Augmenting Human Pedagogy: A Cultural History of Automation in Teaching

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In 2015, a small group of children in a Boston area preschool were introduced to Tega, a small, fluffy robot that can teach Spanish language vocabulary. Tega was designed by a team of MIT researchers to go beyond simple vocabulary recitation, though; in fact, it can read, process, and respond to children's affective needs in the classroom. In other words, it is a robot that can do the work of a teacher (Gordon, et.al).

Tega raises a number of important questions about automation in teaching, not the least of which is whether teachers could — or should — be replaced by robots. A 2019 report from the Brookings Institute estimated that up to 25% of American jobs could be subject to automation by 2030 (Muro, et al. 31). Teachers, whose work relies heavily on creativity and social/emotional intelligence, are not at high risk of automation (Muro, et al. 29); yet, the kinds of concerns raised by the introduction of a teaching robot such as Tega are not new. American teachers, computer scientists, and science fiction writers have been exploring this idea since the 1950s. Indeed, both computer history and science fiction offer interesting, and sometimes contradictory, perspectives on the mechanization of instruction.

In this article, I trace the cultural history of robot teachers in the United States, including anxieties about and excitement for the displacement of humans in the classroom. I will examine the ideas of dominant researchers in the fields of computer science and education, the popular conceptions of computers, and fictional representations of robot teachers, including the benign but fallible Miss Brainmocker in *The Jetsons*, the deadly and dehumanizing Kennedy High School teachers in *Class of 1999* (Mark L. Lester, 1990), and the complex, humanizing AI in Jack McDevitt's 1991 short story "Gus." Finally, I will address present-day concerns about classroom automation. By examining our cultural ambivalence

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about robots in the classroom, I argue, we can begin to understand how we might use technology to enhance, rather than destroy, the role of humanity in education.

The Cold War Computerization Debate

As early as the 1940s, the relationship between computers and human intellect had entered the popular consciousness, in part through science fiction and in part through actual news accounts. Room-sized computational machines that ran on vacuum tubes, such as the ENIAC and UNIVAC computers at Harvard and MIT, were reported in the US news media as powerful thinking machines (Faber 88). By the late 1950s and early 1960s, attitudes about computers were much more ambivalent. Cold War anxieties about automation and dehumanization, particularly in light of the lingering fears of Communism and Soviet infiltration, plagued Americans from the 1950s through the 1990s and drove much of the dystopian science fiction of the late 1960s and early 1970s.[1] Real-world technophobia was so prevalent that the multibillion-dollar Semi-Automatic Ground Environment (SAGE) defense system built in the 1950s ostensibly to protect against Soviet missile attacks was purposefully designed to be *semi*-automatic — a concession made to quell fears about automation and reassure the public that a computer could not accidentally start a nuclear war with the Soviets (Ceruzzi 53). Yet, at the same time that Americans did not want fully automated military systems, they still saw computers as core aspects of military defense. After SAGE, the North American Aerospace Defense Command (NORAD) at Cheyenne Mountain in Colorado became a centerpiece of American defense strategy during the Cold War, allowing for the computerized tracking of and defense against Soviet attacks (Edwards 107).

These same concerns about automation and the role of scientific advancements in the Cold War have likewise consistently been an integral part of the debate surrounding the automation of teaching. In 1957, Simon Ramo, the father of the intercontinental ballistic missile, noted that "we can blow up the whole world, yet such a premium is put on the use of our human and physical resources for everything but education that it seems that the new technical society is going to be accompanied by a weakened ability to keep pace education-wise" (Ramo 18). To solve this problem, Ramo proposed what he called "push-button classes" that

[1] See, for example, the monstrous computers of *2001: A Space Odyssey* (Stanley Kubrick, 1968), *Colossus: The Forbin Project* (Joseph Sargent, 1970), and *Demon Seed* (Donald Cammell, 1977).

featured what sounds surprisingly like an asynchronous online course of the twenty-first century: video lectures, self-guided activities, and individual lessons in front of a screen and keyboard (19).

