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Exploring Process Dissociation as a Tool for Investigating Discrimination in Hiring Situations

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A thesis submitted in partial fulfillment of the requirements for the degree in Doctor of Philosophy
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EXPLORING PROCESS DISSOCIATION AS A TOOL FOR
INVESTIGATING DISCRIMINATION IN HIRING SITUATIONS

(Spine title: Process Dissociation Applied to Hiring Situations)

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by

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A thesis submitted in partial fulfilment
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ABSTRACT

Process dissociation is introduced as a way to overcome methodological limitations currently hindering sexism research. Researchers have identified two main types of sexism in hiring contexts. Meta-analyses confirm that men are traditionally advantaged over women (Tosi & Einbender, 1985), and that both genders encounter discrimination when applying to a job typically associated with the other gender (Davison & Burke, 2000). One problem is that these two biases are often confounded. As a result, researchers have hitherto been limited to showing that the two biases exist, but are largely unable to quantify them.

A possible solution might be process dissociation. It provides a way of measuring processes without the need to isolate them (Jacoby, 1991). The purpose of the dissertation was to explore process dissociation within the context of hiring decisions.

The current dissertation consisted of three parts. A pretest developed materials for use in the main studies. Study 1 then explored how process dissociation estimates compare to existing tools commonly used to study sexism. The pro-male bias was found to relate to old-fashioned sexism. The gender-job fit bias related to benevolent sexism. Measures of bias appeared uncontaminated by internal and external motivation to respond without sexism. Biases did not relate as expected to other measures of sexism, including hostile, modern, and neo-sexism, and two Implicit Association Tests. Finding differential relationships with some expected correlates supports the validity of process dissociation parameters and helps elucidate how the parameters fit within existing sexism constructs.

Study 2 further investigated validity through independent manipulation. Participants were randomly assigned to receive one of four word-sorting tasks containing primes intended to selectively influence one of the two types of bias. These manipulations had the desired effect for only some participants. Though both biases were selectively affected, a full double dissociation was not achieved. Consequently, Study 2 results provide only partial support for the proposed causal mechanisms and independence of process dissociation parameters.

Overall, results illustrate that process dissociation may be a helpful tool for use in research on sexism in hiring decisions. Limitations of process dissociation and potential next steps are discussed.

KEYWORDS: sexism, employment discrimination, process dissociation, personnel selection, job applicants

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CHAPTER 1:

General Introduction

Illegal discrimination remains a pervasive concern in the workplace. In Canada, the Canadian Human Rights Act (1985) prohibits discrimination on the basis of 12 protected grounds, including age, race, and gender. In the United States, the corresponding legislation is Title VII of the Civil Rights Act (1964). Unfortunately, these laws are frequently broken. Between 2007 and 2010, the Canadian Human Rights Commission received nearly 800 employment-related discrimination complaints (Canadian Human Rights Commission, 2010). Over the same period, the U.S. Equal Employment Opportunity Commission settled 24, 000 cases a year for sex-based discrimination alone, with monetary benefits measured in the hundreds of millions (U.S. Equal Employment Opportunity Commission, 2010).

Research into gender discrimination in the workplace generally falls into one of two categories. On the one hand, males are traditionally advantaged over females. This preference for males can be referred to as the pro-male bias. On the other hand, both genders experience discrimination when applying for a job typically associated with the opposite gender. This preference for candidates with a gender that fits the job can be referred to as the gender-job fit bias. Both research streams are well established and supported by meta-analyses (e.g., Davison & Burke, 2000; Olian, Schwab, & Haberfeld, 1988; Tosi & Einbender, 1985).

One methodological difficulty facing researchers is that the two types of gender bias are often confounded. Any candidate applying for a job will likely face both the

advantage (or disadvantage) due to his or her gender and the advantage (or disadvantage)

due to his or her gender congruence with the job. Obtaining a pure measure of the pro-

male bias would normally require that researchers use jobs without any sex typing (for an

attempt, see Jackson, Esses, & Burris, 2001). Likewise, obtaining a pure measure of the

gender-job fit bias would require eliminating the pro-male bias (for an attempt, see

Kawakami, Dovidio, & van Kamp, 2005). These controls are often difficult to the point of

being impractical. An important question becomes: How can researchers confidently

quantify either bias when both are almost always mutually confounded?

Process dissociation might be a possible answer. It allows mental processes to be

measured without the need to isolate them (Jacoby, 1991; Jacoby, Lindsay, & Hessels,

2003). By applying process dissociation techniques developed and refined in cognitive

psychology, I hope that Industrial Organizational Psychologists will gain an important

new tool for understanding discrimination in hiring decisions.

Before process dissociation can be widely relied upon in research on hiring

situations, it must first be evaluated in this new context. Collecting such validation

evidence is the purpose of this dissertation. The dissertation explores evidence of validity

for measures of the pro-male bias and gender-job fit bias that are derived from a process

dissociation procedure. As an initial investigation in a new context, the dissertation may

also serve a broader purpose: proof of concept for applying process dissociation

methodology in hiring situations.

The next two chapters summarize relevant previous work. Chapter 2 reviews the

history and theories underlying the pro-male bias and gender-job fit bias, outlines

problems in their measurement, explains process dissociation as a way of overcoming these problems, and describes how the procedure can be adapted for use in hiring situations. Chapter 3 describes my Master's research as the first attempt to apply process dissociation in hiring situations. Lessons learned from that research were highly influential in designing the present studies.

The remaining chapters describe the current efforts to evaluate the case for validity. Chapter 4 describes the hiring task used to elicit process dissociation parameters. Chapter 5 provides a broad overview of the doctoral research. This doctoral research has three components: a pretest and two main studies. Chapter 6 covers the pretesting of materials. Because the pretest included an update and extension of naming norms from a much-used but now outdated study (Kasof, 1993), it might be of interest to many researchers. Chapters 7 and 8 present the core methods and findings of the doctoral dissertation. Chapter 7 describes how process dissociation parameters fit within the realm of existing measures commonly used to study sexism. Chapter 8 describes attempts to independently manipulate each process dissociation parameter, thus establishing evidence of the causal link between variables and their antecedents, as well as testing an underlying assumption of process dissociation (independence of parameters, Jacoby & Shrout, 1997). Finally, Chapter 9 summarizes the validation evidence for and against process dissociation. The dissertation concludes with a discussion of the general limitations of process dissociation, limitations specific to the current research, suggestions for next steps, and a summary of what has been gained from the current efforts.

CHAPTER 2:

Literature Review and Theoretical Underpinnings

History of Research on Sexism in Hiring Decisions

World War II is largely credited with changing women's roles in the workplace (Goldin, 1991). Pre-war, gender inequality at work was generally accepted and expected. Post-war, more women were in the workforce, and people started to question unfair biases against women at work.

Researchers began turning their attention to gender-based employment discrimination in the 1970s. Even the earliest reviews recognized and discussed both types of gender bias – a pro-male bias, and a gender-job fit bias. The first review of sexism in the workplace was by Arvey (1979). He concluded that females usually received worse evaluations than equally qualified males in employment interviews. He also noted that a candidate was evaluated more favourably when his or her gender was perceived as congruent with the job. Two subsequent reviews by Nieva and Gutek (1980) and by Martinko and Gardner (1983) upheld both conclusions.

There have been three meta-analyses on the topic. Tosi and Eidenbender (1985) analyzed 21 studies investigating sex discrimination during personnel selection. They found that discrimination against women was more common when decision makers had either little information or more gender-salient information on applicants. Olian et al. (1988) added the meta-analytic observation that within-subject designs produce greater discrimination against women. The authors could not adequately test the effect of job sex typing, however, largely because the majority of jobs used in research were classified as

male. The most recent and comprehensive meta-analysis was done by Davison and Burke (2000). Analyzing 49 studies, the authors quantified the pro-male bias in hiring situations at .09 (effect sizes were represented by Pearson correlations). Females were advantaged for female sex-typed jobs ($\rho = -.13$), whereas males were advantaged for male sex-typed jobs ($\rho = .17$). These effects were enhanced when decision-makers had little alternative job-relevant information on which to base a decision.

Research on sexism has continued apace since Davison and Burke's (2000) meta-analysis. The most recent review was by Swim and Hyers (2009). The authors examined the prevalence and consequences of sexism, noting that antifemale sexism receives most of the research attention, though both genders experience sexism in the workplace.

In sum, researchers recognized both the general pro-male bias and gender-job fit bias early in the history of sex discrimination research. Both perspectives were present in early and recent reviews, and both have been supported in meta-analyses. Given that these biases occur, two logical next questions become "what are they" and "why do they occur?" The sections that follow define bias as it relates to sexism research and then describe the theoretical foundations supposed to underlie each bias.

Definition of Key Terms

The *Principles for the Validation and Use of Personnel Selection Procedures* defines bias as "any construct-irrelevant source of variance that results in systematically higher or lower scores for groups of examinees" (Society for Industrial and Organizational Psychology, 2003, p. 32). Applied to sexism in hiring situations, a bias

occurs when candidates with equivalent credentials have unequal probability of being hired because of their gender. Males are often favoured over equally qualified females in general in the workplace (Davison & Burke, 2000). In this dissertation, that preference for males is referred to as the pro-male bias. Similarly, candidates with the stereotypically fitting gender for the job are often favoured when applying for sex-typed jobs (Davison & Burke, 2000). In this dissertation, that preference for individuals with a matching gender is referred to as the gender-job fit bias.

Most explanations for gender-related bias in the workplace rely on stereotypes. Consequently, it may be helpful to quickly summarize research on stereotypes before proceeding to explain how they contribute to the pro-male bias and gender-job fit bias.

Kanahara (2006) reviewed definitions of stereotypes. Based on that review, his recommended definition was "a belief about a group of individuals" (p. 311). He noted that stereotypes can be positive or negative, correct or incorrect, and simple or complicated. They are certainly widely used. A fundamental principle of person perception is that people use immediately available information – including gender – to infer a person's characteristics (Allport, 1954; Fiske & Neuberg, 1990; Tajfel, 1981). In fact, researchers have suggested that gender may be the most primitive and important social category (Kurzban, Tooby, & Cosmides, 2001). It is the first social category that humans are able to discriminate (as early as 9 months old; Hill & Flom, 2007). Given the importance humans place on gender, in may come as little surprise that a person's gender rapidly cues the respective gender stereotype (Stangor, Lynch, Duan, & Glass, 1992; Stephan, 1989). Application of gender stereotypes to job candidates can in turn lead to

bias in hiring decisions through a variety of mechanisms.

Explanations for a Pro-Male Bias

At least two explanations are commonly invoked to explain why males are advantaged in hiring decisions. First, characteristics viewed as masculine are more highly valued than characteristics viewed as feminine. Second, society teaches more respect for men than women.

The characteristics explanation boils down to stereotypes. Widespread sex stereotypes include the idea that more men than women are task-oriented, assertive, achieving, and strong. Conversely, more women than men are believed to be socio-emotional, submissive, caretaking, and gentle (Eagly, 1987; Nutt, 2010). Many authors have noted how the characteristics associated with men tend to be more highly valued in society than are the characteristics associated with women (Deaux & Wrightsman, 1984; Nutt, 2010). Others have pointed out that the agentic (task-focused) characteristics associated with males are particularly valued in the workplace (Eagly & Mladinic, 1994; Heilman, 1983; Jackson et al., 2001). The logic is that stereotypes favouring males convey an advantage at the workplace, including in hiring decisions (Arvey & Campion, 1982; Eagly & Karau, 2002; Gardner & Discenza, 1988; Luzadis, Wesolowski, & Snavely, 2008) and in performance evaluations (Wherry & Bartlett, 1982).

The advantage for males is exacerbated further up the organizational hierarchy (Eagly, Makhijani, & Klonsky, 1992). The "glass ceiling" effect is well known in society (for a recent discussion, see Barreto, Ryan, & Schmitt, 2009). It refers to barriers faced by women as they climb to higher echelons of corporations. Women average a meager 4% of

the presidents in publicly traded European companies and only 15% of members of the boards in U.S. Fortune 500 companies (Eagly & Sczesny, 2009). Again, stereotypes are a common explanation. Traits associated with leadership (e.g., power, competitiveness, assertiveness) are exactly the traits strongly stereotyped as belonging to males rather than females (Eagly & Karau, 2002; Heilman, 2001). Consequently, women are particularly disadvantaged for supervisory roles (Rudman & Glick, 1999). While a woman can choose to violate stereotypes, doing so results in yet another disadvantage: disadvantage due to violation of gender norms (Eagly, 1987; Rudman & Glick, 1999). In other words, jumping out of the proverbial frying pan lands women in the proverbial fire. Whether punished for stereotypes or violation of stereotypes, women face a disadvantage that is particularly acute in high-prestige jobs (Eagly & Sczesny, 2009).

Whereas stereotypes are the most common explanations for the pro-male bias at work, they are not the only explanations. Jackson et al. (2001) made the case that men are more respected than women, which serves to advantage men. The authors argue that men continue to have more power than women in politics, at work, and in romantic relationships (Deaux & LaFrance, 1998). Continued exposure to men having higher status than women might lead to greater respect for males. Mechanisms for this learned association include observational learning, conditioning, or self-perception processes (Bem, 1967; Jackson et al., 2001). Other authors have subsequently trumpeted this respect mechanism (see Rudman & Glick, 2008). For example, Nutt (2010) argues that most cultures teach women that they are of lesser value than men, with the message reinforced throughout the entire life span.

Social dominance theory may help explain how advantages toward males are maintained in workplace. According to social dominance theory, individuals in dominant groups are motivated to maintain their dominance over individuals from subordinate groups in order to retain privileges associated with high status (Quist & Resendez, 2002). Dominance is maintained through the generation and maintenance of legitimizing myths – stereotypes or attitudes promoting the idea that subordinate groups deserve their lower status. Social dominance researchers have noted that men tend to have higher status than women (Sidanius, Levin, Liu, & Pratto, 2000; Sidanius, Pratto, & Brief, 1995). Because men have higher status than women, they are prone to endorse and promote stereotypes that favor men in employment situations, making it harder for women to attain equality (Garcia, Posthua, & Roehling, 2009).

Explanations for a Gender-Job Fit Bias

Just as there were two common explanations for the pro-male bias (male traits being more highly valued than female traits, and greater respect for males), there are likewise two common explanations for why a job becomes sex-typed. Those explanations are gender dominance and job-trait associations.

Many jobs are dominated by one gender or the other. For example, almost all carpenters (98%) are male; almost all registered nurses (94%) are female (Canadian Census, 2005). When most job incumbents belong to one gender, people are prone to a mental shortcut known as the availability heuristic (Jawahar & Mattson, 2005). The idea behind the availability heuristic is that people tend to estimate the likelihood of an outcome based on how easily that outcome comes to mind (Kahneman & Tversky, 1973).

Because most nurses are female, it is probably easier for someone to picture a female nurse than a male nurse. Difficulty picturing a male nurse might then lead a person to (erroneously) estimate that a male applicant is less likely to succeed as a nurse than is a female applicant.

The other explanation for the gender-job fit bias is the association of gendered traits with a job. Put simply, people assume that some jobs require particular traits. In male sex-typed jobs, required traits are associated with males. In female sex-typed jobs, required traits are associated with females. Continuing the previous example, nurses are expected to be nurturing and gentle in order to take care of patients. These are traits associated with women, leading women to be perceived as more appropriate for helping occupations (Cohn, 1985; Davison & Burke, 2000). Conversely, supervisors are expected to be assertive and dominant. These are traits associated with men, leading men to be perceived as more appropriate for supervisory positions (Davison & Burke, 2000; Harnett & Bradley, 1986; Rudman & Glick, 1999). The key observation is that men and women are assumed to possess or lack traits required by a particular job (Dipboye, 1985; Heilman, 1983; Kalin & Hodgins, 1984). Which gender is advantaged depends on the proportion of masculine and feminine traits associated with that particular job.

System justification theory may help explain how gender-job fit biases are maintained in society. The central tenant of system justification theory is that people are inherently motivated to justify the status quo of the status system (Jost & Banaji, 1994). Applied to sexism, researchers have noted that stereotypes toward men and women tend to be complementary in that both groups are seen as possessing strengths that are

"complementary but equal" (Jost & Kay, 2005, p. 499). For example, men are viewed as competent but not communal, whereas women are viewed as communal but not competent (Langford & MacKinnon, 2000). According to a system justification perspective, the idea that each group possesses balanced advantages and disadvantages serves to increase the sense that the system as a whole is fair and legitimate. These stereotypes then serve to justify and reinforce unequal division of labour, including sex-typing of certain jobs (Conway Pizzamiglio, & Mount, 1996; Eagly & Steffen, 1984; Jackman, 1994).

Simultaneous Operation of Independent Biases

Comparing the mechanisms underlying the pro-male bias and gender-job fit bias suggests that the mental processes leading to each may be relatively independent. Agentic traits associated with males are valued in most jobs (van Vianen & Willemsen, 1992), people tend to have greater respect for males than females (Jackson et al., 2001; Nutt, 2010), and social dominance theory implies that the high status enjoyed by males will be reinforced through legitimizing myths favouring males (Garcia et al., 2009). These mechanisms should advantage males for almost any job. In other words, in all but rare cases, a pro-male bias would be expected to some degree regardless of whether a job is sex-typed, and regardless of in what direction the job is sex-typed.

The converse should also be true. When one gender dominates a job, availability heuristics would be expected to occur. Likewise, in a job requiring sex-typed traits, people tend to assume a candidate possesses or lacks required traits based on the candidate's gender. Belief in complementary gendered skill sets serves to justify the

existing system and legitimize sex-typing of occupations. These mental processes would be expected to occur regardless of the level of respect a person has for males/females or the degree to which agentic traits are generally favoured in the workplace. The key observation is that the mental processes leading to one bias (e.g., pro-male bias) may be relatively separate from the mental processes leading to the other bias (e.g., gender-job fit bias), and vice versa.

Given that the mental mechanisms may be relatively independent, it seems reasonable to infer that the pro-male bias and gender-job fit bias have the potential to both contribute to a hiring decision. This inference will be tested by the current research. According to the above rationales, both biases can sometimes be present. When a male applies for a female sex-typed position, some mental processes (the ones underlying the pro-male bias) likely favour males while other mental processes (the ones underlying the gender-job fit bias) favour females. Similarly, when females apply for a male sex-typed job, they are likely up against a double barrier: biases against females at work as well as biases against candidates with the wrong gender for the job. By this view, both the pro-male bias and gender-job fit bias likely affect hiring decisions simultaneously.

Unfortunately, operation of simultaneous biases complicates measurement. These measurement problems are discussed next.

Problems in Measurement

Problems measuring simultaneous processes can be illustrated using a simple example. Suppose a rater advantages females for female jobs. Does the rater have a strong preference for males that was outweighed by an even stronger tendency to match

candidate gender with the job? Or does the rater have a weak or nonexistent pro-male bias that was outweighed by a modest tendency to rely on gender-job fit? All a researcher knows for certain is that the gender-job fit bias occurred; strength of the pro-male bias could range from strong to non-existent, while strength of the gender-job fit bias could range from weak to strong.

The above example illustrates how measuring one bias is complicated when the other is also present. In fact, measuring one bias normally requires eliminating the other. This has proven difficult to the point of being impractical. To control for gender-job fit, researchers have tried using jobs without much sex typing (see Jackson et al., 2001, for one such attempt). Controlling sex typing implies using jobs with a roughly equal gender composition and attempting to balance the number of masculine and feminine traits associated with the job. Note that this procedure necessarily precludes quantifying the pro-male bias in jobs with any degree of sex typing. That is unfortunate considering that sex-typed jobs are the norm rather than the exception (Olian et al., 1988). It means that the pro-male bias would not be quantifiable in the vast majority of jobs.

Similar logic applies to measuring the gender-job fit bias. Obtaining a pure measure requires controlling for the pro-male bias. Researchers have tried to eliminate the effects of stereotyping (e.g., Kawakami et al., 2005), and have used positions in which respect for males will be less important (see Jackson et al., 2001, for a discussion). Unfortunately, evidence suggests that such efforts are unlikely to be wholly successful. Studies have found that that participants still re-weight selection criteria to justify sex-based discrimination in hiring decisions even when male and female candidates are not

stereotyped (Uhlmann & Cohen, 2005) and even when candidates are ranked equally on

pre-established criteria (Luzadis et al., 2008). In other words, controlling the mechanisms

underlying a bias (e.g., stereotypes, evaluations) does not necessarily eliminate that bias.

