

Understanding Underrepresentation in IT Through Intersectionality

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ABSTRACT

Results of an investigation of the effect of intersectionality on perceptions of university students about IT careers are presented. This analysis deepens the discussion began at the 2011 iConference by presenting an examination of responses of African American males and females on the topic of gender norms and stereotypes about IT professionals. The findings provide evidence of the influence of race on gender stereotypes that individuals hold about the IT field. Gender differences in stereotypes reveal within-race variation in perceptions about the IT field. IT skills perceived by African American females as feminine are nearly identical to those found across all participants in the study. In contrast, African American males did not identify any skills as feminine. These results suggest that finer grained analysis of under representation in the IT field can be achieved by pursuing the intersectionality of gender and race.

Categories and Subject Descriptors

K.3.2 [Computers and Education]: Computer and Information Science Education.

K.7.1 [The Computer Profession]: Occupations.

General Terms

Human Factors, Management

Keywords

Careers, ethnicity, gender, individual differences, IT skills, IT, intersectionality, IT workforce, race, stereotypes.

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1. INTRODUCTION

The theme of diversity and inclusion has been a part of the iSchools conference since its inception in 2005 [4][5][7][8][12][20][26][31][34][39][48][49]. Most recently, the I3 initiative (www.ischool-inclusion.org) is directed at redressing the under representation of racial and ethnic groups within the iSchool community. The reason for the emphasis on social inclusion is both societal and professional. At a societal level it is incumbent upon us to reduce barriers to participation in economically rewarding occupations that serve as the means of wealth creation. As information professionals, it is in our best interest to keep open the entry to all individuals, no matter what their demographic characteristics. As research has shown, innovation thrives on diversity [43]. Two aspects of particular interest in this regard are gender and racial / ethnic under representation. Considerable research has been conducted on the topic of the gender imbalance in those parts of the information profession that emphasize information technology (IT). Less research has been conducted on the under representation of racial and ethnic groups in the IT field. And even less has focused on the intersectionality of gender and race / ethnicity in explaining demographic under representation in the IT field.

In this paper we present some findings from a multiyear investigation of the intersection of gender and race / ethnicity on intent of university undergraduates to pursue an IT career [38]. To date, this project has produced an analysis of IT skills and knowledge as understood by both the academic and the practitioner communities [19]. This was followed by an examination of three factors under consideration in this study: gender stereotypes about IT skills [41], and self-efficacy and perceived importance of IT skills [23]. At the 2011 iConference [26] we presented the results of our initial investigation of the intersectionality of gender and race / ethnicity by examining responses about gender stereotypes, self-efficacy and IT importance by race / ethnicity. That paper was based on data from our pilot survey (of a total of 1027 participants only 32 are Black and 35 are Hispanic).

In this paper we draw upon the data from the main survey to examine in greater depth the theme of intersectionality by examining the influence of race on gender stereotypes about the information profession. Hence, the purpose of this paper is to extend and deepen the discussion that began at the 2011 iConference by presenting an examination of responses of African American males and females on the topic of gender norms and stereotypes about the knowledge and skills of information professionals. We begin by reviewing the literature on gender role congruity as it relates to the IT profession. We then present the results of our examination of the influence of gender and race on gender stereotypes about the IT field.

2. LITERATURE REVIEW

Social Role Theory observes a correlation between “ideas people have about men and women and scientifically documented differences in social behavior and personality” [9]. Social roles are a set of shared beliefs among members of a society or culture that guide individual behavior and are “developed and maintained through socialization” [9]; for men and women, this often means acquiring skills considered appropriate and in congruence with their sex-roles. Women often develop and hone interpersonal and communication-oriented skills, while men pursue “agentic” skills such as assertiveness and independence [9] acting in ways that are deemed to be socially and culturally appropriate. Research on sex-role spillover has demonstrated that gender-based expectations can spread into other roles that males and females engage in, regardless of the actual job role [9] such as occupations and career roles. Occupational fields that are perceived to be male-dominated, such as IT [21] are also perceived to require “agentic,” or masculine, qualities while female-dominated professions are thought to require “communal” or feminine skills [2]. With respect to status, higher status roles are perceived as more agentic and therefore more masculine than lower status roles [9].

