Radioactive Ghosts and Psychic Anomalies: Exploring Pripyat's Supernatural Topography in the *S.T.A.L.K.E.R.* Video Game Series

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Introduction

The city of Prypiat is a Soviet atomograd, or atomic city, established in 1970 to house the workers of the Chornobyl Nuclear Power Plant.[1] Prypiat's nearly 48,000 residents enjoyed the perks of modern city life, including wide garden-lined boulevards and modern consumer amenities, in fulfillment of the Soviet technological utopia promised by the visions of a bright communist future. Today, the city is part of the Exclusion Zone, a 30-kilometer area of irradiated land contaminated by the catastrophic meltdown of reactor number four of the Chornobyl NPP that occurred in the early morning hours of April 26, 1986. The only legal means of entering the Zone is through an official tour, because, while the worst of the immediate radiation has been contained, the lingering radiation and the radioactive hotspots still pose a danger. However, video games offer a safe way of exploring this terrain and for players to engage with the psychological dimensions of the disaster. The video game *S.T.A.L.K.E.R. Shadow of Chernobyl* (2007), the first in the series, ushered in a unique open story gameplay where players navigate an unstable terrain filled with mutated creatures and psychic anomalies. What makes the game notable is how the landscape, rendered from real images and video of the Zone, morphs independently and unpredictably to imagine the realities and implications of nuclear disaster. More than just entertainment, the *S.T.A.L.K.E.R.* video game series immerses players into a post-apocalyptic space where the slow violence of nuclear power is made visible through mutant beings and supernatural threats. This article examines how the experience of play within the virtual environment of S.T.A.L.K.E.R.'s Chornobyl Zone awakens a prosthetic memory of nuclear disaster in players that can then challenge the hegemony of the nuclear industry and our increasing reliance on nuclear power. The supernatural and horror-filled landscape of the game

becomes a means of working through the ontological insecurities we all experience since the emergence of a global nuclear infrastructure.

Designing a Reactive Landscape: A Brief History of *S.T.A.L.K.E.R.*

Nuclear disaster and war have always provided an abundant source of narrative and visual inspiration for video games. There are several popular video games dedicated to exploring the cultural and mythological dimensions of nuclear disaster and war, including *Fallout 3* (2008), *Wasteland 2* (2014), and *Metro 2033* (2010). More specifically, Chornobyl is featured in games such as *Call of Duty 4: Modern Warfare* (2007), and recently, *Chernobylite* (2019), *Fear the Wolves* (2018), and *Chernobyl: Road of Death* (2019). However, arguably the most influential and memorable video game series about Chornobyl is the *S.T.A.L.K.E.R.* series. The first game in the series, *Shadow of Chernobyl*, debuted in 2007 and was the project of Ukrainian video game company, GSC Gameworld, based in Kyiv. Given their proximity to the Zone and the creative team's familiarity with the disaster's history, the company was uniquely positioned to produce a game that replicates the actual terrain of the Zone. One of the game's developers, Anton Bolshakov, explains that the impetus behind the original *S.T.A.L.K.E.R.* game 'was to create a game which would remind people of the Chernobyl accident and at the same time warn mankind against any possible fatal mistakes in the future' (Rossignol 2007b). *S.T.A.L.K.E.R.* reckons with Chornobyl's difficult heritage out of an urge to educate players about the very real dangers of nuclear power. In the virtual streets of Prypiat, our fears and anxieties about radiation are brought to life in an interactive way, not so that we might neutralize them, but so we might understand what they are telling us about nuclear danger and risk.

The past and future collide in *S.T.A.L.K.E.R.: Shadow of Chernobyl*. While the game world does resemble the Zone created by the 1986 disaster, the game takes place in an alternative future where a second nuclear disaster has turned humans into mutants and changed the physics of the surrounding environment. The series' title references Andrei Tarkovsky's film *Stalker* (1979) and the source novel for that film, *Roadside Picnic* by Arkady and Boris Strugatsky. The real Exclusion Zone has its own stalkers, illegal explorers who sneak into the Zone to explore the

