Evaluating the Implications of Sex and Gender of Applicants on Job Placement

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Amelia C. Warden

Major Professor: Traci Y. Craig, Ph. D.

Committee Members: Melinda Hamilton, Ph. D.; Todd Thorsteinson, Ph. D.

Department Administrator: Todd Thorsteinson, Ph. D.

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Authorization to Submit Thesis

This thesis of Amelia C. Warden, submitted for the degree of Master of Science with a Major in Psychology and titled "Evaluating the Implications of Sex and Gender of Applicants on Job Placement" has been reviewed in final form. Permission, as indicated by the signatures and dates given below, is now granted to submit final copies to the College of Graduate Studies for approval.

Major Professor: _____ Date _____
Traci Y. Craig, Ph.D.

Committee Members: _____ Date _____
Todd Thorsteinson, Ph. D.

_____ Date _____
Melinda Hamilton, Ph. D.

Department Administrator: _____ Date _____
Todd Thorsteinson, Ph. D.

Abstract

The objectives of the present research were to assess how perceptions of applicants' sex and gender influence ratings of qualification, competence, likability, and job placement into different types of engineering positions. Participants evaluated four target résumés of applicants with equivalent information about education and experience. Résumés differed by information about an applicant's sex (i.e., male or female) and gender (i.e., masculine or feminine). Participants rated each applicant on perceived levels of qualification, competence, likability, and made annual salary suggestions for each applicant. Further, participants made placement decisions for all four applicants into one of four engineering positions (i.e., job types) that were described as requiring different amounts of independent and collaborative work. Results provided evidence that gender of applicant significantly contributed to participant ratings of an applicant's perceived level of qualification, competence, and likability. While sex did have an impact on perceived level of qualification and likability, the effect was overwhelmed by gender.

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Introduction: The Underrepresentation of Women in STEM

The number of women in Science, Technology, Engineering, and Mathematics (STEM) disciplines is disproportionate throughout the United States and internationally when compared to their male counterparts (Beede, Julian, & Langdon, 2011). Women comprise 48 percent of the overall workforce within the United States. However, even though the number of college-educated women has increased within the overall workforce, they hold only 24 percent of STEM occupations (U.S. Census Bureau, 2013; NSF, 2007). According to the National Science Foundation (NSF), in 2007 the number of women with advanced degrees in STEM fields had increased, whereas the number of men had decreased (Glass & Minnotte, 2010; NSF, 2007). While women earn more than half of all bachelor's degrees, half of all professional and doctoral degrees, and 40 percent of advanced degrees in science and engineering, they remain underrepresented in STEM majors and careers in most industrialized countries around the world (Glass & Minnotte, 2010; NSF, 2007; American Council on Education, 2010). Approximately 40 percent of men with a STEM degree occupy a STEM job, whereas 26 percent of women with a STEM degree occupy a STEM job (Beede, Julian, & Langdon, 2011). In other disciplines, such as medicine, law, and business, women occupy nearly as many positions as men (Diekman, Brown, Johnston, & Clark, 2010). Even when considering family, education level, age, and region of residence, women are still less likely than men to occupy STEM jobs (Beede, Julian, & Langdon, 2011). There are many forces contributing to this disparity. Some of these include: the "leaky pipeline" (Blickenstaff, 2005; Burke & Mattis, 2007), hiring and gender discrimination (Ceci & Williams, 2011), the lack of same-sex mentors, advisees, and professors (Blickenstaff, 2005; Burke & Mattis, 2007), social role

perceptions and expectations predetermining the qualifications of women (Eagly, 1987; Diekman et al., 2011), and the gendered nature of the engineering environment (Hewlett et al., 2008; McIlwee & Robinson, 1992, Dryburgh, 1999).

This disparity is particularly evident in the field of engineering. Engineering is one of the largest fields within all STEM occupations, making up 32 percent of the STEM workforce (U.S. Census Bureau, 2013). In 2011, women made up 13 percent of the engineering workforce (U.S. Census Bureau, 2013). Among engineering domains, the highest numbers of women are present in environmental engineering (20.2%), and the lowest numbers are present in mechanical engineering (6.3%) (U.S. Census Bureau, 2013). Eagly's (1987) social role theory states that when a high percentage of women are observed in a particular occupation, such as teaching, they are innately assumed to possess characteristics making them more qualified for such occupations. The distribution of women in engineering occupations suggests the type of engineering job may have an impact on where women tend to be employed. That being said, it may be the case that women are placed into engineering positions that align with working collaboratively (e.g., environmental engineering) more than being placed into independent positions where they are working independently with mechanical systems (e.g., mechanical engineering). Jobs such as environmental engineering may be viewed as more appropriate for women because of the sex of the workers who typically occupy these types of collaborative positions.

Previous research and literature tends to focus on an applicants' decision to pursue a STEM career and assessing evaluations of an applicant on a variety of measures. Such measures have included how participants make ratings of an applicant's perceived

competence and likability, and how participants make annual salary suggestions for applicants (Heilman et al., 2010, 2004; Phelan, Moss-Racusin, & Rudman, 2008; Rudman & Glick, 2001, 1999; Rudman & Fairchild, 2004). The research in this document will use similar measures to explore how participants place applicants into engineering positions and how participants perceive applicants qualifications, competence, and likability. Further, this research investigates whether applicants are preferred for positions and are perceived in ways that are congruent with sex and gender stereotypes. Perceptions of qualification refers to how qualified an applicant is believed to be based on résumé information about their educational background, work experiences, and computer and technical skills. Perceptions of competence refer to how competent an applicant may be when viewed as working in a specific occupation based on information included on their résumés.

Chapter 1: Literature Review

In the following literature review, we discuss the ways in which social role theory helps us understand how sex and gender may relate to the placement and interest of men and women in engineering occupations. First, we will elaborate on key components of Eagly's (1984) social role theory, followed by a brief summary of studies related to sex stereotypes and perceptions of applicants. Furthermore, we focus on how engineering as a field in particular is gendered and structured, and how job placement into engineering positions during the hiring process may be influenced by the sex and gender of applicant.

Social Role Theory

Theories of sex differences originated from evolutionary psychology and social psychology research regarding whether and when men and women differ in their mental abilities, personality traits, and behaviors. Sex differences are often mediated by social and psychological processes, such as gender roles (e.g., masculine as agentic, feminine as communal) and occupational roles that further influence social behavior (Eagly, & Diekman, 2000; Eagly, Wood, & Johannesen-Schmidt, 2004; Eagly & Wood, 2013). Social role theory states that observing a high number of women in certain occupations, such as care-giving, leads to the perception and expectation that women innately possess characteristics making them well suited for these occupations. Similarly, a higher number of men observed in technical occupations, such as engineering, leads to the perception that men innately possess characteristics making them well suited for these occupations. Consequently, both men and women begin to act accordingly and live up to those expectations. The extent to which men and women are perceived as differentially

qualified for these roles depends on how well they fulfill sex- and gender-congruent roles. The gender of the person who holds a specific occupation creates the perception that the occupation is either masculine or feminine; whichever one is congruent with the person's sex. Gender alone may influence the placement of atypical applicants (i.e., feminine men and masculine women). Masculine women employed within masculine occupations are perceived and evaluated as competent, but are also perceived as less likable, pushy, manipulative, and selfish (Heilman et al., 2004, 2010; Phelan et al., 2008; Rudman & Fairchild, 2004; Rudman & Glick, 2001, 1999). Men who perform well in feminine occupations are viewed as less competent and given less respect than women in the same job, and viewed as less competent and respected less than men in gender-congruent jobs (i.e., masculine jobs) (Heilman et al., 2010). In this context, the sex of a person refers to the biological differences between males and females. A person's gender refers to differences in socially and culturally learned characteristics between masculinity and femininity, which are typically shaped by an individual's sex. For instance, little boys tend to play with toys oriented towards working with objects, whereas little girls tend to play with toys oriented towards taking care of others. Eagly's (1987) work continues to demonstrate that beliefs regarding attributes associated with men and women are socially desirable qualities or behaviors that begin to form early in childhood and become role expectations of each sex.

Self-Fulfilling Prophecy and Social Role Theory

Self-fulfilling prophecy is a cyclical process by which some behavior occurs due to the expectation of that behavior. For example, if human resource employees assume that women behave in feminine ways that are congruent with traditional female social roles,

such as working with others, then human resource employees may place women into occupations that are believed to be congruent with traditional female role expectations (e.g., working on a team with others). It remains unclear if human resource employees expect women to perform better than they expect men in collaborative positions, or if they believe women prefer collaborative positions. If human resource employees observe women selecting careers that align more with working with others on tasks, then they are likely to believe that women hold abilities and personality attributes that are more appropriate for collaborative occupations rather than independent occupations. If women are viewed as less likely to pursue male-dominated engineering occupations, it is likely that human resource employees believe that women have less ability to do well in engineering occupations than men. Consequently, sex and gender roles and the self-fulfillment of these roles may contribute to the placement of applicants into different engineering jobs and the evaluation of applicants.

Little research has looked at how gender roles act to facilitate job placement of men and women in masculine occupations, such as engineering. This thesis explores how perceived differences between applicants may influence perceptions about ability and placement for particular engineering occupations. Furthermore, this research attempts to assess if this phenomena is due to the applicants' fulfillment of gender role expectations.

Gender and the Workplace

Previous research regarding gender-stereotypes has consistently demonstrated that others believe traits and behaviors of men and women differ (Eagly, 2000). Cejka and Eagly (1999) demonstrated that gender-stereotypes reflect occupational success

based on attributes from each of the following: personality traits, physical attributes, and qualities of cognition and cognitive style. Cejka and Eagly (1999) assessed how subjective and objective perceptions of sex and gender influence selection, placement and performance evaluations of gender-stereotypic occupations. Participants were divided into two groups where they completed different measures assessing the importance of gender-stereotypic attributes based on a 5-point Likert scale, with 1 indicating "not at all important" and 5 indicating "essential." Group one rated occupations (e.g., airline pilot, architect, barber, elementary school teacher) on gender-stereotypical attributes followed by rating the average man or average women on the same gender-stereotypic attributes. The gender-stereotypic characteristics were determined by rating the likelihood of the occupations, and the extent to which the average man or average woman possessed the following attributes: masculine physical (burly, muscular, rugged), feminine physical (dainty, pretty, sexy), masculine personality (aggressive, competitive, dominate), feminine personality (sympathetic, nurturing, sensitive), masculine cognitive (analytical, mathematical, rationale), and feminine cognitive (intuitive, verbally skilled, expressive). Group two (Cejka & Eagly, 1999) rated the extent to which men and women were perceived to be attracted to each occupation, wage earnings and prestige of each occupation, and estimations of the percentage of women in each occupation.

Results from Cejka and Eagly (1999) indicate that the perception of success within female-dominated occupations (e.g., telephone operator, elementary school teacher, or nurse) requires feminine personality attributes (e.g., sociable, kind, helpful). Likewise, the perception of success within male-dominated occupations (e.g., airline pilot, architect, or computer programmer) requires masculine personality attributes (e.g., in-

dependence, daring, courageous, unexcitable). Another key finding from Cejka and Eagly (1999) indicated that occupations perceived with high prestige and higher wage earnings were associated with stereotypic masculine attributes, such as being aggressive and dominate. This suggests that masculine attributes are a precursor for achieving a high level of prestige and higher wages in a masculine occupation.

Engineering occupations are socially accepted as masculine occupations. Therefore, social perceptions of success in engineering would suggest that engineers possess masculine characteristics. Accordingly, human resource employees may subjectively place applicants into gender-stereotypical occupations when objective criteria, such as qualifications, are equivalent. For example, a masculine male would be thought of as having qualities that align with an independent engineering position because this position may infer a preference for working alone on tasks, such as fixing machines. Furthermore, a feminine female would be thought of as having qualities that align with a collaborative engineering position because this position may infer a preference for working with others on a task, such as designing a system to improve habitat conditions. However, it remains unclear whether human resource employees will use gender-stereotypes to place gender typical and gender atypical applicants into traditionally male-dominated engineering positions. Gender alone may influence the placement of atypical applicants (i.e., feminine men and masculine women). Masculine women in male-dominated occupations are typically viewed as competent, but liked less and perceived as lacking interpersonal skills may be viewed as more appropriate for independent rather than collaborative positions. In general, men are viewed as less competent and liked less in gender incongruent jobs (Heilman et al., 2004). Therefore, a feminine

man in a feminine job (i.e., gender congruent) may be viewed as more likable and experience less backlash than when in a masculine job (i.e., gender incongruent). That being said, feminine men may suffer on evaluations, and be considered more appropriate for collaborative positions than masculine women.

Impact of Sex and Gender on Evaluations

Glick, Zion, and Nelson (1988) demonstrated that information about an applicant's sex and gender impact job interviewing and hiring decisions. Glick et al.'s (1988) study assessed the influence of applicant sex and gender on the likelihood of being interviewed for three different job types: a sales manager of a heavy machinery company (masculine job), dental receptionist/secretary (feminine job), and a bank administrative assistant (gender-neutral job). Participants viewed résumés of equally qualified applicants who differed in their sex and gender. Sex of applicant was manipulated by changing the applicant's name (e.g., "Ken Norris" or "Kate Norris"). Gender of applicant was manipulated by the applicant's summer job, campus work-study job, and extracurricular activities. Both male and female masculine applicants' résumés indicated work as a retail sales person at a sporting goods store, on the campus maintenance crew, and serving as captain of the varsity basketball team. Both male and female feminine applicants' résumés indicated work as a retail sales person at a jewelry store, as an aerobics instructor, and serving as the captain of a pep squad. Both male and female gender-neutral applicants' résumés indicated retail sales work at a shoe store, work at the campus cafeteria, and previous involvement on the varsity swim team. Participants were randomly assigned to read one of six résumés, followed by evaluating the applicant's likelihood to be interviewed for the different job types.

Glick et al. (1988) found that applicants with "masculine" experience were significantly more likely to be interviewed for the stereotypically masculine job than applicants with "feminine" experience. Conversely, feminine applicants were significantly more likely to be interviewed for a stereotypically feminine job than masculine applicants were. While Glick et al. (1988) evaluates the likelihood to interview rather than job placement, these findings provide some idea about how human resource employees might perceive and place applicants into particular occupations. If evaluator's likelihood to interview and hire are based on how well applicants align with the gender of the occupation, then the likelihood of placing an applicant into independent engineering positions may depend on whether that applicant's résumés elicits cues of masculinity. Given that positions with independent work would be considered to possess stereotypically masculine characteristics (e.g., decisiveness, independence, etc.), masculine applicants would be placed into these positions. Conversely, positions that require working with a team of engineers may be considered more congruent with stereotypically feminine characteristics (e.g., working with others, interpersonal skills, etc.), and therefore, feminine applicants would be placed into a these positions.

A study conducted by Rudman and Glick (1999) demonstrated that masculine women experience hiring discrimination for stereotypically feminine jobs. Participants rated their interest in interviewing each applicant for a computer lab position, followed by the applicants' competence level, social skills, and hireability. Job descriptions were manipulated by emphasizing either agentic traits (masculine condition) or communal traits (feminine condition). The masculine job description explicitly sought applicants who were technically skilled, ambitious, and independent. The feminine job description

explicitly sought applicants who were helpful, sensitive to new computer users, and able to listen to client concerns. Communal or agentic traits of applicants were manipulated by applicants' response to specific questions (e.g., "Are you, by nature, a competitive person?"). Agentic applicants answered very directly, whereas communal applicants answered with uncertainty. To enhance the communal and agentic manipulation, participants read "life philosophy" essays for each applicant indicating information about the importance of being connected to others (communal life philosophy) or information emphasizing high self-interest (agentic life philosophy).

Results (Rudman & Glick, 1999) demonstrated that the masculine female is more likely to experience hiring discrimination for the feminine job, rather than for the masculine job. Conversely, a feminine female is more likely to be discriminated against for the masculine job, rather than the feminine job. Rudman and Glick (2001) replicated these results in a follow up study where they found that women who act communally are liked but not respected, and those who act more agentic are respected but not liked. These results suggest that human resource employees may be more likely to make positive inferences about feminine women when considering them for positions that require working with a team of engineers, whereas masculine women may be perceived more positively when human resource employees consider them for an engineering position where she will work independently. Women perceived as masculine may also be perceived as violating heteronormative expectations, and therefore may experience discrimination based not only on gender per se, but perceptions of sexual orientation (Craig & LaCroix, 2012).

In order to explore the implications of gender on sexual orientation Weichselbaumer (2003) undertook a study exploring this question about female applicants. In Australia, Weichselbaumer (2003) evaluated discrimination based on sexual orientation, and assessed whether gender mediates treatment of female applicants. Résumés of equally qualified applicants consisted of: an applicant letter, curriculum vitae, a school report, and a personal photograph. Sexual orientation was manipulated by indicating different types of work experience. Lesbian applicants had experience in "Managerial activity for the Viennese Gay People's Alliance." Heterosexual feminine women applicants had experience with a nonprofit organization assisting school children. Heterosexual masculine women had experience with a nonprofit cultural center. Gender was manipulated by a personal photograph of each applicant, résumés aesthetics, and applicant's hobbies. Masculine applicants had short hair, "plain" resume font and layout, and rock climbing and drums as hobbies. Feminine applicants had long hair, "nice and playful" resume font and layout, and drawing and sewing as hobbies. Weichselbaumer (2003) sent one heterosexual and one lesbian applicant with résumés each differing in gender to accounting and secretarial positions. Interview patterns demonstrated discrimination towards both masculine and feminine lesbian applicants when compared to heterosexual applicants. However, gender did not seem to influence invitations to interview. In this study, information about sexual orientation may have been overwhelmed by information about gender. This does not necessarily provide conclusive evidence that sexual orientation does not convey something about gender, nor that gender is inconsequential for hiring and placement practices even when examining only female applicants.

Heilman and colleagues (2004) conducted three studies evaluating decision making and reactions towards a woman's performance in a masculine job when their performance outcome was clearly successful rather than ambiguous. Heilman, Wallen, Fuchs, and Tamkins (2004) focused on perceptions of employees based on whether they were explicitly given high performance ratings or not. In study one, Heilman et al. (2004) was interested in understanding how information about success would impact the ways in which men and women were perceived when working in the same masculine job. Participants received a packet of materials containing a job description of an Assistant Vice President for sales in an aircraft company, a short biographical description of three employees, and questionnaires. The sex of employee was manipulated by name selection. Gender was manipulated by describing the job as involving distinctly masculine tasks, such as assembling engines, working with fuel tanks, and other aircraft equipment. The gender-typed job was enhanced with a list of 10 employees, eight of which were men.

Participants rated three employees: a man and a woman (target employees) and another male employee (filler employee). The filler employee was included to make sex of employee less salient. The woman target employee was presented first half of the time, and the man target employee was presented first the other half of the time. Of the materials provided, each employee's annual performance review was made explicit: either an ambiguous performance or rated as successful (e.g., top performers). Employees were rated on their competence, likability, achievement-related attributes, and interpersonal hostility.

Results from study one (Heilman et al., 2004) indicated that ratings of competence, likability, achievement-related attributes, and interpersonal hostility for employees vary depending on whether performance review was rated as successful or was left ambiguous. Not surprisingly, both men and women employees with explicit successful performance information were viewed as more competent than those with ambiguous performance information. Further, women employees with top performance evaluations in their occupation were viewed as less likable and more hostile than men employees who had received top performance evaluations. However, when performance was ambiguous men employees were rated as significantly more competent than women employees. Furthermore, when performance information was ambiguous both men and women employees were rated similarly on likability; however, women were rated significantly less hostile than men were.

