The Future of Gender and IT Research: Embracing Intersectionality

Eileen M. Trauth
The Pennsylvania State University
330C IST Building
University Park, PA 16802 USA
1.814.865.6457
etrauth@ist.psu.edu

Curtis Cain
The Pennsylvania State University
307G IST Building
University Park, PA 16802 USA
1.814.865.8952
caincc@psu.edu

K.D. Joshi
Washington State University
440B Todd Building
Pullman, WA 99164 USA
1.509.335.5722
joshi@wsu.edu

Lynette Kvasny
The Pennsylvania State University
329C IST Building
University Park, PA 16802 USA
1.814.865.6458
lkvasny@ist.psu.edu

Kayla Booth
The Pennsylvania State University
307G IST Building
University Park, PA 16802 USA 1.814.865.8952
kmb5445@ist.psu.edu

Submitted to ACM SIGMIS Computers and People Research Conference 2012
November 3, 2011
Abstract

In this paper we argue that focusing on gender or ethnicity, alone, is insufficient to explain the under-representation of women and minorities in IT careers. Rather, we believe that stratifying the population in a more nuanced manner, such as by gender within ethnic group, will provide greater insights into the phenomenon of under representation. Hence, this research approaches the topic of gender and the IT profession from the perspective of intersectionality of gender and ethnicity. The results show that contemporary college students reflect entrenched gender stereotypes in the IT field. Further, within-gender analysis reveals variation in gender stereotyping by gender-ethnic group. White females and minority males (i.e. Black and Hispanic males) exhibited the most masculine stereotyping of IT skills. In contrast, White males and minority females (i.e. Black and Hispanic females) exhibited the fewest. Three themes emerge from this research. First, the skills that will be increasingly important in the future in distinguishing equivalently credentialed IT professionals were not absorbed into the “masculine” category. Second, hegemonic masculine traits appear to be deeply entrenched in the next generation of IT professionals. Third, when peering more deeply into the gender stereotyping of skills by respondent demographics, what emerges is a pattern that emphasizes the critical role of intersectionality in gender analyses of the IT profession.

Categories and Subject Descriptors

General Terms
Human Factors, Management

Keywords
Career choice, ethnicity, gender, gender stereotypes, individual differences, IT professional, IT skills, IT workforce, race
Introduction

For half a century there has been an ACM-sponsored conference devoted to the topic of computer personnel research, which has presented work related to factors affecting the supply of information technology (IT) professionals. More recently, the topic of the gender imbalance has been introduced as a topic of examination. As Table 1, below shows, 43 papers on the topic of gender and the IT workforce have been presented over the past 50 years. The papers listed below are those in which gender is a central theme.