abandoned buildings and grapple with its difficult history. Similarly, stalkers in the game are scavengers who enter the Zone to probe its secrets and look for money and artifacts. Playing as the Marked One, a stalker who has lost their memory, players are instructed to 'Kill Strelok,' unaware that they are Strelok. In exploring this virtual post-apocalyptic city, players face a myriad of threats from ferocious monsters, violent zombies, and deadly force fields, but the real danger is a secret laboratory concealing the C-Consciousness, a psychic weapon controlled by seven scientists who use the Zone to develop catastrophic weapons. Strelok discovers that the hivemind behind the C-Consciousness stole his memories, brainwashed him, and unwittingly sent him on a mission to kill himself. Yet the game is open world, so players can choose to follow this narrative or explore the Zone as they choose, giving players a high degree of agency to explore the game's themes and the virtual landscape, which according to Adam Chapman, allows games to 'function best as heritage and living history' (2016: 178). *S.T.A.L.K.E.R.*'s open world and free agency, while commonplace now, was innovative for its time.

The reactive game world acts and responds unpredictably thanks to a proprietary artificial intelligence engine, which also gives the non-player characters (NPCs) their own life cycles that run irrespective of the main player's actions. There are a variety of NPCs unique to the Zone including bandits, mercenaries, paramilitary groups, and ecologists; some are helpful while others are hostile. The beasts and monsters are similarly unpredictable. This means that players returning to the same places in the game will not encounter the same threats, because the wild beasts and monsters eat, sleep, and fight on their own independent life cycles as well. There are creatures that have mutated over time, such as blind dogs, boars that hunt humans, and underground Bloodsuckers, but there are also beasts that are the result of genetic experimentation and breeding projects, often with supernatural abilities. These creatures are much more threatening. Pseudodogs, a mutated combination of bear, dog, and human DNA, will attack an intruder to their territory immediately. Poltergeists, who are rumored to be the ghosts of former stalkers exposed to high amounts of radiation, haunt empty buildings, have telekinetic powers, and can manipulate gravity. Humanoid Controllers can wage psychic attacks to confound a stalker's aim or control their mind, while Pyrogeists randomly appear as a fiery haze to block paths. Additionally, players may encounter weapon yielding zombified stalkers as well as more generic zombies, those who have lost their mental faculties due to military mind control

technology called the Brain Scorcher. The presence of zombies in this post-apocalyptic setting signals that ethical boundaries have shifted, and the focus is on survival. These creatures are unpredictable and can only be avoided with experience: often, the only defense against these supernatural creatures is to hide. Otherwise, players carry bolts to throw as they explore along with detectors to reveal anomalies such as gravitational vortices that can shred a body to pieces, electros that collect electricity, springboards that release damaging shockwaves, or burners that can melt metal. All *S.T.A.L.K.E.R.*'s supernatural elements originate in the environmental changes inflicted on the Zone through exploitative ideas of technological progress and covert scientific operations that created this unforgiving landscape.

Such agency within the game allows for a deep engagement not only with Chornobyl's history but also our own nuclear future as players explore Prypiat's modern ruins. As the psychological space of disaster is mapped onto the (virtual) physical topography, the abandoned city and villages are transformed from a static background to a responsive environment that, as Chloe Milligan suggests, 'allow[s] us an encounter with the possible dark paths we could have (and still could) experience' (2018: 266). *S.T.A.L.K.E.R.'s* terrain becomes a space for the exploration of our deepest existential fears and anxieties as danger lurks around every corner and the ruins warn of the horrifying possibilities of nuclear disaster. It is revealed later that the reason for Chornobyl's explosion and the second nuclear disaster was the hubris of Soviet scientists who had set up an experimental laboratory in the Zone to conduct research into the human mind. During their experiments, they discovered a psychic energy field, the *noosphere*, linking the entirety of Earth. The scientists believed they could use radio waves to influence human thought and create loyal Soviet citizens. However, their experiments fail catastrophically, allowing the immense psychic energy of the noosphere to penetrate the organic environment and alter it irrevocably. The hubris of our own entanglement with nuclear power has inflicted similarly catastrophic ecological harm to the earth, contaminating the land and contributing to a growing epidemiological crisis that is largely invisible. In the *S.T.A.L.K.E.R.* series, players confront this nuclear legacy in a visible and visceral manner through gameplay, because, as James Paul Gee confirms, the significance of video games lies in how they 'let people understand a world from the inside' (2007: 16). In the game, cultivating a deep understanding of the Zone is key to surviving these unnatural threats.