Occupational fields, such as IT, that are male-dominated, often lead women to hold more negative attitudes about pursuing such careers [21]. As such, predominantly masculine attributes have been ascribed to the generic IT roles [24]. Consequently, IT careers for women could be viewed as in conflict with perceived norms about female gender roles.

While occupational fields may be gender stereotyped, so too may the actual skills associated with those careers. In terms of IT, technical skills, including computing and working with technology, have been stereotyped as masculine [6] [14][22] [28] [29][30][32][47]. For example, a survey of 263 undergraduate and graduate business students (146 were males and 117 were females), including older and part-time students, who were attending a southwestern university in the U.S found that problem solving was perceived as more masculine [1]. Additionally, questionnaire data from 189 introductory psychology students (81 were males and 108 were females) who volunteered to participate in a study of perceptions of occupations indicated that cognitive skills, such as analytical, mathematical, quantitative and logical thinking, were perceived to be more masculine than feminine [2].

Although many skills associated with IT have been perceived and stereotyped as masculine, research indicates that some skills are often classified as feminine. A questionnaire sent to 108 managers (62 percent were males and 38 percent were females) from four U.S. organizations and 325 of their direct reports, which measured

social and emotional skills, found that females were stereotyped as more likely to exhibit sensitivity to the social and cultural environment in their organizations, such as recognition of constraints [13]. Similarly, survey data from [1], which found problem solving to be perceived as masculine found that communicating was perceived to be more feminine. In addition to communication, creativity was also perceived to be more feminine in Cejka and Eagly’s study [2]. Although many IT skills are perceived as masculine, and many fewer as feminine, some studies have demonstrated certain skills to be considered gender neutral. In a survey conducted in 2001 using Torkezadeh and Koufteros’ Computer Self-Efficacy Scale (CSES) to assess self-perception of computer skills and knowledge from 310 undergraduate students (153 females and 157 males) at a large Midwest university, results indicated that there were no substantial differences between males and females regarding their perceived advanced and mainframe computer skills [33] [35]. The same study that found communication to be perceived as more feminine also yielded results indicating the perception of IT skills as gender-neutral. It was found that one fourth to one-third of the participants could not categorize some management sub-roles as either masculine or feminine, thereby casting doubt on the continued prevalence of masculine stereotypes about managers [1].

Because IT remains a male-dominated field requiring many skills perceived to be masculine, Social Role Theory would suggest that women with internalized aspects of gender roles may perceive pursuing careers in IT as unfavorable, due to masculine associated skills and the underrepresentation of female role models in the profession. However, the fact that there are some women in the IT field suggests that other factors must be taken into account in order to explain how it is that not all women internalize the same gender roles or experience the same constraints as a result of these gender roles. Therefore, in an effort to better understand this variation, an avenue of consideration is the intersectionality of gender and race / ethnicity on projected and internalized gender stereotypes about the skills and knowledge required of IT professionals.

However, there are two problems with pursuing this line of investigation. First, since the vast majority of research on gender differences reported in the literature comes from White respondents, insights into the intersectionality of race and gender from such findings could only be applied to this dominant group. The second problem is that race and ethnicity are generally not considered for dominant groups. That is, the terms “racial” or “ethnic” are generally equated with “minority racial” or “minority ethnic” groups. Hence, what remains an open question is the influence of the intersectionality of gender and nondominant racial / ethnic groups, such as African Americans and Hispanics, on gender stereotypes about IT skills. Given this research gap, the particular focus of this paper is on the following research question: *How does intersectionality affect gender stereotypes about IT skills and knowledge for African American college students?*

3. METHODOLOGY

The research reported in this paper was designed to explore possible influences of the intersectionality of gender and race on gender stereotypes about IT skills and knowledge within the African American university student population. The theory chosen to inform this research is the Individual Differences Theory of Gender and IT because it provides the conceptual tools

to examine variation in perceptions about the IT field [36] [37] [45]. The original application of this theory was to explain within-female variation in the influence of individual, institutional and societal factors on female participation in the IT field [42] [44] [46]. Because of its focus on within-gender variation due to individual and group effects, this theory has also been used to explore within-gender variation resulting from the intersectionality of gender and other identity characteristics such as race. For example, [27] applied this theory in an examination of variation among African American women with respect to their engagement with IT.

