Abstract

Presence research is growing in many disciplines, but the organizers of this project identified a sparsity of it in certain areas in the popular culture research. Particularly missing from the literature is an investigation of the potential predictive nature of presence-evoking technologies and the short- and long-term effects of presence on popular culture characters and, ultimately, the audiences who watch them. To expand the literature in this area, researchers designed a qualitative coding instrument to build a technology examples list from such popular culture sources as film, TV, and books. In 2001, they launched an online system for data entry, coding and review. As of January 2018, the database contains 225 portrayals, 104 films, 87 TV series/episodes, and 34 novels/short stories dating to 1927. Researchers have met at various points over the nearly 20-year project to synthesize findings as they relate to a set of exploratory research questions keying to popular culture technologies and presence experiences. The findings are noteworthy, suggesting an association between the ability of technologies to allow social and sometimes physical interaction with characters, the extent of characters’ experiences of social and sometimes spatial presence, and interestingly, the success of conflict resolution in the storyline. Further, the analysis suggests that technologies, as well as characters’ responses to them in the face of personal and cultural wants, desires and challenges, are often predictive of what eventually emerges on the societal scene.

Keywords: Presence, popular culture, portrayal, technology, HCI, CMC
As Black, Friel, Jasak, Lombard, and Russ (2008) point out, (tele)presence is a good predictor of how people will respond to the advancement of technology. As the comprehensive study shows, researchers can even gain insights into the most intimate of relations -- romantic and sexual -- by looking through the lens of presence. There is perhaps no greater place in which presence through advanced technologies can abound and human responses to the experiences can be safely explored at a personal and societal level than in portrayals of popular culture. It is in popular culture that the imagination can run wild and technologies from the most basic to the most sophisticated can evoke presence, interact with the characters, prompt human responses, and enable a rich contemplation of human wants, fears, desires and concerns.

What might researchers glean, then, from studying the experiences of characters in popular culture engaged in relations with the most advanced technologies with the potential of evoking the greatest levels of presence? In a world in which it is increasingly common to experience presence through relations not just with advanced technologies such as VR/AR and robots but even through TV, computers, tablets, smartphones and books, it seems vital to consider the potential influence of presence through the most advanced presence-evoking technologies on all areas of human existence, from sex and love to war and death. An extensive study of presence portrayals in a range of popular culture examples over nearly two decades offers rich data to associate a wide range of presence applications and experiences with characters’ responses to both technology form and content and to their own human existence. Importantly, it provides clues and implications as to how technology will evolve on the societal scene and how people will view themselves and respond to their own humanity, sometimes hindered and sometimes assisted by technological advancement.
Presence and portrayals in popular culture

To date, studies of popular culture and the media have focused largely on issues of gender (Malamuth, 1996; Schug, Alt, Lu, Gosin, & Fay, 2017), stereotypes (Appel & Weber, 2017; Seiter, 1986), crime and race (Oliver, 1994; Saleem, Prot, Anderson, & Lemieux, 2017), minority groups (Mastro, 2017), obesity (Brochu, Pearl, Puhl, & Brownell, 2014) willingness to help (Kogen & Dilliplane, 2017) and poverty (Clawson & Trice, 2000). Broad in theoretical and methodological scope from psychological tests to critical analyses, the popular culture studies suggest nearly uniformly that portrayals in the media have some critical influence on audience identities (Kogen & Dilliplane, 2017; Maier, Gentile, Vogel, & Kaplan, 2014; Mastro, 2017).

Only a few of the studies, however, have addressed how technology is portrayed and even fewer how presence relates to the portrayals and to the characters’ and audience responses (Black et al., 2008). Meanwhile, a growing body of literature on presence in a host of industries from gaming to medicine to education has made associations between technology, presence experiences, and the users’ physical, social, emotional, educational and cultural responses (Black et al., 2008; Lombard & Jones, 2007; Selverian & Hwang, 2003; Selverian & Lombard, 2009). It seems logical, therefore, to conclude that presence should be a consideration in the popular culture research. It is a largely missing and potentially critical variable in assessing the influence of technologies on the evolution of “real” technologies and on perceptions of self, others and society, both within the storyline and in the surrounding world.