The Nuclear Unconscious

The psychological spaces that hold our fears and anxieties are brought to life in the virtual realm and given a palpable presence. Playing *S.T.A.L.K.E.R.* is an immersive experience, engaging both body and mind in the struggle for survival. From the game's beginning, players are thrust into an uncertain situation with just an inaccurate pistol to defend against supernatural threats. The shadowy interiors make one feel claustrophobic, while the open spaces terrorize with distortions and sparks of electricity. The creepy atmosphere pulses with danger, and radiation. The crackling of the Geiger counter is a reminder of pockets of lingering radiation and a detector alerts players to nearby anomalies, which, depending on the type, can radiate, expel, obscure, or burst into flame with unpredictable force. Additionally, *S.T.A.L.K.E.R.*'s ambient soundtrack adds another unsettling layer to the haunted landscape, as video game critic and long-time *S.T.A.L.K.E.R.* player Jim Rossignol comments, 'No other game broods and rumbles like Stalker' (Rossignol 2007). The Zone echoes with unidentifiable howls and rustlings, buzzing, gunshots, ominous creaking, and other strange noises. Chris Livingston, senior editor of PC Gamer, agrees, noting, 'The sense of dread is like white noise: pervasive and constant' (2022).

The Soviet architecture of Prypiat's empty buildings and crumbling structures remind us that these ruins are modern and attest to recent traumas. These video game ruins haunt players, as Emma Fraser explains, 'stripping away the illusions of security and progress, simultaneously reifying and resisting a vision of history as perpetual novelty or beginnings and endings' (2019: 184). Real ruins are imbued with the same haunting quality because of their rapid and often unexpected appearance associated with negative circumstances. According to Tim Edensor, in these spaces, 'ghosts are sought to recall that which has been forgotten, whether through deliberate political strategies or because the horrors of the recent past are too painful to confront' (2004: 835). While ghosts and the spectral are typically invisible, they can be found in the ruin's 'profuse and intrusive textures, peculiar and delicate soundscapes, as well as perplexing visual objects, juxtapositions, and vistas, all at variance to the sensually ordered world outside' (837). Ruins remind us that there are consequences to our actions on earth that have duration, and they remain to warn us of our vulnerability in this increasingly fraught era of environmental crisis that we have initiated with harmful industrial and technological practices.

Nuclear subjectivities are formed by the trauma of knowing that humankind has created a weapon that could wipe out planetary life. In *Radioactive Ghosts*, Gabriele Schwab writes about the shaping of nuclear subjectivities after the creation of the atomic bomb. She argues that the knowledge of the atom bomb's massive destructive potential has fundamentally altered psychic life (2020: 4). The weight of that reality is so difficult to bear that it must be repressed in an act of psychic splitting that occurs out of necessity, as an adaptation to the ontological insecurity of atomic power (5). These fears and anxieties are subsumed into what Schwab terms the nuclear unconscious, allowing us to live in a state of denial, in a mode 'as if' nuclear annihilation was not a current or future threat (17). Schwab contends that even those who may be unaware of the nuclear threat, or the mechanisms of nuclear power are still affected because of the 'virtually irresolvable problems posed by nuclear waste and the real long-term dangers that threaten the survival of the human species' (17). Cancers, genetic mutations, reproductive damage, and contamination from power plants and waste storage are all very real threats that we face as a species, even if another bomb were never to be used again. According to Schwab, signs of nuclear trauma that influence nuclear subjectivities include 'obsession with illnesses developing in radioactively contaminated bodies; fears of reproductive damage and related phantasms of the mutant body; the phantasmatic refashioning of the disaster zone into an idyllic space of freedom,' as well as apocalyptic visions of the future (162). These traumatic dimensions are evident in the ways we think about the Chornobyl nuclear disaster and the Exclusion Zone today. The public health concerns, genetic inheritance, hypervisibility of mutated bodies, and illegal stalker culture all speak to the disaster's traumatic legacy, and all these anxieties are reflected in the game and the depiction of the Zone as a supernatural place.