In this study the focus was on gender differences among contemporary African American college students with respect to gender stereotypes 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 with the opportunity to receive bonus points by their instructors. Participating students were asked in the survey to use a five-point Likert scale to assign a “gender rating” (labeled as: 1 = feminine, 3 = gender neutral, 5 = masculine) to a list of 39 skills that are considered to be part of the IT professional toolkit that were drawn from previous research [40]. Huang et al [19] conducted an extensive review of IT job skills as expressed in scholarly articles, practitioner literature and online job ads. To avoid sequencing bias these skills were presented to each participant in a randomized fashion.

4. FINDINGS

Out of a total of 4523 survey participants, the total number of Black participants was 768. Of these, 390 identified themselves as Black females and 377 identified as Black males. (One Black participant didn’t identify as male or female.) Data was analyzed using standard deviation from the median of 3: the gender neutral point. The means were taken across each trait in the survey. If the deviation was greater than +0.1 ($x > 0.1$) that trait was classified as trending masculine. Conversely if the deviation 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 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 race and gender on gender stereotypes about the IT field.

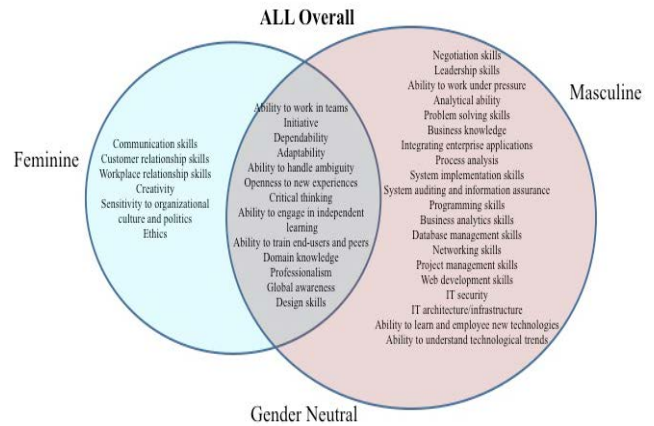


Figure 1. ALL Ethnicities Overall Venn Diagram

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/racial groups. As might be expected, stereotypical feminine traits, or "soft" skills, such as sensitivity and customer relationship skills are present for females. 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.

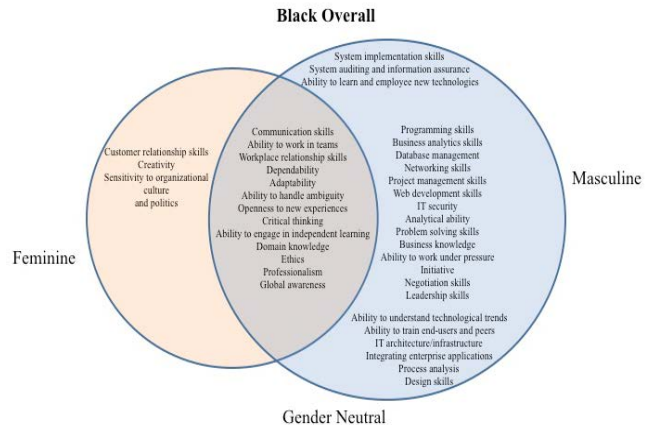


Figure 2. Black Overall Venn Diagram

Figure 2 represents the gender stereotyping of IT skills by those participants who identified themselves as Black. This diagram begins to show a shift in skills compared to those represented in Figure 1. For example, workplace relationship skills and ethics, shifted from feminine 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 2). “Soft” skills, such as communication skills and customer relationship skills remained feminine. Conversely, “hard” skills, such as programming and IT security, remained

masculine. While there are some differences in how traits are classified in Figure 2, the Black overall diagram represents a small shift from Figure 1.