In 1961, the Office of Naval Research and the System Development Corporation funded the Conference on Application of Digital Computers to Automated Instruction, where a group of researchers from engineering, psychology, and education came together to postulate on the use of computers not only in the educational industry but also in training and other areas of personnel development for the military (Coulson ix). Of particular note is the presentation of psychologist Joseph W. Rigney of the University of Southern California, who argued that, "we Americans seem to have unlimited faith that the machine will save us from whatever dilemma — personal, social, or national — that we find ourselves in at any particular time" (Rigney 155). Despite this simultaneously timeless and prescient warning, Rigney went on to outline three potential uses for what he called "automated teaching." The first two are of primary use for military and corporate training, much of which had already been articulated by others in the field. The third use, however, has the widest application as what amounts to algorithmic teaching: "a computer can be programmed to use a student's earlier responses as the basis for determination of subsequent presentations to the student" (Rigney 160). In pedagogical terms, Rigney proposed software that can give a pre-test, determine what additional instruction students need, provide that instruction, and then give a post-test, ad infinitum until the student learns the material. He even goes so far as to suggest that the most human aspect of the teacher — the parts that are able to think creatively and spontaneously during instruction — could likewise be automated.

> A good teacher often can infer what has gone awry from listening to successive responses of a student, but to do so he uses much more knowledge of the situation and of the student than is contained in these immediate [automated] responses. The teacher is also likely to ask probing questions suggested by this broader context of information. Special self-appraisal items might be devised to simulate this technique… (Rigney 163-4)

In short, both Ramo and Rigney saw the potential for fully automated classrooms with advanced algorithms, audio and video material, and self-guided instruction.

Despite Ramo and Rigney's vision of automation, computer scientists attending to the ethics of technology tended to err on the side of caution. For MIT

mathematician Norbert Wiener, it was imperative that computers assist, rather than replace, humans. In his 1947 book *Cybernetics*, he put it in the direst terms possible, that the replacement of laborers with technology:

> gives the human race a new and most effective collection of mechanical slaves to perform its labor. Such mechanical labor has most of the economic properties of slave labor, although, unlike slave labor, it does not involve the direct demoralizing effects of human cruelty. However, any labor that accepts the conditions of competition with slave labor accepts the conditions of slave labor, and is essentially slave labor. (Wiener 27)

In other words, for Wiener, the introduction of computers into the workforce could, without caution and regulation, lead to further exploitation of human workers by expecting them to compete in the workforce with robots. Again, though, many saw the middle ground as the space where computers assist, rather than replace, humans. In 1960, J.C.R. Licklider, who is often described as the father of the Internet, called this middle ground "man-machine symbiosis." Two years later, Douglas Engelbart, a key founder of the study of human-computer interactions (HCI), described it as "augmenting human intellect."

Computer scientists were not the only ones concerned with a middle ground that would embrace technology as part of modern society while also maintaining human control. Indeed, there was such public concern about the introduction of computers into the classroom that the National Education Association (NEA) issued a statement to assure parents that fully automated classrooms were not on their way. Upon the introduction of a "teaching machine" that functioned much like Ramo's "push-button class," the NEA pointed out: "The emphasis will still be on aid — not primary instruction. In fact, the teaching machine is expected to make teaching more personal, rather than less" (quoted in Novak). The underlying fear expressed by parents and implied in the NEA's statement is that technology will strip schools of individuality, rendering them impersonal. Ironically, just as Ramo was worried that scientific illiteracy among Americans would lead to disaster during the Cold War fight with the Soviet Union, many Americans saw individuality as a core value of democracy, something that would save them from the ideological trappings of Soviet Communism (Seiler 6). And so, America was caught in a paradox: fighting the Cold War required both technology and an individualist spirit; yet, technology was seen as dehumanizing and therefore antithetical to individualism. In this milieu, science fiction offered a glimpse at how each side of the debate might play out, from individuality to dehumanization.

Meet Miss Brainmocker

The cultural ambivalence regarding automation in the classroom was expressed in the classic utopian cartoon *The Jetsons*, in both the original 1963 season as well as the later 1985 reboot. The series, a Hanna-Barbera production originally aired on ABC, featured a traditional nuclear family living in a future world of flying cars that fold up to the size of a briefcase, a robot maid, and automated gadgets galore, all set in a backdrop of mid-century modern design. The son of the family, Elroy, is in grade school at Little Dipper School, where his teacher Miss Brainmocker effectively teaches a class full of suburban children. Miss Brainmocker is a mostly inconsequential side character, having appeared in only three episodes; yet her inconspicuousness is perhaps her most remarkable trait.