Nuclear trauma, like radioactive contamination, affects individuals and communities disproportionately. Those who have experienced nuclear disaster firsthand cannot so easily forget the trauma of exposure to radiation and loss of bodily security. 'They have already experienced a 'rupture in "the order of things",' as Schwab notes (4). However, for individuals and communities situated far from sites marked by nuclear bomb testing, waste storage, or a disaster, the easier it is to repress the negative emotions and ontological insecurities that accompany the knowledge that there are weapons deadly enough to wipe out mankind and turn

the land uninhabitable. This denial occurs even as nuclear power, its waste, and the weapons created from it are daily conversations played out in the media and in popular culture: 'While one may split off these nuclear threats from conscious awareness, the images and words will leave their trace in the unconscious' (6). Often supernatural or horrific in nature, popular culture representations also speak to our nuclear trauma. The nuclear unconscious is porous and the fear too ominous to fully ignore. Just as the barbed wire fences around Chornobyl's Exclusion Zone are an inadequate barrier to radioactive dust carried away by heavy winds, and just as our skin does not protect us from the cellular damage of radiation, so too do these unconscious ontological insecurities and nightmarish realities seep out into our everyday lives. We are doubly haunted by past events, such as the bombing of Hiroshima and Nagasaki, the legacy of atomic bomb testing, and disasters at Mayak, Chornobyl, Fukushima, and Three Mile Island, as well as haunted by transgenerational trauma and the potential for future disasters and nuclear war. While the reality of nuclear power's deadly legacy is difficult to bear, the burial of fears linked to these double hauntings of nuclear trauma are also devastating, creating a 'psychic toxicity' (16) that not only destructively divides the self, but also keeps us from demanding change and taking radical action. Schwab reminds us that 'we forget at our own peril' (7). Our forgetting and denial of our nuclear reality has real political, economic, and cultural consequences and makes us complicit in the strengthening of the nuclear industry and the expansion of nuclear danger: Most of us do not want to know or think about how many of our tax dollars feed the nuclear war machine or the nuclear energy industry. Thus, we become involuntary - and for many, indeed, voluntary - participants in nuclear violence, if not complicit bystanders in support of the nuclear war machine (5).

The lack of explicit public discussion on funding, security, and waste for the secretive nuclear-military-industrial complex only affirms this blindness toward our own implicit support of an invasive nuclear infrastructure, which only increases our vulnerability to the nuclear threats we fear so acutely. The nuclear colonialism that is responsible for the widespread development of the nuclear industry has also colonized the mind (19). For Schwab, the same mechanisms of denial and distancing are at work in the promotion of nuclear power as a renewable energy solution to the climate change crisis (12). Refashioning nuclear power as a viable clean energy solution ignores the great costs of uranium mining, power plant construction, and waste storage

issues that make it unsustainable and environmentally harmful (Caldicott 2007: vii-x). Given the multifaceted nature of our entanglement with nuclear power, it is necessary to directly confront the ghosts and monsters of the nuclear unconscious and actively work against the protective instinct to deny what is happening around us. Such confrontation involves a dramatic restructuring of psychic life and a willingness to take on the 'hitherto unimaginable responsibility for the destiny not only of their own species but of other species as well' (Schwab 2020: 21). Can a video game, through the psychological engagement with a compelling story and a bodily experience of gameplay, help cultivate a greater awareness of the nuclear entanglements we currently face?

Gameplay and Prosthetic Memory

In many ways, the nuclear unconscious is the subject matter of *S.T.A.L.K.E.R.: Shadow of Chernobyl*. The double haunting of nuclear trauma is underscored by the alternative history of a second post-Chornobyl nuclear disaster. Additionally, the design of the game world, modeled directly off the Exclusion Zone, juxtaposes the modern ruins against the supernatural changes and further ruin created by the second disaster. The modern ruins of Prypiat are recognizable as part of the visual lexicon of Chornobyl communicated through photography and documentary films about the disaster. The original sarcophagus that covered the destroyed reactor, the grandiose Lazurniy swimming pool, the Prometheus statue, Cafe Prypiat with its beautiful stained-glass windows, and the iconic yellow Ferris Wheel are part of the game, and the texture of the graphics were created from real artifacts and materials found in the Zone. These modern ruins mark the Zone as a heterotopian space, according to Philip Stone, who draws on Foucault's dense concept of heterotopia, 'a ritual space that exists out of time – in which time is not only arrested but also notions of Otherness are consumed in a post-apocalyptic place' (2013: 79). Stone uses the idea to help explain how the Zone functions and is consumed as a dark tourist site. Cordoned off from the public and filled with the decaying ruins of Soviet modernity, the Zone represents a suspension of time and the conventional order of things. The Zone attracts us with its liminality as a space where alternatives are posed, and uncomfortable truths are revealed (Stone 2013: 80). Among the modern ruins, overgrown streets, and broken objects, tour guides