The meaning of presence in popular culture

The common definition of presence is as follows: “Presence (a shortened version of the term ‘telepresence’) is a psychological state or subjective perception in which even though part or all of an individual’s current experience is generated by and/or filtered through human-made technology, part or all of the individual’s perception fails to accurately acknowledge the role of the technology in the experience.” (International Society for Presence Research, 2000). One of the important elements of the definition is technology. Technology is any type of human-created artifact that interacts with people. Most media content and popular culture storylines include some presence-evoking technology. A
character’s phone call to a friend is an example of a technology-mediated interaction in popular culture that can evoke a sense of “being together” with the friend with little or no focus on the technology. In some of the storylines, however, the role of the presence technology can be quite pronounced. For instance, a presence technology might be a primary instrument necessary to create and/or resolve the main conflict, such as the sentient computer HAL 9000 in 2001: A Space Odyssey. The true power of the technology is its ability to evoke different types of presence among the users and to affect their perceptions of and responses to people and things. While presence can be evoked in multiple dimensions (Lombard & Ditton, 1997), there are certain types of presence that are particularly prevalent in portrayals of popular culture.

Among all of the dimensions of presence, four are particularly relevant to technology experiences in popular culture and, therefore, to this study: spatial presence, social presence, realism and immersion (engagement) (Lombard & Ditton, 1997; International Society for Presence Research, 2000). Often in popular culture portrayals, the technology’s key role is to steer toward distance and space perceptions (spatial presence) or to guide perceptions of communication entities and beings (social presence). Likewise, the technology’s key role in popular culture portrayals is often to be an accurate projection of a “real” thing or realism, and to create perceptual immersion (engagement) (Lombard & Ditton, 1997; Lombard et al., 2000).

**Method**

Researchers designed and refined a qualitative coding instrument to build an examples list from popular culture research, web searches, memory, and suggestions. In 2001, researchers set up an online system (Microsoft Access) for data entry and review. The original group and various others, including graduate and upper division undergraduate students, participated in the coding. In 2014, the team set up and transitioned to a new (WordPress, https://smcsites.com/telepresence) system. Researchers read entries to identify patterns in each of the substance variables and to answer the research questions. The database
contains 225 portrayals, 104 films, 87 TV series/episodes, and 34 novels/short stories as of January of 2018. Metropolis (1926) is the oldest entry.

**Figure 1. Yearly frequency of presence portrayals**

The sample is not systematically representative but includes a large segment of the relevant portrayals in popular culture. Given the nature of the sample, complex, open-ended coding, and the time/effort required to watch or read and then evaluate a single portrayal, no formal interjudge reliability was envisioned or conducted. Instead, the researchers focused on ensuring a high level of evaluator expertise and created an analysis plan that involves discussions among them and emphasizes broad themes rather than quantitative/statistical results.

For this analysis, the first four authors divided the 217 records in the database in November 2015. They read the entries, identified themes and patterns, and summarized these as they related to each of the substance variables and research questions.

A coding scheme was developed to answer the research questions. Some of the key coding variables in the coding scheme include summary of the story, characteristics of the world, the year in which the story is set, nature or task activity, performance of the technology, description of the creator of the technology, creators’ major goals, types of presence that users experience, users awareness of the presence experience, valence and responses of the presence experiences, and long-term consequences.

The specific research questions are as follows: 1) possible form and content of future presence-evoking technologies and experiences, 2) types of presence-evoking technologies, experiences and applications that people want, 3) types of presence-evoking technologies, experiences and applications that people fear 4) reasons humans desire presence experiences, 5) ethical issues and perspectives raised by advanced presence-evoking technologies, 6) degree to which fictional portrayals have accurately predicted the form and content of new technologies. Authors identified patterns individually, reviewed and discussed them together, and synthesized the patterns based on their combined observations.
Results

