

**Digital Transformation of the Heart: *Is Media's
Bombardment of our Brains Driving Us
into the Arms of Robots?***

by

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Abstract

My thesis examines whether digital media induced changes will impel the American population to replace humans with robots for social relationships. For the purpose of this paper, social relationships refer to more intimate relationships like those of friendship, family, and romantic partners versus strangers. Ultimately, the paper concludes that the effects of digital media may cause a substantial portion of the population to eventually have social relationships with robots instead of humans. Robots may possibly be better equipped to engage in relationships with, and be more suitable companions for, people whose cognitive functioning, core values, and social habits have been altered by digital media.

To reach this conclusion, an exhaustive amount of academic publications and literature concerned with media theory, media history, social theory, the effects of digital media on human brain functions (both cognitively and socially), and modern society's overall perception of and attitudes towards robotics were deeply examined. Additionally, I used findings from my own study on current attitudes of realistic sex doll owners. This data revealed that the majority of owners: 1.) bought a sex doll for companionship or due to feelings of loneliness; 2.) had given up on human relationships; and 3.) spoke of their sex dolls as if they were human. The findings provided valuable insight into possible future attitudes towards robots as companions. A second study is proposed that involves short-term interactions with robotic devices. Subjects will have their moods measured after socializing with robots to determine the extent of positive and negative feelings emerging from this contact. The study may be useful in clarifying current attitudes towards social robots and determining any short-term effects such interchanges might have on people.

Introduction

The creation of the computer and smartphone have had a monumental impact on the world. These technologies have benefited society in immeasurable ways. Among these benefits are the enablement of instant communication, expansion of access to a wealth of information, and unprecedented improvements in work productivity. However, these technologies have also brought negative effects as well. Issues regarding their influence on mental health, addictive behavior, and privacy have been some of the main topics of serious concern over the past several years. My thesis premise initially concerned itself with digital media's influence on mental health. During my research to determine its connection to conditions like anxiety and depression, I discovered information that has shed new light on an alarming potential future effect of digital media: the possibility that current technologies may be separating us from each other and driving us towards objects for our social satisfaction.

This paper explores how and why digital media has changed our brains, culture, and relationships with each other. And, more importantly, this paper uses these digital media induced changes to determine if the roles of friends, lovers, and even family members will be delegated to robotic devices. That is: *will we substitute humans with robots for our social relationships?*

The evolution of media and how each given medium within each stage of this journey has affected society is integral to understanding this paper's conclusion. My thesis primarily deals with this evolution and its steady and methodical impact on culture from an **American** perspective. My conclusion will therefore not necessarily apply to countries outside of the United States because media's trajectory and influence may differ significantly. A separate analysis would have to be conducted to arrive at a more accurate judgement for other countries.

Section 1: THE PAST

Section 1a: Epistemology of Media

Understanding how various technologies impact one's acquisition of knowledge and perception of the world is a critical component to this paper. Technology not only changes how we communicate with each other, but also how we communicate with ourselves as we mentally organize experiences. Two commonly used examples are the map and the clock. The invention and widespread use of the map fostered the development of abstract thinking by reducing reality (the environment) to a comprehensible picture that could be used to express plans and discover new terrain. By redefining time as a sequence of units of measurement, the clock caused Western civilization to see everything in life as divisible. Nicholas Carr categorizes these type of technologies as "intellectual technologies" because they are tools that we use to "extend or support our mental powers – to find and classify information, to formulate and articulate ideas, to share know-how and knowledge, to take measurements and perform calculations, to expand the capacity of our memory." (Carr, 2010). Media such as print, television, and the internet are also intellectual technologies by this definition. These three intellectual tools have tremendous influence over our thinking processes because they are our means for expressing ourselves, communicating with one another, and making sense of the world. As Carr describes it, intellectual technologies "[embody] an *intellectual ethic*, a set of assumptions about how the human mind works or should work."

To determine the intellectual ethic of digital media, it is important to understand the evolution of modern media in American society. After the rise of the printing press and the widespread distribution of text as a means to convey information, there was a significant change in the way the average person thought. Information processing began to mirror the structure of

print. Marshall McLuhan claims that Western civilization's belief that logic is sequential and that all experiences can be reduced to a systematic process appeared with the extensive use of the phonetic alphabet (McLuhan, 1964). This was not due to the ideas that phonetic words conveyed, but rather "the sharp division in experience" that occurred while reading them. Written language no longer evoked the experience it represented. Phonetic words created a written system in which the visual appearance of a word was unrelated to its meaning. In order to interpret phonetic writing, the brain must: 1.) process the patterns of letters to determine the word being conveyed; 2.) think abstractedly to associate this word with a given object or idea; and 3.) determine the overall meaning of the text imparted by the sequential progression of these words. Thus, to interpret language no longer involved relating visual representations to their corresponding auditory sounds (i.e. a picture of a cat to the sound of saying cat). Instead, the brain had to go through a systematic process to interpret language that was only possible with concentration and a singular focus (McLuhan, 1964). As print became the dominant medium of communication, people used this methodical thought process to interpret experiences beyond what was written on a page. The content of life experiences were seen as a sum of the individual parts and processes instead of as a unified whole. During the height of its literary culture, the Enlightenment and rising importance of individualism occurred in America (Postman, 1986; McLuhan, 1964). Scientific reasoning was applied to every part of life, from politics to the arts. People adopted the intellectual ethic of print which assumes that the mind should behave in a methodical and linear manner.

This intellectual ethic began to shift among the general population with the introduction of the telegraph. The telegraph was the first electric media that instantly transmitted information among people around the world. McLuhan saw this type of electric media as an actual extension

of our central nervous systems. Electric media like the telegraph were not just tools that altered how we processed and organized information, like typography and the map. The instantaneous movement of information across vast distances had the additional effect of intertwining our lives with those of everyone in the world, which McLuhan called the “global village”. Before Samuel Morse invented the telegraph, newspapers in America conveyed mostly local information that specifically impacted the lives of their regional readers. The widespread use of the telegraph changed the idea that space was “an inevitable constraint on the movement of information.” (Postman, 1986). Increasingly more newspapers emerged to share this daily glut of global information. The average person was now involved in the affairs of people from everywhere. However, the majority of these events did not directly involve the reader and were out of context, the effect of which degraded the perceived importance of all information. Information became a commodity that was quickly ingested and discarded. Information was no longer consumed in a sequential manner (Postman, 1986). A new intellectual ethic that assumed the mind should be preoccupied with collecting and reacting to even the most irrelevant information was established.

Although the telegraph had a substantial impact on society, print remained the dominant communication medium, and the intellectual ethic that prioritized a methodical mind remained the standard. The shift in intellectual ethic occurred with the emergence of television.

Television’s rise can be attributed to the combination of instantly relayed information and intense visual imagery. In 1986, Neil Postman stated that through television: “we learn what telephone system to use, what movies to see, what books, records and magazines to buy” and “all public understanding of [politics, news, education, religion, and science] is shaped” (Postman, 1986). Today, the internet and all of its associated media (smart phone, social media) have arguably taken over this dominant role. However, the new intellectual ethic that television

established in American society has not dissipated. In fact, digital media has amplified this intellectual ethic.

Section 1b: Entertainment Culture

When print was the dominant media, societal habits and culture looked much different than they do today. A brief and demonstrative example is presented in Neil Postman's book *Amusing Ourselves to Death* in which he discusses how local audiences in rural Illinois sat through seven famous debates between Abraham Lincoln and Stephen Douglas that spanned from 3 to 7 hours each. The live audiences were able to listen to the long, complexly worded arguments of both men and clearly demonstrated their comprehension of the language by vocally expressing immediate approval or distaste towards specific assertions. Such a patient and engaged audience during a political debate that is purely based on rigorous reasoning and logic may seem alien today, but it was commonplace in America when text was the preeminent form of communication (Postman, 1986). This is attributed to the intellectual ethic that information should be processed and analyzed in a linear fashion which, at that time, was set by print.