relate the history of trauma and loss associated with the abandoned city and villages of the Zone, provoking an experience 'in which feelings of helplessness of preventing the accident stimulates an enhanced awareness of the fragility of our modern world' (89).

Interestingly, while the real Zone's eerie atmosphere and haunting ruins influenced the game, the *S.T.A.L.K.E.R.* series now influences the narratives of the Chornobyl tours. The game has become an advertisement for Chornobyl tourism, and the tours borrow from the game world to enhance their narrative. The synthesis of game world and real world yields unexpected resonances as the experience of gameplay and the tourist experience are motivated by a need for greater exposure to the real or as Andrew F. Wood describes it as 'a longing for corporeal experience not generally found in modern life' (2021: 128). Wood returns to Foucault's idea of heterotopias to add necessary nuance to the discussion. While he agrees that tourists visit the heterotopian space of the Zone out of a desire to 'place themselves within rhetorical, performative, and material conditions that transgress the precincts of safe and unsafe action' the illusory nature of this transgression is misleading. While Foucault would interpret the desire for transgression as a kind of 'social safety valve' occurring in a safe place, the Zone is not exactly safe.

Despite the pretense of safety and the low risk associated with official tours, lingering radiation remains in the dust, the trees, and mushrooms, and deep in the water. The wind picks up particles; fires periodically release the radiation that was absorbed by plants; and there are still areas, such as the Red Forest, where entry is prohibited. The lush return of nature that conceals these dangers should not be misinterpreted as safety, which is why we must acknowledge that Zone tourism is 'more than an imaginary transgression of rules and regulations but also as a corporeal encounter with contamination' (Wood 2021: 151). Inside the Zone and exposed Wood argues, 'we are made real by an acute embrace of material risk' (151). Wood's reading of the Zone as heterotopia underscores the ways that our encounters with the Zone and nuclear disaster, though potentially harmful, are necessary to articulating change in our relationship to nuclear power. In this liminal space, which bears the scars of its exposure, we can confront our nuclear fears and 'contemplate our own ghostly natures' (154). Exposure then becomes the basis for political action and a renewed ethical awareness of the ways that nuclear

power shapes our lives and changes our environment. In rendering the real city accessible to a wide audience, the *S.T.A.L.K.E.R.* game series offers a safe space in which to explore these fears of nuclear catastrophe. The supernatural depiction of Prypiat brings these otherwise invisible forces and anxieties into stark relief.

The divide between humankind and nature has allowed us to exploit the environment in catastrophic ways that have material consequences that now threaten our very existence. In *Exposed: Environmental Politics and Pleasures in Posthuman Times*, Stacy Alaimo examines the idea of exposure as a strategy for understanding the risks of living in a world where material changes in the environment have begun to challenge the notion of human exceptionalism. We are grappling with extensive ecological damage caused by air and water pollution, chemical and radioactive contamination, the invasive nature of microplastics, destructive mining and agricultural projects, and wasteful energy practices, and the consequences are creating new material encounters with harmful substances and toxic environments. Consequently, the idea of an 'impermeable Western human subject is no longer tenable' (2016: 5). Notably, non-Western subjects have long been exposed to the material realities of environmental destruction. From this perspective, Alaimo proposes a new materialist environmentalism in which the 'material interchanges between bodies, consumer objects, and substances become the site for ethical-political engagements and interventions' (9). Examining exposure in this way shows that we are all exposed, and rather than detach and distance ourselves from the consequences, we must occupy it and use it as an opportunity for the formation of a radical environmental politics:

> Performing exposure as an ethical and political act means to reckon with – rather than disavow – such horrific events and to grapple with the particular entanglements of vulnerability and complicity that radiate from disasters and their terribly disjunctive connection to everyday life in the industrialized world. (5)

While the exposures that Alaimo examines are primarily artistic and performative in nature, she does point to the exposure experienced by individuals and communities from the Chornobyl nuclear disaster as an example of absolute exposure that, in turn, exposes our precarity and reveals our mastery over nature to be illusory. Exposure becomes the antidote to breaking the

hold of nuclear colonialism of the mind that Schwab identifies as a barrier to political action and anti-nuclear resistance (2020: 5).