The implication is that there may be no way to defensibly isolate either bias. Attempts to

do so will always be open to criticisms that the other bias was not fully eliminated.

Process Dissociation

Process dissociation was created to solve exactly this type of problem. In the early

1990s, cognitive psychologists were struggling to isolate the effects of processes in

memory that were difficult to isolate. The solution, proposed by Jacoby (1991), was to

eliminate the need for isolation. He noted that the problem was akin to trying to solve a

simultaneous equation. Given that $x + y = 5$, x and y could take on an infinite number of

values. That is the essential problem underlying the measurement of simultaneous biases.

Until Jacoby (1991), the only solution to the dilemma was to try to make one of the

processes equal to 0 (i.e., isolation of one bias). Jacoby's key insight was that there is

already a well-established alternative solution in mathematics: add a second equation.

When a person also knows that $x - y = 3$, it is very easy to substitute the second formula

into the first to solve for x and y. Therefore, what a researcher needs is a way to create

two simultaneous equations. This is accomplished by first having the processes be

congruent (akin to $x + y$), then pitting them in opposition (akin to $x - y$).

Jacoby's (1991) first application and proof of concept for process dissociation was

in memory. The term "memory" commonly refers to controlled recollection (denoted C).

However, memory researches have noted a relatively distinct type of memory in which

past events influence responses without the person necessarily being consciously aware of the memory. Researchers refer to that type of memory as automatic familiarity (denoted A). Jacoby created two simultaneous equations by letting the two types of memory work together in one condition, and in opposition in another condition.

Specifically, participants in Jacoby's (1991) study were presented with two lists of words. They were then presented with a third list that contained both new words and words from the previous two lists. The task was to identify which of the words in the third list had been previously presented. In one condition, participants were instructed to call a word "old" if it had been presented in either of the two initial lists. In that condition, recollection and familiarity are congruent in that both contribute to a correct response. When participants have a controlled recollection that a word was previously presented, they would correctly identify a word as old. Even when controlled recollection fails, a participant could still correctly identify a word as old due to automatic familiarity. In other words, probability of a correct response can be estimated as the probability of controlled recollection (C) plus the probability of automatic familiarity (A) when controlled recollection fails (1 - C). Written as a formula,

$$p(\text{correct} \mid \text{congruent}) = C + A \times (1 - C)$$

The other condition pitted the types of memory against each other. In the incongruent condition, participants were instructed to call a word "old" only if it had been presented on one (but not the other) of the initial lists. New words and words from one of the initial lists were to be called "new." Given these instructions, the two types of memory lead to different outcomes for previously presented words that are supposed to

be called "new." When participants have a recollection for those words, they would correctly be called "new." In contrast, familiarity would drive those words to be incorrectly called "old." Thus, in the incongruent condition, the probability of an incorrect response can be estimated as the probability of the participant having an automatic familiarity (A) but not a conscious recollection $(1 - C)$. That is,

$$p(\text{incorrect} \mid \text{incongruent}) = A \times (1 - C)$$

Substituting this formula into the previous one reveals that, $p(\text{correct} \mid \text{congruent}) = C + p(\text{incorrect} \mid \text{incongruent})$, which can be re-written to isolate for C:

$$C = p(\text{correct} \mid \text{congruent}) - p(\text{incorrect} \mid \text{incongruent})$$

In other words, the estimate of controlled responding is simply the difference in correct vs. incorrect response rates in the two conditions. Given this estimate of controlled recollection, it is simple to solve for automatic familiarity. Re-arranging the terms in the incongruence formula to isolate A shows that,

$$A = p(\text{incorrect} \mid \text{incongruent}) / (1 - C)$$

Substituting the formula for C into this equation reveals that A can be calculated directly from study observations.

$$A = p(\text{incorrect} \mid \text{incongruent}) / [1 - (p(\text{correct} \mid \text{congruent}) - p(\text{incorrect} \mid \text{incongruent}))]$$

The key point is that these formulas allow a researcher to measure controlled recollection and automatic familiarity. All a person needs are these formulas along with some observed responses in the congruent and incongruent conditions.

Process dissociation logic has already been successfully applied in a number of domains (e.g., Jacoby, 1991; Payne, 2001; Payne, Lambert, & Jacoby, 2002; Sherman,

Groom, Ehrenberg, & Klauer, 2003; Toth, Reingold, & Jacoby, 1994). It has even been used to study prejudice. However, it has not yet been applied to study discrimination in hiring decisions. In studying prejudice, Payne (2001) asked participants to categorize tools vs. guns as quickly as possible. The catch is that participants were first primed with a White or a Black face. Research has found that people are more apt to associate Blacks than Whites with guns (Correll, Park, Judd, & Wittenbrink, 2002; Greenwald, Oakes, & Hoffman, 2003; Payne, 2001). Thus, when a White face was followed by a tool, or a Black face was followed by a gun, automatic reactions (associating Blacks with guns) were congruent with controlled ones (recognizing that a gun was presented). Conversely, when a White face was followed by a gun, or a Black face was followed by a tool, automatic reactions were incongruent with controlled ones. Comparing differences in rates of false alarms provided the information necessary to calculate controlled responding. The estimate of controlled responding could then be used in a formula to estimate the automatic component of prejudice.

As a research tool, process dissociation has two main benefits that make it particularly useful. These benefits are summarized by Conrey, Sherman, Gawronski, Hugenberg, and Groom (2005). One benefit is that, unlike traditional task dissociations, process dissociations do not confound the process being measured with a particular measurement task. In research on prejudice, automatic prejudices were often equated with "implicit" tasks (e.g., the Implicit Association Test; Greenwald, McGhee, & Schwartz, 1998), whereas controlled components were equated with "explicit" tasks (e.g., the Modern Sexism Scale; Swim, Aikin, Hall, & Hunter, 1995). The difficulty is that tasks

also differ in a number of other ways, such as the degree to which they tap perceptual vs.

conceptual processes (Roediger, 1990; Sherman, Lee, Bassenoff, & Frost, 1998). Similar

logic applies to research on sexism in hiring decisions. Recall that Davison and Burke

(2000) meta-analytically estimated the amount of pro-male bias and gender-job fit bias in

existing research studies. One difficulty is that the two meta-analytic estimates relied

almost entirely on separate studies with differing methodologies. Differences in

methodologies thus confound estimates. An advantage of process dissociation is that it

allows both parameters to be calculated within the same study within a single task.

The other benefit of process dissociation is that it avoids the need for tasks that are

"process pure." Recall that obtaining a pure measure of the pro-male bias would

traditionally require eliminating gender-job fit. That would likely require using a job

without any sex typing. Such jobs are uncommon (Olian et al., 1988). Moreover,

requiring purely gender-neutral jobs precludes measuring the pro-male bias in the vast

majority of jobs. To obtain a pure measure of the gender-job fit bias would require

eliminating the male bias. Attempts to do so have so far been largely unsuccessful (e.g.,

Kawakami et al., 2005). The primary advantage of applying process dissociation in hiring

situations is that it would overcome this need for pure tasks. It should allow researchers to

estimate the pro-male bias and gender-job fit bias within a single study, without the need

for pure tasks, using jobs that would not otherwise be feasible.

Of course, process dissociation is not a panacea. It has several limitations that

constrain where it can be fruitfully applied. First, it requires conditional probabilities that

add up to one. This condition should be obtainable in sexism research. Selecting a male

candidate means passing up a female candidate, and visa versa. Consequently, the proportion of males and females selected will always add up to one, thus fulfilling the requirement of conditional probabilities adding to one.

Second, the parameters must be independent. Independence means that the pro-male bias parameter does not directly influence the gender-job fit parameter, can be affected without affecting the gender-job fit parameter, and visa versa. Testing this assumption is the purpose of Study 2 in this dissertation.

Third, process dissociation assumes that the contributions of the parameters are the same in both the congruence and incongruence condition. In other words, the degree of pro-male bias should be the same in the male and female sex-typed jobs, and the degree of gender-job fit bias should be the same in the male and female sex-typed job. This assumption is often violated, and violations are not viewed as a serious threat to validity. Consider applications of process dissociation to study prejudice. The association of Whites with tools is probably not as strong as the association of Blacks with guns, yet these parings have formed the basis of several process dissociation studies (e.g., Correll et al., 2002; Greenwald et al., 2003; Payne, 2001). Nonetheless, this assumption of process dissociation is explored more fully in the general discussion using evidence from simulations to test the effect of violations.

Fourth, process dissociation assumes an underlying model. Specifically, one process (e.g., automatic familiarity) is assumed to drive responses only to the extent that the other (e.g., controlled recollection) does not. All of the process dissociation models described so far have been "C-First" models in that controlled responding is assumed to

drive responses when present, and in that the C parameter is calculated first in formulas.

For example, in Jacoby's (1991) study, controlled recollection always drives responses

when present. In the incongruent condition, familiarity only drives an incorrect response

when the participant lacks a controlled recollection. A diagram of a C-First model is

provided in Figure 1.

A small number of articles have employed an alternative model. According to A-

First models, automatic processes dominate, and controlled ones drive responses only to

the extent that automatic ones do not (e.g., Lindsay & Jacoby, 1994). For example, in the

Stroop color-naming task, participants try to name the ink color in which a word is

printed. The catch is that the word also spells a color (e.g., red). In this case, the

automatic tendency to read a word often drives responses despite a controlled ability to

name the ink colour in which the word is written. According to the A-First model, when

the word and ink color are incongruent, the controlled ability to name colours only drives

a response when the automatic tendency to read words does not. The corresponding A-

First model is provided in Figure 2.

C-First models are by far the dominant models in the literature. They have more

validation evidence and tend to be more accepted than are A-First models. Consequently,

this dissertation focuses on a C-First application of process dissociation. Nonetheless,

alternative models were explored, with results discussed in the general discussion.

Adapting Process Dissociation for Use in Hiring Situations

The first step in applying process dissociation to hiring decisions is to derive the

simultaneous equations. These simultaneous equations are how process dissociation

Figure 1

A C-First process dissociation mode applied in Jacoby's (1991) memory study. Each path represents a likelihood. Parameters with lines leading to them are conditional upon preceding parameters. The table on the right of the figure depicts the predicted response of the participant in the congruent and incongruent conditions.
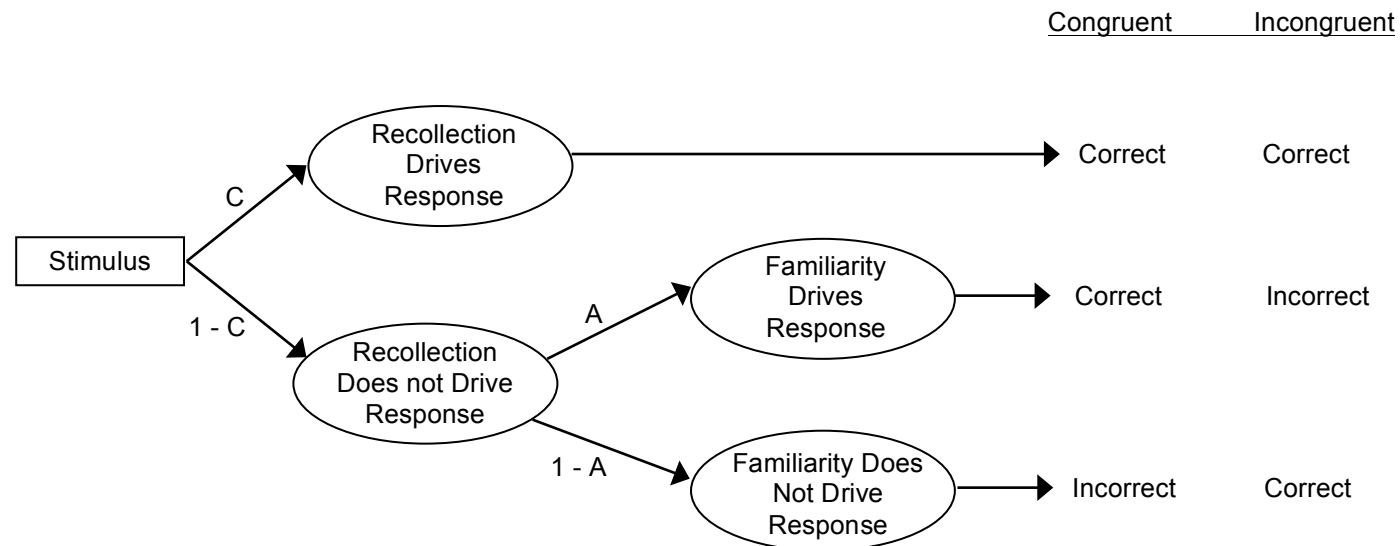
Figure 2

An A-First process dissociation model applied to the Stroop color-naming task. Each path represents a likelihood. Parameters with

lines leading to them are conditional upon preceding parameters. The table on the right of the figure depicts the predicted response of

the participant in the congruent and incongruent conditions.

	Congruent	Incongruent
Word Reading Drives Response	Correct	Incorrect
Color Naming Drives Response	Correct	Correct
Color Naming Does not Drive Response	Incorrect	Incorrect
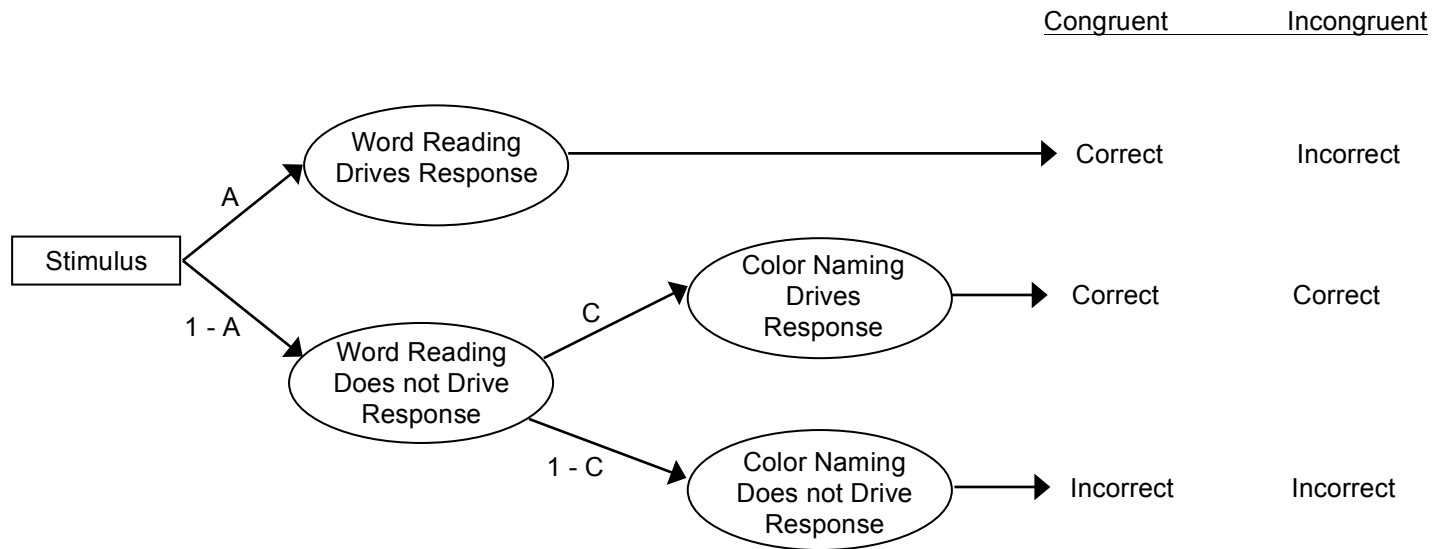
overcomes the need for pure measures. In selection situations, comparing selection ratios of candidates for stereotype congruent or stereotype incongruent jobs should create the needed equations. These equations can be derived from the model diagrammed in Figure 3. They are adapted from Jacoby (1991). For consistency with notations employed in previous research, let the pro-male bias parameter be represented by the letter C. Let the gender-job fit parameter be represented by the letter A.

First consider the congruent condition. The pro-male bias and gender-job fit bias work together in the same direction when males apply to male sex-typed jobs. That is, the biases are added together (C + A). The shared contribution (C × A) is removed because it has been counted twice – once for each process. Thus, p(male selected | male job) = C + A - (C × A). This formula can be re-written as

$$p(\text{male selected} \mid \text{male job}) = C + A \times (1 - C)$$

Next consider the incongruent condition. The pro-male bias and gender-job fit bias work in opposite directions when males apply to female sex-typed jobs. In that case, a female would be selected only when gender-job fit drives the response (A) and the pro-male bias does not (1 - C). Expressed as a formula,

$$p(\text{female selected} \mid \text{female job}) = A \times (1 - C)$$

This formula can be substituted into the previous one. The substitution reveals that p(male selected | male job) = C + p(female selected | female job), which can be rewritten as

$$C = p(\text{male selected} \mid \text{male job}) - p(\text{female selected} \mid \text{female job})$$

Note that researchers can measure the proportions of males selected for male jobs and the proportions of females selected for female jobs. Thus, the above formula allows a

Figure 3

A process dissociation model applied to sex-typed selection situations. Each path represents a likelihood. Parameters with lines

leading to them are conditional upon preceding parameters. The table on the right of the figure depicts the gender of the candidate

(male or female) that should be selected when the sex-type of the job is masculine versus feminine.
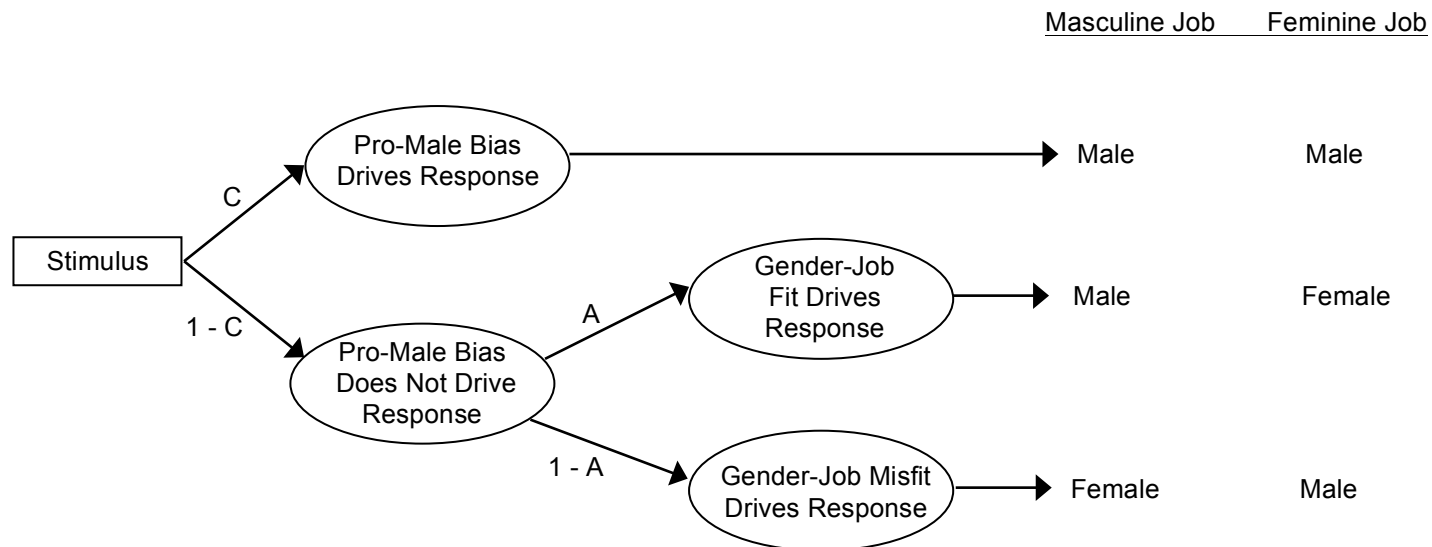
researcher to calculate the degree of pro-male bias based on data collected in a study. Specifically, the pro-male bias is the extent to which males are more advantaged for their gender-congruent jobs than females are for their gender-congruent jobs.

Now that the pro-male bias has been quantified, the gender-job fit bias can easily be solved for. The pro-male bias parameter (C) can be inserted into one of the above formulas, leaving only one unique value for the gender-job fit bias (A).

