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Media Influence on Expectations of Virtual Reality

Abstract

Although virtual reality (VR) technologies like *Oculus Rift*, *Sony PlayStation VR* and *Samsung Gear VR* have only recently become available for consumer use, VR has appeared in fictional works (such as novels and films) since 1964 (Steinicke, 2016). This means the general public have had many years to build up their views of VR and, thus, their expectations of real VR experiences. Since fictional portrayals of science and technology can have a strong impact upon public perceptions of them (Dourish and Bell, 2014), it is worth examining the extent of which fictional portrayals of VR have influenced consumer expectations of VR. Previous research has been carried out about consumer awareness of VR (*Futuresource Consulting*, 2016; *Magid*, 2017). However, the literature lacks studies with a focus on how the general public became aware of the technology and how this could impact what they expect from current VR devices. Therefore, using an original qualitative survey, this study seeks to reveal the impact of fictional representations of VR on its consumers.

Results from the online survey of VR users indicate that fictional representations of VR can and do affect consumer opinions and expectations of the technology. However, these effects seem to differ from those highlighted in studies focusing on other related areas such as forensic science. Whereas previous studies found fictional representations of science and technology to cause the public to overestimate the actual technology (Baskin and Sommers, 2010; Schweitzer and Saks, 2007), the majority of participants in this study were impressed with their real-life VR experiences. Thus, VR appears to be an exception in the way fictional representations have affected its consumers.

Keywords

virtual reality, expectations, consumers, fiction, media influence, head mounted displays

Introduction

This paper examines the extent of which fictional portrayals of virtual reality (VR) have affected VR users' expectations and perceptions of modern VR devices. Several of these devices, such as *Oculus Rift*, *PlayStation VR* and *Google Daydream View*, became commercially available in 2016, making this analysis particularly timely. VR technology has the potential to transform a broad variety of industries – from entertainment, communication and business to healthcare, tourism and education (Blascovich and Bailenson, 2011). Furthermore, research consultancies appear to have high hopes for this new trend of VR devices, with *Juniper Research* (2016) estimating the VR hardware market to make \$53 billion by 2021 and *SuperData* (2017) predicting VR revenue to total \$37.7 billion by 2020.

Importantly, VR as a science fiction concept existed for many years prior to the development of the technology. As early as 1964, the idea of VR appeared in Daniel Galouye's novel *Simulacron-3* and, since then, in William Gibson's novel *Neuromancer* (1984) and *The Matrix* film franchise (1999-2003) amongst many others. Such media play an important role in shaping public views (Boda and Szabó, 2011; Dourish and Bell, 2014). For example, Vincent Sacco (1995) argues "[i]n large, industrialized and post-modern societies, the media are considered to dominate the formation of knowledge, views and assumptions about reality" (cited in Boda and Szabó, 2011, p. 331). Therefore, fictional representations of VR may affect how consumers perceive the technology, particularly since these fictitious works existed long before modern VR devices. Indeed, Paul Dourish and Genevieve Bell (2014) state "science fiction in popular culture provides context in which new technological developments are understood" and, "[w]hether utopian or dystopian, these visions of the future shape our collective understandings of the relationship between science and progress and between people and technology" (pp. 769-770). Here, Dourish and Bell highlight the power fictional texts have in shaping public views and generating perceptions of science and technology – precisely the reason it is important to research this topic.

As will be discussed in more detail below, previous studies have researched consumer awareness and expectations of VR (*Futuresource Consulting*, 2016; *Magid*, 2017). Similarly, others have researched the effects fictional representations of science and technology have on the public (see, for example, Dourish and Bell, 2014; Nisbet et al, 2002 below). The current

study contributes to this existing research by focusing on a different technology – VR – from the angle of *how* expectations and perceptions have been formed, rather than simply what they are. Using both quantitative and qualitative questions, a survey was created and distributed to VR users to uncover the impact fictional representations of VR have on consumers.

This paper begins with a broad review of the related literature across three areas: (1) public responses to VR (*Brandwatch*, 2016; Burch, 2016; *Futuresource Consulting*, 2016; *Magid*, 2017); (2) expectations of science and technology (Baskin and Sommers, 2010; Dourish and Bell, 2014; Nisbet et al, 2002; Schweitzer and Saks, 2007); and (3) fictional representations of VR (Chan, 2014; Fisher, 2011; Lonsway, 2002; O’Riordan, 2005; Taylor, 1997). This is followed by an outline of the method used to carry out this study, including the creation and distribution of a survey and detailing the research questions and hypotheses. Lastly, the findings are explored alongside a discussion of the influences fiction can have upon expectations and perceptions of VR. This analysis allows the media influence on consumer expectations of VR to be established.

Literature Review

The first part of this literature review includes statistics released by VR industry researchers about public responses to VR. These studies act as useful comparisons to the results from the current survey. Following this, papers focusing on the effects of expectations are examined. These works not only help to highlight the importance of researching media influence on expectations of VR but also provide a basis for this project to build on. Lastly, research about fictional representations of VR is discussed in order to better analyse whether these portrayals affect consumer expectations.

