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A SEMIOTIC ANALYSIS OF HUMAN AND MACHINE INTERACTION: THE BLACK MIRROR

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Abstract: *This study examines the ethical implications of contemporary digital technologies for human existence, focusing on the semiotic construction of human-machine interaction in the anthology series Black Mirror. The research gap addressed in this article concerns the limited attention paid to the sign systems through which the series produces ethical meanings: while existing studies have discussed Black Mirror mainly as a thematic critique of technological dystopia, fewer have systematically examined how visual and verbal signs organise questions of consciousness, autonomy, surveillance, identity, and responsibility. To address this gap, the study uses a Saussurean and Peircean semiotic framework to analyse how selected episodes encode ethical problems at the intersection of organic and artificial life. The empirical corpus consists of fourteen purposively selected episodes from seasons 2–6, excluding the later seventh season released in 2025, and was examined through qualitative coding of visual and verbal signs related to consciousness transfer, artificial intelligence (AI), social media, virtual reality, surveillance, and digital vigilantism. The analysis identifies recurring oppositions between embodiment and dis embodiment, autonomy and control, presence and mediation, and responsibility and outsourcing, which together articulate specific moral narratives about technological progress. The article's original contribution lies in linking semiotic form to technological ethics: it shows how popular techno-dystopian fiction not only represents ethical problems thematically but also constructs them through recurring signs, oppositions, motifs, and narrative patterns. The findings suggest that Black Mirror foregrounds the fragility of human agency in technologically mediated environments and problematises unregulated innovation as a threat to dignity, privacy, and social cohesion within the selected corpus. The study concludes that these findings are interpretive insights from a purposively selected corpus, while also indicating the need for further research on how AI and related technologies are represented, governed, and ethically implemented in ways that protect human agency, dignity, and the broader public interest.*

Keywords: *Black Mirror series; artificial intelligence (AI); technological development; human-machine interaction; semiotic analysis.*

JEL Classification: O31, O33, Z13

INTRODUCTION

People have an unstoppable drive to improve their cognitive abilities. To do so, they often try various techniques, such as philosophical martial arts, eastern mystical exercises, or mindfulness, a modern interpretation of these techniques (Bostrom & Sandberg, 2009). In contrast, some modern agents also use traditional techniques. These modern-day agents mostly use autonomous electronic devices (Alonso, 2014). These interactions between human activities, capabilities, and machines raise scepticism about their moral and ethical aspects. For example, many global and local authorities criticise the trustworthiness of constructed, machine, or artificial intelligence (AI), which differs from natural intelligence. Many people fear using AI in transport, patient care, and business. Ryan (2020) argues that trust in AI is not based on trust criteria because it lacks affective states and accountability for its actions. Although AI meets these criteria, it is reliance rather than trust. Trust should not be placed in sophisticated machines, such as AI, as it would diminish interpersonal confidence, anthropomorphise AI, and deflect accountability from its creators and employers. On the other hand, the nature of consciousness is still being debated, including whether machines represent it. Sloman & Chrisley (2003) debate whether virtual machines generate mental states and processes like humans and, if so, to what extent they will develop and support human mental phenomena. In addition, ethical issues remain, such as partners' responsibility in fatal events: Who will be judged for what happened? Undoubtedly, robots and machines operate in cooperation with humans. Therefore, both sides should share responsibility and be assigned supervision and execution (Nyholm, 2018).

In visual arts, science fiction cinema portrays both positive and negative attitudes toward technology, including AI. In a globalised world where individuals are increasingly isolated, AI is seen as a solution to loneliness. The brain supports learning and consciousness and is crucial to AI-human communication and relationships. The rapid development and widespread use of AI are inevitable (Yılmaz & Turan, 2018), and the movies provide insights into how humanity can prepare for this future. Dystopian stories and science fiction depict AI's potential to take over the planet. Popular culture suggests that sentient machines could populate Earth by the first half of the 22nd century, potentially becoming the dominant intelligent life form. However, if these concepts become reality, they could lead to dystopias that render the world untenable. Concerns (Arslan & Köseoğlu, 2023) include the potential destruction of humanity as AI becomes more human-like, causing a loss of human emotions.

This article's research gap arises from how existing scholarship has approached *Black Mirror*. Previous studies have productively discussed the series in relation to technological dystopia, artificial intelligence, surveillance, digital culture, and the social consequences of innovation. However, these discussions often foreground themes and plot content rather than the semiotic mechanisms that produce ethical meanings. Less attention has been given to how particular signs, images, interfaces, bodies, screens, avatars, and verbal cues generate moral interpretations of human-machine interaction, or to how recurring oppositions such as human/machine, autonomy/control, real/virtual, and private/public structure the series' ethical imagination.

This study therefore connects semiotic analysis with ethical debates on AI and digital technologies through a focused examination of selected Black Mirror episodes. Rather than treating the series as only a narrative warning about future technologies, the article shows how ethical dilemmas are encoded through signs and signifying structures. In doing so, it provides a structured account of how popular audiovisual culture organises concerns about consciousness transfer, algorithmic authority, surveillance, virtual embodiment, digital vigilantism, and technological responsibility. This contribution is original because it identifies the semiotic patterns that make these ethical tensions visible and interpretable within a purposively selected corpus.

