to see the machine itself—that would make it too easy. So the machine is kept in a far away room and the jury are allowed to ask it questions, which are transmitted through to it: it sends back a typewritten answer. (Turing, *The Essential Turing* 495)

The test requires three entities: a machine, and human, and a jury. The jury will have a conversation via text with both the machine and the human for a period of five minutes ("Computing Machinery" 442). After this, the jury votes: which one is human? Thus, for Turing, "intelligence" is a black box: text goes in, conversational text comes out. If it's conversational enough, the "box"—be it brain or machine—is intelligent. As Geoffrey Bowker has shown, this perspective on intelligence would come to dominate twentieth century thinking about thought in the field of cybernetics and systems theory.

Meet Cleverbot

In the 1950 paper, Turing predicted that by the year 2000 there would be machines capable of fooling a human jury 70 percent of the time. There have been many attempts to build a program capable of passing the Turing Test, and since 1990 the Loebner Prize contest has been held annually to see which programs might pass the test. So far no one has won the grand prize by completely fooling the jury, but programmers keep trying.

Cleverbot, then, is one of the latest in a long history of efforts to imbue a machine with conversational intelligence. This program works through a Web browser. A user visits the Cleverbot site and sees a simple, Google-like interface: an input box with a blinking cursor. The user can type anything into the box, and Cleverbot will respond. If the user responds back, a conversation can begin. This structure closely imitates the original Turing Test:

this is a text-based conversation with a subject one cannot "see." Compared to other programs, Cleverbot has fared quite well in Turing Test competitions (Aron). What makes Cleverbot unique is the way it *learns* how to have a conversation. Every single utterance created by Cleverbot was first written by a human being. The theory behind this approach to the Turing Test is simple: a child learns to speak by imitating those around her. She learns the patterns of speech and learns that for example, "Hello!" is often followed by "Hi!" Likewise, every statement made by Cleverbot is an imitation of a conversation that it has "witnessed" in the past. Everything you type into Cleverbot's text box becomes part of its understanding of the rhythms and patterns of human conversation.

Using Cleverbot can be disconcerting. For example, look at a YouTube video of two Cleverbots having a conversation (*AI vs. AI*) Take note of how quickly the discussion leads to the existence of God, and then imagine Philip K. Dick smiling. However, despite the oddness of a conversation with Cleverbot, there is something very compelling about talking with it (her?). This echoes what Sherry Turkle found with *Eliza*, the famous Rogerian psychotherapist program created by Joseph Weizenbaum in the 1960s. As Turkle reports, *Eliza* was able to elicit long, personal conversations from users—even those who knew that *Eliza* was a program, not a person (291). Like *Eliza*, Cleverbot has strong holding power; machine or not, it's easy to get lost in a conversation with it. Its attractiveness as a conversational partner makes Cleverbot a useful in-class pedagogical tool, especially when Cleverbot is subjected to the Turing Test.

Replicating the Turing Test in Class with Cleverbot

To test machine thinking and to explore the ontological politics of being human, I created an in-class version of the Turing Test, involving two subjects: Cleverbot (which, or who, is very much software) and my partner, Jesse (who, to the best of my knowledge, is human). The class acted as the jury. Jesse and I talked extensively about the rules of the Turing test before class. She knew she had to try to fool the students. She also spent an hour in conversation with Cleverbot in an effort to scout the competition. Later I would realize that her tactic was to act like a machine, as a sort of double-agent: a human acting like a machine so well that it is clearly human. She did not reveal this strategy to me, however.

The class first read and discussed Turing's "Computing Machinery" essay, and became familiar with the rules. On the day of the test, I explained to the class that I had recruited both Cleverbot and a human to be interrogated in the game. On a computer in the classroom with a screen visible only to me, I opened Cleverbot in a browser window, and I connected with Jesse via an Instant Messaging program in another window. The students could not see the screen, so they could not know who was which; when we talked about the subjects, Cleverbot was labeled "Subject A" and Jesse "Subject B."

We started by interrogating Subject A. The students started the conversation, and I solicited questions from them as a class as the conversation developed. I typed their questions and comments into the browser text box, and then slowly read Cleverbot's responses aloud. I read slowly because although Cleverbot simulates human typing by returning answers typed character by character, the answers appear faster than a human can type. The students reacted to Cleverbot's responses with new questions and comments.[3] Almost everyone in the class volunteered questions, making for a lively conversation. They started with questions such as "Are you human?" "Are you a girl?," but after getting answers from Cleverbot, they started asking questions in a more conversational way, following up on what Cleverbot said. At one point, this resulted in Cleverbot reciting a limerick. The conversation lasted the required five minutes and no more.