Public and Consumer Responses

Research into public responses to VR appears to show a mostly positive reaction towards VR. For instance, *Brandwatch* (2016) examined 120,000 tweets from 8 February to 7 April 2016

on the topic of VR to uncover how *Twitter* users wrote about it. They reported that the vast majority of tweets about VR were positive (85 percent) rather than negative. Considering the high volume of tweets analysed, this is a very significant finding. Similar trends can also be found elsewhere. *Touchstone Research* and *Greenlight VR* carried out what they termed a “consumer sentiment survey” including over 2,000 participants (Burch, 2016). They state that 22 percent of their sample had experienced VR and, out of these, the most common words participants chose to describe the VR experience were ‘cool’, ‘like’, ‘awesome’, ‘excited’ and ‘fun’. Though the exact statistics for the occurrence of these terms are unavailable without purchasing the report, it appears VR users are generally positive about the VR experience. Furthermore, the consultancies detail that 71 percent of respondents aged 10-17 and 58 percent of those aged 35-50 described VR as “cool/fun/awesome” (Burch, 2016). Again, the full statistics for other age groups were unavailable. However, these figures do show that these age groups in particular had a positive reaction towards VR. These findings, therefore, show continuities with *Brandwatch*’s study above.

Rather than focusing on the use of specific words, some companies have measured how VR met consumer expectations. An infographic from research company *Magid* (2017) shows that 64 percent of participants who had purchased a VR device that connects to a PC rated its performance to be ‘slightly better’ or ‘far better’ than expected. Only five percent of respondents reported their experience of the device was ‘slightly below’ or ‘far below’ their expectations. Similarly, another infographic released by *Futuresource Consulting* (2016) shows that 53 percent of consumers who had tried VR were either impressed (28 percent) or extremely impressed (25 percent) with the experience. These findings indicate that the public perceived VR in some way before they experienced it, meaning these perceptions must have come from somewhere. The aim of this study, then, is to examine to what extent these perceptions are influenced by fictional media such as films and novels.

The Effect of Expectations

One major body of literature that has looked at the effect of fictional representations on public perceptions and expectations focuses on the so-called ‘CSI Effect’. The CSI Effect argues that “watching television shows, such as CSI, has influenced the general public’s attitudes, expectations, and decision making related to the use of scientific evidence in jury

trials” (Baskin and Sommers, 2010, p. 97). Researchers of the CSI Effect highlight that media representations (both non-fictional and fictional) can affect public attitudes and opinions of technology. For instance, Schweitzer and Saks (2007) found that viewers of television shows like *CSI* expected real-life forensic science to be more advanced than it is, which made them more critical of forensic evidence than those who had not seen it in fiction. Furthermore, Schweitzer and Saks state “[t]hat public expectations of science are born of fictional portrayals of science, rather than of scientific reality, has long been thought to be true of forensic science” (p. 359). If this is the case for forensic science, it may well be the case for other sciences and technologies as well, including VR.

In another study, Baskin and Sommers (2010) found that “respondents who watched three or more hours per week of crime shows were significantly more likely to rate forensic evidence as reliable compared to respondents who watched zero to two hours per week” (p. 106). This supports the idea that portrayals of science and technology in fiction can affect the public’s views of them in real life. Therefore, just as fictional representations of forensic science can influence public expectations of it, it is possible public expectations of VR technologies have been influenced by their media representations as well.

Aside from studies specific to the CSI Effect, other research has focused on expectations of science and technology in general. Matthew Nisbet et al (2002) analysed how different forms of media generate perceptions of science and technology as a whole. Using existing survey data from US respondents, they found that science television shows “can have positive benefits for public understanding” of science and technology (p. 604). However, the authors state these positive influences are “overwhelmed by the massive popularity of science fiction, science fantasy, and paranormal mystery shows” which “often distorts science as either scary or omnipotent” and generates misconceptions (p. 604). This point is particularly relevant to the current study since it highlights the strong power *fiction* has in creating perceptions. If science fiction creates misconceptions about a technology, those who have seen VR in fiction may have different views and expectations about it compared to those who have not seen VR in fiction.

In a different way, Dourish and Bell (2014) researched the effects of representations of technology in science fiction on ubiquitous computing research. They found that several of the themes appearing in five science fiction TV shows also emerged in ubiquitous computing literature. For instance, they argue that, just as technological research focuses on how technology can be used to erase geographical, political and ethnic boundaries, technology is shown to be able to do this in science fiction TV shows. This, the authors suggest, demonstrates the effect expectations of technologies generated by fiction can have on how these technologies are created and used in the real world. Indeed, they claim “scientific practice cannot be entirely separated from the popular culture upon which it draws” and “the character of technology use is strongly shaped by cultural and institutional arrangements” (p. 778). Thus, Dourish and Bell’s study further supports the idea that portrayals of technology in fiction can influence perceptions, and, as a result, technological practices. The current study will extend these findings to focus on the effects of fictional portrayals on consumers rather than technology researchers as Dourish and Bell have done.