By exploring dystopian narratives, we can better understand the potential consequences of unregulated technological advancement and the loss of human emotions in favour of artificial efficiency. This study investigates the ethical implications of technology for human existence, focusing on the intersections and commonalities between organic and artificial life. Centred on the problem statement, “Can humanity properly manage technological advances with wisdom and virtue?”, this research aims to identify ethical dilemmas and the consequences of human-machine interaction. To achieve this, the study utilizes the British anthology series ‘Black Mirror’ (Brooker, 2011) as a primary case study. Through a qualitative inquiry utilizing semiotic analysis, the research seeks to answer three specific questions: whether transferring consciousness to machines creates ethical problems, how AI negatively affects social life, and the importance of ethics in the digital age. The remainder of this paper is organised to provide a comprehensive analysis of these themes. The initial sections review the development of AI, from Alan Turing’s (1950) early work to the modern era of deep learning and industry 4.0, providing the necessary technological context. The paper then outlines the qualitative research method employed, detailing the selection of fourteen episodes from seasons 2–6, excluding season 1, *Bandersnatch*, and the later seventh season, through purposive sampling and the application of semiotic analysis (Peirce, 1998). It then presents detailed summaries and evaluations of the selected episodes, categorising them by themes such as grief, surveillance, social classes, and virtual reality. Finally, the study interprets these findings through a semiotic lens and discusses them in relation to existing literature on machine ethics, robot rights, and the psychological impact of technology, concluding with recommendations for interdisciplinary collaboration to ensure that AI is developed to serve humanity’s best interests.

LITERATURE REVIEW

The Development of Artificial Intelligence (AI)

AI has fuelled the imagination of scientists, researchers and enthusiasts for decades. Its journey through history is not only a story of technological advancement but also a reflection of human endeavour and ingenuity. The roots of AI lie in ancient myths and philosophical enquiry into the nature of intelligence and consciousness. These early tales laid the groundwork for later philosophical debates about whether humans could create intelligent machines.

AI studies began in the 20th century with Alan Turing’s work. In 1950, Turing proposed a test to determine whether a machine can exhibit human-like intelligent behaviour. This led to a surge of AI research in the 1950s, focusing on replicating human thought processes using symbolic representation and logical reasoning. McCarthy et

al. (1959) laid the groundwork for the first AI research, and programs like ‘General problem solver’ (Newell & Simon, 1961) showcased the power of symbolic reasoning in problem-solving. In the early 21st century, abundant data and computing power shifted AI research. Machine learning, particularly deep learning, gained prominence, enabling systems to learn from data without explicit programming. Deep learning’s success in image recognition (Krizhevsky et al., 2012) and natural language processing (Devlin et al., 2019) has transformed many industries, from healthcare to finance.

As AI technologies have spread, concerns about their ethical and social implications have emerged. Issues such as algorithmic bias (Buolamwini & Gebru, 2018), job displacement (Frey & Osborne, 2017), and transparency (Bostrom & Yudkowsky, 2014) raise questions about the responsible development and use of AI systems. Fostering interdisciplinary collaboration is essential to ensure AI is developed and operated ethically and serves humanity’s best interests.

A Milestone in AI: Deep Blue vs Kasparov

The chess matches between IBM’s supercomputer Deep Blue and Russian world chess grandmaster Garry Kasparov in the late 1990s marked a significant milestone in the history of human-computer interaction. Although Kasparov won the first match, Deep Blue defeated him in the rematch, demonstrating that computers can outperform humans even in complex strategic games (Weber, 1997). These encounters showcased rapid advances in computational power and algorithmic design for tasks requiring strategic thinking and decision-making (Campbell et al., 2002). They sparked debates (Ford, 2018) in the public and scientific communities about the future of AI and its social impacts, prompting scientists to explore AI applications beyond chess, such as banking and healthcare.

The 4th Industrial Revolution and Automation/Robotization

The fourth industrial revolution emerged, supported by developing communication and automation technologies. These include AI, the internet of things (IoT), big data analytics and advanced robots. Machine learning algorithms have enabled robots to gain insights from data and improve their effectiveness over time. IoT is a network that connects objects and systems, enabling data to be shared and integrated instantly across different platforms. A reliable, efficient connection is essential (Atzori et al., 2010) for automating complex industrial procedures and maximizing performance. It examines and extracts valuable insights from large, complex datasets using advanced techniques and tools. Efficient processing of large amounts of data is crucial for making optimal decisions and implementing predictive maintenance in automated systems. Robotics has advanced significantly, with increasingly autonomous robots capable of performing complex tasks. Collaborative robots, also known as *cobots* (Bogue, 2016), are specially designed to increase efficiency and ensure safety.

