Influences of Science Fiction and Fantasy Fandom on Bias

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Influences of Science Fiction and Fantasy Fandom on Bias

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A Thesis presented to the Graduate Faculty
of the College of William and Mary in Candidacy for the Degree of
Master of Arts

Psychology

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ABSTRACT

Science fiction and fantasy have long been lauded for pushing boundaries on what is considered ‘appropriate.’ However, these genres have also been criticized for their tendency to reinforce stereotypical gender roles. Historically, science fiction and fantasy ‘fandom’ (the community of fans) has also underrepresented and ignored women, because female fans are perceived as less interested in the science of science fiction than male fans. Although sci-fi fans are well studied within sociological literature, they remain under-represented in psychological research. Three studies were conducting that examined whether a relationship exists between fandom and implicit and explicit bias. Study 1 explored bias against women in science, using explicit sexism measures and the Gender-Science Implicit Association Test (IAT). Study 2 explored fandom and racism, using explicit racism measures and a Race IAT. Finally, Study 3 explored fandom and sexual orientation bias, using explicit measures as well as a Sexuality IAT. In all three studies, aspects of fandom, such as enjoyment of sci-fi and participation in fan activities were associated with decreased bias. These results suggest that despite the underrepresentation of women in science fiction and fantasy, enjoyment of the genre and participation in fandom culture could serve as a protective factor against bias.
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Influences of Science Fiction and Fantasy Fandom on Bias

In 1970, a group of science fiction, fantasy, and comic book fans started a small convention in southern California (Duffet, 2013). They initially drew a small audience, about 100 attendees, but they successfully generated enough interest and funding to hold another, larger, 3-day event that August. By 1995 the founders had grown to establish themselves as a non-profit organization hosting two prominent conventions: Comic-Con International (previously known as San Diego Comic-Con), and Wondercon Anaheim, which draw audiences from film and media fans of multiple genres. Comic Con in San Diego is the most well known media convention in the country, reporting over 130,000 attendees in recent years (Comic-Con International, 2015).

Those 100 attendees of that first convention in 1970 were dedicated fans committed to finding new outlets for expressing their devotion to science fiction and fantasy (sci-fi). The term ‘fan’ was first used as an abbreviation of the word ‘fanatic’ in 17th century England (Duffet, 2013). Later, journalists in the United States used the word ‘fan’ to describe baseball spectators (Jenkins, 1992). Overtime, the usage of ‘fan’ became much more broad, referring to dedicated consumers of film and music (Duffet, 2013). Currently, within the academic context, a fan is generally defined as an individual who participates in a subculture that is organized around a specific object of study (Hellekson, 2009b). Groups of fans comprise fan communities, or fandoms. Of the many fandoms, the sci-fi community is particularly noteworthy in the United States. Sci-fi fandom in the United States dates back to the 1920s, when magazines such as Amazing
Stories published letters from fans discussing popular sci-fi works (Larbalestier, 2002). The 1930s saw the introduction of some of the first fan conventions, including the international World Con, which continues to this day (Duffet, 2013).

The success of events like World Con and Comic-Con: San Diego demonstrates the pervasiveness of fan culture. However, despite the longevity and popularity of sci-fi fandom, academic study of fans has only truly begun within the last 20 years (Duffet, 2013). In fact, little to no psychological research has been conducted examining sci-fi fans as a population of interest.

As a genre, sci-fi has continued to become more prominent and more popular throughout the past few decades. In 2014, the majority of top grossing domestic films can be classified as sci-fi films (International Movie Database, 2015). There has also been a similar increase in the academic presence of sci-fi as well. Several universities throughout the world, such as the University of Kansas, the University of Liverpool, and Beijing Normal University, now offer degrees in Science Fiction Studies at both the graduate and undergraduate levels. Although the current Science Fiction Studies programs are literary based and primarily study Science Fiction media, psychology is justified in studying the population of fans as well as influences the media might have on attitudes and behavior.

Some psychological research concerning sports fans suggests positive benefits to fandom. For example, Cialdini and colleagues (1976) found that college students tended to use the term ‘we’ more and wear more university affiliated clothing after their sports team experienced a victory, suggesting that
fandom can lead to a phenomenon known as “Basking in Reflected Glory,” which can boost self-esteem. Branscombe and Wann (1991) further found that strong identification with a sports team not only serves as a protective factor against feelings of depression and alienation but also fosters feelings of self-worth and belongingness. Wann and Polk (2007) also found that strong identification with a sports team positively relates to ratings of trustworthiness in others.

The media and cultural studies subfield of sociology has built a fan research field based on sci-fi and fantasy fans. In particular, the popular shows Star Trek (Roddenberry, 1969) and Doctor Who (Lambert, 1963) greatly influenced both the development of fan culture and the academic study of fans.

Much of these studies examine fan practices such as fan fiction or fan videos. Fan fiction, or the practice of writing original stories using characters and settings from already established works, traces its roots to the 1960s (Duffet, 2013). The first instances of fan fiction writing were limited to sci-fi works, but it quickly spread to other forms of media as well (e.g. cop shows) (Duffet, 2013). Today, the advent of the internet allows for large online communities where fans can post their works from any genre and they can view the works of other fans as well. Many fan writers are even able to use fan fiction as a stepping-stone to become published authors in their own right. E.L. James’ popular series 50 Shades of Grey began as a fan fiction work inspired by Stephanie Meyer’s fantasy series Twilight Saga (Morrison, 2012).

Several fan studies scholars have noticed a clear gender divide in popularity of different fan practices. Specifically, making fan videos using footage
from existing shows tends to be a male driven activity while fan fiction writing tends to be a primarily female practice; male fan fiction writers exist, but the majority of writers are female (Duffet, 2013; Haenfler, 2010). Although the internet has allowed for the expansion of fan fiction writing, the practice is not universally accepted within all fandoms (Duffet, 2013). Fan fiction is particularly interesting to fan studies scholars, because the disparity of the practice could be related to the disparity of female fans. The growth of the internet as a resource has unexpectedly led to an increase in scorn directed at typically female cultural products (e.g. works such as Twilight), and fan fiction has come under particular scrutiny as a result (Stabile, 2011).

In spite of mixed feelings about fan fiction, the practice is still quite common. In fact, the prominence of practices such as fan fiction, fan videos, and fan art within fan communities led Henry Jenkins (1992) to describe fandom not only as a distinct cultural group, but also as what he termed a “participatory culture.” As Jenkins describes it, fandom is not just about consuming media. Fans take the works they consume and transform them into cultural activities, whether that be by talking about the works with other fans, by joining a community full of other fans, or by creating some sort of physical product (e.g. a story or a drawing). Consumption naturally leads to production. For fans, the two acts are logically inseparable (Jenkins, 1992).

Like fans, the sci-fi genre itself has been very influential on American culture. The genre is well known for serving as social commentary and pushing boundaries on social norms. Star Trek (Rodenberry, 1969) not only was one of
the first shows to feature a racially diverse cast, but it also caused a huge stir when an episode featured the first interracial kiss on primetime television, between a white male and a black female. The television show *Buffy the Vampire Slayer* (Whedon, 1997) included a plot arc with two female characters falling in love. A later season also featured the first lesbian sex scene in network television.

Sci-fi’s tendencies toward pushing boundaries and causing controversy are particularly noteworthy when the popularity of the genre is taken into consideration. Because the genre has so frequently pushed boundaries on social norms, it is sensible that psychologists pursue research examining the relationship between sci-fi and bias.

Interestingly, despite the seemingly positive relationship between sci-fi and portrayals of minorities, the genre has come under heavy scrutiny for its treatment of women (Kray, 2002; Larbalestier, 2002). Susan Kray (2002) describes in her essay “The Things Women Don’t Say” how female characters are grossly underrepresented within sci-fi works, and when they do show up, they are preliminarily within supporting or background roles (e.g. mothers or love interests). Female protagonists are rare; dynamic, well-developed female characters are even more rare (Kray, 2002). In fact, audiences and critics are so unaccustomed to strong female characters that Joss Whedon, creator of the popular shows *Buffy the Vampire Slayer* (1997) and *Firefly* (2002), routinely gets asked in interviews why he continues to create strong women characters. In
perhaps his most noteworthy response he said, “Why aren’t you asking a hundred other guys why they don’t?” (personal communication, May, 15, 2006).

The dearth of strong female characters in sci-fi has become so severe that a subgenre of feminist sci-fi arose as a reaction against the stereotypic portrayal of women in traditional sci-fi (or lack thereof). However, feminist sci-fi often still falls prey to gender inequality and gender norms (Kray, 2002). Ironically, while focusing on feminine identity, many so-called feminist sci-fi works provide answers to the questions of how women can take charge while still getting dinner on the table; men are typically regarded as a problem to be solved rather than potential allies or equals (Kray, 2002).

Because sci-fi does continue to reinforce stereotypic gender roles, it is possible that the genre could be partially responsible for the disassociation between women and science that seems to be prominent within present day American culture. Even when the genre tries to give a more fair treatment of women, it finds itself strengthening the role of woman as caregiver (Kray, 2002). It is also probable that the negative portrayal of women in sci-fi helps disassociate women from sci-fi itself. This idea that women and men should be kept separate which even shows up in sci-fi promoting itself as feminist could in fact be undermining the very equality it hopes to promote (Larbalestier, 2002).

