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## **Lieutenant Uhura and the Drench Hypothesis: Diversity and the Representation of STEM Careers**

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### **ABSTRACT**

Women are under-represented in disciplines related to science, technology, engineering and mathematics (STEM). African Americans, Latinos, and Native Americans are also under-represented in these careers. Communication scholars have considered the role that media representations may play in this imbalance, as well as whether or not a shift in how STEM careers are portrayed in the media could help to address it. In this audience-based study, STEM professionals and students interested in STEM-related careers were asked about their lifelong media consumption. Responses from people from under-represented populations are analyzed. Their comments provide insights into the influence of the “symbolic annihilation” of women and minority populations in entertainment media. The interviewees’ responses to specific characters provide support for Greenberg’s drench hypothesis (1988), which suggests that one powerful portrayal can offset the overall dearth of positive characters in the media landscape. In particular, the character of Lieutenant Uhura from the original run of *Star Trek* was frequently noted by female respondents as an influential character.

### **KEYWORDS**

media studies, *Star Trek*, STEM careers, stereotypes, gender

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*What was really great about Star Trek when I was growing up as a little girl is not only did they have Lt. Uhura played by Nichelle Nichols as a technical officer [...] At the same time, they had this crew that was composed of people from all around the world and they were working together to learn more about the universe. So that helped to fuel my whole idea that I could be involved in space exploration as well as in the sciences.*

- NASA Astronaut Mae Jemison (Then & Now, 2005)

When asked to draw or describe a scientist, people indicate a White man with glasses who is either bald or sports wild hair. He wears a white lab coat and works in a basement lab. This stereotype surfaced in studies of public attitudes towards science dating from the classic 1957 study by Margaret Mead and Rhonda Metraux. These characteristics are still part of the popular image of the scientist (Steinke et al., 2007).

The popularity of the stereotypical image of scientists has long fueled concerns about how scientists are portrayed in entertainment media, although the media are not the only source for these stereotypes. The frizzy hair evokes Albert Einstein, while the white lab coat has become a symbol of both cleanliness and neutrality (Frayling, 2005). Nevertheless, critics often have turned to popular entertainment media as the source of this stereotypical image and, indeed, this representation of "the scientist" was established in the earliest days of film. The character of Rotwang in Fritz Lang's *Metropolis* (1926) had the unkempt, white hair and mad eyes of later movie scientists (Frayling, 2005). Although some argue that this physical stereotype of fictional scientists is merely the continuation of a long literary tradition dating back to *Frankenstein*, (e.g. Haynes, 1994), Frank (2002) notes that the cycle of 1950s science fiction films helped to establish the image, at least in the United States.

One of the key reasons for concern about these stereotypes is the notion that entertainment media portrayals may be implicated in the ongoing disparity in the demographics of professions related to science, technology, engineering, and mathematics (STEM). Women account for 51% of the US population (U.S. Census Bureau, 2003) and 27% of college-educated people working in science and engineering positions (National Science Board, 2012). The presence of women varies widely, perhaps predictably, by field. Women are well represented in the biological and medical sciences. In physics and astronomy, about 14% of full-time scientists with a master's degree are women (National Science Foundation, 2011). Underrepresented minorities account for 24% of the total U.S. population, but only 10% of college graduates with jobs in science and engineering professions (National Science Board, 2010). Fewer than 2% of physicists and astronomers are U.S.-born underrepresented minorities (National Science Board, 2012).

## **"MAINSTREAM" MEDIA STEREOTYPES**

Given these statistics, critics have wondered if the stereotypical media representations of scientists discourage young women and minorities from pursuing careers in STEM. The theoretical foundation of such concerns is encapsulated in Gerbner's assertion about television—that it is the mythmaking center of our time, teaching us "what exists, what is important, [and] what is related to what" (Gerbner & Gross, 1976, p. 176). Gerbner's cultivation theory relies on the premise that the images and ideas regularly disseminated through mass media products will become the mainstream view through sheer repetition. Colatrella (2011) articulates this approach with respect to gendered images of science, "Representations of gender, science, and technology in fiction films influence our ideas of who should study, practice, and deploy science and technology" (p. 8).

Although the physical characteristics associated with the stereotypical image still have a connotative meaning of "scientist", and can still be found in media representations, it is important to note that the Hollywood film industry has seen fit to expand the physical portrayals of scientists significantly. Most noticeably, there are now more female scientists in Hollywood film than there were in decades past (Flicker, 2003; Frayling, 2005). Flicker considers the extent to which an increase in representation of female scientists has led to significant changes in how such characters are portrayed. She concludes that modern films may feature "powerful, competent, utterly qualified and feminine women scientists" but that these characters "remain dependent on male characters and in this respect stand in the second row, behind their male colleagues" (2003, p. 316).

On a more positive note, Steinke (2005) analyzed 23 films from 1991-2001 which featured women scientists or women engineers, and found that 18 of the portrayals were realistic and professional (as opposed to mad, clumsy, or antisocial), and that in most cases they were in positions of authority or worked as an equal on a research team. The physical image of the Hollywood scientist—for both men and women—has become much more glamorous (Frank, 2002).