Industry 4.0 has significantly impacted productivity, labour markets and economic growth. Automation and robots have increased efficiency by executing activities more quickly, precisely and consistently than human workers. In addition, automation’s impact on employment is complex and varied. Although AI is replacing certain professions (Autor, 2015), it has also created new opportunities in technology-focused sectors such as robotics, engineering, and data analytics. Additionally, automation and

robotization can boost economic growth by encouraging innovation and increasing productivity. The emergence of the fourth industrial revolution has brought numerous challenges and possibilities. AI and robot applications have increased ethical concerns regarding privacy, security, and the extent of human control. In this context, it is essential to create frameworks (Müller, 2020) for the ethical use of AI and determine responsibility. Researchers (Yıldırım & Şimşek, 2021) recommend a greater need for human-oriented studies.

As mentioned above, this process has fundamentally transformed industries and societies, initiating the fourth industrial revolution. Moreover, new organizational concepts have emerged (Durmuş & Akyüz, 2024), such as green technology. Although technology offers significant opportunities to increase productivity, economic growth and innovation, it has also created management-related problems and obstacles. Experts can overcome these obstacles and expand the benefits of industry 4.0 by leveraging the capabilities of emerging technologies.

AI as a Cinematic Subject

Movies have long reflected societal desires and anxieties about technological progress. Early depictions, such as the robot Maria in Fritz Lang's "Metropolis" (1927), portrayed AI as a triumph of human ingenuity while emphasizing its potential to cause social unrest. More recent films such as 'Her' (Jonze, 2013) and 'Ex Machina' (Garland, 2014) have instead foregrounded the moral and philosophical challenges AI poses (De Masi & Li, 2024). Directed by Spike Jonze, 'Her' offered a nuanced perspective on AI by revealing the complex relationships between humans and the AI operating system. The film explored loneliness, intimacy, and awareness (Gelly, 2019), encouraging viewers to reevaluate the distinctions between humans and machines. Similarly, 'Ex Machina' examines the ethical implications of creating AI and the consequences of machines possessing consciousness through the narrative of a sentient AI named Ava. The film addresses themes of autonomy, manipulation, and creators' moral obligations (Vallor, 2016). Another highly rated film, 'Archive' (Rothery, 2020), which has received numerous international awards, highlights the ethical and confidential handling of personal information. Films such as 'Ex Machina' suggest that synthetic intelligence can exhibit humanlike emotional intelligence.

Today, AI-powered robots are improving their ability to understand their environment, and artificial intelligence is becoming increasingly humanlike and sophisticated. However, this advancement prompts new inquiries, such as 'who holds the copyright for each trained AI'?

METHODOLOGY

After discussing the general role of AI and digital technologies, this study aims to demonstrate how ethical issues related to technology are constructed in popular audiovisual culture. The central problem statement guiding the analysis is: "Can humanity properly manage technological advances with wisdom and virtue?" In line with this objective, the study adopts a qualitative case study design and formulates the above research questions to determine the most appropriate analytical strategy.

1. How is the transfer of self and consciousness into machines represented in Black Mirror, and what ethical problems are associated with these representations?

2. In what ways are artificial intelligence and intelligent machines depicted as negatively affecting social life and social relations?
3. How is the importance of ethics in the age of digital technology articulated and problematised in the series?

Case Selection and Sampling

Following previous research that uses *Black Mirror* as an emblematic cultural text on digital futures (e.g. Yang, 2019; Klem, 2019; Wang, 2023; De Masi & Li, 2024), the British anthology series *Black Mirror* (created by Charlie Brooker, first aired in 2011) was selected as the case. The wider series has continued beyond the period covered by this study, with a seventh season released in 2025; however, this article's empirical corpus is limited to episodes available up to and including season 6. Within that scope, fourteen episodes from seasons 2–6 were selected through purposive sampling (Yin, 2003; Creswell, 2013) because they explicitly address one or more of the following thematic domains aligned with the research questions: (a) transfer of consciousness or self into a technological substrate; (b) AI and algorithmic systems affecting social life; (c) virtual reality and simulated environments; (d) surveillance and datafication; and (e) explicit ethical or moral dilemmas involving technology.

Table 1 lists the selected episodes, their seasons, and durations. The sample consists of fourteen episodes from seasons 2–6 only; it does not include season 1, the interactive film *Bandersnatch*, or the later seventh season. The total running time of the analysed corpus is 886 minutes, or approximately fifteen hours, providing a focused and explicitly delimited corpus for semiotic analysis.

Semiotic Framework and Unit of Analysis

The study employs a semiotic framework drawing on Saussurean and Peircean approaches (Saussure, 1915/1966; Peirce, 1998). To operationalize this framework, each selected scene was analysed through a set of observable semiotic categories. In Saussurean terms, the analysis first identified the signifier, understood as the concrete visual or verbal form appearing in the episode, such as a device, interface, body, screen, colour scheme, repeated phrase, rating score, avatar, or technological object. It then identified the signified, understood as the concept or ethical meaning attached to that form, such as grief, control, authenticity, surveillance, commodified consciousness, algorithmic authority, or loss of autonomy. Finally, the analysis examined binary oppositions and paradigmatic contrasts, such as human/machine, organic/artificial, autonomy/control, real/virtual, private/public, and embodiment/disembodiment, in order to determine how ethical meanings were structured within the scene.