The disassociation of women and sci-fi may have roots in the works, but it is promoted within the fandom as well. From the beginnings of the fan communities in the 1920s, female expressions of fandom have been criticized or ignored (Larbalestier, 2002). Editors of magazines such as *Amazing Stories*
published more letters from male fans than female fans. When female fan letters were published, more attention was drawn to the fact that the letter was from a female fan; the actual content of the letter was usually overlooked (Larbalestier, 2002). Female fans were treated as separate from male fans, and even their interest was treated as accidental. Six months after starting the landmark magazine, Hugo Gernsback, the editor of Amazing Stories, wrote in an issue that he was surprised at the number of female readers the magazine was getting. He posits that “they must have picked up Amazing Stories out of curiosity more than anything else,” and continues that they would not have done so if the magazine had referenced science in the title (Gernsback, 1926 p. 483).

Female fans face another major hurdle to acceptance in fandom: a problem recently termed “the fake geek girl.” A popular article in Forbes (Brown, 2012) decried a large portion of female fans as merely pretending to be fans in order to gain attention. The author further argued that these so called “fake geek girls” should be ignored. Since that article has been published, female fans have been constantly accused of being fake fans, forcing them to essentially prove themselves as fans. Many of the women accused of being “fake geek girls” are typically considered attractive. This notion only serves the harmful but often unspoken stereotype that attractive women are not and cannot be interested in science or in science fiction; in other words, only ugly girls are nerds (Haenfler, 2010). Again, this relationship has not been studied empirically, and as such it is impossible to hypothesize how pervasive and harmful this stereotype may be.
Although gender disparity within the sci-fi community is understudied, perceived gender disparity in scientific disciplines is well documented in psychological literature. In particular, perceived gender differences in regard to academic competence, especially in STEM (science, technology, engineering, and mathematics) disciplines are well established (Schmader et al., 2004; Nosek et al., 2002; Feist, 2012). STEM fields are typically considered male dominated, and women are thought of as less competent and less capable (Nosek et al., 2002). In the 1990s, when students were asked to draw a scientist, the majority of them (70%) drew men (see Schiebinger, 2007). Although 70% is lower than the historical rate of 92%, this is still evidence that men are more frequently thought of in a scientific context than women.

Indeed, several researchers have documented links between gender and self-image in science and math; women are more likely to see themselves as inferior to men in science (Nosek et al., 2002; Tobin et al., 1995). Even when women do incorporate science into their self-images, they are distancing themselves from it (see Feist, 2012). Feist and colleagues (see Feist, 2012) found in an investigation of 211 college students that men with low and high science self-images demonstrated higher levels of interest in science than women with high levels of science self-image. Furthermore, Shih, Pittinsky, and Ambady (1999) found that when primed with their gender identity rather than their ethnic identity, Asian women performed worse on mathematical tests than controls; when primed with ethnic identity they performed better than controls.
Because sci-fi incorporates many scientific elements in the genre, it can be argued that sci-fi is inherently related to science. As such, the relationship between sci-fi, gender, and bias should not be overlooked. Interest in sci-fi should be considered an alternate form of interest in science, and as such, psychologist should incorporate sci-fi fandom into the bias literature.

Past research has demonstrated that bias in one domain correlates positively with bias in other domains; that is to say, if you are sexist, you are likely to also be racist and/or homophobic (Allport, 1954; Adorno et al., 1950; Butler, 2007; Glick & Fiske, 1996; Swim et al., 1995). It is logical to conclude, then, that if you are less racist and/or homophobic, then you are likely to be less sexist. Because sci-fi is well known as a genre for portraying characters from various racial backgrounds and sexual orientations, it is possible that repeated exposure to sci-fi works could lead fans to be less racist and/or less homophobic.

Research on intergroup contact has found that exposure to minority individuals can reduce prejudice toward minority groups (Allport, 1954; Shook, Hopkins, & Koech, 2015). Pettigrew (2009) posited that intergroup contact can expand perspective and increase appreciation of and openness to outgroups by reducing the emphasis placed on ingroup values and norms. Furthermore, through a process known as secondary transfer, intergroup contact with one minority group can lead to decreased bias toward other, unrelated groups. For instance, Vezzali and Giovannini (2012) found that Italian high school students who reported more self-reported contact with immigrants demonstrated more positive attitudes toward immigrants, homosexuals, and the disabled.
To date, no empirical research has been conducted examining the relationship between sci-fi fandom and bias, especially gender bias. Unpublished data from introductory psychology students support the existence of a stereotype dissociating women and fandom—both self identified fans and non-fans reported that men were more likely than women to be sci-fi and fantasy fans; however, more research is necessary to further establish whether or not this bias exists and how pervasive it truly is.

Because societal norms dictate equality, people may be less likely to endorse explicit bias, particularly gender bias (Schmader et al., 2004). Implicit bias, however, is more subtle, often occurring outside of an individual’s awareness (Greenwald & Banaji, 1995). Research suggests that implicit and explicit bias are separate, but related constructs (see Fazio & Olson, 2003). Research also suggests that individuals are more likely to embrace stereotypes implicitly rather than explicitly (e.g. Rudman & Kilianski, 2000), so it is important for bias research to take both implicit and explicit bias into account. While it appears that correlations between implicit and explicit measures are often low or nonexistent (see Fazio & Olson, 2003), a meta-analysis conducted by Hofmann and colleagues (2005) suggests that implicit measures and explicit self-report are related, and variations in the correlations may result by a variety of other factors (e.g. conceptual correspondence between measures or methodological issues).

The Implicit Associations Test (IAT) developed by Greenwald, McGhee, and Schwartz (1998) was developed to measure implicit associations between constructs. The IAT assesses the strength of participants’ associations between
some target concept and an attribute dimension by measuring the latency in response times when the target concepts are paired with ‘compatible’ and ‘incompatible’ attributes (Fazio & Olson, 2003). This is done through a multistep process. In the first step, an initial discrimination is made between the components of the target category. For example, in their initial race IAT, Greenwald, McGhee, and Schwartz (1998) had participants sort traditionally White and traditionally Black names. The second step introduces the attribute, by itself, as a two-category distinction as well (e.g. pleasant and unpleasant). In the third step, the target category and the attribute dimensions are superimposed and participants must sort both target and attribute stimuli into their respective dimensions. The final step reverses the response assignments (e.g. Black/unpleasant switches to Black/pleasant) and participants must once again sort stimuli into the correct dimension. Figure 1 (taken from Greenwald, McGhee, & Schwartz, 1998) offers a schematic description of the task in the context of a racial IAT.

Because the IAT has been adapted to measure various kinds of implicit bias, including gender and science, it is well suited to the current research, as similar methodology in implicit measures allows for more direct comparison of different types of bias. The IAT is also beneficial in that its design includes the presence of contrasting categories, which adds to the predictive power of the results, as biased attitudes generally involve direct comparison (Nosek, Banaji, & Greenwald, 2002).
The Gender-Science IAT (Nosek et al., 2002) measures the degree to which individuals associate men with science and women with liberal arts. Research using the Gender-Science IAT has demonstrated that more people implicitly associate women with liberal arts and men with science than the opposite (Nosek et al., 2007).

Surprisingly, despite both the tendency of sci-fi to reinforce gender norms and the apparent marginalization of female fans, data from a preliminary study suggest a healthy relationship between sci-fi and bias. Fans recruited from a small sci-fi convention in southeastern Virginia demonstrated less explicit bias toward women than non-fans recruited from intro psych classes (Gomez, 2014). While unexpected, these findings are consistent with the idea of secondary transfer; if sci-fi fandom is related to decreases in other forms of bias (e.g. racial bias and/or sexual orientation bias), then it could also inherently lead to decreased gender bias as well, despite the seemingly hostile environment for women within sci-fi. It is imperative, then, to further study the relationship between fandom and bias to better understand where the potential disconnect between criticisms of the genre, actions of the fan community and the actual relationship with bias.

To get the best understanding of the relationship between fandom and bias, it is not enough to merely examine differences between fans and non-fans. According to Jenkins’ (1992) theory of fandom as a participatory culture, there is more to fandom than merely exposure to sci-fi works. Specifically, enjoying sci-fi, engaging with the material, and participating in activities such as writing fan
fiction, making fan videos, and discussing fandom with other fans are important components of fandom. These aspects of fandom are particularly noteworthy as well because they are not exclusive to fans. That is to say, while fans are more likely to be exposed to sci-fi and to do all of these activities, it is possible that non-fans might still demonstrate some of these practices and behaviors. Therefore, the best way to examine the relationship between fandom and bias is to include elements of fandom as well as measure differences between fans and non-fans.