Table 1. Gender Research at CPR Conference

<table>
<thead>
<tr>
<th>Reference</th>
<th>Topic</th>
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<tbody>
<tr>
<td>Armstrong et al. (2011)</td>
<td>Investigates challenges and barriers women in the IT field experience within the workplace.</td>
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<tr>
<td>Trauth et al. (2010a)</td>
<td>Current research in the SIGMIS community on women’s participation in the IT workforce.</td>
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<tr>
<td>Clayton et al. (2009)</td>
<td>Effect of gender stereotypes on girls’ participation in ICT work and education.</td>
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<tr>
<td>Berkelaar et al. (2008)</td>
<td>Effect of messages on recruitment and retention of women in computer science programs.</td>
</tr>
<tr>
<td>Buche (2008)</td>
<td>Gender influences on IT professional’s work identity.</td>
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<tr>
<td>Guzman et al. (2007)</td>
<td>Cross-cultural examination of IT field / career cultures and occupational commitment.</td>
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<tr>
<td>Quesenberry and Trauth (2007)</td>
<td>Women’s career anchors within the IT workforce.</td>
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<tr>
<td>Trauth et al. (2006)</td>
<td>Cross-cultural influences on women’s experience in the IT field.</td>
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<tr>
<td>Quesenberry (2006)</td>
<td>Interaction of organizational culture, career anchors, career satisfaction and retention of women in IT.</td>
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<tr>
<td>Authors</td>
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<tr>
<td>Gallivan et al.</td>
<td>Investigates the underrepresentation of women and minorities within the IT workforce, focusing on attracting and retaining both populations.</td>
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<tr>
<td>Kvasny et al.</td>
<td>Kenyan women in university ICT programs, and seeking, and maintaining employment.</td>
</tr>
<tr>
<td>Trauth et al.</td>
<td>Effect of environmental context on underrepresentation of women within the IT workforce</td>
</tr>
<tr>
<td>Joshi and Kuhn</td>
<td>Relationship of masculine perception of characteristics, skills, and roles in IT workforce to retention of women in IT field.</td>
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<tr>
<td>Myers et al.</td>
<td>Opportunities and retention of women in the information security and assurance part of the IT field.</td>
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<tr>
<td>Roldan et al.</td>
<td>Effect of organizational context on retention and promotion of women within the IT field.</td>
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<td>Trauth et al.</td>
<td>Theory based on the individual differences of women to explain their underrepresentation within the IT field.</td>
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<td>Ahuja et al.</td>
<td>Factors contributing to women’s success within the IT field from examination of 5 IT degree-awarding institutions.</td>
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<tr>
<td>Tapia and Kvasny</td>
<td>Examines retention strategies for women and minorities in the IT field.</td>
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<tr>
<td>Joshi et al.</td>
<td>Gendered perceptions held by potential IS professionals.</td>
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<tr>
<td>Gallivan</td>
<td>Adaptation of men and women in IT field to technological innovations in the workplace.</td>
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<tr>
<td>Cukier</td>
<td>Effect of institutional definitions of an IT professional in creation of barriers to women within the IT workforce.</td>
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<tr>
<td>Carayon et al.</td>
<td>Role of satisfaction and job strain to explain underrepresentation and turnover rate of women within the IT field.</td>
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<tr>
<td>Tapia</td>
<td>Behaviors of male employees within software development companies that created a hostile work environment for women during the dot com era.</td>
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<tr>
<td>Nielsen et al.</td>
<td>How women discuss dualisms and contradictions that reinforce preconceived notions about the IT field.</td>
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<tr>
<td>Kvasny</td>
<td>Impact of race, class, and gender on perceptions of IT and need for further research on intersectionality in diverse populations.</td>
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<tr>
<td>Newton et al.</td>
<td>How social gender constructs affect IT job selections for systems developers.</td>
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<tr>
<td>Davis and Kuhn</td>
<td>Investigation of long term plans of men and women to remain in IT careers.</td>
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<td>Authors</td>
<td>Summary</td>
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<tr>
<td>Katz et al. (2003)</td>
<td>Performance, based on gender, of potential CS and IS students during a</td>
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<td>programming tutorial.</td>
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<td>Lending and Kruck (2002)</td>
<td>A method to address gender disparity in IS degree recipients by predicting</td>
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<td>academic success during introductory level IS courses.</td>
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<tr>
<td>Beise et al. (2002)</td>
<td>Factors encouraging and discouraging women with interests in IT.</td>
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<tr>
<td>Niederman and Sumner (2001)</td>
<td>Factors in IT turnover including gender, job satisfaction and salary.</td>
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<tr>
<td>Joshi and Kuhn (2001)</td>
<td>Explores what causes men and women to be attracted to the IS field.</td>
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<tr>
<td>Sumner and Werner (2001)</td>
<td>Gender differences effect on IS career success and experience.</td>
</tr>
<tr>
<td>Myers and Beise (2001)</td>
<td>Factors that encourage and discourage pursuit of IT career, including</td>
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<td>gender, age, etc. from students in a standard introductory-level programming course.</td>
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<td>von Hellens et al. (2001)</td>
<td>How women in Australian IT field view masculinity of the IT industry.</td>
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<tr>
<td>Nielsen et al. (2000)</td>
<td>How Australian women view necessary IT skills, the skills they bring to the</td>
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<td>industry, and how those skills affect their career.</td>
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<tr>
<td>Nielsen et al. (1998)</td>
<td>Role of culture and gender on students’ perceptions of IT to explain fewer</td>
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<td>students choosing to study IT.</td>
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<tr>
<td>Nielsen et al. (1997)</td>
<td>Which cultural factors in Australia encourage female Asian students to</td>
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<td>pursue careers in IT.</td>
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<tr>
<td>Ahuja (1995)</td>
<td>Barriers women face to entering the IT field with respect to three separate</td>
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<td>life stages.</td>
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<td>Igbaria and Chidambaram (1995)</td>
<td>How women and men in the IS workforce were differentiated in terms of</td>
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<td>commitment, satisfaction, and a desire to remain in the field.</td>
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<tr>
<td>Enneis et al. (1971)</td>
<td>Implications of legislation prohibiting employment discrimination based on</td>
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<td>sex.</td>
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Of these 43 papers eight addressed the topic of the intersection of gender with nationality or culture (Adya, 2008; Guzman et al., 2007; Kvasny, 2006; Nielsen et al., 1998, 1997, 2000; Trauth et al., 2006; von Hellens et al., 2001). Two other papers dealt with the topic of gender and ethnicity. Of these, Gallivan (2006) focused on recruitment and retention strategies to address the under representation of women and ethnic minorities as two separate populations in the
American IT workforce. Only Kvasny (2003) has examined the intersectionality of gender and ethnicity as a means of explaining the under representation of certain groups in the IT field.