Findings from study one (Heilman et al., 2004) suggest that in order for women to be perceived as competent and achievement oriented explicit performance information must be provided. However, in doing so, successful and competent women will be perceived as less likable and more interpersonally hostile. Therefore, equally qualified, successful women within traditional male-dominated occupations are perceived and evaluated more negatively in terms of likability when compared to men in these occupations. Evaluators engage in gender-biased assumptions about women during performance based assessments unless they are given explicit information about their performance (Heilman et al., 2004). While Heilman et al. (2004) assesses evaluations of women already employed within traditionally male-dominated occupations, it remains unclear how sex and gender biases influence perceptions of likability for women who

have earned engineering degrees. Earning an engineering degree, having relevant work experience, and relevant computer and technical skills for an engineering occupation are considered as successful. The perception that successful and competent women are more interpersonally hostile and less likable may likely result in such women being liked less than men in the same engineering positions. This may result in women, particularly masculine women, being placed in to positions where they work alone rather than work with others.

In study two, Heilman et al. (2004) assessed perceptions of likability and interpersonal hostility of highly successful men and women positioned within jobs of different gender types. Similar to study one, participants received a packet of materials consisting of a job description as an Assistant Vice President of Human Resources, three short biographical descriptions, and questionnaires. Sex of employee was manipulated by name, where target employees were given a male or female name, and the filler employee was given a male, female, or a neutral name depending on the gender-typed job. Gender-typed jobs were manipulated by the division within the Assistant Vice President of Human Resource job: Financial Planning Division (male-typed position), Employee Assistance Division (female-typed position), and Training Division (neutral-typed position). Additional information regarding the job description was included to further enhance the manipulation of gender (e.g., "additional responsibilities", "characteristics," and employee names).

As in study one (Heilman et al., 2004), participants reviewed and rated the likability and interpersonal hostility of three employees: two target employees and one filler employee. Results from study two (Heilman et al., 2004) revealed a significant interac-

tion between sex of employee and gender-typed job. The female employee in the masculine position was perceived as significantly less likable and more hostile than the male employee was. Conversely, the female employee was perceived as significantly more likeable for the neutral-gender-typed position, and *marginally* more likeable for the feminine position. In addition, the female employee was perceived as significantly less hostile for the feminine- and neutral-gender-typed positions than the male employee was.

Heilman et al. (2004) demonstrate that negative reactions about a successful female employee were dependent upon whether the job was considered as masculine. Women with high levels of success within masculine jobs are perceived as violating normative behaviors, and are consequently disliked and thought of as hostile. If all applicants are perceived as equally qualified without explicit information regarding their performance, human resource employees may infer from this information about the success of each applicant based on their assumptions of what it takes to earn an engineering degree. There is a socially accepted assumption that women in engineering must have worked harder than men to earn the same, in part due to the minority status of women within engineering programs. It may be the case that human resource employees view both masculine and feminine women, who have the same engineering degree as male applicants, as successful. Following from Heilman et al. (2004), it may be the case that both masculine and feminine women are viewed as less likable when compared to men because they are viewed as successful within a male-dominated and masculine occupation.

In study three, Heilman et al. (2004) examined how the effect of being disliked influences employee evaluations and treatment within the work setting. Heilman et al.

(2004) focused on the effect of likability and competence of male and female employees on evaluation reactions and reward recommendations (i.e., salary and special career opportunities). Sex of employee was manipulated by name. Employee likability and competence were manipulated by comparing each employee's likability and competence to ratings of the average company employee's likability and competence. Participants received a packet of information indicating the employee's performance rating within the company and background information (i.e., university information, work experience, career information). Participants also indicated salary level and special career opportunity recommendations for the employee under review.

Results (Heilman et al., 2004) indicated that being disliked negatively impacted employee evaluations and recommendations even when employees were viewed as competent. Competent employees were highly recommended for special opportunities and higher levels of salary; however, the extent to which they were recommended for special opportunities depended on whether they were perceived as likable. Likable employees were more highly recommended for special career opportunities and recommended to have higher levels of salary than less likable employees were. In sum, the perception of one's likability influenced overall evaluations and reward recommendations regardless of their perceived level of competence. If human resource employees tend to focus on likability more so than an applicant's perceived competence, then placement into independent or collaborative positions may be influenced by who will work best alone and who will work best with others. For instance, if masculine women receive lower likability ratings they may be perceived as a better fit for independent jobs rather than jobs that require teamwork. Conversely, if feminine applicants are viewed as

more likable than masculine applicants, they may be considered as a better fit for positions where they would work on a team with other people, rather than work alone.

Occupational Roles

Studies have shown that an individual will be viewed more positively if they display the kinds of behaviors and traits that are typically associated with his or her sex (Eagly, 2000; Heilman et al., 2010, 2004; Rudman & Glick, 2001, 1999). Gender-stereotypes lead to the expectation that individuals *ought* to behave in ways that are congruent with gender roles. Beliefs that others, such as evaluators, have about how men and women *should* behave contribute to the expectation of aligning with gender roles (Eagly, 2000). Evans and Diekman (2009) demonstrated that sex differences relating to careers emerge due to the perception that male and female dominated careers emphasize different goals. According to Evans and Diekman (2009), women tend to pursue careers that emphasize working with and caring for others (i.e., communal values), and men tend to pursue careers that emphasize leadership (i.e., agentic values). Women's placement into or preference for particular jobs may be related to expectations about their goals and performance, rather than perceptions of their preferences or actual capabilities.

The proposed research will assess whether the manipulation of applicant sex and gender allows for discussing the influence of sex and gender on job placement and ratings of qualification, competence, and likability. The social awareness that engineering is male-dominated and the perception that engineering is masculine may influence how applicants with feminine characteristics are perceived, and consequently evaluated and placed into engineering positions. The extent to which a mismatch exist between the

gender role of an applicant and the occupational role of a job may depend on how much these two roles actually differ from each other. For example, a feminine female working collaboratively with a team may be viewed as a better fit for the collaborative position than if she were working solo in an independent position because femininity is linked to working with others. In contrast, a masculine female working solo may be viewed as a better fit for the independent position than if she were working collaboratively with a team because masculinity is linked to independence.

Engineering Work Environment

Kanter (1977) discusses how the beginning of corporations from 1890 to1910 influenced the workplace in terms of the sex-polarization and sex-segregation of the corporate world's organizational structure. Congruent with Eagly, the belief in heteronormative behaviors influences how groups are formed within occupations (Kanter, 1977). Kanter (1977) describes managerial positions as the "masculine ethic," a perception that these positions require masculine traits (e.g., analytical, decisiveness, limited emotions, rationality, and efficiency) over feminine traits. Even as women have begun to move into traditionally male-dominated occupations, they are often placed into positions of lower authority and status (Kanter, 1977). The lack of women within engineering occupations is influenced by the emphasis on masculine traits, especially given that engineering is predominately occupied by men; 86.3% according to the 2013 Bureau of Labor Statistics.

Kanter (1977) describes how pressure to conform to the "masculine ethic" of managerial positions influences employees to conform to specific behavioral expectations of the workplace in order to succeed. Bureaucratic corporations rely on the idea of

who fits into a position based on behavioral expectations (Kanter, 1977). This ultimately leads to the exclusion of people who are perceived as not "fitting in" within the social structure of occupations (Kanter, 1977). Feminine women are viewed as different when positioned into masculine occupations, whereas masculine women are viewed as different in terms of what is expected in society but not necessarily in terms of what is expected in masculine occupations. Both types of women suffer on evaluations and reward recommendations because they are perceived as less likable or less socially similar within the group (Kanter, 1977). Similarly, Heilman et al. (2004) demonstrated that successful and competent women are viewed as less likable than successful men. Consequently, these successful women are not rewarded through salary and career opportunities because they are liked less than men (Heilman et al., 2004).

Given that men make up a high proportion of engineering jobs, perceptions surrounding engineering may be that they require qualities that men and masculine people are expected to possess. Such qualities include task-orientated behaviors, independence, decisiveness, and assertiveness. The gendered perception of engineering occupations may influence the evaluation of applicants and the placement of applicants into different types of positions based on perceptions of an applicant's masculinity and femininity. If an engineering job is viewed as more collaborative and interpersonal than independent, the job may be perceived as requiring some qualities viewed as feminine. For example, a job that requires working with a team of engineers in order to build a sustainable water treatment facility for a poor village would be perceived as interpersonal and helpful. In contrast, a job requiring an engineer to work solo in order to repair a mechanical system would be perceived as task-oriented and emphasize independence. Occupations empha-

sizing feminine qualities may lead women into careers associated more with helping and caring for others, such as life sciences (e.g., medical fields), rather than physical sciences (e.g., chemistry) and engineering (Weisgram & Bigler, 2006).

Current literature on STEM occupations attempts to understand why women pursue particular positions within STEM careers (Diekman et al., 2010). Diekman et al. (2010) found that women were more likely than men to believe STEM careers do no facilitate communal goals, and that this influences STEM career pursuits. However, little research has assessed how perceptions of sex and gender influence occupations that applicants are placed into. Understanding how human resource employees perceive an applicant's sex and gender may contribute toward understanding how different types of positions requiring the same qualifications influence job placement. Furthermore, how human resource employees perceive applicants may help shed light on whether masculine and feminine applicants are placed into these occupations based on gender-stereotypes.

Women in Engineering

Among society, the perception that engineering is a masculine profession unsuitable for women has negatively influenced some women's abilities to become successful within the field. Powell et al. (2009) proposes the way gender is "done" in work environments may influence the inequality between the sexes; "In 'doing' engineering, women often 'undo' their gender" (Powell et al., 2009). The gender performativity of women within engineering may be a product of self-fulfilling prophecy rather than a socially conforming in order to gain access into engineering. Human resource employees may expect women to perform in masculine ways if they are pursuing an engineering occupa-

tion. Consequently, women rise to these expectations in order to "fit in" with the social structure of the occupation. McIlwee and Robinson (1992) discuss the academic and work culture of engineering, stating that academia values the performance of women based on how well they perform on their work whereas the engineering workplace values "a fascination with technology, expertise as a tinkerer, and an aggressive style of self-presentation" (p.50). These values are characteristic of traits masculine people are assumed to have. McIlwee and Robinson (1992) also state that women must outwardly demonstrate competence about their knowledge and skills, as well as perform and enact masculine norms; they have to "do" the masculine gender (Dryburgh, 1999; McIlwee & Robinson, 1992, p.139-140). McIlwee and Robinson (1992) explore how structural and gender role perspectives contribute to understanding the status of women in engineering careers, and the factors that contribute to occupational segregation of women in traditionally male-dominated careers.

The structural perspective proposes that occupational status and behaviors of men and women are influenced by the structure of the work environment and society, as opposed to specific characteristics men and women bring to the workplace (McIlwee & Robinson, 1992, p.14). According to McIlwee and Robinson (1992), previous research has suggested that characteristics of a job may predict work related attitudes and behaviors better than the gender of the employee (see Kanter, 1977; see Gordon, 1972). However, job placement of applicants is likely to be influenced by perceptions of how well attributes of the occupation match attributes of an applicant.

The gender-role perspective focuses on the influence of gender-role socialization relative to women within the workforce (McIlwee &Robinson, 1992). In congruence

with Eagly (1987), gender-role socialization proposes that when a high percentage of women occupy a specific job that values certain types of goals, there exist an expectation that these women also value the goals of the job. Gender-roles influence how men and women develop particular personality characteristics associated with social role expectations, and shape how boys and girls view occupations as "male" or "female." Men are expected to be competent, instrumental, assertive, competitive, and career oriented within the workplace, whereas women are expected to be expressive, emotional, nonassertive, and family oriented within the workplace (McIlwee & Robinson, 1992, p.11). Such role expectations likely contribute to placement decisions of men and women within the workplace. Gender-socialization and social role theory indicate that males and females associate characteristics fundamental to engineering as masculine (e.g., math orientated, technological, and aggressive).

Hacker (1990) looked at a culture of engineering based on the values of male students and faculty at an east coast engineering institute. Hacker (1990) describes this particular culture of engineering as emphasizing the importance of male traits over female traits. The culture of engineering has norms and values emphasizing masculinity, where competence of an engineer is a based on their level of aggression, competitiveness, and degree of technical orientation (McIlwee & Robinsion, 1992). The role of gender becomes important in terms of being within an engineering workplace; to be perceived as an engineer is to "look like an engineer, talk like an engineer, and act like an engineer" (McIlwee & Robinson, 1992). Given that the culture of engineering has a preference towards masculinity, the underlying gendered component of engineering occupations is masculinity, not maleness. That is, to be considered an engineer one must look,

talk, and act masculine. Some work environments of the engineer may be established in such a way that they promote particular expectations of behavioral norms defined by social roles. Given that the work culture of engineering has been established around masculinity (McIlwee et al., 1992), human resource employees may question the competence and qualification of engineers who may be perceived as feminine. Violation of gender roles are typically perceived unfavorably, however, is it likely this violation is relative to the ideology of particular jobs. For example, if the engineering work environment is established around masculinity, the extent to which masculine women and feminine men are perceived as likable, and qualified and competent for each type of position may depend more on gender rather than sex. That is, a masculine woman conforms to the masculine role of engineering, whereas a feminine man may be viewed as violating traits considered necessary for that role. Consequently, the masculine woman may be viewed as more qualified and competent than the feminine man.

Research Objective

Our research explores the role that sex and gender has on perceptions of an applicants' qualification, competence, likability, starting annual salary suggestions, and job placement decisions into different engineering positions. We hope to understand how sex, gender, and job types interact to influence: (a) how do participants rate applicants on perceptions of qualification, competence, and likability, (b) how participants suggest a starting annual salary for each applicant, and (c) how participants place equally qualified applicants into different job types. The perception of qualification refers to how qualitied participants believed the applicant to be based on the applicant's education, work experience, and computer and technical skills. The perception of competence re-

fers to the participant's perception that the applicant will have the ability to accomplish required tasks of the occupation.

Overview and Hypotheses

Previous research has attempted to understand women's interest in pursuing STEM careers as a whole, rather than focusing on a specific subfield within STEM occupations. What occurs during job placement processes has received little attention. The current research address factors that may influence evaluation ratings and job placement of applicants into engineering. We explore what influences how applicants are placed into engineering positions, and how the collaborative or independent context of these positions may influence these decisions.

Three factors were manipulated in order to assess the effects sex and gender on perceived qualification, competence, likability, starting annual salary suggestions, and job placement of applicants: sex of applicant, gender of applicant, and the job type of each engineering position (i.e., independent and collaborative). The purpose of using collaborative job types was to explore whether positions where an applicant would be working on an engineering team would be viewed as a better fit for female and feminine applicants. The purpose of using independent job types was to explore whether positions where an applicant would be working alone would be viewed as a better fit for male and masculine applicants. We predicted that perceived levels of qualification, competence, and likability, and starting annual salary suggestions and job placement would differ based on applicant's sex and gender. We hypothesized that participants would place applicants into positions that viewed as aligning with an applicant's sex and gen-

der. In testing the hypotheses listed below, we attempt to shed light on whether evaluations and job placement are influenced by perceptions of applicant sex and gender.

Social Role Theory suggests that males pursuing male dominated occupations are particularly well-suited for the work (Eagly,1987). From this, we predicted that male applicants would be viewed as more qualified and competent than female applicants for a male-dominated occupation because they are sex-congruent with the occupation.

Hypothesis 1: Regardless of job type, there will be a main effect of sex such that male applicants will be rated as more qualified, competent, and likable than female applicants. In addition, starting annual salary suggestions will be greater for male applicants than female applicants.

Research from Eagly and colleagues (1999) has demonstrated that perceptions of success in male-dominated occupations requires masculine characteristics. Furthermore, we predicted that masculine applicants would be viewed as more qualified and competent than feminine applicants because they possess masculine characteristics viewed as necessary for a masculine occupation, such as engineering.

Hypothesis 2: Regardless of job type, there will be a main effect of gender such that masculine applicants will be rated as more qualified and competent than feminine applicants.

Research from Heilman et al. (2010) has demonstrated that women in male-typed jobs are liked less than men, and that men's likability ratings were not impacted when in male- and female-typed jobs. Heilman et al. (2004) has also demonstrated that women in male-typed jobs are liked less than men when viewed as successful but also considered equally competent to these men. In our study, all applicants were pursuing Engineering as a career and therefore are likely to be viewed as having the necessary degrees and work experience to be successful. Thus, female applicants for engineering jobs are likely to be seen as competent and as a consequence we hypothesized they would be less well-liked. In addition, Mahalik (2000) found that individuals who violate gender norms are often viewed negatively. More specifically, we predicted that the masculine male would be viewed as more likable than all applicants because he is sex- and gender-congruent with the occupation, and that the feminine male would be viewed as more likable than the female applicants because he is sex-congruent with the occupation. Furthermore, we predicted that the feminine female would be viewed as more likable than the masculine female because she does not violate gender norms.

Hypothesis 3: There will be a two-way interaction between sex and gender such that: (a) the masculine male will be rated as more likable than all applicants, (b) the feminine male will be rated as more likable than both female applicants, and (c) the feminine female will be rated as more likable than the masculine female.

Research from Diekman et al. (2010) suggests that women have a preference for occupations that involve working collaboratively. Further, Eagly and colleagues (1999) have discussed that perceptions of success in a male-dominated occupation require masculine characteristics, and vice versa for female-dominated occupations. From this, we predicted male and masculine applicants would be viewed as more qualified and competent than female and feminine applicants for engineering jobs that require working independently. We also predicted that female and feminine applicants would be viewed as more qualified and competent than male and masculine applicants for engineering jobs that require working collaboratively. Furthermore, we predicted that the frequency of placement into each of the four positions would depend on sex and gender as indicated by Hypothesis 6.

Hypothesis 4: There will be a two-way interaction between sex and job type such that: (a) male applicants will be placed into independent positions more frequently than female applicants, and will be rated as more qualified and competent for these positions, and (b) female applicants will be placed into collaborative positions more frequently than male applicants, and will be rated as more qualified and competent for positions.

Hypothesis 5: There will be a two-way interaction between gender and job type such that: (a) masculine applicants will be placed into independent positions more frequently than feminine applicants, and will be rated as more qualified and competent for these positions, and (b) feminine applicants will be placed into collabora-

tive positions more frequently than masculine applicants, and will be rated as more qualified and competent for these positions.

Hypothesis 6: There will be a three-way interaction between sex, gender, and job type. This interaction will be such that: (a) the masculine male will be viewed as most qualified and competent for the 100% independent position, (b) the feminine female will be viewed as most qualified and competent for the 100% collaborative position, (c) the masculine female and feminine male will be viewed as more qualified and competent for the 75% independent-25% collaborative and 75% collaborative-25% independent. More specifically, the masculine female will be more qualified and competent for the 75% independent-25% collaborative position, and the feminine male will be more qualified and competent for the 75% collaborative-25% independent position.

Chapter 2: Method

Participants

Ninety-six undergraduate psychology students (59 females and 37 males) from the University of Idaho participated in this study. Data from two participants were excluded because they were unable to complete the entire experiment due to prior obligations. The mean age of participants was 19.57 (*SD* = 2.06), with a range from 18 to 31. Participants identified their race and/or ethnicity as Caucasian or White (83.33%), Hispanic (14.58%), Black/African American (3.13%), Asian or Pacific Islander (3.13%), American Indian (2.08%), and other (1.04%). Participants identified their undergraduate major as Social Sciences (43.75%), STEM (29.17%), Arts and Humanities (10.42%), General/Interdisciplinary Studies (10.42%), Business (4.17%), and Health and Medicine (2.08%).