## **EXCEPTIONAL CHARACTERS**

As the diversity of fictional scientists has increased, so too have the opportunities for viewers to find fictional characters with whom they feel they can relate. Media scholars have long recognized that viewers can develop relationships with both real and fictional television personalities, and that these relationships have some features of interpersonal relationships (Horton & Wohl, 1982). While much discussion of these "para-social interactions" has focused on unhealthy, or even obsessive, behavior, Horton and Wohl's original conception of para-social relationships included the idea that media personalities could change the self-perception of viewers for the better, and that the relationship may "constitute an exploration and development of new role possibilities" for the viewer (p. 198).

Bradley Greenberg's classic drench hypothesis (1988) counters the assumptions of cultivation-oriented approaches to media studies. Rather than focusing on the

cumulative "drip-drip-drip" of dominant, or mainstream, portrayals, the drench hypothesis suggests that one exceptionally striking character can have a significant impact on viewer "beliefs, perceptions, or expectations about a group or a role, particularly among younger viewers" (p. 100-101). Using the drench hypothesis as a guide, we would expect that unusually strong and positive portrayals of female or minority scientists would be especially significant to some viewers.

## **METHODS**

This project utilizes interviews and falls within the broad category of audience research or media reception studies. Starting with the uses and gratifications tradition, which considers why individuals select specific media and evaluates what they get out of it (Katz et al, 1974), work in the area of audience research generally is concerned with the audience's experiences of mass media consumption. Cultural-studies approaches consider how individuals or specific audiences use the media to make sense of the world.

This paper is a part of a larger, audience-based study that investigated how 50 STEM professionals and students responded to portrayals of science in entertainment media. The study used a convenience sample; the sample included 38 adults who were in the physical and biological sciences, engineering, and mathematics, as well as 12 minors interested in STEM careers. Initially, the only aim in the sampling procedure was to recruit participants from a wide variety of STEM fields. While this was successful, it soon became clear that without a concentrated effort, the sample was going to have very little diversity in other realms. This was problematic as indices of identity—such as race or ethnicity, gender, and social class—can influence both media consumption and how media content is integrated into day-to-day life.

In order to rectify this situation, a "purposeful sampling" model was employed (Seidman, 1998). The goal of purposeful sampling is to achieve specific types of variation among the subjects. Websites of professional organizations for female and minority scientists and engineers, along with the websites of historically Black colleges and universities, were consulted. Although the diversity remained weak—for instance, there are no participants who identified as Latino—the interviews with the participants who were recruited during this stage were, ultimately, critical for the project as a whole.

This is a small, qualitative study; no statistical analysis can be done. The following quantitative profile of the sample is presented to provide background information only. For this paper, the interviews with the 23 respondents who were female and/or identified as members of an under-represented minority were analyzed. This group comprised 18 females and 5 males. There were 15 adults and 8 minors. The sample included 12 people who identified as African American or as of African descent, along with two people who identified as American Indian. All but two of the 23 participants were from the United States or Canada. Participants are assigned pseudonyms below.

It is important to note that it is not my intention to conflate the issues faced by women in STEM careers with those that affect STEM professionals from underrepresented minority groups; the women from underrepresented minority groups who were interviewed did speak to issues relevant to both discussions.

Another factor taken into consideration during recruitment was the participants' attitudes towards science fiction. At the outset of the project I did not have a sense of how many of the scientists would have anything to say about science fiction media. Even if the viewership for science fiction was a small subpopulation within the scientific community, I wanted to have an opportunity to hear their views, so some individuals who were publically associated with science fiction were recruited. As it turned out, science fiction was quite popular across the entire sample. Of the 23 interviews represented here, 3 were with people who were approached because I knew them to be fans of science fiction (these were all adults). 13 of the remaining 20 interviewees described themselves either as fans of science fiction in general or as fans of a particular movie, television show or book. *Star Trek* was the media product most often mentioned.

After obtaining consent, interviews were conducted in person, over the telephone, or via email. Interviews conducted live ran between twenty minutes to an hour and were audio recorded. After the interview, transcripts or partial transcripts were typed. In the few instances where an email interview was necessary, follow-up questions were sent in a second email. The main purpose of the interviews was to learn about the respondents' media use across life stages, their inspiration for going into STEM careers, and if they felt that there was any relationship between these two realms. This audience-centered approach considers people in STEM professions to be an interpretive community with particular strategies for making sense of the media that are available.

The real-time interviews followed a planned list of questions tailored for the individual participants; the scope was not restricted to the prepared questions. In this "semi-structured" interviewing model, "[r]esearchers listen to each answer and determine the next question based on what was said. Interviewers do not work out three or four questions in advance and ask them regardless of the answers" (Rubin & Rubin, 2005, p. 12). The questions began with the participants' childhood media experiences and continued through their media viewing habits as adolescents, college students, and at present. Respondents were asked about their positive and negative reactions to portrayals of science and scientists in visual media. Along with the discussions of media, participants were asked about when and why they decided to pursue STEM careers.