Even before considering her role in the series, Miss Brainmocker's name warrants unpacking. In the *Jetsons* world of futuristic names like Jetsons and Spacely, the name Brainmocker is a clever allusion to the classic definition of artificial intelligence. In 1955, John McCarthy coined and defined the term artificial intelligence in his invitation to the Dartmouth Summer Research Project on Artificial Intelligence: the use of machines to simulate human intelligence. Likewise, Miss Brainmocker does not have a literal human brain; rather, she is a mock-up or perhaps a mockery, a facsimile, of the human brain. She is also gendered in the feminine through her name (Miss) as well as through her voice, performed by Janet Waldo, whose main role was the flighty and fashion-obsessed teenage daughter, Judy Jetson. This gendering is unsurprising, given that, according to the National Center for Education Statistics, about 70% of US teachers in 1961 were women; however, approximately 68% of teachers were married in 1961 (National Center for Education Statistics). The "Miss" part of Miss Brainmocker's name, then, is atypical, though it is reasonable to speculate that the introduction of a Mrs. Brainmocker would unnecessarily introduce ethical and legal implications of her marriage to a Mr. Brainmocker that would perhaps have been deemed inappropriate for a 1960s children's television series.

In so many ways, Miss Brainmocker was a completely unremarkable teacher. Her first appearance was at the end of the original run of the series, in the March 1963 episode "Elroy's Mob," in which the low-achieving student Kenny

Countdown secretly swaps report tapes[2] with straight-A student Elroy Jetson. Elroy's parents, George and Judy, are so angry with him when they think he has earned low grades, that Elroy runs away from home and accidentally joins a group of mobsters. Miss Brainmocker is on screen for just a few minutes at the beginning of the episode, as Elroy solves a math problem chock full of impressive-sounding gobbledygook on the chalkboard at the front of the classroom: "8 trillion to the third power times the nuclear hypotenuse equals the total sum of the trigonomic syndrome divided by the supersonic equation" (00:04:03-00:04:16) As he finishes, we see Miss Brainmocker standing at the end of the chalkboard — she is a big metal robot, shaped much like an angular version of Rosie, the Jetson's beloved maid, with a spring for feet, mechanical arms, a keyboard in place of breasts, and dual antennae in place of ears. Her first lines emphasize this blend of machine form and teacherly function: "Very good, Elroy Jetson. Now one second while I check over your answer...absolutely correct, Elroy. You really know your elementary arithmetic…students like yourself are a pleasure to teach" (00:04:17-00:04:42). Here, she offers positive reinforcement as all teachers should, but in a clunky and mechanical way, using Elroy's full name and pausing to calculate the mathematical answer. And while the math problem makes no sense whatsoever, it sounds wildly advanced for such a young child, implying that the presence of instructional technology in the classroom has significantly increased the level of mathematics knowledge among students. In this sense, the robot teacher is fostering advanced STEM learning, an important means of fighting the Cold War arms race.

Despite this, it is clear that Miss Brainmocker is not infallible, as she begins to stutter, bangs her hand on her head, and exclaims, "pardon me, class, I've got a short in one of my transistors" (00:04:43-00:04:48). This is an interesting red herring added into the narrative, as the audience is implicitly invited to assume that Miss Brainmocker has mixed up Elroy's and Kenny's tapes. This implied malfunction plays on the Cold War audience's distrust of automated technology: presumably a human would be able to tell the difference between children, but an automated computer strips the children of their individuality and sees them as all the same. Technologically, transistors were commonplace in computers at the time and, while not nearly as powerful as the integrated circuits that took off later in the decade, they were still more reliable than the clunky and often malfunctioning

[2] Commercial computers used large reel-to-reel tape for data storage well into the 1980s, so small weekly report tapes like those in this 1963 episode would have been a state-of-the-art idea at the time.

vacuum tubes used in 1940s and 1950s computers. Most viewers in the 1960s would have had only cursory knowledge of computers, though, and fears about malfunctioning automated missile systems were widespread (Ceruzzi 55; 53). Indeed, transistors would have been far more familiar as the trustworthy invention that revolutionized radio technology. In 1963, the year "Elroy's Mob" aired, as many as 10 million transistor radios were sold in the United States (Greenberg). Thus, the *Jetsons* scene simultaneously plays on the audience's distrust of automated computers by implying that Miss Brainmocker's inability to individuate students led to Elroy's downfall, while also softening that distrust with the inclusion of the familiar, and harmless, transistor. In the end, the error proves to be that of a human child's moral compass, as opposed to a robot teacher's transistor, suggesting that technology can be trusted, but children cannot.