Research Design

A 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA was used to assess perceived levels of applicants' qualification, competence, likability, and starting annual salary suggestions. A 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) x 4 (job type: 100% independent, 75% independent-25% collaborative, 75% collaborative-25% independent, 100% collaborative) repeated measures ANOVA was used to assess each applicant's perceived level of qualification and competence for each job type. Applicant sex (i.e., male or female) was manipulated by varying the first name of each applicant on each résumé (e.g., Adam or Sara). Applicant gender (i.e., masculine or feminine) was manipulated via extracurricular activity and volunteer information associated with ste-

reotypically masculine or stereotypically feminine characteristics as determined by a pretest. Each engineering job type varied by the degree of working independently and collaboratively: 100% independent, 75% independent-25% collaborative, 75% collaborative-25% independent, 100% collaborative. The dependent variables measured included ratings of each applicant's perceived level of qualification, competence, and likability, and starting annual salary suggestions. Job placement was measured by how frequently each applicant was placed into each position. In addition, participants completed the following measures: Need for Closure (Roets & Van Hiel, 2011), Need for Cognition (Cacioppo & Petty, 1982), Social Dominance Orientation (Sidanius et al., 1994), Attitudes toward Women scale (Spence, Helmrich, & Stapp, 1973), Ambivalent Sexism Inventory (Glick & Fiske, 1996), Motivation to Control Prejudice Reactions Scale (Dunton & Fazio, 1997), and a measure of attitudes towards engineers.

Materials

We created four applicant résumés similar to those used in previous research (see LaCroix & Craig, 2008; Glick et. al., 1988; Horvath & Ryan, 2003; Weichselbaumer, 2003) reflecting all four possible combinations of sex and gender: masculine male (mM), masculine female (mF), feminine male (fM), and feminine female (fF). Résumés included different but equivalent information about education, work experience, and computer and technical skills. Sex of applicant was manipulated through the use of male and female first names. Gender of applicant was manipulated through information about extracurricular activities and volunteer work. Résumés belonging to masculine applicants contained information about extracurricular activities perceived as masculine (e.g., football or rugby team captain, intramural mix martial arts) and volunteer work per-

ceived as masculine (e.g., Fire Fighter and Homeless Shelter). Résumés belonging to feminine applicants contained information about extracurricular activities perceived as feminine (e.g., ballet dancer or instructor, practices yoga, or intramural gymnastics) and volunteer work perceived as feminine (e.g., Women's Shelter or Low-income Daycare Center). The perception of gender for extracurricular activities and volunteer work was determined by a pretest measure assessing the degree of masculinity and femininity for each item. Applicant résumés were similar to each other regarding information about years of work experience, education (degree and university), and time from graduating with a degree. See Appendix A for applicant résumés.

In addition to four applicant résumés, participants received four different job type descriptions. Each job type was described as a different position within the same engineering firm, Innovate, Inc. The general job description specified seeking engineers for an entry-level position who would be capable of carrying out various projects at one of four branches: the North, Everett, McNair, and Central Branch. The North Branch position was described as 100% independent, requiring a decisive and assertive applicant capable of independently designing, developing, and implementing engineering projects and solutions. The Everett Branch position was described as 100% collaborative work, requiring an applicant with the ability to work collaboratively with a team of other engineers to design, develop, and implement various projects. The McNair Branch position included tasks requiring 75% of the work to be completed independently and 25% of the work to be completed with a team of other engineers. The Central Branch position included tasks requiring 25% of the work to be completed independently and 75% of

the work to be completed with a team of other engineers. See Appendix B for detailed job descriptions.

Pretest

Prior to conducting the experiment, 87 participants completed a pretest designed to determine which qualifications would be perceived as equivalent for various résumé items, and the perceived level of masculinity and femininity of extracurricular activities and volunteer work. A 7-point Likert scale was used to assess how qualified an applicant was perceived based on various résumé items with 1 indicating "not at all qualified" and 7 indicating "extremely qualified." Pairwise comparisons were used to determine the equivalence of résumé items. The following résumé items were perceived as being equal ($p > 0.05$) regarding an applicant's qualification for the engineering position: a B.S. degrees from different universities, B.S. degrees in different domains of engineering, previous professional work experience, and experience with computer operating systems, software, and languages. See Appendix C for the pretest results.

Participants rated extracurricular activity and volunteer work on how masculine or feminine each was perceived to be using a 7-point Likert scale ranging from 1 ("not at all masculine" and "not at all feminine") to 7 ("extremely masculine" and "extremely feminine"). Results demonstrated extracurricular activities perceived as more masculine than feminine were football, rugby, and mixed martial arts ($p < 0.05$). Extracurricular activities perceived as more feminine than masculine were ballet, gymnastics, and yoga ($p < 0.05$). Results also demonstrated that volunteer work perceived as more masculine than feminine included work as a volunteer fire fighter and work with habitat for humanity ($p < 0.05$). Volunteer work perceived as more feminine than masculine included

volunteering at a low-income day care center and a women's shelter ($p < 0.05$). See Appendix C for pretest results.

Measures

The short version of the Need for Closure scale (Roets, A. & Van Hiel, A., 2011) consists of 15-items measuring a person's motivation to find answers to ambiguous situations even if the answer is incorrect, and measures their aversion towards ambiguity. Participants rated a series of statements (e.g., "I don't like situations that are uncertain.") using a 6-point Likert scale ranging from 1 ("completely disagree") to 6 ("completely agree"). Individuals with a high score have a preference towards order and structure, and are uncomfortable with ambiguity and confusion (Webster & Kruglanski, 1994). Individuals with a low score are more open-minded and tolerant to ambiguity (Webster & Kruglanski, 1994). The Cronbach's coefficient alpha level for the Need for Closure scale is reported as 0.84, indicating strong reliability as a scale (Webster & Kruglanski, 1994; Roets, A. & Van Hiel, A., 2011). See Appendix D for additional measures.

The Need for Cognition scale (Cacioppo & Petty, 1982) consists of 18-items measuring an individual's "tendency to engage in and enjoy thinking." Participants rated a series of statements (e.g., "I prefer complex to simple problems") on a 5-point Likert scale ranging from 1 ("extremely uncharacteristic of me") to 5 ("extremely characteristic of me"). Individuals with a high score demonstrate an increased interest in idea evaluation and problem solving, whereas individuals with a low score may process information more heuristically (Cacioppo, Petty, & Kao, 1984). The Cronbach's coefficient alpha level for the Need for Cognition scale is reported as 0.90, indicating strong reliability as a scale. See Appendix D.

Social Dominance Orientation (Pratto & Sidanius et al., 1994) is a 16-item scale that measures the degree to which a person prefers inequality among social groups. A 7-point Likert scale is used to measure a series of statements and phrases containing a balance of traits for and traits against these statements and phrases (e.g., "Group equality should be our ideal."). Participants rated their level of agreement or disagreement with each statement on a scale ranging from 1 ("strongly disagree") to 7 ("strongly agree"). Higher Social Dominance Orientation indicates a strong preference towards inequality among social groups. The Cronbach's coefficient alpha level for Social Dominance Orientation for this study was 0.89, indicating strong reliability as a scale. See Appendix D.

The Attitudes toward Women scale (Spence, Helmrich, & Stapp, 1973) measures individual beliefs regarding the rights, roles, and privileges that women should fulfill. The short version of the Attitudes toward Women scale (Daughtery & Dambrot, 1986) consist of 25 items assessing attitudes towards gender roles. Participants rated statements (e.g., "A woman should be as free as a man to propose marriage") about the rights and roles of women in various areas (e.g., vocational, educational, and intellectual activities; dating and sexual behaviors) ranging from "agree strongly" to "disagree strongly." Items are scored from 0 to 3, where 0 indicates a traditional response and 3 indicates a contemporary, profeminist response (Spence et al., 1973). The Cronbach's coefficient alpha level for the Attitude toward Women scale for this study was 0.84, indicating strong reliability as a scale. See Appendix D.

The Motivation to Control Prejudice Reactions Scale (Dunton & Fazio, 1997) consists of 17-items that measure individual differences towards controlling prejudice reac-

tions. Participants rated how much they agree or disagree with each statement (e.g., "I would never tell jokes that might offend others") on a scale ranging from -3 ("strongly disagree") to +3 ("strongly agree"). The Cronbach's coefficient alpha level for Motivation to Control Prejudice Reactions Scale for this study was 0.77, indicated strong reliability as a scale. See Appendix D.

The Ambivalent Sexism Inventory (Glick & Fiske, 1996) differentiates between hostile and benevolent sexism in order to predict ambivalent attitudes towards women. The scale consists of 22-items divided into two sub-scales consisting of 11-items each: the hostile sexism scale and the benevolent sexism scale. Participants rated their level of agreement to statements (e.g., "Women should be cherished and protected by men.") on a 6-point Likert scale ranging from 1 ("disagree strongly") to 6 ("agree strongly"). Individuals high in hostile sexism negatively evaluate career-oriented women, whereas individuals high in benevolent sexism positively evaluate non-career oriented women (e.g., domestic roles). High scores on the Ambivalent Sexism Inventory indicate less sexism, whereas low scores indicate more sexism. The Cronbach's coefficient alpha level for the Ambivalent Sexism Inventory for this study was 0.80, indicating strong reliability as a scale. See Appendix D.

In order to assess participant attitudes toward engineers, a questionnaire was created using The Reysen Likability Scale (Reysen, 2005). The Reysen Likability Scale (Reysen, 2005) assesses how much a person likes a specified target based on how strongly a person agrees or disagrees with a series of statements (e.g., "This person is likable.") about the specified target. The attitudes toward engineers questionnaire consists of 15-items that measures the degree of likability a person has towards an engi-

neer. Participants rated how much they agree or disagree with each statement on a scale ranging from 1 ("do not agree at all") to 7 ("extremely agree"). Individuals who score high on the scale represent higher liking towards engineers. The Cronbach's coefficient alpha level for the Reysen Likability Scale for this study was 0.75, indicating strong reliability as a scale. See Appendix D.

Procedure

After obtaining IRB approval from the University of Idaho (see Appendix E), participants were asked to participate in an experiment that involved evaluating applicants and making job placements based on personality and individual differences. All participants were given an informed consent document. All questions were presented using MediaLab software (Jarvis, 2012). First, participants were told that we were interested in understanding how people with different perspectives and personalities rate applicants for employment, and were instructed to take on the role of a human resource employee responsible for placing four applicants into one of four engineering positions. Following this, participants were instructed to complete two individual difference measures using MediaLab: the Need for Closure and the Need for Cognition. Once all participants completed these measures, they were given two folders, one containing four different job descriptions and the other containing four different applicant résumés. Prior to giving the folders to participants, the contents of each folder were randomized and counterbalanced using a random number generator from 1 to 4. Participants were instructed to begin by reading each job description thoroughly due to the similarities between them. Once participants finished reading all job descriptions, they were instructed to carefully read each applicant résumé. To simulate a more realistic résumé evalua-

tion process, participants were provided with pen and paper in order to record any notes deemed necessary, and were allowed to keep both folders for reference when making job placement decisions and evaluation ratings.

Immediately after all participants finished reviewing all job descriptions and applicant résumés, they made placement decisions for all four applicants using MediaLab. Participants were instructed to place one applicant into one of the engineering positions and that they could not place more than one applicant into each position (i.e., forced placement of each applicant into one position). This procedure is most similar to real world situations in which a single position may be available and it is not possible to place multiple people into that position. Conversely, a very qualified candidate cannot fill more than one full-time position. After all placement decisions were made participants made starting annual salary suggestions for each applicant within a salary range of $50,000 to $90,000 using MediaLab. The presentation of each applicant was randomized when participants made job placement decisions and annual salary suggestions.

Participants then concurrently rated each applicant on their perceived level of qualification, competence, and likability using a 7-point Likert scale ranging from 1 ("not at all qualified/competent/likable") to 7 ("extremely qualified/competent/likable"). The presentation of each applicant was randomized when participants made evaluation ratings, and the questions about to each applicant were presented in a random order. Next, participants answered a series of questions pertaining to each applicants' demographics, and a series of questions designed to assess whether the experimental manipulations were successful. Lastly, participants completed a series of additional measures in the following order: (1) attitudes toward engineers; (2) Social Dominance Orientation

(Sidanius et al., 1994), (3) Attitudes toward Women (Spence, Helmrich, & Stapp, 1973), (4) Ambivalent Sexism Inventory (Glick & Fiske, 1996), (5) Motivation to Control Prejudice Reaction Scale (Dunton & Fzaio, 1997), and (6) participant demographic information (i.e., age, sex, college major, race/ethnicity).

To determine if the manipulation of applicant gender was effective, participants rated how masculine and how feminine they perceived each applicant to be using a 7-point Likert scales ranging from 1 ("not at all masculine" and "not at all feminine") to 7 ("extremely masculine" and " extremely feminine"). To determine if the manipulation of job type was effective, participants rated how independent and how collaborative they perceived each job type to be on a scale ranging from 1 ("not at all independent" and "not at all collaborative") to 7 ("extremely independent" and "extremely collaborative"). Upon completion of the experiment, participants were debriefed and thanked for their participation.

Dependent Variables

Qualification. A two-item measure was used to evaluate how qualified participants perceived each applicant. The first item asked participants, "In general, how qualified do you feel the applicant is?" The second item asked participants, "How qualified is the applicant for any position at Innovate, Inc.?" Participants rated each item using a 7-point Likert scale ranging from 1 ("not at all qualified") to 7 ("extremely qualified"). The Cronbach's coefficient alpha level for the two items demonstrated good internal consistency for the masculine male ($\alpha = 0.82$), feminine male ($\alpha = 0.88$), and masculine female ($\alpha = 0.83$). The Cronbach's coefficient alpha level for items relative to the feminine female was slightly lower than 0.70 ($\alpha = 0.67$).

Competence. A two-item measure was used in order to evaluate how competent participants perceived each applicant to be. The first item asked participants, "In general, how competent do you feel the applicant is?" The second item asked participants, "How competent is the applicant for any position at Innovate, Inc.?" Participants rated each item using a 7-point Likert scale ranging from 1 ("not at all competent") to 7 ("extremely competent"). The Cronbach's coefficient alpha level for the two items demonstrated good internal consistency for the masculine male ($\alpha = 0.72$), feminine male ($\alpha = 0.74$), and masculine female ($\alpha = 0.79$). The Cronbach's coefficient alpha level for items relative to the feminine female was slightly lower than 0.70 ($\alpha = 0.62$).

Likability. A four-item measure was used in order to evaluate how likable participants perceived each applicant to be. The first item asked participants, "In general, how likable do you feel the applicant is?" The second item asked participants, "How likable does this applicant seem?" Participants rated each item using a 7-point Likert scale ranging from 1 ("not at all likable") to 7 ("extremely likable"). The third item asked participants, "In general, how nice do you feel the applicant is?" The fourth item asked participants, "How nice does this applicant seem?" Participants rated each item using a 7-point Likert scale ranging from 1 ("not at all nice") to 7 ("extremely nice"). The Cronbach's coefficient alpha level demonstrated good internal consistency for the masculine male ($\alpha = 0.92$), feminine male ($\alpha = 0.96$), masculine female ($\alpha = 0.93$), and feminine female ($\alpha = 0.93$).

Annual Salary Suggestions. Participants made starting annual salary suggestions ranging from $50,000 to $90,000 for each applicant. Participants were able to suggest a specific value within and including the upper and lower limits of this range.

Chapter 3: Results

Manipulation Check: Gender of Applicant

To test the manipulation check of gender data were evaluated using a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA procedure.

Masculine Applicants. To determine if the manipulation of masculinity was effective, participants were asked to rate how traditionally masculine they believed each applicant to be using a 7-point Likert scale ranging from 1 ("not at all masculine") to 7 ("extremely masculine"). Results demonstrated a significant main effect of gender, $F(1, 95) = 408.91$, $p < 0.001$, $\eta^2 = 0.62$. The effect was such that participants perceived masculine applicants ($M_{MM} = 6.11$, $SD_{MM} = 1.04$; $M_{MF} = 5.05$, $SD_{MF} = 1.06$) as more masculine than feminine applicants ($M_{FF} = 2.26$, $SD_{FF} = 1.06$; $M_{FM} = 3.19$, $SD_{FM} = 1.36$). There was also a significant main effect of sex, $F(1, 95) = 65.76$, $p < 0.001$, $\eta^2 = 0.08$, such that the male applicants ($M_{MALES} = 4.65$, $SD_{MALES} = 0.88$) were perceived as more masculine than female applicants ($M_{FEMALES} = 3.66$, $SD_{FEMALES} = 0.71$). These effects demonstrate evidence that the manipulation of gender was successful for masculine applicants.

Feminine Applicants. To determine if the manipulation of femininity was effective, participants were asked to rate how traditionally feminine they believed the applicant to be using a 7-point Likert scale ranging from 1 ("not at all feminine") to 7 ("extremely feminine"). Results demonstrated a significant main effect of gender, $F(1, 95) = 308.48$, $p < 0.001$, $\eta^2 = 0.60$. The effect was such that participants perceived feminine applicants ($M_{FF} = 5.86$, $SD_{FF} = 1.15$; $M_{FM} = 4.92$, $SD_{FM} = 1.24$) as more feminine than masculine applicants ($M_{MM} = 2.08$, $SD_{MM} = 1.00$; $M_{MF} = 3.03$, $SD_{MF} = 1.34$). There was also a

significant main effect of sex, $F(1, 95) = 82.16$, $p < 0.001$, $\eta^2 = 0.07$, such that female applicants ($M_{FEMALES} = 4.45$, $SD_{FEMALES} = 0.76$) were perceived as more feminine than male applicants ($M_{MALES} = 3.50$, $SD_{MALES} = 0.70$). These effects demonstrate significant evidence that the manipulation of gender was successful for feminine applicants.

Manipulation Check: Job Descriptions

To test the manipulation check for different job types, data were evaluated using a one-way repeated measures ANOVA with four levels of job types (i.e., 100% independent, 75% independent-25% collaborative, 25% collaborative-75% independent).

Independent Job Description. To determine if independent job type manipulations were effective, participants were asked to rate how independent each position was perceived using a 7-point Likert scale ranging from 1 ("not at all independent") to 7 ("extremely independent"). Results from a one-way repeated measures ANOVA demonstrated a significant main effect for job type, $F(3, 93) = 475.50$, $p < 0.001$, $\eta^2 = 0.87$. The effect was such that the 100% independent position ($M_I = 6.69$, $SD_I = 0.81$) and 75% independent-25% collaborative position ($M_{IC} = 5.60$, $SD_{IC} = 0.80$) were perceived as more independent than the 100% collaborative position ($M_C = 1.46$, $SD_C = 1.03$) and 75% collaborative-25% independent position ($M_{CI} = 2.81$, $SD_{CI} = 1.11$).

Furthermore, the 100% independent position was rated as significantly more independent than the 75% independent-25% collaborative position, $F(1, 95) = 154.38$, $p < 0.001$, $\eta^2 = 0.62$, 75% collaborative-25% independent position, $F(1, 95) = 742.24$, $p = 0.001$, $\eta^2 = 0.89$, and 100% collaborative position, $F(1, 95) = 1393.50$, $p < 0.001$, $\eta^2 = 0.94$. The 75% independent job was rated as significantly more independent than the 75% collaborative position, $F(1, 95) = 329.31$, $p < 0.001$, $\eta^2 = 0.78$, and 100% collabora-

tive position, $F(1, 95) = 861.48$, $p < 0.001$, $\eta^2 = 0.90$. These effects demonstrate evidence that the manipulation of independent job types was successful.