The current thesis discusses three studies conducted examining the relationship between sci-fi fandom and different forms of both explicit and implicit bias, using the IAT. Study 1 explores fandom and gender bias, including bias toward women in science, in an attempt to replicate the findings of Gomez (2014). After replicating the relationship between fandom and gender bias, Study 2 explores racial bias in accordance with the theory that because sci-fi portrays more racial equality then fans will demonstrate less bias. Finally, Study 3 extends the link between fandom and bias even further by examining fandom and sexual orientation bias. In all three studies we hypothesized that, consistent with intergroup contact theory, increased enjoyment of and exposure to sci-fi would be related to decreased bias. Furthermore, incorporating Jenkin’s (2002) theories of fandom as a participatory culture, we operationalized two distinct components of participation: investment, the degree to which fans develop emotional attachments to works and characters, and participation, or enactment of fan practices such as writing fan fiction, making fan videos, and communicating with
other fans about works and characters. Because of discrepancies within expressions of fandom (e.g. the controversy over fan fiction), as well as perceived gender differences in fandom, we also operationalized two additional components of fandom: identity, which concerns what people think about other fans, and fandom/gender. Because of methodological issues, we were unable to measure these four components of fandom in study 1, so they will only be discussed in studies 2 and 3. However, we hypothesized that identity, investment, and participation would relate to decreased bias.

**Study 1**

Study 1 was developed to replicate and expand upon results from a previous study (Gomez, 2014), which found that fans recruited from a medium sized sci-fi fan convention demonstrated less explicit sexism than non-fans recruited from introductory psychology classes. The results of Gomez (2014) were contradictory to the hypothesized results, but the current study adopted a new theoretical framework, intergroup contact and secondary transfer to contextualize the findings and subsequent new hypotheses. Gomez (2014) also had several factors outside the researchers’ control that led to unusable IAT data; as such, the relationship between fandom and implicit gender-science bias could not be investigated, so the current study aimed to investigate that relationship. Gomez (2014) also included a priming condition where participants were given a sci-fi or a control passage to read. However, the prime had no effect, so it was removed in the current study. Otherwise, Study 1 was a direct replication of the Gomez (2014).
Method

Participants

Two hundred ninety-seven participants (225 fans) were recruited online from Amazon’s Mechanical Turk. Of the participants, 152 were female. The mean age was 36 years. The majority of the sample (79%) were Caucasian.

Measures

Participants were given a link to an online program, where they completed the Gender-Science Implicit Associations Test (Nosek et al., 2002), which is a reaction time (calculated in milliseconds) measure that assesses to what degree people implicitly associate males with science and females with liberal arts.

Participants were presented with gendered words (e.g. man, aunt, woman, grandpa) that they needed to sort into the appropriate gender headings (i.e. male, female). They were also presented with academic words (e.g. Biology, English) that they needed to sort into the appropriate heading (science, liberal arts). In the first set of test trials, the gendered headings were first paired with one academic heading, and participants sorted words from both groups (e.g. male-science, female-liberal arts); male and science words were sorted with one response key, female and liberal arts words were sorted with a different response key. In the second set of test trials, the pairings were switched (e.g. male-liberal arts, female-science), and the participants re-sorted words. The IAT was counterbalanced such that approximately half the participants saw ‘male’ and ‘science’ paired together first and some saw ‘female’ and ‘science’ paired together first. Further descriptions of the timing and procedure are offered in
Nosek et al. (2002). After completing the IAT, participants were directed to a second portion of the study, where they completed the explicit sexism and fandom measures and provided demographic information. Once they finished the survey, participants were debriefed and paid. The entire study took about 25 minutes to complete.

Four measures of explicit sexism were included to assess different aspects of sexism. The Attitudes Toward Women Scale (Spence et al., 1973), was given to measure endorsement of traditional gender roles. This measure includes items such as “Swearing and obscenity are more repulsive in the speech of a woman than a man.” The Modern and Old Fashioned Sexism Scale (Swim et al., 1995) and the Neosexism Scale (Tougas et al., 1995) were included to assess more covert forms of sexism. These questionnaires include items such as “Discrimination against women is no longer a problem in the United States,” and “Women are generally not as smart as men.” Finally, beliefs about math ability were assessed using the three-item Gender Stereotype Endorsement Scale (Schmader et al., 2004). Appendix B contains all four explicit measures. All sexism scales were scored such that higher scores reflect more bias. To measure fandom, first participants were asked to self-identify as either a fan or a non-fan. Because people may exhibit elements of fandom without specifically identifying as a fan, two items were given that measured participants’ enjoyment of sci-fi: “On a scale of 1-10, how much do you enjoy science fiction?” and “On a scale of 1-10 how much do you enjoy fantasy? Participants were also asked to rate how familiar they were/how much of a fan they were of various prominent
sci-fi works. The questionnaire also included measures intended to gauge aspects of fandom in line with Jenkins (1992) conceptions of fandom as a participatory culture; however, because of ambiguous wording, internal consistency was low (i.e. Cronbach’s alpha<.5) and the results were unusable. For that reason, analyses with those measures will not be discussed. Appendix C contains the fan questionnaires used in Study 1.

**Results**

**Implicit Results**

The Gender Science IAT was scored in accordance with Greenwald, Nosek and Banaji (2003). A difference score (d-score) was calculated for each participant. Individual trials with reaction times greater than 10,000 ms were deleted, and participants for whom more than 10% of trials have reaction times shorter than 300 ms were not used. Fewer than 5% of all trials were removed for these reasons. Higher d-scores indicated a stronger association between stereotype consistent categories (e.g., math-men; liberal arts-women) than stereotype inconsistent categories (e.g., math-women; liberal arts-men).

Table 1 contains mean d-scores broken down by both fan status and gender. To determine whether fans and non-fans differed in levels of implicit bias, a 2 (gender) x 2 (fan status) ANOVA was conducted. Overall, fans demonstrated higher d-scores than non-fans, and women displayed higher d-scores than men; however, these differences were not statistically significant, $F(1, 292)=1.13, p=.29$. 
Total Enjoyment was calculated as the combination of self-reported ratings of personal enjoyment of science fiction and fantasy. Total Exposure was quantified as the number of works (from the list) of which a participant expressed familiarity and/or fandom. As a manipulation check, 2x2 ANOVAs were conducted to determine differences between fans and non-fans in levels of Enjoyment and Exposure. A main effect of fan status \( (F(1, 290)=476.03, p<.0001) \) and a main effect of gender \( (F(2, 290)=6.45, p<.05) \) were found on Total Enjoyment, but no interaction effect \( (F(1, 290)=1.46, p=.228) \). As expected, fans reported significantly higher enjoyment \( (M=16.4, SD=2.75) \) than non-fans \( (M=6.9, SD=3.95) \). Men \( (M=15.0, SD=4.66) \) also reported significantly higher levels of enjoyment than women \( (M=13.4, SD=5.07) \). Because age was significantly positively correlated with exposure \( (r=.161, p<.01) \), we included age as a covariate when analyzing Total Exposure. Main effects for fan status \( (F(1,291)=183.87, p<.001) \) and gender \( (F(1,291)=9.14, p<.01) \) were also found on Total Exposure scores, but no interaction. Fans reported significantly higher exposure \( (M=108.3, SD=49.36) \) than non-fans \( (M=28.1, SD=21.11) \). Men \( (M=102.9, SD=75.99) \) also reported significantly higher exposure than women \( (M=76.0, SD=52.54) \).

To determine if Total Exposure and Total Enjoyment were related to IAT score, we calculated correlations were calculated between Total Exposure (partialing out age), Total Enjoyment, and IAT scores among self-identified fans. Both Total Exposure \( (r=-.151, p<.05) \) and Total Enjoyment \( (r=-.152, p<.05) \) were significantly negatively correlated with IAT score, such that greater enjoyment of
sci-fi as well as greater exposure to sci-fi predict less implicit bias against women. See Figures 2 and 3 for graphical depictions of these relationships.

**Explicit Results**

Table 2 contains means for male and female fans and non-fans on all four measures of explicit sexism. A 2 (gender) x 2 (fan status) ANOVA conducted to examine gender differences in sexism revealed a main effect of gender on all four measures of explicit sexism; however there was neither a main effect of fan status nor an interaction between fan status and gender for any of the four measures. Table 3 contains F-values and degrees of freedom for the gender results.

To determine if Total Enjoyment could predict explicit sexism among fans, linear regression analyses were conducted using gender, Total Enjoyment and scores on each of the explicit sexism measures among fans only. A significant interaction was observed between gender and enjoyment on the Neosexism scale, $B=1.41, t(224)=2.51, p=.01$. While there was no significant association between total enjoyment and Neosexism for female fans, $b=-0.08, p=.85$, among male fans greater Total Enjoyment predicted less sexism, $b=-1.49, p<.001$. Figure 4 shows this interaction. Furthermore, this interaction between enjoyment and gender was found in measures of Modern and Old-Fashioned Sexism ($B=1.56, t(220)=4.51, p<.001$), and Attitudes Toward Women ($B=-1.74, t(218)=-3.86, p<.001$), but not Gender Stereotype Endorsement ($B=-0.119, t(220)=-1.48, p=.14$).