When television became the dominant media, much of our logical reasoning was replaced by a preoccupation with what cultural critic Mario Vargas Llosa calls *the spectacle*, or simply stated, *entertainment* (Llosa, 2016). The main reasons for this were: 1.) the image based nature of the television; and 2.) the voluminous influx of information. Image-based mediums are conducive to conveying *concrete material*. It is difficult for these mediums to convey *abstract ideas* because the visual content is *inherently concrete*. Abstract ideas can only be presented in image-based mediums through the use of *concrete 'examples'* (Bates, 2016). As an example, on television "discourse is conducted largely through visual imagery, which is to say that television

gives us a conversation in images, not words.” (Postman, 1986). For this reason, the content of television naturally became more biased to image rich entertainment than philosophical arguments. Even the most serious content, the nightly news, became a form of entertainment that was more focused on providing an engaging performance by the commentators rather than it was on comprehensively and objectively informing viewers of accounts of news events. Postman evokes the following description of television news by Robert MacNeil, a former executive editor and legendary co-anchor of the “MacNeil/Lehrer NewsHour” (known today as the “PBS NewsHour”):

“The idea”, he writes, “is to keep everything brief, not to strain the attention of anyone but instead to provide constant stimulation through variety, novelty, action, and movement. You are required ... to pay attention to no concept, no character, and no problem for more than a few seconds at a time.” [...] “visual stimulation is a substitute for thought, and [...] verbal precision is an anachronism.”

Television evolved the intellectual ethic of the telegraph into something new: the mind should be occupied with collecting and reacting to *entertaining* information, regardless of the relevance to one’s life.

Even if it made sense that entertaining content would dominate television, this does not explain why almost *all* content on television and, eventually, all digital content had to be entertaining. That is, why did American culture itself become wholly consumed with entertainment (Llosa, 2016)? McLuhan’s concepts of *hot* and *cool* media offer an explanation. *Hot media* are rich in sensory data and amplify a single sense until the point of cognitive immersion, while *cool media* possess rudimentary sensory data that requires the audience to determine what is being portrayed by filling in the blanks. Examples of hot media include: film,

photographs, and print. Cold media includes: telephone, oral speech, and cartoons. It is important to emphasize that the distinction has nothing to do with the *cognitive effort* involved in using the media, but rather the *sensory experience* it elicits. Even though reading a book involves more mental effort than watching a movie, both are considered to be *hot medias* because they provide an immense amount of data to our eyes for our brain to visually process (McLuhan, 1964). In film, this is delivered in the form of an abundance of images, while in print this is expressed in the form of pages of letters. In contrast, a cool media like the typical comic book does not elicit similarly high visual processing activity because the drawings are relatively crude and there is very little text to read.

In *Understanding Media*, McLuhan discusses a phenomenon in which the central nervous system numbs all of the senses in reaction to hot media that is overstimulating. He demonstrates this phenomenon through the example of the *Audiac*, a device used by dentists to numb pain (Stephenson, 2017):

Battle shock created by violent noise has been adapted for dental use in the device known as audiac. The patient puts on headphones and turns a dial raising the noise level to the point that he feels no pain from the drill. The selection of a single sense for intense stimulus [...] is in part the reason for the numbing effect that technology has on its makers and users. For the central nervous system rallies a response of general numbness to the challenge of specialized irritation.

Though the pain relieving results of various audio-anesthesiology experiments have been mixed, psychology recognizes the numbing effect that overstimulation has on the brain, which could be called the *autoamputation* of the senses. Using the theories of the famous endocrinologists Hans

Seyle and Adolphe Jonas, McLuhan states that the central nervous system triggers this as a protective mechanism to reduce physical stress from overstimulation.

With its generally high quality and elaborate imagery, modern television became a hot media by the 1980s. The combination of the telegraph and the newspapers that relayed its information to the public established the average person's connectivity to the rest of the world. However, the television gave people the power to tune into this *global village* and all of its stimulating imagery whenever they wanted to. One no longer had to wait for tomorrow's publications to receive their daily fresh fix of irrelevant regional, national or global news. Cable News Network (CNN) debuted in 1980, marking the beginning of 24-hour news (Miller, 1989). By 1989 cable subscribers had 79 cable networks to choose from, more than 25 times larger than the 'big three' national network options previously available¹. As long as a television was present, a person could visually immerse themselves into a sea of content such as up-to-the-minute news, a concert or video featuring a foreign band, or a soap opera depicting the trials and tribulations of the lives of the extraordinarily wealthy.

This ability of the television to immediately convey vast amounts of information that is extremely visually stimulating causes an autoamputation of the senses. Physically overwhelmed by the vast amount of emotional stimuli, the senses become numb to purposefully prevent the brain from further irritation, which throws the body out of equilibrium (McLuhan, 1964). McLuhan points to two 'cures' that can alleviate the brain of this overstimulation: 1.) social or physical therapy; and 2.) pleasure through physical activity (sports), entertainment, or substances. Entertainment is then not only more conducive as content for hot visual mediums, but seemingly the only type of content that the audience of an overstimulating media can

¹ ABC, NBC, CBS

cognitively tolerate for a prolonged period of time. McLuhan's idea of entertainment as a mechanism to equilibrate an overstimulated brain is consistent with Zillmann's *theory of mood management*, which states that individuals find entertaining media emotionally gratifying because they have a desire for a moderate level of arousal, which drives "over-aroused" individuals to "soothing" content and bored individuals to arousing content (Bartsch, 2010). Based on this theory, it makes sense that a person who is overstimulated by a hot media would be generally driven to amusing content that does not require much cognitive effort. This is why entertainment has an important role in the intellectual ethic established by television, and why this ethic has become amplified in the hyperactive Digital Age.

Section 2: THE PRESENT

Section 2a: Entertainment Overload and Cognitive Functioning

The amalgamation of the internet and the smartphone has taken sensory overstimulation *several* steps beyond television. Before the advent of the smartphone, our connection to the entire world required our physical presence in front of a television or a computer. The smartphone allowed each of us to carry the *global village* in our pocket and receive a perpetual stream of events from anywhere in the world. Americans were quick to immerse themselves deeply into this perpetual digital stream. Research from 2018 found that American adults spent, on average, almost half of every day (11 hours) interacting with media (Fottrell, 2018). Television and devices connected to the web each account for approximately 4 hours of this time. The remaining 3 hours is split between other media like AM/FM radio and video games. Assuming the average person spends 8 hours per day sleeping, then only 5 waking hours are spent *without* interaction with these stimulating hot medias.

This continuous sensory overstimulation means that in order to restore the nervous system back to a state of equilibrium the body's protective mechanism of autoamputation (numbing the senses) is at risk to occur constantly. As stated previously, pleasure in the form of entertainment can serve as a remedy for this imbalance. Now that smartphones and other technologies have facilitated the constant bombardment of information, our desire to be entertained at every given moment has emerged. Consequently, less time is spent on intellectual activities that foster logical and abstract thinking. American culture has shifted from one that views the world from a lens of reason and logic to one that is obsessed with "extracting the last drop of fun out of every experience" (Vorderer, 2001).

There is an additional consequence that has risen from this perpetual bombardment, which is the condition referred to as *cognitive overload*. Evidence suggests that the brain can only process two to four 'elements' of information at any given time in its working memory (Carr, 2010). *Cognitive overload occurs when too much information is simultaneously entering into the brain's working memory (located in the frontal lobe). During cognitive overload, the brain's ability to store information into its long-term memory is lost, rendering the brain incapable of processing or learning this information.* The sheer volume of stimulus to the brain from simply reading even text based, unamusing web pages leads to cognitive overload. This is in sharp contrast to the deep linear thinking and much lower rate of information ingestion that occurs while reading a physical book, synchronously *enhancing* the brain's ability to learn.

Nicholas Carr attributes *digital media induced* cognitive overload to 1.) the inherently distracting format of webpages with hyperlinks that effortlessly "propel" users to different content; 2.) the ease of search-ability within the page(s) that enables us to quickly find and "jump to" new windows of content; 3.) pop-up emails and social media notifications; and 4.) the ability

to display a multitude of different media on one page (graphic-rich advertisements, videos, etc.). Simply phrased, “By combining many different kinds of information on a single screen, the multimedia Net further fragments content and disrupts our concentration.” (Carr, 2010).