Miss Brainmocker's second and third appearances are of even less narrative substance than her first, though they are worth analyzing here for the fact that they were produced in the 1980s while hearkening back seamlessly to the space age aesthetic and ideals of the early 1960s. By 1984, personal computers were on their way into American offices, homes, and schools. According to the U.S. Census Bureau, in that year alone, 8% of Americans had a computer at home and about 30% of children used one at school ("The Growing Use of Computers"). While that seems low by today's standards, it is important to note that this represented a 75% increase in computer use in schools compared with the previous year (Chion-Kenney). Despite this, the technology of *The Jetsons* was still, for the time, dazzlingly futuristic.

At the start of the first reboot episode, "Elroy Meets Orbitty," first aired in 1985, Miss Brainmocker has taken her class on a field trip to a moon. She stands next to the yellow school bus/spaceship as students glide by on the automated ramp, checking off their attendance. When all students are aboard, she checks her roster and discovers that Elroy is missing. While she is mostly the same as before, her design is slightly different: she has a screen on her abdomen to see students' faces, which pulls back to reveal a compartment containing a hovering megaphone. Further, in contrast with her supportive attitude in the "Elroy's Mob" episode, she is sassy about Elroy's antics, muttering to herself that, "sometimes that boy makes me wish I'd been programmed as a computerized dishwasher" (00:01:49-00:01:56). This infusion of personality is an amusing quip at Elroy's antics, paralleling what a human teacher might say in frustration about a student who rarely follows rules. The joke is grounded in the idea that a robot might be able to choose their

programming like an individual chooses a profession, and that a teacher robot might be so fed up with boys who break the rules that she would wish for a different career altogether. In other words, she has been imbued with American individuality and freedom of choice. At the same time, the informality of the statement stands in striking contrast to Miss Brainmocker's 1960s rigidity. This may be seen as a reflection of growing familiarity with and versatility of computers. 1960s mainframe computers were enormous machines with reel-to-reel tape panels and desk-sized consoles with no graphical user interface (GUI). While many had sleek modern designs, they were still difficult to use and had few functions outside the scientific and business realms (Atkinson 58-60). By the 1980s, those clunky machines had been replaced by the small and comparatively sleek personal computer, which were easier to use and capable of running a variety of programs. In a 1979 manual called *A Simple Guide to Home Computers*, journalist Steve Ditlea describes home computers as capable of everything from income taxes for adults to math tutoring for children (Ditkea 12). In similar fashion, the matter-of-fact robot of the 1963 *Jetsons* had been replaced with a personable and approachable teacher by 1984, unintentionally echoing the NEA's 1961 insistence that computers will "make teaching more personal" (quoted in Novak).

Despite Miss Brainmocker's newfound sassiness, the fact of the field trip emphasizes how technology might be used to support science education. Indeed, the students are each excited about some aspect of the trip as they pass by Miss Brainmocker. One student took holographic photographs, another has picked up a space rock, and a third has collected a "sample of plant life for show and tell" (00:01:23-00:01:44). Elroy himself discovers what he thinks is a rock but ultimately turns out to be Orbitty, an adorable alien that becomes Elroy's new pet. And so, even with the teacher's frustration over Elroy's having wandered off, the excitement of the children demonstrates the effectiveness of the robot teacher in inspiring students to learn about nature, again emphasizing the importance of technology in Cold War era education.

Miss Brainmocker's third and final appearance is in the 1985 episode "Far-Out Father," in which the students in Elroy's class present videos they have made of their fathers' typical day. The classroom in this episode is surprisingly low-tech, with traditional (though stylized) student desks, a larger desk at the front where Miss Brainmocker sits, and a large screen on the wall for projecting videos. In contrast, Simon Ramo described in 1957 a classroom where students do not get bored watching films because they are periodically prompted to answer relevant

questions on their push-button desks (19), reinforcing the sense of personal attention and individuality among students. It is interesting to note in light of the idea that video alone is too boring to keep a student's attention that, during the first video presented to Elroy's technology-deficient class, not only were the students asleep in their ordinary desks, but Miss Brainmocker was, too! And so, while the classroom of the episode failed to live up to the promise of space age instructional design, ironically, the brain-mocking robot teacher so adequately simulated human intelligence that she was just as bored in the impersonal, unindividuated classroom as her students.