Several authors have stressed the importance of studying expectations of science and technology, which highlights why studying the media’s influence upon expectations of VR is beneficial. For example, in an article overviewing studies of expectations in science and technology, Mads Borup et al (2006) state expectations “guide activities, provide structure and legitimation, attract interest and foster investment” and more (p. 286). Thus, “analysing the dynamics of expectations is a key element in understanding scientific and technological change” (p. 286). This sentiment is shared by Kornelia Konrad (2006) who analysed expectations of electronic commerce and interactive television. She states “collective expectations motivate innovation actors to engage in innovation projects” (p. 442). Similarly, in an analysis of how discourses about nanotechnologies affects expectations of them, Cynthia Selin (2007) states “expectations serve a very real, very palatable role in the development of nanotechnology” (p. 215). Just as these authors highlight the importance of studying expectations of other technologies, the same can apply to studying the impact of fiction in creating expectations of VR.

Fictional Representations of Virtual Reality

In order to uncover the influence of fictional representations of VR on consumer expectations, these representations must first be understood. One of the most extensive studies of fictional portrayals of VR is documented by Melanie Chan (2014) in her book *Virtual Reality: Representations in Contemporary Media*. Through analysing various media representations of VR from the 1980s to 1990s, Chan found that “virtual reality was often represented as a wondrous technology” with a particular focus on transcendence (p. 1). To transcend is to “escape from the confines of the physical world” (Biocca, Kim and Levy, 1995, p. 7). In other words, as well as being shown positively, Chan found VR was portrayed as enabling the user to do more than they are physically capable of in the real world. Chan highlights the example of *Avatar* (2009) to demonstrate this transcendence theme. *Avatar*'s protagonist, Jake Sully, is paralysed from the waist down. However, when he enters an alternate world in the virtual body of an avatar, he regains use of his legs. VR has allowed him to transcend the physical limitations of his real body whilst using a virtual avatar.

The common theme of transcendence found in Chan's work is also supported by Kate O'Riordan (2005) when writing about cyberspace. Cyberspace can be understood as the virtual environment experienced when using VR. As Michael Heim (1993) states: “Cyberspace renders a represented or artificial world, a world made up of the information that our systems produce and that we feed back into the system” (p. 79). O'Riordan suggests some films depicting cyberspace have a transcendence theme. For instance, she states that in the novel *Neuromancer*, people access cyberspace by “jacking-in, escaping from the ‘meat’ and ... leaving the body behind” (p. 139). By being able to do more in the virtual world than the real world, VR is shown to have transcendent capabilities. With transcendence being a common theme in VR literature, it is possible this representation has influenced the way consumers perceive real-life VR.

Equally, another common theme that appears in VR fiction which may influence public perception is transportation. VR is often shown as able to transport the user from the real world to the virtual world. For example, Brian Lonsway (2002) states “popular fiction invents myriad mechanisms and devices which provide novel ways to travel *from* reality *into* cyberspace.” (p. 61, italics in original). This sentiment is also shared by Jonathan Taylor

(1997) and Kevin Fisher (2011) amongst others. By showing VR as able to transport the user from one place to another, VR is portrayed as very immersive. Immersion within VR can be understood as the feeling “of being somewhere else, experiencing something else entirely” (Parisi, 2016). In other words, the user feels as if they are *in* another world, rather than viewing a virtual environment in the same way one might view a videogame on a computer monitor. If users of VR devices perceive the technology as immersive, they may well have been influenced by the fictional portrayals of VR as immersive.

Indeed, Chan (2014) argues that “contemporary media representations of virtual reality are incredibly influential since they can shape our attitudes towards the virtual and the real” (p. 2). Combined with Vincent Sacco’s argument above that “the media are considered to dominate the formation of knowledge” (cited in Boda and Szabó, 2011, p. 331) and Dourish and Bell’s statement that “science fiction ... provides context in which new technological developments are understood” (2014, pp. 769-770), it is very likely that fictional representations of VR will have some correlation with consumers’ opinions of the technology today. Furthermore, if fictional VR representations are strongly positive (or, as Chan (2014) states above: “wondrous”), consumers may be disappointed with their actual experiences of VR, just as they have been with the other aforementioned technologies.

Reviewing this literature helps to hypothesise what might be found in the current study as well as to highlight a gap in the field. Both *Futuresource Consulting* (2016) and *Magid* (2017) found VR users were generally impressed with the VR experience and, similarly, findings from *Brandwatch* (2016) and *Touchstone Research* and *Greenlight VR* (Burch, 2016) suggest the reaction to VR is usually positive. These studies provide insight into the public’s views of VR technologies, which will be expanded upon in the current study by measuring *how* these perceptions and expectations were formed rather than simply what they are. Furthermore, other noted works have measured the effects of expectations generated by fiction on the public’s views of science and technology, including forensic science (Baskin and Sommers, 2010; Schweitzer and Saks, 2007), nanotechnology (Nisbet et al, 2002) and ubiquitous computing (Dourish and Bell, 2014). These findings help to hypothesise that fictional portrayals of VR *will* impact consumer expectations and perceptions of VR. Moreover, the current study builds on these works by analysing the relationship between

fiction and expectations for a previously unresearched technology: VR. Lastly, the above literature by Chan (2014), Fisher (2011), Lonsway (2002), O’Riordan (2005) and Taylor (1997) suggests VR in fiction is frequently portrayed in a positive light, as well as being immersive with transcendent capabilities. These strongly positive representations of VR in fiction may cause users to be disappointed with their actual VR experiences, just as viewers of crime shows were found to overestimate forensic science (Baskin and Sommers, 2010; Schweitzer and Saks, 2007). These studies on VR in fiction are also useful for the current project in uncovering whether the themes in fiction translate to the public’s view of VR. For instance, if immersion and transcendence themes appear in the way users describe VR, this may indicate that these fictional works have influenced their opinions of VR. Therefore, the current study is able to build on this literature to examine the effects these fictional representations may have on the general public or consumers.