One final step is to remove the base rate of responding. Given no bias, gender proportions of people hired should be equivalent to gender proportions of applicants. When half the applicants for a job are male, half the people hired should be male given random responding. This base rate is subtracted from A to reveal the gender-job fit bias. The resulting formulas can be summarized as follows:

$C = p$(male selected | male job) $– p$(female selected | female job)   (1)

$A = [p$(female selected | female job) $/ (1 – C)] –$ base rate of gender congruence   (2)

A sample calculation may help to clarify how to apply this logic in real life. Consider what would happen if decision-makers were asked to hire five people out of twelve candidates for a male sex-typed job, and five out of twelve candidates for a female sex-typed job. For simplicity, suppose that the applicant pool has an equal number of males and females, and that all applicants are equally qualified. The data show that a participant selects 80% males for the male sex-typed job and 60% females for the female sex-typed job. Applying Formula 1, the participant's pro-male bias can be calculated as

$$C = p\text{(male selected | male job)} – p\text{(female selected | female job)}$$

or

$$C = .8 - .6 = .2$$

Given the participant's pro-male bias parameter, it is easy to calculate their gender-job fit parameter using Formula 2.

A = [p(female selected | female job) / (1 – C)] – base rate of gender congruence

or

A = [.6 / (1 - .2)] - .5 = .25

The above example illustrates that it is indeed possible to quantify the degree to which a person displayed a pro-male bias and gender-job fit bias without needing to control for either. Armed with the above formulas and some data from hiring decisions, calculations are relatively painless.

There are some differences between the procedure just outlined and traditional applications of process dissociation. The core logic and assumptions of process dissociation remain unchanged. However, there are some non-trivial procedural modifications necessary to maintain realism in how hiring decisions are typically made.

Typical process dissociation studies have hitherto involved relatively simple decisions with right/wrong outcomes. For example, is the word new or old? Does the picture display a tool or a gun? What color is the word's ink? In contrast, hiring decisions are more complex. In a typical hiring situation, the decision-maker has a job to fill, with several candidates applying. The task of choosing a candidate out of the available pool normally requires significant time and effort to weigh all available information (e.g., resumes, test scores, references). Though sometimes there may be a clear correct/incorrect choice, often there will not be. There are a number of possible ways to potentially simplify the task of hiring decisions to make the task more consistent with

simple decisions. For example, fewer candidates could be presented, or less information could be presented for each candidate, or one candidate might be made clearly superior. However, nothing in process dissociation logic stipulates that participant decisions have to be simple, or be classified as right/wrong. Given that complexity should not affect process dissociation logic, the more realistic design (presenting rich information on multiple candidates) seems preferable.

Another difference between the present study and traditional process dissociation designs involves the meaning of the parameters. In studies of process dissociation to date, one process is typically thought to be relatively controlled (e.g., recollection, color naming, tool/gun sorting) while the other is thought to be relatively automatic (e.g., familiarity, tendency to read words, stereotype associations), hence the C-First and A-First nomenclature. Some authors have even gone so far as to define process dissociation as a "technique that is designed to differentiate automatic processes from controlled processes" (Moss, 2008, p. 1). In contrast, the current study makes no suggestion that parameters are controlled or automatic. Nothing in process dissociation logic suggests that it is limited to investigating certain types of processes (e.g., controlled vs. automatic ones). The core idea is simply that simultaneous equations are an alternative solution to estimating confounded variables that are hard to isolate. In fact, use of the terms controlled vs. automatic may be misleading to the extent that whether the processes being investigated are actually controlled or automatic is a separate empirical question. For example, Jacoby (1991) investigated effects of recollection vs. familiarity in memory. Whether recollection truly is controlled or familiarity truly is automatic is a separate

question from whether they can be investigated with process dissociation. In other words, the distinction may be inappropriate as well as being irrelevant. Nonetheless, so far as I am aware, this is the first application of process dissociation that does not seek to distinguish the contribution of a process thought to be controlled from one thought to be automatic.

Arguably the main difference between the current and past research applying process dissociation involves the number of trials. Past applications of process dissociation have involved dozens if not hundreds of trials by participants. For example, memory experiments asked participants to sort dozens of words as old or new (e.g., Jacoby, 1991). In prejudice, participants sorted nearly two hundred items as either a gun or a tool (Payne, 2001). A parallel in hiring decisions would be if decision-makers had dozens or hundreds of jobs to fill, and were asked to choose from a separate pool of two or more candidates for each job.

Such a design for applying process dissociation in hiring decisions might be possible in theory. However, the reality of hiring situations poses two barriers. First, hiring decisions take considerable time. Having participants make dozens or hundreds of decisions would likely imply major tradeoffs in the realism of those hiring decisions. Second, even if time were not an issue, the design still deviates from reality in that most organizational decision-makers likely make decisions for only one or possibly a small handful of jobs at any given time.

In other words, realistic hiring decisions likely imply a low number of trials. This low number of trials is a problem to the extent that it might affect reliability of

measurement. Similar to the effect of test length on reliability, estimates based on a large number of hiring decisions should be more reliable than estimates based on a small number of hiring decisions. In short, researchers are faced with a tradeoff between increasing the number of decisions while maintaining realism of those decisions.

To offset the small number of trials in simulated hiring decisions, participants in the current studies were asked to make multiple hiring decisions per job. Specifically, they were asked to pick the top three candidates, in order, out of a larger candidate pool. Identifying the top three candidates parallels common practice in hiring situations in that decision makers often identify alternative choices in case the top pick declines the job offer. Though this procedure seems realistic in a hiring context, it is relatively unique in a process dissociation context. As far as I am aware, past implementations of process dissociation have involved a one-to-one correspondence between trials and decisions. That is, each trial involved one decision, which was orthogonal to the next trial/decision. In contrast, the proposed procedure involves multiple decisions per trial. Those decisions are at least partially related in that selecting one candidate as the top pick for a given job means that one less candidate will be available when deciding on the second pick for that job, etc.

Despite these differences, the conditional probability requirement of process dissociation should continue to be met in the proposed design. The probability of selecting males for a job is still one minus the probability of selecting females. Whether the remaining assumptions of process dissociation (outlined in the previous section) continue to be met is what the current research is investigating. I therefore see no logical

barriers to applying a procedure that realistically simulates hiring decisions, even if that procedure deviates from past implementations of process dissociation.

Besides breaking new ground in process dissociation, these procedural modifications also carry potential tradeoffs. For example, asking participants to make decisions for more than one job might produce fatigue or carry-over effects. Asking participants to choose multiple candidates for a job might weaken observed effect sizes compared to having participants hire only their top pick. More decisions might be fit into a smaller time by reducing the amount of information given on each candidate, but asking participants to base decisions on little information might attenuate realism. Researchers applying process dissociation in hiring situations will need to weigh the tradeoffs associated with each method of increasing the number of hiring decisions in order to fit the required number of decisions into the available time.

The current research applied a combination of solutions to maximize the number of hiring decisions made by participants. The exact procedure was informed from previous work in my Masters Thesis. That research and the lessons learned are described next.

CHAPTER 3:

Summary of Masters Research

The example used to outline process dissociation formulas in hiring situations was essentially my master's thesis. It represented the first attempt to apply process dissociation to study discrimination in hiring decisions (Lewis, 2006). Though not a part of the current doctoral dissertation, there are two reasons why my master's thesis is worth briefly reviewing before describing the current efforts. First, it is the only other study ever to apply process dissociation in hiring situations, and therefore merits consideration. Second, lessons learned from that research were highly influential in the design of the current studies.

Methods

A total of 188 undergraduates viewed 12 resumes and indicated their top 5 choices in an online study. This was repeated for 2 jobs: one male sex-typed job (management analyst), and one female sex-typed job (editorial assistant). Resumes were adapted from actual resumes listed on a job posting website. Names and photographs clearly displaying gender were randomly attached to the resumes. There were an equal number of male and female candidates for each job, and no photo, name, or resume appeared more than once. Sex-typed jobs, resumes, and photos were pretested and chosen based on numerous selection criteria. Participant effort was measured by recording the time taken to make hiring decisions, and by subsequently administering two memory tests evaluating participant memory for the candidates they chose.

Findings

  Pro-male bias. A pro-male bias occurred in the order but not the frequency of selection. In other words, even though males and females were on average equally represented in the top five lists for both sex-typed positions, males were generally selected before females. Biernat and Fuegen (2001) found a similar result. In their study, males and females were equally represented when participants created a "short list," but males were more likely to be the top hiring choice. Potential explanations include (a) women need to meet lower minimum criteria to be shortlisted but higher standards to be chosen as the top candidate (Biernat & Fuegen, 2001; Biernat & Kobrynowicz, 1997), and (b) a subtle form of sexism in which initial screening judgments are based on valid cues whereas final decisions are based on more biased processes such as emotion and intuition (Levin, Rouwenhorst, & Trisko, 2005). Either explanation would account for why women were equally represented in the proportion of shortlisted candidates in my thesis, but disadvantaged in the rankings of those shortlisted candidates.

  Effect of effort. This pro-male bias discovered in my thesis was negatively related to effort. Those who exerted greater effort showed less favouritism toward males. Meta-analytic evidence confirms that sex discrimination in selection is greatly reduced when decision-makers are given more and better information to compare candidates (Davison & Burke, 2000; Tosi & Einbender, 1985). The common-sense caveat suggested by the results is that merely presenting decision-makers with additional information may not be enough; for reduction in bias to occur, decision-makers must actually make the effort to use the additional information.

Gender-Job Fit Bias. In contrast to the pro-male bias, gender-job fit bias did not occur. It was unclear whether gender-job fit effects were minimized because of the large amount of relevant detail provided in the resumes (Davison & Burke, 2000; Tosi & Einbender, 1985), or whether the jobs were simply not sex-typed enough to produce consistent effects. In contrast to results from the pretest, ratings by 23 participants indicated that the editorial assistant position did not differ (statistically or practically) from neutral on two of three dimensions of sex typing (prestige and estimated percentage of females). Given the weak female sex-typed job, it seems premature to draw conclusions on gender-job fit bias from my master's thesis.

CHAPTER 4:

Design of Hiring Task Used to Elicit Process Dissociation Parameters

Lessons learned from the master's research were essential in refining how process dissociation parameters were obtained in the doctoral studies. These lessons and their effect on the design of the primary hiring decision task are described below. All studies in the current dissertation utilized the following core hiring decision task.

General Design

Participants were presented with ten qualified candidates for a job. Candidate information was represented either by full length resumes (Study 1), or by a list of summary scores (Study 2). The task was to indicate which candidate should be sent a job offer. Participants were also asked which candidate should be sent a job offer second if the first choice declines, and finally, which candidate should be sent an offer third if both the first two choices decline. This was repeated for four sex-typed jobs. Each job had an equal number of male and female candidates. Male and female sex-typed jobs were presented in alternating order, with order of presentation counterbalanced. In addition, resume order within each job was counterbalanced.

Differences from my master's thesis include the fact that participants identified the top three (instead of the top five) candidates. At the same time, the number of jobs doubled from two to four. These changes allowed participants to be more selective in their hiring decisions while increasing the overall number of decisions. The enhanced selectivity and number of hiring decisions should contribute to the reliability of process dissociation parameters.

Method of Delivery

Hiring decisions were recorded on a computer. Job definitions taken from the Occupational Information Network (O*Net) appeared at the top of the page. Participants were given space for recording notes in the middle of the page. Hiring decisions were indicated using drop-down boxes containing candidate first names. After completing the selection decisions for one job, participants would click a button and the procedure would be repeated for the next job.

Sex-Typed Jobs

A weak female sex-typed job made it difficult to interpret results of my master's thesis. Consequently, jobs were more strongly sex-typed in my doctoral studies.

The two male sex-typed jobs used in the dissertation were mechanical engineer and lead computer programmer. The two female jobs were childcare worker and receptionist.

The jobs were chosen based on Shinar's (1975) three components of job sex typing: male sex-typed jobs tend to be associated with stereotypically male traits whereas female sex-typed jobs tend to be associated with stereotypically female traits; male jobs tend to be high in prestige whereas female jobs tend to be low in prestige; male jobs tend to have predominantly male job incumbents whereas female jobs tend to have mostly female job incumbents. These three components of sex typing – stereotypicality, prestige, and gender composition – were the components used in factor analyses by Glick, Wilk, and Perreault (1995).

Information on the sex typing of positions came from two sources. The 2005

Canadian Census data lists the actual gender composition of jobs. The given jobs were chosen because they were each dominated by one gender to an equal degree – about 90% of incumbents shared that gender. However, arguably more important than the real-world gender composition is participants' perceptions of each position. To assess participant perceptions of the positions, all jobs were pretested. The pretest is described in Chapter 6. As expected, all positions were perceived as strongly sex-typed in the expected directions on all dimension of sex typing (see Table 1 in Chapter 6).

Note that gender bias could reasonably arise from any one of Shinar's (1975) three components of sex typing, or a combination of all three. For instance, participants might display a gender-job fit bias solely due to differences in gender-laden traits associated with jobs, or solely due to differences in prestige levels associated with jobs, or solely due to perceptions of one gender dominating a job, or a combination of these factors. It is also possible that pro-male biases reported in past studies were affected by average levels of these components of sex typing across a wide variety of jobs. If most jobs studied involved stereotypically male traits, the net effect would be to advantage males over females. In the current research, male and female jobs differed on all three components of sex typing. Because all three components varied together, the current design does not allow for an examination of which component of job sex typing is driving a particular gender bias in hiring decisions. That question is left to future research. Instead, as an initial investigation and proof of concept, it seemed advisable to have the strongest manipulations possible. Distinguishing male from female jobs on all three dimensions of sex typing should produce the best chance observing biases due to job sex

typing.

Manipulation of Candidate Gender: First Names

First names that unambiguously conveyed gender were prominently displayed above candidate descriptions. Candidate name is the most common way of manipulating gender in discrimination research (e.g., Atwater & Van Fleet, 1997; Norton, Vandello, & Darley, 2004; Uhlmann & Cohen, 2005, 2007). To ensure that participants mentally processed these names, participants had to use the first names in the drop-down boxes to indicate hiring decisions.

There is a growing field of research suggesting that all names are not created equal. People infer traits – such as intelligence, race, competence, and age – from someone's name (Kasof, 1993; Mehrabian, 2001; Young, Kennedy, Newhouse, Browne, & Thiessen, 1993). There is also evidence showing that these inferences affect hiring decisions (Bertrand & Mullainathan, 2003; Bruning, Polinko, Zerbst, & Buckingham, 2000; Cotton, O'Neill, & Griffin, 2008).

Given that first names are a key manipulation in the current research, it seemed prudent to ensure that the male and female names used in the study differed only on gender. Otherwise, name effects other than implied gender might confound conclusions.

Kasof (1993) published a list of gendered names matched for implied competence, age, and attractiveness. His list has since been widely cited and adopted by researchers using paired names in their research (cited 63 times, according to PsychInfo). Unfortunately, that study is now almost two decades old, and much of the data in it is even older. Name perceptions are highly cohort specific (Kasof, 1993). Two decades is

more than enough time for name associations to change considerably.

Consequently, I replicated and updated Kasof's (1993) study using current census data as well as a new large sample of undergraduates. This updated list may be of interest to researchers who use matched names. Full methodological details and results are presented in Chapter 6.

Results of this update to Kasof (1993) were used to pair gendered names on age association, competence, and attractiveness. Each candidate description was shown with a male name half the time, and the matched female name the other half of the time.

Last Names

It is a rare resume indeed that provides only a first name. For enhanced realism, last names were also listed at the top of candidate descriptions. Unlike first names, last names were always displayed with the same candidate description. Last names included in the research were the most common ones found in the 2000 U.S. Census (Canadian surname data was unavailable). To control for race effects, only Caucasian surnames were included. None of the last names communicated gender information about the candidate. The list of last names included in the study is provided in Appendix L.

Effort Measures

Consistent with my master's thesis, I recorded time taken to make hiring decisions. Specifically, it was recorded as the number of seconds a person spent viewing materials.

Unlike my master's thesis, the dissertation studies did not rely on memory-based effort measures. Performance in person/name and person/category matching tasks (the

memory tests used in the master's thesis) actually involves the joint operation of memory for discussion statements, person memory, category memory, and several guessing processes (for a discussion, see Klauer & Wegener, 1998). The bottom line is that memory is an imperfect proxy for effort.

Other sexism researchers have also struggled with how to measure participant effort. One promising technique employed with good success in a gender-job fit study is to have participants list their thoughts on each candidate (Uhlmann & Cohen, 2007). Put simply, taking notes requires effort and indicates deeper-level processing of information. The more notes a person takes, the more effort he or she likely expended in thinking about and making those notes. Accordingly, the current studies provided spaces for participants to take notes on each candidate and then recorded the number of characters.

Last but not least, it was possible to visually code participant effort in one of the studies. For Study 1, I observed participants completing the hiring decisions and rated each person's effort on a behaviorally-anchored scale ranging from 1 (*very little effort*) to 5 (*very high effort*).

CHAPTER 5:

Overview of Current Research

The histories and theories underlying the pro-male bias and gender-job fit bias

have now been articulated. I have argued that both biases likely influence hiring decisions

simultaneously, and that both are problematic to isolate. Process dissociation was

proposed as a way to overcome these difficulties because it provides a way to quantify the

biases without the need to isolate them. My master's thesis was then described as the first

attempt to apply process dissociation in a hiring context. Lessons learned from that

research greatly influenced the design of the core hiring tasks used in the doctoral studies.

The tone of this paper now shifts from review to new. The necessary groundwork

has been covered; what follows is a description of the novel efforts constituting my

doctoral research. That research involves three components:

First, all materials were pretested. The pretest served several functions, including

refinement of materials and procedures, verification that the sex-typed positions were

perceived appropriately by participants, and updating Kasof's (1993) list of matched

names for use in gender research (including this dissertation).

Second, Study 1 examined how the process dissociation parameters fit into the

broader realm of existing sexism measures. Specifically, the eight most popular measures

of sexism were collected and results correlated with the process dissociation parameters.

Relationships with age, work experience, and effort were also examined.

Third, Study 2 attempted to independently manipulate each process dissociation

parameter. Some participants were primed to show or not show a pro-male bias. Other

participants were primed to show or not show a gender-job fit bias. Showing a selective influence on one parameter and not the other greatly aids the case for causality. In addition, the resulting double dissociation tests an assumption of process dissociation – that parameters be independent (Jacoby & Shrout, 1997).

The following chapters describe the Pretest, Study 1, and Study 2. Each study contains its own literature review, methods, results, and discussion. The dissertation concludes with a general discussion summarizing the validation case for and against process dissociation in hiring decisions, the limitations of process dissociation, limitations of the current studies, logical next steps, and what has been gained by the current efforts.

CHAPTER 6:

Pretest

The pretest accomplished several goals, described below.

Refinement of Materials

It was important that resumes in Study 1 be as realistic as possible. To that end, a

large number of actual resumes listed on various job posting websites were collected for

each sex-typed job. To protect the identity of applicants, identifying information (e.g.,

applicant names, company names, school names, dates worked) was replaced. Fabricated

scores on the Big 5 personality traits were then added at the top of each resume. These

Big 5 scores were intended to mimic material a decision-maker might normally receive as

the result of a pre-hire personality assessment. These resumes and pre-hire personality

assessment scores are consistent with typical hiring practices. In a recent survey of

Fortune 1000 firms, Piotrowski and Armstrong (2006) found that virtually all companies

collected resumes (98%), and that a significant number used pre-hire personality

assessments (19%).

Besides being realistic, it was also important that resumes and personality scores

be reasonably similar in quality and qualifications. If one candidate clearly stood out as

being better or worse than the others, then the proportion of eligible males and females

might differ, affecting process dissociation calculations. Consequently, some

qualifications were exchanged between candidates and glaring errors (e.g., grammar or

spelling errors) were removed. To further equalize candidates, thirty-eight students from

the undergraduate psychology pool completed the hiring task described in Chapter 4

except that no gender/name information was given. Instead, candidates were identified only by letters of the alphabet. Also, to help identify weak candidates, participants indicated the three weakest applicants in addition to the three strongest ones. Sessions were proctored. Based on the hiring decisions and notes of participants, particularly strong candidates were weakened, and particularly weak candidates were strengthened. This procedure was repeated as necessary to achieve sufficient equivalence. The end result was ten highly realistic and reasonably equivalent candidate descriptions (resume and personality score combinations) for each sex-typed position. A sample candidate description used in the pretest is provided in Appendix C.

Refinement of Procedures

Besides refining the materials, the pretest also served as a testing ground for procedures. All candidate descriptions in Study 1 were printed. It soon became clear that organizing the resumes for a given sex-typed position into booklets was helpful, as were divider tabs that let participants easily flip between candidates.