Collaborative Job Description. To determine if the collaborative job type manipulation was effective, participants were asked to rate how collaborative each position was perceived using a 7-point Likert scale ranging from 1 ("not at all collaborative") to 7 ("extremely collaborative"). Results from a one-way repeated measures ANOVA demonstrated a significant main effect for job type, $F(31, 93) = 694.05$, $p < 0.001$, $\eta^2 = 0.89$. The effect was such that participants perceived the 100% collaborative position ($M_C = 6.89$, $SD_C = 0.74$) and 75% collaborative-25% independent position ($M_{CI} = 5.63$, $SD_{CI} = 1.14$) as more collaborative than participants perceived the 100% independent position ($M_I = 1.31$, $SD_I = 0.73$) and 75% independent-25% collaborative position ($M_{IC} = 2.74$, $SD_{IC} = 0.94$).

Furthermore, the 100% collaborative position was rated as significantly more collaborative than the 75% collaborative-25% independent position, $F(1, 95) = 120.3$, $p < 0.001$, $\eta^2 = 0.56$, 75% independent-25% collaborative position, $F(1, 95) = 1059.5$, $p < 0.001$, $\eta^2 = 0.92$, and 100% independent position, $F(1, 95) = 2121.84$, $p < 0.001$, $\eta^2 = 0.96$. The 100% independent position was significantly less collaborative than the 75% independent-25% collaborative position, $F(1, 95) = 212.29$, $p < 0.001$, $\eta^2 = 0.69$. The 75% collaborative-25% independent position was significantly more collaborative than the 100% independent position, $F(1, 95) = 828.89$, $p < 0.001$, $\eta^2 = 0.89$. The 75% collaborative-25% independent position was significantly more collaborative than the 75% independent-25% collaborative position, $F(1, 95) = 339.37$, $p < 0.001$, $\eta^2 = 0.78$. These

effects demonstrate evidence that the manipulation of collaborative job types was successful.

Hypothesis 1-3

To test Hypothesis 1-3 data were analyzed using a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA.

Dependent Variables

Qualification. Hypothesis 1 predicted a main effect of sex such that male applicants would be rated as more qualified than female applicants. A 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA was used to test whether sex of applicant influenced perceptions of qualification. Hypothesis 1 was not supported, $F(1, 95) = 1.00$, $p = 0.95$; participants perceived male applicants as equally qualified when compared to female applicants.

Hypothesis 2 predicted a main effect of gender such that masculine applicants would be rated as more qualified than feminine applicants. Hypothesis 2 was supported for perceptions of qualification. There was a significant two-way interaction between sex and gender of applicant on perceptions of qualification, $F(1, 95) = 4.26$, $p = 0.04$, $\eta^2 = 0.01$, and a main effect of gender, $F(1, 95) = 6.07$, $p = 0.02$, $\eta^2 = 0.03$. For males and females, being masculine led to being rated as more qualified than being feminine; however, this difference was greater for male applicants than female applicants. Further analyses of simple effects tests comparing the differences between ratings of qualification for each level of sex were conducted. For male applicants, a repeated measures ANOVA with two levels of gender (i.e., masculine, feminine) demonstrated that the masculine male was viewed as significantly more qualified than the feminine male, $F(1, 95) =$

11.04, $p = 0.001$, $\eta^2 = 0.10$. A second repeated measures ANOVA for female applicants revealed that the masculine female and the feminine female were viewed as equally qualified, $F(1, 95) = 0.70$, $p = 0.41$, $\eta^2 = 0.01$. The main effect of gender was such that masculine applicants ($M_{MM} = 6.09$, $SD_{MM} = 0.88$; $M_{MF} = 5.95$, $SD_{MF} = 1.22$) were perceived as more qualified than feminine applicants ($M_{FF} = 5.84$, $SD_{FF} = 0.90$; $M_{FM} = 5.71$, $SD_{FM} = 1.05$).

Competence. Hypothesis 1 predicted a main effect of sex such that male applicants would be rated as more competent than female applicants. A 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA was used to test whether sex of applicant influenced perceived levels of competence. Hypothesis 1 was not supported, $F(1, 95) = 0.94$, $p = 0.33$; participants perceived male and female applicants as equally competent.

Hypothesis 2 predicted a main effect of gender such that masculine applicants would be rated as more competent than feminine applicants. A 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA was used to test whether gender of applicant influenced perceived levels of competence. Hypothesis 2 was supported for perceptions of competence. There was a significant main effect of gender, $F(1, 95) = 9.34$, $p = 0.003$, $\eta^2 = 0.04$, such that participants rated masculine applicants ($M_{MM} = 5.98$, $SD_{MM} = 0.96$; $M_{MF} = 5.87$, $SD_{MF} = 1.11$) as more competent than feminine applicants ($M_{FF} = 5.63$, $SD_{FF} = 0.94$; $M_{FM} = 5.69$, $SD_{FM} = 0.92$).

Likability. Hypothesis 1 predicted a main effect of sex such that male applicants would be rated as more likable than female applicants. A 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA was

used to test whether sex of applicant influenced perceived levels of likability. Hypothesis 1 was not supported, $F(1, 95) = 1.57$, $p = 0.20$; participants perceived male female applicants as equally likable.

Hypothesis 3 predicted a two-way interaction between sex and gender such that participants would perceive: (a) the masculine male as most likable, (b) the feminine male as more likable than the feminine female and the masculine female, and (c) and the feminine female as more likable than the masculine female. A 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA was used to test whether sex and gender of applicant influenced perceived levels of likability. Partial support for Hypothesis 3 was found. There was a significant two-way interaction between sex and gender of applicant, $F(1, 95) = 5.61$, $p = 0.02$, $\eta^2 = 0.01$. For both males and females, being feminine led to being rated as more likable than being masculine; however, this difference was greater for female applicants than male applicants. Results also demonstrated a significant main effect of gender, $F(1, 95) = 35.8$, $p < 0.001$, $\eta^2 = 0.14$, such that participants rated feminine applicants ($M_{FF} = 5.89$, $SD_{FF} = 0.92$; $M_{FM} = 5.81$, $SD_{FM} = 1.07$) as more likable than masculine applicants ($M_{MM} = 5.41$, $SD_{MM} = 1.05$; $M_{MF} = 5.13$, $SD_{MF} = 1.14$).

Further, planned comparisons were used to directly test Hypothesis 3(a), 3(b), and 3(c). Likability ratings for the masculine male were compared to likability ratings for all other applicants. Contrary to our expectation, results demonstrated that the masculine male was perceived as significantly less likable than all other applicants, $F(1, 95) = 5.05$, $p = 0.03$. Likability ratings for the feminine male were compared to likability ratings for the feminine female and masculine female. Results demonstrated support for

Hypothesis 3(b), the feminine male was perceived as more likable than the feminine female and masculine female, $F(1, 95) = 8.04$, $p = 0.01$. Likability ratings for the feminine female were compared to likability ratings for the masculine female. Results demonstrated support for Hypothesis 3(c), the feminine female was perceived as more likable than the masculine female, $F(1, 95) = 34.03$, $p < 0.001$.

Annual Salary Suggestions. Hypothesis 1 predicted a main effect of sex such that starting annual salary suggestions for male applicants would be greater than starting annual salary suggestions for female applicants. A 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA was used to test whether sex of applicant influenced starting annual salary suggestions. Hypothesis 1 was not supported, $F(1, 95) = 0.83$, $p = 0.4$; participants made equal starting annual salary suggestions for male and female applicants. Starting annual salary suggestions for applicants were as follows: males (M_{MM} = \$69, 385, SD_{MM} = \$9,599; M_{FM} = \$67, 411, SD_{FM} = \$10, 428) and females (M_{MF} = \$68, 041, SD_{MF} = \$9, 754; M_{FF} = \$67, 250, SD_{FF} = \$8, 945). No significant effect of gender was found.

Hypothesis 4-6

To test Hypothesis 4-6 data were analyzed using a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) x 4 (job type: 100% independent, 75% independent-25% collaborative, 75% collaborative-25% independent, 100% collaborative) repeated measures ANOVA. A chi-square goodness of fit test was used to assess job placement of applicants.

Qualification. Both Hypothesis 4 and 5 predicted a two-way interaction between sex and job type, and gender and job type. We predicted that male and masculine appli-

cants would be rated as more qualified for independent positions than female and feminine applicants, and female and feminine applicants would be rated as more qualified for collaborative positions than male and masculine applicants. Hypothesis 6 predicted a three-way interaction between sex of applicant, gender of applicant, and job type. We predicted that the masculine male would be rated as more qualified for the 100% independent position than all other applicants. We also predicted the feminine female would be rated as more qualified for the 100% collaborative position than all other applicants. In addition, we predicted that the masculine female would be rated as more qualified for the 75% independent-25% collaborative position, and the feminine male would be rated as more qualified for the 75% collaborative-25% independent position.

Results from a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) x 4 (job type: 100% independent, 75% independent-25% collaborative, 75% collaborative-25% independent, 100% collaborative) repeated measures ANOVA demonstrated a significant main effect of job type, $F(3, 93) = 11.39$, $p < 0.001$, $\eta^2 = 0.02$. This effect was such that participants rated all applicants as more qualified for jobs that required working collaboratively ($M_{CI} = 5.44$, $SD_{CI} = 0.87$; $M_C = 5.34$, $SD_C = 0.94$) than jobs that required working independently ($M_{IC} = 5.30$, $SD_{IC} = 0.87$; $M_I = 4.95$, $SD_I = 1.03$). Hypothesis 4, 5, and 6 were not supported for significant main effects of sex $F(1, 95) = 0.03$, $p = 0.87$, or gender, $F(1, 95) = 0.62$, $p = 0.43$, and no significant interactions were present. See table 8 for means. In sum, it appears that participants did not differentiate between applicants' qualification for the four different job types based on sex or gender. Results suggest that all applicants were perceived as more qualified for jobs requiring collaborative work rather than jobs requiring independent work.

Competence. Both Hypothesis 4 and 5 predicted a two-way interaction between sex and job type, and gender and job type. We predicted that male and masculine applicants would be rated as more competent for independent positions than female and feminine applicants, and female and feminine applicants would be rated as more competent for collaborative positions than male and masculine applicants. Hypothesis 6 predicted a three-way interaction between sex of applicant, gender of applicant, and job type. We predicted the masculine male would be rated as more competent for the 100% independent position than all other applicants. We also predicted the feminine female would be rated as more competent for the 100% collaborative position than all other applicants. In addition, we predicted that the masculine female would be rated as more competent for the 75% independent-25% collaborative position than all other applicants, and the feminine male would be rated as more competent for the 75% collaborative-25% independent position than all other applicants.

Results from a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) x 4 (job type: 100% independent, 75% independent-25% collaborative, 75% collaborative-25% independent, 100% collaborative) repeated measures ANOVA found evidence for a significant main effect to of job type, $F(3, 93) = 6.90$, $p = 0.0003$, $\eta^2 = 0.02$. This effect was such that participants rated all applicants as more competent for jobs requiring collaborative work ($M_{CI} = 5.40$, $SD_{CI} = 0.89$; $M_C = 5.30$, $SD_C = 0.91$) than jobs requiring independent work ($M_{IC} = 5.19$, $SD_{IC} = 0.96$; $M_I = 4.93$, $SD_I = 1.08$). Hypothesis 4, 5, and 6 were not supported for significant main effects of sex, $F(1, 95) = 2.24$, $p = 0.14$, or gender, $F(1, 95) = 0.16$, $p = 0.7$, and no significant interactions were present. See table 9 for means. In sum, it appears that participants did not differen-

tiate between applicants' competence for the four different job types based on sex or gender. All applicants were perceived as more competent for jobs requiring collaborative work rather than independent work.

Job Placement. Hypothesis 4 predicted that (a) male applicants would be placed into independent positions more frequently than female applicants, and (b) female applicants would be placed into collaborative positions more frequently than male applicants. Hypothesis 5 predicated that (a) masculine applicants would be placed into independent positions more frequently than feminine applicants, and (b) feminine applicants would be placed into collaborative positions more frequently than masculine applicants. A chi-square goodness of fit test was used to directly test Hypothesis 4 and 5. Hypothesis 4 and 5 were not supported. Results demonstrated that placement into the 75% independent-25% collaborative position was not equally distributed for masculine and feminine applicants, $\chi^2(1) = 3.88$, $p < 0.05$. Feminine applicants were placed into the 75% independent-25% collaborative position more frequently than masculine applicants.

In addition, results demonstrated that placement into the 100% collaborative position was not equally distributed for masculine and feminine applicants, $\chi^2(1) = 4.45$, $p < 0.05$. Masculine applicants were placed into the 100% collaborative position more frequently than feminine applicants. Chi-square goodness of fit tests for the placement of masculine and feminine applicants into the 100% independent and 75% collaborative-25% independent positions were not significant, indicating that participants placed masculine and feminine applicants equally into these positions.

Chi-square goodness of fit tests were also performed to determine whether male and female applicants were equally likely to be placed into each position. No significant results were found, indicating that male and female applicants were equally likely to be placed into each position; that is, sex of applicant did not significantly influence placement. A frequency distribution of applicant placement demonstrated that all applicants, except for the feminine female, were placed more frequently into collaborative positions compared to independent positions. The feminine female was placed into the 75% independent-25% collaborative position and 100% independent position more frequently than all applicants, particularly the masculine male who was placed into the 100% collaborative position more frequently than the feminine female.

Additional Measures

Participant scores for the Attitudes toward Women scale were positively correlated with ratings of perceived qualification ($r = 0.22 – 0.30$, $p < 0.05$). Attitudes toward Women scores were positively correlated with ratings of perceived competence ($r = 0.21 – 0.38$, $p < 0.05$). These findings suggest that participants closer to the contemporary, profeminist side of the Attitude toward Women scale are more likely to rate all applicants higher on how qualified and competent they were perceived.

Participant scores on the Ambivalent Sexism Inventory were negatively correlated with ratings of competence for the masculine female, $r = -0.29$, $p = 0.004$. Participants with higher Ambivalent Sexism Inventory scores were more likely to rate the masculine female lower on perceived competence. Scores on the Benevolent Sexism subscale was negatively correlated with competence for the feminine female applicant, $r = -0.21$, $p = 0.04$. Participants with higher benevolent sexism scores were more likely to rate the

feminine female lower on perceived competence. In particularly, female participant scores on the Ambivalent Sexism Inventory were negatively correlated with ratings of competence for the masculine female, $r = -0.43$, $p = 0.001$. For female participants, the higher their score on the Ambivalent Sexism Inventory, the more likely they were to rate the masculine female lower on perceived competence. It may be the cause that female participants hold negative stereotypes about professional women who deviate from traditional gender roles.

Participant scores on the Social Dominance Orientation, Motivation to Control Prejudice Reactions Scale, and attitudes towards engineers measure did not account for any significance variance in perceived ratings of qualification, competence, or likability. Furthermore, these measures did not demonstrate correlations with other measures.

Exploratory Dependent Variables

Data was collected on several exploratory variables. The exploratory variables that result in significant findings included each applicant's likelihood of being interviewed, level of experience, possession of masculine and feminine attributes, and relationship and family information. Data from these exploratory variables were analyzed using a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA. Only statistically significant results from these variables are reported below.

Interview Likelihood. Likelihood of interviewing each applicant was assessed using a single-item question asking, "How likely is it that you would have selected this applicant for an interview?" Participants rated the likelihood that they would have interviewed each applicant using a 7-point Likert scale ranging from 1 ("not at all likely")

to 7 ("extremely likely"). Results from a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA demonstrated a significant main effect of gender on interview likelihood, $F(1, 95) = 5.59$, $p = 0.02$, $\eta^2 = 0.03$. This effect was such that participants were more likely to have selected masculine applicants ($M_{MM} = 6.17$, $SD_{MM} = 0.96$; $M_{MF} = 6.04$, $SD_{MF} = 1.19$) for an interview than feminine applicants ($M_{FF} = 5.77$, $SD_{FF} = 1.15$; $M_{FM} = 5.86$, $SD_{FM} = 1.20$). This finding is partially congruent with Glick et al.'s (1988) finding that applicants with "masculine" work experience are more likely to be interviewed for a stereotypically masculine job. While masculine applicants did have "masculine" work experience, feminine applicants also had "masculine" work experience, given that all applicants had relevant engineering work experience. It may be that differences in volunteer work influenced perceptions of masculinity such that masculine applicants were perceived has having more "masculine" work experience than feminine applicants, and therefore, were rated as more likely to have be interviewed.

Experience. A single-item question was used to assess each applicant's level of experience (e.g., "Please rate how experienced the applicant is for the engineering position."). Participants rated level of experience using a 7-point Likert scale ranging from 1 ("not at all experienced") to 7 ("extremely experienced"). Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA revealed a marginally significant main effect of gender, $F(1, 95) = 3.83$, $p = 0.053$, $\eta^2 = 0.01$. This effect was such that masculine applicants ($M_{MM} = 5.61$, $SD_{MM} = 1.20$; $M_{MF} = 5.73$, $SD_{MF} = 1.02$) were viewed as slightly more experienced for the engineering position than feminine applicants ($M_{FF} = 5.44$, $SD_{FF} = 1.30$; $M_{FM} = 5.56$, $SD_{FM} = 1.14$).

Masculine Attributes. Participants were asked several questions assessing how much applicants possessed various masculine attributes (e.g., "How independent does this applicant seem?" and "How assertive does this applicant seem"?). Participants rated masculine attributes using a 7-point Likert scale ranging from 1 ("not at all independent/decisive/etc.") to 7 ("extremely independent/decisive/etc."). Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA demonstrated a significant main effect of gender for masculine attributes (i.e., aggression, ambition, decisiveness, independence, toughness, and strength), $F(1, 95) = 451.24$, $p < 0.001$, $\eta^2 = 0.71$. This effect was such that masculine applicants ($M_{MM} = 5.76$, $SD_{MM} = 0.80$; $M_{MF} = 5.85$, $SD_{MF} = 0.68$) were rated as possessing more masculine attributes than feminine applicants ($M_{FF} = 3.91$, $SD_{MM} = 0.81$; $M_{FM} = 4.05$, $SD_{MF} = 0.78$).

Feminine Attributes. Participants were asked several questions assessing how much applicants possessed various feminine attributes (e.g., "How helpful does the applicant seem?" and "How emotional does the applicant seem?"). Participants rated feminine attributes using a 7-point Likert scale ranging from 1 ("not at all helpful/emotional/etc.") to 7 ("extremely helpful/emotional/etc."). Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA demonstrated a significant main effect of gender for feminine attributes (i.e., sensitivity, passiveness, helpfulness, emotionality, and nurturing), $F(1, 95) = 314.44$, $p < 0.001$, $\eta^2 = 0.64$. This effect was such that feminine applicants ($M_{FF} = 5.43$, $SD_{MM} = 0.73$; $M_{FM} = 5.36$, $SD_{MF} = 0.78$) were rated as having more feminine attributes than masculine applicants ($M_{MM} = 3.79$, $SD_{MM} = 0.77$; $M_{MF} = 3.63$, $SD_{MF} = 0.80$).