Method and Sample

After analysing the literature, three research questions were devised for this project. The research questions and hypotheses were as follows:

RQ1: To what extent do fictional representations (films, television shows, books, videogames, and so on) of VR affect consumer expectations of VR?

H1: Based on previous research that has found fictional representations of VR to be very positive (Chan, 2014), as well as studies showing fiction has caused the public to overestimate technology (Baskin and Sommers, 2010; Matthew Nisbet et al, 2002; Schweitzer and Saks, 2007), it is expected that participants will be disappointed with their real-life VR experiences.

RQ2: To what extent do fictional representations of VR affect consumer perceptions of VR?

H2: Common ways in which VR is represented in fiction, such as immersive and transcendent, will emerge in the way respondents describe VR.

RQ3: Do consumer expectations and perceptions of VR differ between participants who have experienced VR in fiction and those who have not?

H3: The two groups will perceive the technology differently and will use it for different applications. Particularly, participants who have not experienced VR in fiction will be more positive about it because fictional representations have not caused them to overestimate the technology.

To address these questions, an 18-item online survey was created and distributed to VR users. The sample was collected by posting the survey in several VR-based social media groups, as well as some general technology groups. This included *Facebook* groups named ‘Virtual Reality Augmented Reality Interest Group’, ‘Virtual Reality Fans’, ‘Latest in Virtual Reality’ and ‘Virtual Reality Discussion’ as well as community pages on *Google Plus* named ‘Technology’, ‘Virtual Reality’ and ‘Virtual Reality and Augmented Reality’. This resulted in 104 responses; reduced to 101 unique responses after duplicates were removed.

The survey included a range of questions about respondents’ experiences of VR in fiction, how they use VR devices and their opinions of the technology. Questions were mostly closed-ended to ensure the resulting data could be easily compared and analysed statistically. To supplement these questions there were some optional free-text items such as space for participants to provide examples of the fictional media in which they had seen representations of VR.

Using an *online* survey was particularly useful for the nature of this project. Though there is the chance of sample bias in online survey distribution due to the portion of the population using the internet (Baltar and Brunet, 2011), this specific research would have been difficult to accomplish without disseminating the survey this way. This is because, as the major VR devices were only released in 2016, VR currently has quite a limited consumer base compared to more established technologies. For example, 6.3 million VR devices were shipped in 2016 (*SuperData* and *Unity*, 2017), compared to 174.8 million tablets such as the *Apple iPad* and *Samsung Galaxy Tab* (*International Data Corporation*, 2017) and 21.1 million smartwatches (Waltzer, 2017). It may therefore have been difficult to find VR users in the local area by handing out paper questionnaires. In this case, perhaps the strongest benefit of using an online survey was that it could be specifically distributed to online groups

likely to have experienced VR. Social media have proved to be extremely useful in this way as their networks provided the ideal space to reach relevant participants since the survey could be posted in VR and technology groups.

Another benefit of using an online survey was that the software offers more features than possible in paper questionnaires (Lumsden, 2006), such as notifying the user if they have ticked too many or not enough options in a question and making it compulsory to answer certain questions (van Gelder et al, 2010). This reduced the chance of errors and ensured all participants responded to certain questions, making results more accurate and comparisons easier and fairer.

Findings and Discussion

Once the survey data had been collected, it was analysed to provide insight for all three research questions. The findings are displayed here in three sections with each mainly focusing on one research question.

Influence of Fiction on Expectations of VR

In order to analyse the potential impact that fictional representations of VR may have on consumers, it was first necessary to uncover how many respondents had seen VR in fiction. The survey found that the vast majority of respondents (86.14 percent) *had* seen examples of VR in fiction. Additionally, when asked how they found out about VR, the largest percentage of respondents stated they first found out about VR through films (29.7 percent). The percentage of respondents who chose the remaining categories were as follows: 12.87 percent for ‘news’ and ‘social media’, 7.92 percent for ‘friends/relatives’ and ‘learnt about it in school/college/university’, 6.93 percent for ‘novels’ and ‘seeing it demoed in a public place’ and 2.97 percent for ‘advertising’. Lastly, 11.88 percent stated they did not know how they found out about VR. With a significant portion of participants (36.63 percent) finding out about VR through either films *or* novels, it is possible these fictional works could have influenced their opinions of VR. Indeed, people’s first impression of something can have a

strong impact upon their perceptions of it (Rabin and Schrag, 1999; Saadé and Otrakji, 2007). Furthermore, most participants found out about VR in a time period before they first experienced it (65.35 percent). For example, the most common time period for respondents to find out about VR was ‘1991-2000’, whereas ‘2016 onwards’ was the most common period for participants to have their first VR experience. This means respondents generally had time to build their expectations and perceptions of VR before actually using it as they knew about VR many years before experiencing it first-hand.