But at this transition point in the history of the conference, as we look back and forward, it is important to consider how CPR research into gender will need to change in the future. In the United States, changing population demographics will necessarily influence gender research in the future. For example, current population statistics show 47.8 million Hispanic Americans in 2010 with a projected Hispanic population of 102.6 million in 2050 (US Census 2010). The projected demographic shifts in the USA call into question the value of continuing to view “males” and “females” as homogeneous groups. In this paper we argue that focusing on gender or ethnicity, alone, is insufficient to explain the under-representation of women and minorities in IT careers. We believe that stratifying the population in a more nuanced manner, such as by gender within ethnic group, provides greater insight into the phenomenon of under representation. Hence, this paper approaches the topic of gender and the IT profession from the perspective of intersectionality of gender and ethnicity. We begin by reviewing the literature of sex roles as it relates to the IT profession. We then describe our methodology and results. Finally, we discuss the findings and implications for research and practice.

**Literature Review**

The social constructionist theory of gender is often used to explain stereotyping of skills and knowledge required to succeed in IT careers. In this view gender ideology is perceived as a socially constructed script that prescribes different values, attributes, and activities for men and women (see Adya & Kaiser, 2005; Eagly, Wood, & Diekman, 2000; Konrad et al, 2000; Smith, 1997; Wilson, 2004). According to the social constructionist perspective, the social perception that feminine attributes are commonly female-owned traits and masculine attributes are
commonly male-owned traits are socially constructed, accepted and internalized. In other words, men will be socially perceived to be well suited to perform stereotypically masculine roles whereas women will be viewed to fit well in stereotypically feminine roles. These social prescriptions of gender-based roles put pressure on men and women to conform to prescribed normative roles. While conformance to the gendering process may be resisted by certain individuals, the constructivist view holds that the cultural and social roles and norms ascribed to their gender nevertheless shape the majority of individuals’ world views (Wilson, 2004).

A meta-analysis of a decade worth of gender studies have reported gender differences in job attribute preferences in the general population (see Konrad, Ritchie, Lieb, & Corrigall, 2000, for a comprehensive review). Many job attributes can be connected to gender roles and stereotypes, and differences in self-concept and self-presentation may cause women and men to value job attributes differently. For example, men are socialized to be more concerned with a job's pay, prestige, and power. And research shows that men are more likely to initiate negotiations for higher pay (Babcock & Laschever, 2003). Women are socialized to place more importance on aspects such as social interactions and relations with co-workers, customers, and working with people. These differences have been linked to masculine stereotypes of dominance and exhibition and feminine stereotypes of nurturance and affiliation. Theories of gender roles, gender stereotypes, and gendered social structures have all been used to explain differences in what men and women most desire from their work (Konrad et al., 2000; Wood & Eagly, 2002).

Kuhn and Joshi (2009) examined gender similarities and differences in IT job attribute preferences among graduating seniors. Participants evaluated a series of multi-attribute job descriptions in a policy-capturing design. Overall, their results suggest that male and female aspiring IT professionals are more similar than different in their performances of job attributes.
This observation is contrary to gender differences reported in past research, thus stressing the point that commonly accepted stereotypes do not necessarily apply. However, the results also demonstrate that although male and female aspiring IT professionals have similar work values and desire the same types of job attributes there are subtle gender differences in the weight they place on these factors in evaluating potential jobs. For instance, women, on average, were less attracted to jobs described as mainly coding and testing of systems than were men. However, contrary to the hypothesis, both men and women were more attracted to jobs described as service-oriented than to the more technical description, suggesting that an increased emphasis on social-orientation in IT work may be attractive to both genders. Compared to men, women preferred job descriptions which had a higher level of social interaction.

While there is evidence of a trend towards feminization of certain IT careers paths (e.g., Hazzan & Levy, 2006; King, 2004; Vaas, 2000; Woodfield, 2002), this trend is not observable in the IT consulting career paths (Joshi and Kuhn 2007; Joshi and Kuhn 2010). Joshi and Kuhn (2007) captured multiple stakeholder perceptions from a large international IT consulting firm to assess prototypes of a “top” consultant. They found that most critical skills used to characterize a top IT consulting performer at all job levels (entry, mid and upper levels) are significantly more masculine-typed rather than feminine-typed. This stereotypic perception was stronger when viewed through the lenses of “others,” (subordinates, supervisors, and clients). Within this other group, male participants identified significantly more feminine typed skills to characterize top IT consultants, whereas the converse was true for women. That is, women participants identified significantly more masculine traits to describe a prototype of top consultant.