**Discussion**
Our implicit data did trend in ways suggesting that fans might hold more implicit bias than non-fans; however, because the differences were not statistically significant, we cannot make that conclusion. The rest of our results suggest that enjoyment of as well as exposure to sci-fi are associated with decreased implicit bias against women in science, and decreased explicit bias against women. While these results are consistent with the initial study and our hypotheses, they are still seemingly contradictory to what might be expected from sociological literature and anecdotal evidence within the fan community implicating that bias toward female fans is rampant in the community (Haenfler, 2010; Larbalestier, 2002; Kray, 2002). There are two potential explanations for this relationship that are consistent with the intergroup contact and secondary transfer theories. First, individuals predisposed to enjoy sci-fi may be more exposed to women and science. This exposure may lead them to more readily associate women with science. Second, exposure to sci-fi and enjoyment of it may lead to less bias in other domains, which carries over into gender bias. Studies two and three sought to determine if that is in fact the case. It is also possible that additional variables, such as Openness to Experience, may have confounded our results (more about this will be discussed in the general discussion).

A couple of limitations in Study 1 need to be addressed. As previously mentioned, some of our measures were unusable because of ambiguous wording. Similarly, while we found a significant relationship between total exposure and bias, because the exposure questionnaires included asking
participants how much of a fan they were of various works, it is possible that enjoyment overlapped with exposure.

Study 2

Study 1 examined the relationship between fandom and gender bias. As previously mentioned, past research has demonstrated that individuals who demonstrate one type of bias are likely to demonstrate other types as well (Butler, 2007). Therefore, it stands to reason that decreased bias in one domain will be related to decreases in other forms of bias as well. Study 2 sought to test this by extending the findings to a different form of bias: racism. Study 2 also addressed the methodological issues that arose in Study 1. Specifically, we restructured our exposure questionnaires and our measures of fandom. The fandom component questions were reworded as to be less ambiguous, and we included questions that measured both investment and participation, as well as questions intended to measure a third component of fandom: identity.

Method

Participants

Two hundred ninety-three participants (216 fans) were recruited from Amazon’s Mechanical Turk to complete a study about attitudes and opinions. Approximately 76% of the sample identified as Caucasian; 8% of participants identified as African American, 7% identified as Hispanic, and 6% identified as Asian. The remaining 3% of participants reported as ‘other’ or chose not to respond.

Measures
The Race IAT (Greenwald, McGhee, & Schwartz, 1998) was used to measure implicit racial bias. Participants also completed measures of explicit racism toward Blacks, including the Attitude Toward Black Scale (ATB; Brigham, 1993) and the Internal and External Motivation to Respond Without Prejudice scales (IMS/EMS; Plant & Devine, 1998). The Internal and External Motives to Respond Without Prejudice scales measure to what extent people avoid making prejudiced responses because they internally value not being prejudiced (IMS) and to what extent they are simply trying to avoid facing negative ramifications for giving prejudiced responses (EMS). Though these concepts are not direct forms of prejudice, they give valuable insight toward participant motives. To measure racism toward a second ethnic group, participants also completed the Modern Ethnicity Bias scale (MEB; adapted from McConahay, 1986), which measures bias toward Hispanics. Participants also completed measures of Social Dominance (SDO; Pratto et al., 1994), which measures belief in strict social hierarchies, and a ‘feelings thermometer’ where they were asked to rate how warm they felt toward various groups. With the exception of the IMS scale, questionnaires were scored such that higher scores reflected more bias.

As previously mentioned, fan questionnaires were modified from the previous study to maintain independence between measures of enjoyment and exposure. Participants were still presented with a list of works and asked if they had seen/read the works. However, instead of being asked how much of a fan they were of each work, participants were instead asked how many parts of the series or how many works by an author they had read. They were also given a
free-response question, in which they were asked to list any series/works they had read/viewed in entirety more than once. Modified questionnaires from this study can be seen in Appendix D, and the racism measures are contained in Appendix E.

**Results**

Total Enjoyment was calculated in the same manner as in Study 1. Total Exposure was calculated by summing the items in the new exposure questionnaire. Three independent raters coded the free-response question within the new exposure questionnaire, and the average rating from the coders was used. Exploratory factor analysis in a pilot study revealed four subscales within the additional fan questionnaires: consistent with our hypothesized components of fandom, we have named them Investment (Cronbach’s alpha=0.87), Identity (Cronbach’s alpha=0.49), Participatory (Cronbach’s alpha=0.81), and Fandom/Gender. Items were scored into those subscales; however, the Fandom/Gender component of fandom was not examined in this study, as gender was not a variable of interest. As a manipulation check, One-way ANOVAs were calculated comparing differences between fans and non-fans on all measures of fandom. As expected, fans scored significantly higher than non-fans on all measures of fandom. The IAT was scored the same as in Study 1. The explicit questionnaires were scored according to their respective guidelines. Table 4 contains mean scores for fans and non-fans on all measures. Because 24% of our sample consisted of non-white participants, we conducted analysis
including and excluding those participants. The data followed the same patterns in both analyses, so the results including the full sample are reported.

Implicit Results

A one-way ANOVA comparing fans and non-fans found no significant differences on d-scores, $F(1,286)=1.33$, $p=.25$. To determine whether or not components of fandom predicted d-scores, linear regression was used, including fans and non-fans. Total Enjoyment ($B=-0.01$, $p=.11$), Total Exposure, with age included as a covariate ($B=-0.004$, $p=.09$), and the Investment component ($B=-0.01$, $p=.07$) were not significant predictors of d-scores. The Participatory component of fandom was found to significantly predict lower d-scores ($B=-0.02$, $p<.05$), as did the Identity component ($B=-.02$, $p=.01$). This means participating more in fan activities and having more positive views about what it means to be a fan independently predicted less bias.

Explicit Results

The Identity component marginally predicted lower scores on the Modern Ethnicity Bias Scale ($B=-0.38$, $p=.057$) and significantly predicted higher scores on the Attitudes Toward Black scale ($B=0.72$, $p<.05$), which is indicative of less bias. Total Enjoyment ($B=0.35$, $p=.21$), the Investment component ($B=0.181$, $p=.34$), and the Participatory component ($B=0.23$, $p=.43$) did not significantly predict scores on the ATB. Similarly, Total Enjoyment ($B=-0.155$, $p=.31$), Investment ($B=-0.111$, $p=.28$), and Participatory ($B=-0.08$, $p=.07$) were not significant predictors of scores on the MEB. However, Total Exposure (with age as a covariate) significantly predicted lower MEB scores ($B=-0.04$, $p<.05$),
indicating less bias toward Hispanics, but Total Exposure ($B=0.12$, $p=.25$) was not a significant predictor of less bias on the ATB.

Because Social Dominance Orientation was found to relate to motives to respond without prejudice, particularly External Motives to Respond Without Prejudice ($r=.272$, $p<.001$), we statistically controlled for it when conducting our analyses of the IMS and EMS variables, by including it as a covariate. Examining fans and non-fans together, when controlling for SDO, Total Enjoyment marginally predicted greater Internal Motivation to Respond Without Prejudice (IMS; $B=0.19$, $p=.06$). Furthermore, Total Enjoyment significantly predicted less External Motivation to Respond Without Prejudice, when keeping SDO constant (EMS; $B=-0.31$, $p<.05$). Figures 5 and 6 demonstrate these relationships.

Keeping SDO constant, the Identity component significantly predicted greater IMS ($B=0.47$, $p<.01$) and lower EMS ($B=-0.51$, $p<.01$). Total Exposure was marginally predicted IMS ($B=0.10$, $p=.051$), but did not predict EMS ($B=-0.05$, $p=.40$). The Participatory component predicted neither IMS ($B=0.11$, $p=.43$) nor EMS ($B=-0.21$, $p=.19$). Finally, the Investment component was not a significant predictor of IMS ($B=0.08$, $p=.40$) or EMS ($B=-0.15$, $p=.16$).

**Discussion**

Study 2 demonstrates that although fans and non-fans may not distinctively differ on measures of racial bias, aspects of fandom, particularly the Identity and Participatory components, are associated with decreased racial bias. These findings are consistent with patterns established in Study 1.
Unfortunately, the internal consistency of the Identity subcomponent within Study 2 is not as high as we would like it to be, so reliability could be a concern within that particular component of fandom. However, because the reliability was calculated across fans and non-fans, and because people can naturally vary in how they define a fan, it is possible that the measure could still be reliable and consistency would be naturally low.

**Study 3**

Studies 1 and 2 established a pattern relating elements of fandom and reduced bias in two domains. Continuing on the assumption that decreases in bias in one domain will associate with decreases in bias in other domains, Study 3 sought to replicate and extend that pattern into the context of a third type of bias, sexual orientation bias.

**Method**

**Participants**

An initial sample of 400 participants was recruited from Amazon’s Mechanical Turk; however, 144 participants had to be removed because they were not from the United States. The final sample consisted of 257 individuals (175 fans, 123 male). Of the participants, approximately 77% identified as exclusively heterosexual, and 73% identified as Caucasian.