Supporting this is the finding that the largest percentage of participants thought their expectations of VR were based on fiction (46.53 percent). In this question, participants could select multiple answers from ‘virtual reality in fiction’, ‘marketing of the device’, ‘news media’, ‘friends/relatives’ and ‘other’. After ‘virtual reality in fiction’, ‘marketing of the device’ was the most common, chosen by 39.6 percent of participants. This was followed by ‘news media’ (29.7 percent), ‘friends/relatives’ (18.81 percent) and, lastly, ‘other’ with 19.8 percent. Thus, although respondents perceived their expectations to come from a range of sources, VR in fiction was the most common. This further suggests that fictional representations of VR could have influence over what participants expect from real VR devices.

To analyse whether this was the case, respondents were asked to rate how their VR experiences met up to their expectations: from ‘1 – much worse than I expected’, to ‘5 – much better than I expected’. Respondents typically rated their VR experiences as exceeding their expectations, with the average rating being 3.88. Very few participants reported a negative experience of VR: zero participants rated their VR experience as ‘much worse than I expected’ and only five participants rated their VR experience ‘2’. Four was the most common rating (43.56 percent) and, overall, 68.32 percent of respondents rated their VR experience as either better or much better than they expected. Some participants thought their VR experience was neither better nor worse than they expected, with 26.73 percent rating it ‘3’. These findings partly reject the hypothesis for RQ1 that expected VR users to be disappointed by the real VR experience after seeing positive views of the technology in fiction. Instead, the results coincide with *Futuresource Consulting* (2016) and *Magid’s*

(2017) findings that VR users were usually more positive than negative about their VR experiences.

To gain deeper insight, the above experience ratings were measured against what participants thought their expectations were based on (see above) as well as the responses from a question that asked participants what types of fiction they had seen VR in (out of ‘film’, ‘TV’, ‘novels’, ‘comics’, ‘anime’, ‘video games’ and ‘other’). There were few statistically significant correlations between rating and type of fiction (see Table 1). The only major difference was that respondents who had seen examples of VR in videogames were more likely to rate the VR experience highly, with 40 percent of participants rating their experience a ‘2’ having seen VR in videogames compared to 72 percent that rated it ‘5’.

	Types of fiction VR seen in... (%)					
Rating	Film	TV	Novels	Comics	Anime	Video games
2	80.00	40.00	60.00	40.00	40.00	40.00
3	77.78	48.15	44.44	14.81	22.22	44.44
4	84.09	54.55	54.55	34.09	40.91	65.91
5	84.00	56.00	40.00	28.00	28.00	72.00

	Expectations based on... (%)					
Rating	Virtual reality in fiction	Marketing of the device	News media	Friends/relatives views	Other	
2	80.00	20.00	20.00	20.00	20.00	
3	59.26	33.33	18.52	18.52	18.52	
4	40.91	54.55	31.82	13.64	15.91	
5	36.00	24.00	40.00	28.00	28.00	

However, basis of expectations did appear to have an effect on rating of the VR experience. Respondents who rated the VR experience ‘5’ had a variety of views on what these expectations were based on (see Table 2). This ranged from 24 percent for ‘marketing of the device’ to 40 percent for ‘news media’. What is significant is that the lower respondents rated the VR experience, the higher the percentage of respondents thought these expectations were based on ‘virtual reality in fiction’. As shown above, this ranged from 36 percent of participants who rated the VR experience ‘5’, to 80 percent of participants who rated the experience ‘2’. No other basis of expectations had the same trend, which suggests the positive

representations of VR in fiction identified by Chan (2014) may have caused consumers to overestimate VR and thus, have caused consumers to be underwhelmed by real VR experiences. This therefore shows more support for H1 than initially observed.

Influence of Fiction on Perceptions of VR

As well as uncovering how fictional representations can affect consumer *expectations*, this study also measured their effect on *perceptions* of VR. One way this was achieved was by asking participants to select words they would use to describe VR. Participants were provided with a list of 20 terms, as well as the option to choose ‘none of these’ and add their own words in an ‘other’ field. Results showed VR is generally thought of highly, with most negative words being chosen few times. Words such as ‘dangerous’, ‘boring’ and ‘unimportant’ were chosen eight, four and three times respectively. Particularly telling is that the word ‘disappointing’ was only chosen by one participant – further disproving H1 by finding the vast majority of participants (99.01 percent) had not been disappointed by real-life VR. By contrast, even the positive word selected the least (‘high-quality’) was chosen by 26 participants. The only negative words chosen by at least 30 percent of the sample were ‘addictive’ and ‘expensive’. Therefore, the sample showed mostly positive views towards VR, which could have been influenced by those similarly positive representations of VR in fiction, rather than these positive portrayals causing disappointment as initially expected. This finding also shows continuity with *Brandwatch* (2016) and *Touchstone Research* and *Greenlight VR*’s (Burch, 2016) studies that found the overall reaction to VR to be positive.