While books are relevant to this discussion, especially for the science fiction fans, the focus was on popular visual media. Respondents were asked about visual media other than film and television, but the main result of this was a few passing references to comic books. Even when prompted, respondents did not have much to say about their own experiences with portrayals of science in video games or on internet-specific media outlets. While it is true that the user-generated content and narrowcasting of Web 2.0 resources might provide an exciting counterpoint to the

representations of STEM professionals in traditional media, recent research suggests that, so far, digital media such as blogs, wikis, and photo/video sharing sites reproduce the highly gendered representations of STEM often found in television and film (Moreau & Mendick, 2012).

## **THE REAL-WORLD CONTEXT**

Media choices are not the primary source of influence regarding career aspirations. Social class and parental education levels, for instance, are both implicated to a greater extent in whether or not a person might pursue a science-oriented career (Cook et al., 1996).

Respondents indicated that that an effective family support structure for a science career goes beyond simply having a “family” that is “supportive.” Belinda, a biologist of African descent, was careful to mention that her parents always encouraged her in the pursuit of her dreams, even though that encouragement was not what led her to consider a science career:

I’ve always been fascinated by biology [...] No one in my family has pursued science or was particularly interested in it [...]

Only a handful of people in my family actually went on to post-secondary education. If you don’t have those role models in your family, you don’t necessarily start out with the assumption that you can do whatever you want, even though your parents tell you that. Which they did.

Belinda described how, at the start of college, she “wanted to be a doctor. Maybe 90% of us who are good in biology end up going that route.” This woman credited a college professor for helping her to make the discovery that she could be a scientist, yet her comment emphasizes that for some high-achieving students, a science career is never presented as an option. Jared, a male science educator, addressed this issue and described why “doctor” is one of the default career options for many people of color who are academically successful, while “scientist” is not:

[High achievers] go into law, engineering, or medicine. Why? Those are good jobs. Become an engineer, become a lawyer, become a medical doctor. Science, for that subset population--the African American or Hispanic American--is at this point a bizarre luxury that a very few of us will actually go out and try to explore. Why? Environment. The bulk of us don’t have scientists. If we’re lucky and we have people that look like us who are professionals, there will be an African American or Hispanic doctor, which is rare, or lawyer, which is a little more plausible. And engineers, they are out there. But a scientist? Almost non-existent.

Ty, a male, Native American engineer, also talked about the lack of role models available to him. He did not know any Native American scientists or engineers;

furthermore, he encountered few people with college degrees in any field. The above quotes describe a world in which science is "off the radar." This engineer said that he grew up in a culture in which science and technology were not valued, even in the abstract. For him, science and engineering were not ignored or treated as a luxury. Rather, he felt actively discouraged from pursuing these interests by the presence of other cultural priorities that were seen to conflict with the study of science.

I'm American Indian, and a bunch of my friends that I grew up with were American Indian. And going through school we had those stereotypes put on us that we were supposed to be religious, environmental kind of people, and not into the hard sciences or those kind of things. So we actually were discouraged from taking the physics classes and the advanced mathematics classes. So there were definitely some problems growing up that way.

Ty said that, after being exposed to the PBS science show *Nova*, his goal as a young child was to work in the space program. Later, he went to college to study engineering, but the tension about what he was "supposed" to be doing in college continued. While an engineering student, he tried to incorporate other studies that he felt would be more useful in his desire to give back to the Native community. He continued to struggle, pulled towards both engineering and Native studies, until he encountered a professional organization for American Indian scientists and engineers. He said, "That made me realize that it's okay to be American Indian and still want to do science, nerdy kind of things."

Amy, a White female science writer, emphasized that media stereotypes were insignificant compared to the difficulties faced by women entering STEM fields which are dominated by men:

[Did] media images of science ever discourage me? Well, no. It's the reality. It's the real images of science that discouraged me, like everybody thinking you're a dork if you're smart, or if you like science, and everybody thinking that it's stupid to be interested in science. And then being in an astrophysics program. I'm the only girl, you know. It gets to you after a while.

Charlene, an African American, female engineer, also talked about some of the difficulties associated with entering a field that lacks diversity. She felt that the assumptions and stereotypes that people have about science and engineering are not—or at least not solely—the product of media influence.

I guess to me, science fiction—it's not like that's the news or reality. People can write stories how they want to write stories. So I don't really assign any blame. I think everybody has those stereotypes, even other Black people. I get the same thing from them. [...] There is a very strong idea about who scientists are. Everybody shares the same views.

The shared views to which she refers may exist partly a result of media exposure, but she is making the point that the media representations do not exist in a vacuum. She went on to describe how stereotypes regarding engineers—regardless of source—prevented people from being able to accept her position easily:

The way it comes up for me most often is that I get comments, especially when I first started as a professor—and it still happens sometimes—getting shocked looks when I tell people that I am a professor of engineering. Getting comments: “you look too young” or “you look too whatever.” And I’m thinking, I’m a young Black woman. I don’t look like a scientist. I don’t look like an engineer. I don’t look like a professor.