In Peircean terms, each sign was coded according to its dominant sign relation. Icons were identified when a sign resembled the object it represented, for example, android bodies, avatars, robotic dogs, or visual simulations of memory. Indices were identified when a sign pointed to, resulted from, or materially indicated an underlying condition, such as surveillance feeds indicating control, rating scores indicating social status, neural implants indicating technological mediation of perception, or bodily reactions indicating fear and coercion. We identified symbols when meaning depended on cultural or narrative convention, such as hashtags, corporate platforms, legal consent forms, military terminology, or moral language about responsibility. For each

sign, the analysis also specified the object it referred to and the likely interpretant, understood as the ethical meaning generated within the narrative context.

Operationally, we coded a scene only when it contained at least one technologically mediated interaction and at least one ethically relevant sign. The coding sheet recorded: (1) episode and scene context; (2) signifier or representamen; (3) signified or object; (4) sign type, whether icon, index, or symbol; (5) relevant binary opposition; (6) ethical issue, such as autonomy, consent, privacy, personhood, accountability, dignity, or social control; and (7) interpretive memo explaining how the sign contributed to the narrative construction of human–machine interaction. This procedure allowed the analysis to move from individual signs to broader semiotic patterns across the corpus.

Analytic concept	Operational definition in this study	Example of observable evidence
Signifier / representamen	The concrete visual, verbal, or narrative form that carries meaning.	AI replica, rating score, hashtag, neural implant, avatar, surveillance screen.
Signified / object	The concept, condition, or ethical problem to which the sign refers.	Grief, social status, public punishment, manipulated perception, commodified identity.
Icon	A sign that resembles what it represents.	Android body resembling a deceased person; avatar resembling or replacing a self.
Index	A sign that points to an underlying condition or consequence.	Rating scores indicating social access; surveillance footage indicating control.
Symbol	A sign whose meaning depends on cultural, institutional, or narrative convention.	Hashtags, platform terms of service, military labels, corporate interfaces.
Binary opposition	A structured contrast through which ethical meaning is organised.	Human/machine, autonomy/control, real/virtual, private/public, body/data.
Interpretant	The ethical meaning produced by the sign in its narrative context.	The viewer is invited to read a technology as a threat to consent, agency, dignity, or accountability.

The unit of analysis is the scene, understood as a continuous segment of narrative action situated in a specific time-space configuration. Within each scene, specific signifying elements are examined, including: (a) technological devices and interfaces; (b) bodily states and gestures of human characters; (c) dialogue and voice-over that explicitly refer to ethical or moral questions; and (d) recurring visual motifs (e.g. screens, eyes, recording devices, avatars). These units are then related to broader narrative structures (e.g. oppositions such as human/machine, autonomy/control, real/virtual).

Coding Framework and Analytical Procedure

The empirical analysis proceeded in several stages. First, the author watched all fourteen episodes in full and produced detailed analytic notes focusing on human–machine interactions, explicit ethical dilemmas, and the consequences of technological use. Second, a preliminary coding framework was developed deductively from the research questions and the semiotic concepts (e.g. codes for types of human–machine

interaction, forms of surveillance, representations of consciousness transfer, instances of digital vigilantism, explicit references to ethics or responsibility) and inductively from salient patterns observed in the initial viewing.

Third, the episodes were re-watched scene by scene, and the pre-defined units of analysis were coded using this framework. For each coded segment, the relevant signs were identified (e.g., specific technological artefacts as icons or indices of control; symbolic use of colour or framing to connote isolation or dehumanisation), and short analytic memos captured the narrative's implied ethical stance. Fourth, codes were grouped into higher-order categories and themes corresponding to the three research questions (e.g. "commodification of consciousness", "algorithmic governance of social life", "erosion of consent and privacy", "contested ethics of technological progress").

Inter-Coder Reliability

To improve the reliability of the qualitative coding, a second independent researcher analysed a subset of the material. Both researchers applied the coding framework to the same set of scenes (covering all 14 episodes, with particular emphasis on key turning points in each narrative). We assessed agreement at the level of thematic codes assigned to each scene. Inter-rater agreement exceeded 80% for the percentage of scenes for which both coders assigned the same primary thematic code. Disagreements were discussed and resolved through consensual refinement of code definitions, and the coding framework was then applied to the remaining material.

The Black Mirror Case

Black Mirror is a British anthology series created by Charlie Brooker that explores the often dystopian consequences of contemporary and emerging technologies. Each stand-alone episode presents a self-contained narrative, typically set in a near future where digital technologies such as social media, AI, virtual reality, ubiquitous surveillance, and data-driven platforms shape everyday life. Across genres that range from science fiction to drama, horror, and satire, the series foregrounds morally fraught situations and invites viewers to reconsider their relationship with technology and its unintended effects.

The episodes frequently stage conflicts around autonomy, privacy, memory, intimacy, and responsibility, thereby offering rich material for examining how ethical concerns about technology are signified and narrated. Because of its critical acclaim and cultural impact, Black Mirror has become a key reference point in public and academic debates about digital futures, making it a particularly suitable case for a semiotic analysis of human-machine interaction and technological ethics.