A 2013 study by Kari Mercer Dalton found that **the perpetual cognitive overload induced by digital media actually changes the neural circuits of the brain** and can accomplish this with relative ease:

The Internet is able to rewire our brains because it delivers a steady stream of inputs to our visual, somatosensory, and auditory cortices. The Internet simultaneously engages all of our senses, except for taste and smell. The constant sensory and cognitive stimuli of the Internet alter the brain circuits, especially of Millennials, because it is repetitive, intense, interactive, and addictive. [...] The constant use of technologies such as smartphones, computers, search engines, and the like "stimulate brain cell alteration and neurotransmitter release, gradually strengthening new neural pathways in our brains while weakening old ones."

Even when people who have reached this level of overload are not using digital devices, they still process information in the same manner as when they are interacting with the devices. The brain has reorganized its neural connections (neuroplasticity) to accommodate the incessant media usage.

Among younger generations, studies are finding that frequent digital media use is, in fact, stunting frontal lobe development. The frontal lobe is not only responsible for our working memory, but also higher order reasoning skills like critical thinking and decision making (Dalton, 2013). Essentially, the brain’s ability to remember, deeply process and analyze information is impaired, which diminishes its capacity to learn and derive meaning from content

(Shtepura, 2018). The ability to effectively communicate is also being impaired, yet another skill that the frontal lobe is responsible for (Dalton, 2013).

The natural question to ask is: What are these old neural connections being replaced with? Studies have found that areas of the brain which are involved in more primitive (lower-level) functions such as visual cue processing and reflex responses are strengthened (Carr, 2010; Dalton, 2013). Results from studies of brain activity in frequent computer gamers found that the higher order reasoning focused frontal lobes were impaired, but the functioning of brain areas involved in controlling movement and vision were enhanced. The brain is not storing, interpreting, reflecting on, and synthesizing information with other knowledge it has acquired because this requires “rest periods” from intense stimulation that would allow the brain to “solidify experiences and turn them into persistent memories” (Richtel, 2010; Dalton, 2013). Instead, the brain becomes a “signal-processing [unit], quickly shepherding information into consciousness and then back out again.” (Carr, 2010).

Entertainment culture in the *Digital Age* takes on a new character. It is no longer just a matter of entertainment being the most convenient type of content to portray on a medium, or the type of content best suited for lowering our neurological anxieties in a state of overstimulation. Entertainment has become the only information simple enough for our brains to effectively process and store.

A 2008 study found that Americans collectively consumed 3.6 zettabytes of information per day, or approximately 16 PC sized hard drives per person (Bohn et al., 2012). With the widespread use of the smartphone, it is reasonable to assume that information consumption has grown since this study. This means that a myriad of different bits of information continuously compete for our attention. However, these snippets of information are often unsuccessful in

capturing it. In addition to being entertaining, content must also be more emotionally stimulating than even the 1980s news programming discussed previously. Information that is successfully conveyed through digital media must evoke emotions in order to make the brain stop and pay attention, even if for a second (Tyng et al., 2017). This is why news is commonly displayed with sensationalist headlines (clickbait) and tweets that contain images are retweeted 150% more than tweets that do not (Mawhinney, 2019).

The prerequisite to have entertaining and emotionally triggering content is not restricted to digital media. All institutions need to compete with the emotionally engaging content available in one's pocket, which explains why modern art exhibits display degenerate acts of defecating and intimacy with dead animals (Llosa, 2016; Jhala, 2019). The majority of information we feed to our brains, online and offline, is primarily pleasure inducing and highly emotional in nature, which naturally makes us more reactive and less logical. The new intellectual ethic established by digital media is: the mind should *always* be preoccupied with *reacting* to entertaining information, regardless of its relevance to one's life.

Section 2b: More Connected, but Less Involved

"I see within all of us [...] the replacement of complex inner density with a new kind of self – evolving under pressure of information and the technology of the 'instantly available'. [...] we risk turning into "pancake people" – spread wide and thin as we connect with that vast network of information accessed by the mere touch of a button." -Richard Foreman

Digital media has not just changed the intellectual ethic of modern day America. It has also changed the social landscape. People are more connected to one another today than at any other time in history. Yet, people are feeling increasingly more isolated from each other and

lonely (Turkle, 2012; Cigna, 2018). One hypothesis for this is that the modern “multitasking brain” is not as prepared to fulfill the emotional needs of other people, therefore more people are turning to strangers online for social interaction.

The prior section discussed how the new intellectual ethic has created a mindset focused on always engaging with and reacting to entertaining content. The brain has adapted to this perpetually immersive experience into an abundance of content by multitasking. The “multitasking brain” is constantly switching from one activity to another and is never deeply focused on or immersed in a specific undertaking. This perpetual multitasking has become increasingly more common because our heightened connectedness to the world requires us to respond to significantly more information. Although entertainment is a popular content choice, people heavily leverage the instant connectivity of digital media to fulfill a fundamentally essential desire: social interaction.

Frequent connection is no longer limited to those closest to us or in our physical proximity. Thus, connections to *weak social ties*, acquaintanceships or work peers, have become prolonged through use of social networking sites (SNS) (Bapna et al., 2011). As a result, more energy is often expended on these weak social ties which could have otherwise been spent on the more emotionally fulfilling *strong social ties*, the close and intimate relationships in our lives. Shifting attention away from our strong social ties comes with a cost, even if we are physically with them. Turkle points out how many children feel neglected even while in the presence of their parents because the parents often forego interacting with the children until they complete phone related activities (texting, emailing, etc.) (Turkle, 2012). In recent studies, 90% of subjects admitted to using their phones during social interactions, and 50% of subjects disclosed that they felt ignored by their romantic partners who chose to use their smartphones during personal

conversations (Chotpitayasunondh et al., 2018). Feelings of social exclusion frequently arise as a result of this type of behavior as it mirrors many of the characteristics associated with personal rejection including silence during the interaction (“the silent treatment”) and a lack of eye contact. In their research, Varoth Chotpitayasunondh and Karen Douglas found that this behavior is correlated with significantly reduced satisfaction with the relationship.

Despite this common dislike of being ignored by smartphone users, a 2016 survey that polled 500 millennials found that 75% of respondents prefer texting to phone calls, which was often due to the convenience and less ‘disruptive’ nature of texting (*“Millennials Prefer Texting But Marketers Miss the Boat”*, 2016). Another reason cited for preferring texting is that phone calls take too much time (Turkle, 2012). The ubiquitous smartphone has caused people to become chronic multitaskers to the extent that a phone call is too time consuming and disruptive to them. Such intense multitasking has been shown to decrease the quality of performing any given task because it is more difficult to maintain focus (Ophir, 2009). The lack of focus can be attributed to heavy multitaskers’ “fragmented attention” that is characterized by less control over their working memory and an impaired ability to concentrate (Affleck, 2013; Dalton, 2013). When the ability to concentrate on one particular activity is sacrificed for the ability to chronically remain connected to a multitude of people and consume information, people frequently fail to adequately perform the task of meeting the emotional needs for acceptance and attention of those closest to them. As Nicholas Carr phrases it: “It’s not only deep thinking that requires a calm, attentive mind. It’s also empathy and compassion.” Aside from the blatant signals of rejection, if information overload prevents us from contemplation, we are less capable of feeling and expressing empathy, compassion, and other emotions that are crucial for maintaining successful relationships (Carr, 2010).