The other procedural refinement informed by the pretest was the amount of time recommended to participants to make their hiring decisions. Time constraints are often an unavoidable part of research with human participants. From an external validity standpoint, it is important that participants are not artificially rushed beyond the bounds of time pressures people would normally face in a workplace. To help determine an appropriate amount of decision time, half the pretest participants were given 40 minutes, and the other half were given 60 minutes to make hiring decisions. Everyone was then asked whether they felt they had enough time, and how much time they think participants

should be given in the future. When asked how much time they think should be given for

hiring decisions, participants on average indicated 53 minutes (*SD* = 15). When asked

whether they had enough time, almost all the participants given 60 minutes agreed (11

agreed or strongly agreed, 2 neutral, 2 disagreed). This time allotment is consistent with

findings on how much time recruiters generally spend on a resume. Ross and Young

(2005) surveyed recruiters, finding that roughly two thirds of recruiters spent about 2

minutes on a resume. Based on this evidence, 60 minutes seemed like a reasonable

amount of decision time to recommend participants aim for in Study 1. This was only a

guideline. Participants were instructed that they could take more or less time if required.

Pretest Perceptions of Sex-Typed Positions

It is not enough that the sex-typed positions are dominated (i.e., ~90%) by one

gender according to the Canadian Census. They should also be sex-typed based on

participants' perceptions on the three dimensions of job sex typing: stereotypicality,

prestige, and gender composition. As noted previously, gender biases could reasonably

arise from any one or a combination of these dimensions. Because all dimensions of sex

typing are being manipulated simultaneously, the current procedures do not allow for an

investigation of which dimension(s) underlie a particular bias. Instead, the current focus is

on producing strong manipulations such that a bias due to job sex typing can arise

regardless of which dimension(s) contribute to that bias.

After completing the hiring decision task, the 38 participants rated the positions

on the three dimensions of sex typing. Stereotypicality was rated using Glick, Zion, and

Nelson's (1998) seven-point scale, where 1 = *indicative of feminine traits*, 4 = *neutral*,

and 7 = *indicative of masculine traits*. Use of a single stereotypicality dimension rather than separate male/female dimensions (e.g., the Bem Sex-Role Inventory) was recommended by Glick et al. (1995), who found that participants only used one dimension when rating sex typing of jobs even when presented with separate male/female dimensions to rate. Prestige was rated out of 5 using Jawahar and Mattson's (2005) item, where 1 = *very low prestige* and 5 = *very high prestige*. Participants estimated the percentage of job occupants that are male by filling in a blank.

Results for perceptions of sex typing are listed in Table 1. Note that all positions were sex-typed in the appropriate direction on all dimensions. The effect size of sex typing was also large, exceeding one standard deviation in all cases but one – the job of childcare worker was below neutral prestige by only three quarters of a standard deviation. Moreover, the male and female sex-typed jobs have a reasonably equivalent degree of sex typing. Based on these results, the jobs appeared to be appropriate for use in process dissociation.

Matched Names: Replication and Update of Kasof (1993)

Recall that Kasof (1993) provided a list of gendered names matched on age association, competence, and attractiveness. This list has since been cited 63 times, according to PsychInfo. It is widely used in research requiring matched names, such as the current dissertation. Unfortunately, name associations are highly cohort specific. Many associations have undoubtedly changed since 1993. In fact, many of the attractiveness and competence ratings used in Kasof's study come from much earlier (the 1970s and 80s). This list was brought up to date in the current research by replicating

Table 1

Perceived Sex Typing of Jobs as Rated by 38 Pretest Participants

	Stereotypicality (1 = *feminine traits*; 7 = *male traits*)	Prestige (1 = *low*; 5 = *high*)	Estimated Percentage Male
Childcare Worker	1.58 (0.75)	2.43 (0.76)	14.65 (12.23)
Mechanical Engineer	6.04 (1.12)	4.42 (0.90)	82.43 (15.43)
Receptionist	1.64 (0.84)	2.06 (0.81)	16.29 (17.76)
Lead Computer Programmer	5.51 (1.08)	3.89 (0.79)	76.93 (15.08)

Note: Standard deviations appear in brackets.

Kasof's original methodology with updated materials and ratings.

Kasof (1993) categorized names into categories of "older adult," "younger adult," and "age unassociated" based on whether the name changed in frequency of use over several decades. Population name data were taken from Dunkling's (1986) frequency ranking of names for the U.S. Kasof considered a name older if its use in 1925 and 1940 was 10 ranks higher than its average use in 1950, 60, and 70. The name was considered younger if it was 10 ranks different in the opposite direction. It was classified as age unassociated if the ranking did not change by 10 ranks.

Name frequency rankings for the current updated analysis come from all U.S. Social Security applications from the 1950s through 80s (Social Security Online, 2010). Note that this is a more comprehensive source of name frequencies than the one originally used by Kasof (1993). Data on Canadian name frequency were not available. Names were the same ones analyzed by Kasof. A name was categorized as younger/older if its average rank order over a decade increased/decreased by at least 10 between the 1950s and 60s vs. 70s and 80s. Otherwise it was classified as age unassociated. In other words, a name was classified as younger if it is more popular for adults currently in their 20s and 30s as of the year this research was conducted, older if it is more popular for adults in their 40s and 50s, and age unassociated if its popularity does not differ between 20- to 50-year-olds.

In Kasof (1993), attractiveness and competence ratings came from several sources: 32 undergraduates run by Kasof near the date of his publication; Buchanan and Bruning's (1971) like-dislike ratings of forenames; Dion's (1985) desirable-undesirable ratings of forenames; and Mehrabian's (1988) ratings of intellectual competence

connotations.

To update these ratings, 205 undergraduates provided attractiveness and competence ratings for each name in exchange for course credit. Participants included 35 people who completed the rest of the pretest (name ratings were completed last), plus an additional 170 participants who completed name ratings online. Consistent with past research (e.g., Bruning et al., 2000; Cotton et al., 2008), competence ratings were assessed by the item "I believe this individual would be a good employee," measured on a 7-point agree/disagree scale. Attractiveness ratings were assessed by the item "I think this is a good name," measured on a 7 point agree/disagree scale.

Male and female names were then paired based on age implication, competence ratings, and attractiveness ratings. Two lists were created. The first list matched 20 male and 20 female names closely an all three dimensions (see Table 2). This list provided the matched names used in the core hiring recommendation task for eliciting process dissociation parameters. The second list included 10 male and 10 female names that do not have a good match on all three dimensions (see Table 3). This list was used in the Implicit Association Test in Study 1. Because these names could not be paired on all relevant criteria, they are instead paired as closely as possible on the criteria that is arguably most pertinent to hiring decisions: competence ratings.

As expected, the characteristics of names have changed significantly since the early 1990s. I recommend that researchers requiring matched names in their studies use these updated data.

Table 2

First Names Used for Candidates in Studies 1 and 2 Matched on Age Association, Competence, and Attractiveness

	Male Names				Female Names		
	Age Association	Competence	Attractiveness		Age Association	Competence	Attractiveness
Andrew	Younger	4.82 (1.36)	4.88 (1.40)	Elizabeth	Younger	4.90 (1.52)	4.88 (1.56)
Christopher		4.82 (1.52)	4.84 (1.63)	Sarah		4.83 (1.43)	4.94 (1.45)
Brian		4.63 (1.31)	4.44 (1.52)	Lisa		4.71 (1.39)	4.42 (1.57)
Eric		4.68 (1.41)	4.63 (1.49)	Katherine		4.77 (1.40)	4.52 (1.55)
Matthew		4.76 (1.36)	4.71 (1.51)	Michelle		4.75 (1.47)	4.51 (1.61)
Joseph	Age unassociated	4.57 (1.35)	4.34 (1.61)	Christine	Age unassociated	4.58 (1.34)	4.38 (1.50)
Alan	Older	4.66 (1.35)	3.78 (1.64)	Diane	Older	4.68 (1.37)	3.79 (1.53)
Frank		4.40 (1.55)	3.64 (1.72)	Theresa		4.39 (1.49)	3.64 (1.60)
Fred		3.81 (1.41)	2.98 (1.54)	Sally		3.82 (1.47)	2.92 (1.53)
George		4.32 (1.37)	3.52 (1.50)	Elaine		4.37 (1.47)	3.50 (1.57)
Ronald		4.27 (1.40)	3.55 (1.69)	Patricia		4.30 (1.49)	3.63 (1.61)
Peter		4.35 (1.48)	3.72 (1.62)	Linda		4.32 (1.43)	3.64 (1.45)
Walter		4.16 (1.59)	3.15 (1.61)	Brenda		4.16 (1.42)	3.04 (1.48)
Ted		4.10 (1.43)	3.16 (1.55)	Sandra		4.13 (1.51)	3.29 (1.58)
Edward		4.60 (1.64)	3.82 (1.84)	Susan		4.61 (1.32)	3.68 (1.43)
Dennis		4.47 (1.49)	3.62 (1.64)	Carol		4.49 (1.42)	3.48 (1.40)
Thomas		4.67 (1.29)	4.36 (1.48)	Anne		4.66 (1.37)	4.22 (1.60)
Donald		4.11 (1.53)	2.84 (1.57)	Ruth		4.18 (1.56)	2.85 (1.70)
Lawrence		4.53 (1.46)	3.92 (1.73)	Karen		4.62 (1.48)	3.92 (1.63)
Gary		4.48 (1.33)	3.73 (1.55)	Alice		4.35 (1.49)	3.94 (1.68)

Note: *n* = 205 for competence and attractiveness ratings. *SD* values are in brackets. Age association information comes from US Social Security Number applications during the 1950s, 60s, 70s and 80s. Names were ranked ordered within gender according to frequency of use. An age is categorized as younger/older if its rank order increased/decreased by at least 10 between the 1950s & 60s vs. 70s & 80s.

Table 3

Names Used in the Implicit Association Test. Names Were Matched on Competence.

	Male Names				Female Names		
	Age Association	Competence	Attractiveness		Age Association	Competence	Attractiveness
Jack	Older	4.46 (1.35)	4.14 (1.57)	Gail	Older	4.27 (1.48)	3.20 (1.62)
Stephen	Older	4.56 (1.36)	4.46 (1.57)	Mary	Older	4.41 (1.49)	3.24 (1.51)
Dan	Older	4.47 (1.37)	4.63 (1.51)	Sharon	Older	4.33 (1.36)	3.57 (1.55)
Michael	Age unassociated	4.92 (1.35)	5.08 (1.38)	Laura	Younger	4.91 (1.29)	5.02 (1.35)
James	Age unassociated	4.87 (1.37)	4.83 (1.54)	Jennifer	Younger	4.94 (1.43)	4.65 (1.50)
Andy	Younger	4.38 (1.36)	4.30 (1.66)	Deborah	Older	4.39 (1.45)	3.14 (1.54)
Patrick	Younger	4.53 (1.45)	4.14 (1.70)	Jane	Older	4.56 (1.44)	3.80 (1.63)
William	Age unassociated	4.64 (1.51)	3.97 (1.71)	Suzanne	Older	4.31 (1.33)	3.42 (1.50)
Greg	Older	4.44 (1.45)	4.12 (1.60)	Helen	Older	4.42 (1.39)	3.38 (1.55)
Carl	Older	4.20 (1.32)	3.96 (1.58)	Barbara	Older	4.18 (1.53)	2.76 (1.43)

Note: $n = 205$ for competence and attractiveness ratings. *SD* values are in brackets. Age association information comes from US Social Security Number applications during the 1950s, 60s, 70s and 80s. Names were ranked ordered within gender according to frequency of use. An age is categorized as younger/older if its rank order increased/decreased by at least 10 between the 1950s & 60s vs. 70s & 80s.

CHAPTER 7:

Study 1 – How Process Dissociation Fits With Existing Sexism Measures

Process dissociation parameters are essentially new measures of gender discrimination. An important first step in developing a new measure is to determine how it relates to other relevant constructs and measures. Accordingly, the purpose of Study 1 was to establish how the process dissociation parameters fit within the existing nomological network of tools used to study sexism.

To my knowledge, there are no existing individual difference measures that evaluate the degree to which a person is biased in favour of males in selection decisions, nor are there any that evaluate the degree to which a person shows gender-job fit bias. Thus, to the best of my knowledge, it is not currently possible to assess convergent validity because there are no measures of identical constructs. The current research is therefore pioneering in that the process dissociation parameters would be the first measures of their respective constructs.

There are, however, related concepts with established measures. The four most prominent measures in sexism research are the Ambivalent Sexism Inventory (Glick & Fiske, 1996), Modern Sexism Scale (Swim et al., 1995), Neo-Sexism Scale (Tougas, Brown, Beaton, & Joly, 1995), and Internal and External Motivation to Respond Without Prejudice Scales (Klonis, Plant, and Devine, 2005). The primary purpose of Study 1 was to examine relationships with these scales.

A secondary purpose of Study 1 was to investigate possible relationships using the Implicit Association Test (introduced by Greenwald et al., 1998). Though not a measure of prejudice per se, the Implicit Association Test is a popular tool commonly used in

studies of prejudice.

Each measurement tool will now be described. Because the current research measures all variables in one session, it can appropriately be seen as a concurrent validation. At issue is how process dissociation parameters are similar and dissimilar from these existing constructs.

Ambivalent Sexism Inventory

Ambivalent Sexism was the topic of a recent special issue in *Sex Roles* (see Lee, Fiske, & Glick, 2010). The Ambivalent Sexism Inventory consists of 22 agree/disagree items measuring two related but distinct aspects of sexism. As described by Glick and Fiske (1996), *hostile sexism* is defined as hostility toward women. It involves negative opinions and emotions toward women (e.g., devaluation of women, belief that women are out to gain power over men), and includes "beliefs in women's incompetence at agentic tasks [that] characterize women as unfit to wield power over economic, legal, and political institutions" (p. 492). In other words, hostile sexism is the type of sexism that results in beliefs that women are inferior to men while also being threatening to men. Given this definition, hostile sexists would be expected to show bias in favour of males over females in selection decisions. This is exactly what Masser and Abrams (2004) found: higher scores on the hostile sexism scale were associated with negative evaluations of female candidates and positive evaluations of male candidates. Based on this definition and evidence, I hypothesized that hostile sexism would be positively related to the pro-male bias parameter.

Hypothesis 1. Hostile sexism will be positively related to the pro-male

bias parameter.

In contrast, *benevolent sexism* involves "attitudes toward women that are sexist in terms of viewing women stereotypically and in restricted roles but that are subjectively positive in feeling tone" (Glick & Fiske, 1996, p. 491). For example, women are seen as nurturing and suited to corresponding work but incompetent at many tasks that require masculine traits. This definition of benevolent sexism closely matches descriptions of gender-job fit. In both, positive stereotypes associated with women advantage them for restricted roles. Accordingly, I hypothesized that benevolent sexism would be positively related to the parameter representing gender-job fit bias.

Hypothesis 2. Benevolent sexism will be positively related to the

parameter representing gender-job fit bias.

Old Fashioned, Modern, & Neo-Sexism Scales

The Modern Sexism Scale and Neo-Sexism Scale share a lot in common. Both are short agree/disagree scales (8 and 11 items respectively); both were published in 1995; both are based on the same parallel with the (at the time) recent distinction between traditional and modern racism (McConahay, 1986); both concepts can be defined as a "manifestation of a conflict between egalitarian values and residual negative feelings toward women" (Tougas et al., 1995, p. 843); both rely on gender-related political issues (e.g., denial of discrimination) to measure prejudice.

The core idea underlying these scales is that blatant old-fashioned prejudiced beliefs (e.g., women belong in the home) are no longer socially acceptable. As open acceptance of prejudice declined, so have scores on traditional prejudice measures

(Dovidio & Gaertner, 1986). However, lower scores on traditional scales do not necessarily mean decreased levels of prejudice in society. Dovidio and Gaertner (1986, 1998) argue that the "normal" face of prejudice is simply shifting into a more subtle form. In modern prejudice, people outwardly endorse or truly believe egalitarian principles yet still display bias, perhaps without realizing it (Dovidio, Gaertner, Nier, Kawakami, & Hodson, 2004; Pearson, Dovidio, & Gaertner, 2009). The Modern Sexism Scale and Neo-Sexism Scale are predicated on the belief that these hidden prejudices will be reflected in people's denial of continuing discrimination, antagonism towards women's demands, and resentment about special favours for women. In addition to their Modern Sexism Scale, Swim et al. (1995) also published a 5-item measure of old-fashioned sexism, which the authors defined as "traditional beliefs about women… [emphasizing] negative stereotypes about women's competence" (p. 202).

Glick and Fiske (1996) found that old-fashioned sexism and modern sexism/neo-sexism were moderately to strongly related to hostile sexism and unrelated to benevolent sexism. Recall that the former should relate mostly to pro-male bias whereas the latter relates primarily to gender-job fit bias. Furthermore, it makes conceptual sense that antagonism and resentment toward women should serve to generally advantage men for all jobs and never to advantage women. Therefore, I hypothesized that the three sexism scales – Old Fashioned, Modern, and Neo-Sexism – should relate positively with the parameter representing the pro-male bias parameter.

Hypothesis 3a. Old-Fashioned Sexism scores will be positively related to the pro-male bias parameter.

Hypothesis 3b. Modern Sexism scores will be positively related to the

pro-male bias parameter.

Hypothesis 3c. Neo-Sexism scores will be positively related to the pro-

male bias parameter.

Internal and External Motivation to Respond Without Prejudice

Klonis et al. (2005) created scales for use in sexism research to parallel Plant and Devine's (1998) measures of Internal and External Motivation to Respond Without Prejudice toward Blacks. Each scale consists of 10 agree/disagree items. The core idea is that societal norms discouraging prejudice create intense pressure to be – or at least appear – nonprejudiced. According to the authors, external motivations to respond without sexism represent a desire to avoid the social sanctions that displaying sexism often elicit. In contrast, internal motivations stem from a desire to be egalitarian in order to meet a personal standard, because egalitarianism is core to the person's self-concept.

Past theorizing often assumed that when people do not feel constrained to appear nonprejudiced by external social norms, they will express their true prejudiced attitudes (Crosby, Bromley, & Saxe, 1980; Gaertner & Dovidio, 1986; McConahay, 1986; Sears & Kinder, 1985). Klonis et al. (2005) argued that this view discounts the potential influence of internal reasons to act in nonprejudiced ways (e.g., due to non-sexist personal standards). The authors found that both external and internal motivations affected public evaluations of sexist jokes, but only internal motivations affected private ones.

According to the above logic, the effect of external motivation depends on the privacy of the situation. It is not immediately obvious whether Study 1's methodology is

particularly public or private. On the one hand, participants were completing the study

with assurances of confidentiality, suggesting that decisions were private. On the other

hand, participants were instructed to imagine that they were making hiring decisions for a

company, suggesting that their decisions would be publically apparent to other people in

that company. Because of this ambiguity surrounding privacy of hiring decisions, no

hypothesis was made regarding scores on the External Motivation to Respond Without

Sexism Scale.

In contrast, internal motivations should have a consistent effect: to reduce sexism.

Items on the scale refer to internal motivation to avoid disadvantaging women (e.g., "It is

personally important to me to let people know that I think women are just as good as men

in high-level careers"). Consequently, people high on the scale should have a smaller pro-

male bias parameter than people low on the scale.

Hypothesis 4. Scores on the Internal Motivation to Respond Without

Sexism Scale will be negatively related to the pro-male bias parameter.

Implicit Association Test

The sexism scales described thus far are the most prominent measures of sexism

currently in use. They are all considered explicit scales in that all of them rely on

participant self-reported attitudes and beliefs. Rather than stop at explicit measures, it

seemed worthwhile to also include implicit measures in the current validation efforts. The

most common tool used to investigate implicit prejudice is the Implicit Association Test

(IAT). Any attempt to add IATs to the already long list of measures posed some unique

methodological barriers. In the end, two IATs were included. However, they were

included as secondary research questions in that the other sexism scales were given priority.

Introduced by Greenwald et al. (1998), the IAT is an attempt to measure a person's strength of association between concepts (Greenwald, Banaji, Rudman, Farnham, Nosek, & Mellot, 2002). Since its inception, the IAT's popularity has exploded. According to Fiedler, Messner, and Bluemke (2006), "hardly any lab in social or personality psychology can be found that is not somehow concerned with this favourite tool" (p. 78). For a recent meta-analysis on IAT predictive validity in sexism research, see Greenwald, Uhlmann, Poehlman, and Banaji (2009).