The analysis of the popular culture sample in light of the research questions led to some distinct patterns in the possible form and content of future presence technologies (R1), the types of presence technologies people want and fear (R2, R3, respectively); why people desire presence experiences (R4), the ethical issues surrounding the presence experiences (R5), and the degree to which fictional portrayals predict form and content of new technologies (R6). Notably, in the areas of technology form and content, the data show that the most advanced technologies often evoke the highest levels of spatial and social presence among characters in the popular culture portrayals. The technology is often highly advanced and at the center of the plot. Often, the once-imagined “impossible” technology has become a reality in present-day life, e.g., artificial intelligence, voice recognition, in holographs and robots. Importantly, when any form of presence technology is present in the popular culture portrayals, the content of the storyline often revolves around the development of a problem and an attempt toward its resolution. Misuse of the technology often triggers the problem. Ultimately, human characters intervene, with varying results. The intervention provokes much contemplation about the fallibility of both the machine and the person and an uncertainty as to whether either will evolve to a state that benefits individuals and the world. Ethical issues of power, mortality, and the very nature of being become as pivotal as the plot itself. Most of the time, the story is set in present day or in the future, but present day is most predominant. When the setting is in the future, there is usually a dystopian world – overcrowded, post-apocalyptic, and with severe inequalities of socioeconomic status and power. This again prompts a reflection on technology’s value and whether its potential can be greater than that of humanity’s to build a better world. Interestingly, a pattern was found not just between the level of technology and the level of presence but also between the level of presence and the debate about fears and desires for a better world. In essence, the debate between human and machine grew louder and the resolution of the problem more likely as the technology grew more sophisticated and the spatial and social presence more pronounced.
Technologies that evoke presence in popular culture (R1, R6)

In the sample, the presence-evoking technology’s form and the content produced through it are so prevalent and highly vivid and immersive through sight, sound and touch that it is easy to imagine its contribution to the “real” world. In fact, versions of the technologies from older popular culture works can be found in society today. Artificial intelligence systems and human-like robots or human bodies are particularly apparent in the portrayals. The technologies are almost always interactive, engaging in direct verbal and/or physical exchanges with at least one main character, e.g., the androids called “Mechas” can speak, touch, and in some ways feel in relations with people in A.I.: Artificial Intelligence, and simulator spaceships are able to communicate instantaneously verbally and tactiley with children directing them against enemy “Buggers” in Ender’s Shadow.

Mirroring humans and senses: When technologies take human forms in the portrayals, it may be an exact figure of a person (Blade Runner, 1982) or an approximate figure (Lars and the Real Girl). It may also be the “voice” of a person, e.g., spoken words or text, without sensible human body form in the film Her (2013). In Silent Running (1972), Lowell engages with the drones (Huey, Dewey, and Louie). Although the drones respond in human voice, they do not take human shapes. An example where the human form is invisible entirely is a planet that generates VR experiences in Here There Be Tygers. Similarly, in the TV series Person of Interest, “the machine” and Samaritan do not take human form.

Intangible human qualities such as compassion and goodness ultimately define the technology’s human likeness. In spite of the unquantifiable and risky nature of human traits, it must be included in the formula in order for technologies to achieve ultimate success. This primary technology performance theme is epitomized in the film Extant. The original intention for the human-created humanichs is to be equal to humans and to help them accomplish a variety of human tasks/roles, including that of being a family member. Eventually, however, the humanichs become soldiers acting against the wish of their creator and harbor a very dangerous willingness to follow human-threatening commands. Ethical limits
and human compassion are missing from their makeup, so they must be eliminated. People are able to intervene and save the world by reinserting this important missing human component.

**Communication modes:** In the popular culture examples, presence technologies are both wired and wireless connected technologies or stand-alone operations that generate illusions of people, things, environments and physical and/or social interaction with them. They come in the forms of wearables (e.g., HMD, gloves, suit), free-standing non-humans (e.g., *Guardian of Forever* in *ST: TOS*), a person merged with technology (*Ghost in the Shell*), pocket watches, rooms, buildings, and drones.

Technological components almost always engage the senses of sight and hearing. Frequently, the film and TV experience is immersive (sense-surrounding) because it engages both of these senses with heightened visual and aural effects and can be viewed on a large screen in a theater or at home, e.g., *Smart House, Pleasantville, and The Outer Limits: Virtual Future*. The experience is intensified in films made for the larger, all-surround IMax screen, e.g., *Interstellar* and *Chappie*. A similar immersive experience is possible through novels, as the imagination transports the reader to the technology-generated or mediated world, e.g., in *Dreamships*. The effect is a focus on the content emitted through the technologies as much as or greater than the physical features of the technologies, e.g., the hologram PAT in *Smart House*, the town in *Pleasantville*, the future in *The Outer Limits*, space in *Interstellar*, the highway in *Chappie*, and the future in *Dreamships*. In virtual reality applications made of a few films, the sense of touch is also enlisted, e.g., *Lawnmower Man*. In a very few instances, the technologies are not electronic or digital but still enlist the senses, e.g., a black backdrop and images upon it in David Copperfield’s TV illusions.