**Measures**

To measure implicit heterosexism, participants completed a Sexuality IAT (adapted from Greenwald, McGee & Schwartz, 1998). Explicit heterosexism was
measured using the Attitudes Toward Lesbians and Gays Scale (Herek, 1997; see Appendix F). All other measures were the same as those used in Study 2.

**Results**

Total Enjoyment, Total Exposure, and the IAT were scored in the same way as in the previous studies. The fan questionnaires were scored into the same four subscales (Identity, Investment, Participatory, Fandom/Gender) as in Study 2. As a manipulation check, we conducted one-way ANOVAs to compare fan and non-fan responses to the fan questionnaires. As expected, fans scored significantly higher on all measures of fandom except the Fandom/Gender component, demonstrating that fans exhibit more elements of fandom than non-fans. We did not include the Fandom/Gender component in analyses. Reliability analysis conducted on the Investment (Cronbach’s alpha=0.88), Identity (Cronbach’s alpha=0.67), and Participatory (Cronbach’s alpha=0.82) components of fandom revealed high internal consistency in our measures. Table 5 contains means for fans and non-fans on all measures. The Attitudes Toward Lesbians and Gays scale was scored into two subscales: Attitudes Toward Lesbians (ATL) and Attitudes Toward Gays (ATG). Items were scored such that higher scores indicated more bias.

**Implicit Results**

An ANOVA examining fan status found no significant differences between fans and non-fans in d-scores, $F(1,250)=0.04, p=.85$. Interestingly, an ANOVA revealed gender differences in implicit bias. Overall, men ($M=0.437$, $SD=0.4195$) had significantly higher d-scores than women ($M=0.286$, $SD=0.4444$), suggesting
men hold higher implicit bias toward homosexuality, $F(1,250)=7.68$, $p<.01$. Linear regression conducted on fan measures revealed that Total Exposure significantly predicted lower d-scores, when including age as a covariate ($B=-0.003$, $p<.05$), implying that greater exposure to sci-fi predicts less implicit bias against homosexuals. Similarly, the Identity component marginally predicted lower d-scores ($B=-0.01$, $p=.06$), indicating less bias. Total Enjoyment ($B=-0.01$, $p=.34$), the Investment component ($B=-0.01$, $p=.15$), and the Participatory component ($B=-0.004$, $p=.48$) were not significant predictors of d-scores.

**Explicit Results**

Unlike the implicit measures, no gender differences emerged in either the ATG ($F(1,245)=1.25$, $p=.27$) or the ATL ($F(1,245)=1.75$, $p=.19$) scales. While there were no significant differences between fans and non-fans on the ATG, fans scored significantly lower on the ATL ($M=18.1$, $SD=2.84$) than non-fans ($M=19.0$, $SD=3.07$), $F(1,240)=4.58$, $p<.05$), suggesting that fans hold less explicit bias toward lesbians. Total Enjoyment significantly predicted lower scores on the ATL ($B=-0.09$, $p<.05$) as well as the ATG scale ($B=-0.30$, $p<.01$), indicating that enjoyment of sci-fi predicts less bias against homosexuals. Figures 7 and 8 depict these relationships graphically. Keeping age constant, Total Exposure significantly predicted lower scores on the ATL ($B=-0.02$, $p<.05$) and the ATG ($B=-0.09$, $p<.05$), once again indicating less bias. The Identity component did not significantly predict scores on the ATL ($B=-0.04$, $p=.41$) or the ATG ($B=-0.25$, $p=.09$) The Investment component was also not a significant predictor of ATL scores ($B=-0.003$, $p=.91$) or ATG scores ($B=-0.15$, $p=.10$). Finally, the
Participatory component did not significantly predict ATL ($B=0.07$, $p=0.11$) or ATG ($B=-0.04$, $p=0.78$).

**Discussion**

Like studies 1 and 2, the results of study 3 suggest that aspects of fandom are associated with decreased bias. It is interesting to note that the fans in study 3 had lower exposure scores than the fans in studies 1 and 2. Differences in fans between studies may impact the generalizability of these findings.

**General Discussion**

Although there were few direct differences between fans and non-fans found in levels of bias, with the exception of the Attitudes Toward Lesbians measure in Study 3, all three studies provide support for a relationship between aspects of sci-fi and fantasy fandom and reduced bias against women, blacks, Hispanics, gays, and lesbians. Across all three studies, aspects of fandom were related to lower bias. Even the aspects of fandom that were not significant predictors still trended in the direction of less bias.

Though significant effects were found in every study, it is important to note that there was no single measure of fandom that significantly predicted reduced bias in every measure of every study. Total Exposure and the Identity component of fandom, which measures what people think of fans, seemed to be the most consistent predictors of reduced bias; however, they were not consistent in all measures of all studies.

It is understandable that Exposure and Identity would be the most consistent predictors of less bias. As exposure to sci-fi increases, exposure to
other groups also increases. This result is consistent with intergroup contact
theory, and it demonstrates that mere exposure to diverse individuals can
decrease bias (Pettigrew, 2009). The Identity component discusses how people
view fans. People who are higher on this measure have more accepting views of
fans. It makes sense, then, that more accepting views of fans would correspond
with less bias.

It should also be noted that the effects we did find were weak. However,
the pattern established across all three studies indicates that the relationship
between elements of fandom and decreased bias does exist. It is probable that
natural variability in expressions of fandom accounts for some of the
discrepancies in consistency across studies. It is also probable that variables for
which we did not account, such as personality variables, are also responsible for
the lack of consistency. However, despite the inconsistencies in which
components of fandom predicted less bias, the data do still support the existence
of a relationship between sci-fi and less bias in multiple domains.

The findings of Study 1 are perhaps the most interesting and the most
perplexing. According to the results, among fans greater enjoyment of science
fiction is related to less sexism. However, these findings seemingly contradict
reports of the way female fans are treated within the fan community.

There are several possible reasons this discrepancy could be present.
First, it is possible that marginalization and harassment of female fans is not as
pervasive a problem as it seems to be. Empirical research needs to be
conducted to determine the extent to which female fans are actually being
marginalized as opposed to the extent to which they perceive that they are being marginalized.

However, the anecdotal reports of female fans should not be ignored. It is likely that marginalization is a problem. It is far more likely that other factors are influencing the continuation of demonstrated bias against female fans, despite the relationship between fandom and reduced bias. Nolan and colleagues (2008) have demonstrated that social norms can have a powerful influence on both beliefs and behavior, yet the impact of social norms often goes undetected or overlooked. It is possible that there is an existing social norm that “girls can’t be sci-fi fans” which leads to the creation of a hostile atmosphere for female fans within the fan community. The social norm associating males with fandom could lead fans to act in biased ways because they want to act in accordance with the norm, even if they themselves do not endorse that bias.

Similarly, there are debates within the implicit attitudes literature as to what extent implicit attitudes and actual behavior are related. According to Ajzen and Cote (2008) only strong attitudes are likely to influence specific behaviors. Furthermore, they posit that global attitudes are poor indicators of particular behaviors. It is possible that the IAT measures global attitudes that are not strong enough to impact fan behavior.

Study 1’s findings have important implications for the larger field of research concerning gender gaps in STEM. As researchers continue to examine what impacts girls’ beliefs about their capabilities in STEM fields, it is also important to examine what impacts girls’ beliefs about their capabilities in
engaging in sci-fi fan culture. It is reasonable to infer that the attitude in fandom distancing girls from sci-fi could by extension be helping to contribute distancing girls from science. In a commentary from the editor of the original fan magazine *Amazing Stories*, the editor (a male) attempted to justify excluding letters from female fans by claiming they were less focused on science than male fans (Larbalestier, 2002). By doing so, he created this dichotomy that male fans focus on the science of sci-fi and female fans focus on other things. It is logical to conclude that not only does the social norm deterring girls from sci-fi does exist, but it could be linked to the social norm deterring girls from STEM. Subsequently, by helping girls pursue science interests both in and out of the classroom, researchers can potentially use interest in sci-fi as a way to branch into interest in science. Furthermore, it is also possible that combating the norm deterring girls from sci-fi norm could help combat the STEM norm. Future research should seek to determine to what extent interest in sci-fi and interest in science are linked, and, if applicable, develop ways to use sci-fi to increase interest in science.

These studies also are important to place in the context of bias research at large as well. All three studies provide evidence that sci-fi might serve as a protective factor against bias. Future research should seek to better understand this relationship.

The fact that components of fandom are what seem to be driving the relationship between fandom and bias demonstrate the need of psychologists to understand the structure of fandom and fan culture. Personality psychologists in particular could benefit greatly from understanding individual differences in
fandom. Specifically, future research needs to distinguish whether it is truly fandom that is driving the relationship with bias, or if some other third variables are confounding the results. Research has demonstrated that differences in personality variables such as Openness to Experience, Agreeableness, and Conscientiousness have ramifications for prejudice (Duckitt, 2001; Duckitt & Sibley, 2009). Flynn (2005) also found that participants who scored higher on measures of Openness to Experience in particular demonstrated less prejudice. Data from mass testing have shown that fans are more Open to Experience than non-fans; it is therefore possible that Openness could be driving the relationship between fandom and reduced bias. However, researchers need to further understand the relationship between variables such as Openness to Experience and fandom. The important question becomes are fans naturally more Open, or does being a fan lead someone to become more open?

