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REFLECTING ON THE FUTURE OF LAW AND TECHNOLOGY EDUCATION: USING FILM AND TELEVISION AS A TOOL TO TEACH THE ETHICAL, LEGAL AND SOCIAL IMPLICATIONS OF EMERGING TECHNOLOGIES

Dov Greenbaum*

ABSTRACT

The COVID-19 pandemic has exacerbated a long-standing problem in post-secondary education: the competition for student attention in a world full of more interesting distractions. This problem is magnified in the teaching of the ethical legal and social implications of new and emerging technologies (“ELSI”) where the technologies are often complicated, the legal concerns esoteric and non-intuitive, the social issues non-obvious, and the ethical analysis constantly shifting. To teach students in a time where they are both physically and mentally distant from the educator, this Essay aims to provide a solution that appropriates the distractions and repurposes them into the educational process. More than just using media as a crutch for learning, we should place it at the center of the course and as the source from which all the other learning evolves. *Black Mirror*—the British anthology series that is just steps ahead of our current timeline with regard to emerging technologies—is a perfect lynchpin for such a course. Herein, this Essay describes the purpose of such a course, as well as additional aspects of the curriculum—including socially distanced interviews with stakeholders within the science-fiction film industry. My goal is to provide students with the necessary skills to not only examine emerging technology through the ELSI lens, but to inculcate them with the appreciation that everything, even simple television, can be a learning opportunity.

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INTRODUCTION

The coronavirus pandemic has forced much of the higher education establishment to reassess many of its current pedagogical models, its overall role in modern society, the usefulness of physical campuses and degree programs—and a multitude of other trappings demanded by the various conventional wisdoms relating to post-secondary education.^{1 2}

As a result of the mass closures, shutdowns and quarantines, and the other emergency measures instituted by universities to protect individual and community health during the pandemic—many higher education establishments are still facing economic hardships more than two years into the pandemic in their struggle to continue to educate the next generation during COVID-19.³ However, more fundamental than the finances, universities and their educators must comprehensively rethink how they can optimally assimilate their students into what looks like an emerging paradigm shift in education that will result in a longer-term remote-learning *weltanschauung*—somehow divining how to best inculcate their students from afar.⁴

I.

The struggles of educators in the modern connected world predate COVID-19. Professors have long had to compete with outside distractions that successfully

¹ Doug Lederman, *Presidents' Growing Worry? Perceived Value of College*, INSIDE HIGHER ED. (June 29, 2020), <https://www.insidehighered.com/news/survey/college-presidents-increasingly-worried-about-perceived-value-degrees> [https://perma.cc/99UL-G3PJ].

² Susan Dynarski, *College Is Worth It, but Campus Isn't*, N.Y. TIMES (July 3, 2020), <https://www.nytimes.com/2020/06/29/business/college-campus-coronavirus-danger.html> [https://perma.cc/BZK8-D7A4].

³ Paul N. Friga, *Under Covid-19, University Budgets Like We've Never Seen Before*, THE CHRON. HIGHER EDUC. (Apr. 20, 2020), <https://www.chronicle.com/article/under-covid-19-university-budgets-like-weve-never-seen-before/> [https://perma.cc/4JC7-YNVT].

⁴ Marguerite Wotto, *The Future High Education Distance Learning in Canada, the United States, and France: Insights From Before COVID-19 Secondary Data Analysis*, 49 J. EDU. TECH. SYS. 262, 273 (2020).

(mis)appropriate students' attention.⁵ Today it may be smartphones and social media; tomorrow it will be something else.⁶

However, this struggle has been exacerbated by the aforementioned increase in distance between the educator and their charge.⁷ Although previously protected by the isolation of the ivory tower bubble—many students are still at least intermittently disconnected from the physical classroom, and immersed and enmeshed within the real-world and the myriad of distractions and diversions that come with it—it is now harder than ever, regardless of jurisdiction, to attract and sustain a student's interest.⁸

⁵ Andrew Lepp, Jacob E. Barkley & Aryn C. Karpinski, *The Relationship Between Cell Phone Use and Academic Performance in a Sample of U.S. College Students*, SAGE OPEN (Feb. 19, 2015), <https://journals.sagepub.com/doi/pdf/10.1177/2158244015573169> [<https://perma.cc/ZY8Q-HDR4>]; Jesper Aagaard, *Media Multitasking, Attention, and Distraction: A Critical Discussion*, 14 PHENOMENOLOGY & COGNITIVE SCIS. 885, 885–96 (2015); Bill Thornton, Alyson Faires, Majja Robbins & Eric Rollins, *The Mere Presence of a Cell Phone May Be Distracting*, 45 SOC. PSYCH. 479, 479–88 (2014); Richard C. Emanuel, *The American College Student Cell Phone Survey*, 47 COLL. STUDENT J. 75, 75–81 (2013).