Next, we moved to Jesse, or as the class knew her, Subject B. I switched windows to the Instant Messaging program connected to Jesse, who was working on a laptop at home, and we replicated the above process. My students had a conversation with her through me as a typing mediator. As I mentioned, Jesse's plan was to appear to be a human imitating a computer imitating a human. Because my students aren't professional interviewers, they often asked closed questions, and she was more than happy to offer binary yes/no responses. Once the students caught on to this, they asked more open-ended questions. Despite that, Jesse only offered the minimal response to these questions, answering in a staccato fashion.

After Subject B's five minutes were up, the students voted on which one was human, Subject A or Subject B? The majority of the 15 students selected Subject A, Cleverbot because it was, as they put it, more fluid, with more repartee, in short, "more human." Subject B—my loving and wonderful partner—was derided as robotic and cold. However, the minority who picked Subject B noted that B was *too* robotic, too cold; they surmised they were being tricked. They also pointed to Cleverbot's speed in answering questions, particularly when Cleverbot offered a full limerick in a matter of seconds. I had tried to read that slowly to make it seem as if it were being typed, but some students caught on.

After the class made their selection, I revealed the answer: Subject B was the human. The students who chose Cleverbot were surprised by this. For the remainder of the class, we had a discussion about why one entity appeared more human than another. How is "humanness" conveyed via text? Can the reader or listener use the ability to discern humanness in other situations where the ontological status of the entity is in doubt? I recall this being one of the best discussions we had all semester. Students talked about the challenges of programming a computer to have a conversation, and even more intriguingly, how to appear human in such circumstances.

I remember being a little chagrined that my partner Jesse, qua text, appeared robotic to my students. But, regardless of whether humans or the machines win the Turing Test, there are many pedagogical implication for using it in a class on technology.

3 I unfortunately did not save a transcript of either the conversation with Cleverbot or with Jesse.

Three Lessons From Cleverbot

The Turing Test with Cleverbot can raise many issues to be explored in class. In discussions of technology, students frequently demonstrate a reaction that David Nye calls the "technological sublime," a potent mix of fear, terror, awe, and even reverence toward technology. For these twenty year olds, networked computers, smart phones, and intelligent agents such as Siri are both helpfuland tormenting. Students speak of having to be in constant contact via their phones but not in personal contact with the people around them "in real life"; of the pace of life seemingly sped out of control by networked communication; of information overload; of their fear of machine intelligence; and of language being destroyed by texting. One common example that they offer is the group of friends sitting at a table together, all with heads down, texting, with no one speaking. At the heart of these concerns is what Langon Winner describes in *Autonomous Technology* as the ontological conception that technology is fundamentally autonomous and self-determining. Students often use language such as "technology is always changing" to describe what they're seeing, and assert that technology "forces" them to keep up. And yet, in many class discussions, students often argue that their problems, including those they see as created by technology, are fixable with more and better technology.

Thus one of my goals in The Culture of Computing was to get students to stop simply thinking of technology as developing outside human history and agency. Instead, I ask students to see how technology is socially constructed, where technologies come from, and how their meanings are created (Pinch and Bijker). We have class discussions and readings about origins and uses of technologies: every technological artifact arises from political and social struggle and debate. Somewhat paradoxically, Cleverbot—which appears to exist apart from social and political contexts, because it can do the highly intelligent task of having a conversation—can illustrate the process by which technologies are socially constructed. In a follow-up class after we conduct the Turing Test, students study the architecture of Cleverbot by reading the Cleverscript manual, and we talk about how every utterance that Cleverbot makes is derived from human intervention.[4] The manual reveals to students how programmable Cleverbot is, how much work goes into making such a system, and that it can be changed, including by anyone with enough programming knowledge. Rather than arising independently of culture, Cleverbot comes from a specific cultural history: the history of programming machines to imitate humans, and the history of encoding human activity into algorithms. Moreover, although the history of the Turing Test and the Loebner Prize is marked by failures in the sense that programs cannot pass the test, the real prize of such a test for programmers is a job working for firms seeking to automate and shape many human activities. As we discuss in class, Cleverbot, or any program, is not a neutral, rational system separate from human politics and culture.

4 Technical details on how Cleverbot operates are in the CleverScript manual, particularly Section 6.

This leads the class to broader, interpretive questions: why do programmers try to create machines that can act human? Such questions lead to concerns of political economy: Cleverbot emerges from a history of attempts to replace human labor—including emotional labor—with machines. For example, students link Cleverbot to online customer service interactions – and ask if the humans doing those jobs can be fired and replaced. Student who hold or have held such jobs often recognize this possibility. Cleverbot also links to bots that live within social media, so-called "socialbots," who are built to act human and autonomously interact with us while we're on Facebook and Twitter (Gehl). As I ask in classes, when these bots are used by governments, corporations, and celebrities to automatically shape our online interactions, what kinds of politics do they facilitate, and what kind do they inhibit? After I describe socialbots to students, those who use Twitter start to question how many of the accounts they follow are human and how many are not. Because socialbots are such a new phenomenon, in the Culture of Computing, students connect them to the science fiction we read (especially Asimov). Students also connect Cleverbot to other forms of artificial intelligence they encounter, such as suggestions Netflix and Amazon offer based on past choices. They ask: in what ways do such algorithms shape our tastes and choices? To what purpose? Such systems are starting to be used in higher education, in venues such as MOOCs, where we already see students algorithmically profiled and sorted (Young). Throughout the course, students consistently critically questioned—even hinted at rebelling against—automated systems that would categorize their tastes and their futures. In class, we also read Kurt Vonnegut's *Player Piano*, which addresses some of the same themes of replacement of labor by robots, computerized sorting of humans, and deadening yet "personalized" culture. Finally, we have a conversation about Siri. What does she help you find? What *won't* she help you find? How do her algorithms determine the difference? And who programmed her? In fact, Siri is one of the first connections the students make, and they start to look at her a bit more critically after our Turing Test. My hope is that students come to see Siri as something that is connected to the commercial goals of Apple, Incorporated.