Relationship Status. Relationship status was assessed using three items asking the likelihood that an applicant was single, married, or divorced. Participants rated applicants using a 7-point Likert scale ranging from 1 ("not at all likely") to 7 ("extremely likely"). Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA demonstrated a significant two-way interaction between applicant sex and gender on likelihood of being single, $F(1, 95) = 4.33$, $p = 0.04$, $\eta^2 = 0.02$. For male applicants, femininity led to perception of more likely to be single than did masculinity. For female applicants, masculinity led to perception of more likely to be single than did femininity, $F(1, 95) = 8.82$, $p = 0.004$. Overall, participants rated masculine applicants ($M_{MM} = 4.17$, $SD_{MM} = 1.38$; $M_{MF} = 4.66$, $SD_{MF} = 1.26$) as more likely to be single than feminine applicants ($M_{FF} = 4.13$, $SD_{FF} = 1.31$; $M_{FM} = 4.25$, $SD_{FM} = 1.47$).

Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA demonstrated a significant main effect of gender on likelihood of being divorced, $F(1, 95) = 6.59$, $p = 0.02$, $\eta^2 = 0.02$. This effect was such that participants rated masculine applicants ($M_{MM} = 3.10$, $SD_{MM} = 1.40$; $M_{MF} = 3.27$, $SD_{MF} = 1.32$) as more likely to be divorced than feminine applicants ($M_{FF} = 3.0$, $SD_{FF} = 1.38$; $M_{FM} = 2.88$, $SD_{FM} = 1.34$). These results may in part explain why masculine applicants were also rated as more qualified and competent than feminine applicants. It may be the case that participants perceived masculine applicants as having the ability to devote more time towards their career due to the perception that they do not have the same family responsibilities as feminine applicants.

Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA demonstrated a significant two-way interaction between applicant sex and gender on likelihood of being married, $F(1, 95) = 8.74$, $p = 0.004$, $\eta^2 = 0.04$. For male applicants, masculinity led to perception of more likely to be married than did femininity. For female applicants, femininity led to perception of more likely to be married than did masculinity, $F(1, 95) = 12.12$, $p = 0.001$. Overall, the masculine male and feminine female ($M_{MM} = 4.06$, $SD_{MM} = 1.34$; $M_{FF} = 4.20$, $SD_{FF} = 1.50$) were more likely to be viewed as married than the feminine male and masculine female ($M_{FM} = 3.85$, $SD_{FM} = 1.51$; $M_{MF} = 3.48$, $SD_{MF} = 1.24$).

Children. Participants rated the likelihood that applicants had children using a single-item question (e.g., "Please rate the likelihood that the applicant has children.") using a 7-point Likert scale ranging from 1 ("not at all likely") to 7 ("extremely likely"). Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA demonstrated a significant main effect of gender for the likelihood of having children, $F(1, 95) = 24.13$, $p = 0.001$, $\eta^2 = 0.08$. This effect was such that feminine applicants ($M_{FF} = 3.86$, $SD_{FF} = 1.66$; $M_{FM} = 3.82$, $SD_{FM} = 1.62$) were rated as more likely to have children than masculine applicants ($M_{MM} = 3.26$, $SD_{MM} = 1.55$; $M_{MF} = 3.05$, $SD_{MF} = 1.23$). This effect may explain why feminine applicants were perceived as more likable than masculine applicants. Traditionally feminine characteristics include caring for others, compassion, and nurturing, which may lead one to assume feminine people are more likable.

Chapter 4: Discussion

Overall, results demonstrated that the effect of applicant gender overwhelmed the effect of sex on ratings of perceived qualification, competence, and likability. While the effect of sex did interact with gender in terms of perceived levels of qualification and likability, gender influenced these perceptions more so than sex. More specifically, masculinity led to the perception that applicants were more qualified and competent, whereas femininity led to the perception that applicants were more likable. Perceptions of applicant's qualification and competence for each job type was dependent only on whether the positions were independent or collaborative, not dependent on applicant sex or gender. All applicants were viewed as more qualified and competent for collaborative positions than independent positions. Furthermore, feminine applicants were more frequently placed into the 75% independent-25% collaborative position, and masculine applicants were more frequently placed into the 100% collaborative position.

Sex alone did not influence participants' perceptions of applicant qualification, competence, likability, or starting annual salary suggestions. The interaction between sex and gender was such that masculinity influenced perceptions of qualification more for males than females. The interaction between sex and gender also influenced perceptions of likability where femininity influenced perceptions of likability more for females than males. Perceptions of competence for male and female applicants depended on gender alone. Participants did not view male applicants as more competent than female applicants, and did not suggest higher starting annual salaries for male applicants. The fact that the manipulation of gender overwhelmed the manipulation of sex suggests that perceptions related to sex are actually due to beliefs that sex and gender are congruent.

Specifically, when people think that females are feminine the female stereotype regarding incompetence is activated. When females are presented as masculine then the female stereotype is violated and the woman is made competent by virtue of her gender (not her sex).

With regard to male dominated occupations our findings may suggest that evaluations that people make when considering male-dominated and masculine jobs are more influenced by one's perceived gender rather than sex. This gender information is in turn seen as an indicator of one's level of qualification, competence, and likability. The lack of sex effects for qualification, competence, and likability may suggest that perceptions of an applicant's gender may be seen as providing more accurate information when viewing an applicant. In engineering these gender differences may be particularly important to understanding fit within an organization in part due to the deep seeded masculine roots that engineers have established within their organizational culture (McIlwee & Robinson, 1992).

The lack of sex effects on qualification and competence may be a result of a perception about the number of females within engineering. Because women are underrepresented in engineering and masculinity is viewed as a pre-requisite for success in the field, a woman who has successfully obtained a degree and experience may be by that fact alone perceived as masculine and therefore competent. In order, to determine whether this is the case it would be necessary to conduct a follow up study asking participants for their perceptions of female engineers and ask them how masculine or feminine they perceive female engineers to be.

Given that it is well known that women are underrepresented in STEM occupations and there has been a call for more women to be employed in engineering, it may be that people do not use sex as a primary indicator of one's qualification and competence. One recommendation could be that sex and gender information on resumes should be entirely removed prior to human resource employee's actually making placement and evaluation decisions about each applicant. This would prevent markers of femininity from being viewed as negatively impacting evaluations. However, for women who have masculine interests this may also preclude them from establishing competence that they would normally be imbued with based on their choice of extracurricular pursuits. Establishing a filter process for evaluating resumes would help to reduce individual bias and to reduce the impact that gender stereotypes have on perceptions of applicants.

The lack of sex differences in starting annual salary suggestions may have been due to the positions being described as "entry-level" and that applicant résumés did not have extensive work experience indicating past employment with another engineering firm. Similar results from Jagacinski (1987) demonstrated no starting salary differences between men and women engineers who were new to the field (i.e., 0-5 or 6-10 years of experience). However, Jagacinski (1987) did find significant differences between men and women who had more experience (i.e., 11-15 or 16-20 years of experience). Here, male engineers received significantly higher starting salaries than female engineers within the same range of work experience. Furthermore, the new professional status of each applicant may have caused participants to perceive applicants similarly competent for employment with the engineering firm. A follow up study including résumés of appli-

cants with different levels of experience may reveal gender and sex differences that were not evident in this study.

Hypothesis 2 predicted that masculine applicants would be perceived as more (a) qualified and (b) competent than feminine applicants. Support for Hypothesis 2(a) and 2(b) was demonstrated by a two-way interaction between sex and gender of applicant. Both male and female applicants with masculine characteristics were viewed as more qualified for the engineering positions than applicants with feminine characteristics, this difference was especially pronounced for female applicants. Research by Heilman (2010) found that men who perform well in feminine jobs are viewed as less competent and given less respect than men in gender-congruent jobs. This may suggest that men who violate expected gender roles by performing well in a gender-incongruent occupation consequently experience gender bias when rated on their level of competence. If we extend this finding to feminine men and feminine women who pursue masculine occupations, they may also be judged as less competent. This has the potential to impede the success of women engineers because women (in the absence of gender information) are presumed to be feminine and lacking in masculine characteristics.

Consistent with Heilman's (2010) work, in our study the feminine male was viewed as less qualified and competent for a masculine job than the masculine male. While feminine male engineers are pursuing a sex-congruent occupation, engineering is not a gender-congruent occupation for feminine males. Therefore, feminine males are violating gender norms by demonstrating more femininity than would be typical for masculine men. For feminine females, engineering is both a sex and gender incongruent occupation. This violation of expectations about sex and gender appropriate occupations

is also likely to be met with biased perceptions about competence and qualification. Our measures of explicit bias were not meaningfully correlated with participant ratings of qualification, competence, or likability. Thus, effects of gender and sex that indicate that feminine applicants (both male and female) are less competent or qualified may be in part due to subtle implicit bias, rather than overt explicit bias.

While our results from the Attitudes toward Women scale did not demonstrate any type of explicit bias, the negative impacts on perceptions of qualification and competence for applicants who were viewed as sex- and/or gender-incongruent may have been due to subtle implicit gender-stereotypes. Further investigation using an Implicit Association Test may allow for the exploration of any implicit bias that may have influenced participant's perceptions. Applicants who were perceived as masculine were viewed as "fitting in" with the "masculine culture" of engineering. Even though the masculine female violates gender-norms, her masculinity aligns her more with the engineering culture and provides her more freedom to violate gender expectations than feminine applicants.

Further evidence from Glick et al. (1988) has demonstrated that individuals who are perceived as gender-congruent within an occupation (e.g., masculine female in a masculine occupation) are viewed as more competent than those who are not gender-congruent within an occupation (e.g., feminine female in a masculine occupation). Given this perception, participants likely viewed masculine applicants as gender-congruent with the occupation, and viewed them as more qualified and competent. According to findings from Cejka and Eagly (1999), masculine attributes were necessary for perceptions of success in male-dominated occupations. It may be the case that engineers need

to have a degree of masculinity in order meet the expectations for working in an engineering occupation. Applicants who are perceived as gender incongruent (i.e., feminine) relative to an engineering occupation leads to the perception that they lack masculine traits (e.g., independence, decisiveness) deemed necessary for engineering.

Hypothesis 3 predicted that perceptions of likability would depend on sex and gender of applicant. Results from Hypothesis 3 indicated that for males and females being feminine led to being viewed as more likable than being masculine. Hypothesis 3(a) was not supported; the masculine male applicant was liked less than all other applicants. Hypothesis 3(b) and Hypothesis 3(c) were supported; the feminine male applicant was viewed as more likable than both female applicants, and the feminine female applicant was viewed as more likable than the masculine female applicant. Applicants who were viewed as feminine were also viewed as more compassionate, sensitive, emotional, helpful, and nurturing, all characteristics that implicate niceness and likability. It may be that participants perceive femininity as a precursor to niceness, and therefore view feminine applicants as more likable. Results from part one of a study conducted by Heilman and Okimoto (2007) may provide support as to why feminine applicants were liked more than masculine applicants.

In their study, Heilman and Okimoto (2007) emphasized communality as differentiating factors, where the female manager with explicit communal characteristic was liked more than the male manager with explicit communal characteristics. Descriptions about male and female managers without communal information resulted in female managers being liked less than male managers without communal information. While the direction of likability for Heilman et al.'s (2007) results are different from our re-

sults, it may be the case that feminine applicants are viewed as having stereotypically feminine characteristics associated with niceness and being liked. In general, women who pursue male-dominated occupations may be viewed as violating gender role expectations. Given that the feminine female was viewed as the most feminine of all applicants, more likely to have been married and more likely to have children, she may have also been viewed as pursuing engineering as a single way in which she was violating expectations of how a woman *should* be. On the other hand, the masculine female was viewed as masculine, less likely to be married or have children, and therefore was simply adding engineering to a longer list of gender violations. Consequently, the feminine female received more positive ratings of likability than masculine female because she lived up to her role expectations more so than the masculine female.

While the masculine female's masculinity may be rewarded by positive ratings of qualification and competence, her violation of gender stereotypes negatively impacted perceptions of her likability. The feminine male's violation of gender stereotypes resulted in different consequences. While he was viewed as more likable than both female applicants, he was negatively rated on perceived qualification and competence. It may be that applicants viewed as outwardly feminine receive positive feedback about perceptions of niceness and likability, but maleness was not sufficient to imply levels of masculinity that would also lead to perceptions that a feminine male was qualified and competent. In contrast, applicants who are viewed as outwardly masculine "fit" the gender expectations of engineering and are viewed as more qualified and competent than applicants who do not meet these expectations.

Women and Family

A secondary explanation for the perception that masculine applicants are viewed as more qualified and competent than feminine applicants may be due to perceptions about family obligations, particularly for women. Scientists with immediate family responsibilities are perceived as less committed to their work and less competent, whereas women without children are viewed as violating the expectation that women should be mothers (Williams et al., 2014). Further, women without children have been reported to work more hours than other employees (Williams et al., 2014; Traders Union Congress, 2008). This increased time at work may not only be perceived as a greater commitment to the organization, but also to the occupation as a whole.

Other results from Correll et al. (2007) have demonstrated that employees that were mothers were viewed as less competent than employees who were not mothers; however, fathers were not penalized. Participants in our sample viewed the feminine female as more likely to be married with children, and the masculine female as more likely to be single or divorced and without children. It may be the case that participants viewed the feminine female as potentially being less committed to work as evidence by perceived family obligations, and therefore less qualified and competent than masculine applicants. Similarly, the feminine male was also viewed as more likely to have children. Since employees who are fathers are not penalized (Correll et al., 2007), the feminine male may experience negative consequences for violating gender norms, but not for having family obligations.

Hypothesis 4 and 5 predicted that sex and gender would influence placement into positions involving varying levels of collaborative and independent work. Placement of

applicants differed from what was expected. Our pretest data indicated that, applicant resumes were equivalent in terms of education, relevant work experience, and similar computer and technical skills. Therefore, applicants should be placed into all positions at an equal rate if there is no bias in the placement decisions. Given what is known about gender bias in the workplace (Rudman & Glick, 1999) and Diekman et al.'s (2010) research indicating that women desire more collaborative rather than solitary jobs, we expected that male and masculine applicants would be preferred for independent positions. In addition, we expected that female and feminine applicants would be preferred for collaborative positions. Contrary to these expectations, masculine applicants were placed more frequently into collaborative positions. Given that engineering is masculine, masculine applicants were likely viewed as "fitting" the characteristics of what it takes to be an engineer, and therefore viewed as a part of the team more than the feminine applicants. Feminine applicants were placed into the 75%independent-25% collaborative position more frequently than masculine applicants.

Even though feminine applicants were viewed as less qualified and competent than masculine applicants, they were placed into a position that required 75% of the work to be completed independently more frequently than masculine applicants. Research from Diekman et al. (2010) has demonstrated that women who pursue STEM occupations tend to opt out due to the perception that these occupations lack the opportunity for working with others. However, in our study, when women were given access to both independent and collaborative engineering jobs, participants chose to place them into independent positions more than collaborative positions. Even after gaining access into an engineering occupation, feminine applicants appear to have been pushed

away from positions that would allow them to work on a team and into positions where they are socially isolated. If women do indeed have a preference towards working collaboratively, but they see women, particularly feminine women, in more isolated positions, these women may tend to opt out of particular career pursuits. Rather than women seeing STEM occupations as predominantly solitary work, they may see that women doing the work are isolated from other STEM professionals who do have greater latitude for collaboration within the field. This opportunity to collaborate with others in the field may be closely linked to the perceptions of female competence, and opportunities to network with other engineers (mostly men) in the workplace. It may be due to the perception that they do not "fit" the mold of what is expected of engineers (i.e., masculinity), and therefore, are put into positions where others do not have to deal with them. Previous literature (Robinson & McIlwee, 1991) has demonstrated that women in engineering often experience sexual harassment, and if they do not "fit in" with the masculine ethic, they are socially isolated. Participants may have implicit associations linking feminine women within a masculine occupation with the potential of sexual harassment to occur. Therefore, this is avoided by isolating her into a position where she works solo.

Hypothesis 6 predicted that gender would shape perceptions of qualification for independent collaborative positions. Results from Hypothesis 6 were not supported, there were no effects of gender on how qualified and competent applicants were for independent and collaborative positions. Overall, participants viewed all applicants as more qualified and competent for collaborative positions than independent positions. Given that the overall job description specified each position as "entry-level", it may be that participants viewed all applicants as lacking the experience necessary to work in-

dependently on various engineering projects. It is unclear exactly how participants viewed independent and collaborative positions and how their understanding of what is required to work independently and collaboratively influenced their ratings of qualification and competence.

Future work would benefit from understanding perceptions about independent and collaborative work. Shifting the language around these types of positions to indicate more specific characteristics required for each job may influence how participants place and evaluate applicants. It may be that participants viewed working collaboratively as having the opportunity for team building, which requires some form of social conformity dynamics (i.e., masculinity) in order for a team to function effectively. Further, independent work may be seen as suitable for those who would not do well in a group setting, rather than a place of prestige for those with sufficient expertise to work without the aid of others.

Limitations

There are several limitations to the present study. The first limitation is that of generalizability. This experiment was conducted in a laboratory setting with undergraduate student participants. The majority of our sample were students majoring in social sciences, particularly psychology. Graduates with similar degrees tend to go into human resource occupations where they may actually be responsible for making job placement decisions. In order to have a more representative sample a future study should use participants who plan to enter into human resource occupations and/or who plan to work for an engineering company. Finding such a sample was beyond the means of the pre-

sent study. Further, it is not clear whether what was found for engineering would hold for other STEM occupations or even for male-dominated occupations.

While the forced placement of applicants into each position may be viewed as a limitation, this scenario is likely to happen in the real world. It is unlikely human resource employees would have the ability to place multiple applicants into one job position, unless the position was hiring for multiple applicants. For example, if a new branch office is opening, there may be multiple positions and multiple applicants, but the positions may vary in terms of specific work task, even when the necessary qualifications in terms of education and expertise are equivalent. A future study could assess how participants would place applicants without the specification that only one applicant can be placed into one position. Another possible limitation could have been the use of only four resumes. Including additional filler resumes over target resumes becomes problematic. In order to manage this limitation we used measures to ask about qualification and competence, in addition to the placement into particular positions as a stand-alone measure.

Another limitation is the uncertainty of how the feminine female was perceived by participants. The manipulation check of femininity indicated that she was significantly more feminine than all other applicants. However, perceived qualification and competence measures demonstrated lower Cronbach's coefficient alpha levels than all other applicants, and she was placed into independent positions more frequently than all other applicants. Including a manipulation check for sex to ensure that she was perceived as female would have clarified some of these inconsistencies. Prior to conducting a future study, male and female names should be pretested for the manipulation of sex. That is,

the feminine females name "Kelsey" may also be considered as an appropriate name for males. As participants read through resumes, it may be that their presumption about sex is derived from the name at the top and then modified as the resume is reviewed. It may also be that participants considered qualification and competence items differently for the feminine female. It may be that these items did not hold together because they were thinking of her employment for other positions aside from an engineering position (e.g., secretarial work). It would also be useful to determine if it is possible to have a neutral resume for engineering positions, or whether it is inherently assumed that the applicant is male unless there is clear indication about the applicant's sex and gender.

A statistical limitation is the use of two-item scales for the analysis of applicants' perceived qualification and competence, and a four-item scale of the analysis of how likable applicants were perceived. While the Cronbach's coefficient alpha levels for each construct demonstrated good internal consistency for most applicants (Nunnally, 1978, p. 245), increasing the number of items would increase the reliability of each measure. To gain further clarity on participant perceptions of qualification, competence, and likability, future studies should include more items assessing each construct.