A common consequence of feeling rejected is an attempt to meet social needs by strengthening bonds with other people (Chotpitayasunondh et al., 2018). Matthew Lieberman's *social pain theory* provides insight into why this may occur. The theory states that social pain, or negative emotions associated with rejection and relationship loss, is registered by the brain in the same manner as physical pain (Lieberman, 2013). Lieberman believes that there are evolutionary reasons behind this because social cooperation was imperative for the survival of early humans. Furthermore, when the brain is idle – the areas associated with socializing become active, implying that it is inherently preoccupied with social behavior and driven to engage in it (Lieberman, 2013). Therefore, it seems reasonable that those who feel ostracized would try to ease the pain by gaining social acceptance. Feeling alone and dissatisfied with their 'real life' interactions, there is a trend among people to turn to connections formed on digital media to meet their social needs. 49% of participants in a 2007 Pew Research Center study stated that they used online networks to "make new friends" (Lenhart et al., 2007).

Research has found that digital relationships are not a perfect substitute for 'real' relationships because they are typically less sustainable and useful in developing close bonds when compared to face to face interaction and telephone communication (Cummings et al., 2002). A key contributing factor to this ineffectiveness is the personalized nature of digital media. The ability to customize our digital experiences by having the option to pick and choose our interactions prejudices us to socialize with those who think in a similar manner and will most likely be compatible (De-Wit et al., 2019). Such relationships are too filtered, sporadic and impersonal to foster necessary personal development. Boris Zizek wrote a paper in 2017 that analyzed the interaction between a 17-year-old girl (pseudonym *P*) and anonymous posters on *A Thin Line*, a website where users could anonymously share abusive behavior they experienced on

the internet and receive feedback regarding whether people agreed with the notion that the behavior was abusive. The experience that *P* shared was the following:

My dad committed suicide in 2007, and recently i wrote about how much i loved/missed him on myspace. People sent me messages saying it was my fault, and i deserved it, and they said if 'i were your dad i would have killed myself too ... over the line?'

Considering the extreme reaction from *P*'s 'abusers' and feedback from users could be rejected if deemed inappropriate, Zizek states that it was clear that *P* knew she would receive empathetic responses to her post and that her purpose for sharing this experience was to receive confirmation. The feedback to this post was very sympathetic to the situation. However, Zizek points out that the language of the responses were noticeably generic and indicate an emotionally uninvolved position. He goes on to say that "*P*'s primary problem is not the people who insulted her but that she does not know how to protect herself". Turkle (2012) touches on this disadvantage from turning to weak social ties on digital media for social satisfaction. She believes that these weak ties deprive people of turning to those who actually care for them and will provide the necessary perspective to facilitate personal growth. Indeed, digital interactions have become especially popular among those with low self-esteem and social anxiety because they provide a "buffer for social interactions" (Morahan-Martin, 2008). Digital interactions with strangers do not provide push back because these relationships lack the "resiliency and flexibility" present in our most intimate relationships (Wright). Instead, they allow us to "[conduct] relationships at arm's length, round-the-clock, and simultaneously, and only with those who reinforce one's worldview" (Zizek, 2017).

An apparent benefit of digital media is that it removes many of the unpleasant uncertainties and disagreements present in face-to-face interactions by allowing us to control the

situation. It turns social interactions into a form of entertainment that serves a compensatory purpose. People who are disappointed with reality often use entertainment to search for: “distraction or [...] alternative, if only temporary, realities to take them away into a dreamlike world [...] These ‘journeys’ into alternative worlds are most often pleasant, sometimes suspenseful, seldom disappointing and almost always compensatory.” (Vorderer, 2001). Digital interactions offer similar promise by providing the opportunity to filter out the negative aspects of interaction that we can seldom escape while communicating with someone in person. Still, Turkle points out that those who have a rich social life with digital strangers can feel a sense of emptiness immediately upon going offline. This may be due to the lack of physical contact with other humans, without which people are at more risk for depression and physical illness (Hunter; Pinker, 2015). Another contributing factor may be that online strangers sometimes respond in an uncaring or even cruel manner when we express vulnerabilities. Our natural expectation to be “nurtured” after exposing a sensitive part of ourselves is contradicted by such responses (Turkle, 2012). Ultimately, digital relationships can leave us feeling just as emotionally unsatisfied as being with a distracted companion, but they develop a new expectation that we should have complete control over the outcomes of our social interactions and that interactions should always be pleasant.

Section 2c: SNS Use as a Cry for Acceptance and Narcissism

“Social media ask us to represent ourselves in simplified ways. And then, faced with an audience, we feel pressure to conform to these simplifications.” - Sherry Turkle, Alone Together

Lieberman’s social pain theory can be used to explain why many people willingly ‘exhibit’ themselves on social media. The amount of disclosure of personal information on social

networking sites (SNS) is strongly correlated with the amount of friends they have (Aguiton, 2009). As a result, many people craft online personas that will attract additional friends and followers. Crafting an online persona presents a unique challenge because one cannot easily change personas depending on the audience, as is the case in real life. This is referred to as *context collapse*: the inability to present oneself differently to different audiences because *everyone* is the potential audience at any given time (Marwick et al., 2010). To appeal to as many people as possible, users begin to undergo a “self-conscious commodification” by “displaying themselves in an easily-consumed public way using tropes of consumer culture.” (Marwick et al., 2010). Users often engage in self-censorship and inauthentic self-expression to decrease the likelihood that their anonymous audience will be offended and reject them through unfollowing or unfriending their account. Social acceptance on popular SNS seems to then require that we present carefully manicured, mass appealing versions of ourselves. **We are now no longer observers of entertainment culture, but active participants** – essentially turning ourselves into generic, celebrity figures. This has the secondary effect of causing narcissistic behavior. That is not to say that most Americans are clinical narcissists, but rather, researchers have noted that people are more frequently exhibiting this type of behavior.

The combination of turning oneself into a mass appealing figure and being in the ‘presence’ of millions of users doing the same thing creates a dehumanizing effect. Naturally to be ‘universally’ accepted, one must embrace popular modern day values, the values that make people ‘likable’. Given the predominance of entertainment culture in American society, it is natural that among these values are: physical attractiveness, an amusing display of content, and often extravagance. The sheer volume of people and the emphasis on extremely superficial values causes people to more closely resemble stock characters than complex, unique

individuals. This is often why dating apps have a dehumanizing effect on the dating ritual. People become disposable when individuals are judged on characteristics that are unrelated to individualism and there are millions of relatively similar, or ‘better’, users within reach. Rob Whitley found that dating apps in particular breed “endless self-questioning regarding dating options” due to the enormous amount of choices and the shallow nature of the brief interactions among users. There is a perpetual idea that there may be someone equivalent or superior just one swipe away and that any given user one is interacting with currently is expendable (Whitley, 2018). Friends, romantic prospects, and colleagues have been stripped of the individuality that made them interesting and uniquely desirable, and have essentially become replaceable commodities.

Even if people are seemingly more disposable, are people actually treating them as such through digital media? The answer for some researchers is *yes*. Sherry Turkle points out how digital media can cause us to behave in a manner that treats even those whom we are close to as disposable. An interview with a teenage girl is cited in which she describes why she does not necessarily need to speak with her best friend or close contacts during upsetting times. She usually will reach out to a multitude of people until she receives a response from one person who will help mend her feelings. After she feels better, the conversation ceases until she encounters another reason to contact that person again. By dehumanizing people and making millions of others within reach through a keystroke, digital media has made it easy to “take pieces of people” as we need them and then dispose of these people when their purpose is fulfilled.

This is common behavior practiced by clinical narcissists. Narcissists do not view individuals as inherently valuable or important. Instead, people are only valuable to the extent that they meet the *needs and desires* of the narcissist (Ni, 2017). If a person is unable to do this,

the narcissist discards them and moves on to someone who can. Unsurprisingly, narcissists also have trouble maintaining relationships because it is rare that individuals will perfectly meet their desires. If more and more Americans are behaving in a similar manner, it is expected that relationships with other people will become even more dissatisfying and unstable. Studies have found that an increase in US divorce rates was positively correlated with the increasing popularity of Facebook use, and marriage satisfaction is negatively correlated with SNS use (Valenzuela, 2014). A 2015 study found that 42% of Tinder users were already in relationships (McGrath, 2015). Narcissistic tendencies may lead to an expectation that all of one's wants should be immediately met. The relationship will be discarded once conflict arises due to the belief that there are plenty of people to replace any given person.