Belinda also described how people are surprised to find that she is a professor in a STEM field:

When I first started my position here, and I don’t know if this is from the media or not, but it was true that a lot of students were shocked that I was a professor and a scientist. I mean that’s all caught up with the fact that at the time there was hardly any women in our department, and I am a woman of color. So they’d never seen anyone who looked like me who was a scientist.

## **PROBLEMS WITH MEDIA**

If family influence, interpersonal relationships, and broader socio-structural factors are so critical in the process of selecting a STEM career, why study the role of media representations at all? It is precisely because of family and interpersonal influences that we must consider the role of media. One common path towards a STEM career is through personal role models. If having personal relationships with adults who are scientists and engineers can suggest to children that such careers are both possible and worthwhile, might children without such real-life mentors gain important exposure to role models through media representations? This possibility suggests it is worthwhile to examine the nature of these representations. When it comes to portrayals of female and minority STEM professionals in entertainment media, two key problems stand out. The first is the lack of such representations in the media landscape. The second is that when such characters are portrayed at all they are often trivialized through the narrative.

### **Lack of Media Representation**

Ty, the Native American engineer who talked about an absence of real-life role models, went on to describe how a lack of fictional characters with whom he could identify affected him:

Any images of Native Americans would have been helpful. American Indians just aren’t represented on TV at all, unless they’re in buckskin



running around with cowboys. Images of Native people in contemporary life doing scientific work would have been amazing.

Given the fact that he did not feel comfortable in his role as a Native engineer until after college, this story emphasizes how just one popular, fictional character could make a powerful difference in how young people see themselves and their place in the world. In particular, interviewees spoke of their disappointment when science fiction movies and television shows fail to provide an inclusive vision of the future. Charlene complained about the 2008 film *City of Ember*.

I guess it was a nuclear war or something. They never say what. But the war was coming to an end and they built this underground city. So all the scientists in the world, all the smart people in the world, came together and built this city. And all of the scientists were all old, White men and women. There were two old White women, and the rest were old White men. And supposedly, this was supposed to be all of the brightest minds in the world. So that bothered me.

Charlene is an avid science fiction and fantasy fan who described reading Ray Bradbury, Ursula LeGuin and Octavia Butler; she sought out diverse representations in novels, films, and cartoons:

What always stood out to me was any time I saw somebody Black doing something even remotely related to science. So with the cartoons, the Batman cartoons, his main mechanic was a Black guy who turned out to be a superhero, in this cartoon anyway. But he was the guy who took care of Batman's car, which was very advanced. He put all of technology in the car...I would just always take note. That's cool, that person is doing that. I'm sure that had an influence on me.

I watched things with equal enjoyment when there weren't Black people doing the science. It's just that when I saw it, it always stuck with me.

Similarly, a number of female respondents described actively looking for representations of women in the sciences and not finding adequate role models. Even when an unusual level of family support was available to a young girl, the absence of media role models was a disappointment. Dawn, a White female aerospace engineer, came from a family with many advantages:

My father was an engineer and my father was also a private pilot. So we had an airplane when I was a little girl, a little four-seater. I was flying since I was two and I could pre-flight an airplane when I was like 7 or 8, something like that. My dad would let me fly it. So I always felt like technology was accessible to me. I would launch rockets in my backyard and I thought that was normal that all kids did that. I had a lot of experiences that were probably outside the box.

However, she went on to remember her frustration at the lack of female role models who were adept with technology.

There were no pictures of me anywhere. There was no one I could really aspire to be in the media, so I really had to just come up with the images myself [...] I would say that there were very, very few—and I don't know if I can think of one—images of a woman being a technical woman that really inspired me.

### **Gender and Trivialization**

As was noted earlier, the diversity of fictional scientists and engineers has improved dramatically over the past twenty years. A girl growing up now can find a character such as *Firefly's* Kaylee (played by Jewel Staite), a sweet chief mechanic on a small spaceship. Yet the character of Kaylee is socially awkward and decidedly unfeminine compared to other women on the ship. She struggles with being both a woman and a grease-covered mechanic. This brings up a common area of tension regarding how female scientists and engineers are portrayed onscreen. For some, the portrayal of STEM women as sexy is an indication that they are being trivialized in the narrative, while others think that it is important to demonstrate to young women that female scientists can have both brains and sex appeal. This tension was described by Kitzinger, Haran, Chimba, and Boyce as a debate about whether the fictional scientists should provide role models that are "aspirational" or "realistic" (2008, p. 21). The discussion below echoes one of the key findings of that study—ultimately, both the hyper-sexualized scientist and the extremely awkward geek can be alienating.