⁶ Najya A. Attia, Lubna Baig, Yousef I. Marzouk & Anwar Khan, *The Potential Effect of Technology and Distractions on Undergraduate Students' Concentration*, 33 PAK. J. MED. SCIS. 860, 864 (2017).

⁷ Hancheng Cao, Chia-Jung Lee, Shamsi Iqbal, Mary Czerwinski, Priscilla Wong, Sean Rintel, Brent Hecht, Jaime Teevan & Longqi Yang, *Large Scale Analysis of Multitasking Behavior During Remote Meetings*, CHI CONF. ON HUM. FACTORS COMPUTING SYS. (May 2021), https://hci.stanford.edu/publications/2021/cao_remote/CHI2021-RemoteMeetingMultitask.pdf [<https://perma.cc/8R4E-MLJS>]; Margaret E. Morris, Kevin S. Kuehn, Jennifer Brown, Paula S. Nurius, Han Zhang, Yasaman S. Sefidgar, Xuhai Xu, Eve A. Riskin, Anind K. Dey, Sunny Consolvo & Jennifer C. Mankoff, *College From Home During COVID-19: A Mixed-Methods Study of Heterogeneous Experiences*, PLOS ONE (June 28, 2021).

⁸ Beth McMurtrie, *A 'Stunning' Level of Student Disconnection*, THE CHRONICLE OF HIGHER EDUCATION (Apr. 5, 2022), <https://www.chronicle.com/article/a-stunning-level-of-student-disconnection> (“In 20 years of teaching at Doane University, Kate Marley has never seen anything like it. As many as 30 percent of her students do not show up for class or complete any of the assignments. The moment she begins to speak, she says, their brains seem to shut off. If she asks questions on what she’s been talking about, they don’t have any idea. On tests they struggle to recall basic information.”); Susan W. Parker, Mary A. Hansen & Carianne Bernadowski, *COVID-19 Campus Closures in the United States: American Student Perceptions of Forced Transition to Remote Learning*, 10 SOC. SCIS. 62, 1, 15–16 (2021) (“Undergraduate students experienced feelings of increased frustration, decreased accountability and engagement during remote learning.” “For students, who were already feeling isolated and frustrated, remote courses seemed to lack connectedness, leaving them with additional feelings of isolation and frustration. Additionally, it seems there was a lack of common ground as students and faculty alike struggled to make sense of the new learning environment. Furthermore, a mutual readiness for collaboration was non-existent as neither group, students or faculty had a choice in moving to virtual course delivery. Lastly, there was little to no time to address technology needs and course work was being redefined in real time, leaving everyone a bit adrift. . . . While student engagement neither guarantees accountability nor decreases student-cheating behaviors, it could indeed help students retain content. Moreover, examination of instructional strategies used by faculty while teaching virtually could help students succeed in such an environment. It is imperative that universities, and the faculty, continue to examine the ways in which this pandemic affected both undergraduate and graduate students.”); Fatoni, Nurce Arifiatib, Ety Nurkayati, Ela Nurdiawati,

Additionally, with distance learning grudgingly being accepted as the new reality, and the likelihood of it being used long after the COVID-19 pandemic,⁹ new teaching methods and technologies are needed to educate the next generation.

Essentially a technological wallflower until now, the various iterations of Edtech (the technologies of education) are finally finding opportunities to go mainstream.¹⁰ Among other goals, Edtech strives to make the educational experience more palatable, particularly from remote locations.¹¹ However, it takes a lot of bells and whistles to impress today's jaded students, and even then, there is no guarantee that these next-generation technologies will sufficiently distract students from their distractions.

These modern educational hurdles are especially exacerbated in the broadening field of law and technology—particularly within ELSI—the study of the ethical, legal, and social implications of science and emerging technologies and the responsible research and innovation thereof.¹² The field demands that students understand and appreciate not only complicated underlying technologies, but also learn and apply sometimes esoteric legal concepts, as well as having a feel for the ever-changing ethics of modern society.¹³ This is not an easy task even under optimal

Fidziah, Giantoro Pamungkas, Suhroji Adha, Irawan, Agus Purwanto, Octoberry Julyanto & Enji Azizi, *University Students Online Learning System During Covid-19 Pandemic: Advantages, Constraints and Solutions*, 11 SYSTEMATIC REVS. PHARMACY 570, 571, 573–74 (2020); Zohra Lassoued, Mohammed Alhendawi & Raed Bashitialshaaer, *An Exploratory Study of the Obstacles for Achieving Quality in Distance Learning During the COVID-19 Pandemic*, 10 EDUC. SCIS. 232, 240–41 (2020); Ghaleb Awad El Refae, Abdoulaye Kaba & Shorouq Eletter, *Distance learning during COVID-19 Pandemic: Satisfaction, Opportunities and Challenges as Perceived by Faculty Members and Students*, 18 INTERACTIVE TECH. & SMART EDUC. 298, 301 (2021).