**Nature of task or activity:** The nature of tasks, activities, and interactions with technologies relates to many aspects of current life. These include daily communication, having sex, fighting, exploring, living, manipulating real/virtual people and events. Among these activities, there are usually two main scenarios in which the technologies are enlisted. They are either presented separately, together, or in sequence: 1) to rescue the world or someone in it in some helpful or heroic way, e.g., *Total Recall*.
and *Gravity*, or 2) to assist in or orchestrate the realization of a self-serving cause, e.g., *Phantom Menace* and *The Matrix*, 1999. The task to achieve these scenarios may at first seem ordinary, e.g., driving a taxi in *Total Recall* and using a telephone in *The Matrix*. They have small and large greater purposes, however, that gradually reveal themselves, e.g., realizing fantasies and creating a breathable atmosphere on Mars in *Total Recall*, and bringing people in and out of dormant states and ultimately breaking through a human-controlling web in *The Matrix*.

**Performance of the technology**: The functions of the technologies in the portrayals often present positive effects until humans begin to manipulate them as part of their dark nature or naiveté. The dark side of the human nature and naivete may lead to unexpected consequences as shown in *Brainstorm* and *Smart House*. While there are many human heroes with hopes and dreams of their own in the examples examined, they almost always call on technologies to help make them a reality (Luke Skywalker/Han Solo in *Star Wars*, Neo in *The Matrix*, Deckard in *Blade Runner*, Christof in *The Truman Show*, the Wizard in *The Wizard of Oz*, the Resources Development Administration in *Avatar*, Skynet in *Terminator*, and Big Brother in 1984). Consistently, there are human flaws that emerge along the way, either in the humans in the form of the evil scientist or in technologies infused with human evil. This initially interrupts the flow of the heroism, e.g., T-1000 in *Terminator*, Agent Smith in *The Matrix*, replicants in *Blade Runner*, Hal 9000 in *2001: A Space Odyssey*, the Ludovico technique in *A Clockwork Orange*, and precogs in *Minority Report*. Ironically, in the end, human imperfection saves the day. The technologies, usually accompanied by humans, ultimately prevail by embracing more compassionate human qualities (see: *Avatar*, *The Matrix*, *Star Wars*, *Wizard of Oz*, *Star Trek*, and *War Games*). The common theme in the performance of the technologies, therefore, is humanity. It appears at first as an element of human hope that the technology will help fix or advance the imperfect human condition. Subsequently, however, human flaws emerge in humans and/or are embodied in the technologies and cause a major catastrophe. In addition, present-day technologies usually work better than in reality, e.g., L&O:SVU.
Creators: In spite of their seeming autonomy through personification in name and gender, the technologies are almost always, in part or in whole, conceived, designed, and made by humans, e.g., Hal 9000 in *2001: A Space Odyssey*, George in *The Outer Limits*, the TV remote in *Pleasantville*, and the Visicom in *Thomas in Love*. On rare occasion, they can reproduce themselves, e.g., clones in *Solaris* and Johnny 5 in *Short Circuit*. The creators of the technologies can be government staff, military officers, scientists, or staff from large corporate entities, and even supernatural forces. The assumption is that they are in positions of power, authority, and/or with great knowledge. For example, the creator of Robby the Robot is scientist Dr. Morbius in *Forbidden Planet*; the creator of the androids is a genius corporate head, Dr. Eldon Tyrell, in *Blade Runner*; and the creator of the world-controlling remote is Morty, the Angel of Death, in *Click*.

As major players in the construction and operation of the technologies, humans almost always set the initial path and take ultimate responsibility for the technologies. Whether the creator is identified or not, there is generally a human affiliated with the technology who influences the technology directly or indirectly, intellectually and/or emotionally in some way from the beginning.

Some creators use the technology to gain control, power or money. They may attempt to use the technology for evil, e.g., power-hungry politicians in *The Sixth Day*; or for good, e.g., the last survivors of a plague who create virtual reality domains to relieve pain in *Edenborn*. In some instances, the technology itself takes on the traits of the evil- or good-doer and carries them out autonomously, e.g., T-1000 in *Terminator* and Agent Smith in *The Matrix*.