Another clinical narcissistic trait that many people are exhibiting is the desire for instant gratification. Much of this has to do with impairments to the cognitive thinking areas of the brain that were previously discussed in *Section 2a*. However, the outlets that digital media provides for people also perpetuates this type of behavior. Consumerism on the internet is a prime example of this. People no longer need to actually leave their homes to receive many of the things they wish for. Anything a person may want is simply a click away. This has caused impatience among people when these instant 'needs' are not being met. Even the average YouTube user begins to abandon their attempt to watch a video if it does not load within 2 seconds (Krishnan et al., 2013).

The need for instant gratification also extends to how we interact with other people. For example, selfies provide a type of instant gratification on a social level. Researchers have found that posting selfies has a particularly important role for narcissists because it is an opportunity for instant, positive feedback that maintains their "fragile-self images" (Biolcati, 2018). Many

individuals with low self-esteem behave in a similar manner to narcissists in terms of posting frequent selfies for validation. The nature of websites like Twitter provide immediate feedback for whether or not our thoughts are agreeable or likeable. A sense of confidence or value no longer need to be developed through actual achievement or meaningful personal interactions. It can occur from a simple post or tweet. This type of instant gratification is temporary, which leads to the tendency to frequently engage in these self-promoting and vain activities on SNS – ultimately creating a perpetual desire to be gratified in this manner.

Section 3: THE FUTURE

Section 3a: Will We Turn to Robots?

Collecting Data on Current Alternatives

The remainder of this paper will discuss how the factors discussed in the previous sections may be used to predict the willingness of people to replace their social relationships with robotic companions. To summarize, this paper has discussed how:

1. Digital media has created a new intellectual ethic that emphasizes a mind seeking to perpetually satiate itself with and react to entertaining information
2. Entertainment is seemingly the only type of information that the brain can constantly handle because cognitive overload and frequent digital usage has ‘rewired’ the brain to be structurally more reactive and less able to engage in deep critical thinking.
3. Digital media usage (especially the smartphone) often causes people to ignore each other and turn to less satisfying alternative relationships for social interaction on outlets like SNS or community websites.

4. Digital media interaction creates an expectation of social control and that most (or all) interactions should be amusing.
5. SNS in particular dehumanize people by perpetuating the tendency to value them based on superficial traits and promoting the idea that millions of similar people are easily within reach. People are stripped of their individuality and seen as replaceable.
6. Digital media breeds narcissistic behavior by providing an avenue for instant gratification and validation, and creating the ability to effectively dispose of others.

Matthew Lieberman's previously mentioned social pain theory states that social pain, or negative emotions associated with rejection and relationship loss, is registered by the brain in the same manner as physical pain (Lieberman, 2013). Given the increasing feelings of loneliness and social isolation that have arisen from perpetual digital media use, it is possible that people will begin to search for companionship when they feel that the people in their lives are failing to fulfill their needs. This *search* is commonly done via interactions with weak social ties or even complete strangers on SNS and other internet mediums; but these interactions are not necessarily socially satisfactory either. Robotics may become an attractive alternative.

There are already examples of people replacing humans with alternatives for their social relationships that are not nearly as interactive as robots. I compiled data on one of these groups: owners of realistic sex dolls. These sex dolls are realistic in that their appearance is astonishingly close to that of humans. My data was collected from the websites *clubrealdoll.com* and *dollforum.com*. These websites were chosen because they are two popular forums where owners and enthusiasts (I refer to them as 'posters') chat about their personal experiences with 'doll' companions. The prices of the dolls discussed on these forums are as much as \$7,999 each. The

price for higher end sex dolls like RealDoll, manufactured by Abyss Creations, LLC, can be even higher depending on the choice of ‘custom’ options.

I followed the posts of 74 users in total on both forums to determine these data points:

- 1. The relationship status of the poster**
- 2. If the sex doll was purchased because the poster needed a companion or was lonely**
- 3. If the poster had given up on romantic relationships with humans**
- 4. If the poster spoke about his or her sex doll(s) as if it were a human.** This was determined by noting if the poster:
 - a. Used gender pronouns (e.g. she) instead of ‘thing’ pronouns (e.g. it) to speak about the doll
 - b. Indicated that the doll had a distinct personality (e.g. doll has specific preferences), and / or
 - c. Attributed feelings to the doll (e.g. it loves the poster; it enjoys certain activities)

73 users were men while only one user was a woman. Thus the data collected has a gender bias and may not be representative of female doll owners. The discrepancy in the gender of the posters may be due to the sex doll market appearing to be dominated by male customers, although I cannot confirm this with statistics. The age and geographic location of the users were unknown. All users were English speakers.

Results: What Drives People to Sex Dolls?

The results of the data collection were telling of why the users purchased sex dolls and their feelings towards them. The majority of the users were single (58%), but a significant portion were divorced (26%) or married (10%). *Figure 1* breaks down the percentages of each observed relationship status. The reasons for *purchasing the doll* and *feelings towards the doll* were not correlated with any of the relationship statuses. That is, the observed factors of purchasing the doll for companionship or to assuage feelings of loneliness, giving up on human relationships, and speaking of the doll as if it were human did not predict the relationship status of the user.

Figure 1: Relationship Status of Posters

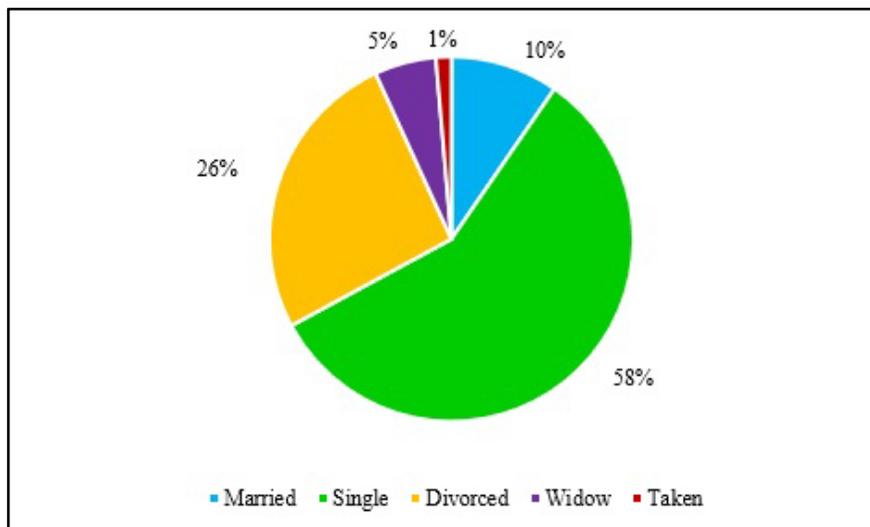
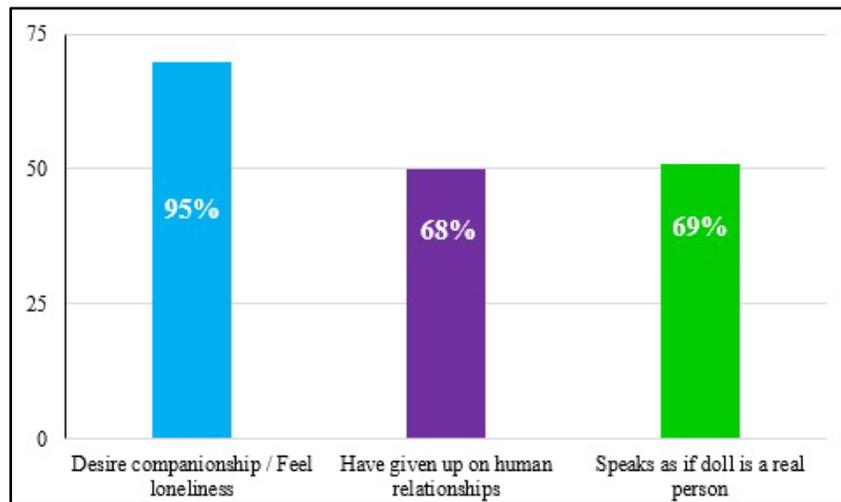


Figure 2 showcases the prevalence of the observed factors among posters. The vast majority of the posters purchased a sex doll because they desired companionship or felt lonely (95%). A smaller majority of posters expressed that they had given up on relationships with humans (68%), which factored into their decision to purchase the doll. Some stated reasons for this were general weariness of dealing with the “drama” that was believed to characterize relationships and feelings that one would never meet the right person. Finally, most posters

spoke about their sex dolls as if they were human (69%). This was determined by noting if the poster: 1.) used *gender* pronouns (e.g. “she”) instead of *thing* pronouns (e.g. “it”) to speak about the doll; 2.) spoke as if the doll had a distinct personality (e.g. the doll was described as having specific preferences / likes); and / or 3.) described the doll as having feelings (e.g. the doll loved the poster, the doll enjoyed certain activities).