An increase in the diversity of how scientists are portrayed on television is not a victory if the White male characters maintain the bulk of power and authority in the fictional world; for some critics, the sexualization of the female characters can be one indicator of this power relationship. Tuchman (1978) described how, despite the increased visibility of female characters on television, these characters were routinely trivialized. More recent studies have found some similar patterns regarding the portrayal of female scientists specifically (e.g. Steinke, 2005), and some of the study respondents echoed these concerns. Belinda said that the title character in *Bones* was strangely sexualized.

In the case of *Bones* she clearly has no social skills and is basically portrayed as a sexpot computer, right? Which is kind of an odd portrayal [...] They [television scientists] are often uni-dimensional. Like in the case of *Bones*, [she's] just sort of a computer on legs.

Some argue that an overly sexy female scientist is trivialized in the narrative. Similarly, the image of an awkward and geeky scientist is sometimes defended on the grounds that it provides a realistic, attainable model. Amy described being drawn to the media portrayals of nerdy, smart characters:

I knew that I was geeky and nerdy and I had been wearing glasses since I was in 3rd grade, and the characterizations that I saw of--not even women, just people--who wore glasses and were smart (and I knew that I was smart from a very early age too) were either bitter losers or scientists. So that was a very early role model.

Other respondents noted that they did not object to geeky portrayals specifically, but that they found that such representations were associated with flat, undeveloped characters and that this was problematic. Charlene said:

I think the geeky thing is a stereotype because there is truth to it, so I don't think it should be eliminated. But I do think that scientists shouldn't be shown as just one-dimensional, like that's all there is to them. They don't have a family; they don't have a girlfriend or a boyfriend. They're not athletic. They're just one-dimensional, the geek part, and that's it.

Sexualization is not the only way of undermining the authority of female characters; another is by portraying them as overly emotional—a quality in conflict with our general perception of what scientists are supposed to be like. Belinda was irritated by one scene in *Mimic*, a film that she otherwise enjoyed.

I remember the Mira Sorvino movie where she was a research scientist who worked on invertebrates. And they have these giant cockroaches that have evolved, they are pretending to be people and gobbling people up. And at first I started watching that movie and I kind of liked it, because here's a young woman, you know, she seemed like a fairly regular person but she was just really into science and stuff, and I thought that was a nice way to portray a scientist.

But then there's this one scene in the movie where she's investigating these mutant cockroaches and one of them does something that scratches her. And so she crushes it, in a fit of fury. [Laughs.] I thought, are you kidding? You think you've got a new species and it scratches you so you get pissed off and you kill it? It just didn't make any sense at all.

While several women did note that the kinds of narrative elements outlined by Tuchman continue to undermine powerful portrayals of women in STEM careers, others felt that it is important to present female scientists as sexy, appealing characters. Only by having access to such images, they argue, will girls be able to see a science career as something that complements (rather than contradicts) their other goals. Dawn has been active in trying to recruit girls into engineering. She said:

You know, what I would really like is to see them portray women as fun and not geeky in their roles, showing them as people who are

coming up with out-of-the-box ideas [...]. They're sitting at the table and everyone [is] helping to throw out ideas. I would love to see that, to see them really portrayed as normal people with cool clothes. They definitely have to have high heels and cool clothes.

The arguments about whether on-screen scientists should be dorky, well-rounded, or ultra-glamorous could find a resolution in the perspective of Colatrella (2011), who argues in favor of glamorous scientists, but only as one option among many. She suggests that "perhaps the formula linking glamor and expertise is faulty, perhaps scientists are sometimes sexy and sometimes not, and perhaps de-linking these categories as oppositional or related liberates us from categories and stereotypes" (2011, p. 113).

### **STAR TREK AND THE DRENCH HYPOTHESIS**

If there are few representations of female and minority STEM professionals, and if those that do exist are often trivialized as too sexy, too dorky, or otherwise unappealing, the drench hypothesis (Greenberg, 1988) suggests that the rare positive portrayals may take on a special importance to viewers.

In 1965, the secret agent show *I Spy* premiered, showcasing Bill Cosby in the first lead role for an African American actor in a U.S. television drama. In the fall of 1966, *Star Trek's* premiere introduced the groundbreaking character of Lieutenant Uhura. As the Communications Officer on the Starship Enterprise, Uhura provided a vision of a successful, career-oriented woman of African descent previously absent from television fare. As with Cosby's character, the portrayal of Uhura resonated with audiences; the studio was flooded with fan mail for actor Nichelle Nichols.

*Star Trek* arrived in the wake of several key moments of the civil rights movement. In 1965, shortly after the assassination of Malcolm X, television audiences had been stunned by the footage of police violence against civil rights activists in Alabama. The Voting Rights Act was signed into law later that year. The following week, rage over years of discrimination and police brutality in South Central Los Angeles exploded into the violent and destructive Watts Riots. It is in this landscape that *Star Trek* provided an appealing utopian fantasy of a future devoid of racism and unjust violence, a conflict-free counterpoint to the news images of the day. *Star Trek's* Federation was built on a philosophy of equality and diversity.