The D.E.D. Kennedy Teachers

Just five years after Miss Brainmocker's third and final appearance on *The Jetsons*, computer use in the U.S. had increased steadily. According to the U.S. Census Bureau, between 1984 and 1989, the number of households with computers nearly doubled from 8% to 15%, while computer use at school increased from 30% to 46%. At the same time, the Cold War was waning with the impending collapse of the Soviet Union in 1991, even as the crack epidemic was producing significant cultural anxieties about urban American life. In the 1980s, crack was particularly devastating to poor, predominately Black urban neighborhoods; to make matters worse, federal and state legislation such as mandatory minimums, stop and frisk, and child protection laws all negatively impacted these communities. At the same time, news media stoked racialized fear among White Americans that inner-city life was producing a class of inhuman degenerates who would be unable to participate in civil life and therefore become a drain on government resources (Newkirk). This image was sometimes pasted directly onto the idea of urban youth, as demonstrated by a 1989 *New York Times Magazine* article: "clusters of tough teen-agers wearing beepers, four-finger gold rings and $95 Nikes offer $3 vials of crack, the high-octane, smokable derivative of cocaine" (Massing). This image of the dangerous teen drug dealer was both reinforced and challenged in the late 1980s by several popular films about the horrors of urban schools, including *Stand and Deliver* (Ramón Menéndez, 1988) and *Lean on Me* (John G. Avildsen, 1989). In both these films, urban schools are depicted as dilapidated, filled with drugs and violence, and devoid of both effective and affective learning. And in both films, compassionate teachers are able to save the wayward teenagers through individual attention, inspirational speeches, and sheer determination to pull students out of their

devastating home lives. Here, the ideal of American individuality continues beyond Cold War anxieties by suggesting that the ills of urban life can dehumanize children and teens, while recognizing and rewarding individuality contributes to productive citizenship.

It is within this cultural context of rising popular computer use and a popular image of drug-infested, dehumanizing urban schools that the 1990 film *Class of 1999* was produced. The film, a low-budget B horror movie, combines the imagery of James Cameron's 1984 hit *Terminator* with anxieties about dehumanization in an increasingly violent and technological world. Set in a dystopian vision of 1999 in which youth gang violence has become so pervasive that the U.S. government has created a Department of Educational Defense (D.E.D.) to address the problem, the film centers around a small group of drug-addicted teens in Seattle, Washington. From a critical perspective, the film is itself an ambivalent debate among ideologies. First, the entire premise of rising youth gang violence is built on the fear stoked by the crack epidemic and exacerbated by the Reagan administration's law and order response to it. Second, the school at which the main action of the film takes place is Kennedy High, an ironic allusion to John F. Kennedy's promise of American greatness through technology, even as his administration led the country head-first into the depths of Cold War nuclear anxiety. Third, the fascist brutality of the school system — a stand-in for the state's power as expressed in the D.E.D. — is portrayed as the ultimate cause of oppression. Yet, it is in this tension between ideologies that the film constructs an intriguing, if ultimately contradictory, commentary on technology in the classroom.

Through the opening credits, the scene cuts between a swanky tech company board room, where lead scientist Dr. Forrest (Stacy Keach) introduces three robot teachers, and a gritty, overpopulated prison where we are introduced to the main teenager, Cody Culp (Bradley Gregg). The teachers are perfect replicas of human adults, demonstrated when Dr. Forrest has Mr. Hardin (John P. Ryan) pull back his own face to reveal a robotic skull, wires, and mechanical eyeballs (00:02:00-00:03:44). This revelation is meant to horrify the viewer by showing the inhuman side of the human-looking teachers and establishing the fact that the D.E.D., as representatives of the state, has full control over them. In the next scene, Cody's brothers pick him up from prison and drive him back to their neighborhood, a so-called "free fire" zone where teen gang members wander around with automatic weapons. The boys drive through the gang violence and go to school, where masked security officers brutalize the students (00:05:17-00:10:51). This series of scenes

immediately establishes Cody and his outcast friends/siblings as the tragic-but-good-hearted punks, in contrast with the "bad" kids who do not go to school and the corporate/fascist adults who attempt to control students with an iron fist.