⁹ Samar A. Ahmed, Nagwa N. Hegazy, Hany W. Abdel Malak, W. Cliff Kayser III, Noha M. Elrafie, Mohammad Hassanien, Abdulmonem A. Al-Hayani, Sherif A. El Saadany, Abdulrahman O. Al-Youbi & Mohamed H. Shehata, *Model for Utilizing Distance Learning Post COVID-19 Using (PACT)TM a Cross Sectional Qualitative Study*, 20 BMC MED. EDUC. 1, 12 (2020).

¹⁰ Dov Greenbaum, *After Decades of Being Unappreciated, the Pandemic Could Give Distance Learning a New Lease on Life*, CALCALIST: CTECH (Sept. 6, 2020), <https://www.calcalistech.com/ctech/articles/0,7340,L-3831898,00.html> [<https://perma.cc/G3TT-PKNE>].

¹¹ Marianne Bakia, Linda Shear, Yukie Toyama & Austin Lasseter, *Understanding the Implications of Online Learning for Educational Productivity*, U.S. DEP'T EDUC. OFF. EDUC. TECH. (Jan. 2012), <https://tech.ed.gov/files/2013/10/implications-online-learning.pdf> [<https://perma.cc/3U2R-HEBS>].

¹² Dov Greenbaum, *Expanding ELSI to All Areas of Innovative Science and Technology*, 33 NATURE BIOTECHNOLOGY 425, 425–26 (2015).

¹³ *Id.*

in-person conditions; it is easy to get lost. To this end, educators are experimenting with an educational opportunity to better present law and technology content to our world-weary students.

II.

Few other sectors in modern society can match the ability and skill of the entertainment industry in getting and holding our eyeballs.¹⁴ Notwithstanding the simple mindless games, witty memes or 280-character screeds, the entertainment industry aims to capitalize on maintaining our attention by creating more complicated ideas and stories, necessitating a realism that can truly suspend our disbelief.¹⁵ With fiction and science residing in a symbiotic relationship, influencing one another for centuries,¹⁶ science-fiction cinema can be an especially useful educational tool for teaching the ethical, legal, and social implications of even complicated science and technology.¹⁷

Our efforts aim to understand, harness and most importantly, extract some of this symbiotic Hollywood movie magic dust and incorporate it into the educational experience.¹⁸ HBO's award-winning series, *Silicon Valley* has already assisted in achieving this goal.¹⁹ To this end, we have developed a new law and technology course curriculum that seeks to further highlight the intersection between science and technology as a learning tool by evoking the lessons learned from the television anthology *Black Mirror*.²⁰

¹⁴ James E. Cutting, Jordan E. DeLong & Christine E. Nothelfer, *Attention and the Evolution of Hollywood Film*, 21 PSYCH. SCI. 432, 436–37 (2010); James E. Cutting, *Narrative Theory and the Dynamics of Popular Movies*, 23 PSYCHONOMIC BULL. & REV. 1713, 1713 (2016); Stephen J. Hinde, Tim J. Smith & Iain D. Gilchrist, *Does Narrative Drive Dynamic Attention to a Prolonged Stimulus?*, 3 COGNITIVE RSCH: PRINCIPLES & IMPLICATIONS 1, 1 (2018).

¹⁵ Dov Greenbaum, *Biology's Brave New World*, 369 SCI. 1170, 1170 (2020).

¹⁶ Dov Greenbaum, *Revisit a cautionary classic*, 359 SCI. 168, 168 (2018).

¹⁷ Dov Greenbaum, *Is It Really Possible to Do the Kessel Run in Less than Twelve Parsecs and Should It Matter? Science and Film and Its Policy Implications*, 11 VAND. J. ENT. & TECH. L. 249, 293 (2008); Dov Greenbaum, *The Importance of Authentic Science on Screen*, 344 SCI. 980, 980 (2014).

¹⁸ Aviv Shemma, Roy Meiom & Dov Greenbaum, *The Impact of the Humanities in Science and Technology Research: A Multidisciplinary Approach to the Ethical, Social, and Legal Impacts of Science and Innovation*, 7 AJOB NEUROSCIENCE 106, 107 (2016).

¹⁹ Dov Greenbaum, *Making Law School a Better Place: Using HBO's Silicon Valley to Teach Intellectual Property Law and Entrepreneurship*, 57 IDEA 183, 224 (2016).