Unfortunately, such ideals were not reflected at *Star Trek's* studio, Desilu Productions. In her 1994 autobiography, Nichols recounts how poorly she was treated by studio executives, who not only cut Uhura's lines and screen time, but also conspired to hide the volume of fan mail that Nichols' performance was generating. When she learned that the mailroom clerks had been ordered to withhold her mail, Nichols decided to quit. Shortly after reaching this decision, Nichols met Dr. Martin Luther King, Jr. and learned that he was a big fan of the show because, as he said, it was about "[m]en and women of all races going forth in peaceful exploration, living as equals" (p. 164). He argued that Uhura's cultural impact meant that Nichols had a responsibility to stay with the show because "for

the first time, the world sees us as we should be seen, as equals, as intelligent people--as we should be" (pp. 164-165). His input convinced her to continue with the role. While the civil rights movement had made the character of Uhura possible, she had, in turn, become an important figure in the public discourse about equality.

Constance Penley theorized that *Star Trek* has been particularly successful in creating a forum for "citizens to engage in an ongoing conversation about what it means to be human in a technological and multicultural world" and that this success provided the basis for a "symbolic union" between *Trek* and NASA which benefited both the show and the space agency (1997, p. 16-17). This union is seen most dramatically in the relationship between Nichelle Nichols and NASA.

*Star Trek* was cancelled in 1969; the show's demise gave rise to the phenomenon of *Trek* fandom. Starting in the early 1970s, Nichols and other cast members became regular guests at *Star Trek* conventions. In 1975, Nichols and the rest of the cast attended a large convention in Chicago with an unusual featured speaker: Dr. Jesco von Puttkamer, NASA's science director and a fan of the show. Nichols describes being inspired by Puttkamer's presentation about the space program, but her enjoyment was marred by the space agency's poor record of inclusion:

There was no one in the astronaut corps who looked anything like me. There were no women, no Blacks, no Asians, no Latinos. I could not reconcile the term "United States space program" with an endeavor that did not involve anyone except White males. No offense to those fine, brave men, but if we in America tell our children they can be all that they dream, why weren't there women and minority astronauts? Thousands of fans wrote thanking me for Uhura's inspiration. Little Black girls and boys, Latino and Asian children had a legitimate right to share in that dream. Things had to change (Nichols, 1994, pp. 210-211).

Soon, Nichols was an outspoken supporter of space exploration and was appointed to the Board of Directors of the National Space Institute (NSI), a civilian space advocacy organization. Meanwhile, NASA was recruiting astronauts for the new Space Shuttle program. Historically, astronauts were required to have experience as military test pilots, a restriction that excluded women—including female pilots—from the astronaut corps (Lathers, 2010). The new Shuttle program was open to astronauts who were not pilots at all. While this new openness theoretically meant that a wider range of people could become astronauts, women and minorities were not applying to the program. NASA was embarrassed by its inability to recruit astronauts who did not fit the image of the White, male test pilot that had been the norm for astronauts throughout the history of the agency.

Officials at NASA knew of Nichols' activities in space advocacy, and they were well aware that the Uhura character still resonated powerfully with African Americans and women from all backgrounds. In an effort to change, NASA hired Nichols to run an outreach program with the goal of increasing diversity in the pool of potential astronauts. The program was a success—Nichols was responsible for dramatically

increasing the total number of applications as well as the percentage of applications from women and minorities (Nichols, 1994).

When asked about childhood media exposure to images of science and technology, both African American and White women in STEM careers described Uhura as a positive influence. Why was this NASA program a success? Why do both African American and White women in STEM careers single out Uhura as an important influence? Faye, a White, female aerospace engineer, said of Uhura:

I was an instant fan. Lieutenant Uhura was my role model because she was a woman on the bridge, even though they made her wear that silly miniskirt [...]

There were no scientists in my immediate family, [...] [but] when I was a little girl, [my mother] saw me dreaming about the stars and talking about *Star Trek* and talking about how I was going to go live on the moon [...] She always wanted to make me feel like I belonged to the whole planet, not just where I grew up. Part of that—I think that was part of the philosophy of *Star Trek*. We're part of a whole big universe, and we're just this one part.

Although the interviewees were asked if any specific episode or scene featuring Uhura stood out, none of them indicated that this was the case. Rather, it seemed to be her presence as a key member of a diverse crew that made an impression. Norah, an African American female aerospace engineer, said of Uhura, "I do realize that, for me, her just being there, [that there was] such a multicultural team [which] included a Black woman, helped me to envision my being there...The crew was multicultural, international and interworld." This emphasis on Uhura's importance as a member of a diverse crew is also reflected in this paper's opening quote from astronaut (and *Star Trek* fan) Mae Jemison.

As reference to the "silly miniskirt" above suggests, not all elements of Uhura's character were admired by every viewer. Although most responses to Uhura were very positive, some people did feel that they preferred characters with more responsible, technical, or scientific jobs. Norah initially felt disappointed with Uhura's role, but her view changed over time. Again, this shift was related to Uhura's position on the team:

I didn't realize until later that a Communications Officer was such an important role, technically. I used to think of Lt. Uhura as almost the secretarial type on the ship's deck. I guess it was because she didn't get to go out and explore the planet's surface. I did observe that she was a respected member of the team.