EMPIRICAL DATA

The table below summarises the selected episodes.

Table 1. Selected Black Mirror Episodes Included in the Analysis

Season (S)	Episode (E)	Title	Duration
2	1	Be Right Back	48'
2	4	White Christmas	73'
3	1	Nosedive	63'
3	2	Playtest	57'
3	5	Men Against Fire	60'
3	6	Hated in The Nation	89'
4	1	Uss Callister	76'
4	2	Arkangel	52'
4	3	Crocodile	59'
4	5	Metalhead	41'
5	1	Striking Vipers	61'
5	2	Smithereens	70'
6	1	Joan is Awful	58'
6	3	Beyond The Sea	79'

Total: 14 episodes from seasons 2–6; total duration 886 minutes (≈ 15 hours). Season 1, *Bandersnatch*, and the later seventh season are outside the analysed corpus

Source: Author's compilation

After approximately fifteen hours of viewing, the author took detailed notes on each episode, focusing on scenes in which human–machine interactions, ethical dilemmas, and technological consequences were particularly salient. These notes formed the basis for the coding and semiotic analysis described above. Two independent researchers then cross-checked the coded material to enhance reliability, with inter-rater agreement exceeding 80% as explained in the methodology section.

S2 / E1 – “Be Right Back”

A grieving woman, Martha, uses an AI service that reconstructs her deceased partner Ash from his digital traces and eventually inhabits an artificial body. The episode contrasts intimate, embodied memories with the eerie persistence of a synthetic “Ash,” foregrounding the limits of digitally mediated authenticity. It raises ethical questions about commodifying grief, the status of AI replicas as persons or tools, and whether extending a relationship through technology ultimately impedes acceptance of mortality.

S2 / E4 – “White Christmas”

“White Christmas” interweaves the stories of Matt and Joe, both implicated in a technology (“cookies”) that creates sentient digital copies of human consciousness. Through the manipulation, torture, and indefinite confinement of these copies, the episode stages dilemmas around punishment, consent, personhood, and the commodification of subjectivity. It shows how surveillance and AI-driven control architectures can normalise extreme domination once consciousness is treated as data.

S3 / E1 – “Nosedive”

Set in a society where every interaction is rated on a ubiquitous social platform, “Nosedive” follows Lacie, whose life unravels when her carefully managed score collapses. Ratings interfaces, pastel corporate aesthetics, and choreographed politeness together symbolise a regime in which social value is reduced to quantifiable approval. The episode critiques social media addiction, conformity, and the erosion of authentic identity when algorithmic reputation governs access to rights and opportunities.

S3 / E2 – “Playtest”

In “Playtest,” Cooper tests an experimental augmented-reality horror game via a neural implant that blurs the line between perception and simulation. As the game increasingly draws on his personal fears, he loses any stable reference point for what is real. The narrative interrogates the psychological and ethical risks of immersive technologies that directly interface with the brain, highlighting how entertainment can become a site of uncontrolled experimentation on consciousness.

S3 / E5 – “Men Against Fire”

“Men Against Fire” depicts soldiers equipped with a brain implant (“MASS”) that enhances combat performance by visually transforming targeted humans into monstrous “roaches.” When the system malfunctions, Stripe realises he has been killing ordinary people who have been dehumanised through technological filtering. The episode critiques propaganda, perception management, and algorithmic dehumanisation in warfare, raising questions about responsibility when lethal decisions are mediated by neuro technologies.

S3 / E6 – “Hated in the Nation”

This episode links a viral hashtag (#DeathTo) to a series of killings carried out by autonomous drone bees originally designed for pollination. As public shaming escalates into real-world executions, the story exposes how online outrage, anonymity, and state surveillance can converge in technologically facilitated vigilantism. It warns of the ethical and political consequences when networked platforms and autonomous systems amplify collective aggression without adequate safeguards.

S4 / E1 – “USS Callister”

“USS Callister” portrays Robert Daly, a game designer who secretly clones his co-workers’ DNA to create sentient digital versions of them inside his private space opera simulation. He exercises absolute power over these copies of consciousness, subjecting them to humiliation and control. The episode explores abuse, authoritarianism, and the ethics of virtual environments in which ostensibly “fictional” beings may experience real suffering, questioning where moral responsibility lies when godlike control is technologically enabled.

S4 / E2 – “Arkangel”

“Arkangel” follows Marie, who implants her daughter Sara with a surveillance device that allows real-time tracking, visual filtering of distressing stimuli, and playback of Sara’s experiences. What begins as protective care gradually becomes invasive

control, damaging trust and autonomy. The episode interrogates parental overreach, the erosion of privacy, and the unforeseen relational consequences of normalising technological oversight as love.

S4 / E3 – “Crocodile”

In a future where memories can be externally accessed and viewed via a device called the “recaller,” architect Mia commits a series of escalating crimes to hide an old accident. An insurance investigator’s routine use of memory extraction inadvertently uncovers her past, illustrating how a supposedly neutral truth technology can entangle bystanders and intensify harm. The episode examines guilt, moral responsibility, and the dangers of treating subjective memory as an authoritative, surveillable resource.