Support for H2 also appears in the responses for this question. The word ‘immersive’ was chosen to describe VR by 84.16 percent of respondents – the most common of all descriptors. As the idea of immersion often appears in fictional representations of VR, this suggests respondents’ viewing of VR in fiction affects their perceptions of the technology. Nevertheless, immersion is also a strong focus in VR marketing and VR news reports (Kaylee Graves, 2017) so it cannot be certain whether this idea was influenced by fiction or other media. However, another common theme in fiction also appeared – transcendence. The word ‘transcendent’ itself was not originally included in the list of descriptors as it is a word not all respondents may have been familiar with. Therefore, it is unlikely participants would select it to describe the ways they think of VR. To avoid this, the idea of VR as transcendent

was measured using simpler words such as ‘helpful’ and ‘useful’. These words can be seen to relate to this notion when examining Chan’s (2014) example of transcendence in *Avatar* mentioned above. The protagonist’s virtual body is *useful* to him because it *helps* him in being able to walk again. With this in mind, the fact ‘useful’ and ‘helpful’ were chosen by 51.49 percent and 27.72 percent of respondents respectively may relate to VR being transcendent and shows additional support for H2. Although not all participants may have chosen these words in the context of transcendence, the above example indicates this could have been the case for some respondents. As transcendence is a strong theme in portrayals of VR in fiction (Chan, 2014; O’Riordan, 2005), this finding suggests fictional representations of VR do affect perceptions of the technology.

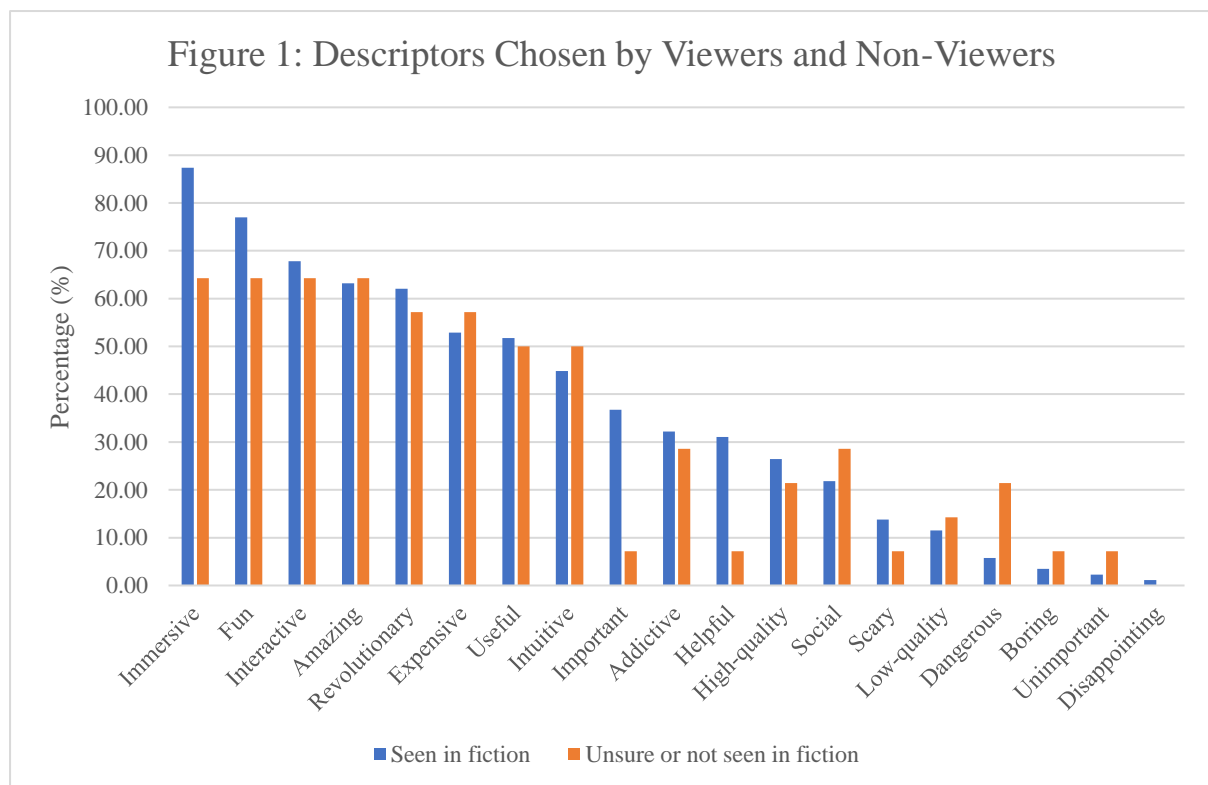
Comparison: Viewers and Non-Viewers of VR in Fiction