More common is the creators’ positive use of the technologies. The goals of these creators are to improve the world and human condition, increase the efficiency of communication, promote information flow, or gain entertainment, pleasure, and new knowledge. For example, Kevin Flynn who saves the real and virtual worlds from the malevolent master control program, ENCOM, with the help of the heroic independent security system, TRON, in *Tron*.

Technology users: Those who use the technologies could be ordinary people. Among them, privileged wealthy male scientists seem to be in the majority. Most main characters are white males in
their 20s to 60s. Fewer users are females, children, and minorities. In *The Outer Limits: Mary 25*, the person who experiences a presence-evoking technology, is a white male in his 40s or 50s. He is a wealthy executive who experiences medium-as-social-actor presence with a robot. In *Videodrome*, the user is a single, white, male owner of a television station specializing in pornography. He is in his late 30s or early 40s and experiences social-actor-within-medium presence when interacting with the environment in the television program.

**Technology-evoked presence experiences in popular culture (R2, R3, R4)**

In the portrayals, the highly vivid and multidimensional audio-visual technologies are most likely to evoke presence. Artificial intelligence systems and human-like robots or human bodies are dominant for evoking social presence, and telecommunication systems are dominant for evoking spatial presence. Both are capable of evoking a sense of realism (a perception of the “real” thing) and of immersion (engagement in the form and content) and do so most apparently when there are high levels of visual, auditory and interactive cues working together. The sense of both social and spatial presence, realism and immersion seem enhanced when the visual, auditory and interactive forms are all apparent. This is evidenced through periods of longer physical interaction with the technology and a more engaged and in-depth dialogue with/through it, e.g., *Blade Runner*. Social presence remains apparent when there is vocal communication between the machine and the human characters (*Huey, Dewey, and Louie*), even when the sense of realism and immersion is less apparent because there is no visual to enhance the social experience. Characters in the portrayals often experience social presence or social presence and spatial presence and less frequently experience spatial presence alone.

**Human-computer interactions**: Presence technologies that take human forms are especially likely to evoke high levels of both social and spatial presence in characters. In some cases, it is an exact figure of a person (*Blade Runner*) and in other cases, an approximate figure (*Lars and the Real Girl*). Social presence is especially pronounced when there is a technology capable of textual or verbal dialogue. Evidence of this is in a more engaged and in-depth discourse with the machine, e.g., *Blade Runner*. Social presence is more apparent than spatial presence when there is no realistic human form to the technology.
In the movie *Time (2009)*, for instance, users believe that a timer can bring them face to face with their “true loves.” They do not need to see the human form in or through the technology. They are able to perceive the social interaction. There may be just the “voice” of a person, e.g., spoken words or text, without sensible human body form, as in the film *Her (2013)*. In *Silent Running (1972)*, likewise, Lowell engages with the drones, which speak in human voice but do not take human shape. Similarly in the TV series *Person of Interest*, “the machine” and Samaritan interact but do not take human form. An example where the human form is invisible entirely is a planet that generates VR experiences in *Here There Be Tygers*. A lessened sense of realism and immersion noted in these less multi-sensory technologies may not enhance the social presence experience but they do not prohibit it either.

The technologies examined in this project are almost always identified in some way by their physical features. Through the decades, they are most often given a male name and gender or named after a male creator, e.g., Robby the Robot in *Forbidden Planet*, “waldoes in Waldo,” Hal 9000 in *2001: A Space Odyssey*, Manfred in *Dreamships*, and *Chappie*. There are far fewer representations of females than males and of minorities than Caucasians. There has been some increase in female or gender-neutral human and technology protagonists and antagonists over the last 10 years, but they are almost always accompanied by a male superior, e.g., Samantha in *Her* and humanichs in *Extant*.

**Suspended disbelief:** One of the key findings in the project is that the power of the presence experience is highly related to the ability of the characters to suspend disbelief that the technology is present in order to believe that the illusion is “real.” When the illusion that there is no mediating technology is the greatest, the levels of both social and spatial presence seem enhanced, interactions with the surroundings more intense, and conversations more in-depth, e.g., *Interstellar*. Technology users are often aware of the existence of technologies, but they are so effective at presenting visual, aural and other sensory cues that the form effectively disappears in the content. Other times, however, the characters are not aware of the technology’s existence until it is revealed. In *The Truman Show (1998)*, for instance, Truman’s life is the focus of a reality television show. Truman believes that everything is real and normal
until a loyal audience hints to him the oddness of his world. In the end, Truman leaves the fake world to find his new real life. In this rare example of an absence of knowledge, Truman abandons his state of “presence,” as it was as unreal as the virtual world itself.