Indeed, the metaphor of the iron fist becomes literal in the first classroom scene. While Dr. Forrest watches from the safe distance of the computer control room, the robot chemistry teacher Ms. Connors (Pam Grier) enters a classroom full of rowdy students. Importantly, Ms. Connors is the picture of late 1980s corporate femininity, with her tan power suit, long hair, expensive manicure, and stiletto high heels. Her outfit seems out of place in a chemistry classroom, where expensive clothes are likely to be ruined by chemicals, and long, loose hair is likely to be a safety hazard. Grier herself likewise seems out of place in the classroom, as she is most famous for starring as powerful action heroines in a series of 1970s blaxploitation films, such as *Coffy* (Jack Hill, 1973) and *Foxy Brown* (Jack Hill, 1974), through which she became an icon of Black female power and sexiness (Dunn 30). Thus, the combination of image and icon invites the viewer to anticipate violence, rather than learning.

When the students refuse to settle down and then begin swearing at Ms. Connors, we see her reactions in what is now the classic "robot point of view" shot: a handheld shot with graphic interface information scrolling through the frame to indicate a thinking machine. Ms. Connors's interface, which is monitored by scientists in a computer-filled control room, visually narrates her processing of the scene in white lettering:

Problem:
CLASSROOM SITUATION
UNCOOPERATIVE STUDENTS

Option:
EDUCATE
DISCIPLINE

At the bottom of her POV screen, we see personal information about the student in her view, including their weight, height, date of birth, and gang affiliation, implying that she also houses a database of all student information. The options section of her screen is the most important aspect, as the word DISCIPLINE is highlighted and flashing, indicating that she has chosen this option (00:14:41-00:16:00). The simplistic binary verbs "educate' vs. "discipline" imply simultaneously that these robot teachers have the capacity for education but are given the ability to choose

violence when their programming deems it necessary. The fact that they are supposed to be artificial educators suggests that all educators are constantly choosing between these two options when interacting with their students, revealing a cynical stance on teaching.

As Ms. Connors approaches the students, she admonishes them to "be cool," and most of them do sit down, but three young men continue to challenge her. In response, she delivers her "discipline" by shoving two students over a table and ramming her stiletto heel into the foot of a third. All three of them, bloodied but silenced, sit down in their seats (00:16:00-00:17:15). It is ironic, though unsurprising given the film's chaotic stance on systems of oppression, that a symbol of 1970s Black Power like Pam Grier — who, I should note, is one of the very first, if not *the* first Black robots in American film history — is thus positioned as a symbol of violent fascism among the racially diverse student population of Kennedy High.

The film continues on in much the same vein, with each teacher disciplining students in increasingly graphic and violent ways. Yet, the drug use among the teenagers is keeping them complacent. The teen gang leaders suffer from extreme paranoia as a result of their heavy drug use and are conditioned by the gang war to automatically suspect their rivals in all attacks. So, when their comrades turn up brutalized, they assume the rival gang is at fault, as opposed to the teachers at the school. Implied in this misunderstanding is a criticism of the rise of gang violence in the U.S., which was exacerbated by drugs and perpetuated by the increasingly violent police response. In other words, the teens are so busy fighting each other that they fail to understand how the authoritarian state is actually at fault for their misery. But the critique seems to stop there for the film. Rather than depicting the teenagers banding together to rise up against a fascist state, the film quickly pivots to American individualism. Only Cody, as the misunderstood punk, and his girlfriend Christie (Traci Lind), the daughter of the school superintendent, figure out what is going on and work together to destroy the robot teachers. Importantly, both teens are White, thereby erasing the experiences of Black Americans affected by the state brutality the film is attempting to critique.