Figure 2: Posters’ Attitudes



Discussion of Results

Most of the posters were driven to purchase their dolls because they wanted a companion or felt lonely. Moreover, many of the users expressed that they had given up on human relationships, frequently due to a lack of desire to deal with the negative aspects of relationships. Unable to find emotional satisfaction in humans, many of these posters turned to inanimate dolls to fulfill that need. It is also important to note that the majority of posters spoke about their dolls as if they were human. The perception of humanness makes these sex dolls appear to be suitable replacements for actual humans. This coincides with the dehumanization of people discussed in *Section 2c*, where the value of a person is primarily based on superficial traits such as physical attractiveness.

As discussed in prior sections herein, there has been an increase in feelings of loneliness and relationship dissatisfaction among the American population. Though only a minority of the population purchases sex dolls, I will discuss later in this paper how similar feelings may make a larger amount of the population more willing to seek emotional satisfaction and companionship with robots. Additionally, people are growing accustomed to avoiding unpleasant interactions by filtering who they interact with on digital media and keeping social relationships at arm's length by communicating through convenient, undisruptive text messaging. If our brains are multitasking, then we have less capacity to effectively deal with the baggage of others. Posters in the sex doll forums express this same lack of willingness to deal with the “drama” of other people. And if a realistic looking yet motionless doll is “human enough” to drive (at least²) thousands of people to spend as much as \$8,000 to acquire one, then how many more people will be enticed by an attractive and much more interactive AI powered robot that will be “human enough” to fulfill their needs for companionship and love? Is it reasonable to think that humans will replace people, with all of their idiosyncrasies and faults, with friendly, attentive, accommodating and agreeable machines – especially when the value of an individual is already being reduced to their cosmetic and trivial characteristics?

Section 3b: A Human without the ‘Bad’ Parts

When researchers evaluated reactions of studied participants towards robotic animal companions, many participants expressed extremely positive feelings. One study dealt with patients interacting with a Paro or Aibo robot. Paro is a robot seal that is meant to replace living animals being used in animal therapy and Aibo is a robotic pet dog developed by Sony

² Dollforum.com has 63,209 registered users and 6,777,748 visitors since January 1, 2012. Currently, there is no accurate information on the size of the sex doll market.

(Robinson et al., 2014). Turkle also conducted studies in which participants of various ages were required to live with an Aibo for several weeks. At the end of the study many participants felt that these robots were equally as good or better pets than real animals. The main reason: they provide the positive aspects of having a pet, such as companionship, affectionate reactions, and a sense of purpose, while simultaneously sparing their owners from the negative aspects of having a living animal. Participants liked the idea that these robot pets did not require clean up, never demanded their time during inconvenient moments, and would never die – thus shielding them from the traumatic pain of loss. In a sense, these robotic animals were ideal pets.

A similar mindset has been observed when people are asked about the attractiveness of robots or digital simulations as social companions. A robot or digital partner / friend will be unwavering in the amount of empathy and loyalty it gives to its human companion; it will never lie to, abandon, or cheat on its owner (Levy, 2008). Levy describes in detail how robots can meet key factors that researchers have found cause people to fall in love with one another³:

1. **Similarity** - people prefer relationships with people who have similar attitudes, personality traits, social habits, and other characteristics. These traits can be pre-programmed in a robot companion, and Levy believes that advancements in AI will eventually allow robots to emulate characteristics they observe from their human partners. The personalized nature of digital media has already accustomed us to seek out interactions with people who are very similar to ourselves and primes us to be enticed by a companion that can mirror who we are.
2. **Desirable characteristics of the other** - specific personality and physical traits that are deemed desirable have a major influence on attraction. *Section 2c* discussed how people

³ Aron, Arthur et al., *Journal of Social and Personal Relationships*, 1989

on SNS have become valued on superficial traits that formerly were used primarily to characterize celebrities (e.g. attractiveness, how amusing one's persona is) and how this has a dehumanizing effect on how we view other people. The shift in values works in the favor of robot companions because they can be customized to *perfectly* meet *all* of these standards forever, which for a human being, is virtually impossible. This is very similar to the situation where sex doll owners see the dolls as suitable replacements for humans because these dolls easily meet such superficial criteria.

3. **Reciprocal liking** - when we are aware that someone likes us, we feel likable, which makes us feel good about being around that person and more prone to be attracted to them. This behavior is programmable in a robot, and studies have already confirmed the positive, caring reactions of the human subjects elicited by the affectionate behavior of robots like AIBO and Paro (Robinson, 2014). By always communicating how much they like us, robots will not induce feelings of rejection as our interactions with distracted social ties, uncaring internet strangers, or even traditional social relationships that end negatively do.
4. **Filling needs** - relationships are attractive because they fulfill a need (e.g. intimacy, closeness, company, sex, etc.). Robots can be programmed to fulfill many of these needs and will do so with certainty and on demand. This is attractive to the narcissistic tendency to seek validation and solely use people for what they can provide.

Like the robotic pets, these companions can provide people with *almost* all of the positive experiences that draw people to relationships, while shielding them from the more complicated, unenjoyable aspects.

It can be argued that such one dimensional relationships would not have mass appeal because it is the sense of being connected and bonding with another human being that makes relationships fulfilling. A robotic companion cannot be programmed to fulfill this abstract need. However, it may not be necessary to meet this need. This paper discussed in *Section 2a* how the desire to be perpetually entertained has become a primary priority for the American public. A reason proposed for this by McLuhan was that such entertainment is one of the ways that the brain returns itself to equilibrium upon cognitive overload. Unentertaining stimuli that requires deep thinking or reflection is generally rejected due to the modern intellectual ethic. The current mindset is reactive and can only deal with shallow and amusing stimuli. The rising trend of people mainly choosing to conduct their digital interactions *with like-minded, agreeable people* is influenced by this new state of mind. These interactions make people happy and are often engaging because they reinforce our beliefs, but they are usually superficial and do not lead to personal growth. They also create the expectation that we can control our interactions with people in a way that is only pleasurable, much like someone can control what channels they watch or the music that they listen to. Digital media has changed the rules of engagement and robots can follow these rules much better than humans can. A robot can be programmed to reinforce beliefs and be as agreeable as one would like, and if the trends in digital communication habits are accurate, this is the type of “stress-free” interaction that many people now prefer.

Furthermore, digital media has made many relationships with real humans less satisfying. People are feeling rejected and isolated as they have to compete with digital media for the attention of their personal connections. A robotic companion in comparison begins to appear more socially satisfying because you always have its complete attention without working for it. It

does not matter if the robot actually cares for you because “[at] the robotic moment, the performance of connection seems connection enough.” (Turkle, 2012). As early as 2008, Levy claimed that a key allure of a robotic companion would be that it would possess “a combination of social, emotional, and intellectual skills that far exceeds the characteristics likely to be found in a human friend.” (Levy, 2008). The rules of social engagement have not only changed, but the players and their respective skill sets have as well. The benefits of robotic companions become threefold: 1.) all of the positive aspects of a relationship are fulfilled; 2.) the negative aspects of a relationship are discarded; and 3.) the capacity of robots to perform these positive behaviors is *better* than people. Just as robotic pets have been found to be the perfect “friction free” replacements for live pets, robotic companions can essentially become the ideal substitutes of their comparatively aloof, distracted, self-centered human counterparts.