**Surprise and anxiety:** While users often experience social and/or spatial presence in the popular culture portrayals, a heightened sense of realism and immersion seems to evoke other accompanying feelings. These include surprise and anxiety. The television drama *The Outer Limits: The Tribunal* (1995), for instance, provides a vivid illusion that takes the user on a journey through time with his pocket watch and gold chain as his “transporter.” The experience, while vivid and “real,” is also surprising, frightening, and disconcerting. It is particularly creepy when the character travels back to the Auschwitz concentration camp in 1944, where he witnesses a murder and is able to procure evidence about the crime.

**Desire and despair:** Experiences of social presence in particular often evoke positive emotional responses until the character loses control over the technology. In the movie *Ex-Machina* (2015), Caleb enjoys talking with the humanoid robot, Ava, when testing if Ava can pass the Turing test. Caleb becomes attracted to Ava and decides to help her escape from the lab. As he discovers that Ava cheated on him and helped kill his friend, Nathan, Caleb is shocked and frustrated. Presence-evoking technologies bring him the joy of love but also the sorrow of loss.

**Consequences of presence-evoking technologies and ethical dilemmas (R2, R3, R4, R5)**

**Conflict and resolution:** Whether at the hands of people, machines or both, most of the portrayals include some personal and societal conflict and end with a resolution of that conflict. The resolution generally leaves humanity better than it was before or at a minimum with some hope for a better future. Interestingly, when the conflict between the characters and the technology is at its peak, the focus seems to shift more to the nature of the human condition than to the failures or successes of the machine. In essence, presence experiences amplify the potential of the person more than of the machine, even when there is political, social, cultural or personal failure on the human’s part and humans need rescuing. For example, *Star Trek* always ends with the human and/or machine working together to save
humility. Sometimes the positive endings occur after heroic human or artificial intelligence intervention. Other times, users have to reject or destroy the technology (Blade Runner, 2001; A Space Odyssey; Gamer).

Still in other instances, endings are bittersweet for the characters (The Outer Limits: I, Robot, 1995; The Outer Limits: The Other Side, 1999; The Purple Rose of Cairo, 1985). In the film The Purple Rose of Cairo (1985), the fictional character Tom breaks away from the movie screen and enters the real world. Cecilia, a film buff, was later asked to choose between Tom, a perfect fictional lover, and Gil, the actor who plays Tom. Although Cecilia finally decides no longer to live in the mediated world and chooses Gil, Gil deceives her and leaves for Hollywood alone. The ending of the film shows Cecilia beginning to watch another film and starting to look a little happier again.

Negative endings often come in the form of warnings of technological development in the current age, even though the ills of technology often take on human traits. In the movie Ex-Machina (2015), for instance, Caleb was fooled by the robot, Ava, and was locked in the lab as a result. The consequence suggests a potential physical risk of engaging with presence-evoking technologies but prompts a reflection of the human qualities that might be at the root of that risk. Ava’s -- and therefore technology’s -- biggest mistake, in essence, may be mimicking the human trait of untrustworthiness.

There are other instances where some resolutions are less conclusive and even mysterious, suggesting technology’s contributions to humanity are uncertain. For example, Inception leaves audiences with an open ending where the gyroscope keeps spinning.

**What we desire:** The researchers note that the types of presence-evoking technologies that the characters tend to desire include the ones associated with human-like social interaction, companionship (including with the dead), entertainment, role-playing, efficiency, eternal life, and convenience. Users like “real” and attractive human-like technologies, such as humanoid robots (Ex-Machina, 2015; The Outer Limits: Glitch, 2000). Users also prefer technologies that can provide pleasant interaction experiences and can bring convenience to life (The Sixth Day, 2000; The Time Machine, 2002). When using these technologies, the characters can experience strong parasocial relationships, involvement, engagement,

**What we fear:** Many movies, TV shows, and books in the database demonstrate that the characters fear technology will be manipulated for war or profit. There is also concern that technologies can go awry or make substantial mistakes, often marking turning points in the stories (*I, Robot*). In these cases, there is a clear association of the technology with the threat of political, social and cultural domination of humanity and even invasion or extinction. Interestingly, humans are also suspect in many of the portrayals. Technology users sometimes lose control of the machines, fail to distinguish reality and virtual environments, demonstrate intensive negative emotions, show violence tendencies, and stagnate from over-reliance on the technologies (*The Matrix*). In these cases, there are human or human-like antagonists -- typically white males -- who exploit people socially, culturally and/or politically and the machine -- with or without a human protagonist -- comes to the rescue (*Agent Smith*).