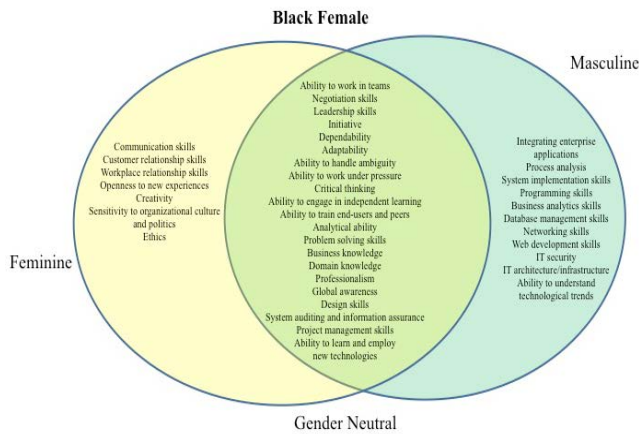


Figure 3. Black Female Venn Diagram

Figure 3 depicts the responses of survey participants that identified themselves as Black females. Black females' conceptualization of feminine IT skills is similar to that in Figure 1, which reflects the responses from all survey participants. There is only one exception: "openness to new experiences," something that was classified as gender neutral in Figure 1. An interesting finding is 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 2, 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 the ability to understand technological trends has remained masculine across Figures 1, 2 and 3.

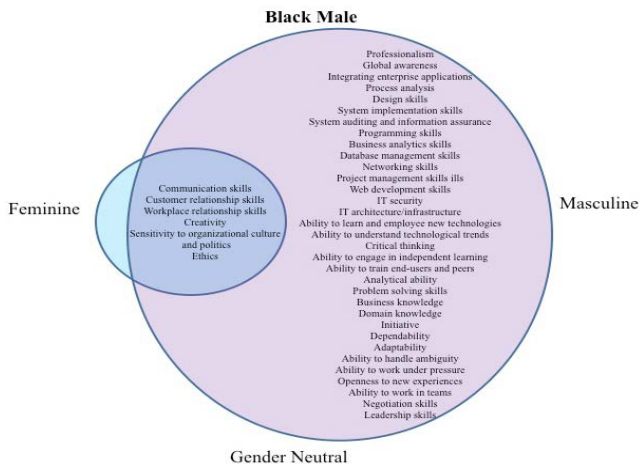


Figure 4. Black Male Venn Diagram

Figure 4 represents the results from survey participants who identified themselves as Black males. Our Black male participants represent the starkest contrast of any gender/racial group with 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 and customer relationship skills. Interestingly Black males shifted every trait that appeared in the overall diagram of all race / 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.

5. DISCUSSION

The work of both Game and Pringle [11] and Cockburn [6] can aid in the interpretation of the overall group results. Game and Pringle [11] observe that job skill is an ideological and social category, not merely a technical one. There is also a gender dimension in this social construction of job skill. For instance, distinctions such as light/heavy, clean/dirty, non-technical/technical, immobile/mobile are constructed to preserve a sexual division of labor and distinguish between men's and women's work. Cockburn [6] further argues that people's relationship to technology and technical skills is part and parcel of what makes us women and men. Thus, gender relations shape technology and technology shapes gender relations. For example, the finding that there were no feminine skills could mean that Black males desire to not "feminize" their work and thus preserve a sexual division of labor, consistent with IT work being largely seen as a masculine occupation.