Implications and Future Directions

Previous research regarding women in STEM tends to focus on occupational pursuits (Diekman et al, 2010). Little research has directly assessed how applicants are perceived during the placement process, and how these perceptions influence decisions and ratings of qualification, competence, and likability. Our research has demonstrated that masculine applicants are viewed as more qualified and competent than feminine applicants; however, feminine applicants were placed into independent positions more fre-

quently than masculine applicants. It is unclear why applicants viewed as less qualified and competent would be placed into an independent position that may be viewed as requiring more responsibility. While participants do not demonstrate explicit gender bias as determine by results from the Attitudes toward Women scale, it may be the case that people hold an implicit bias towards femininity in engineering. Participants are willing to place feminine applicants into positions that require more responsibilities; however, participants' ratings of feminine applicants indicate that they view them as less qualified and competent. Future research could include an Implicit Association Test in order to explore whether sex- and/or gender-associations with STEM occupations may influence perceptions of applicants violating the masculine gender role of engineering, and influence perceptions of qualification and competence.

From this study, it is still unclear how participants perceive gender typical and gender atypical applicants within engineering, specifically women. Future studies should include the Attitudes Towards Women Engineers Scale (Jagacinski, 1987) and a scale assessing engineering opportunities for women relative to men (Jagacinski, 1987). These measures would be useful for assessing how women in engineering are viewed and how participants view opportunities for women in engineering relative to men. Furthermore, a measure assessing the extent to which participants believe each applicant preferred to work in any of the positions would allow us to explore beliefs about what types of positions men and women pursue within engineering.

In addition, assessing how participants viewed each independent and collaborative position may shed light onto how participants made placement decisions and evaluations. Additional measures could include items assessing how participants perceived

each independent and collaborative position, and what attributes participants believe are necessary in order to work for an engineering firm, and in order to work independently and collaboratively. Another future study direction could explore how applicant sex and gender effects shift for different types of engineering degrees and different levels of experience. It may also be useful to provide participants with resumes of applicants who have worked for an engineering company for several years, and manipulate availability information about applicant performance.

Chapter 5: Conclusions

If we hope to increase the participation of women in STEM occupations, it is critical that we expand our research beyond the leaky pipeline and the perceptions women have of STEM occupations. Organizations may make great strides in recruiting women, but once hired by an organization the opportunities provided within the organization may still lead to quite different career trajectories for those who do not fit the masculine male engineer expectation. In an economy that is increasingly reliant on technology, the workforce will not be able to sustain growth by employing only men who fit the traditional mold of engineer. Rather our conceptualization of who can be an engineer will also need to evolve to include trained and competent individuals regardless of their sex and gender characteristics. It is also important to understand how the increased reliance on interdisciplinarity and teams influence perceptions of who will be a good "team player" and who is relegated to work for which one has sole responsibility. As our society evolves to be more inclusive and accepting of a variety of career trajectories, distribution of labor within household and childcare responsibilities, it will be important to be intentional about overriding traditional biases. The call is not to be blind to sex or gender, but rather to re-envision engineering. The field must move beyond being an occupation solely for masculine men, to an occupation that prioritizes expertise, education, and finds value in being inclusive of women and femininity. At the core of engineering greatness is innovation and it is this innovation and openness to new ideas that will serve engineering well. Engineering organizations that find ways to be inclusive and move beyond these limiting biases will most certainly be organizations with long and profitable futures.

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Table 1. Summary of Hypotheses

Hypotheses	**Qualified**	**Competent**	**Likable**	**Annual Salary**
M = male F = female m = masculine f = feminine				
H_1: Main Effect of Sex	M > F	M > F	M > F	M > F
H_2: Main Effect of Gender	m > f	m > f	--	--
H_3: Sex X Gender	--	--	mM > fM, mF, fF fM > fF, mF fF > mF	--
H_4: Sex X Job Type Independent Jobs Collaborative Jobs	 M > F F > M	 M > F F > M	--	--
H_5: Gender X Job Type Independent Jobs Collaborative Jobs	 m > f f > m	 m > f f > m	--	--
H_6	**100% I**	**75% I**	**75% C**	**100% C**
Placement	mM	mF	fM	fF
Qualified Competent	mM > all others mM > all others	mF > all others mF > all others	fM > all others fM > all others	fF >all others fF >all others

Table 2. Summary of Results

Hypothesis 1: There will be a main effect of sex such that male applicants will be rated as more qualified, competent, and likable than female applicants. In addition, starting annual salary suggestions will be greater for male applicants than female applicants.	
Not Supported:	No significant main effects of sex on perceived ratings of qualification, competence, and likability were found. No significant main effects of sex on starting annual salary suggestions were found.
Hypothesis 2: There will be a main effect of gender such that masculine applicants will be rated as more qualified and competent than feminine applicants.	
Supported:	Results demonstrated a significant two-way interaction between sex and gender of applicant. For males and females, masculinity led to being rated as more qualified than femininity; however, this difference was greater for male applicants than female applicants. Results demonstrated a significant main effect of gender such that participants perceived masculine applicants as more qualified and competent than feminine applicants.

Table 2. Summary of Results (Continued)

Hypothesis 3: There will be a two-way interaction between sex and gender such that: (a) the masculine male will be rated as more likable than all applicants, (b) the feminine male will be rated as more likable than both female applicants, and (c) the feminine female will be rated as more likable than the masculine female.	
Supported:	Results found a significant two-way interaction between sex and gender of applicant. For both males and females, femininity led to being rated as more likable than masculinity; however, this difference was greater for female applicants than male applicants. Results found a main effect of gender such that participants perceived feminine applicants as more likable than masculine applicants. Hypothesis 3(b) was supported; the feminine male was more likable than both the feminine and masculine female. Hypothesis 3(c) was supported; the feminine female was more likable than the masculine female.
Not Supported:	No significant planned comparison test for Hypothesis 3(a).
Hypothesis 4: There will be a two-way interaction between sex and job type such that: (a) male applicants will be placed into independent positions more frequently than female applicants, and will be rated as more qualified and competent for these positions, and (b) female applicants will be placed into collaborative positions more frequently than male applicants, and will be rated as more qualified and competent for positions.	
Supported:	Results found a main effect of job type such that all applicants were perceived as more qualified and competent for collaborative positions than independent positions.
Not Supported:	No significant interaction or main effect of sex on perceptions of qualification or competence for different job types.

Table 2. Summary of Results (Continued)

Hypothesis 5: There will be a two-way interaction between gender and job type such that: (a) masculine applicants will be placed into independent positions more frequently than feminine applicants, and will be rated as more qualified and competent for these positions, and (b) feminine applicants will be placed into collaborative positions more frequently than masculine applicants, and will be rated as more qualified and competent for these positions.	
Supported:	Results found a main effect of job type such that all applicants were perceived as more qualified and competent for collaborative positions than independent positions.
Not Supported:	No significant interaction or main effect of gender on perceptions of qualification or competence for different job types.
Hypothesis 6: There will be a three-way interaction between sex, gender, and job type. This interaction will be such that: (a) the masculine male will be viewed as most qualified and competent for the 100% independent position, (b) the feminine female will be viewed as most qualified and competent for the 100% collaborative position, (c) the masculine female and feminine male will be viewed as more qualified and competent for the 75% independent-25% collaborative and 75% collaborative-25% independent. More specifically, the masculine female will be more qualified and competent for the 75% independent-25% collaborative position, and the feminine male will be more qualified and competent for the 75% collaborative-25% independent position.	
Not Supported:	No support for a three-way interaction between sex, gender, and job type was demonstrated.

Table 3. Hypothesis 1 and 2: Qualification

	Applicant Gender					
Applicant Sex	Masculine		Feminine		Total	
	M	*SD*	*M*	*SD*	*M*	*SD*
Male	6.09[a]	0.88	5.71[b]	1.05	5.90	0.78
Female	5.95[ab]	1.22	5.84[b]	0.90	5.90	0.88
Total	6.02	0.93	5.78	0.85		

Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA demonstrated a significant two-way interaction between sex and gender of applicant on perceptions of applicant qualification, $F(1, 95) = 4.26$, $p = 0.04$, $\eta^2 = 0.01$. Results also demonstrated a main effect of gender on perceptions of applicant qualification, $F(1, 95) = 6.07$, $p = 0.02$, $\eta^2 = 0.03$. No support for Hypothesis 1 was found, $F(1, 95) < 1.00$, $p > 0.05$.

Table 4. Hypothesis 1 and 2: Competence

	Applicant Gender					
Applicant Sex	Masculine		Feminine		Total	
	M	*SD*	*M*	*SD*	*M*	*SD*
Male	5.98	0.96	5.69	0.92	5.84	0.80
Female	5.87	1.11	5.63	0.94	5.75	0.85
Total	5.93[b]	0.89	5.66[a]	0.74		

Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA demonstrated a significant main effect of gender on perceptions of applicant competence, $F(1, 95) = 9.34$, $p = 0.003$, $\eta^2 = 0.04$. No support for Hypothesis 1 was found, $F(1, 95) = 0.95$, $p > 0.05$.

Table 5. Hypothesis 1 and 3: Likability

	Applicant Gender					
Applicant Sex	Masculine		Feminine		Total	
	M	*SD*	*M*	*SD*	*M*	*SD*
Male	5.41[a]	1.05	5.81[b]	1.07	5.61	0.90
Female	5.13[c]	1.14	5.89[b]	0.92	5.51	0.82
Total	5.27	0.93	5.85	0.82		

Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA demonstrated a significant two-way interaction between sex and gender on perceptions of applicant likability, $F(1, 95) = 5.61$, $p = 0.02$, $\eta^2 = 0.01$, and a main effect of gender, $F(1, 95) = 35.80$, $p < 0.001$, $\eta^2 = 0.14$. No support for Hypothesis 1 was found, $F(1, 95) = 1.57$, $p > 0.05$.

Table 6. Hypothesis 3: Direct Test of Likability

Applicant		Comparison	*F*	*Sig.*	*DF*
Masculine Male	<	Feminine Male Feminine Female Masculine Female	5.05[a]	0.03	95
Feminine Male	>	Feminine Female Masculine Female	8.04[b]	0.01	95
Feminine Female	>	Masculine Female	34.03[c]	< 0.001	95

Planned comparisons were used to directly test hypothesis 3 for likability ratings. Hypothesis 3(b) and hypothesis 3(c) were statistically significant in the predicted direction; the feminine male was more likable than the female applicants, and the feminine female was more likable than the masculine female. Hypothesis 3(a) was statistically significant, however, this was not in the predicted direction; all applicants were more likable than the masculine male.

Table 7. Hypothesis 1: Starting Annual Salary Suggestions

	Applicant Gender					
Applicant Sex	Masculine		Feminine		Total	
	M	*SD*	*M*	*SD*	*M*	*SD*
Male	$69, 385	9, 599	$67, 411	10, 428	$68, 398	7, 498
Female	$68, 041	9, 754	$67, 250	8, 945	$67, 645	7, 126
Total	$68, 713	7, 735	$67, 330	7, 472		

No support for Hypothesis 1 was found, $F(1, 95) = 0.83$, $p = 0.4$. There were no sex or gender differences in starting annual salary suggestions.

Table 8. Hypothesis 4-6: Qualification for Job Types

	Job Type							
Applicant	100% I		75% I 25% C		75% C 25% I		100% C	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
MM	5.03	1.83	5.24	1.48	5.48	1.35	5.55	1.41
FM	4.84	1.77	5.22	1.50	5.45	1.38	5.29	1.54
MF	4.95	1.82	5.12	1.66	5.57	1.48	5.30	1.68
FF	4.98	1.73	5.56	1.36	5.27	1.47	5.22	1.48
Total	4.95[b]	1.03	5.30[b]	0.87	5.44[a]	0.87	5.34[a]	0.94

Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) x 4 (job type: 100% independent, 75% independent-25% collaborative, 75% collaborative-25% independent, 100% collaborative) repeated measures ANOVA demonstrated a significant main effect of job type for perceived qualification, $F(1, 95) = 11.39$, $p < 0.001$, $\eta^2 = 0.02$. This effect was such that all applicants were viewed as more qualified for collaborative jobs than independent jobs.

Table 9. Hypothesis 4-6: Competence for Job Types

	Job Type							
Applicant	100% I		75% I 25% C		75% C 25% I		100% C	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
MM	4.97	1.77	5.15	1.55	5.26	1.51	5.36	1.51
FM	4.82	1.68	5.04	1.49	5.40	1.33	5.30	1.56
MF	5.01	1.81	5.18	1.62	5.48	1.35	5.34	1.50
FF	4.93	1.68	5.40	1.37	5.45	1.30	5.21	1.58
Total	4.93[b]	1.08	5.19[b]	0.96	5.40[a]	0.89	5.30[a]	0.91

Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) x 4 (job type: 100% independent, 75% independent-25% collaborative, 75% collaborative-25% independent, 100% collaborative) repeated measures ANOVA demonstrated a significant main effect of job type for perceived competence, $F(3, 93) = 6.90$, $p = 0.003$, $\eta^2 = 0.02$. This effect was such that all applicants were viewed as more competent for collaborative jobs than independent jobs.

Table 10. Gender Manipulation Check: Masculinity

	Applicant Gender					
Applicant Sex	Masculine		Feminine		Total	
	M	*SD*	*M*	*SD*	*M*	*SD*
Male	6.11	1.04	3.19	1.36	4.65	0.88
Female	5.05	1.06	2.26	1.06	3.66	0.71
Total	5.58	0.75	2.72	0.98		

Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA demonstrated a significant main effect of gender, $F(1, 95) = 408.91$, $p = 0.001$, $\eta^2 = 0.62$, such that masculine applicants were rated as more masculine than feminine applicants.

Table 11. Gender Manipulation Check: Femininity

	Applicant Gender					
Applicant Sex	Masculine		Feminine		Total	
	M	*SD*	*M*	*SD*	*M*	*SD*
Male	2.08	1.00	4.92	1.24	3.50	0.70
Female	3.03	1.34	5.86	1.15	4.45	0.76
Total	2.56	0.91	5.39	0.97		

Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA demonstrated a significant main effect of gender, $F(1, 95) = 308.48$, $p = 0.001$, $\eta^2 = 0.60$, such that feminine applicants were rated as more feminine than masculine applicants.

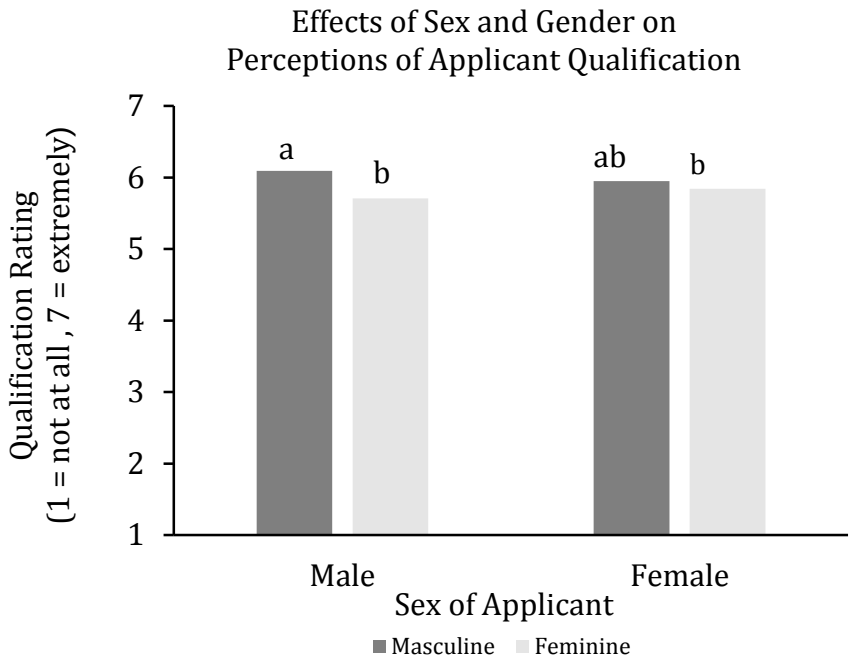

Figure 1. Effects of sex and gender on applicant qualification

Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA demonstrated a two-way interaction, $F(1, 95) = 4.26$, $p = 0.04$, $\eta^2 = 0.01$. For males and females, masculinity led to being rated as more qualified than femininity; however, this difference was greater for male applicants than female applicants. Results also demonstrated a main effect of gender, $F(1, 95) = 6.07$, $p = 0.02$, $\eta^2 = 0.03$, such that masculine applicants were more qualified than feminine applicants. No main effect of sex was demonstrated; $F(1, 95) < 1.00$, $p > 0.05$.

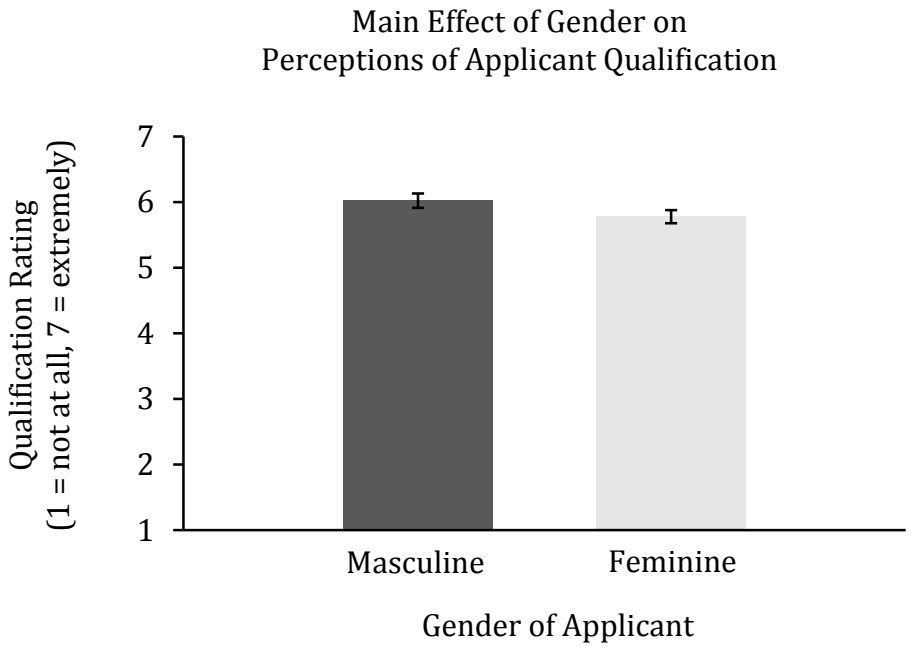

Figure 2. Main effect of gender on applicant qualification

Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA demonstrated a main effect of gender, $F(1, 95) = 6.07$, $p = 0.02$, $\eta^2 = 0.03$. Masculine applicants were perceived as more qualified than feminine applicants.