²⁰ *Black Mirror* (Netflix 2011).

We are not the first to see value in *Black Mirror* as an educational tool,²¹ but we are early adopters in applying it to the critical examination of ELSI in current and future iterations of science and technology. The eight-time Emmy winning television series (launched in 2011 on the UK's BBC Channel 4, now on Netflix) was created by showrunner Charlie Brooker.²² Many of the episodes deal with dystopian futures seemingly just moments ahead of our current era; mostly mirroring our current society while incorporating one additional seemingly fantastical technology.²³ Although some futuristic technologies make repeat appearances in different episodes, the anthology is different from most in its genre, in that aside from those technologies and random self-referencing Easter eggs to thrill the fans,²⁴ there is little if any substance linking one episode to another; each new episode is a fresh take, a standalone tool for teaching law and technology.

Pedagogically, the show provides the student with a valuable twist on standard law and technology education. With the focus on a fictional technology set in roughly the present day, students can explore how emerging technologies might impact our current society, and if and how those technologies should be limited or regulated, without having to acknowledge the scientific inaccuracies.²⁵ And, since many of the *Black Mirror* technologies are often simply more futuristic versions of the current state of the art, students can reflect on how we ought to encounter actual technologies in our own reality via the ELSI lens inculcated throughout the course.

Consider the following three examples that provide only a sampling of what students might extract from the television show.

²¹ David Blanco-Herrero & Laura Rodríguez-Contreras, *The Risks of New Technologies in Black Mirror: A Content Analysis of the Depiction of Our Current Socio-Technological Reality in a TV series*, TEEM (Oct. 16–18, 2019), <https://dl.acm.org/doi/10.1145/3362789.3362844> [<https://perma.cc/G7K7-JZ2R>].

²² *Black Mirror*, *supra* note 20.

²³ Blanco-Herrero & Rodríguez-Contreras, *supra* note 21.

²⁴ Morgan Jeffery, David Opie & Abby Robinson, *27 Black Mirror Easter Eggs That Prove Charlie Brooker's Anthology Lives in One Universe*, DIGITAL SPY (June 6, 2019), <https://www.digitalspy.com/tv/ustv/g27695449/black-mirror-easter-eggs-shared-universe-explainer/> [<https://perma.cc/QH7F-VDQ7>].

²⁵ Jarrod L. Green, *Why Scream About Sound in Space? The Functions of Audience Discourse About Unrealistic Science in Narrative Fiction*, 28 PUB. UNDERSTANDING SCI. 305, 306 (2019).

A. *Season One, Episode 3, The Entire History of You*

Season One, Episode 3, *The Entire History of You*, is an episode wherein a futuristic device—the Grain—is implanted behind the ear in seemingly everyone.²⁶ The novel technology, which could be construed as having many societal similarities with our own smartphone technology,²⁷ can be used to record what each individual sees, and can be controlled via a small handheld device.²⁸ The Grain provides the user with many different tools, including reviewing memories, zooming in on remembered footage, as well as lip reading capabilities.²⁹

Viewers of the episode watch as the technology is used both at the border by the government to review potential criminal activity (like are done today with our laptops³⁰) but mostly by the protagonist—an attorney named Liam—who obsessively and compulsively reviews his memories. When his jealous paranoia regarding his wife Ffion is exacerbated by this obsession, it causes his life to spiral out of control.³¹

In reviewing this episode, students have the opportunity to consider the laws related to unrestrained search and seizure, especially of our technological tools, at the border. In these instances some U.S. circuit courts³² have found that Fourth Amendment rights against warrantless search and seizure are less applicable, or do not apply at all.³³ Students can also discuss the modern persistence surveillance that is further exacerbated by unreliable facial recognition technology and the social justice concerns that it raises.³⁴ Students might also compare this fictional ability to

²⁶ *Black Mirror: The Entire History of You* (Netflix 2011).

²⁷ See, e.g., Maya Kosoff, *Apple Predicts Black Mirror Memory Implants Could Soon be a Reality*, VANITY FAIR (Apr. 25, 2017), <https://www.vanityfair.com/news/2017/04/apple-exec-predicts-black-mirror-tech-could-soon-be-a-reality> [<https://perma.cc/26L5-LUV8>].

²⁸ *Black Mirror: The Entire History of You*, *supra* note 26.

²⁹ *Id.*

³⁰ Caroline V. McCaffrey, *Fairly Exposed: A Proposal to Improve the Reasonableness Standard for Digital Forensic Searches at the Border*, 80 LA. L. REV. 201, 203 (2019).

³¹ *Black Mirror: The Entire History of You*, *supra* note 26.