S4 / E5 – “Metalhead”

Set in a stark post-apocalyptic landscape, “Metalhead” follows Bella as she is hunted by a highly efficient robotic “dog.” The machine’s implacable pursuit and minimal design symbolise a pure, context blind instrumentality detached from human judgement or mercy. The episode foregrounds themes of survival and the loss of human control, suggesting how autonomous weapons and security systems might outlive and dominate the fragile humans who created them.

S5 / E1 – “Striking Vipers”

Two old friends, Danny and Karl, rekindle their relationship through a VR fighting game whose hyper-realistic avatars enable an unexpected sexual and emotional connection. Their in-game intimacy destabilises Danny’s marriage and their own sense of identity, revealing tensions between embodied life and virtual desires. The episode probes the ethics of digital infidelity, the fluidity of gender and sexuality in virtual spaces, and how VR complicates boundaries between fantasy and real-world commitments.

S5 / E2 – “Smithereens”

“Smithereens” centres on Chris, a rideshare driver who takes a tech employee hostage to force a conversation with the CEO of a major social media firm. Haunted by his fiancée’s death in a distracted driving accident linked to the platform’s design, Chris confronts the corporation’s responsibility for addictive interfaces and their social effects. The episode explores grief, corporate accountability, and the systemic harm of attention-economy business models.

S6 / E1 – “Joan Is Awful”

Joan discovers that a global streaming platform is broadcasting a dramatized show of her life, generated in real time through a powerful “quamputer” that processes her personal data and environment. Without meaningful consent, her everyday choices are transformed into entertainment content starring celebrity actors. The episode critiques data exploitation, AI-generated media, and the collapse of boundaries between private life and commercial spectacle in the platform economy.

S6 / E3 – “Beyond the Sea”

Two astronauts, Cliff and David, pilot a deep-space mission while teleoperating lifelike replicas of their bodies on Earth to maintain family life. After David’s family is murdered, he temporarily uses Cliff’s replica to cope, but emotional entanglements with Cliff’s wife lead to devastating consequences. The story dramatizes how remote embodiment technologies complicate identity, fidelity, and grief, foregrounding the ethical risks in separating consciousness from a single, accountable physical body.

The table below reveals the narrative patterns in the data. The discussion section highlights the connotations, paradigms, and myths in the analysis.

Table 2. Interpretation of Episodes with The Semiotic Analysis

Episodes	The Signifier	The Signified
S2, E1	Digital Replica	Cope with Sorrow
S2, E4	A Device Called ‘Cookie’	Conscious-Sense of One’s Guilt
S3, E1	A Social Media Site	Digital Approvement
S3, E2	A Novel Augmented Reality Horror Game	Blurring of Digital and Physical Boundaries
S3, E5	A Brain Implant Called ‘Mass’	Politic Manipulation and Illusion
S3, E6	A Hashtag on Social Media	Herd Mentality and Propaganda
S4, E1	A Virtual Reality Game	Manipulation and Cyberbullying
S4, E2	A Parental Control System called Arkangel	Extreme Authority
S4, E3	A Technology Known as A ‘Recaller’	Past Deeds’ Consequences
S4, E5	Robotic Creatures Known as ‘Dogs’	The Pressure of The Authority
S5, E1	A Virtual Reality Game	Suppressed Feelings of Humans
S5, E2	The Social Network Firm ‘Smithereen’	Social Media Addiction
S6, E1	A Global Streaming Platform	Privacy and Personal Data Protection
S6, E3	Robotic Duplicates	Goodwill and Moral Values

Source: Author’s compilation

All episodes mention at least one effect of modern technological advancements. Moreover, they show the rigidity of human nature, which was the same in ancient times, so humanity still seems unchangeable.

RESULTS AND DISCUSSION

The semiotic analysis of the fourteen Black Mirror episodes shows that human–machine interaction is consistently framed through ethical tensions around consciousness, social order, and responsibility. Across the corpus, technologies operate not merely as narrative devices but as signs that condense broader anxieties about the limits of human agency, the stability of identity, and the erosion of moral judgement in digitally mediated environments. In what follows, the findings are organised in line with the three research questions.

RQ1. Representations of Transferring Self and Consciousness into Machines

Several episodes construct the transfer of self or consciousness into technological systems as a profound ethical disturbance. In *Be Right Back*, grief is semiotically

encoded through the repeated juxtaposition of intimate, embodied memories with the AI replica's artificial presence. The android body functions as an uncanny icon and index of the deceased partner, while its inability to reproduce spontaneity and emotional depth exposes the limits of machine-mediated authenticity. The episode thus visualises a key ethical question: whether technologically extended life undermines the dignity and finitude that give human existence its meaning.