Because sci-fi fans are an understudied population in psychological research, it is also important for future research to seek to better understand what it means to be a sci-fi and fantasy fan. Psychological research has already included sports’ fans; researchers should relate what they know of sports fandom to sci-fi and media fandom. By doing so, researchers can collaborate with sociologists to gain a better understanding of fandom. Understanding fan cultures enables psychologists to include fans as a distinct cultural group in research, which allows for opportunities in psychological research.

One such avenue for future research involves studying fans as a marginalized population. Within American culture, being a sports fan is socially
acceptable. However, being a media fan, particularly a sci-fi fan, is met with derision and scorn (Duffet, 2013). Several negative stereotypes exist against sci-fi fans, and these stereotypes are perpetuated by mainstream society. A popular skit from the show Saturday Night Live (Michaels, 1975) demonstrated several of those stereotypes. In that sketch, Star Trek fans were portrayed as social misfits who cannot separate reality from fantasy (Jenkins, 1992). Fans are described as eccentric, obsessive, and even crazy (Haenfler, 2010). Jenkins (1992) further adds that fans are also portrayed as psychopathic and antisocial. Male fans are often feminized; female fans are often eroticized (Jenkins, 1992). It is possible that status as a marginalized group could impact the relationship between fandom and reduced bias. Fans might exhibit less bias toward other minority groups because they themselves know what it is like to be marginalized. Future research should examine this potential relationship.

Relatedly, there are also opportunities to incorporate fans into intersectionality research. Numerous researchers have commented on the importance of taking multiple minority identities into account (Babbitt, 2011; B, 2008). Because of the prominence of sci-fi in American culture and the marginalization media fans face, it is important for researchers to begin including fandom as a minority identity and examining experiences of fans belonging to other minority groups (e.g. gender, race, sexual orientation).

Before psychologists can study fans, however, a valid measure of fandom needs to be established. The fan questionnaires developed for these studies are a good first step. The internal consistency of the components of fandom was high.
in studies 2 and 3, but this alone does not establish reliability or validity. More extensive questionnaires and analyses need to be conducted to create a measure of fandom that is both accurate and comprehensive. While the current studies do not have sufficient sample sizes or sufficient representation of non-fans to do so, future studies with more data are well suited to use confirmatory factor analysis to establish a factor structure of fandom. The factor structure, then, can be used to construct measures to study fandom.

Similarly, a few limitations of these studies need to be addressed. First, the validity of measures is a major concern. When a valid measure of fandom is established, these studies should be replicated. Second, in all three studies, the number of fans drastically exceeded the number of non-fans. The unequal representation may have affected results. Future studies should try to obtain more equal distributions of fans and non-fans. Finally, the fans in study 3 scored noticeably lower on some of the measures of fandom than fans in studies 1 and 2. While this may reflect a natural distribution of fandom within fans, it may influence the comparability of the studies.

It is important to note that these studies are initial forays into research using sci-fi fans as a population of interest. Although we found significant effects, our effect sizes are small, most likely because of noise in the data for which we could not account. Consequently, while these studies do provide evidence for a relationship between fandom and bias, they should be seen as a starting point rather than definitive statements. Future research should build upon these
findings, and elaborate upon the nature of the relationship between sci-fi fandom and bias.

**Conclusion**

It is evident that there is some form of relationship between sci-fi fandom and bias, but the findings of these studies are far from conclusive. More research needs to be done to better understand the nature and extent of this relationship. Psychologists also need to work together with sociologists conducting research on fans. If sci-fi fandom does in fact relate to decreased bias, then that knowledge can be used in a myriad of ways, including in interventions against bias.
References


Gomez, M.A. (April, 2014). The Final Frontier: Influences of Science Fiction & Fantasy Fandom on Bias Toward Women in Science. First year psychology department talk, Williamsburg, VA.


### Appendix A: Tables & Figures

Table 1: Mean d-scores on Gender-Science Implicit Association Test in study 1, broken down by Gender and Fan Status.

<table>
<thead>
<tr>
<th></th>
<th>Male M (SD)</th>
<th>Female M (SD)</th>
<th>Total M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fan</td>
<td>0.303 (.3767)</td>
<td>0.376 (.3729)</td>
<td>0.339 (.3750)</td>
</tr>
<tr>
<td>Non-Fan</td>
<td>0.245 (.3692)</td>
<td>0.326 (.3392)</td>
<td>0.294 (.3510)</td>
</tr>
<tr>
<td>Total</td>
<td>0.292 (.3747)</td>
<td>0.362 (.3633)</td>
<td>0.328 (.3693)</td>
</tr>
<tr>
<td></td>
<td>Attitudes Toward Women M (SD)</td>
<td>Neosexism M (SD)</td>
<td>Modern &amp; Old-Fashioned Sexism M (SD)</td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------------------------</td>
<td>------------------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td><strong>Fans</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>38.5 (14.34)</td>
<td>31.9 (11.74)</td>
<td>65.5 (11.41)</td>
</tr>
<tr>
<td>Women</td>
<td>30.9 (13.74)</td>
<td>24.0 (11.79)</td>
<td>72.1 (10.60)</td>
</tr>
<tr>
<td>Total</td>
<td>34.7 (14.57)</td>
<td>28.0 (12.40)</td>
<td>68.7 (11.49)</td>
</tr>
<tr>
<td><strong>Non-Fans</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>40.3 (14.02)</td>
<td>31.4 (11.76)</td>
<td>65.2 (11.59)</td>
</tr>
<tr>
<td>Women</td>
<td>33.3 (13.79)</td>
<td>24.0 (11.15)</td>
<td>72.2 (10.51)</td>
</tr>
<tr>
<td>Total</td>
<td>36.1 (14.19)</td>
<td>27.0 (11.88)</td>
<td>68.8 (11.44)</td>
</tr>
</tbody>
</table>

Table 2: Means and standard deviations for male and female fans and non-fans on all measures of explicit sexism used in study 1.
<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>df</th>
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<tbody>
<tr>
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<tr>
<td>Neosexism</td>
<td>20.25***</td>
<td>1, 268</td>
</tr>
<tr>
<td>M&amp;O-FS</td>
<td>18.04***</td>
<td>1, 268</td>
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<tr>
<td>GSE</td>
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</tbody>
</table>

Table 3: F values for one-way ANOVAs comparing sexism scores across genders. Values with * are significant at the p<.05 level, values with *** are significant at the p<.001 level.
<table>
<thead>
<tr>
<th></th>
<th>Fan M (SD)</th>
<th>Non-Fan (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATB</td>
<td>105.1 (20.59)</td>
<td>103.5 (21.84)</td>
</tr>
<tr>
<td>MEB</td>
<td>269.4 (11.95)</td>
<td>270.2 (10.28)</td>
</tr>
<tr>
<td>d-score</td>
<td>0.327 (.4018)</td>
<td>0.391 (0.4384)</td>
</tr>
<tr>
<td>IMS</td>
<td>35.3 (9.43)</td>
<td>36.0 (9.83)</td>
</tr>
<tr>
<td>EMS</td>
<td>20.0 (11.73)</td>
<td>22.4 (12.26)</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>16.0 (2.83)</td>
<td>8.2 (3.66)</td>
</tr>
<tr>
<td>Exposure</td>
<td>79.6 (36.81)</td>
<td>27.4 (19.09)</td>
</tr>
<tr>
<td>Investment</td>
<td>17.9 (5.36)</td>
<td>7.5 (4.41)</td>
</tr>
<tr>
<td>Participatory</td>
<td>8.6 (4.34)</td>
<td>4.1 (1.73)</td>
</tr>
<tr>
<td>Identity</td>
<td>13.2 (3.44)</td>
<td>11.5 (3.51)</td>
</tr>
</tbody>
</table>

Table 4: Means for fans and non-fans on all measures used in Study 2.
<table>
<thead>
<tr>
<th></th>
<th>Fan M (SD)</th>
<th>Non-Fan M (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>d-score</td>
<td>0.365 (0.4230)</td>
<td>0.352 (0.4713)</td>
</tr>
<tr>
<td>ATL</td>
<td>18.1 (2.84)</td>
<td>19.0 (3.07)</td>
</tr>
<tr>
<td>ATG</td>
<td>15.4 (8.67)</td>
<td>17.6 (9.90)</td>
</tr>
<tr>
<td>Identity</td>
<td>13.3 (3.49)</td>
<td>11.4 (4.42)</td>
</tr>
<tr>
<td>Fandom/Gender</td>
<td>8.8 (2.00)</td>
<td>8.7 (1.80)</td>
</tr>
<tr>
<td>Investment</td>
<td>17.9 (5.47)</td>
<td>9.1 (4.98)</td>
</tr>
<tr>
<td>Participatory</td>
<td>8.9 (4.36)</td>
<td>4.5 (2.74)</td>
</tr>
<tr>
<td>Enjoyment</td>
<td>15.8 (3.05)</td>
<td>7.7 (3.96)</td>
</tr>
<tr>
<td>Exposure</td>
<td>25.6 (17.95)</td>
<td>9.4 (7.86)</td>
</tr>
</tbody>
</table>