As this evidence, shows, perceptions of gender differences continue (Eagly & Wood, 1991). Women are stereotypically perceived to be more expressive: building relationships;
nurturing and concerned with emotions. Men, on the other hand, are thought to be more instrumental: assertive and focused on getting a job done or a problem solved (Bem, 1981; Spencer and Helmreich, 1980). Cognitive abilities such as being analytical and quantitatively skilled are perceived as more masculine, whereas verbal skills and creativity are typed as feminine (Cejka & Eagly, 1999). Woodfield’s (2000) interviewees revealed that skills such as building credible relationships with clients are often viewed as feminine-typed attributes whereas an attribute like technical competency is associated with men. Although there is some evidence change over time in these stereotypes, with traditionally masculine traits seen as more acceptable for women, the basic pattern is still observable (e.g., Joshi and Kuhn, 2007; Joshi and Schmidt, 2006; Atwater, Brett, Waldman, DiMare, & Hayden, 2004; Cejka & Eagly, 1999; Greening, 1999; Hull & Umansky, 1997; Willemsen, 2002). Overall, the research literature indicates that business students are more likely to rate masculine traits as more applicable to successful managers than feminine traits (Atwater et al., 2004; Willemsen, 2002). Cejka and Eagly (1999) found that students rated feminine attributes as more important to success in female-dominated occupations, and masculine attributes as more important to success in male-dominated occupations. However, higher prestige and higher earnings were associated with occupations thought to require masculine attributes. Greening (1999) examined gender typing among computing students, and Hull and Umansky (1997) found that male accountants tended to devalue female accountants who displayed “masculine” leadership traits. Personality measures based on self-reports also reflect these stereotypes (Costa, Terracciano, McCrae, 2001). The ascription of different traits to men and women has pervasive, although often subtle, effects on how people perceive both their and others’ capabilities which in turn determines occupational choice of men and women.
But in all of this research, what remains critically unexamined is the intersectionality of gender with other identity characteristics such as race, ethnicity, sexual orientation, gender identity or socioeconomic class. Hence, there is a need to move to a deeper level of analysis in the examination of sex roles in technical fields such as IT in order to understand what effect, if any, is due to gender intersectionality. Hence, the research question addressed in this paper is the following: Does the intersectionality of gender and ethnicity affect gender stereotypes about the skills and knowledge in the IT profession?

**Methodology**

In conducting this research we sought a theory that could provide the conceptual tools to examine variation in perceptions about the IT field based on the intersectionality of gender and ethnicity. Hence, the theory chosen to inform this research is the Individual Differences Theory of Gender and IT (Trauth, 2002, 2006; Trauth et al. 2004). This theory originated out of the effort to explain within-female variation in the influence of individual, institutional and societal factors on female participation in the IT field (Trauth et al., 2008a, 2008b, 2009). Because of its focus on within-gender variation that results from individual and group effects, this theory has also been used to explore within-gender variation related to the intersectionality of gender and other identity characteristics such as race and ethnicity. For example, Kvasny et al (2009) applied this theory in an examination of variation among African American women with respect to their engagement with IT and participation in the IT profession.

In this study the focus was on gender differences among contemporary Black, Hispanic and White male and female college students with respect to gender stereotypes they hold about the IT field. Undergraduate students enrolled in IT courses at 12 public institutions were surveyed during 2010 and 2011 to explore gender stereotypes about the skills and knowledge of
the IT field. Three of these institutions are classified as predominantly White institutions (PWI), four are classified as Hispanic serving institutions (HSI) and five are classified as historically Black colleges and universities (HBCU). Students participated in this study on a volunteer basis; in some cases, instructors offered extra credit for participation in the survey. Using a five-point Likert scale, students were asked to rate a list of 39 skills that are considered to be part of the IT professional toolkit that were drawn from previous research (Trauth et al., 1993, 2010b; Huang et al., 2009). To avoid sequencing bias these skills were presented to each participant in a randomized fashion.

Findings

Out of a total number of 4523 survey participants the distribution of participants by ethnicity and gender category is shown in Table 2.1

<table>
<thead>
<tr>
<th>Gender / Ethnicity Category</th>
<th>Number</th>
</tr>
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<tbody>
<tr>
<td>Male</td>
<td>2679</td>
</tr>
<tr>
<td>Female</td>
<td>1453</td>
</tr>
<tr>
<td>White</td>
<td>2171</td>
</tr>
<tr>
<td>Black</td>
<td>768</td>
</tr>
<tr>
<td>Hispanic</td>
<td>346</td>
</tr>
<tr>
<td>White Male</td>
<td>1557</td>
</tr>
<tr>
<td>White Female</td>
<td>611</td>
</tr>
<tr>
<td>Black Male</td>
<td>377</td>
</tr>
<tr>
<td>Black Female</td>
<td>390</td>
</tr>
<tr>
<td>Hispanic Male</td>
<td>206</td>
</tr>
</tbody>
</table>

1 The variation in categories is due to nonresponses by some survey participants about gender and / or ethnicity.
Table 2. Respondent Numbers by Gender / Ethnicity Category