**Ethical challenges:** The portrayals have also raised many compelling ethical issues. When demonstrating human-robot interactions, for instance, the portrayals delve quite personally -- and sometimes intimately -- into what it means to be a human vs. a machine and whether it is mortality or emotion or social interaction or physical intimacy that distinguish between the two. At this one-to-one level when the technologies are most likely to evoke social presence, the portrayals also raise questions about who should interact with the technologies and what qualifies them for the interactions. Is it appropriate, and who decides? Likewise, when characters interact one-to-one with technologies that evoke spatial presence, they are sometimes transported to another world where they might feel invincible, even capable of evading death. Where will these feelings of immortality lead them? Although there are many portrayals of technologies that try to make humans immortal, people are not immortal like machines and may be at risk of injury or death in their state of suspended disbelief (*Bicentennial Man*, 1999). At a societal level, the portrayals raise similar concerns about the limitations and potential of people, whether these limitations and potential are transferable to technologies, and whether advanced technologies that
evoke heightened spatial and social presence might be even more capable of either saving or destroying the world than humans themselves.

**Discussion**

The rich qualitative analysis of technology portrayals in popular culture led to some clear and noteworthy patterns suggesting a predictive value of spatial and social presence in technological advancement and human development in the “real” world. The primary points of significance key to the research questions in three main ways: technology form and content, presence-evoking technology experiences, and consequences of the presence experiences personally and societally. The results show that when a technology’s form is at the center of the plot, it is often highly advanced, futuristic and even “impossible” for it to exist in the storyline period. Interestingly, however, most of the features of technologies in the popular culture examples that were produced before the analysis are now “possible” and exist on the “real” societal landscape. This includes artificially intelligent social agents (Apple’s Siri, Amazon’s Alexa, and Google Home), voice recognition tools (on most computer and TV devices), robots (iRobot Roomba), and a host of virtual or augmented reality applications (in gaming, theme parks, advanced home and TV consoles, medical centers, rehabilitation facilities, learning institutions, etc.)

There is a clear predictive element noted in the popular culture technology examples. When it comes to content, the technologies are generally critical to the plot, often taking the role of protagonist or antagonist or serving as a springboard for discussion and/or action. Nearly uniformly, the portrayals revolve around the development of a problem and an attempt toward its resolution. While the conflict sometimes involves a person, it nearly always involves a technology. While the resolution nearly always involves a person, it also often involves a technology. In either case, human qualities come into play for both the person and the technology. Since the characters routinely interact with the technologies physically and/or socially, they may begin to “see” them as other people. Ethical and ontological issues become prominent, as the characters try to distinguish themselves from the machines in order to save themselves and their world. Ultimately, the research indicates, the more the characters associate with
rather than distinguish themselves from the technologies, the greater their chance of successful conflict resolution. Importantly, the research suggests that an enhanced sense of social and sometimes spatial presence can strengthen the interactions that can help conflict resolution.

**Technological predictions: Implications for presence scholars, designers, businesses**

An important implication of the study is the predictive nature of the popular culture technologies for the real world. Generally, early versions of most of the portrayed technologies exist today. These include the Internet, virtual reality, wearable watches, glasses, computer avatars, AI, humanoid robots, and other artificial intelligences. An example of a specific popular culture portrayal that introduced technology to society can be seen in *The Outer Limits: Mind over Matter* (1996). This film showcased the CAVE system, a machine created to analyze psychological problems. It generates virtual reality space for patients and doctors. Today, virtual reality technologies follow in its footsteps, e.g., Samsung’s Gear VR, Facebook’s Oculus Rift, and Microsoft’s holograms. VR has also been used in medicine and rehabilitation, such as to treat military patients (Terhakopian, 2013).

Despite the realization of some technologies, scientists are looking forward to the technologies that have not been fully realized yet. For instance, experts and engineers are testing the possibilities of time travel with quantum physics and string theory. While movies like *The Time Machine* (2002) and *The Twilight Zone: Once Upon a Time* (1961) have demonstrated devices like the time machine and the time helmet, scientists are still attempting to understand, explore, and explain the mysteries of both the microscopic world and the macro universe.