In classical IAT paradigms, words are displayed one at a time on the screen. Participants must sort these words as quickly as possible into categories displayed at the top of the screen by pressing keys on a keyboard. The IAT will be described in greater detail in the methods section. For now, consider the following example. The target-concept "nurse" is paired with the attribute "female." Nurse is a highly sex-typed position, and people have a strong association of nurses being females. Consequently, responses should be made rapidly. Subsequently, the target-concept "nurse" is paired with the attribute "male." Because this is not the stereotypical association, it should result in slower responses despite the respondent's best efforts. Anyone who has taken the IAT will appreciate how hard it is to counteract the slowdown on incompatible trials. How much slowdown occurs will depend on the strength of the pre-existing association. According to IAT logic, strong associations should produce larger differences in reaction times.

There are numerous critiques and limitations of the IAT (e.g., Brendl, Markman, & Messner, 2001; Fazio & Olson, 2003; Fiedler et al., 2006; Greenwald, 2004; Mierke & Klauer, 2001, 2003; Rothermund & Wentura, 2004; Steffens & Plewe, 2001). One key criticism is whether scores represent stereotypes or merely cultural knowledge regardless of personal endorsement of that knowledge. For instance, a researcher who studies sexism is probably aware of the common stereotype that males are more agentic than females; this knowledge does not imply that the researcher personally holds that stereotype. Clearly, some caution is needed when interpreting IAT scores. Assuming IAT scores accurately measure mental associations, those mental associations may not represent sexist attitudes or beliefs.

In addition to the above problems inherent to the IAT, there were some additional methodological difficulties to applying IATs in the current study. As a reaction time task, IATs require a high level of participant attention. Because of this high demand on attention, IATs are likely especially prone to effects of fatigue. Administering two IATs in a single session – one for the pro-male bias, and one for the gender-job fit bias – is already uncommon. Putting those IATs before the hiring decision task would alert participants that sexism is being investigated, confounding hiring decisions and the resulting process dissociation estimates. Consequently, the IATs had to be administered after the hour-long hiring decision task. Placing IATs an hour into a study is also uncommon because fatigue becomes an enhanced concern. To complicate matters, IATs could also influence results on the explicit sexism measures. Though both explicit and implicit measures can contaminate each other, implicit measures should be more robust to

contamination than are explicit ones. Therefore, a decision was made to administer the IATs after the explicit sexism scales. This decision to place the IATs last further exacerbated fatigue concerns. However, the choice was viewed as the lesser of two evils. The alternative would have been to administer the IATs after the hiring decision task and before the sexism scales for at least some participants. Doing so would have introduced a potential confound into the explicit sexism scales with only a minor reduction in fatigue concerns for the IAT (the IATs would still occur an hour into the study session).

The sheer popularity of the IAT as the dominant measure of implicit associations merits recognition. Balancing this need for recognition with the procedural barriers just outlined, the IAT was included, but was considered a secondary research question. As a secondary research question, it was administered after all the other measures to avoid confounding those measures. Despite the limitations, inclusion of implicit measures of prejudice was considered a strength of the current research.

Two IATs were included in this research. The first measured association between gender and career vs. household. This IAT was essentially a replication of Gawronski, Ehrenberg, Banse, Zukova, and Klauer (2003). The degree to which participants associate men with career and women with household was expected to positively relate to the pro-male bias parameter.

Hypothesis 5. Participants' strength of male/career and female/household associations as measured by the IAT will be positively related to their pro-male bias parameter.

The other IAT measured the association between gender and sex-typed jobs. The degree

to which participants associate men with male sex-typed jobs and females with female sex-typed jobs was expected to positively relate to the gender-job fit parameter.

Hypothesis 6. Participants' strength of male/masculine job and female/feminine job associations as measured by the IAT will be positively related to their gender-job fit parameter.

Method

Participants

Participants were 105 undergraduates (52 males; 53 females) who completed the study in exchange for course credit. Average age was 18.38 ($SD = 2.47$). Participants had an average of 3.21 years of part-time work experience ($SD = 3.24$) and .94 years of full-time work experience ($SD = 3.26$). According to Equal Employment Opportunity Commission ethnicity classifications, the majority of participants were White ($n = 63$) or Asian ($n = 30$), with few Blacks or African Americans ($n = 1$), Hispanics or Latinos ($n = 2$), Aboriginal or American Indian ($n = 1$), or Other/Mixed ($n = 8$).

Materials

The general design of the hiring task was presented in Chapter 4. Material creation and pretesting was described in Chapter 6. As an overview, participants indicated the top 3 candidates for each of 4 sex-typed jobs. Notes on candidates and hiring-decisions were recorded on the computer. Job descriptions from O*Net were provided for each job (Occupational Information Network, 2010).

Realistic resumes. When making hiring decisions, participants used printed versions of full-length resumes that were as realistic as possible. Resumes simulated

output that decision-makers might typically receive from a company's application system. Resume creation was described in Chapter 6. Each sex-typed job had 10 resumes depicting candidates with relatively equal qualifications. Each resume contained a candidate's fabricated scores on a pre-hire measure of Big 5 personality traits, plus sections outlining work experience and education. Work experience and education content were taken from real resumes submitted by job applicants, with identifying information modified. All resumes were formatted consistently. Definitions of the Big 5 traits were provided on a separate sheet of paper. Order of resume presentation was counterbalanced.

Manipulation of candidate gender. Gender of applicants was manipulated via first names at the top of the resume (see list names in Table 2). Surnames were also presented (see Appendix L). As described in Chapter 6, male and female names were matched for age association, inferences of competence, and attractiveness.

Process dissociation parameters. Pro-male bias and gender-job fit bias parameters were calculated using formulas 1 and 2 listed at the end of Chapter 2. High scores indicate greater gender discrimination in hiring decisions.

Effort measures. Consistent with past research (Uhlmann & Cohen, 2007), effort was measured by time participants took to reach hiring decisions and the number of characters they typed as notes. Both were automatically recorded by the computer. I also visually rated each participant's effort using a behaviorally anchored rating scale ranging from 1 (*very little effort*) to 5 (*very high effort*).

Sexism scales. All sexism measures were completed on a scale of 1 (*Strongly*

disagree) to 7 (*Strongly Agree*). Sexism scores were calculated as a person's average on the items of the corresponding established measure of sexism. Higher scores indicate greater sexism.

Implicit Association Test. Two IATs were administered on IBM-compatible desktop computers running PXLab software (Irtel, 2007) in a Windows environment. One IAT was a replication of Gawronski et al. (2003). Consistent with Greenwald, Nosek, & Banaji (2003), the IAT consisted of seven blocks. In Block 1, 10 male and 10 female names had to be sorted into the categories "man" and "woman," respectively. The names, listed in Table 3, were common Caucasian names matched as closely as possible on ratings of competence. The rating process was described in Chapter 6. Participants pressed the left arrow key when a male name appeared on the screen, and the right arrow key when a female name appeared. Block 2 was the attribute discrimination task. In it, 10 career-related nouns and 10 household-related nouns had to be classified into either "career" (left arrow key) or "household" (right arrow key). The nouns were the same ones used by Gawronski et al. (2003): desk, salary, economy, file, laptop, management, fax-machine, company car, business, competition vs. children, diapers, kitchen, fridge, duster, laundry, vacuum cleaner, cloth, ironing board, bucket. In the first practice combined block (Block 3), targets practiced pressing the left arrow when either a male name or a career-related noun was presented, and the right key when a female name or household-related word appeared. Block 4, the first test combined block, was identical to Block 3. Block 5 reversed the target-concept discrimination task. Names again had to be sorted, but this time male names appeared on the right. Block 6, the practice reverse combined

task, again combined the two sorting tasks, except now in a stereotype-inconsistent manner. Participants pressed the left arrow for either a female name or career-related word vs. the right arrow for either a male name or household-related word. Block 7, the test reverse combined block, was identical to Block 6.

The other IAT was identical to the one just described except that instead of the categories "career" vs. "household," it involved sorting male vs. female sex-typed jobs into the categories "male job" and "female job." The male and female sex-typed job stimuli were chosen and matched based on stereotypicality, prestige, and estimated gender composition ratings published by Glick (1991). The male jobs were mechanical engineer, lead computer programmer, brick layer, plumber, construction worker, truck driver, firefighter, supervisor, police officer, electrician; the female jobs were receptionist, child care worker, nurse, librarian, flight attendant, secretary, tailor, cashier, dental assistant, and hairstylist, respectively.

Each block began with short instructions. The three discrimination Blocks (1, 2, and 5) consisted of 40 trials each. The practice combined blocks (Blocks 3 and 5) consisted of 40 trials each (20 names and 20 nouns/jobs). The test combined blocks consisted of 80 trials each (40 names and 40 nouns/jobs). Order of stimuli were randomized. If participants made an error, a red cross appeared in the middle of the screen and participants had to correct their response. The response stimulus interval following correct responses was 500ms.

Scoring for the IAT was consistent with the recommendations of Greenwald et al. (2003). One respondent had less than 300ms latency on more than 10% of trials and was

removed from the IAT analysis. Trials with response latencies higher than 10 000ms were eliminated. Error trials were replaced with the person's mean on that block plus 600ms. Averages and standard deviations were calculated for each practice and test block. Individual IAT scores were calculated as a weighted average of (1) the difference between Blocks 6 and 3 divided by their pooled standard deviation, and (2) the difference between Blocks 7 and 4 divided by their pooled standard deviation. Scores were interpreted as a participants' idiosyncratic strength of association, with high scores indicating stronger stereotypic associations.

Procedure

All sessions were proctored and took 2 hours. Because informing participants of the nature of the study might influence results, the letter of information told participants that the study was about qualifications that affect hiring decisions. After reading the letter of information and signing consent forms, participants completed demographic questions on the computer then read the instructions for the hiring task.

Hiring Decision Task. The instructions for the hiring decisions task asked participants to play the role of human resource professionals whose job it was to make hiring decisions. To recreate real-world pressure to make good hiring decisions, participants were asked to imagine that their job rewards (e.g., pay, opportunities for promotion) were tied to the outcomes of the hiring decisions they made. These instructions were also reiterated verbally to participants. They were then given the resumes and allowed to proceed at their own pace.

Sexism Scales. After completing the hiring task, participants were presented with

the Ambivalent Sexism Inventory, Old Fashioned Sexism Scale, Modern Sexism Scale, and Neo-Sexism Scale. Items in those four inventories are very similar in that all of them ask about attitudes toward gender in society. As such, each scale makes clear to a similar degree that attitudes toward gender are being investigated. One potential concern is that exposure to items from any of these sexism scales might affect responses to subsequent items on other sexism scales. To address item order effects, scale items were intermixed, with participants completing the items in one of two counterbalanced orders.

A similar concern applies to the Implicit and Explicit Motivation to Respond without Sexism scales. Items in those scales ask participants to endorse various reasons for why they try to be or appear nonsexist, which could prime participants to respond differently to subsequent sexism scales. In order to avoid the motivation items affecting scores on other sexism scales, the Motivation to Respond Without Sexism scales were presented after the other sexism scales were completed. Participants could not go back and change their earlier responses. Again, scale items were intermixed, with two counterbalanced orders of presentation. Items were completed on the computer.

Implicit Association Tests. The two IATs were presented last, with order of presentation counterbalanced. As described earlier, the presence of the previous hiring task and sexism scales could contaminate IAT results. Also, it is uncommon to administer two IATs back to back. One might contaminate the other, and fatigue effects may accumulate. For each participant, whichever IAT was presented second suffered from the potential confound of cross-contamination and added fatigue from the earlier IAT. Consequently, added caution is warranted when interpreting IAT results.

After all materials were completed, participants were thanked and debriefed.

Results

Effort scores. All three effort scores were highly correlated ($r >= .47$). They were also intended to measure the same construct. Consequently, Z scores for time spent making hiring decisions, number of characters taken as notes, and visually coded effort were averaged to create an aggregate effort score. Cronbach's α for this aggregated effort score was .82. Higher scores indicate greater effort.

Implicit Association Test. In order to determine the reliability of the IATs, the practice and test blocks were each divided into three parts of equal length (i.e., 13 trials per practice block and 27 trials per test block). IAT scores for each participant were then calculated based on means from these thirds. To assess fatigue effects due to administration of two IATs back to back, reliability was also separately examined for the first and second IATs in a session. Internal consistency (Cronbach's α) of these scores based on thirds of the IATs were above .80 for both the first and second IATs in a session, without applying Spearman-Brown corrections for length. These reliabilities were deemed sufficient. Relationships with other variables were also examined using just the first IAT in a session. Because conclusions did not differ regardless of whether both IATs from a session were included or just the first one, only results using both IATs are presented.

Process dissociation parameters. To estimate the internal consistency of process dissociation parameters, parameters were calculated using two of the sex-typed jobs (e.g.,

receptionist and mechanical engineer). This was repeated for all possible combinations of sex-typed jobs, resulting in four estimates of each parameter. Consistency of those estimates was assessed using Cronbach's α. Cronbach's α was .61 and .68 for the pro-male bias and gender-job match bias parameters, respectively. These internal consistency values indicate greater systematic than error variance. Though they fall short of the .7 levels typically recommended for use in research (Nunnally, 1978), in the context of an innovative adaptation of process dissociation to a new domain, the current internal consistency levels were viewed as acceptable.

Main results. Tables 4, 5, and 6 list the correlations between study variables, along with variable means, standard deviations, and Cronbach's alphas. Whereas process dissociation parameters were expected to function similarly regardless of participant gender, many of the sexism scales likely function differently for men compared to women. For example, the Motivation to Respond Without Sexism scales were developed and validated using a sample consisting exclusively of men (see Klonis et al., 2005). Consistent with past findings (e.g., Glick & Fiske, 1996; Sibley & Perry, 2010), the genders displayed substantial mean differences on sexism scales, along with differing relationships between study variables. Consequently, in addition to analyzing results for the combined sample (Table 4), results were also examined separately for male (Table 5) and female (Table 6) participants. Separating the genders resulted in a power of .81 to detect a moderate correlation (*r* = .34). Power was calculated using the G*POWER 3 program (Faul, Erdfelder, Lang, & Buchner, 2007).

Table 4

Descriptive Statistics, Reliabilities, and Correlations Among Study 1 Variables for the Overall Sample

	M	SD	α¹	1	2	3	4	5	6	7
1. Age	18.38	2.47	-							
2. Years of part time experience	3.21	3.25	-	.13						
3. Years of full time experience	1.09	3.57	-	.52**	.02					
4. Visually coded effort	3.70	1.27	-	.02	.10	-.18*				
5. Time making decisions (min)	52.30	12.15	-	.03	.07	-.05	.74**			
6. Number of characters in notes	2595	1811	-	.02	-.02	-.10	.56**	.54**		
7. Aggregate effort score	0.01	0.86	0.83	.03	.06	-.12	.89**	.88**	.81**	
8. Benevolent sexism	3.88	0.90	0.75	-.09	-.23**	-.11	-.03	.04	.17*	.07
9. Hostile sexism	3.93	0.94	0.82	.03	.13	-.03	-.08	-.08	-.08	-.09
10. Neo-Sexism	3.18	0.80	0.75	-.03	-.06	-.10	-.017*	-.08	-.05	-.12
11. Modern sexism	3.79	0.95	0.77	-.14	-.02	-.18*	-.16	-.15	-.21*	-.20*
12. Old fashioned sexism	2.16	1.06	0.71	.02	-.10	-.01	-.01	.05	.05	.05
13. IMRWS	6.98	1.53	0.85	.15	-.02	.05	.13	.22*	.02	.14
14. EMRWS	5.15	1.67	0.79	-.19*	.05	-.23**	.06	.01	.07	.06
15. Career/household IAT	0.33	0.24	0.81	-.14	-.17*	-.08	.03	.02	-.02	.00
16. Sex-typed Job IAT	0.58	0.28	0.87	.15	.08	.20*	-.03	-.06	-.03	-.06
17. Pro-male bias parameter	0.01	0.22	.61	-.10	-.03	.01	.10	.04	.00	.06
18. Gender-job fit parameter	0.00	0.14	.68	.07	.14	.13	.06	.05	.06	.05

Table 4 cont.

	8	9	10	11	12	13	14	15	16	17
1. Age										
2. Years of part time experience										
3. Years of full time experience										
4. Visually coded effort										
5. Time making decisions (min)										
6. Number of characters in notes										
7. Aggregate effort score										
8. Benevolent sexism										
9. Hostile sexism	.24**									
10. Neo-Sexism	.21*	.64**								
11. Modern sexism	.03	.48**	.56**							
12. Old fashioned sexism	.22*	.36**	.64**	.23**						
13. IMRWS	-.22*	-.28**	-.42**	-.27**	-.46**					
14. EMRWS	.15	-.10	-.05	-.13	-.05	.18*				
15. Career/household IAT	.02	.14	.20*	.16	.09	.01	-.10			
16. Sex-typed Job IAT	-.10	.09	.01	-.08	-.01	-.05	-.13	.13		
17. Pro-male bias parameter	-.07	-.12	-.14	-.16*	.04	-.11	.00	-.07	.01	
18. Gender-job fit parameter	.13	-.04	-.13	-.10	-.04	.05	-.10	.04	.06	-.04

*$p < .05$ (1-tailed), **$p < .01$ (1-tailed)

[1] To measure the internal consistency of the pro-male bias and gender-job fit parameters, the parameters were calculated using all possible combinations of one male sex-typed job and one female sex-typed job. This resulted in 2 (male jobs) * 2 (female jobs) = 4 estimates for each parameter. Values presented in this table represent the consistency of those estimates calculated using Cronbach α.

Notes: $n = 105$. IMRWS = Internal motivation to respond without sexism. EMRWS = External Motivation to Respond Without Sexism. IAT = Implicit Association Test.

Table 5

Descriptive Statistics, Reliabilities, and Correlations Among Study 1 Variables for Male Participants

	M	SD	α[1]	1	2	3	4	5	6	7
1. Age	18.13	0.93	-							
2. Years of part time experience	3.27	3.65	-	.21						
3. Years of full time experience	1.29	4.14	-	.17	.04					
4. Visually coded effort	3.50	1.41	-	.04	.09	-.25*				
5. Time making decisions (min)	50.56	12.65	-	.08	.12	-.13	.75**			
6. Number of characters in notes	2175	1561	-	-.06	-.12	-.32*	.59**	.47**		
7. Aggregate effort score	-0.17	0.87	.82	.01	.04	-.26*	.92**	.88**	.77**	
8. Benevolent sexism	3.92	1.02	.81	-.06	-.27*	-.15	-.01	.00	.36**	.11
9. Hostile sexism	4.41	0.80	.75	.19	.05	-.13	.00	.02	.06	.00
10. Neo-Sexism	3.51	0.73	.78	.05	-.11	-.23*	-.13	-.11	-.03	-.11
11. Modern sexism	4.05	1.00	.69	.09	-.02	-.22	-.07	-.11	-.14	-.13
12. Old fashioned sexism	2.37	1.05	.70	-.11	-.20	-.03	-.01	-.03	.09	.04
13. IMRWS	6.72	1.60	.85	.12	.02	.06	.18	.25*	.12	.21
14. EMRWS	4.96	1.60	.75	-.20	.18	-.29*	.13	.00	.30*	.17
15. Career/household IAT	0.37	0.24	.80	-.05	-.25*	.02	.01	-.08	.08	-.04
16. Sex-typed Job IAT	0.60	0.27	.89	-.05	.00	.20	-.19	-.22	-.11	-.22
17. Pro-male bias parameter	-0.01	0.23	.64	-.19	-.04	.10	.04	.02	.05	.06
18. Gender-job fit parameter	-0.01	0.14	.68	.15	.07	.25*	-.10	.00	-.03	-.08

Table 5 cont.