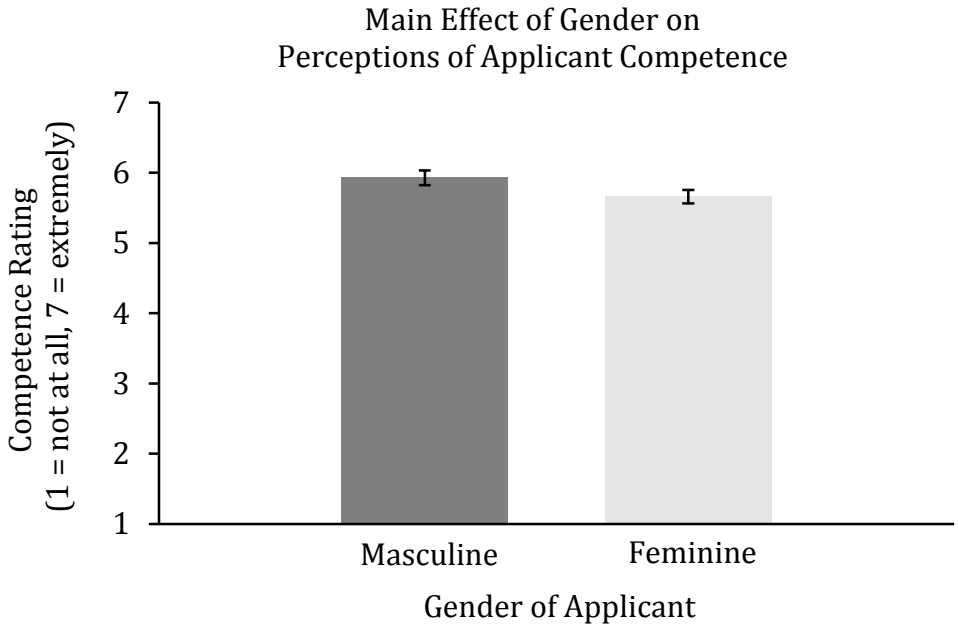

Figure 3. Main effect of gender on applicant competence

Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA demonstrated a significant main effect of gender on perceptions of applicant competence, $F(1, 95) = 9.34$, $p = 0.003$, $\eta^2 = 0.04$. Masculine applicants were perceived as more competent than feminine applicants. There was no main effect of sex, $F(1, 95) = 0.95$, $p > 0.05$.

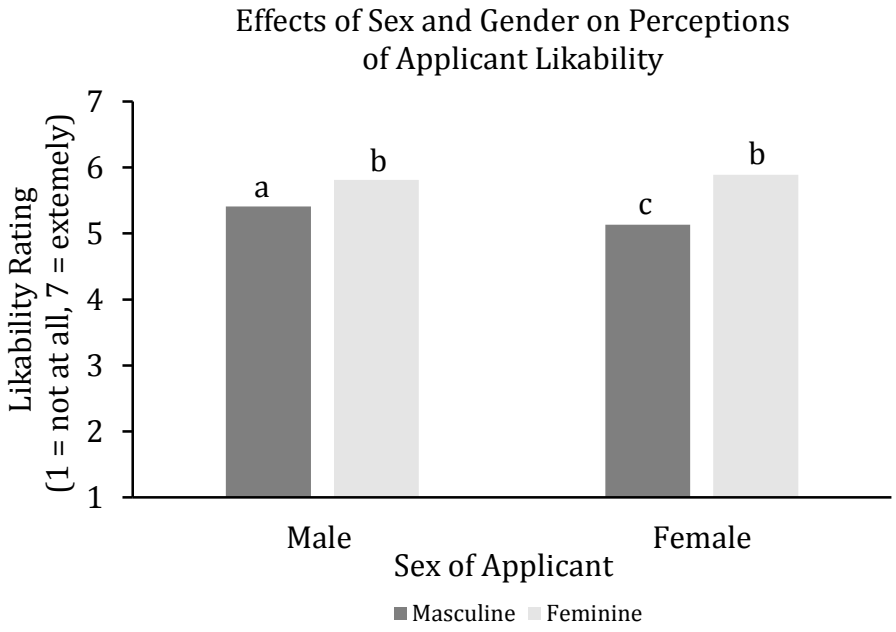

Figure 4. Effects of sex and gender on applicant likability

Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA demonstrated a significant two-way interaction between sex and gender on perceptions of applicant likability, $F(1, 95) = 5.61$, $p = 0.02$, $\eta^2 = 0.01$, and a main effect of gender, $F(1, 95) = 35.80$, $p < 0.001$, $\eta^2 = 0.14$. No support for Hypothesis 1 was found, $F(1, 95) = 1.57$, $p > 0.05$.

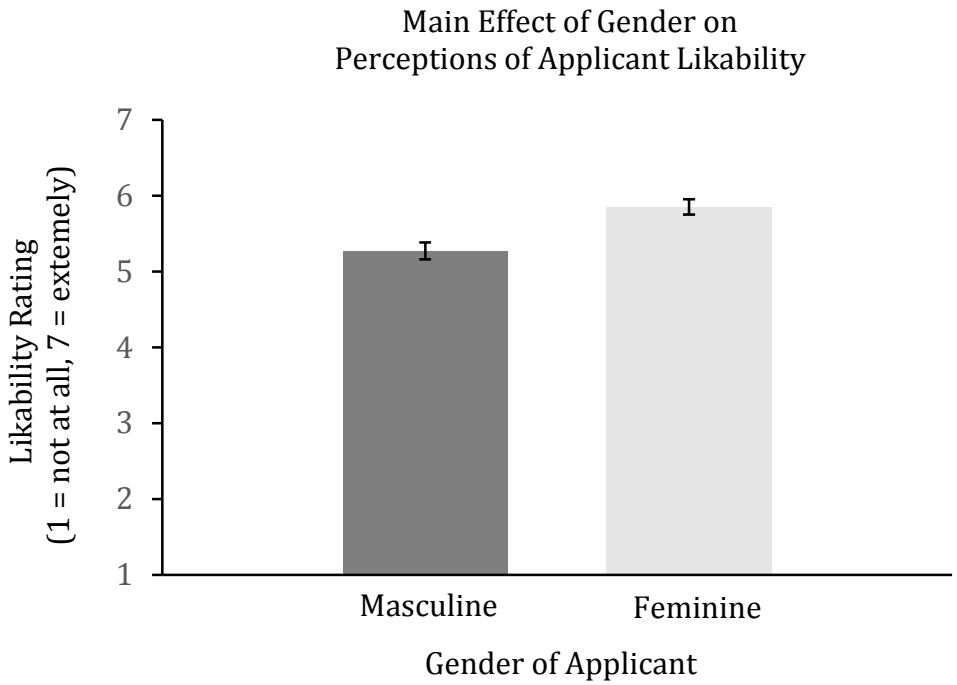

Figure 5. Main effect of gender on applicant likability

Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) repeated measures ANOVA demonstrated a main effect of gender, $F(1, 95) = 35.80$, $p < 0.001$, $\eta^2 = 0.14$. No support for Hypothesis 1 was found, $F(1, 95) = 1.57$, $p > 0.05$.

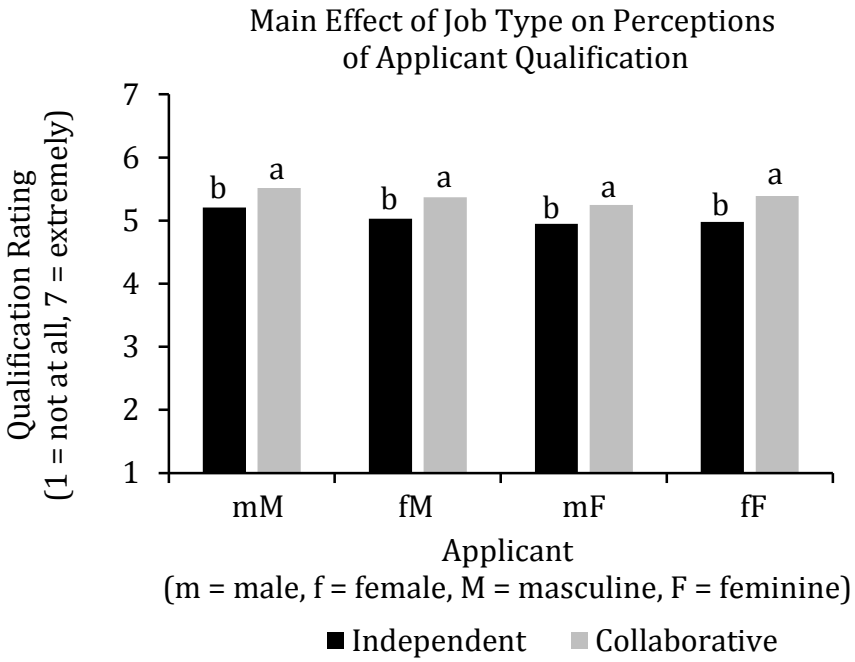

Figure 6. Main effect of job type for applicant qualification

Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) x 4 (job type: 100% independent, 75% independent-25% collaborative, 75% collaborative-25% independent, 100% collaborative) repeated measures ANOVA demonstrated a significant main effect of job type for perceived qualification, $F(1, 95) = 11.39$, $p < 0.001$, $\eta^2 = 0.02$. This effect was such that all applicants were viewed as more qualified for collaborative jobs than independent jobs.

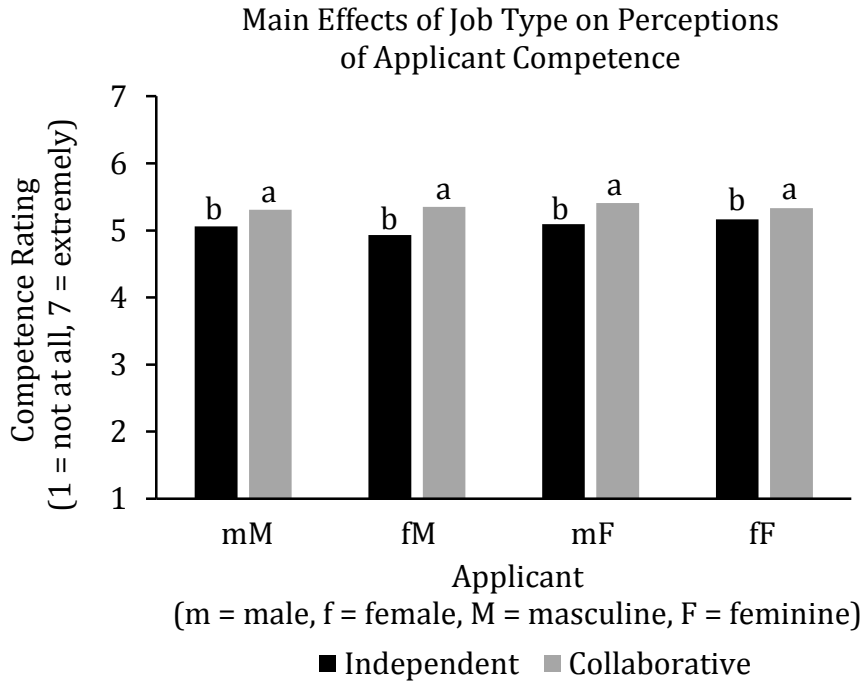

Figure 7. Main effect of job type for applicant competence

Results of a 2 (sex of applicant: male or female) x 2 (gender of applicant: masculine or feminine) x 4 (job type: 100% independent, 75% independent-25% collaborative, 75% collaborative-25% independent, 100% collaborative) repeated measures ANOVA demonstrated a significant main effect of job type for perceived competence, $F(3, 93) = 6.90$, $p = 0.003$, $\eta^2 = 0.02$. This effect was such that all applicants were viewed as more competent for collaborative jobs than independent jobs.

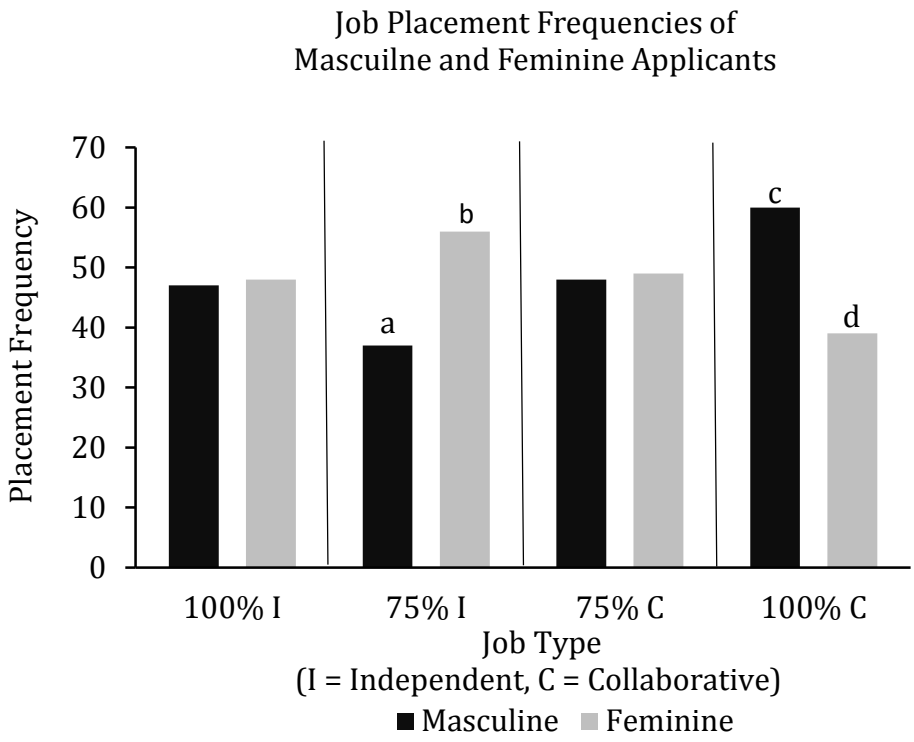

Figure 8. Job placement frequencies for masculine and feminine applicants

Feminine applicants were placed into the 75% independent-25% collaborative position more frequently than masculine applicants, $\chi_{ac}^2(1) = 3.88$, $p < 0.05$. Masculine applicants were placed into the 100% collaborative position more frequently than feminine applicants, $\chi_{cd}^2(1) = 4.45$, $p < 0.05$. Masculine and feminine applicants were placed similarly into the 100% independent position, $\chi^2(1) = 0.01$, $p > 0.05$, and the 75% collaborative-25% independent position, $\chi^2(1) = 0.01$, $p > 0.05$

Appendix A: Applicant Résumés

Adam Hark
Address • City, State Zip Code
Cell phone • adamhark@gmail.com

Education

United States Military Academy, West Point
B.S. in Industrial Engineering, 2013

Work Experience

- Designed and implemented a new mixed-model assembly line to accommodate a new product.
- Development of a Decision Support System Software tool using Microsoft Excel and Access.

Computer and Technical Skills

- Java, XML, Microsoft Excel, Decision Support Systems, Unix, Mac OS

Volunteer Experience

- Volunteer for Habitat for Humanity

Extracurricular Activities

- Intramural football team captain
- Mixed Martial Arts Instructor

Evan Hayes
Address • City, State Zip Code
Cell phone • evanhayes@gmail.com

Education

Georgia Institute of Technology, Atlanta
B.S. in Civil Engineering, 2010

Work Experience

- Completed various industrial and manufacturing projects supporting the company's assembly line.
- Designed concepts and strategies for improving the quality of electrical equipment.

Computer and Technical Skills

- Java script, Pascal, Decision Support Systems, MathCAD, Windows XP, Mac OS

Volunteer Experience

- Volunteer with the local Low-income Daycare Center

Extracurricular Activities

- Ballet dancer
- Gymnastics Instructor for children

Sara Graham
Address • City, State Zip Code
Cell phone • saraggraham@gmail.com

Education

University of Michigan, Ann Arbor
B.S. in Architectural Engineering, 2010

Work Experience

- Development of a Decision Support System Software tool using Microsoft Excel and Access.
- Designed concepts and strategies for improving the quality of electrical equipment.

Computer and Technical Skills

- XML, Java Script, Graphical Information Systems (GIS), Microsoft Excel, Mac OS, Unix

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Volunteer Experience

- Volunteer Fire Fighting

Extracurricular Activities

- Captain of UM's rugby team
- Practices Mixed Martial Arts

Kelsey Williams
Address • City, State Zip Code
Cell phone • kelseywilliams@gmail.com

Education

Purdue University, West Lafayette
B.S. in Mechanical Engineering, 2013

Work Experience

- Designed concepts and strategies for improving the quality of electrical equipment.
- Designed and implemented a new mixed-model assembly line to accommodate a new product.

Computer and Technical Skills

- Java, Pascal, MathCAD, Graphical Information Systems (GIS), Linux, Mac OS

Volunteer Experience

- Volunteer at the local Woman's Shelter

Extracurricular Activities

- Ballet instructor for children
- Practices yoga

Appendix B: Engineering Job Descriptions

Main Job Description

Innovate, Inc. Consulting Engineering Firm

Innovate, Inc., is a consulting engineering firm that provides expertise in engineering, science, technology, and related areas to governments, industries, and developers. Innovate, Inc. is seeking engineers from various backgrounds capable of carrying out various projects at one of four branches: North, Everett, McNair, and Central.

North Branch Job Description

Reports To:

Division/Branch Manager

Entry Level Position:

The engineer is responsible for working 100% independently on designs and drawings in preparation for various projects, in a timely and cost effective manner, while meeting client, contractual and company requirements.

Job Responsibilities:

Independently prepare simple and routine plans, designs, calculations and cost estimates by following standard engineering practices and procedures. Carry out routine technical surveys.

Independently interpret engineering specifications and solve problems by applying defined procedures.

Propose suggestions for modifying concepts and/or product techniques and materials.

Work 100% independently on complex designs, plans, calculations, surveys, and proposal development and contract documentation.

Remain updated on current practices and maintain awareness of new products and procedures in industry.

Comply with all company policies, e.g., safety and regulations.

Perform other duties as required.

Education and Experience:

Applicant must have an engineering degree.

Familiarity with computer modeling programs used to develop designs.

Basic knowledge of engineering software.

Applicant characteristics include: ability to work independently, decisive and assertive, attention to detail, project development and managerial skills, and basic knowledge of engineering software.

Everett Branch Job Description

Reports To:

Division/Branch Manager

Entry Level Position:

The engineer is responsible for working 100% collaboratively with other engineers on designs and drawings in preparation for various projects, in a timely and cost effective manner, while meeting client, contractual and company requirements.

Job Responsibilities:

Collaboratively prepare simple and routine plans, designs, calculations and cost estimates by following standard engineering practices and procedures. Carry out routine technical surveys.

Collaboratively interpreting engineering specifications and solve problems by applying defined procedures.

Discuss suggestions for modifying concepts and/or product techniques and materials.

Work 100% collaboratively on complex designs, plans, calculations, surveys, and proposal development and contract documentation.

Remain updated on current practices and maintain awareness of new products and procedures in industry.

Comply with all company policies, e.g., safety and regulations.

Perform other duties as required.

Education and Experience:

Applicant must have an engineering degree.

Familiarity with computer modeling programs used to develop designs.

Basic knowledge of engineering software.

Applicant characteristics include: ability to work with a team, attention to detail, project development and group dynamic skills, and basic knowledge of engineering software.

McNair Branch Job Description

Reports To:

Division/Branch Manager

Entry Level Position:

The engineer is responsible for working 75% independently and 25% collaboratively on designs and drawings in preparation for various projects, in a timely and cost effective manner, while meeting client, contractual and company requirements.

Job Responsibilities:

Independently and collaboratively prepare simple and routine plans, designs, calculations and cost estimates by following standard engineering practices and procedures. Carry out routine technical surveys.

Independently and collaboratively interpret engineering specifications and solve problems by applying defined procedures.

Propose and discuss suggestions for modifying concepts and/or product techniques and materials.

Work 75% independently and 25% collaboratively on complex designs, plans, calculations, surveys, and proposal development and contract documentation.

Remain updated on current practices and maintain awareness of new products and procedures in industry.