Data was analyzed using standard deviation (x) from the median. The median in this survey was 3: the gender-neutral point. The means were taken across each trait in the survey. If deviation existed that was greater than +0.1 (x > 0.1) that trait was classified as trending masculine. Conversely if deviation occurred that was less than -0.1 (x < -0.1) that trait was classified as feminine. For any trait in which deviation existed between -0.09 and +0.09 (-0.09 < x < 0.09) that trait was identified as gender neutral. A two-sample T-TEST determined that the differences between Black, White and Hispanic males and females were statistically significant (p < .05). Using the standard deviation from each trait, the following Venn diagrams were developed to visually represent the findings of our investigation of the influence of the intersectionality of ethnicity and gender on gender stereotypes about the IT field.
Figure 1 represents the responses of all participants in the study with respect to gender stereotyping of IT skills. This Venn diagram is included here to provide a basis for comparison in tracking changes in these responses by specific gender/ethnic groups. As might be expected, stereotypical feminine traits, or "soft" skills, such as sensitivity and customer relationship skills are feminine. Similarly, stereotypical masculine traits such as programming are listed as masculine or "hard" skills, as are several business and management skills. Interestingly, creativity is listed among the feminine skills even though design, something heavily dependent upon creativity, is listed as gender neutral, and problem solving is listed as masculine. This finding is also noteworthy in view of the current emphasis on innovation in the IT field.

Figure 2 represents the responses of all participants who identified themselves as males. In comparison to Figure 1, we begin to notice a shift between “soft” IT skills, such as
communication skills and customer relationship skills, and “hard” IT skills, such as programming skills and networking skills. The skills that men describe as masculine are a representation of typical stereotyping of males as more inclined to be skilled in business knowledge and skills that are perceived to require in-depth thought. However, there is a disconnect with respect to creativity and innovation. Men placed creativity into the feminine category even though creativity is necessary to spur innovation, many of which traits are categorized as masculine. Reflecting the fact that males outnumber females in our survey by a ratio of nearly two to one, the Male Overall diagram represents a stark contrast to the Overall diagram in Figure 1 with respect to the movement of skills from feminine and gender neutral to masculine.

Figure 3 represents the responses from all survey participants that identified themselves as female. In comparison to the Male Overall diagram in Figure 2, females were much more
likely to rate traits as being gender neutral than their male counterparts. Like the males, females also viewed the more traditional “soft” IT traits of communication skills and customer relationship skills as feminine. Females also rated creativity as being a feminine trait. The “hard” IT skills, such as programming and networking skills remain as masculine. The trend of “soft” skills being feminine and “hard” skills being masculine reinforces conventional gender stereotyping of these skills. In comparison to the All Overall diagram in Figure 1, there was a movement by females to classify more IT traits as gender neutral and feminine.

Figure 4: White Overall Venn Diagram

Figure 4 displays the White Overall, inclusive of male and female, ratings of IT skills. Figure 4 is similar to the diagram in Figure 1. In view of the fact that Whites outnumber non-Whites in the survey nearly three to one, this is not surprising. Ratings of “soft” skills such as customer relationship skills and ethics appear as feminine while “hard” skills such as programming and IT security appear as masculine. Since White males outnumbered White
females in the survey by a ratio of nearly 2.55:1, for traits to appear in the feminine category, a significant number of males had to have rated the trait as feminine. Thus, it appears that many White males associate some IT skills as non-masculine. However, the traits that appear as feminine are those which are mostly stereotypically viewed as “soft” IT skills.

Figure 5: White Male Venn Diagram

Figure 5 shows how White males rated IT skills. The White male diagram is most similar to the White overall diagram due to the fact that White male survey respondents greatly outnumbered White females. However, White males ranked IT soft skills as feminine, which included communication skills and customer relationship skills, while ranking hard skills, such as programming and networking skills, as masculine. White males rated skills such as openness to new experiences and the ability to work in teams as gender neutral. In comparison to the White overall diagram in Figure 4, no trait moved from masculine over to feminine or gender neutral.
Figure 6 shows White females’ representation of IT skills. Females tended to rank more skills as feminine, such as dependability and adaptability. The White female Venn diagram closely resembles the female overall diagram in Figure 3. White females rated more skills, such as analytical ability and critical thinking, as gender neutral. However, in comparison to the White Overall diagram in Figure 4 and White Male diagram in 5, White females continued to rank IT soft skills such as communication skills and customer relationship skills, as feminine and IT hard skills such as IT security and programming, as masculine. The continued rating of traditional IT soft and hard skills as feminine and masculine is indicative of how deeply entrenched are these gender stereotypes about the IT field, even by those who are negatively impacted.

Figure 6: White Female Venn Diagram

Figure 7 represents the gender stereotyping of IT skills by those participants who identified themselves as Black. This diagram shows a shift in skills that were represented in Figure 1 as feminine, such as workplace relationship skills and ethics, to the gender neutral
category. This shift shows that Black participants classified more skills as gender neutral and masculine and fewer as feminine. It is noteworthy that while creativity remained in the feminine classification, design skills shifted from gender neutral (in Figure 1) to masculine (in Figure 7). “Soft” skills, such as communication skills and customer relationship skills remained feminine. Conversely, “hard” skills, such as programming skills and IT security, remained masculine.