**Implications for society: Presence experiences and consequences**

One of the most significant observations from the project is that the characters’ experiences of technology-evoked social presence and combined spatial and social presence -- and to a lesser degree spatial presence alone -- can take the characters beyond what they might experience in nonmediated experiences, paradoxically allowing them to explore issues of humanity in more pronounced ways. In essence, the research shows that characters interact with magnified versions of humanity through the technologies, allowing them to contemplate the nature of their own humanity in an all-at-once connected
yet distanced ways. While the other actor may be a technology, it has presented itself as a person, often with exaggerated human traits, e.g., power, control, violence, discrimination, manipulation, calculation, curiosity, sex, and love. This allows the characters to explore a range of present and possible very human fears, from concerns of disrespect and loss in personal relationships to threats of invasion, annihilation, and extinction societally. It also encourages the characters to entertain the possibility of solutions beyond the basal human default of flight or fight. The interactions can spark hope for a world where tolerance and reason take the place of war, greed, power and discrimination, and, through equality and tolerance, humanity can build a better home (*Interstellar*). In this way, there is a predictive, or at least hopeful, element noted in the popular culture technology-evoked presence experiences just as in the technologies themselves.

When the problems in the popular culture portrayals are set in the future, there is usually a dystopian world that provides profound challenges for humans. They are often faced with socioeconomic, political, cultural and physical threats to survival. It is in these situations, when the technology is often part of the problem, that the research reveals most profoundly the characters’ need for soul-searching and creative problem-solving to achieve more successful resolutions. Ironically, it is at this juncture that the human relationship with the technology appears most pronounced and social presence, sometimes accompanied by spatial presence, is at its greatest level. The more immersive and engaging the characters’ interactions with the technology, the more presence is generated, and the more likely there is substantive discourse. The technology, ultimately, becomes part of the solution. Conversation often reveals that humans are as much the problem as the machine and that machines can sometimes set an example for a better way (*Bicentennial Man*). The technology may also be helpful physically, sometimes enabling humans to relocate to a better world (*The Outer Limits: The Tribunal*, 1995; *Interstellar*, 2014). Even when the technology embodies the problems, there is often a realization through the characters’ interaction with the technology that the problems are of a human nature, e.g., the drive for power, control, and greed. The technology is terminated in some way as a symbolic gesture of destroying undesirable human qualities (*Blade Runner*).
These presence-enabled or enhanced social and physical interactions put both humans and technologies to the test, often leading to uncomfortable consequences for humans, including fear of failure, mortality, and, in the worst case, racial annihilation. They can also lead to positive consequences, including satisfied physical and social wants and desires and the formation of a better, fairer and safer world. The power of presence in popular culture, in sum, may reach far beyond the characters on the pages of the book or in scenes on the screen. It may transcend humans in “real” life to a world in which technology not only enhances daily functions but inspires us to inspect our very nature, to grow our minds, and to find more creative solutions for a brighter future.

**Limitations and future research**

The primary goal of this longitudinal study was to provide a comprehensive overview of the form and content of technologies in popular culture, how characters may experience states of presence through the technologies, how the experiences can help or hurt the characters, and how this can predict the development of technologies and the responses of people in the “real” world. The researchers believe a study of this nature is essential, as there are only a few in the literature that accumulate rich data to investigate the predictive power of presence-evoking technologies in popular culture. The researchers, therefore, began accumulating an extensive list of popular culture works over the course of nearly 20 years in order to identify the potential themes within them relating to technologies, presence experiences, and the consequences and implications of these. A comprehensive set of research questions based on the presence and popular culture literature provided suitable guidelines for detailed coding, synthesizing, analyzing and categorizing themes. The complexity of the stories made this narrowing-down step necessary before a more systematic method could be applied. Future studies may now take from this study’s key observations and suggested variables to form more specific research questions and tailored hypotheses.

While the current sample size of popular fiction portrayals is ample at 225, the popular culture pool is extensive and ever-growing. This study’s database, therefore, must and will continue to grow,
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strengthened by the collaborative efforts of researchers within and outside of the university. As the sample grows, follow-up studies will generate increasingly robust analyses and results.
Reference


Figures and Tables

Figure 1. Yearly frequency of presence portrayals

Yearly frequency

Count