Norah indicated that she sought out other role models on the show as well:

Actually, I think I bonded more with Spock since like he I am very logical-minded, intelligent and strong.

Dawn said that she was specifically looking for portrayals of women who were working actively with technology. Although Uhura's job was a technical one, she was never shown taking apart the communications console in order to repair it, and she therefore did not stand out as the most important portrayal for this respondent:

I would say the character that I really identified with—I watched *Speed Racer* a lot, and I thought Trixie was really cool because she wasn't afraid to get in the car and to do things with the car mechanically. She would roll up her sleeves and get right into it [...]

*Star Trek*, for example, the females in that show were the communications officer and the nurse. And I knew I didn't want to be a nurse. So it was hard to find women beyond Trixie in *Speed Racer*, that really, I thought were cool and that sparked my interest into that area.

Nichelle Nichols' autobiography and other first-hand accounts of *Star Trek's* production reveal that Uhura's role was a matter of constant, behind-the-scenes struggle. Nichols and series creator Gene Roddenberry fought to have Uhura's participation expanded, but they often failed. Even with the character cuts, the portrayal has been so important; one cannot help but wonder how much more influential she could have been if the creative team had been given free rein. Later incarnations of *Star Trek* continued the tradition of promoting a multicultural future. Of *Star Trek: The Next Generation* (1987-1994), Charlene said:

I did especially like the fact that Geordi LaForge was the Chief Engineer...and he was Black. He was a Black man and he was basically in charge of running the ship and keeping it working [...] I always thought that *Next Generation* seemed realistic. It always seemed like life, the world, could really be like that one day.

Norah watched *Star Trek: Deep Space Nine* (1993-1999):

Another figure who I really was encouraged/inspired/excited by was the Black Captain on the space station Deep Space Nine. I used to say, 'There is a Brother on the deck.' His character was more realistic in the sense that he was a single parent raising a son and he seemed to understand his faults but kept a cool head.

The factors that keep young people from engaging with science and technology are complex. Gender, race or ethnicity, social class, and access to educational opportunities all play a role, and the intersection of these identity markers creates a set of cultural and social expectations which can discourage—or at the very least fail to encourage—the pursuit of careers in the sciences and engineering. These expectations are deeply embedded in the institutional fabric of culture and are slow to change.

Media can play a critical role in reinforcing such expectations or in providing a counterpoint to them. One powerful image—one Uhura—can create a cultural ripple effect that lasts for decades. Aerospace engineer Faye said, "I have since met Nichelle Nichols at various functions, and I've told her that she was one of my role models growing up...You never know who you're going to influence."

While the story of Nichols' role on *Star Trek* is important to the cultural history of television in general and to an historical analysis of media representations of African Americans in particular, the impact of the Uhura character is due, in part, to the possibilities offered by science fiction as a genre. It has been argued that the speculative nature of science fiction allows writers and film directors to explore hot-button topics with a directness exceeding that of more realistic genres (e.g. Kuhn, 1990). Nor does science fiction merely present an altered vision of the present for examination—through alien or future worlds, science fiction offers "space to interrogate contemporary politics" (Weldes, 2003, p. 11). *Star Trek* creator Gene Roddenberry understood this feature of science fiction and worked to use the show as a way to promote his vision for humanity's peaceful and integrated future:

Intolerance in the 23rd century? Improbable! If man survives that long, he will have learned...that differences in ideas and attitudes are a delight, part of life's exciting variety, not something to fear. It's a manifestation of the greatness that God, or whatever it is, gave us. This is infinite variation and delight; this is part of the optimism we built into *Star Trek* (quoted in Bernardi, 1997, p. 214).

### **Young Scientists: The Next Generation**

Based on the grim statistics of lack of participation of underrepresented groups in the sciences, we might argue that the egalitarian and upbeat messages of *Star Trek* prepared a generation for a world of equality and social justice which never came.

And yet, there have been real-world changes. Characterizations such as that of Uhura are no longer quite so rare. Ironically, the prevalence of African American characters with scientific or technical jobs may mean that young viewers have the freedom to relate to a wider range of characters, utilizing aspects of identity other than race or ethnicity. During the course of this study, I spoke with four African-American teenagers who were interested in STEM careers. None of them indicated any particular preference for African American characters in television shows or movies. One possible explanation for this is that these young people preferred not to discuss race or issues related to racism with a White researcher. Since this may well be the case, I am reluctant to read too much into the fact that they mentioned admiring or aspiring to be like White characters. Still, their enthusiasm for the characters that they did discuss indicates that, at least in part, the character appeal was based on factors other than racial/ethnic identification.