![Black Overall Venn Diagram](image)

**Figure 7: Black Overall Venn Diagram**
Figure 8: Black Male Venn Diagram

Figure 8 represents the results from survey participants who identified themselves as Black males. These participants represent the starkest contrast of any gender/ethnic group to the overall responses shown in Figure 1. Black males identified no IT skill or knowledge area as being feminine, even those that have been found elsewhere in the literature and in this survey to be stereotypically feminine, such as communication skills and customer relationship skills. Interestingly, Black males shifted every trait that appeared in the overall diagram of all ethnicities in Figure 1 as feminine to gender neutral and every trait that appeared as gender neutral in Figure 1 to masculine. The shift noticed in the Black male diagram might suggest that they do not view the IT domain as one that necessitates a female's "soft" skills. Another view may be that Black males do not view the IT field as one that is welcoming to women. To the extent that the Black male view is representative of the majority of individuals working in IT, this finding might help to explain the over representation of males in the IT profession.
Figure 9: Black Female Venn Diagram

Figure 9 depicts the responses of survey participants that identified themselves as Black females. Black females’ conceptualization of feminine IT skills is nearly identical to that in Figure 1. The only exception is “openness to new experiences,” something that was classified as gender neutral in Figure 1. An interesting finding was that Black females were much more likely to identify a trait as being gender neutral instead of masculine or feminine. Skills that were masculine in Figure 1 and Figure 8, such as negotiation skills and leadership skills were classified as gender neutral by Black females. This shift from masculine to gender neutral may suggest that Black females do not believe that IT skills that are traditionally categorized as masculine should be classified as such. However, some of the more stereotypical feminine skills, such as communication skills and customer relationship skills, remained within the feminine domain. Another interesting finding for Black females is that most of the “hard” skills did not shift from being masculine. Perhaps the biggest indication that technology remains male centric is that “ability to understand technological trends” has remained masculine in Figures 1, 7 and 8.
Figure 10 depicts the responses of survey participants that identified themselves as Hispanic. This diagram shows the separation of “soft” skills being categorized as feminine and “hard” skills being categorized as masculine. Compared to the White Overall diagram in Figure 4 and Black Overall in Figure 7 the Hispanic Overall diagram more closely resembles the Black Overall diagram. Hispanics were more likely to rate skills as masculine or gender neutral than feminine. In comparison to the overall diagram in Figure 1, the Hispanic Overall diagram bears a close resemblance and a small shift between skills.

Figure 10: Hispanic Overall Venn Diagram
Figure 11 represents the results from survey participants who identified themselves as Hispanic males. Our Hispanic male participants represent the second starkest contrast to Figure 1 of any gender/ethnic group after Black males as seen in Figure 8. Hispanic males identified only two IT skills as being feminine: “customer relationship skills” and “creativity”. Those traits that have been found elsewhere in the literature and in this survey to be stereotypically feminine, such as communication skills and workplace relationship skills, are rated as gender neutral by Hispanic males. Similar to Black males, Hispanic males shifted all but two traits that appeared in the overall diagram of all ethnicities in Figure 1 as feminine to gender neutral and every trait that appeared as gender neutral in Figure 1 to masculine.
Figure 12: Hispanic Female Venn Diagram

Figure 12 depicts the responses of survey participants that identified themselves as Hispanic females. Hispanic females’ conceptualization of feminine IT skills is similar to that in Figure 1, which reflects the responses from all survey participants. An interesting finding was that Hispanic females were much more likely to identify a trait as being gender neutral instead of masculine or feminine than their Hispanic male counterparts. The Hispanic females’ representation of IT skills closely resembles that of Black females. Skills that were masculine in Figure 1 and Figure 11, such as negotiation skills and leadership skills were classified as gender neutral by Hispanic females. Some of the more stereotypical feminine skills, such as communication skills and customer relationship skills, remained within the feminine domain. Similar to Black females and White females, most of the “hard” skills remained masculine.

Discussion

The results shown in the previous section reinforce the claims made at the outset of this paper about the need for CPR researchers to consider the intersectionality of gender and ethnicity when
investigating issues related to the gender imbalance in the IT field. As these data show, the intersection of gender and ethnicity is a factor influencing gender stereotypes held by current university students about the skills and knowledge of the IT profession. It can be expected that these gender stereotypes will, in turn, affect both their own career decisions and interactions with IT professionals who possess different demographic characteristics than theirs.