Section 3c: A Companion Made for the Multitasking Brain

A robotic or digital companion is well suited for the modern multitasking brain that is perpetually overwhelmed with information. This paper established how various cognitive functions of the brain are impaired after frequent digital media use due to the nature of the medium and information overload. These functions are specifically associated with critical thinking, memory, and information processing. Typically, human relationships are complicated and require these mental tasks to sustain them. These cognitive processes enable us to reflect on our own behavior and how it affects other people; effectively communicate our feelings with others; and make thoughtful decisions to resolve conflicts that arise (Dalton, 2013; Greenfield, 2009). They are also the foundations for patience, empathy and compassion because they foster the abstract thinking that allows us to view the world from the perspectives of others. Successful

relationships between people require this skill set and these skills seem to be declining as digital media use has increased.

A successful relationship with a robot does not require this skill set. Social robots are predictable and are designed to elicit pleasurable feelings. If desired, they may be programmed to occasionally require that you interpret their ‘feelings’ and respond accordingly to their ‘needs’, as is the case with the Aibo dog that expresses boredom or sleepiness. However, fulfilling the ‘needs’ of these robots is straightforward and takes relatively little effort compared to human relationships. As discussed in *Section 3a*, a companion without any “drama” is a common reason for purchasing a sex doll. Reflecting on interviews with people who own robotic companions that they are emotionally attached to, Turkle states:

I hear a certain fatigue with the difficulties of life with people. We insert robots into every narrative of human frailty. People make too many demands; robot demands would be of a more manageable sort. [...] [When people talk of robots, they] talk about how hard it is to understand family and friends. [...] A thirty-year-old man remarks, “I’d rather talk to a robot. Friends can be exhausting. The robot will always be there for me. And whenever I’m done, I can walk away.”

Simply put, robot relationships require very little cognitive effort and are low maintenance. This is compatible with a brain that is lacking the capacity to meet the high emotional demands of a person because it is already cognitively overloaded. Robotic relationships can provide the mental ‘break’ that could make personal relationships more mentally digestible to a multitasking brain.

Convenience is another key element that makes robotic companions more alluring to the multitasking brain. Perpetual connection and communication with the *global village* has seemingly left us with less time. Since time has become more scarce, and therefore more

valuable, there seems to be an aversion to spending too much of it on one specific task. *Section 2b* discussed how many people prefer texting over speaking on the phone because of its flexible and non-committal nature. Speaking on the phone requires that you give the person on the other end of the call your complete attention and exert the time to have a continuous conversation. Texting allows you to pick up and halt the conversation whenever most convenient. Convenient interaction also made the Aibo an attractive pet to participants in one of Turkle's (2012) research studies, such as the ability to turn off the dog when one tired of interaction. The ability to turn off social companions when necessary is similarly attractive. Interactions can be abruptly halted when the brain becomes absorbed with something else or bored. Just as important is the fact that this can occur without any repercussions of straining the relationship because the robotic companion will not *feel* rejected or neglected. Social relationships with robots are symbiotic with the current intellectual ethic in that they are aligned with the character of all digital mediums where there is an emphasis on entertainment and convenience.

Section 3d: A Relationship that Only Considers Your Needs

As feelings of loneliness and narcissistic behavior increase, perhaps one of the most alluring aspect of a robotic partner is that it only considers the needs of the person it is in a relationship with. Many people use SNS as an outlet to connect with people and often as a substitute for in person interaction. The substitute is not perfect because the communities on SNS often consist of millions of relatively generic personas. Again, this is not because the individuals behind these personas are necessarily generic, but rather, social success on SNS derives from being mass appealing (*note*: this can be mass appeal to a particular niche group, but the point is you are becoming some sort of archetype). In *Section 2c* I discussed how this generates the

ancillary effect of fostering certain narcissistic behaviors by creating the idea that people are generic and easily replaceable. Moreover, SNS creates an avenue for frequent, instant validation. The value of people becomes solely based on how they can fulfill your needs. These narcissistic tendencies have the dual effect of adding to the allure of a robotic companion and eases the mental acceptance of robots as a legitimate replacement, as the robot's singular mission is to make only its owner feel good.

A robot companion can *always* provide instant gratification. One does not need to text a multitude of people to find someone who is available to emotionally comfort them. There is no need to habitually upload selfies or posts on SNS in search for immediate self-validation. A robot companion is instantly available at any time to provide emotional comfort, validation, and satisfy any other need within its design. Human relationships do not function to instantly meet only one person's desires. People require a perpetual 'give and take' that involves compromise to meet the mutual needs of both parties and a true understanding of each other's feelings. Human relationships require that we empathize with *each other* and demonstrate that *we care*. This can be challenging even under normal, more traditional circumstances, and is therefore extremely problematic when our cognitively overloaded brains are losing strength in the neural connections that are critical to feeling empathy, constantly seeking entertainment (or pleasure) at any given moment. It makes sense that clinical narcissists, who are also fixated on instant gratification and frequent validation, particularly find robot companions appealing (Appel, 2019). A robot companion eliminates the elements of relationships that require sacrifice, patience and understanding. The robot turns social relationships into a pleasant, instantly gratifying experience.

Section 3e: Acceptance / Human Enough

“We can’t identify the replicants because the people, inexplicably, took to acting like them.” -Sherry Turkle, Alone Together

Even if there are obvious benefits to a robot companion, this does not mean that humans will necessarily be replaced by them for social interactions. People need to accept robots as human *enough* to feel comfortable with a complete substitution. In the past, the idea of love or friendship with a robot was rejected by the American public (Moskowitz, 2013). However, the prevalence of favorable attitudes towards relationships with robots has increased with the rise of digital media. A recent survey revealed that approximately 25% of millennials were open to having romantic relationships with robots (*Would You Date A Robot?*, 2017). This is a dramatic change from the 1980s study that completely rejected any kind of personal relationship with robots.

A contributing factor towards this increasing acceptance is the increasing dehumanization of people through digital media. As people begin to be seen less as individuals and more like objects, then replacing them with an actual object becomes easier. If people are valued primarily on appearances, their entertainment factor, and how much they instantly gratify desires then they can be replicated by a robot. Further agitating the situation is that people are devoting increasingly less attention to one another as digital media competes for their attention. Waning emotional support for one another can contribute to further dehumanization. Essentially, digital media has contributed to Americans losing traits that have characterized humanity, like individualism and altruism. Consequently, we begin to view ourselves as indistinguishable from a programmable, unfeeling machine.

Another reason why acceptance of robots as social companions has become more prevalent is because they have increasingly become *human enough*. That is, it is not necessary for a robot to be an exact physical replica of a human for us to accept it. They must possess *just enough* relatable characteristics. In fact, even a text based chatbot is relatable enough for us to consider it to possess human feelings. *The Eliza Effect* is a prime example of this phenomenon. Carr discusses the effect the original chatbot *Eliza* had on people who chatted with it during its initial release in the 1970s. Even people who were completely aware of its underlying program expressed that they believed it truly understood them and sometimes confided private information to it (Carr, 2010). A similar phenomenon is seen in Japan with men who are dating simulated high school girls on the Nintendo DS game *LovePlus*. Despite the fact that these ‘girlfriends’ are animations limited to the screen of a game console, players demonstrate significant emotional attachment to them (Galbraith, 2011). My data collection in *Section 3a* shows that even inanimate dolls are *human enough* for some people because their realistic appearances make them relatable to humans and, perhaps, their general attractiveness even makes them superior to people by fulfilling an important superficial feature that is often associated with the value of a person. Turkle (2012) discusses extensively how if robots have enough human characteristics, we will begin to see them in our image and assign them human feelings that make us feel connected to them. Robotic pet products have met this threshold which is why those who interact with them often express positive feelings.