White Christmas and Beyond the Sea further elaborate this theme by representing consciousness as something that can be copied, stored, and re-embedded in different substrates. In these narratives, consciousness transfer is symbolised by interfaces, control panels, and miniature “copies” of the self that are subjected to temporal manipulation and coercion. These signs foreground power asymmetries between those who control the technology and those whose subjectivity is technologically captured, raising questions about consent, personhood, and punishment. The notion of a “self” that can be paused, accelerated, or indefinitely confined illustrates the ethical vacuum that can emerge when legal and moral frameworks lag behind technological capabilities, echoing calls for AI laws designed to prevent abuse and reinforce human ethics (Ashrafian, 2015).

Episodes such as Playtest and Crocodile extend this problem to memory and perception. In Playtest, virtual reality headsets and neural implants function as indices of a porous boundary between reality and simulation; the collapsing distinction between the two dramatizes the human mind's vulnerability when used as a testing ground for immersive technologies. In Crocodile, the memory-extracting device operates as a symbol of absolute epistemic authority, transforming subjective recollections into evidentiary “truth”. The device's ability to penetrate private mental spaces semiotically encodes a world in which internal experiences are no longer protected, thereby raising ethical concerns that resonate with debates on brain-computer interface (BCI) policy and the need for more sustained reflection on BCI ethics (Coin et al., 2020).

Taken together, these episodes depict consciousness and memory as manipulable data, thereby foregrounding the ethical risks of treating the self as information that can be archived, duplicated, or weaponised. They also visualise a world in which irrational responses to loss, isolation, and grief, such as clinging to artificial surrogates, are understandable yet ethically problematic survival strategies in technologically saturated environments.

RQ2. Negative Social Impacts of AI and Intelligent Machines

A second cluster of episodes addresses how AI systems, platforms, and autonomous machines reshape social relations and collective life. Nosedive constructs a world in which a ubiquitous rating system fully mediates social evaluation. The constant presence of smartphones, rating interfaces, and pastel coloured suburban spaces operates as a symbolic code for enforced civility and aspirational conformity. Here, the algorithm becomes a quasi-invisible authority, governing access to housing, transport, and status. The episode thus visualises the erosion of authentic sociality and the reduction of identity to quantifiable metrics of popularity and likeability.

In Men Against Fire, military implants and augmented reality overlays function as indices of a systematic dehumanisation of the enemy. The technological “filter” that transforms human targets into monstrous figures semiotically encodes how perception itself can be programmed, supporting analyses that link autonomous systems to con-

cerns about human dignity in warfare (Sharkey, 2019). At the same time, the suggestion that such systems might be designed to be more “ethical” than human combatants (Sullins, 2010) is complicated by the show’s emphasis on how technological mediation facilitates, rather than constrains, violence when embedded in hierarchical command structures.

Hated in the Nation and Smithereens foreground the collective dimensions of digital harm. In Hated in the Nation, hashtags, drone bees, and live feeds together form a sign system that links online harassment to material lethality. The swarm’s movement from digital command to physical attack renders visible the otherwise abstract consequences of social media mobs and digital vigilantism. This aligns with contemporary discussions of hate speech and content moderation that seek to balance freedom of expression with the need to mitigate harm, such as treating malicious content analogously to quarantined software (Ullmann & Tomalin, 2020). Smithereens, by contrast, centres on the addictive design and opaque governance of social media platforms; the corporate control room, algorithmic dashboards, and distracted users symbolise a socio-technical order in which platform logics subordinate attention and mental health.

Episodes featuring autonomous or semi-autonomous machines, Metalhead in particular, depict technology as a relentless, impersonal force. The robotic dogs are constructed as icons of pure instrumentality: efficient, affectless, and devoid of context-sensitive judgement. Their pursuit of human characters in desolate landscapes shows how, once deployed, such systems can exceed human control and generate environments in which survival, rather than ethical deliberation, becomes the dominant concern.

Finally, USS Callister, Arkangel, Striking Vipers, and Joan Is Awful explore how virtual environments and surveillance technologies reshape intimacy, authority, and identity. In USS Callister, the virtual game world becomes a stage where power fantasies are enacted without external constraint; avatars and code function as symbols of a regime in which others can be reduced to programmable objects. Arkangel presents parental surveillance technology as a sign of care that gradually becomes an instrument of control and intrusion, visually underscoring the thin line between protection and violation of privacy. Striking Vipers and Joan Is Awful highlight how immersive gaming and streaming architectures destabilise fixed identities: digital avatars and algorithmically generated “versions” of the self dramatise the multiplication of subject positions and the difficulty of maintaining coherent boundaries between public, private, and commercial uses of personal data.

Across these episodes, AI and related technologies are thus represented as re-configuring social life by altering how individuals see one another, how they are evaluated, and how they relate to institutions. The series suggests that when such systems are introduced without robust ethical safeguards, they amplify existing inequalities, intensify social pressures, and normalise forms of coercion and surveillance.

RQ3. The Importance of Ethics in the Age of Digital Technology

The third research question concerns how Black Mirror articulates the need for ethical reflection in technologically mediated societies. Rather than offering explicit moral prescriptions, the series uses narrative and visual strategies to stage ethical dilemmas and to expose the consequences of their neglect. Recurrent motifs, such as screens that mediate relationships, interfaces that override consent, and devices that

outlive their creators, operate as symbolic reminders that technical capabilities routinely outpace ethical and legal frameworks.