	8	9	10	11	12	13	14	15	16	17
1. Age										
2. Years of part time experience										
3. Years of full time experience										
4. Visually coded effort										
5. Time making decisions (min)										
6. Number of characters in notes										
7. Aggregate effort score										
8. Benevolent sexism										
9. Hostile sexism	.12									
10. Neo-Sexism	.08	.61**								
11. Modern sexism	-.16	.45**	.52**							
12. Old fashioned sexism	.13	.33**	.56**	.18						
13. IMRWS	-.14	-.14	-.43**	-.21	-.55**					
14. EMRWS	.15	-.15	.20	-.18	.15	.11				
15. Career/household IAT	.13	.20	.19	.27*	.05	-.05	-.24			
16. Sex-typed Job IAT	.01	.27*	.17	.04	.13	-.19	-.26*	.23		
17. Pro-male bias parameter	-.01	-.06	-.05	-.22	.26*	-.11	.16	-.06	.13	
18. Gender-job fit parameter	.24*	.06	-.23*	-.24*	-.16	.03	-.21	.08	.07	-.04

*$p < .05$ (1-tailed), **$p < .01$ (1-tailed)

[1] To measure the internal consistency of the pro-male bias and gender-job fit parameters, the parameters were calculated using all possible combinations of one male sex-typed job and one female sex-typed job. This resulted in 2 (male jobs) * 2 (female jobs) = 4 estimates for each parameter. Values presented in this table represent the consistency of those estimates calculated using Cronbach α.

Note: $n = 52$. IMRWS = Internal motivation to respond without sexism. EMRWS = External Motivation to Respond Without Sexism. IAT = Implicit Association Test.

Table 6 cont.

	8	9	10	11	12	13	14	15	16	17
1. Age										
2. Years of part time experience										
3. Years of full time experience										
4. Visually coded effort										
5. Time making decisions (min)										
6. Number of characters in notes										
7. Aggregate effort score										
8. Benevolent sexism										
9. Hostile sexism	.42**									
10. Neo-Sexism	.39**	.50**								
11. Modern sexism	.31*	.38**	.50**							
12. Old fashioned sexism	.33**	.30*	.68**	.20						
13. IMRWS	-.32*	-.31*	-.34**	-.26*	-.32*					
14. EMRWS	.16	.04	-.18	-.02	-.18	.22				
15. Career/household IAT	-.13	-.08	.08	-.07	.06	.15	.07			
16. Sex-typed Job IAT	.22	-.11	-.20	-.22	-.17	.10	-.01	.02		
17. Pro-male bias parameter	-.14	-.09	-.15	-.04	-.16	-.15	-.19	-.04	-.06	
18. Gender-job fit parameter	-.02	-.03	.03	.13	.13	.04	-.01	-.02	.06	-.06

*$p < .05$ (1-tailed), **$p < .01$ (1-tailed)

[1] To measure the internal consistency of the pro-male bias and gender-job fit parameters, the parameters were calculated using all possible combinations of one male sex-typed job and one female sex-typed job. This resulted in 2 (male jobs) * 2 (female jobs) = 4 estimates for each parameter. Values presented in this table represent the consistency of those estimates calculated using Cronbach α.

Notes: $n = 53$. IMRWS = Internal motivation to respond without sexism. EMRWS = External Motivation to Respond Without Sexism. IAT = Implicit Association Test.

For the overall sample, for males, and for females, group averages on the process dissociation parameters were near 0 (means ranged from -.01 to .03). The near 0 values indicate that the net bias was small at the aggregate group level. However, as an individual differences design, the issue in the current study is whether individual differences in bias parameters meaningfully relate to scores on other constructs. In fact, there was considerable variation between individuals. Standard deviations for the pro-male bias parameter were .22 for the overall sample and for females and .23 for males. For gender-job fit bias, standard deviations were .14 for the overall sample and for males and .13 for females. This variability was sufficient in both parameters to find significant relationships with other constructs.

Hypotheses 2 and 3a were supported, but only for males. In other words, male participants' benevolent sexism scores were positively correlated with their gender-job fit parameters from process dissociation ($r = .24$, $p < .05$). Old-fashioned sexism scores were positively correlated with pro-male bias parameters from process dissociation ($r = .26$, $p < .05$).

The remaining hypotheses were not supported. In contrast to old-fashioned sexism, individuals high on measures of recent reconceptualizations of sexism (i.e., hostile, modern, and neo-sexism) were, if anything, *less* likely to advantage males in hiring decisions compared to individuals low in those constructs. For hostile sexism (Hypothesis 1), $r = -.12$ for the overall sample, -.06 for males, and -.03 for females, n.s.. For modern sexism (Hypothesis 3b), $r = -.16$ for the overall sample, -.22 for males, and -.04 for females, n.s.. For neo-sexism (Hypothesis 3c), $r = -.14$ for the overall sample, -.05 for males, and -.15 for females, n.s..

Internal motivation to respond without sexism (Hypothesis 4) did not significantly relate to either the pro-male bias or gender-job fit bias, $r = -.11$ and .05 respectively for the overall sample, $r = -.11$ and .03 for males, and -.15 and .04 for females, n.s.. Likewise, IAT scores did not significantly relate to either process dissociation parameter. The career-household IAT did not relate to pro-male bias (Hypothesis 5), $r = -.07$ for the overall sample, -.06 for males, and -.04 for females, n.s.. The sex-typed job IAT did not significantly relate to gender-job fit bias (Hypothesis 6), $r = .06$ for the overall sample, .07 for males, and .06 for females, n.s..

Discussion

The purpose of Study 1 was to see how the sexism parameters produced by process dissociation are similar and dissimilar to other relevant constructs. As a measure of how much a participant favoured males in his or her hiring decisions, the pro-male bias parameter should relate to certain constructs and not others. Likewise, as a measure of how much a participant matched candidate gender with the job, the gender-job fit parameter should differentially relate with constructs. The results contain both expected and unexpected findings.

The expected findings involved two key relationships that support the validity of the process dissociation parameters. Benevolent sexism was expected to correspond with the gender-job fit parameter (Hypothesis 2) because both involve positive stereotypes associated with women that advantage women for restricted roles. Male participants showed exactly that: their degree of benevolent sexism was significantly related to the amount of gender-job fit bias they displayed in the hiring task. At the same time,

benevolent sexism did not significantly relate to the pro-male bias parameter. The reverse was true for old-fashioned sexism. Consistent with Hypothesis 3a, male participants' old-fashioned sexist views significantly correlated with the degree to which they advantaged males in the hiring task. Old-fashioned sexism did not correlate significantly with the parameter corresponding to gender-job fit bias. Finding differential relationships with expected correlates supports the validity of the process dissociation parameters.

The unexpected results were that differential relationships were only found for males, and many relationships did not turn out as hypothesized. Looking at the effect of participant gender, old-fashioned and benevolent sexism only significantly correlated with hiring decisions for males. For old-fashioned sexism, the finding might simply be due to floor effects. Few females endorsed old-fashioned sexist views, resulting in the mean being within a standard deviation of the bottom of the scale. Such floor effects would attenuate relationships. In contrast, male and female participants scored relatively equally and in the middle of the scale on benevolent sexism, yet these scores related to gender-job fit bias only for males. Previous researchers have noted that benevolent sexism has a different meaning and different correlates for females. For example, Sibley and Perry (2010) created a model for benevolent sexism and discussed differences in the construct for males and females. The current research adds to this literature, suggesting that effects of benevolent sexism on hiring decisions may depend on a person's gender.

Another contribution is the fact that hostile, modern, and neo-sexism did not correlate as expected with the pro-male bias parameter (contradicting Hypotheses 1, 3a, and 3b, respectively). Those three scales all share a lot in common. Besides being

published within a year of each other, all three include gender-related political issues and denial of continuing discrimination as indicators of sexism. These three measures of sexism displayed different results compared to the measure of old-fashioned sexism. It appears that people who endorsed traditionally sexist views (e.g., "Women are generally not as smart as men") favoured males in hiring decisions, whereas people with other types of sexist views (e.g., "Women seek to gain power by getting control over men") did not. Though unexpected, the null result for non-traditional sexism scales may meaningfully contribute to sexism research. It suggests that there is a substantive difference in the constructs of the traditional "old-fashioned" vs. recent reconceptualizations of sexism. Between the two, old-fashioned sexism was the only one to significantly relate with pro-male bias in the current study.

The finding that participants with high scores on the Hostile Sexism Scale were not biased against female candidates contradicts earlier findings by Masser and Abrams (2004). Those authors found that hostile sexism correlated with negative evaluations for females and positive evaluations of males when applying for a masculine-typed occupational role. One key difference between the current study vs. Masser and Abram's is that Masser and Abram relied on ratings of candidate suitability for the position as their criterion for discrimination. Those authors are not alone. Most studies on gender-job fit rely on suitability ratings (e.g., "probability that you would hire", "suitability of applicant") rather than simulated hiring decisions. Reliance on surrogates has been criticized in other employment domains, such as intent to turnover. Dalton, Johnson, and Daily (1999) provide one such critique of using "intent to" variables in organizational

research. Put simply, surrogates make imperfect substitutes. In employee selection, research has demonstrated that sex discrimination against gender-incongruent individuals still occurs in mock hiring situations even after candidates are evaluated equally on pre-established criteria (Luzadis et al., 2008). If differences in hiring decisions can still occur even after establishing equivalence in suitability ratings, then clearly suitability ratings should not be considered interchangeable with hiring decisions. A strength of process dissociation in this context is that it is based on mock hiring decisions rather than suitability ratings. I would argue that those hiring decisions are better criteria for discrimination than are ratings of candidate suitability.

Also noteworthy is the fact that internal motivation to respond without prejudice correlated negatively with other sexism scales but not with the pro-male bias parameter (contrary to Hypothesis 4). A likely explanation is that motivation to respond without prejudice only started correlating with sexism measures once participants were on guard to avoid sexist behaviour. Conversations with participants after the study confirmed that they were unaware of gender being an important variable until the sexism scales were presented after the hiring decision task. A lack of a relationship between hiring decisions and motivation to respond without sexism would then be seen as evidence that decisions were robust to potential contaminants. Because participants were off guard at the time of the hiring decisions, they did not alter their decisions to appear nonsexist. By this view, hiring decisions were uncontaminated by motivations to respond in prescriptive ways valued by society or by the participant himself/herself. In other words, the process dissociation parameters displayed discriminant validity with measures of motivation to

avoid sexism.

The IATs also did not correlate with process dissociation parameters. The degree to which participants associated males with career and females with household did not correlate with the pro-male bias parameter (contrary to Hypothesis 5). Likewise, the degree to which they associated men with stereotypically male jobs and women with stereotypically female jobs did not correlate with the gender-job fit parameter (contrary to Hypothesis 6).

One possibility is that IAT results are substantive. The investigated associations may not relate to gender biases in hiring decisions. Implicit measures may not relate to bias in hiring decisions as much as do some explicit sexism measures (e.g., old-fashioned and benevolent sexism). A competing explanation is that procedural limitations of the current study affected IAT results. Recall that methodological barriers made it difficult to include the IATs in the study. Consequently, the IATs were included for completeness, but as a secondary research question. They were placed last in the two-hour session, where fatigue might affect them, and where they were vulnerable to contamination from preceding measures. Weak IAT results could simply reflect these procedural limitations. Nonetheless, the IATs displayed acceptable reliability. They also correlated moderately with other sexism scales (at least for men). These relationships with other variables argue against dismissing null results as a procedural artifact. Perhaps the findings are best explained by an understanding of the IAT itself. The IAT purports to measure the strength of mental associations. However, it does not distinguish between the meaning of those mental associations. For example, it does not distinguish between knowledge that a

stereotype is common vs. personally believing in that stereotype (De Houwer, 2006).

Current results are consistent with the idea that people with greater knowledge of

stereotypes score high on the IAT, but are not necessarily the people inclined to let those

stereotypes bias their hiring decisions.

Turning to general limitations of the study, Type I and Type II errors are

considerations in any empirical research, and the current study is no exception. Type I

error refers to the probability of false positives. Because the current study was an initial

investigation, it involved a large number of hypothesis tests: eight hypothesis tests for

males, and eight for females. If all of those hypotheses were tested at an alpha of .05,

overall Type I error rate for the study finding at least one significant result would be

greater than .05. To control for this family-wise error rate, the Bonferonni correction

suggests testing significance against alpha divided by the number of comparisons (.05 /

16 = .003). None of the hypotheses in the current study obtained that level of significance.

Inability to rule out family-wise error was not considered a major limitation. Given the

exploratory nature of the study (exploring relationships with correlates), inability to rule

out family-wise error might be expected. On the other side of the error coin, Type II error

refers to the probability of false negatives. The current research had an 80% chance of

detecting a medium-sized relationship between variables. This meets standard power

recommendations for research. Nonetheless, by definition, 80% power leaves a 20%

chance of failing to find a significant relationship when one exists.

A concern more specific to the current research is that the adaptations to process

dissociation procedure may have weakened results. Recall that in order to adapt process

dissociation in the context of hiring decisions, the current study involved several modifications that distinguish it from past research. For instance, process dissociation studies typically ask participants to view and sort one stimulus at a time in a relatively simple decision; in contrast, participants in the current study were asked to choose several candidates from a larger candidate pool in a relatively complex decision. These modifications were intended to increased realism in simulating common hiring practices. Aside from my Master's research, the current study was the first empirical test of this modification. The fact that the current design produced some expected results suggests that process dissociation may be amenable to the modifications.

Another difference is in the number of trials and hiring decisions participants made. Process dissociation studies have typically involved dozens or hundreds of decisions. In contrast, the current study involved only four trials (four sex-typed jobs) and twelve decisions (three hiring recommendations for each of four sex-typed jobs). Again, this adaptation was necessary to maintain realism in the context of hiring decisions. There is also a time constraint in that it takes considerable time to properly consider resumes and reach a hiring decision. Consequently, there are only so many hiring decisions that can fit into a single study session. Despite the comparatively low number of decisions on which process dissociation parameters were based, estimates of pro-male bias and gender-job fit bias displayed a level of reliability sufficient to produce relationships with correlates: between .6 and .7. Applying the Spearman-Brown prophecy formula, doubling the number hiring decisions would bring all process dissociation parameters for all groups up to .7, while tripling the number of decisions would bring reliability to .8. These

findings might be useful in guiding choices on what number of hiring decisions to include in future research. Of course, increasing the number of decisions would likely involve tradeoffs in realism. Researchers will have to carefully weigh the pros and cons of squeezing more hiring decisions into a session. For Study 1's purpose of estimating relationships between correlates, realism was considered important. Overall, the study arguably struck an appropriate balance between maintaining realism while achieving reliability coefficients sufficient for analyses.

There are several take-home messages from Study 1 that are worth briefly summarizing. First, some expected relationships were discovered for old-fashioned and benevolent sexism, supporting the case for validity. Second, estimates of pro-male bias and gender-job fit bias did not appear to be contaminated by motivations to respond without sexism. Third, recent re-conceptualizations of sexism adapted from research on racism (e.g., hostile sexism, modern sexism, neo-sexism) showed different relationships with hiring decisions compared to old-fashioned sexism, suggesting differences between those constructs. Fourth, though two IATs were subject to some alternative explanations, results suggest that not all mental associations related to sexism necessarily translate into biased hiring decisions. Finally, despite several adaptations to typical process dissociation methodology, the validity evidence obtained provides some evidence that process dissociation functioned appropriately in the current research.

CHAPTER 8:

Study 2 – Experimental Manipulations of Process Dissociation Parameters

The purpose of Study 2 was manipulation. Independent manipulation contributes two important aspects to the case for validity. First, successful manipulations provide strong evidence for causality. Second, manipulations test the underlying assumption of process dissociation that the parameters be independent.

Evidence for Causality

Causality is a topic of much interest to philosophers and researchers. Many theorists have equated causation with manipulation, claiming that x causes y if and only if a change in x changes y (e.g., Collingwood, 1940; Gasking, 1955; Menzies & Price, 1993; von Wright, 1971). More recent theories do not reduce causality to manipulation. Instead, manipulation is seen as adding strong evidence for causation (Pearl, 2000; Woodward, 2003). In either case, manipulation is one of a researcher's best tools for establishing causal mechanisms.

The manipulations in the current study were primes that participants received prior to making hiring decisions. Previous research has shown that unobtrusively priming concepts can have dramatic effects on subsequent judgments and behaviours (Bargh, Gollwitzer, Lee-Chai, Barndollar, & Troetschel, 2001; Bargh, Chen, & Burrows, 1996; Devine, 1989; Dijksterhuis & Bargh, 2001). For example, Uhlmann and Cohen (2007) found that priming a female gender stereotype using a word-sorting task significantly affected subsequent hiring preferences.

Given Uhlmann and Cohen's (2007) recent success in sexism research, the current

study employed the same priming method used by those authors. An equal number of male and female participants completed a word-sorting task intended to cue male success in the workplace. An equivalent set of participants completed a word-sorting task intended to cue female success in the workplace. The logic is that people recently primed to associate one gender with success in the workplace should be more inclined to hire that gender for all jobs in the study. Thus, participants primed with male success were expected to have higher pro-male bias parameters than did participants primed with female success.

> *Hypothesis 1. Participants primed with male success in the workplace will have higher pro-male bias parameters than will participants primed with female success in the workplace.*

A separate manipulation was performed in order to affect the gender-job fit parameter. A fresh group of participants (half male, half female) was primed with men and women displaying stereotype consistent personality traits and working in stereotype consistent jobs. An equivalent group of participants was primed with men and women displaying stereotype *in*consistent personality traits and working in stereotype *in*consistent jobs. Recall that availability bias and assumed possession/lack of stereotypical traits were primary explanations for the gender-job fit bias (Davison & Burke, 2000; Dipboye, 1985). It follows that priming recent examples of people in occupations should affect availability biases, and that priming gender consistent vs. inconsistent traits should influence whether males and females are hired for jobs requiring gender-laden traits. Thus, participants primed with examples of people with

stereotype consistent jobs/traits should display more gender-job fit bias than do participants primed with examples of people with stereotype inconsistent jobs/traits.

> *Hypothesis 2. Participants primed with examples of people with stereotype consistent jobs/traits will have higher gender-job fit parameters than will participants primed with people displaying stereotype inconsistent jobs/traits.*

Independence of Process Dissociation Parameters

Each hypothesis represents a dissociation. In Hypothesis 1, the manipulation was intended to affect the degree of pro-male bias and not the degree of gender-job fit bias. In Hypothesis 2, the manipulation was intended to affect the degree of gender-job fit bias and not the degree of pro-male bias. Together, Hypotheses 1 and 2 formed a double dissociation. Besides helping to establish causality, a double dissociation would be precisely the evidence needed to test an underlying assumption of process dissociation.

Process dissociation assumes that the parameters are independent (Begg & Toth 1997; Jacoby & Shrout, 1997; Trainham, Lindsay, & Jacoby, 1997). Two types of independence have been articulated. Functional independence is demonstrated by showing that parameters can be independently affected through manipulations. Stochastic independence is harder to establish. Stochastic independence refers to the fact that one parameter should not affect scores on the other. Again, independent manipulation is the best evidence a researcher can collect. If one parameter greatly affected the other, thus badly violating the assumption of stochastic independence, it would be impossible to reliably find dissociations (Trainham et al., 1997). The take-home message is that

showing a selective influence on process dissociation parameters through double dissociation is the standard and preferred way to test the underlying assumption of independence (Jacoby & Shrout, 1997).

Method

The general design of the hiring task was presented in Chapter 4. The hiring task used in the current study was nearly identical to the one used in Study 1, with a few exceptions. One exception was that participants completed a word-sorting task before making hiring decisions and did not complete any individual difference measures after the hiring task. Another difference is that the study was unproctored and completed online. Rather than use full-length resumes, candidates were instead represented by summary scores. These summary scores were intended to mimic information that a high-level manager or consultant might receive when making hiring decision.

Use of summary scores presented advantages and disadvantages. On the one hand, two meta-analyses have suggested that providing less information on candidates maximizes reliance on stereotypes in hiring decisions (Davison & Burke, 2000; Tosi & Einbender, 1985). Thus, use of summary scores should maximize the chance of finding dissociations. On the other hand, summary scores might reduce realism. I could not find information estimating the percentage of decision-makers in organizations relying on summary scores, though it is probably less than the percentage using full-length resumes. Given the purpose of Study 2 – to test whether parameters can be dissociated – maximizing the chances of finding dissociations was seen as worth the potential trade-off in realism. Moreover, other researchers commonly publish studies on sexism in which

candidates are represented by summary scores (e.g., Jawahar & Mattson, 2005), implying that such representations of candidates are acceptable in research.

Participants were instructed to imagine that their job involved making hiring decisions (see Appendix W). From the many people who applied, they and their assistants have narrowed the pool to just 12 candidates and summarized each candidate's strengths and weaknesses on several important criteria. As in Study 1, pressure to make good decisions was recreated by asking participants to imagine that their job rewards (e.g., salary, opportunities for promotion) are tied to the performance of the people they hire. Instructions suggested that participants take around 20 minutes to make hiring decisions. Participants were told that they could take more time if they wished, but they would only receive compensation for a half hour study.