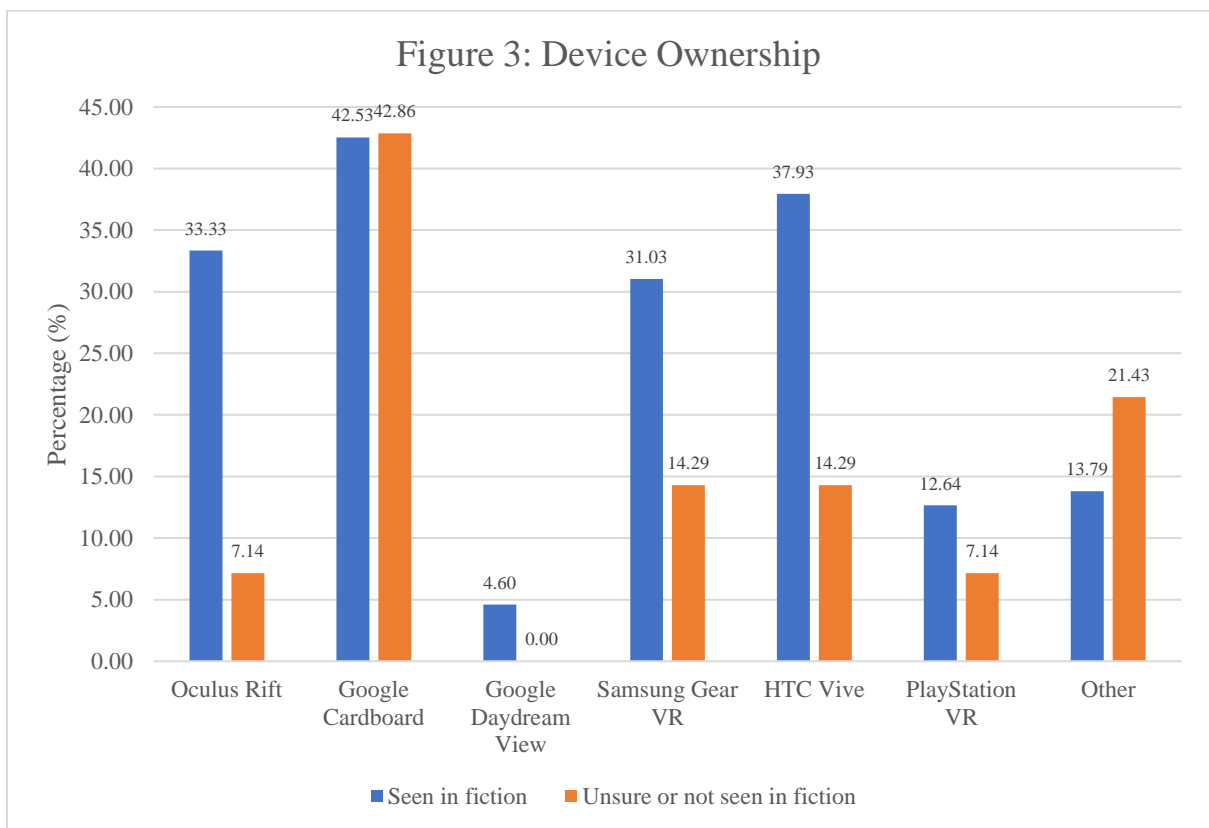
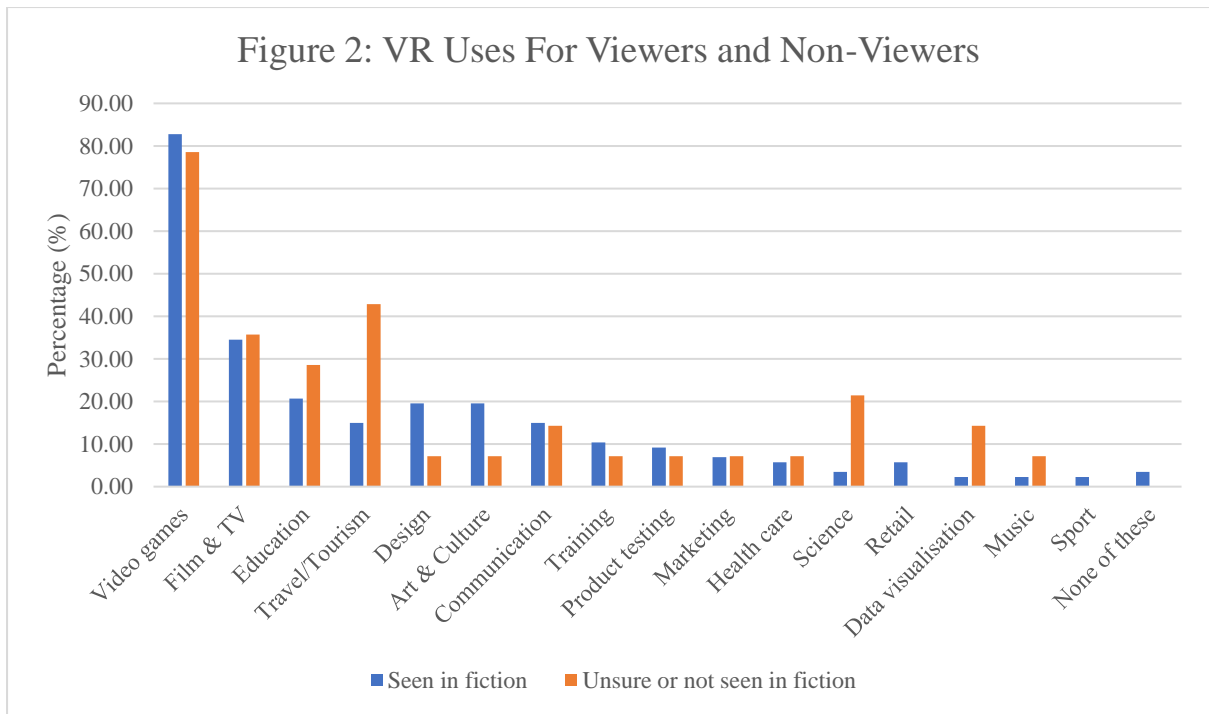
Word choices were further analysed to provide insight into RQ3 by comparing them for participants who had and had not seen VR in fiction. For clarity, from now on the term ‘viewers’ will be used to describe respondents who had seen examples of VR in fiction, and ‘non-viewers’ will be used for participants who either had not seen VR in fiction or were unsure. The majority of descriptors were used by a similar percentage of both viewers and non-viewers, with some notable exceptions (see Figure 1). For example, the term ‘immersive’ was used 23.07 percent more by viewers than non-viewers, further supporting H2. Additionally, non-viewers used the term ‘important’ 29.64 percent less, and ‘helpful’ 23.89 percent less than viewers did. This suggests fictional representations of VR have helped generate positive perceptions of VR, at least in terms of how it is important and helpful, which partly rejects H3. This is enhanced by the finding that non-viewers used the term ‘dangerous’ to describe VR 15.68 percent more than viewers did. Thus, it appears that fictional representations of VR have had the opposite effect than was expected – with viewers perceiving VR more positively than non-viewers.