Table 5: Fan and non-fan means on all measures used in Study 3.
Figure 1: Schematic description of an Implicit Association Task. The sequences are represented in the columns, and the rows denote the general description, instructions, as well as sample stimuli. (Taken from Greenwald, McGee & Schwartz, 1998 p. 1465).
Figure 2: Scatterplot of correlation between Total Enjoyment and Gender-Science IAT score among fans, with regression line. From study 1.
Figure 3: Scatterplot of correlation between Total Exposure and Gender-Science IAT score among fans, with regression line. From study 1.
Figure 4: Gender-Enjoyment Interaction in Neosexism measure. From study 1.
Figure 5: Scatterplot with Regression line of Total Enjoyment (among fans and non fans) and Internal Motivation to Respond without Prejudice, controlling for Social Dominance Orientation. From study 2.
Figure 6: Scatterplot with Regression line of Total Enjoyment (among fans and non fans) and External Motivation to Respond without Prejudice, controlling for Social Dominance Orientation. From study 2.
Figure 7: Scatterplot with Regression line of Total Enjoyment and Attitudes Toward Lesbians. From study 3.
Figure 8: Scatterplot with Regression line of Total Enjoyment and Attitudes Toward Gays
Appendix B: Fan Questionnaires in Study 1

1. How would you define a 'fan' of something?
2. Do you consider yourself a science fiction and/or fantasy fan? [Yes, No]
3. How long in years have you considered yourself a science fiction and/or fantasy fan? (Please only enter the number of years.)
4. At what age would you say you first became a fan of science fiction and/or fantasy?
5. On a scale of 1-10 (1 being 'do not enjoy at all' and 10 being 'enjoy extremely'), rate how much you enjoy science fiction and/or fantasy:
   Science Fiction (1)
   Fantasy (2)
6. Using the scale below [Never, Less than Once per Month, At Least Once per Month, At Least 2-3 Times per Month, At least once per Week, At Least 2-3 Times per Week, Daily], indicate how often you do the following activities:
   Converse with other fans about science fiction and/or fantasy
   Contribute to fan sites (i.e. a fan wiki or forum) on topics related to science fiction and/or fantasy
   View fan works (i.e. fanfiction, fan videos, fan art) related to science fiction and/or fantasy
   Create fan works (i.e. fanfiction, fan videos, fan art) related to science fiction and/or fantasy
7. How many science fiction/fantasy conventions do you attend in a year (do not include anime conventions)?
   Less than 1 per year
   1-2
   3-4
   5 or more
   I do not attend science fiction/fantasy conventions
8. Approximately how many hours do you spend per week on science fiction/fantasy-related activities?
   Less than 10
   10-20
   20-30
   More than 30
9. Approximately how much money do you spend per year on science fiction/fantasy-related purchases (this includes products, convention registration fees, movie tickets, etc.)
   less than $20
   $20-$50
   $50-$100
   $100-$250
   $250-$500
   More than $500
10. Please rate how much of a fan you consider yourself to be of the following works/authors [I do not enjoy; not a fan, I enjoy but am not a fan, I am a slight fan, I am a moderate fan, I am an extreme fan, I am not familiar with this]:

    Star Wars (original films, all editions) Ray Bradbury
    Star Wars (extended universe) Isaac Asimov
H.G. Wells
A Brave New World
Ursula K. LeGuin (Tales of Earthsea)
Ursula K. LeGuin (other works)
The Wheel of Time Series (Robert Jordan)
Arthur C. Clarke
The Day the Earth Stood Still (1951)
Buffy the Vampire Slayer (and/or Angel)
The Outer Limits (1963 and/or 1995)
The Chronicles of Riddick (films)
The Back to the Future series (films)
The Lord of the Rings (Peter Jackson Films)
The Lord of the Rings (J.R.R. Tolkien Novels)
J.R.R Tolkien (other works)
The Twilight Zone (1959-1964)
The Dragonriders of Pern series (Anne McCaffrey)
Anne McCaffrey (other works)
Logan’s Run (1976)
Jim Butcher (The Dresden Files and/or Codex Alera)
The Dark Tower Series (Stephen King)
Star Trek (Original Series)
Star Trek (TNG and DS9)
Star Trek (films; 2009-present)
Star Trek (other)
Neil Gaiman
Invasion of the Body Snatchers (1956 and/or 1978)
Terry Pratchett

Tamora Pierce
Battlestar Galactica (1978)
Battlestar Galactica (2004)
Babylon 5
Firefly (and Serenity)
Close Encounters of the Third Kind (1977)
Doctor Who (Doctors 1-8)
Doctor Who (Doctors 9-present)
Torchwood
Soylent Green (1973)
The X-Files
Phillip K. Dick
Farscape
Lost in Space (TV Show)
Stargate (any version)
Donnie Darko
Red Dwarf
Supernatural
Blade Runner (any version)
A Song of Ice and Fire Series (George R.R. Martin)
A Hitchhiker’s Guide to the Galaxy (Douglas Adams)
The Terminator Franchise (any/all)
The Planet of the Apes (films)
Frank Herbert
Alien franchise
1984 (George Orwell)
Labyrinth (Jim Henson)
Dark Crystal (Jim Henson)
Stardust (film and/or book)

11. In the space below, you may list up to five science fiction and/or fantasy works you consider yourself to be a fan of that are not previously listed. Please do not list any anime works, video game franchises or superhero works (i.e. Dragonball Z, Halo, or the Avengers). Note: works that were written by one of the previously listed authors will fall under that author (and works that are part of a previously listed group of works will fall under that group). For example, ‘The Color of Magic’ would be included under ‘Terry Pratchett.’
Appendix C: Sexism Questionnaires used in Study 1

Neosexism Scale (Tougas et al., 1995)

1. Discrimination against women in the labor force is no longer a problem in the United States.
2. I consider the present employment system to be unfair to women.
3. Women shouldn’t push themselves where they are not wanted.
4. Women will make more progress by being patient and not pushing too hard for change.
5. It is difficult to work for a female boss.
6. Women’s requests in terms of equality between the sexes are simply exaggerated.
7. Over the past few years, women have gotten more from government than they deserve.
8. Universities are wrong to admit women in costly programs such as medicine, when in fact, a large number will leave their jobs after a few years to raise their children.
9. In order not to appear sexist, many men are inclined to overcompensate women.
10. Due to social pressures, firms frequently have to hire underqualified women.
11. In a fair employment system, men and women would be considered equal.

Attitudes Toward Women Scale (Spence et al., 1973)

1. Swearing and obscenity are more repulsive in the speech of a woman than a man.
2. Under modern economic conditions, with women active outside the home, men should share in household tasks such as washing dishes and doing laundry.
3. It is insulting to women to have the “obey” clause still in the marriage service.
4. A woman should be as free as a man to propose marriage.
5. Women should worry less about their rights and more about becoming good wives and mothers.
6. Women earning as much as their dates should bear equally the expense when they go out together.
7. Women should assume their rightful place in business and all the professions along with men.
8. A woman should not expect to go to exactly the same places or to have quite the same freedom of action as a man.
9. Sons in a family should be given more encouragement to go to college than daughters.
10. It is ridiculous for a woman to run a locomotive and for a man to darn socks.
11. In general, the father should have greater authority than the mother in the bringing up of children.
12. The intellectual leadership of a community should be largely in the hands of men.
13. Economic and social freedom is worth far more to women than the acceptance of the ideal of femininity, which has been set up by men.
14. There are many jobs in which men should be given preference over women in being hired or promoted.
15. Women should be given equal opportunity with men for apprenticeship in the various trades.

Modern and Old-Fashioned Sexism (Swim et al., 1995)
Items with an * are reverse scored.