The Zone is a space of trauma, created when Soviet citizens were betrayed by the government that was supposed to protect them and by the safety promised in utopian visions of a bright communist future. Like Alaimo, Adriana Petryna, in her study of biological citizenship post-Chornobyl, confirms that exposure to radiation is an extreme form of harm given how unprepared the human body is to defend against such a powerful form of energy: 'The deep intrusion of illness into personal lives fostered a type of violence that went beyond the line of what could be policed' (2002: 216). The inhabitants of Prypiat were betrayed when they were told that everything was under control even as radiation reached fatal levels and fires spewed radioactive smoke and ash for weeks. They were lied to about the possibility of being able to return to their normal lives and inevitably lost their land, their homes, their animals, their possessions. Worse, they have been forced to contend with that nuclear legacy and their extreme vulnerability without adequate support or proper knowledge of the risks and consequences of exposure. The lack of health monitoring for victims means that we cannot understand the full health costs related to the disaster so that we might learn from this mistake (Petryna 2002: 30). Stephen Harmon explains that for a game to be transformative, the 'virtual experience must…contain consequences (simulated consequences) of a sufficient gravity to emotionally engage the learner beyond a surface level' (2011: 31). While *S.T.A.L.K.E.R.* may not turn players into anti-nuclear activists, the simulated danger of the game has the potential to attune players to nuclear risk and develop empathy for those who have suffered from the hubris and negligence of the nuclear industry.

The desire to visit the Zone is the siren song of the nuclear unconscious and exposure, in some form, is what we crave as a means of releasing the psychic toxicity of a divided self in which survival is predicated on denying that which most threatens us. Our coping strategy of blindness is unsustainable and destructive, whereas the acknowledgement of our exposure provides 'a rare opportunity to make real and visible the edges that shape us' (Wood 2021: 151). Still, traveling such a long distance at great expense to enter the heterotopia of the Zone is not possible for everyone. Just as tourists desire to learn about Chornobyl by visiting the actual

Zone, as players we too, 'seek to learn about the past by exposing ourselves to some of the same perceptual information as those in the past experienced in their environment' (Chapman 2016: 180). Video games, by the fact of their virtuality, are safe and can simulate an immersive experience of exposure through a combination of game mechanics, narrative play, and open world exploration that allow players the opportunity to confront the fears and anxieties buried in the nuclear unconscious. The threat of radiation is dramatized through ambient noises and refashioned from a purely invisible threat into a supernatural landscape teeming with monsters, zombies, and psychic anomalies. In Nuclear Borderlands, Joseph Masco underscores the invisible power of nuclear materials:

> Radiation is colorless and odorless, yet capable of affecting living beings at the genetic level. In this sense, nuclear materials produce the uncanny effect of blurring the distinction between the animate and the inanimate, and between the natural and the supernatural. (2020: 30)

Players navigate this space on high alert, challenged by the unstable visual field and unpredictably ferocious wildlife: 'It's a place where the usual distractions from the moment are almost entirely absent, and your own senses are heightened by the knowledge that there is literally something in the air' (Lane 2019). To stay alive, players must make quick decisions, study the Zone's topography, learn to interpret the Zone's eerie soundscape for threats, and manage risk. As Jen England explains, 'Ultimately, these games force players to confront the lengths to which they're willing to go to thrive, survive, or perish' and so become 'both a reflection of and preparation for environmental collapse' (2020: 114).