In this regard, we would like to focus on three themes. First, the skills that will be increasingly important in the future in distinguishing equivalently credentialed IT professionals were not absorbed into the “masculine” category. The skills that can give an individual a competitive advantage in a crowded employment field were classified as gender neutral or feminine. These include such traits as initiative, dependability, adaptability, critical thinking, global awareness, comfort with ambiguity and new experiences, and ability to engage in independent learning. It is particularly noteworthy that despite the fact that innovation is touted as a key economic driver of virtually every sector, “creativity” was categorized as a feminine attribute by all the respondents except Black males (who didn’t identify any traits as feminine). The implication of these findings is that to the extent that the IT field is stereotyped as a masculine field, the demasculinization of these traits might coincide with devaluing them – to an IT professional’s peril. Further research is needed to relate the gender stereotyping of these traits to the value placed upon them. Second, hegemonic masculine traits appear to be deeply entrenched in the next generation of IT professionals. Whereas the gender boundary separating human and domain skills into feminine, gender neutral and masculine appears to be porous, the stereotypically masculine skills appear to remain impervious to change. Third, when peering more deeply into the gender stereotyping of skills by respondent demographics, what emerges is
a pattern that emphasizes the critical role of intersectionality in gender analyses of the IT profession.

We can see this by examining within-gender variation in gender stereotypes. Within the context of hegemonic masculine traits deeply entrenched in the IT profession, White females exhibited sex role stereotypes to a greater extent than did their Black or Hispanic counterparts. They classified 14 skills as masculine, 14 as gender neutral and 11 as feminine. In contrast, minority women rated only 11 skills as masculine and shifted other masculine skills into the gender neutral category. We find it noteworthy that Black women classified 21 of the 39 skills as gender neutral and Hispanic women classified 17 as gender neutral.

One interpretation of these results is that Black Women, historically, have worked outside the home and have been socialized to work in the formal economy. Arguably, Black Women, as a group, have had considerably more experience with handling discrimination and assumptions that they are not smart or only have a position because they are “an affirmative action hire.” This interpretation of the data flows from the viewpoint that White women and women of color have different notions of womanhood and relationship with work. Whereas women of all ethnicities are victims of the feminization of poverty, and are often exploited and underpaid in the service economy, White women have historically enjoyed an ethnic privilege that gives them advantages in the workplace. In contrast, the work of Black and Hispanic women – until quite recently -- has consisted of domestic labor (for upper and middle-class white women), factory work and migrant farm labor. For instance, Davis (1983) points out that historically, virtually all African American women were workers. African American women and men worked side by side in the fields during slavery. Following slavery, Black women struggled to be economically successful in a society that greatly limited the opportunities for both African Americans and women. Domestic service in white households was one of the few jobs that society offered African-American women. In
1940, 60 percent of Black women in the labor force were household workers; in 1960, one-third were still in domestic service - and their employers were White women (Davis, 1983).

With respect to the gender stereotypes assigned by Hispanic women, understanding differentiations in their pre-college experience may provide some insight. In immigrant households, which includes many but certainly not all Hispanic families, adolescents may take on the role of “brokering,” which encompasses interpreting language, culture, and media and then translating these understandings for their parents or caregivers to integrate the family into a community. This happens most frequently when children of immigrant parents are the primary English speakers in the household. Female adolescents are most often brokers, something that gives them experience in interpretation, problems solving, and communication, which may in turn give them confidence in their abilities as well as an association with females and these sets of skills. In addition, females are more inclined to be bilingual, able to successfully communicate both in their family’s language of origin, as well as English. This may also fuel comfort and association with communication (Katz, 2011). The combination of both exposure and association may indicate why some Hispanic females, who may have or are currently brokering for their families, associate skills such as communication, negotiation, and problem solving as either strictly feminine or gender neutral.

The identity internalized by Black and Hispanic women stands in contrast to the idealized identity of White women. The notion of womanhood as pampered, spoiled and elevated on the invisible pedestal was never extended to women of color. Hooks (1999) argues that Black women, from the seventeenth century to the present day, were and are oppressed by White men, Black men and White women. Caraway (1991) states that this history continues to shape women's work identities and serves as a potent legacy that should not be underestimated.

This historical tension between White women and women of color is played out through the social construction of ethnicity and class in the context of gender. While White women suffer under gender oppression, they also benefit from a privilege system based on ethnicity. This line of reasoning
is consistent with the criticism of American feminism as a “White female” phenomenon. The argument is that since a women of color has always needed to work and has not been able to rely on a man to support her, the issues around the female dilemma of working outside the home versus working in the unpaid labor force does not resonate with her. Hence, she might be less influenced by societal sex role stereotypes applied to the IT field.

With respect to male gender stereotyping of IT skills, White males classified the least (24) as masculine and the most (6) as feminine. This contrasts with Black males by whom no traits were classified as feminine and only 6 as gender neutral, and Hispanic males who only classified two traits as feminine and 12 as gender neutral. One interpretation of these findings is that in an ethnically stratified society (which accompanied European settlement and only began to be dismantled in the mid1960s) Black men have not had equal access to the central components of masculinity, i.e. patriarchal power and authority. Hence, they now pursue the conventional routes to masculinity, as evidenced in the gender stereotypes revealed in these findings. According to Harris (1995), Black males have redefined White male patriarchal notions of masculinity to emphasize sexual promiscuity, toughness, thrill seeking, and the use of violence in interpersonal interactions as a means of asserting masculinity. According to Hooks (2004), part of the hypermasculine identity is to make manhood synonymous with domination and control of others. This interpretation of our data would be that these cultural forces motivate Black men to reject and distance themselves from feminine roles.