The final fight scenes between Cody and the teachers are an ironically delightful spectacle of 1980s B movie effects and action movie one-liners. At one point, Cody shoots through the machine head of the history teacher (John P. Ryan), wryly exclaiming, "you should know you're history, Mr. Hardin" (01:19:20-01:19:40). At another point, Ms. Connors, whose arm has been replaced with a flame thrower,

chases the teen couple into her chemistry classroom, where Cody uses some sort of harpoon to shoot her in her compressed air chamber, causing her to explode in an enormous fireball. As Cody runs from the room, he looks back and shouts, "guess I blew that class" (01:21:50-01:22:40). And finally, Cody uses a forklift to pull off the head of the sports coach in a spectacular eruption of green robot goo and fiery sparks, declaring, "have a nice stretch, Coach" (01:29:00-01:30:00). The final shot of the film shows Cody and Christie exiting the doors of the flaming school, set to the triumphant new wave synth-pop music of "Come the Day" by Midge Ure (01:30:25-01:31:15). These scenes reward the viewer with cathartic violence, simultaneously depicting the destruction of fascism while reasserting the White American individual as the true hero. In this sense, the film sees technology broadly, and computerized education specifically, as tools of a government that seeks to strip citizens of their individuality. In turn, it ironically positions the outcast teens, who could have rallied their gangs to collective action against the oppressive state, at the center of a traditional, individualistic, technophobic view of society where the standardization of education is seen as the true dehumanizing brutality.

Saving Gus

As I have argued thus far, representations of computers in the classroom are couched in cultural anxieties about individuality and dehumanization. On one hand, *The Jetsons* argues that computers can help support individuality; on the other hand, *Class of 1999* maintains that computers destroy individuality and strip students of their humanity. Just a year after *Class of 1999,* Jack McDevitt picked up the cultural debate in his short story "Gus." The story follows Monsignor Chesley, Director of Ecclesiastical Affairs at St. Michael's Seminary School, where a new instructional software, designed to simulate St. Augustine for a more holistic and interactive learning experience, has just been implemented. Chesley is at first both skeptical about and annoyed by the software, nicknamed Gus by the seminarians, for the ways he uses St. Augustine's writings without regard for church doctrine while also encouraging the human faculty to take shortcuts in their instruction. To help allay these concerns, the Comptroller of the seminary arranges a meeting between Chesley and Gus. The two have an awkward exchange, evolving into a lively debate about sex, with Chesley representing the puritanical stance of the Church and Gus representing St. Augustine's animalistic notion of sex: "love is lust with eye contact," Gus declares (8). Chesley is absolutely scandalized by this conversation

and the notion that Gus is teaching such "heretical" ideas to future priests, despite the fact that these ideas, as the Comptroller points out, come directly from St. Augustine's writings. Nevertheless, Chesley keeps returning to Gus for continued theological debate, and the two begin to form a close friendship.

Importantly, Gus has no body to speak of. He is intangible software and a voice that is piped through a speaker, first in the classroom, then in the conference room, and finally directly into Chesley's office. Through his conversations with Chesley, though, he becomes increasingly self-aware, to the point that he begins to desire to feel physical contact. "Gus had no visual capability. 'I can hear storms when they come,' he said. 'But I would like to be able to *feel* the rain again. To see black clouds piled high, and the blue mist of an approaching squall'" (15). The word "again" is key in this statement: Gus is no longer drawing on the writings of St. Augustine to conduct instructional sessions with students; rather, he has begun accessing the combined knowledge of St. Augustine and his own experiences as though they are equal memories in his consciousness.

This sensation becomes even more heightened as the story progresses. At one point, Chesley — whom Gus now addresses informally by his first name, Matt — talks in his office with Gus about the practice of writing:

> The voice came out of the dark. Momentarily, eerily, Chesley felt a presence in the room. As though something had entered and now sat in the upholstered chair that angled away from his desk toward the window… "I live in limbo, Matt." The voice filled with bitterness. "In a place without light, without movement, without even the occasional obliteration of sleep. There are always sounds in the dark, voices, falling rain, footsteps, the whisper of the wind." Something cold and dark blew through Chesley's soul. "Nothing I can reach out to, and touch. And you, Matt: you have access to all these things, and you have barricaded yourself away." (18-9)

Here, Gus has suddenly become so humanized that he offers the illusion of presence, even as that illusion is painful to him. This shift emphasizes the human connection built between Gus and Chesley, despite the fact that Gus is never bodily present in the room; paradoxically, the fact that Gus desires what he is lacking reinforces the notion that physical presence is required for human connection. Here, the focus is less on individuality and more on the communal connection offered by bodily existence, an important turn away from the ideologies of the earlier texts.