1. Women are generally not as smart as men.*
2. I would be equally comfortable having a woman as a boss as a man.
3. It is more important to encourage boys than to encourage girls to participate in athletics.*
4. Women are just as capable of thinking logically as men.
5. When both parents are employed and their child gets sick at school, the school should call the mother rather than the father.*
6. Discrimination against women is no longer a problem in the United States.*
7. Women often miss out on good jobs due to sexual discrimination.
8. It is rare to see women treated in a sexist manner on television.*
9. On average, people in our society treat husbands and wives equally.*
10. Society has reached the point where women and men have equal opportunities for achievement.*
11. It is easy to understand the anger of women's groups in America.*
12. It is easy to understand why women's groups are still concerned about societal limitations of women's opportunities.
13. Over the past few years, the government and news media have been showing more concern about the treatment of women than is warranted by women's actual experiences.*

Gender Stereotype Endorsement (Schmader et al., 2004)

1. It is possible that men have more math ability than do women
2. In general, men may be better than women at math.
3. I don’t think that there are any real gender differences in math ability.*
Appendix D: Modified Fan Questionnaires in Studies 2 & 3

1. Do you consider yourself a science fiction and/or fantasy fan? [Yes, No]
2. On a scale of 1-10 (1 being 'do not enjoy at all' and 10 being 'enjoy extremely'), rate how much you enjoy science fiction and/or fantasy:
   - Science Fiction (1)
   - Fantasy (2)
3. Using the scale below [Never, Less than Once per Month, At Least Once per Month, At Least 2-3 Times per Month, At least once per Week, At Least 2-3 Times per Week, Daily], indicate how often you do the following activities:
   - Converse with other fans about science fiction and/or fantasy
   - Contribute to fan sites (i.e. a fan wiki or forum) on topics related to science fiction and/or fantasy
   - View fan works (i.e. fanfiction, fan videos, fan art) related to science fiction and/or fantasy
   - Create fan works (i.e. fanfiction, fan videos, fan art) related to science fiction and/or fantasy
4. On a scale of 1-7 (1 being very unlike me, 7 being very like me), rate how much of the following statements describe you:
   - I consider myself to be very knowledgeable about the works of science fiction/fantasy I enjoy.
   - I often imagine myself in the universe of my favorite works.
   - I often fantasize about my favorite characters.
   - I would get upset if (or when) my favorite characters were to die.
5. On a scale of 1-7 (1 being strongly disagree, 7 being strongly agree), rate how much you agree or disagree with the following statements:
   - Within the fan community, all fans are treated equally.
   - Any person that calls himself/herself a fan is a "real fan".
   - Men are more likely to be science fiction and/or fantasy fans than women.
   - Female fans are more knowledgeable about science fiction and/or fantasy fan communities.
   Creating fan works (i.e. fan fiction, fan videos, fan art) is a legitimate expression of enjoyment of or dedication to a work of science fiction or fantasy.
6. Please indicate how many times have you seen or read the following movies or books [Never, 1, 2, 2-3, 4+]:

   - 1984 (George Orwell)
   - The Hobbit
   - Dune
   - War of the Worlds
   - The Time Machine
   - The Left Hand of Darkness
   - Bladerunner
   - Soylent Green (1973)
   - Stardust (film)
   - Close Encounters of the Third Kind (1977)
7. Please indicate how many parts of these series you have seen or read [None, 1-2, more than 2, All]:

- Star Wars (Original IV-VI)
- Star Wars (Prequels I-III)
- Star Trek (films old and new)
- The Chronicles of Riddick (films)
- The Back to the Future series (films)
- The Lord of the Rings (Peter Jackson films)
- The Lord of the Rings (J.R.R. Tolkien Novels)
- Terminator
- Planet of the Apes (old and new)
- Harry Potter (films)
- Harry Potter (books)
- Alien
- Firefly
- Tales of Earthsea
- Wheel of Time (Robert Jordan)
- Dragonriders of Pern
- The Dark Tower Series (Stephen King)
- A Song of Ice and Fire (George R.R. Martin)
- A Hitchhiker’s Guide to the Galaxy (Douglas Adams)
- The Dresden Files
- Codex Alera
- Battlestar Galactica (1978)

8. Please indicate how many episodes of each TV series you have seen [None; 1-2 episodes; 1-2 seasons (20-40 episodes); Every episode, every season]:

- Buffy the Vampire Slayer and/or Angel
- The Outer Limits (1963 and/or 1995)
- Babylon 5
- Star Trek (original series)
- Star Trek (TNG and DS9)
- Doctor Who (Doctors 1-8)
- Doctor Who (Doctors 9-present)
- Torchwood
- The X-Files
- Farscape
- Lost in Space
- Stargate (all versions)
- Red Dwarf
- Supernatural
- The Twilight Zone (1959-1964)

9. Please indicate how many works you have read by each author [None, 1, 2-3, 4+]:

- Ray Bradbury
- Isaac Asimov
- Arthur C. Clarke
- Neil Gaiman
- Terry Pratchett
- Tamora Pierce
- Phillip K. Dick

10. In the space below, list any of the previously mentioned works you have read or seen multiple times:
Appendix E: Racism Questionnaires in Study 2

Attitudes Toward Blacks (Brigham, 1993)

This questionnaire contains 20 questions concerning your opinions about current social issues. Please respond to each question in terms of the 1-to-7 scale below, where 1 = **strong disagreement** with the statement and 7 = **strong agreement**. Write a number from 1 to 7 that best represents your opinion on the line to the left of each question. Please answer **every question**; do not leave any out. There are no “right” or “wrong” answers; please be as honest and straightforward as you can. All responses will be treated confidentially and analyzed as group data only.

1. I enjoy a funny racial joke, even if some people might find it offensive.
2. If I had a chance to introduce Black visitors to my friends and neighbors, I would be pleased to do so.
3. I would rather not have Blacks live in the same apartment building I live in.
4. Racial integration (of schools, businesses, residences, etc.) has benefited both Whites and Blacks.
5. I probably would feel somewhat self-conscious dancing with a Black in a public place.
6. I think that Black people look more similar to each other than White people do.
7. It would not bother me if my new roommate was Black.
8. Interracial marriage should be discouraged to avoid the “who-am-I?” confusion, which the children feel.
9. If a Black were put in charge of me, I would not mind taking advice and direction from him or her.
10. Generally, Blacks are not as smart as Whites.
11. The federal government should take decisive steps to override the injustices Blacks suffer at the hands of local authorities.
12. It is likely that Blacks will bring violence to neighborhoods when they move in.
13. Black and White people are inherently equal.
14. I get very upset when I hear a White make a prejudicial remark about Blacks.
15. I worry that in the next few years I may be denied my application for a job or a promotion because of preferential treatment given to minority group members.
16. I favor open housing laws that allow more racial integration of neighborhoods.
17. Black people are demanding too much too fast in their push for equal rights.
18. I would not mind it at all if a Black family with about the same income and education as me moved in next door.
19. Whites should support Blacks in their struggle against discrimination and segregation.
20. Some Blacks are so touchy about race that it is difficult to get along with them.

Modern Ethnicity Bias Scale (adapted from McConahay, 1986)

1. Over the past few years, the government and news media have shown more respect to Hispanics than they deserve.
2. It is easy to understand the frustration of Hispanics in America.
3. Discrimination against Hispanics is no longer a problem in the United States.
4. Over the past few years, Hispanics have gotten more economically than they deserve.
5. Hispanics have more influence upon school language issues than they ought to have.
6. Hispanics are getting too demanding in their push for the usage of the Spanish language.
7. Hispanics should not push themselves where they are not wanted.
8. Hispanics are taking advantage of their minority status.
9. Hispanics are taking too many jobs from non-minorities.
10. Migrant farm-workers have been treated poorly in many instances.
11. Hispanics often intentionally exclude non-Spanish speakers in their conversations.
12. Mexicans crossing the U.S. border are often dealt with too harshly.

Internal and External Motives to Respond Without Prejudice Scales (Plant & Devine, 1998)

Internal Subscale
1. I attempt to act in non-prejudiced ways toward Black people because it is personally important to me.
2. According to my personal values, using stereotypes about Black people is OK. (R)
3. I am personally motivated by my beliefs to be non-prejudiced toward Black people.
4. Because of my personal values, I believe that using stereotypes about Black people is wrong.
5. Being non-prejudiced toward Black people is important to my self-concept.

External Subscale
2. I try to hide any negative thoughts about Black people in order to avoid negative reactions from others.
3. If I acted prejudiced toward Black people, I would be concerned that others would be angry with me.
4. I attempt to appear non-prejudiced toward Black people in order to avoid disapproval from others.
5. I try to act non-prejudiced toward Black people because of pressure from others.

Social Dominance Orientation Scale (Pratto et al., 1994)

1. Some groups of people are simply inferior to other groups.
2. In getting what you want, it is sometimes necessary to use force against other groups.
3. It's OK if some groups have more of a chance in life than others.
4. To get ahead in life, it is sometimes necessary to step on other groups.
5. If certain groups stayed in their place, we would have fewer problems.
6. It's probably a good thing that certain groups are at the top and other groups are at the bottom.
7. Inferior groups should stay in their place.
8. Sometimes other groups must be kept in their place.
9. It would be good if groups could be equal.
10. Group equality should be our ideal.
11. All groups should be given an equal chance in life.
12. We should do what we can to equalize conditions for different groups.
13. We should have increased social equality.
14. We would have fewer problems if we treated people more equally.
15. We should strive to make incomes as equal as possible.
16. No one group should dominate in society.
Appendix F: Questionnaires Used in Study 3

Attitudes Toward Lesbians and Gays Scale (Herek, 1997)

Attitudes Toward Gay Men Subscale
1. I think male homosexuals are disgusting.
2. Male homosexuality is a perversion.
3. Male homosexuality is a natural expression of sexuality in men. (Reverse-scored)
4. Sex between two men is just plain wrong.
5. Male homosexuality is merely a different kind of lifestyle that should not be condemned. (Reverse-scored)

Attitudes Toward Lesbians Subscale
6. I think lesbians are disgusting.
7. Female homosexuality is a perversion.
8. Female homosexuality is a natural expression of sexuality in women. (Reverse-scored)
9. Sex between two women is just plain wrong.
10. Female homosexuality is merely a different kind of lifestyle that should not be condemned. (Reverse-scored)