Bell hooks (2004) views the Black male identity – as constructed by Black males - as being largely nonexistent. She views Black male identity as largely a creation of white culture. Racial identity development as applied to African American males is a concept that psychologists have studied intensely (Franklin, 1999; Cokley, 2002; Cokley, 2003; Carter &
Goodwin, 1994). In harmony with hooks’ assessment of African American male identity, Jackson (1999, 2006) voices the observation that Black male identity is largely a white media construction. This is particularly the case when it comes to characterizations of Black males by academic systems that have stereotyped them as being intellectually inferior to White students and disinterested in learning (Franklin, 1999; Cokley, 2005). This stereotype has been challenged by scholars who have contended that African American students are intrinsically highly motivated and that their motivation is not related to how they perform academically or to their academic self-concept (Cokley, 2005; Cokley, 2002; Cokley, 2003; Carter & Goodwin, 1994). Margolis (2008) posits that Blacks lived experiences equate to struggles with a stratified intellectual class system for which there are unintended consequences of well-intended policies at every level. We posit that this competing mix of projected and internalized ethnic identities has produced a hypermasculine IT identity being adopted by Black males.

A study by Saez et al (2009) about cultural and ethnic definitions of masculinity can also provide insights into why Hispanic men rated IT skills as predominantly masculine. Saez et al found that Hispanic men who strongly identified with their ethnic identity were also more likely to identify with traditional masculinity ideology, which emphasizes characteristics such as aggressiveness, assertiveness, and patriarchal values. This study also found that Hispanic men tend to endorse ideologies similar to their fathers and other men from the environments in which they were first socialized. Hence, this idea of hypermasculinity defined as an “exaggerated form of masculinity ideology” (Saez, 2009) might explain why Hispanic men rated almost all IT skills as masculine, fewer as gender neutral, and only two as feminine. A desire to perceive oneself as dominant and successful, often associated with the traditional masculine gender role, may have influenced their interpretation of IT skills as not being feminine. If skills necessary for success
in their chosen field are classified as masculine, an identity with which males often seek to align themselves, then they may more easily perceive themselves capable of succeeding and therefore fulfilling their masculine roles. It may be threatening to patriarchal values, towards which males aspire in public career spaces, that skills men are required to use daily may be feminine, thereby threatening a sense of career success or dominance over their female counterparts. Finally, Saez’s study points out that hypermasculine men are often less willing to acknowledge differences among individual males, something that may explain their polarized views and the adherence to strict, unbending views of what it masculine.

These results suggest empowerment for underrepresented Black and Hispanic women insofar as their gender stereotypes are more in alignment with their gender identity than is the case for White women. However, these results also point to the challenges they might well encounter in the workplace due to the overall hegemonic masculine stereotypes held by all men. The more extreme hegemonic masculine stereotypes held by Black and Hispanic males suggests that these women may encounter within-ethnic group barriers associated with differences about sex roles and the IT field. But while White men revealed fewer hegemonic masculine stereotypes, they have historically held more power in IT organizations. Hence, minority women might experience the effects of these gender stereotypes even more than those of Black and Hispanic males.

**Conclusion**

The findings of this research have implications for both theory and practice. They reinforce our theoretical position that analyses of gender under representation benefit from examination of within-gender variation. In this paper, within-gender variation was examined through the lens of gender-ethnic intersectionality. When peering more deeply into the gender
stereotyping of skills by respondent demographics such as gender and ethnicity, what emerges is a pattern that emphasizes the critical role of intersectionality in gender analyses of the IT profession. The implications for practice are that efforts to address the gender imbalance might benefit from targeted recruitment efforts that address the specific gender stereotypes held by specific groups in the population. Further, despite the ubiquity of digital technology in use by today’s youth, gender stereotypes about who should develop the digital world remain entrenched.

The results presented in this paper represent only part of the story of intersectionality and the gender imbalance. Further research is being conducted in order to see the relationship between gender stereotypes about IT skills and the importance placed upon them. Research is also being conducted into the connection between gender stereotypes and gender-based differences in self-efficacy related to these skills. The ultimate objective of this research is to link gender stereotypes, skill importance and self-efficacy in a model that can predict intention to become and IT professional. One of the limitations of this research is the imbalance in the respondent categories. There were approximate 10 times more White males than Hispanic females in the study. Efforts are currently underway to increase the response rates of Black and Hispanic participants.

References