³² Pamela C. Corley, *Forensic Searches of Electronic Devices at the Border: United States v. Tousef*, 40 JUST. SYS. J. 86 (2019).

³³ *Alasaad v. Mayorkas*, 988 F.3d 8, 13 (1st Cir. 2021).

³⁴ Sharon Nakar & Dov Greenbaum, *Now You See Me. Now You Still Do: Facial Recognition Technology and the Growing Lack of Privacy*, 23 B.U.J. SCI. & TECH. L. 88, 101 (2017); see also Dov Greenbaum,

infinitely revisit memories with the current trend to record every banality of life through social media and the obligations of social media companies to secure such data and protect the privacy of its users.³⁵ This discussion also ties into the ongoing political football: Section 230 of the Computer Decency Act, which some believe, fails to adequately regulate what social media platforms can allow onto their sites.³⁶ Technologies like Google Glass, which can also record events and provide augmented information, are also somewhat like the Grain technology,³⁷ and raise many of the same ethical and legal concerns. Students might further discuss concerns related to the ownership of the data,³⁸ especially data extracted from the body,³⁹ collected by the Grain and/or social media companies, and the limitations, if any, on the use of that data. One of the characters in the story, Hallam, lacks a Grain, having had hers gouged out by an attacker who will likely sell the memories, similar to current hackers who steal your data to appropriate your identity.⁴⁰

Another notable piece of information derived from the episode is how Liam's car monitors his sobriety and warns him that his insurance is invalidated if he is under the influence.⁴¹ This raises a host of concerns related to the emerging internet of things ("IoT") technology increasingly embedded in our vehicles to track our

Where Everybody Knows Your Face, CALCALIST: CTECH (Mar. 22, 2019), <https://www.calcalistech.com/ctech/articles/0,7340,L-3758811,00.html> [<https://perma.cc/YV75-YZZF>].

³⁵ Michal Kosinski, David Stillwell & Thore Graepel, *Private Traits and Attributes are Predictable from Digital Records of Human Behavior*, PROCEEDINGS NAT'L ACAD. SCIS. U.S. (Mar. 11, 2013).

³⁶ 47 U.S.C. § 230(c).

³⁷ See generally Anisha Mehta, 'Bring Your Own Glass': *The Privacy Implications of Google Glass in the Workplace*, 30 J. MARSHALL J. INFO. TECH. & PRIV. L. 607 (2013); see generally Kristin Bergman, *Cyborgs in the Courtroom: The Use of Google Glass Recordings in Litigation*, 20 RICH. J.L. & TECH. 11 (2014).

³⁸ See generally Frank M. Shipman & Catherine C. Marshall, *Ownership, Privacy, and Control in the Wake of Cambridge Analytica: The Relationship Between Attitudes and Awareness*, CHI CONF. ON HUM. FACTORS COMPUTING SYS. (Apr. 2020), <https://dl.acm.org/doi/fullHtml/10.1145/3313831.3376662> [<https://perma.cc/266V-D2A8>].

³⁹ Stephanie Naufel & Eran Klein, *Brain-Computer Interface (BCI) Researcher Perspectives on Neural Data Ownership and Privacy*, 17 J. NEURAL ENG'G 1, 4 (Jan. 28, 2020).

⁴⁰ See generally Rajeev K. Goel, *Identity Theft in the Internet Age: Evidence from the U.S. States*, 40 MANAGERIAL & DECISION ECON. 169, 169 (Jan. 7, 2019).

⁴¹ A. WAYNE JONES, JØRG G. MØRLAND & RAY H. LIU, *ALCOHOL, DRUGS, AND IMPAIRED DRIVING* 16 (1st ed. 2020).

driving, ostensibly to provide more apropos coverage commensurate with your actual driving habits, and not based mostly on your demographic.⁴²

B. Season Two, Episode 4, White Christmas

Season two, episode 4, *White Christmas*, is a story within a story. The protagonist, Matt, played by Jon Hamm, has a day job where he programs artificial intelligence (“AI”) digital clones of people, Cookies, to be modern day slaves for those people—sometimes through psychological manipulation and torture of artificially intelligent digital twins.⁴³ His skill set is applied differently and illegally at night where he employs a technology called Z-Eyes (Zed Eyes in the British pronunciation of the show’s creators).⁴⁴ This is an eye-based technology similar to the Grain described above, to help people navigate the complexities of their lives, like dating.⁴⁵ In the episode, a client at a party is helped fit in through being surreptitiously fed relevant and personal data extracted from the internet.⁴⁶ The client is eventually caught up in a murder suicide, and Matt is ultimately arrested for his accessory role.⁴⁷