Harris and colleagues [17][18] found that notions of masculinity vary within any one society according to different types of ethnic groups. For men from historically subordinated ethnic groups, masculinity is influenced by both the dominant culture and by experiences related to a myriad of factors including structural inequalities in education and employment, racial barriers and stereotypes. Franklin [10] found, for instance, that African American males score higher on androgyny than do Whites. There are two opposing explanations for this finding. On the one hand, because women head three times as many Black households as White households, it can be argued that African American males are taught "feminine" values such as empathy and warmth. On the other hand, it can be argued that Black men from households headed by a single female are taught from an early age to assume the role of "man of the house." Outside their homes, they develop measures of masculinity based upon physical strength, dominance, sexual consumption, and coolness. The influences of these disparate cultural values shape Black men's relationship with technology. The fact that Black men in this study saw all IT skills as either masculine or gender neutral may suggest that the "soft" skills such as communication and creativity are not at odds with a more androgynous, gender neutral perspective on IT work. If Black males are more androgynous in their relationship to technology, then their gendering of IT skills may not fit cleanly into the typical masculine and feminine gender roles of their society.

Others may argue that while Black males see technology as largely masculine, their concept of masculinity is motivated differently than those from the dominant culture. For instance, in a study of Black male college students, Harper [16] found that these high-achievers “held certain beliefs and aspired to roles that are consistent with traditional, mainstream White definitions of masculinity (i.e. provider, family man, and executive). At the same time, their motives were strikingly different. They were involved in leadership roles for selfless reasons and believed their work as student leaders was central to the advancement of the African American community on their campuses.” Thus, Black males may be motivated differently in their gendering of these IT skills as masculine.

It could also be that Black males see skills such as communication, ethics, and leadership in ways that differ from hegemonic notions of masculinity. Hegemonic masculinity, according to Cheng [3, p. 295], is “characterized by numerous attributes such as domination, aggressiveness, competitiveness, athletic prowess, stoicism, and control.” Black males may be strongly rejecting hegemonic culture by failing to classify any IT job skills as feminine. Cheng [3, p. 25] goes on to state, “One way to ‘prove’ hegemonic masculinity is to act aggressively or even violently toward what is regarded as ‘feminine,’ for example, women, homosexuals, and nerds.” In their choice of an IT major and future career, they may be redefining seemingly feminine aspects of the job.

Like Black men, Black women may differ from their White counterparts in their gendering of IT skills. Hanson [15] argues that assumptions about the mismatch between women’s interests and STEM (science, technology, engineering and mathematics) is often based on the experiences of White women. In the African American community, for example, many of the characteristics that are considered appropriate for African American women, such as high self-esteem, independence, and assertiveness are associated with success in STEM fields [15]. For Black women in our study, these business-oriented skills are seen as gender neutral rather than masculine. If Black women view these business oriented IT skills as gender neutral, then acquiring these types of skills would be considered appropriate and in congruence with their sex-roles. For example, Kvasny [25] found that for low-income Black women heading their households, IT skills were viewed as an integral component of their strategies for escaping poverty, finding higher paying jobs, and parenting their children. The gendering of the skills was not a deterrent in their decision to pursue IT training and jobs.

6. CONCLUSION

Three important conclusions can be drawn from this investigation of intersectionality of race and gender with respect to gender stereotypes about the skills and knowledge in the IT field. First, the findings provide evidence of the influence of race on gender stereotypes that individuals hold about the IT field. Second, differences between African American males and females reveal a within-race gender difference in perceptions about the IT field. It is also noteworthy that the gender stereotypes perceived by African American females are nearly identical to the gender stereotypes that were found across all participants in the study. Finally, it was found that African American males did not identify any skills and knowledge as being stereotypically feminine. Skills identified by all participants and by African American females as being feminine were identified by the males as being gender

neutral. Further investigation is needed in order to ascertain whether this finding indicates their rejection of anything associated with the feminine or whether their conception of masculinity includes items that White society sees as feminine. Indeed, the next step in this research program is to conduct focus groups at the institutions where the survey was administered in order to explore these and other possible interpretations. Nevertheless, these results provide evidence that finer grained analysis of under representation can be achieved by pursuing the intersectionality of gender and race.

7. ACKNOWLEDGMENTS

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