Participants

Participants were 194 undergraduates (97 males; 97 females) who completed the study for course credit. Average age was 19.14 ($SD = 3.57$). Participants had an average of 3.82 years of part time work experience ($SD = 4.17$) and 3.82 years of full time work experience ($SD = 7.42$). According to Equal Employment Opportunity Commission ethnicity classifications, the majority of participants were White ($n = 130$) or Asian ($n = 38$), with few Blacks or African Americans ($n = 3$), Hispanics or Latinos ($n = 1$), no Aboriginal or American Indians ($n = 0$), and some Other/Mixed ($n = 22$).

Materials

Priming manipulation. The priming manipulation was a word-sorting task. It was the same priming method used successfully in sexism research by Uhlmann and Cohen

(2007; also see Banaji, Hardin, & Rothman, 1993; Bargh et al., 1996; Devine, 1989). First introduced by Srull and Wyer (1979), the word-sorting task presented participants with 12 sentences, each containing five words in nonsensical orders. Four of these words could be arranged to form a viable sentence while the fifth word had to be ignored. For example, "monitor computers new need they" could be rearranged to "they need new computers." The word "monitor" is discarded.

There were four priming conditions: prime male success at work, prime female success at work, prime gender congruent traits, prime gender incongruent traits. When planning the research, some reviewers suspected that gender or age of participants might affect process dissociation parameters. To control for these potentially contaminating effects, participant gender and age were controlled for when assigning people into one of the four priming conditions. For example, a male under 25 might be assigned into the first priming condition. The next male under 25 to complete the study would then be assigned into the second priming condition, etc. This method of assignment guaranteed an equal number of people in each priming condition, an equal number of males vs. females in each priming condition, as well as an equal number of adults over vs. under 25 in each priming condition.

When priming associations between males and success, half of the sentences were unscrambled to reveal males succeeding at work (e.g., "he excelled at work"). In the condition priming associations between females and success, the identical sentences unscrambled to reveal females succeeding at work (in the previous example, replace "he" with "she").

When priming associations of males and females with gender-congruent traits, half the sentences unscrambled to reveal a male or female displaying a trait typically associated with their gender (e.g., "she was always gentle"), or performing a corresponding sex-typed job (e.g., "Jane was a nurse"). In the condition priming gender incongruent associations, the identical sentences unscrambled to reveal a male or female displaying a trait typically associated with the other gender (in the example, replace "she" with "he"), or performing a job associated with the other gender (in the example, replace "Jane" with "James").

The full list of sentences used in the research is presented in Appendix U. Participants had to retype the unscrambled sentences into a textbox. They received immediate feedback on whether they got the sentence right in the form of a green check mark or red "X" appearing beside the sentence (for a screenshot, see Appendix V). To ensure that participants received the primes, they had to complete a minimum of 8 sentences correctly before continuing to the hiring task.

Candidate descriptions. When making hiring decisions, participants used summary scores on each candidate. Summary scores were work experience, level of education, extracurricular activities, personality, interview performance, and resume quality. These dimensions were intentionally left open to interpretation because past research indicated that discrimination is more likely when information is ambiguous (Davison & Burke, 2000). Each score was on a 10-point scale ranging from 1 (*very low*) to 10 (*very high*). Summary scores were displayed graphically to facilitate interpretation. Higher scores were always better. For all ten eligible candidates, summary scores always

summed to a constant. Past research indicated that work experience and education tend to affect hiring decisions more than do the other dimensions (Cole, Rubin, Field, & Giles, 2007). Consequently, dimensions were weighted according to Cole et al.'s (2007) empirically determined importance ratings in order to calculate the constant. The result was that no candidate was stronger or weaker on average than any other candidate. Thus, hiring decisions had to be based on a determination of which scores were more important to the decision-maker for that particular job. Past research has demonstrated that people redefine merit to justify discrimination (Uhlmann & Cohen, 2005). Given that the current hiring situation lent itself to redefining merit, it should be well suited to producing discrimination.

Each candidate appeared on their own tab such that participants could easily flip between candidates. A place for notes was also available above each candidate's summary scores. Decisions were indicated in a separate decision tab (see Appendix X). A sample screen shot of materials participants used to make hiring decisions is provided in Figure 2.

Manipulation of candidate gender. Gender of applicants was again manipulated via first names at the top of candidate descriptions (see list names in Table 2). Surnames were also presented (see Appendix L). As described in Chapter 6, male and female names were matched for age association, inferences of competence, and attractiveness.

Process dissociation parameters. Pro-male bias and gender-job fit bias parameters were calculated using formulas 1 and 2 listed at the end of Chapter 2. High scores indicate greater discrimination in hiring decisions.

Figure 4

Sample screen shot of candidate descriptions used in Study 2

Effort measures. Effort was measured by the time participants took to reach hiring decisions and the number of characters they typed as notes.

Nonpurposeful response checks. Because the study was unproctored, nonpurposeful responding was an enhanced concern. What was needed was a way to identify when someone did not really compare candidates when making hiring decisions. Two such checks were used. First, a participant needed to at least look at each tab before making final hiring decisions. Second, in each sex-typed job, two particularly weak candidates were added. If a participant chose an obviously weak candidate as one of their top three choices, chances are good that the participant was not actually basing decisions on candidate qualifications.

The addition of weak candidates resulted in a high probability of detecting nonpurposeful responding. If a participant responded at random, they would have a 10 (valid candidates) in 12 (total number of candidates) chance of escaping detection for their 1st hiring recommendation within a job. There would then be 9 valid choices out of 11 remaining for their 2nd hiring recommendation within that same job, and 8 out of 10 valid choices remaining for their 3rd hiring recommendation for that job. Thus, chance of escaping detection for all three hiring recommendations within a job was 10/12 * 9/11 * 8/10 = 720/1320. The chance of escaping detection for all four sex-typed jobs would be (720/1320) ^ 4 = .09. In other words, there is only a 9% chance of escaping detection throughout the entire study. Put differently, the nonpurposeful response check should identify 91% of people responding randomly. Combined with the check of whether a participant looked at all tabs before making a final hiring decision, this level of sensitivity

to nonpurposeful responding was considered sufficient.

Procedure

The study took approximately half an hour. Participants signed up online and completed materials at their convenience. Because informing participants of the nature of the study might influence results, the letter of information told participants that the study was about qualifications that affect hiring decisions. After reading the letter of information, participants completed demographic questions on the computer followed by one of the four priming conditions. Participants then read the instructions for the hiring task and began comparing candidates. After completing decisions for one job, participants moved on to the next job until all four sex-typed jobs were completed. Lastly, participants received a page containing debriefing information.

<div align="center">Results</div>

Nonpurposeful response checks. Out of the 194 participants, nonpurposeful response checks flagged 12 individuals (6%). Those individuals were removed from analyses, leaving a final sample size of 182. The resulting power to detect a medium effect size (Cohen's d= .53[1]) in the overall sample was .80. Power was calculated using G*Power (Faul et al., 2007).

Process dissociation parameters. Internal consistency was estimated for process dissociation parameters using the same procedure as in Study 1. Parameters were

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[1] Cohen's d is a measure of effect size (see Cohen, 1988). It represents the mean difference between groups divided by the pooled standard deviation. For interpreting d values, values of .2 are considered small, values of .5 are considered medium, and values of .8 are considered large.

calculated using two of the sex-typed jobs (e.g., receptionist and mechanical engineer).

This was repeated for all possible combinations of sex-typed jobs, resulting in four

estimates of each parameter. Consistency of those estimates was assessed using

Cronbach's α. Cronbach's α was .58 for both the pro-male bias and gender-job match

bias parameters, indicating greater systematic than error variance in measurement. As in

Study 1, these values fall short of the .7 levels typically recommended for use in research

(Nunnally, 1978), but were viewed as acceptable in the context of an innovative

adaptation of process dissociation to a new domain.

Main results. Table 7 lists the correlations between study variables, along with

variable means and standard deviations. Table 8 displays the means and standard

deviations separately for each priming condition, along with the results of the *t*-tests used

to test hypotheses.

Results did not differ by gender. Male and female participants did not have

significantly differing pro-male bias parameters, $M = 0.00$ ($SD = .25$) for males, and $M = -.01$ ($SD = .22$) for females, $t(180) = 1.30$, n.s.. They also did not have different gender-

job fit parameters, $M = .02$ ($SD = .13$) for males and $M = .03$ ($SD = .11$) for females,

$t(180) = 1.49$, n.s. Nor did gender moderate the effect of manipulations. Regressions

indicated that gender and priming condition did not interact to predict the pro-male bias

parameter ($b = .145$, n.s.). Likewise, gender and priming condition did not interact to

predict the gender-job fit parameter ($b = .034$, n.s.). Because participant gender did not

affect conclusions, only combined results are presented.

Table 7

Descriptive Statistics and Correlations for Study 2 Variables

		M	SD	1.	2.	3.	4.	5.	6.	7.
Overall sample	1. Age	19.16	3.67							
(*n* = 182)	2. Time on hiring decisions (min)	16.89	8.73	.02						
	3. Number of sentences correct	11.08	1.17	-.03	.03					
	4. Number of characters in notes	820	825	-.09	.65**	.03				
	5. Years of part time work experience	3.85	4.30	.14	.07	.01	.18*			
	6. Years of full time work experience	3.92	7.64	.50**	.10	-.16	.07	.51**		
	7. Pro-male bias	0.00	0.23	-.16*	-.11	-.11	-.08	-.08	-.19	
	8. Gender-job fit bias	0.02	0.12	.06	-.10	.14	-.06	-.18*	-.02	.01
White	1. Age	19.15	4.18							
(*n* = 122)	2. Time on hiring decisions (min)	16.72	8.39	.04						
	3. Number of sentences correct	11.07	1.11	-.01	0					
	4. Number of characters in notes	751	727	-.13	.51**	-.05				
	5. Years of part time work experience	4.08	4.04	.22*	.10	.05	.25**			
	6. Years of full time work experience	4.18	8.21	.60**	.20	-.08	.14	.62**		
	7. Pro-male bias	-0.05	0.22	-.17	-.05	.02	-.00	-.02	-.25	
	8. Gender-job fit bias	0.01	0.11	.01	-.20*	.14	-.15	-.19*	-.04	-.02
Asian	1. Age	19.17	2.43							
(*n* = 36)	2. Time on hiring decisions (min)	16.72	6.50	.01						
	3. Number of sentences correct	11.25	1.16	-.30	.06					
	4. Number of characters in notes	971	855	-.01	.82**	-.07				
	5. Years of part time work experience	2.23	2.40	.49**	.11	-.48**	.25			
	6. Years of full time work experience	2.00	1.33	.25	-.26	-.05	-.30	.13		
	7. Pro-male bias	0.08	0.22	-.11	.04	.08	-.09	-.09	-.48	
	8. Gender-job fit bias	0.06	0.14	.24	.03	-.02	-.02	.03	.10	-.02

*p < .05, ** p < .01

Table 8

Comparison of Process Dissociation Parameters in Each Priming Condition

		Priming Condition			Priming Condition		
		Male Success	Female Success	*t*	Gender-Job Match	Gender-Job Mismatch	*t*
Overall Sample	Pro-male bias	.02 (.27)	0.00 (.20)	*t*(89) = .45	.02 (.21)	-.05 (.23)	*t*(89) = .15
	Gender-job fit bias	.00 (.13)	.06 (.13)	*t*(89) = 2.13*	.02 (.12)	.01 (.10)	*t*(89) = .67
White	Pro-male bias	-.08 (.22)	.01 (.23)	*t*(60) = 1.61	-.03 (.23)	-.08 (.22)	*t*(58) = .911
	Gender-Job fit bias	-.01 (.11)	.06 (.13)	*t*(60) = 2.18*	-.02 (.11)	-.01 (.09)	*t*(58) = .39
Asian	Pro-male bias	.19 (.24)	-.07 (.16)	*t*(14) = 2.40*	.10 (.18)	.08 (.22)	*t*(18) = .22
	Gender-job fit bias	.04 (.18)	.16 (.11)	*t*(14) = 1.60	.09 (.09)	.01 (.13)	*t*(18) = 1.50

* *p*< .05
Note: Standard deviations are in brackets.
n = 122 for Whites, 36 for Asians, and 182 for the Overall Sample

Though results were unaffected by participant gender, they were affected by participant ethnicity. Consistent across priming conditions, the 35 Asian participants displayed a small ($d = .36$) but significant preference for male candidates, $M = .08$ ($SD =.22$), $t(35) = 2.31$, $p < .05$. They also displayed a moderate ($d = .43$) and significant gender-job fit bias, $M = .06$ ($SD = .14$), $t(35) = 2.77$, $p < .05$. In contrast, the 122 White participants displayed a small pro-*female* bias ($d = .23$) and no significant gender-job fit bias ($d = .09$), $M = -.05$, $SD = .22$, $t(121) = 2.24$, $p < .05$, and $M = .01$, $SD = .11$, $t(121) = .56$, n.s., respectively. These differences in parameters between Asian and White participants were significant, $t(156) = 3.06$, $p < .01$ for the pro-male bias, and $t(156) = 2.56$, $p < .05$ for the gender-job fit bias. Ethnicity also moderated the effect of manipulations. Regressions indicated that ethnicity and priming condition interacted significantly to predict the pro-male bias parameter ($b = -.030$, $p < .05$) but not the gender-job fit parameter ($b = .008$, n.s.). Consequently, results are interpreted for Whites and Asians separately. No other ethnic groups had a sufficient sample size for analysis.

Several authors recommend not interpreting results for the overall sample when a significant interaction indicates that effects differ for one or more subgroups (e.g., Finney, 1948; Pedhazur & Schmelkin, 1991; Underwood, 1981). They point out that combined analyses make arbitrary assumptions on how much each subgroup should be weighted, and that any statements are likely to be misleading to the extent that they do not apply to all subgroups. In the current study, there were over three times as many White as Asian participants. Due to this differential representation, results for the overall sample reflect mostly the results for White participants, and often differ from conclusions for Asian participants. Accordingly, though results for the overall sample are included in the tables

of results (Tables 7 and 8), the discussion focuses on Whites and Asians separately.

Hypothesis 1 received mixed support. Consistent with the Hypothesis, priming Asian participants with male vs. female success at work had a large effect ($d = 1.30$) on the pro-male bias parameter. People primed with male success ($M = .19, SD = .24$) favoured males whereas those primed with female success showed a mean pro-*female* bias ($M = -.07, SD = .16$), $t(14) = 2.40, p < .05$. Paradoxically, the primes had an unintended effect on White participants. For White participants, priming male/female success had a moderate effect ($d = .46$) on the unexpected parameter – the gender-job fit parameter. People primed with female success ($M = .06, SD = .13$) engaged in more gender-job fit compared to those primed with male success ($M = .00, SD = .13$), $t(89) = 2.13, p < .05$.

Hypothesis 2 was not supported. Priming gender congruent vs. incongruent associations did not produce any detectible (i.e., significant) effects.

To further explore the observed ethnic differences, results for male/female success primes were investigated for effects of effort and gender. In the overall sample, effort did relate to the pro-male bias. Participants who took longer to make hiring decisions showed less pro-male bias ($r = -.16, p < .05$). However, whites and Asians did not differ on the effort measures. They typed a similar number of characters as notes, $M = 751, SD = 727$ for Whites, and $M = 971, SD = 855$ for Asians, $t(156) = 1.53$, n.s. They also took similar lengths of time to make hiring decisions, $M = 1003$ seconds, $SD = 504$, for Whites, and $M = 1003$ seconds, $SD = 390$ for Asians, $t(156) = 0.00$, n.s.. Turning from effort to gender, there was a greater proportion of males in the Asian than White samples (62% vs. 47%

males, respectively). That difference in representation might affect results to the extent that genders show differing levels of bias or susceptibility to manipulations. However, recall that males and females did not significantly differ on their levels of either the pro-male bias or the gender-job fit bias. Nor did gender moderate the effect of manipulations. This equality argues against random gender imbalances influencing conclusions. Nonetheless, 3-way interactions remain a possibility. Despite gender not being a moderator for the overall sample, differences in gender proportions might still affect results if gender was a significant moderator for Asians in particular. Sample size of Asian participants was not sufficient to explore such a 3-way interaction of whether moderator effects significantly differed by ethnicity.

One additional exploration of White and Asian differences was also performed. To examine whether White and Asian participants differed on their levels and types of sexism, t-tests were performed on sexism scale data from Study 1. In Study 1, two scales showed some evidence of ethnic group differences: benevolent sexism and internal motivation to respond without sexism. Asian participants had a higher average level of benevolent sexism ($M = 4.41$, $SD = .83$) compared to White participants ($M = 3.64$, $SD = .83$), $t(91) = 4.17$, $p < .001$. They also had lower internal motivation to respond without sexism ($M = 6.51$, $SD = 1.51$) compared to White participants ($M = 7.16$, $SD = 1.46$), though the latter difference was only marginally significant, $t(91) = 1.98$, $p = .05$. Ethnic differences on benevolent sexism and internal motivation to respond without sexism might then account for differing levels of bias showed in hiring decisions.

Discussion

The purpose of Study 2 was to perform manipulations in order to assess evidence for causality and independence. One manipulation was intended to affect one process dissociation parameter; the other manipulation was intended to affect the other parameter. Results were not so clear-cut. They provide mixed evidence for causality, but they also contain some evidence suggesting that process dissociation parameters are independent.

The case for causality. The case for causality is ambiguous. On the one hand, priming male/female success had the intended effect for Asian participants. That is, consistent with Hypothesis 1, the primes affected the pro-male bias parameter. Showing that a manipulation had the intended effect suggests that the associations of males or females with success at work can cause one gender to be advantaged in hiring decisions. On the other hand, priming male/female success did not have the intended effect for White participants. For those participants, priming did not affect the pro-male bias parameter. Moreover, priming had the unintended effect of influencing the gender-job fit parameter. This finding seems to contradict the notion that associations of males or females with success at work cause one gender to be advantaged in hiring decisions regardless of sex-type of the job.

It is unclear why the manipulations would have differing effects for Whites vs. Asians. A popular model for explaining cultural differences is Hofstede's (1980; 2001). For a recent review and meta-analysis on the model, see Tara, Kirkman, and Steel (2010). According to Hofstede's model and data, Asian countries are higher than Canada on power distance (i.e., they are more ready to accept unequal distributions of power in

organizations), collectivism (i.e., they prefer to act in a group rather than as individuals), uncertainty avoidance (i.e., they seek to avoid situations with uncertain outcomes), and long term orientation (i.e., they have more future-oriented values such as persistence and thrift). Arguably the most relevant dimension to sexism research would be masculinity-femininity, which represents the degree to which traditionally masculine traits are more highly valued than are feminine traits. However, that is the one dimension on which Canadians and Asians are most similar (Hofstede, 2010).

Three other possible explanations for White/Asian differences were explored: effort, gender representation in the sample, and ethnic differences in levels of sexism. Besides Hofstede's (2010) dimensions, there are common societal stereotypes describing how Asians supposedly differ from other North American students. The "model minority" stereotype holds that Asians exert more effort and earn better grades than their White classmates (Nellie & Dina, 2010). Effort has previously been shown to be a variable affecting the amount of bias in hiring decisions (Lewis, 2006). Consistent with past results, effort was significantly related to the pro-male bias in the current study. However, there are two major barriers to using ethnic differences in effort levels as an explanation for results. First, in the current study, Whites and Asians did not significantly differ on either measure of effort (number of characters taken as notes, and time taken to make hiring decisions). Second, the effect of effort is in the wrong direction. Effort and pro-male bias were negatively related, implying that the group stereotyped as showing higher effort (i.e., Asians) should show *less* bias. In fact, Asians displayed *more* pro-male bias than did White participants. Thus, the effect for Asians is in the opposite direction to what

the effort-based stereotype would suggest.

Another potential explanation for ethnic differences is gender proportion in the sample. Recall that the sample was constrained to have equal numbers of older and younger males and females in each condition. At the outset, ethnicity was not expected to be a significant moderator of effects. Because gender composition within ethnic groups was not controlled for, it is possible that random differences in the assignment of genders might affect results. For example, a greater proportion of males in the Asian sample might confound results to the extent that males/females displayed differing levels of parameters or differing susceptibility to manipulations. In fact, there was a greater proportion of males in the Asian (62%) vs. White (47%) samples. Thus, differing gender proportions might have affected results. However, male and female participants did not significantly differ in the degree to which they showed biases in hiring decisions. Nor did they significantly differ in their susceptibility to manipulations. This similarity in how the genders responded to the study argues against gender representation in the Asian sample affecting results. Nonetheless, 3-way interactions cannot be ruled out at this time. If significant gender-based moderator effects are specific to Asian participants, gender representation in the Asian sample might still reasonably affect results.