The bodily and psychological engagement with *S.T.A.L.K.E.R.*'s virtual recreation of the Zone has the potential to become what Alison Landsberg terms 'prosthetic memory.' According to Landsberg, prosthetic memories form 'as the result of a person's experience with a mass cultural technology of memory that dramatizes or recreates a history he or she did not live' (2004: 28). Films, books, and video games can communicate powerful memories to a wide audience across a variety of physical, social, and cultural barriers. The sophistication of new media technologies has turned them into important 'sites of experience,' where people of all

different backgrounds can consume the same images and engage with the same narratives out of a 'popular longing to experience history in a personal and even bodily way' (33). Their understandings of a prosthetic memory may differ, but the shared engagement with a prosthetic memory provides a basis for further collaboration and connection. Prosthetic memory 'enables people to take on memories of the past, even to identify with people from the past' (149) so that they can experience empathy and develop a sense of responsibility for others. If we can better understand one another and the difficult experiences and traumas that we all endure, then we can make meaningful alliances that affect real political change. Landsberg does not discuss video games, but video games might be the most sophisticated technology we have for the formation of prosthetic memory because of the immersive virtual experience offered by the game visuals, design, and narrative.

To challenge and provoke players, the radiation of the real Zone is made visible through supernatural encounters as the fears and ontological insecurities related to nuclear disaster are given shape and are designed to shape the experience. These monsters, zombies, and otherworldly forces permeate the Zone and work to visualize the radioactive contamination in the virtual space. Defending against these supernatural creatures and psychic entities generates a similar fear and anxiety of nuclear trauma in the body, which responds to the virtual threat with feelings of unease, discomfort, panic, and alarm. The vulnerability invoked by this virtual exposure performs a crucial intervention, collapsing the divide between consciousness and the nuclear unconscious. *S.T.A.L.K.E.R.'s* supernatural landscape and horrifying atmosphere approximates the extreme vulnerability induced by radiation exposure. Chris Livingston, game critic and seasoned RPG player, admits that 'no matter how deep I've gone into the Exclusion Zone, I've never really stopped feeling…easily spooked and exceedingly vulnerable' (2022).

The real city of Prypiat haunts the virtual city in the game. As players explore the Zone and its modern ruins, the game play 'engages players in cognitive work valuable for understanding actions and practices that can lead to collapse not only in the virtual world but, importantly, in the material world too' (England 2020: 115). Just as radiation is difficult to obtain, so is the reality of our nuclear entanglement, which already haunts us with nuclear violence and even annihilation. Masco points out that the thousands of atomic bomb tests have

already contaminated the planet: 'Taken up by global wind currents as well as plants and animals, these materials were delivered into each and every person on the planet and deposited in varying amounts within their genomes' (2020: 159). In addition to the atomic bomb testing, which left areas of the American West, Bikini Atoll, and Kazakhstan with the consequences of radiation, radiation was released into the environment from the Hanford site in Washington state and Rocky Flats in Colorado; radioactive waste was dumped into the Techa River in Chelyabinsk, as well as several nuclear accidents from the Mayak Power Plant; and the disaster at Fukushima only reminds us that nuclear disasters are more prevalent then we allow ourselves to comprehend. Given the increasing frequency with which nuclear power is proposed as a solution for climate change and energy crises, it is more necessary than ever that we understand the real costs of nuclear development so that we may resist its further incursion into our bodies and living spaces.

Conclusion: War in the Zone

In 2018, GSC Gameworld announced that work had begun on a long-anticipated addition to the *S.T.A.L.K.E.R.* series. Fans eagerly awaited the release of *S.T.A.L.K.E.R.* 2 only to have the release date pushed forward to September 2024 after the Russian invasion of Ukraine on February 4, 2022, led to significant delays. By early March, Russian forces had taken control of the Chornobyl Exclusion Zone, holding the workers hostage for nearly five weeks. Communication from the plant was cut off while laboratories and offices were looted, and the area became a temporary military base. The damage to the Zone is shocking. Russian soldiers dug trenches and drove tanks over irradiated land, releasing radioactive dust into the air and unknowingly disturbing hotspots (Kamenev 2022). The occupation of the Zone is an instance of the game coming to life as young Russian soldiers, many of whom are the target audience for *S.T.A.L.K.E.R.*, were exposed to the Zone's radioactive dangers unknowingly and without any true protection. Although the occupation of the Zone ended on April 1, the Zaporizhzhia Power Plant in Enerhodar, Ukraine remains in Russian control. Russian forces seized control of operations and installed their own personnel to handle the plant's operations (Hinshaw and Parkinson 2022). Russia has refused to allow the International Atomic Energy Agency to inspect