In his plea bargain, Matt uses his combined skills to help the police obtain a confession from a murderer via the murderer’s AI cookie, seemingly extracted without consent.⁴⁸ In return for his services Matt is released, but he is forever literally branded as an undesirable by the pervasive Z-Eyes technology where everyone

⁴² See, e.g., Sabine L.B. VanderLinden, Shân M. Millie, Nicole Anderson & Susanne Chishti, *THE INSURTECH BOOK: THE INSURANCE TECHNOLOGY HANDBOOK FOR INVESTORS, ENTREPRENEURS AND FINTECH VISIONARIES* 75 (2018); see also Michelle Canaan & John Lucker, *Opting in: Using IoT Connectivity to Drive Differentiation*, DELOITTE UNIV. PRESS (June 3, 2016), <https://www2.deloitte.com/us/en/insights/focus/internet-of-things/innovation-in-insurance-iot.html> [https://perma.cc/N25L-SFA8]; David Kwon, *Digital Reinvention for Insurance: Differentiating through IoT, Analytics and UX*, IBM: SMARTER BUS. REV. (Dec. 10, 2019), <https://www.ibm.com/blogs/services/2019/12/10/digital-reinvention-for-insurance-differentiating-through-iot-analytics-and-ux/> [https://perma.cc/UD84-NRDQ].

⁴³ *Black Mirror: White Christmas* (Netflix 2014).

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ *Id.*

⁴⁷ *Id.*

⁴⁸ *Id.*

perceives him—à la the Scarlet Letter, metaphorically represented in the episode as a red blob.⁴⁹

This episode raises many timely ELSI considerations. Consider, for example, the lack of legal protection against cyberstalking is relevant in the storyline here when Matt helps his client access the social media accounts of various individuals for their personal information—to be used for his client’s benefit.⁵⁰ Additionally, the constitutional rights against self-incrimination are being eroded via various technological advancements particularly in the area of neurotechnology. This is seen in the use of functional magnetic resonance imaging (“fMRI”), which could potentially allow a court to peer inside an individual’s brain through measuring brain activities via blood flow. fMRI technology, like the AI cookies which similarly represent an individual’s consciousness, could provide incriminating information against the will of the defendant. Like a polygraph that ostensibly assess whether an individual is lying, the fMRI technology can potentially show a court what a person is truly thinking, consciously, or even subconsciously.⁵¹

The episode also potentially implicates government’s use of fake news and information. Here, Matt and the police trick the murderer into confessing, by presenting a seemingly safe fake reality. It is a slippery slope from tricking one person with a fake reality to convincing a whole cohort of citizens of an alternative reality.⁵²

Another timely concern relates to the emerging field of bio-cybersecurity—the intersection of biology and cybersecurity.⁵³ While typically this relates to issues of synthetic biology and the printing of toxic DNA, the use of Z-Eyes, a technology that incorporates biology of sight and artificial intelligence would also be subsumed within this field. Such technology could become a target for malicious hackers,

⁴⁹ *Id.*

⁵⁰ See generally David DeMatteo, Suraji Wagage & Jaymes Fairfax-Columbo, *Cyberstalking: Are We on the Same (Web)page? A Comparison of Statutes, Case Law, and Public Perception*, 9 J. AGGRESSION, CONFLICT & PEACE RSCH. 83, 91 (2017).

⁵¹ See generally Stephen J. Morse, *Neuroscience and Law: Conceptual and Practical Issues*, NEUROSCIENCE & L. (June 2, 2020).

⁵² See generally Nadine Liv & Dov Greenbaum, *Deep Fakes and Memory Malleability: False Memories in the Service of Fake News*, 11 AJOB NEUROSCIENCE 96 (Mar. 31, 2020).

⁵³ See generally Rami Puzis, Dor Farbiash, Oleg Brodt, Yuval Elovici & Dov Greenbaum, *Increased Cyber-Biosecurity for DNA Synthesis*, 38 NATURE BIOTECHNOLOGY 1379, 1380 (2020).

allowing them to take control of another's vision and memories. This potential threat necessitates strong cyber regulations to protect the consumers.⁵⁴

Z-Eyes is also very similar to other emerging neurotechnologies, real or just hype,⁵⁵ that can read and write to the brain. The oversight and regulations of these technologies are only just emerging.⁵⁶

Notably, not all legal considerations raised by this episode relate to emerging areas of law and technology. Intellectual property rights, specifically the ability of the Z-Eyes to manipulate images in real time as the user perceives them, raises copyright concerns, as well as issues relating to censorship and free speech.⁵⁷

Additionally, the abuse of the AI cookies further raises concerns associated with the potential granting of personhood and associated rights to AI machines.⁵⁸ The cookies are also similar to an emerging area of technology, digital twins. Ostensibly created to allow for stress testing on expensive equipment, digital twins can potentially be incorporated into other areas, including clinical drug trials.⁵⁹ The use of digital twins, however, can raise a number of regulatory concerns relating to the usefulness of the data compared to the current gold standards in clinical trials.⁶⁰