Thus, thinking about Cleverbot redirects students from seeing technology as some sublime, naturalized, autonomous thing acting rationally to shape our lives for the best. Instead, they ask the important questions: where do technologies come from? Who built them? Why? Who benefits? Who doesn't? In subsequent writing assignments on the history of computing, students take up these questions and work through them as they critique the science fiction, science writing, and criticism that we have read.

In addition, the Turing Test with Cleverbot can help illuminate how language shapes perception, as well as the role of mediation in that process. I draw the students' attention to the highly mediated, highly delimited character of the test, where all interactions flow through text boxes. The next time I do this particular in-class activity, I want to

explore the question, "Where is communication *not* mediated?" Thinking about this question leads students to realize that, unless the Vulcan Mind–Meld is perfected among humans, there's simply no way to understand something or someone else without technological mediation; at the very least, the mediating technology of *language* is required. The often overlooked shortcomings of language are brought into stark relief by the Turing Test, which is predicated on using language proficiency as the sole determinant of intelligence. The human, we are to understand, is the master of language, and the machine is not. But of course, as students readily point out, all humans are sloppy with language: they use txt-speak and misspell words in writing; they confuse words and mispronounce them in speech; they struggle to describe complex and abstract phenomena such as emotion or culture because of the frailty and complexity of language in mediating experience. If a human cannot "master" the world by mapping language directly onto it, if language slips out of our control, it's no wonder a machine is clumsy with language, as well. In hindsight, looking back on this activity, one issue Cleverbot raises is that its linguistic quirks and foibles are the same as our human ones.

Finally, this discussion can be extended by thinking about other forms of mediation. Social media deploy what Korina Patelis calls a "transparency ideology": They ask, " 'where do you want to go today' not 'where are we taking you today?'" (121). Given the students' interest in social media, we spend several classes reading about and discussing Facebook, and we watch David Fincher's film *The Social Network*. Students discuss the ways in which Facebook shapes our online and offline lives through its culture and architecture. In other words, Facebook and other social media attempt to act as a mere service connecting friends; Facebook claims to "get out of the way" of our sharing and communication among our friends. Likewise, the Turing Test brackets off everything but pure textualized language, which stands in for intelligence. However, chatting with a robot via text might remind students of how mediated these systems are, how many things are left out of the equation, and this revelation can be linked to how mediated a site like Facebook is. In their class discussions and writings, students argue that Facebook friendship seems constrained and limited. Students raise many questions: in a site like Facebook, we often communicate through little text boxes—who's to say the person on the other end is human? Why are there such limitations in how we interact? How do these parameters shape interaction? From there, we can revisit the idea of technology as a social construction and ask, why is this constructed in the way it is? Is Facebook a place for "friends" and for communicating freely with real friends? What can't you do in Facebook, and why? Who benefits from Facebook's architecture and structure? Students consistently raise questions about the socially constructed architecture of Facebook, as well as any other form of communication. The Cleverbot exercise draws students' attention to these questions of social construction and mediation.

Conclusion

My first excursion into using Cleverbot in class has made me eager to adapt it to other pedagogical uses and to encourage colleagues to do so. It can help in exploring the gendering of technology: is a robot a male or female, and why? A writing instructor could use this version of the Turing Test to help students think about audience in a new way: how do you write questions to ferret out the robots among us? What does an interview with a chatterbot look like? How might it differ from an interview with a human, and why? Can students collaborate with Cleverbot in creative ways (as a filmmaker did with bizarre results in "*Do You Love Me*", *a Film by Cleverbot*)?

In my course, after the Turing Test with Cleverbot, several students chose to write a science fiction story for their final paper (an option I gave them at the beginning of the class). One story featured a man who fell in love with a robot only to become enraged when he learned that the robot was sent to spy on him. Another featured robots sacrificing themselves for their families. In a more conventional research paper, one student explored the history of computer-generated voices in popular music. In writing on our complex relationship with technology, students built on what they had learned from the Turing Test and were able to better engage the ontological politics of being human in a time of ubiquitous computing.

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