Much has been made of the role of forensic crime shows such as *CSI* in inspiring young people to pursue careers in forensic sciences, and these shows were popular with the youth respondents in this study. As a group, these shows feature a diverse



array of STEM professionals. Unfortunately, the portrayals of female scientists often include the pattern of trivialization through sexualization, as discussed above, or, in the case of scientist Abby Sciuto (played by Pauley Perrette) from *NCIS*, infantilization (Bergman, 2012). Still, these portrayals can have appeal. The shows can foster interest in science careers, through both character identification and the drama of fighting crime with science.

Monica, a sixteen-year-old, African American girl, explained how *CSI* and other crime shows inspired her to want to become a forensic scientist. In this quote, she refers to the *CSI* character Gil Grissom, a middle-aged White man played by William Petersen.

I just fell in love with the whole crime investigations thing, and forensics. The little stuff, like how a piece of hair could change a whole case. I started watching *Bones*, *Law and Order* and I couldn't decide whether I wanted to be a police detective. But forensics—I kind of just got caught up in it. [...] Grissom. I wanted to be like Grissom, and I already liked chemistry, stuff like that, like science was not really a problem in school. Then seeing a more fun side to science made me want to do forensics.

Monica emphasized that she wanted to model her career on Grissom from *CSI*, but her greatest admiration for a character was for Olivia Benson (played by Mariska Hargitay) a White, female police detective on *Law and Order: Special Victims Unit*.

If I could be anybody in the world, I'd be Olivia, off *Law and Order*. That's because she's passionate but she does her job really, really well. Really well. So, it's like an inspiration to me.

Although she wants to become a forensic scientist and help in the investigation of crime, she does not say that she wants to be Medical Examiner Melinda Warner, an African American character played by Tamara Tunie, also on *Law and Order: SVU*. Warner is a secondary character, but a prominent one featured in the show's opening titles. Her scientific expertise provides regular plot points; like Uhura, she is a respected member of the team. The portrayal of Warner is not marked by any of the "trivializing" themes noted in Bergman's (2012) analysis of crime fiction, such as being treated as a sex object or a child in need of rescuing. She is a skilled professional.

The *Law and Order* franchise has remained remarkably popular over the past twenty years, and Tunie's character has been a memorable one—she has been featured as the organizing theme for the USA Network's regular *Law and Order: SVU* marathons. Yet even strong characters such as Dr. Melinda Warner are not household names in the same way that Lieutenant Uhura was. Why not? Another viewer's reaction to Uhura may help to illuminate the difference. Whoopi Goldberg had regular appearances on *Star Trek: The Next Generation* as Guinan, the wise alien bartender. In describing why she begged Gene Roddenberry for the opportunity to be on the show, Goldberg recounted how important Uhura had been

to her when she saw the original *Star Trek* as a child. "I saw this show and screamed throughout the house—'Mamma! Mamma! Come quick! Come quick! There's a Black lady on TV and she ain't no maid!'"(quoted in Sheridan, 2006).

The fact is that such portrayals are more commonplace now. *Law and Order's* Dr. Warner is not an aberration; no young person would be astonished by her presence on screen. Recalling again Greenberg's drench hypothesis, it makes sense that as such representations became more frequent, and thus less of a counterpoint to the "mainstream" culture, they would make less of a "splash." This does not mean that diverse media portrayals are no longer important—quite the opposite. It has been the exclusive privilege of White men to be able to assume that there was a place for them in the fields of science and technology. In a world where everyone had that privilege, diverse representations of scientists would be the norm. I do not mean to suggest that we have reached such a point—the adult respondents in this study were clear that even with the new science-oriented television shows, they still wanted to see more representations of women and African American scientists. Furthermore, it must be noted that the gains in diversity of media images may not hold true for other groups such as Latinos or Native Americans. Nevertheless, by helping to chip away at the stereotypes of scientists, characters such as Melinda Warner are valuable. Even if mere inclusiveness may no longer be enough to generate an Uhura-scale "drenching" across the population, a diverse collection of characters in our media landscape can provide young people with a variety of role models.

## **CONCLUSION**

While many changes have taken place since the initial airing of *Star Trek*, STEM fields continue to struggle with issues of diversity. When people from particular groups have been systematically excluded from whole fields, it can be especially crucial for them to have role models. Family or other personal relationships are, perhaps, the most powerful source of role models, where available. When these are lacking, media representations can fill the void. Young people—even young people who *do* have family support and role models—often seek out characters that they admire who "look like them."

Conversely, respondents complained about movies and television shows which fail to include scientists or engineers who are women and/or who represent various minority groups. While the interviewees had some differences regarding their favorite portrayals, overall they wanted to see more well-rounded, successful scientists from diverse backgrounds, in the hope that such portrayals would lead to greater diversity in the STEM disciplines.

Dawn said, "I think there's so many societal issues that we need to solve today that require good problem-solvers...[E]liminating, right off the bat, women and underrepresented minorities from that pool is just such a travesty." In other words, the reason that it is important to increase diversity in the sciences is the same reason that it is important for the sciences to exist in the first place—to expand human knowledge and achievement.

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