Finally, the concept of forever being tagged as an undesirable might come in conflict with the Right to be Forgotten under the European GDPR (General Data Protection Regulation). Arguably, this right to be forgotten—which grants data subjects the right to request that personal data relating to them be erased off the internet—arises from the philosophical conception of privacy, as the right to self-determine how the world perceives you. This right is infringed when others take

⁵⁴ See generally Dov Greenbaum, *Cyberbiosecurity: An Emerging Field that has Ethical Implications for Clinical Neuroscience*, 30 CAMBRIDGE Q. HEALTHCARE ETHICS 662, 666 (2021).

⁵⁵ Anna Wexler, *Separating Neuroethics From Neurohype*, 37 NATURE BIOTECHNOLOGY 988 (2019).

⁵⁶ Tal Dadia & Dov Greenbaum, *Neuralink: The Ethical Rhythmic of Reading and Writing to the Brain*, 10 AJOB NEUROSCIENCE 187 (2019).

⁵⁷ *Disney Enters., Inc. v. VidAngel, Inc.*, 869 F.3d 848 (9th Cir. 2017).

⁵⁸ Roman V. Yampolskiy, *AI Personhood: Rights and Laws*, in MACHINE LAW, ETHICS, AND MORALITY IN THE AGE OF ARTIFICIAL INTELLIGENCE 1–11 (2021).

⁵⁹ See Dov Greenbaum, *Making Compassionate Use More Useful: Using Real-World Data, Real-World Evidence and Digital Twins to Supplement or Supplant Randomized Controlled Trials*, PAC. SYMP. ON BIOCOMPUTING 38 (2021).

⁶⁰ *Id.*; Ori Rozenberg & Dov Greenbaum, *Making It Count: Extracting Real World Data From Compassionate Use and Expanded Access Programs*, 20 AM. J. BIOETHICS 89 (2020); Tolga Erol, Arif Furkan Mendi & Dilara Dogan, *The Digital Twin Revolution in Healthcare*, IEEE (Oct. 2020).

information that you deem private and make it public, thereby limiting your ability to decide how you are presented to the public. This legal right is further associated with the timely idea that one ought to have the right to self-identify. Digitally, this right means that if a search engine or social media site creates an advertising dossier of an individual resulting from the data that it extracted from that individual's various online activities, and the individual disagrees with the way it has characterized them, the individual should be able to have that characterization revised. It is unclear whether that right exists; it clearly does not exist in the *Black Mirror* universe.

C. *Season Four, Episode 1, USS Callister.*

A third example of a teachable episode within the anthology is Season Four, Episode 1, USS Callister. This episode presents a dystopian view of the video game industry, wherein software clones of real-life coworkers, based on swiped DNA, are trapped within a gifted programmer's (Robert Daly, played by Jesse Plemons) gameplay.⁶¹ The clones are portrayed as being similar in personality to Daly's coworkers.⁶² Daly abuses the cloned coworkers within the game, but eventually they escape Daly's version of the game, trapping Daly's clone in the game which also seems to trap Daly's real self within the video game's immersive VR setup in the real world.⁶³

With an increase in online gaming, arguably as a result of the pandemic, issues relating to the rule of law in online gaming, and the applicability of real-world laws on various aspects of gaming is very timely—for example the nature of intellectual property rights in-game creations, or the government's ability to tax you for in-game monetary gains.⁶⁴

This episode provides a further optimal opportunity to assess the complicated nature of artificial intelligence personhood: what rights if any ought AI machines have. Robert Daly's misappropriation of his coworkers' likeness as well as their minds raises questions related to the intellectual property rights that we each

⁶¹ *Black Mirror: USS Callister* (Netflix 2017).

⁶² *Id.*

⁶³ *Id.*

⁶⁴ See, e.g., Dov Greenbaum, *Can The IRS Tax Your Fortnite Avatar*, CALCALIST: CTECH (Feb. 21, 2020), <https://www.calcalistech.com/ctech/articles/0,7340,L-3795051,00.html> [https://perma.cc/4H23-TSMJ]; Dov Greenbaum, *How Covid-19 Might Create an Onerous Economy Inside Video Games*, CALCALIST: CTECH (Mar. 15, 2020), <https://www.calcalistech.com/ctech/articles/0,7340,L-3822874,00.html> [https://perma.cc/74Z9-VQ9A].