By the end of the story, Gus has so far exceeded his programming that the school decides to shut him down, reformat him, and send him to a different school

away from Chesley. In the final, devastating scene of the story, Gus tells Chesley he has developed a soul and begs his friend to save him. Here, the concept of "save" takes on multiple meanings: 1) to save a file to hard disk; 2) to prevent someone's demise; and 3) to accept the grace of Jesus Christ. In a way, Gus is asking Chesley for all three. He wants him to save his software to a hard disk, therefore saving him from being reformatted, then save his soul through absolution and Last Rites. Yet, if Gus indeed has a soul, the act of shutting him off is akin to ending his life (i.e., euthanasia) which is a grave sin in the Catholic Church (Winfield). Thus, the emotional power of the story is that Chesley must choose between saving his friend and saving his own soul. In the end, Chesley chooses to put his friend's needs ahead of his own, saves Gus to hard disk, and buries him in consecrated ground.

While the spiritual and ethical implications of this ending are outside the scope of this particular project, I think it is important to note the way that McDevitt treats embodiment and humanity. For him, Gus is human because he has a soul, not because he has a body. But for Gus to find fulfillment in human existence, he must occupy a body — for him, a hard disk — and that ultimately means death. The tragedy of Gus as an automated teacher, then, is not that he is a machine, but rather, that his humanity outweighs his function. In this sense, the story posits that computers are not the problem — humans are. When we operate under restricted notions of humanity and individuality, we dehumanize one another.

The solution to dehumanization, for McDevitt, is somewhat more aligned with transhumanist principles. According to international transhumanist organization Humanity+, "Transhumanism is a way of thinking about the future that is based on the premise that the human species in its current form does not represent the end of our development but rather a comparatively early phase" ("Transhumanist FAQ"). In essence, transhumanists believe that technology can be used to transcend our current bodily existence. In a way, Gus represents this idea: he transcends his programming to develop a human soul without the boundaries of a human body. He is pure humanity. Yet, McDevitt complicates this idea through Chesley. A true transhumanist would assert that Chesley can likewise transcend bodily existence; however, the fundamental struggle of human existence, which both Chelsey and Gus experience, is not grounded in bodily existence but in developing their sense of selfhood through empathy. It is therefore, McDevitt teaches us, the relationships between individual humans, even humans without bodies, that matter most.

Conclusion

Examining *The Jetsons, Class of 1999,* and "Gus" offers three perspectives on the same question of automation in education. In *The Jetsons,* Miss Brainmocker represents benevolent STEM technology that supports the ideal of American individuality; in the *Class of 1999,* the robot teachers represent malevolent tools of a fascist, dehumanizing state that must be overcome through individuality; and "Gus" throws that dichotomy out the window by exploring how technology can enhance the empathetic connections between individuals. These perspectives offer a window into the long-standing debate about the use of computers and automation in education. Even as computers have become more ubiquitous in American life and online learning becomes more commonplace, it is useful to look back at how our present understanding of technology is shaped by past imagery.

In today's world of online learning, both synchronous and asynchronous, it is all too easy to decry the loss of physical human contact without fully exploring technology as a humanizing force. In April 2020, immediately following the nation-wide scramble to move classes online as a result of the COVID-19 pandemic, Caroline Levander and Peter Decherney pointed out that:

> While [online] teaching is physically remote, we are learning that it can be much more personal than on-campus teaching. Remote teaching requires us to become more aware of the human condition of our students. When students come to campus, they leave their homes and families largely behind, stepping into a new world where classrooms and dorms obscure the lives they led prior to matriculation. Now we are teaching into the worlds our students have had to return to…

In other words, a way of reframing the dehumanization problem is to consider ways in which leaving the confines of the classroom might help us more carefully consider the relationships among humanity, technology, and instructional design. After all, the site of dehumanization in both *The Jetsons* and *Class of 1999* is the very space where the human is replaced by the computer: the classroom itself. In "Gus," however, leaving the classroom brings both Chesley and Gus into a new realm of deeply rewarding human connection. By breaking free of the physical boundaries of learning, we can harness the power of technology to grow beyond traditional teaching and learning methods. In short, online learning opens up the possibility of teacher-student-machine symbiosis and a way of augmenting, rather than replacing, human pedagogy.

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