the plant and ensure its safety, stoking fears of nuclear catastrophe. The nuclear dimension of the war in Ukraine is alarming, given the vulnerability of power plants to missile strikes and the risks associated with loss of power or an interruption to vital plant operations. The Zaporizhzhia NPP is the largest nuclear power plant in Europe, so any major explosion there would be worse than Chornobyl. It is a dire warning of the precarity of our collective investment in nuclear power.

Russia's invasion of the Zone is yet another layer to an already burdened space of trauma and the occupation of the Zaporizhzhia NPP amplifies existent nuclear anxieties. It will be interesting to see how the war has influenced the new game, either directly or as a presence haunting the narrative. Unfortunately, many parts of Ukraine already resemble the ruins made so infamous by the Chornobyl nuclear disaster. After Chornobyl, fears about radiation and nuclear disaster proliferated in countries around the world, particularly in countries where background radiation levels increased. Radioactive material was detected as far away as Finland, but the anxiety of exposure and contamination was even more pervasive as fears about nuclear energy and Chornobyl 'infected' cultural micronarrations and initiated an era of dark ecology in which we must confront the harm done to the environment and the possibility that we all have been exposed. In doing so, we will begin to understand that 'the atmosphere has taken on for us, as well as for all nonhuman beings, a radically new agency — the composition of the air not only had a physical dimension, but also a military, political, medical, social and affective one' (Jelewska and Krawczak, 2018: 3). We live now in a world in which a technological disaster like Chornobyl is not an impossible event, and neither is a nuclear war. Unfortunately, the 'specter of nuclear conflict' hangs over this war, with both NATO and Russia leveraging its respective nuclear arsenals in a risky strategy to manipulate the other's involvement (Kimball 2024). While Russia's nuclear threats seem to be largely performative, Putin's inflammatory 'nuclear rhetoric' is nonetheless alarming and means that regardless of the likelihood of actual nuclear war, countries have had to prepare for that possibility (Baev 2024). Ukraine is caught in the middle once more.

Chornobyl's haunting resonance compels us to explore its spectral dimensions. Players return to the abandoned city of Prypiat out of fascination and a need to understand the Chornobyl

disaster. Playing the game is more than just a ludic exploration of a post-Soviet landscape of industrial ruin and failed technological utopia. Players return to this unsettling supernatural city repeatedly to experience something real, as game enthusiast and critic Josef Burton confirms: 'The horror and supernatural elements of the game feel not scary, but eerie because they are happening in a world that feels real…Stalker has built a legend around an atmosphere of grounded and tangible desperation' (2022). The unpredictability, the faulty weapons, the unexpected encounters, and numerous unscripted side quests are compelling, and, as Bernard Perron suggests, these horror game fictions force 'characters to see the invisible and the unbearable, to discover lurking threats to their health and sanity, to confront stupendous dangers to humanity, and to face monstrous entities' (2018: 249). The age of environmental crisis in which we find ourselves means that future disasters are inevitable. In this context, the supernatural happenings and beings also become metaphors for deeper fears and anxieties about the precarious state of our planet. Players must learn this constantly morphing landscape filled with unpredictable threats and invisible horrors. Identifying and learning about this ravaged environment allows for a sense of agency within the game that cannot be cultivated outside of it given the powerlessness of individuals to prevent future disasters and manage risk. In *S.T.A.L.K.E.R.,* the supernatural environment cannot be defeated; instead, players must adapt to its uncertainties. Similarly, without any changes to the current nuclear status quo, we too may have to radically adapt our lives to radioactive contamination and a future haunted by our inability to understand nuclear danger. Perhaps, in engaging with the nuclear unconscious and confronting the fears there through gameplay, we can also begin to recognize the ways that we are haunted by the destruction all around us.

Endnotes

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[1] This article uses Ukrainian spellings of 'Chornobyl' and 'Prypiat', though many titles and quotations use the Russian spellings 'Chernobyl' and 'Pripyat'.

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