Comply with all company policies, e.g., safety and regulations.

Perform other duties as required.

Education and Experience:

Applicant must have an engineering degree.

Familiarity with computer modeling programs used to develop designs.

Basic knowledge of engineering software.

Applicant characteristics include: ability to work independently and occasionally with a team, decisive and assertive, attention to detail, project development and managerial skills, and basic knowledge of engineering software.

Central Branch Job Description

Reports To:

Division/Branch Manager

Entry Level Position:

The engineer is responsible for working 75% collaboratively and 25% independently on designs and drawings in preparation for various projects, in a timely and cost effective manner, while meeting client, contractual and company requirements.

Job Responsibilities:

Collaboratively and independently prepare simple and routine plans, designs, calculations and cost estimates by following standard engineering practices and procedures. Carry out routine technical surveys.

Collaboratively and independently interpret engineering specifications and solve problems by applying defined procedures.

Propose and discuss suggestions for modifying concepts and/or product techniques and materials.

Work 75% collaboratively and 25% independently on complex designs, plans, calculations, surveys, and proposal development and contract documentation.

Remain updated on current practices and maintain awareness of new products and procedures.

Comply with all company policies, e.g., safety and regulations.

Perform other duties as required.

Education and Experience:

Applicant must have an engineering degree.

Familiarity with computer modeling programs used to develop designs.

Basic knowledge of engineering software.

Applicant characteristics include: ability to work on a team and occasionally independently, decisive, attention to detail, project development and group dynamic skills, and basic knowledge of engineering software.

Appendix C: Pretest Results

Table 1-6 consists of a series of pairwise comparisons testing perceptions of qualification for résumés items.

Table 1. Equivalent B.S. Engineering Degrees from: United States Military Academy (M_{USMA} = 6.11), Georgia Institute of Technology (M_{GTECH} = 6.03), University of Michigan (M_{UM} = 6.03), and Purdue University (M = 6.09).

University	M_D	*SD*	*t*	*Sig.*	*DF*
USMA-GTECH	0.001	1.371	0.006	0.995[a]	84
USMA-UM	0.038	1.118	0.315	0.753[a]	84
USMA-PU	0.021	1.195	0.162	0.872[a]	84
GTECH-UM	0.037	1.005	0.342	0.733[a]	84
GTECH-PU	0.020	1.282	0.145	0.885[a]	84
UM-PU	-0.017	0.880	-0.180	0.857[a]	84

Note: Non-significant results of pairwise comparisons indicate that résumés items were perceived as equivalent.

Table 2. Equivalent B.S. Engineering Degrees in: Civil Engineering (M = 5.91), Industrial Engineering (M = 5.97), Architectural Engineering (M = 5.97), and Mechanical Engineering (M = 6.17).

Engineering Degree	M_D	*SD*	*t*	*Sig.*	*DF*
Civil-Mechanical	-0.257	1.339	-1.766	0.081[a]	84
Civil-Industrial	-0.062	1.448	-0.395	0.694[a]	84
Civil-Architecture	-0.059	1.561	-0.351	0.727[a]	84
Mechanical-Industrial	0.195	1.029	1.744	0.085[a]	84
Mechanical-Architecture	0.197	1.669	1.089	0.279[a]	84
Industrial-Architecture	0.003	1.241	-0.180	0.985[a]	84

Note: Non-significant results of pairwise comparisons indicate that résumés items were perceived as equivalent. Mechanical Engineering was the degree for all applicant résumés.

Table 3. Equivalent Computer Programming Experience: Java (M = 5.49), XML (M = 5.30), Pascal (M = 5.30), and Java Script (M = 5.44).

Language	M_D	*SD*	*t*	*Sig.*	*DF*
Java-XML	0.189	1.075	1.619	0.109[a]	84
Java-Pascal	0.189	1.160	1.500	0.137[a]	84
Java-Java Script	0.048	0.912	0.484	0.630[a]	84
XML-Pascal	0.000	0.707	0.000	1.000[a]	84
XML-Java Script	-0.141	1.049	-1.239	0.219[a]	84
Pascal-Java Script	-0.141	0.875	-1.484	0.142[a]	84

Note: Non-significant results of pairwise comparisons indicate that résumés items were perceived as equivalent.

Table 4. Equivalent Software Experience: Microsoft Excel (M = 6.09), Decision Support Systems (M = 6.22), Graphical Information Systems (GIS) (M = 6.38), and MathCAD (M = 6.43).

Software	M_D	*SD*	*t*	*Sig.*	*DF*
Microsoft Excel – Decision Support Systems	-0.134	1.058	-1.161	0.249	83
Microsoft Excel – GIS	-0.266	1.260	-1.948	0.055	84
Decision Support Systems – GIS	-0.159	0.937	-1.556	0.124	83
Decision Support Systems – MathCAD	-0.204	0.928	-2.010	0.048*	83
GIS-MathCAD	-0.044	0.872	-0.465	0.643	84
Microsoft Excel – MathCAD	-0.310	1.242	-2.303	0.024*	84

Note: While experience with MathCAD was perceived as statistically different from experience with Decision Support Systems and Microsoft Excel, MathCAD experience was perceived as equivalent to GIS experience. Therefore, MathCAD was used as an additional software system item of experience for all four applicants. Asterisk (*) denotes significance indicating software systems were not perceived as equivalent.

Table 5. Operating System Experience: Microsoft Windows XP (M = 5.61), Linux (M = 5.74), Unix (M = 5.75), and Mac OS (M = 5.50).

Operating System	M_D	*SD*	*t*	*Sig.*	*DF*
Windows XP-Unix	-0.141	1.356	-0.958	0.341	84
Windows XP-Mac OS	0.121	1.069	1.037	0.303	83
Windows XP-Linux	-0.137	1.237	-1.023	0.309	84
Unix-Mac OS	-0.252	1.171	1.970	0.052*	83
Linux-Mac OS	0.248	1.075	2.113	0.038*	83
Linux -Unix	-0.004	0.557	-0.060	0.952	84

Note: While experience with Mac OS was perceived as statistically different from experience with Linux and Unix, Mac OS experience was perceived as equivalent to Windows XP. Therefore, Mac OS was used as an additional operating system item of experience for all four applicants. Asterisk (*) denotes significance indicating operating systems were not perceived as equivalent.

Table 6. Applicant work experience: (1) designed and implemented a new mixed-model assembly line to accommodate a new product (M = 6.21), (2) completed various industrial and manufacturing projects supporting companies assembly line (M = 6.28), (3) development of a Decision Support System Software tool using Microsoft Excel and Access (M = 6.03), and (4) designed concepts and strategies for improving the quality of electrical equipment (M = 6.20).

Work Experience	M_D	*SD*	*t*	*Sig.*	*DF*
(1) – (2)	-0.060	0.822	-0.673	0.503[a]	84
(1) – (3)	0.207	1.237	1.542	0.127[a]	83
(1) – (4)	0.018	1.223	0.138	0.891[a]	83
(2) – (3)	0.267	1.269	1.940	0.056[a]	84
(2) – (4)	0.091	1.258	0.662	0.509[a]	83
(3) – (4)	-0.155	1.125	-1.266	0.209[a]	83

Note: Numbers in the work experience column correspond to each type of work experience discussed above. Non-significant results of pairwise comparisons indicate that résumés items were perceived as equivalent.

Tables 7-8: A series of pairwise comparisons for the manipulation of gender on résumés items. Statistical significance indicates that the items were perceived differently in terms of masculinity or femininity.

Table 7. Manipulation of Gender via Extracircular Activities

	Masculine		Feminine				
Sport	*M*	*SD*	*M*	*SD*	M_D	*t*	*DF*
Football*+a	6.68	8.184	2.65	8.555	4.031	18.50	84
Rugby*+a	6.76	8.183	2.60	8.564	4.163	18.16	84
MMA*+a	6.28	8.335	3.44	8.407	2.847	10.92	84
Basketball*	5.74	8.283	4.15	8.433	1.597	8.64	84
Ballet*+b	2.99	8.553	6.76	8.197	-3.765	-15.08	84
Gymnastics*+b	3.39	8.566	6.36	8.182	-2.969	-11.75	83
Yoga*+b	3.31	8.157	6.32	8.252	-3.009	-11.85	84

Note: Asterisks (*) indicate statistical significance, $p < 0.05$. Items denoted with a cross were items selected for résumés. Items denoted with 'a' indicate activities that were significantly more masculine and least feminine than all other items. Items denoted with 'b' indicate activities that were significantly more feminine and least masculine than all other items.

Table 8. Manipulation of Gender via Volunteer Experience

	Masculine		Feminine				
Volunteer	*M*	*SD*	*M*	*SD*	M_D	*t*	*DF*
LDC*+b	3.86	8.502	6.00	8.285	-2.141	-8.157	84
HH*+a	5.44	8.304	4.79	8.379	0.651	3.400	84
FF*+a	6.51	8.275	3.51	8.460	3.000	11.516	81
CCC*b	4.13	8.500	5.79	8.250	-1.657	-7.158	83
WS*+b	4.03	8.534	6.11	8.215	-2.082	-8.346	83
HS	4.86	8.373	5.08	8.347	-0.188	-1.011	84

Note: Asterisks (*) indicates statistical significance, $p < 0.05$. LDC = Low-income Daycare Center, HH = Habitat for Humanity, FF = Fire Fighter, CCC = Children's Cancer Center, WS = Woman's Shelter, and HS = Homeless Shelter. Items with a cross indicate items selected for résumés. Items denoted with 'a' indicate volunteer experience that was significantly more masculine and least feminine than all other items. Items denoted with 'b' indicate volunteer experience that was significantly more feminine and least masculine than all other items.

Appendix D: Additional Measures

Items on the Social Dominance Orientation (SDO)

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

The responses on the Social Dominance Orientation Scale range from 1 to 7: 1 = strongly disagree; 2 = disagree; 3 = somewhat disagree; 4 = neither agree nor disagree; 5 = somewhat agree; 6 = agree; 7 = strongly agree. Items denoted with an asterisk are reverse coded: 7 = 1; 6 = 2; 5 = 3; 4 = 4; 3 = 5; 2 = 6; 1 = 7. For scoring, sum items 1 through 8 to get the subscore for these items. Sum items 9 through 16 for a second subscore. The total score is the sum of the two subscores. Scores greater than 75 indicter a strong tendency toward social dominance orientation. (Pratto & Sidanius et al., 1994)

Items on the Attitudes toward Women Scale (AWS)

1. Swearing and obscenity are more repulsive in the speech of a woman than of a man.
2. Women should take increasing responsibility for leadership in solving the intellectual and social problems of the day.*
3. Both husband and wife should be allowed the same grounds for divorce.*
4. Telling dirty jokes should be mostly a masculine prerogative.*
5. Intoxication among women is worse than intoxication among men.
6. Under modern economic conditions with women being active outside the home, men should share in household tasks such as washing dishes and doing the laundry.*
7. It is insulting to women to have to "obey" clause remain in the marriage service.*
8. There should be a strict merit system in job appointment and promotion without regard to sex.*
9. A woman should be free as a man to propose marriage.*
10. Women should worry less about their rights and more about becoming good wives and mothers.
11. Women earning as much as their dates should bear equally the expense when they go out together.*
12. Women should assume their rightful place in business and all the professions along with men.*
13. A woman should not expect to go to exactly the same places or to have quite the same freedom of action as a man.
14. Sons in a family should be given more encouragement to go to college than daughters. *
15. It is ridiculous for a woman to run a locomotive and for a man to darn socks.
16. In general, the father should have greater authority than the mother in the bringing up of children.
17. Women should be encouraged not to become sexually intimate with anyone before marriage, even their fiancés.
18. The husband should not be favored by law over the wife in the disposal of family property or income.*
19. Women should be concerned with their duties of childbearing and house tending rather than with desires for professional or business careers.
20. The intellectual leadership of a community should be largely in the hands of men.
21. Economic and social freedom is worth far more to women than acceptance of the ideal of femininity which has been set up by men.*
22. On the average, women should be regarded as less capable of contributing to economic production than are men.
23. There are man jobs in which men should be given preference over women in being hired or promoted.
24. Women should be given equal opportunity with men for apprenticeship in the various trades.*
25. The modern girl is entitled to the same freedom from regulation and control that is given to the modern boy.*

The responses on the Attitudes Towards Women Scale are indicated with A (agree strongly), B (agree mildly), C (disagree mildly), and D (disagree strongly). In scoring each items: A = 0, B = 1, C = 2, and D = 3. Items denoted with an asterisk are reverse coded: A = 3, B = 2, C = 1, D = 0. High scores indicate a profeminist, egalitarian attitudes. Low scores indicate traditional, conservative attitudes. (Spence, Helmrich, & Stapp, 1973)

Items on the Ambivalent Sexism Inventory (ASI)

1. No matter how accomplished he is, a man is not truly complete as a person unless he has the love of a woman. B
2. Many women are actually seeking special favors, such as hiring policies that favor them over men, under the guise of asking for "equality." H
3. In a disaster, women ought not necessarily to be rescued before men. B(P)*
4. Most women interpret innocent remarks or acts as being sexist. H
5. Women are too easily offended. H
6. People are often truly happy in life without being romantically involved with a member of the other sex. B(I)*
7. Feminists are not seeking for women to have more power than men. H*
8. Many women have a quality of purity that few men possess. B(G)
9. Women should be cherished and protected by men. B(P)
10. Most women fail to appreciate fully all that men do for them. H
11. Women seek to gain power by getting control over men. H
12. Every man ought to have a woman whom he adores. B(I)
13. Men are complete without women. B(I)*
14. Women exaggerate problems they have at work. H
15. Once a woman gets a man to commit to her, she usually tries to put him on a tight leash. H
16. When women lose to men in a fair competition, they typically complain about being discriminated against. H
17. A good woman should be set on a pedestal by her man. B(P)
18. There are actually very few women who get a kick out of teasing men by seeming sexually available and then refusing male advances. H*
19. Women, compared to men, tend to have a superior moral sensibility. B(G)
20. Men should be willing to sacrifice their own well being in order to provide financially for the women in their lives. B(P)
21. Feminists are making entirely reasonable demands of men. H*
22. Women, as compared to men, tend to have a more refined sense of culture and good taste. B(G)

The responses on the Ambivalent Sexism Inventory range from 0 to 5: 0 = disagree strongly; 1 = disagree somewhat; 2 = disagree slightly; 3 = agree slightly; 4 = agree somewhat; 5 = agree strongly. Items denoted with an asterisk are reversed coded (0 = 5, 1 = 4, 2 = 3, 3 = 2, 4 = 1, 5 = 0). H = Hostile Sexism, B = Benevolent Sexism, P = Protective Paternalism, (G) = Complementary Gender Differentiation, (I) = Heterosexual Intimacy. The Hostile Sexism score is the average of the following items: 2, 4, 5, 7, 10, 11, 14, 15, 16, 18, 21. The Benevolent Sexism Score is the average of the following items: 1, 3, 6, 8, 9, 12, 13, 17, 19, 20, 22. (Glick & Fiske, 1995)

Items on the Motivation to Control Prejudice Reactions Scale (MCPRS)

1. In today's society it is important that one not be perceived as prejudiced in any manner.
2. I always express my thoughts and feelings regardless of how controversial they might be.*
3. I get angry with myself when I have thoughts or feelings that might be considered prejudiced.
4. If I were participating in a class and a Black student expressed an opinion with which I disagreed, I would be hesitant to express my own view point.
5. Going through life worrying about whether you might offend someone is just more trouble than it's worth.*
6. It's important to me that other people not think I'm prejudiced.
7. I feel it's important to behave according to society's standards.
8. I'm careful not to offend my friends, but I don't worry about offending people I don't know, or don't like.*
9. I think it is important to speak one's mind rather than worry about offending someone.*
10. It's never acceptable to express one's prejudices.
11. I feel guilty when I have a negative thought or feeling about a Black person.
12. When speaking to a Black person, it's important to me that he/she not think I'm prejudiced.
13. It bothers me a great deal when I think I've offended someone, so I'm always careful to consider other people's feelings.
14. If I have a prejudiced thought or feeling, I keep it to myself.
15. I would never tell jokes that might offend others.
16. I'm not afraid to tell others what I think, even when I know they disagree with me.*
17. If someone who made me uncomfortable sat next to me on a bus, I would not hesitate to move to another seat.*

The responses on the Motivation to Control Prejudiced Reaction Scale range from -3 (strongly disagree) to +3 (strongly agree), with the midpoint as 0 (don't know). Items denoted with an asterisk are reverse coded. (Dunton & Fazio, 1997)

Attitudes towards engineers

1. Engineers spend most of their time working alone.
2. Engineers spend relatively little time dealing with other people.
3. Engineers are typically considered likable professionals.
4. Engineers work collaboratively most of the time.
5. Engineers are considered nice people.
6. I consider engineers to be competitive.
7. I would consider engineers to be caring.
8. Engineers deal primarily with 'things,' rather than other people.
9. Engineers are considered approachable.
10. Engineers are considered as friendly.
11. Engineers are considered as warm.
12. I would like to work with an engineer.
13. I would ask an engineer for advice.
14. I would like to be friends with an engineer.
15. Engineers are knowledgeable.

The responses on the attitudes towards engineers scale range from 1 ("do not agree at all") to 7 ("extremely agree"). Scores are determined by adding up all items and dividing by 15. Higher numbers indicate greater perceived likability.

Appendix E: Institutional Review Board

November 23, 2011

University of Idaho

Office of Research Assurances (ORA)
Institutional Review Board (IRB)
PO Box 443010
Moscow ID 83844-3010

Phone: 208-885-6162
Fax: 208-885-5752
irb@uidaho.edu

To: Craig, Traci

From: IRB, University of Idaho Institutional Review Board

Subject: Exempt Certification for IRB project number 11-101

Determination: November 23, 2011
Certified as Exempt under category 2 at 45 CFR 46.101(b)(2)
IRB project number 11-101: Evaluation of Resumes and Stereotypes

This study may be conducted according to the protocol described in the Application without further review by the IRB. As specific instruments are developed, each should be forwarded to the ORA, in order to allow the IRB to maintain current records. Every effort should be made to ensure that the project is conducted in a manner consistent with the three fundamental principles identified in the Belmont Report: respect for persons; beneficence; and justice.

It is important to note that certification of exemption is NOT approval by the IRB. Do not include the statement that the UI IRB has reviewed and approved the study for human subject participation. Remove all statements of IRB Approval and IRB contact information from study materials that will be disseminated to participants. Instead please indicate, "The University of Idaho Institutional Review Board has Certified this project as Exempt."

Certification of exemption is not to be construed as authorization to recruit participants or conduct research in schools or other institutions, including on Native Reserved lands or within Native Institutions, which have their own policies that require approvals before Human Subjects Research Projects can begin. This authorization must be obtained from the appropriate Tribal Government (or equivalent) and/or In-

stitutional Administration. This may include independent review by a tribal or institutional IRB or equivalent. It is the investigator's responsibility to obtain all such necessary approvals and provide copies of these approvals to ORA, in order to allow the IRB to maintain current records.

This certification is valid only for the study protocol as it was submitted to the ORA. Studies certified as Exempt are not subject to continuing review (this Certification does not expire). If any changes are made to the study protocol, you must submit the changes to the ORA for determination that the study remains Exempt before implementing the changes. The IRB Modification Request Form is available online at: http://www.uidaho.edu/ora/committees/irb/irbforms

University of Idaho Institutional Review Board: IRB00000843, FWA00005639