Section 4: Conclusion and Demographics Affected

I have not come to the conclusion that all Americans or even the majority of Americans will replace their social relationships with robots. However, a significant amount of the population is at risk. In particular, the upper middle and upper class Millennial and Generation Z populations face a higher risk. Economic class demographics as of right now are significant because robots that are complex enough to be interactive companions are typically several thousand dollars, and it is likely only these demographics could afford them. One of the more complex social robots, Nao, retails at \$9,500. Even more sophisticated robotic pets are fairly expensive: Aibo and Paro are priced at \$4,798 and \$5,000, respectively.

Millennials and Generation Z also face specific cultural circumstances that make them more susceptible to robotic relationships. Greg Lukianoff and Jonathan Haidt's *The Coddling of the American Mind* (2018) points to overprotective parenting as causing an expectation of "emotional safety" and a desire to be guarded against *anything* that causes emotional discomfort among these generations. Naturally, human relationships require us to be emotionally vulnerable and risk emotional pain. Andrew Reiner argues that the prevalence of 'hook up' culture and reluctance to marry among younger generations is due to a general fear of vulnerability (Reiner, 2014). If Millennial and Generation Z populations are averse to any type of emotional discomfort, then robots are much safer alternatives to human relationships.

Only time and additional studies will be able to adequately predict the magnitude of the American population that will replace human relationships with robots. However, the amount of the population at risk will increase as the severity and prevalence of the effects from digital media discussed in this paper grow. If people continue to dehumanize each other to the point of objectification, then replacing people with an actual object will be much easier. If people

continue to fixate on instant, emotional gratification and lack the deep thinking that breeds empathy and understanding for others, then a robots may become more suitable partners. And finally, if people are too busy to give others their full attention, then robots may be more emotionally satisfying. Much will depend on to what extent humans become *more* robotic, and robots become *more* human.

Appendix 1: Proposed Experiment for Measuring

Short-term effects of Robot Interaction

Background

There is a dearth of information regarding the effects of human interaction with social robots. This may be because the social robotics industry is still in its early stages and there are few products on the market. I planned on conducting an experiment to compensate for this lack of data, but could not execute it in time for this thesis due to delays from the formal approval process. The experiment would have provided data on short-term mood changes resulting from human interaction with robotic products. There are still plans to conduct the experiment sometime in the near future.

Experiment

The experiment will involve subjects interacting with either: 1.) an Amazon Echo device; 2.) an Anki Cozmo robot; or 3.) a human. The Amazon Echo device is a smart speaker that responds to voice commands and has a variety of interactive capabilities. The Anki Cozmo robot has a multitude of social and playful behavior that is programmed into it. An example of social behavior is the Cozmo device's ability to recognize a human face and display a positive reaction. Playful behavior includes interactive games that can be played with humans. Both devices will be programmed to be highly sociable and interactive. The reactions towards these robots will be measured during and after the experiment to discern how favorably subjects feel towards these devices throughout the interaction. The results from the robot interactions will be compared to the results from subjects who socialized with a human. The aim of the experiment is to determine if: 1.) interactions with robotic devices elicit responses that are less, equally, or more positive

than interactions with humans; and 2.) there is a correlation between internet addiction and how a subject feels towards their social experience with a robot or human.



(Anki Cozmo robot)

Procedure

Initial Phase

Subjects will be required to sign a consent form in the beginning of the experiment. Afterwards, the Positive and Negative Affect (PANAS) mood measurement tool and Digital Addiction Test will be distributed to participants. The PANAS tool will determine the participants' baseline moods and the internet addiction test will measure the severity of their digital habits. They will be given approximately 5 minutes to complete both of these questionnaires. Upon completion, these materials will be given to the researcher. After this initial phase, participants will interact with either an Anki Cozmo device, an Amazon Echo device, or a human. The experimental group will consist of those who socialize with the Echo device or Cozmo robot. The control group will consist of those who socialize with a human.

Interaction Phase

The methodologies for these three types of interaction are the following:

- ***Anki Cozmo Device:*** Participant interactions with the Anki Cozmo device will be monitored and guided. Participants will be guided to play pre-programmed games or activities with the Cozmo device. The interaction will last for 10-15 minutes.
- ***Amazon Echo Device:*** Participant interactions with the Amazon Echo device will be monitored and guided. The device will be programmed to have social responses to a multitude of possible speech input it receives. For example, if a participant states “I am bored”, the Echo may respond “Why are you bored?”. Participants will be guided to have a conversation with the Echo device. The interaction will last for 10-15 minutes.
- ***Human:*** Participant interactions with the human will be monitored. Participants will have a conversation with a human. There will be no designated topic for this conversation, the direction of the discussion will be mainly led by the participant. The interaction will last for 10-15 minutes.

Final Phase

Participants will be distributed a second mood measurement tool, the Self-Assessment Manikin (SAM), and given approximately 5 minutes to complete it. The completed questionnaires will be given to the researcher.

PANAS questionnaire template

Time instructions

There are different time instructions possible when using the PANAS Scale. Mark the option that you are applying for this test:

- Moment (you feel this way right now)
- Today (you have felt this way today)
- Past few days (you have felt this way during the past few days)
- Week (you have felt this way during the past week)
- Past few weeks (you have felt this way during the past few weeks)
- Year (you have felt this way during the past year)
- General (you generally feel this way)

Scale & Scorecard

1	2	3	4	5
Very slightly or not at all	A little	Moderately	Quite a bit	Extremely

#	Score	Feelings/emotions
1		Interested
2		Distressed
3		Excited
4		Upset
5		Strong
6		Guilty
7		Scared
8		Hostile
9		Enthusiastic
10		Proud

#	Score	Feelings/emotions
11		Irritable
12		Alert
13		Ashamed
14		Inspired
15		Nervous
16		Determined
17		Attentive
18		Jittery
19		Active
20		Afraid

Scoring instructions

Positive Affect Score

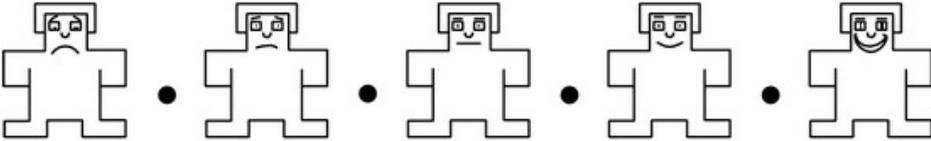
Add the scores on items 1, 3, 5, 9, 10, 12, 14, 16, 17 & 19. Scores can range between 10 – 50. Higher scores represent higher levels of positive affect. Mean scores: momentary = 29.7 and weekly = 33.3.

Negative Affect Score

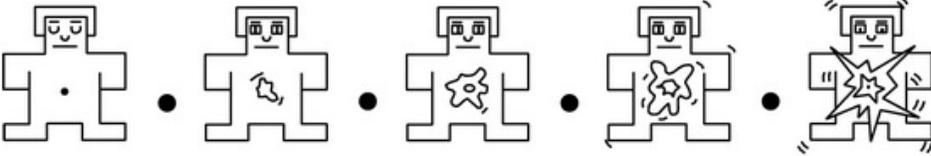
Add the scores on items 2, 4, 6, 7, 8, 11, 13, 15, 18 & 20. Scores can range between 10 – 50. Higher scores represent higher levels of negative affect. Mean scores: momentary = 14.8 and weekly = 17.4.

Self-Assessment Manikin (SAM) Example

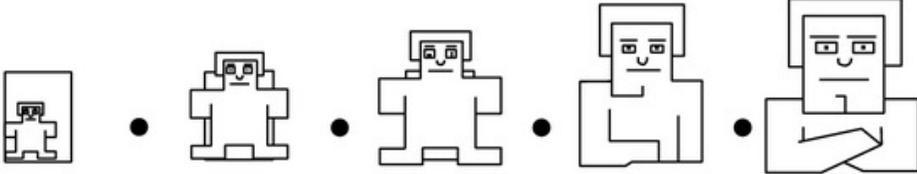
Valence (negative-positive)



Arousal (passive-active)



Dominance (dominated-dominant)



Liking (dislike-like)



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