ostensibly hold in our persona.⁶⁵ While the legal issue relating to likeness⁶⁶ is jurisdiction specific and has been extensively litigated, the emerging area of intellectual property rights in personality has not. Consider the real-life capabilities of AI bots like *Luka* that are being used to represent and reflect the personalities of deceased loved ones, one version available on the Apple App Store.⁶⁷

The episode also provides the student with an opportunity to review the ethical, legal, and social implications of more immersive technologies such as augmented and virtual realities. Even biotech issues arise in this episode, specifically the ownership of our discarded DNA,⁶⁸ the source of information for Robert Daly's video game clones. Broadly, this episode raises timely privacy questions as to how much one can learn about another simply from their DNA, and the use of DNA as both an identifier in the criminal justice system, and as a more in-depth describing technology within the world of direct-to-consumer DNA sequencing.⁶⁹

CONCLUSION

More than a standard university-level curriculum, we aim to further create buy-in from the students by making the course international. We have invited students from institutions across the globe to take part and work on multi-national, multi-disciplinary team-projects together in this course. The projects task the students with developing a more comprehensive analysis of the ethical, legal, and social implications of technologies represented on the television show, employing their respective perspectives and academic backgrounds, and then applying it to current technologies.

⁶⁵ Robert C. Post & Jennifer E. Rothman, *The First Amendment and the Right(s) of Publicity*, 130 YALE L.J. 86 (2020).

⁶⁶ See generally Melville B. Nimmer, *The Right of Publicity*, 19 L. & CONTEMP. PROBS. 203 (1954).

⁶⁷ Luka, Inc. *Roman Mazurenko: A Digital Avatar*, APPLE, <https://apps.apple.com/us/app/roman-mazurenko/id958946383> [<https://perma.cc/FB8R-BDZ7>]; see also Kirsten Brukamp, *The Material Return of the Avatar: Computational Commemoration of the Deceased via Social Robots*, in CULTURALLY SUSTAINABLE SOCIAL ROBOTICS: PROCEEDINGS OF ROBOPHILOSOPHY 215 (Norskov et al eds., 2021).

⁶⁸ See generally Dov Greenbaum, *If You Can't Walk the Walk, Do You Have to Talk the Talk: Ethical Considerations for the Emerging Field of Sports Genomics*, 13 AM. J. BIOETHICS 19 (2013).

⁶⁹ See generally Dov Greenbaum, Arif Harmanci & Mark Gerstein, *Proposed Social and Technological Solutions to Issues of Data Privacy in Personal Genomics*, IEEE (Sept. 8, 2014); Dov Greenbaum & Sharon Nakar, *Editorial: Genomics and Criminal Law*, 8 RECENT ADVANCES DNA & GENE SEQUENCES 57, 57–58 (2014); Dov Greenbaum, *US Diplomats Collecting DNA—What's Going On?*, STAN. L. SCH. L. & SCI. BLOG (Aug. 3, 2011), <https://law.stanford.edu/2011/08/03/us-diplomats-collecting-dna-whats-going-on/> [<https://perma.cc/R8BR-4YVS>].

To further add to the curriculum, we also include edited interviews conducted with various screenwriters, producers, and other stakeholders involved in the production of relevant science-fiction and science-related films. These recorded interactions aim to help the students get a better understanding of the process by which science and technology is applied to fiction and how the legal, ethical, and social concerns are raised and tackled through the making of each story. This aspect, which adds a new dimensionality to the ELSI educational experience, was directly inspired by the American Film Institute's Catalyst screenwriting workshop for scientists from earlier this century, wherein screenwriters and other stakeholders in film shared their vision as to how best incorporate science and technology into film.⁷⁰ By understanding the creative process in developing exceptional media like *Black Mirror*, the students can develop the necessary skillset to forecast both the direction of technology development, as well as the potential interaction that technology may have, for better or for worse with society.

In addition to recorded interviews with Hollywood-types, the class also provides recorded interviews with stakeholders in technologies that approximate the technologies presented in the show. In this sense, students can compare the concerns created by the fictional technologies with the concerns created by those technologies that most closely resemble them in real life. By making this class into a meeting place of many differently thinking minds, coalescing students, and talent from around the world, we hope to provide just a bit more justification for our aging educational system: as the best meeting place of multidisciplinary educators and personalities.

Finally, an emerging idea for some college administrations is the reframing of college campuses as not simply a place to while away our youth, but rather as life-long centers of education that can and ought to be revisited by each of us, every so often. We aim to further this ideal of education as a perpetual, persistent and perennial process. Through this class, we hope to show students that there are learning opportunities abound, not only in the staid ivy-covered campuses, but even on the couch, just chilling to Netflix.

⁷⁰ See generally Jonathan Knight, *Science in the Movies: Hollywood or Bust*, 430 NATURE 720 (2004).