Additionally, other differences emerged between the two groups. Firstly, rating of the VR experience was measured for both viewers and non-viewers. The difference between average ratings was marginal, with viewers’ average rating being only slightly higher than non-viewers’ (3.93 compared to 3.57). However, a larger percentage of viewers rated their VR

experience as either ‘4’ or ‘5’ (71.26 percent) than non-viewers (50 percent). This, again, partly rejects H1 and H3 as representations in fiction did not cause disappointment.

Secondly, respondents’ VR usage habits were compared for viewers and non-viewers. Regarding application use, there were not many significant differences between the two groups (see Figure 2), with most application uses differing by less than eight percent. However, non-viewers used VR for ‘travel/tourism’ 27.91 percent more and ‘science’ applications 17.98 percent more than viewers did. On the other hand, viewers used both ‘design’ and ‘art & culture’ applications 12.40 percent more than non-viewers did. These findings suggest expectations of VR based on fiction can impact what consumers use VR for; partly supporting H3.





Lastly, viewers and non-viewers differed quite drastically in terms of which VR devices they owned (see Figure 3). For example, just 7.14 percent of non-viewers owned *Oculus Rift*, compared to 33.33 percent of viewers. The only device that was owned by almost the same percentage in both groups was *Google Cardboard* (both approximately 43 percent). This

suggests that fictional representations of VR could affect consumers' purchasing choices as viewers and non-viewers purchased different VR devices. These last two points are particularly relevant to the VR industry as they highlight the potential power media creators have upon the VR market.

Though it is useful to note the difference between those who have experienced VR in fiction and those who have not, it is important to keep in mind that only a small number of participants had either not seen VR in fiction or were unsure (14 in total) so these comparisons may not be completely accurate if applied to a larger sample. However, these results serve as indicators as to the role fictional representations of VR may play in shaping consumer attitudes, expectations and uses of VR devices. Therefore, these findings do, in part, support H3, though further study with a larger number of non-viewers would be needed to clarify this hypothesis.

Conclusion

Using an original survey, this study has found that fictional portrayals of VR can and do affect consumers expectations, perceptions and uses of VR. However, these effects appear to differ from those discovered in relation to other technologies such as forensic science and nanotechnology. Rather than being disappointed by their real-life experiences of VR, most respondents were positive about them, which rejects H1. On the other hand, fictional representations of VR seem to have an impact upon the way respondents perceive the technology. The common ways VR is represented in fiction, such as transcendent (Chan, 2014; O'Riordan, 2005) and immersive (Fisher, 2011; Lonsway, 2002; Taylor, 1997) were also found in the way consumers described VR. Thus, it appears fictional media have influenced consumers' perceptions of VR, supporting H2. Lastly, H3 was supported by finding that those who had seen VR in fiction used different words to describe VR, used different VR applications and owned different VR devices compared to those who had not seen VR in fiction. Though these differences were present, they were not what was expected. Rather than non-viewers being more positive about VR, they were actually more negative than viewers, choosing negative words to describe VR more often than viewers. This

suggests that VR is different to other sciences and technologies such as forensic science and nanotechnology in that the positive portrayals of VR in fiction have not caused consumers to be disappointed with their real-life experiences of VR. Each of these findings highlight the power creators of fiction have in shaping public opinion of technology.

As is the nature of research into a new topic, there are several areas worth exploring further in future projects. Firstly, building upon this study's findings on *consumer* perceptions of VR, it would also be worthwhile examining the effects fiction has upon the creators of VR technology, as Dourish and Bell (2014) did for ubiquitous computing. This would uncover the extent to which fiction can influence industry practices instead of public perceptions alone. Furthermore, as this study shows some indication of the potential effects representations of VR in *fiction* can have on consumer expectations and perceptions of VR, future research could build on this by analysing the influence of other forms of media upon consumer views of VR. This could take the form of comparing the wider area of media representations, including news and social media or by carrying out interviews or focus groups to better understand how consumers form their opinions of VR.

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