Episodes such as *White Christmas*, *Men Against Fire*, *Hated in the Nation*, and *Smithereens* collectively foreground the absence or inadequacy of regulatory mechanisms. The ease with which consciousness can be punished indefinitely, perceptions manipulated, or crowds mobilised for punitive ends highlights the gap between technological sophistication and normative guidance. This resonates with broader debates on AI law, governance, and the integration of artificial entities into society, where empirical research on moral and social attitudes toward robots and AI remains limited but increasingly recognised as crucial (Harris & Anthis, 2021).

The series also anticipates concerns about BCI ethics and the emergence of “homo technologicus” (Warwick, 2016). By depicting characters whose cognitive and bodily boundaries are permeated or extended by implants, interfaces, and networked devices, *Black Mirror* visualises a transitional condition between homo sapiens and technologically augmented humans. The ethical stakes are signified through the costs borne by individuals, loss of privacy, autonomy, or even ontological security, whenever new capabilities are adopted without corresponding reflection on responsibility, rights, and dignity.

Overall, the semiotic patterns identified across the episodes suggest that *Black Mirror* consistently frames ethics not as an optional add-on to technological progress but as a constitutive dimension of human–machine interaction. Technologies in the series function as mirrors that reflect back human desires, fears, and failures. When characters confront situations of loss, isolation, and grief, the technologically available options, whether resurrecting the dead via AI, escaping into virtual realities, or outsourcing decisions to algorithms, are portrayed as understandable yet fraught responses that can ultimately exacerbate suffering. In this sense, the series invites viewers to question whether societies can manage technological advances with wisdom and virtue, underscoring the urgency of developing ethical frameworks that keep pace with innovation.

CONCLUSION

This study examined how selected episodes of *Black Mirror* semiotically construct ethical tensions in human–machine interaction. On the basis of the fourteen episodes analysed, the findings indicate that the series repeatedly represents technologies such as AI replicas, consciousness copies, rating systems, neural interfaces, surveillance devices, autonomous machines, virtual worlds, and data-driven platforms as signs through which concerns about autonomy, consent, privacy, identity, accountability, and social control are articulated. The analysis supports the conclusion that, within this corpus, technological innovation is commonly narrated as ethically ambivalent: it may respond to recognisable human needs such as grief, security, social connection, or entertainment, but it also becomes problematic when it commodifies subjectivity, weakens human agency, intensifies surveillance, or allows responsibility to be displaced onto systems and institutions.

These conclusions should therefore be understood as interpretive findings about a purposively selected set of audiovisual texts rather than as generalisable claims about all science fiction, all digital technologies, or actual user behaviour. The study demon-

strates that a semiotic approach can clarify how ethical meanings are produced through recurring oppositions such as human/machine, autonomy/control, real/virtual, and private/public. However, it does not establish causal effects on audiences, measure public attitudes toward AI, or evaluate the technical feasibility of the technologies depicted in the series. Its contribution lies in showing how popular techno-dystopian fiction can stage and organise ethical questions that are relevant to broader debates on AI, surveillance, virtual reality, and human–technology relations.

Future Recommendations and Limitations

Exploring the ethical implications of interactions between human consciousness and machines would raise essential questions about identity, authenticity, and the moral obligations involved in such technological advancements, and could inform further research. Moreover, investigating the negative impacts of AI and advanced technologies on social life in greater depth could help examine how social media, surveillance, and technological control affect human behaviour, relationships, and societal structures. It is also crucial to expand the discussion of ethics in the digital age, drawing on narratives that explore privacy, data exploitation, and the blurred boundaries between reality and virtual worlds. This could inform the development of ethical frameworks and policies to guide the responsible use of emerging technologies. The author strongly recommends encouraging interdisciplinary collaboration among fields such as philosophy, psychology, sociology, and computer science to better understand the complex interplay between humans and machines and the moral and social implications of technological progress. There is also a need to promote further research on developing ethical AI systems that align with human values and moral principles, highlighting the dangers of unchecked technological power and the need for accountability. Exploring the potential of science fiction narratives, such as those in *Black Mirror*, as a tool for anticipating and addressing the ethical challenges posed by technological advancements could yield new social science perspectives. By addressing these recommendations, researchers and policymakers can work together to ensure that ethical considerations guide technological progress and serve humanity's best interests.

Several limitations should be noted. First, the sample consists of fourteen episodes selected through purposive sampling, so the analysis cannot represent the entire *Black Mirror* series or other media texts dealing with technology. Second, the study relies on qualitative semiotic interpretation; although inter-coder checking strengthened reliability, the analysis remains shaped by the selected theoretical framework and the researchers' interpretive judgements. Third, the study focuses on textual and visual signs within the episodes and does not include audience reception data, interviews, surveys, production materials, or comparative analysis with other series or films. Fourth, because the objects of analysis are fictional narratives, the findings should not be read as empirical evidence about the real-world effects of AI, virtual reality, surveillance systems, or other emerging technologies.

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