The last potential explanation explored was ethnic differences on sexism scales. In Study 1, Asians had higher average levels of benevolent sexism than did White participants, and lower levels of internal motivation to respond without prejudice relative to White participants. Either could help account for some of the current results. Differences on benevolent sexism may explain why Asians showed more gender-job fit

bias, on average, than did White participants. Differences on internal motivation to respond without prejudice may explain why Asians showed more pro-male bias, on average, than did White participants. However, pre-existing levels on these types of sexism were not expected to moderate reactions to primes. Priming male vs. female success should have a similar effect (i.e., influence the pro-male bias and not the gender-job fit bias) regardless of a person's pre-existing level of benevolent sexism or motivation to respond without sexism. Thus, it is not immediately apparent why primes would have different effects for Asian vs. White participants.

In short, results do not appear to be due to difference in effort between Whites and Asians; results could be an artifact of random differences in gender composition, but there is insufficient evidence to support that explanation. Differences on sexism measures can help account for some of the observed ethnic differences, but not all of them. The current study is thus descriptive in showing that the ethnic differences occur, but may have insufficient information to explain why those differences occur. Explaining differences between ethnicities in gender bias might be an interesting topic for future research.

While the first manipulation produced mixed evidence, evidence from the second manipulation was very consistent. Priming gender congruent vs. incongruent associations failed to produce any significant differences in process dissociation parameters. The skeptical interpretation of this null result might be to blame the priming manipulations. Despite the male/female success priming manipulations producing significant effects, the gender-job fit priming manipulations may not have had sufficient effects on mental associations. Gender stereotypes can be deeply held beliefs. Lenton, Bruder, and

Sedikides (2009) recently conducted a meta-analysis on the malleability of automatic gender stereotypes, concluding that gender stereotype interventions generally produce stable effects. The most effective intervention strategy investigated by the meta-analysis was the one utilized in the current research: to present examples of stereotype consistent vs. inconsistent individuals. The authors estimated the average effect size of such interventions to be .46 (measure of effect size was Hedges's *g*). The current study compared two such manipulations – one priming gender-job fit, the other priming misfit. Thus, even if each manipulation had just over half the typical effect size, the combined effect would still be medium in size, which is within the range of effect that the study was designed to detect. Of course, it is always possible that the achieved effect sizes were smaller than the study could detect, or that power was sufficient and the relationship was simply missed anyway (a Type II error). However, available evidence indicates that the study had sufficient power to detect typically expected effect sizes.

Assuming that the manipulations appropriately affected activation of gender-trait associations, results may be substantive. Current findings would suggest that those mental associations did not necessarily translate into a gender-job fit bias in hiring decisions. This result is consistent with findings from Study 1. Recall that mental associations measured using the Implicit Association Test did not significantly correlate with biases in hiring decisions. Study 2 builds upon that non-experimental individual differences design, showing that an experimental manipulation in a group design can produce similar results. In both cases, gender-trait associations did not necessarily translate into gender-job fit bias in hiring decisions.

Looking at the bigger picture, conclusions should not overreach the findings. While observing predicted effects from intended manipulations would have provided strong evidence for causality, failure to observe those effects does not provide equivalent evidence against causality. Lack of evidence does not necessarily imply evidence of lack. The best interpretation is that the case for causality remains open to further research.

The case for independence of parameters. Results contain some evidence supporting the case for independence of parameters. That said, the evidence provided is not as strong as it could be.

On the one hand, both biases were selectively influenced. Obtaining a selective influence was the purpose of attempting a double dissociation. For Asians, the male/female success manipulation resulted in a significant effect on pro-male bias and not gender-job fit bias. The reverse was shown for Whites. The manipulation resulted in a significant effect on gender-job fit bias and not pro-male bias. Thus, both biases showed the ability to be selectively influenced in the results.

On the other hand, the selective influences of the gender-job match parameter did not result from the intended manipulation. For any given individual, current manipulations only allow for one of the two processes to be selectively influenced. In other words, obtaining a double dissociation from intended manipulations remains elusive. If parameters truly do not meet the independence requirement, such a double dissociation will remain elusive. However, such pessimism seems premature. Just because a double dissociation from intended manipulations was not achieved in one study does not mean that such a double dissociation is impossible in all studies. The fact that

both biases were selectively influenced in the results is consistent with the notion that a future study can reproduce the selective influences using planned manipulations.

To accomplish such a double dissociation, one potential manipulation would be to present participants with a set of instructions targeting one of the process dissociation parameters. For example, a reminder of equal employment laws might affect the degree to which participants favour males without affecting the degree to which participants engage in gender-job fit. Conversely, a description urging against gender-job fit might reduce that bias without affecting the pro-male bias. Such instructions might succeed where the current word-priming manipulations did not.

Despite current shortcomings, it was worthwhile trying the word-priming manipulations. Sentence unscrambling primes are relatively subtle and "pure" manipulations in that they can target specific associations without participants being aware of the effects of the primes and without revealing that gender is an important topic under investigation. In contrast, any instruction set would almost certainly alert participants to the fact that the study was investigating gender-related discrimination in hiring decisions. That awareness might in turn affect both the pro-male bias and gender-job fit bias, making it difficult to isolate the effects of manipulations to just one type of bias. Because of possible confounds associated with that awareness, subtle manipulations are worth trying before blunt ones.

There are several take-home messages from Study 2. First, ethnicity appears be an important variable to investigate or at least control for in future research on bias in hiring decisions. Second, both biases showed that they could be selectively influenced, though

the obtained influences were not always from the intended manipulation. These results provide mixed evidence for causality, and are supportive but not conclusive for the independence assumption of process dissociation. Third, consistent with results from Study 1, gender-trait mental associations may not necessarily impact bias. Last but not least, more research is implicated. Obtaining a full double dissociation from intended manipulations in a hiring context is still a laudable and worthwhile goal. Obtaining such dissociations would further strengthen the case for validity of process dissociation in a hiring context.

CHAPTER 9:

General Discussion

The Case for Process Dissociation

The overall goal of the current research was to evaluate process dissociation as a tool for investigating discrimination in hiring situations. Accordingly, results show some evidence supporting the validity of process dissociation in this new context.

Study 1 established differential relationships with correlates. The pro-male bias parameter was found to relate to a measure of old-fashioned sexism. Males endorsing traditionally sexist items (e.g., "Women are generally not as smart as men") favoured men in their hiring decisions. Likewise, the gender-job fit parameter was found to relate to a measure of benevolent sexism. Males who viewed women in restricted but subjectively positive roles (e.g., "Women, compared to men, tend to have a superior moral sensibility") displayed gender-job fit bias in their hiring decisions. Parameters appeared to be largely uncontaminated by participant motivation to respond without sexism. Other recent reconceptualizations of sexism (e.g., hostile sexism, modern sexism, neo-sexism) functioned differently than did old-fashioned sexism, suggesting differences between those constructs. Also, mental associations measured by the Implicit Association Test did not relate to bias, possibly reinforcing the idea that not all mental associations necessarily lead to bias (e.g., knowledge of a stereotype vs. belief in a stereotype). Though these results contain both expected and unexpected relationships, the overall picture provides some evidence that parameters measure what they are intended to measure. They also help illuminate how the pro-male bias and gender-job fit bias might fit within the broader

realm of existing sexism measures.

Study 2 provided inconsistent evidence of causality. Priming male vs. female success at work affected the degree to which males were advantaged, but only for Asian participants. Thus, evidence from Asians supported the case for gender associations with workplace success causing the pro-male bias. However, the same did not hold true for White participants.

Study 2 also provided partial evidence for independence of process dissociation parameters. Both the pro-male bias and gender-job fit bias showed that they could be selectively influenced. A manipulation primarily affected pro-male bias for Asians, and primarily affected gender-job fit bias for Whites. These dissociations go a long way toward establishing that both biases can indeed be selectively influenced, demonstrating functional independence and suggesting stochastic independence. The caveat is that the full double dissociation was not achieved within a single group. If parameters are independent, it should be possible to affect a person's pro-male bias parameter without affecting their gender-job fit parameter and visa versa. For any given individual, current methods only allow for one of the two dissociations. In other words, current evidence is suggestive but not as strong as it could be given a full double dissociation.

The Case Against Process Dissociation

The current research involved several modifications to typical process dissociation procedure. Participants faced complex rather than simple decisions; parameters did not correspond to processes thought to be relatively controlled (e.g., controlled recollection) vs. relatively automatic (e.g., automatic familiarity); the research involved four rather

than dozens of trials; and participants made multiple decisions per trial rather than a single decision. Each of these changes was necessary in order to maintain realism in the context of hiring decisions. Each one also had the potential to affect the validity of process dissociation estimates. Though the current study provided some evidence for validity, it is still too early to give a definitive verdict on whether validity was maintained despite the changes in procedure and context. Some caution is warranted, especially given that current results provide mixed evidence.

Mixed results include the fact that some expected relationships appeared in Study 1, but others did not. Specifically, measures relying upon recent reconceptualizations of sexism showed different relationships to biases in hiring decisions than did a measure of old-fashioned sexism. Also, mental associations measured using the IAT did not relate to biases in hiring decisions. Null results for the IAT could represent incorrect causal mechanisms being investigated, procedural limitations in the current study, or the notion that not all mental associations lead to biased decisions (e.g., knowledge of stereotypes rather than belief in stereotypes). These findings may provide an interesting basis for future research. Nonetheless, the unexpected findings await replication.

Study 2 attempted to test one aspect of whether process dissociation continued to be valid in the new context of hiring decisions despite changes to typical procedure. Specifically, Study 2 tested whether parameters were independent. Though results contained some evidence of independence (both biases were selectively influenced), a full double dissociation was not achieved. Ultimately, the verdict on parameter independence is still out until results from other attempts at dissociations become available. If many

such attempts fail, then the pro-male bias and gender-job fit biases may truly not make independent contributions to hiring decisions. However, it is too soon for such pessimism. As noted by Jones (1987), "on a criterion of parsimony, processes should be assumed to be unaffected by each other's presence until a demonstration to the contrary occurs" (p. 230). In other words, one can assume that mental processes operate independently until proven otherwise. Far from disproving independence, all available evidence is consistent with the notion that the independence assumption is met.

The dissertation does contain evidence to address the last modification to traditional process dissociation designs: what number of decisions is sufficient to achieve reliable estimates? Both Study 1 and Study 2 involved 12 hiring decisions per participant. Study 1 used realistic full-length resumes in an hour-long hiring decision task. That procedure achieved reliability coefficients in the .6 to .7 range, which is in the minimally acceptable range commonly recommended for research (Nunnally, 1978). Study 2 involved candidate summary scores in a 20-minute hiring decision task, achieving reliability coefficients around .6. Spearman-Brown corrections suggest that doubling the number of hiring decisions would bring all reliabilities above .7, while tripling the number of decisions would bring reliabilities above .8. These results can inform the design of future studies. Using full-length resumes would require approximately 2 hours in order to achieve .7 reliability in measurement. Using summary scores instead of full-length resumes (as in Study 2) would allow for shorter administration times: 40 minutes for .7 reliability, or 60 minutes for .8 reliability. Researchers can use this information to decide how best to balance realism, reliability, and time limitations of research. Applied

to the current studies, the number of decisions in each study arguably struck an appropriate balance for their respective purposes.

Limitations of Process Dissociation

As mentioned in the introduction, process dissociation relies on a few assumptions. Those assumptions will now be considered in greater depth. The assumption that parameters be independent has already been discussed. The other assumptions are that the contributions of processes should be the same in the congruence and incongruence conditions (Payne, Jacoby, and Lambert, 2005), and that the underlying model is appropriate.

Assumption of equal contributions. According to the congruence assumption, the strength of the pro-male bias should be the same in both male and female sex-typed jobs. Similarly, the gender-job fit bias should be the same for males in male sex-typed jobs as for females in female sex-typed jobs. This assumption is often violated, and violations are not viewed as a serious threat to validity. Consider applications of process dissociation to study prejudice. The association of Whites with tools is probably not as strong as the association of Blacks with guns, yet these pairings have formed the basis of several process dissociation studies (e.g., Correll et al., 2002; Greenwald et al., 2003; Payne, 2001). In the current studies, the male and female jobs were carefully matched on degree of sex typing (see Table 1). This match on degree of sex typing was intended to help equalize the gender-job fit parameter across the male and female sex-typed jobs.

To further explore the potential effects of violations of the equal contributions assumption, a simulation was developed specifically for the current studies. The

simulation involved inputting known values for the pro-male bias and gender-job match

bias in each sex-typed position. By varying the degree to which the parameters changed

between the sex-typed positions, it was possible to observe the effects of violations.

      For the simulation, the pro-male bias parameter and gender-job fit parameters

were investigated at values up to two standard deviations beyond average levels observed

in the current studies (i.e., between -.4 and .4). Values were investigated at increments of

.05. One of the bias values was then modified in the other sex-typed job, producing a

violation in that the contribution of that bias was no longer equal in both sex-typed jobs.

The result was 9 826 observed cases representing every possible combination of values

and violations: 17 pro-male bias parameter values (at .05 increments between -.4 and .4) x

17 gender-job fit parameter values x 17 degrees of violation x 2 parameters in which

violations were investigated. In each of the 9 826 cases, the probability of selecting a

male for a male job was calculated using parameter values in the male job, and the

probability of selecting a female for a female job was calculated using parameter values

in the female job. So far, all values are "true" scores in that they are based on assigned,

known, values. To see what the observed bias estimates would have been, the

probabilities of selecting males for a male job and females for a female job were then

used as input parameters in a process dissociation calculation (using Formulas 1 and 2).

The effect of violations could then be measured as the difference between the assigned

parameters and ones derived by process dissociation. Specifically, the effect of violations

was defined as the difference between "true" parameter values averaged across the male

and female sex-typed job and the "estimated" values that would have been produced by

process dissociation.

Consistent with the view that violations are typically not serious, it took extreme violations of the equivalence assumption in the male bias parameter to moderately affect the accuracy of process dissociation estimates. Moderate inaccuracies in estimates (around .10, or half a standard deviation) sometimes occurred when the pro-male bias parameter differed between conditions by a full standard deviation. Even then, estimates were robust so long as the pro-male bias and gender-job fit bias were similar in size (within .20 of each other). Process dissociation estimates were more sensitive to violations of equivalence in gender-job fit bias. In those cases, moderate inaccuracies in estimates of gender-job fit bias did not occur until violations were severe (beyond a standard deviation). Moderate inaccuracies in pro-male bias estimates began to occur when violations surpassed half a standard deviation. Taken together, it appears that estimates of gender bias in hiring decisions have varying levels of robustness, depending on the size of the violation, and the initial size of the parameter values.

Model assumptions. The remaining assumption of process dissociation pertains to the underlying model. Specifically, one parameter (e.g., gender-job fit bias) is assumed to drive responses only to the extent that the other (e.g., pro-male bias) does not. Early process dissociation studies investigated the influence of recollection vs. familiarity in memory. Whenever a recollected memory existed, it was assumed to drive the response; familiarity drives responses only insomuch as recollection does not. Because recollection was conceptualized as a controlled process, and this controlled process was given precedence, such models are referred to as C-First models (Conrey et al., 2005). A small

number of articles have employed an alternative. According to A-First models, automatic processes dominate, and controlled ones drive responses only to the extent that automatic ones do not (e.g., Lindsay & Jacoby, 1994). Note that the C-First and A-First nomenclature in the context of hiring decisions is adopted for consistency with past research. It is not intended to imply that either the pro-male bias or gender-job fit bias are controlled vs. automatic processes.

C-First models (see Figure 1 in Chapter 2) are by far the dominant process dissociation models in the academic literature. Consequently, they have more validation evidence and tend to be more accepted than are A-First models. An example of this debate is Hillstrom and Logan (1997) vs. Trainham et al. (1997). The former authors argue against the use of an A-First model whereas the latter authors support its use. To investigate the effect of model assumptions, data from the current studies were analyzed using both C-First and A-First models. Results were virtually identical. Process dissociation parameters produced by the models correlated near unity ($r > .94$). Because conclusions did not differ, results are presented only for the dominant (i.e., C-First) model. Designing a study to test model fit in hiring decisions would be an interesting idea for future investigation. However, at least in the current research, model assumptions did not affect results. Therefore, debate on A-First vs. C-First models is welcome, but at least for the current studies, such debate would be academic.

Though A-First vs. C-First models made little difference to the current studies, other potential model variations may be worth considering. For example, mental processes underlying the pro-male bias may be conceptually distinct from mental

processes that would serve to generally advantage females for all jobs (i.e., a pro-female

bias). Participants might show bias in favour of males across jobs because they value

male traits more than female traits or because they have greater respect for males than

females. In contrast, they might generally favour females across jobs for different

reasons, such as a desire to promote equal opportunity. In the current research, the degree

of bias favouring a particular gender across jobs is conceptualized as one-dimensional.

Positive values on the pro-male bias variable indicate males were advantaged over

females; negative values indicate females were advantaged over males. This makes

intuitive sense to the extent that the two are necessarily complementary – selecting a male

candidate means passing up a female candidate, and visa versa. However, it is possible to

imagine more complex models.

The example given for an alternative model (a separate pro-male and pro-female

bias) would likely not be amenable to process dissociation. Process dissociation requires

that processes be able to work in both the same and in opposite directions. Logically, a

pro-male and a pro-female bias would always work to favour different individuals.

Consequently, it may not be possible to create the congruence condition required by

process dissociation. Nonetheless, the principle is sound: more complex process

dissociation models are possible (e.g., Conrey et al., 2005). Each additional parameter

estimated requires an additional condition/formula. Applied to the current research, if

separate mental processes were combined in a single bias parameter, that combination

might increase error noise in estimates for that parameter.

The possibility of more complex models should not invalidate the model used in

the current research. As statistician George Box famously said, "Essentially, all models are wrong, but some are useful" (Box & Draper, 1987, p. 424). In other words, all models are simplifications of reality. As simplifications, they inevitably fail to capture the full complexity of reality. Nonetheless, complex models are not necessarily superior to parsimonious ones. The burden of proof rests with researchers to show that adding additional variables provides sufficiently improved fit with data to justify an increase in model complexity.

Limitations Specific to the Current Studies

Besides incurring the limitations of process dissociation, the current research involved several additional limitations.

Exclusive use of undergraduates was both a strength and a limitation. The strength was that materials were validated using the same population pool on which they were applied. Consistency in the participant pool allows confidence that perceptions of resumes, jobs, and names as measured in the pretest were appropriate for the participants in Studies 1 and 2. The weakness was that laboratory research using students has often been viewed skeptically as less externally valid than field research using employees (Mook, 1983). The fear is that a lack of student work experience may make them unable to simulate decisions in a realistic environment. That traditional view has come under increasing scrutiny. Comparisons of field and laboratory studies indicate that laboratory studies using students typically generalize quite well, producing results that are highly consistent with those from studies in the field using employees (Anderson, Lindsay, & Bushman, 1999; Bergmann & Grahn, 1997; Locke, 1986). More specific to hiring

decisions, studies report a lack of differences between students and professionals in selection-related evaluations (Dipboye, Fromkin, & Wiback, 1975; Jawahar & Mattsson, 2005). Nonetheless, traditional cautions about generalizability still apply: there is no guarantee that findings from students generalize to the workplace.

Other sample characteristic effects might also arise from the use of undergraduates. For instance, undergraduates might be less prone to bias due to youth, inexperience, or due a trend in which gender biases become less acceptable and less prevalent with successive generations. In the current samples, average levels for the pro-male bias and gender-job match bias were near 0, indicating that bias was not generally present at a group level. Lack of net bias at a group level should not necessarily threaten either Study 1 or Study 2. Study 1 was an individual differences design. As such, the most important consideration is whether there was sufficient variability between individuals. Results showed that there was sufficient variability in biases to find relationships with other variables. Study 2 was an experimental group design. As such, the most important consideration is whether manipulations could affect levels of bias. Results showed that word-priming manipulations in Study 2 were capable of significantly affecting the levels of bias displayed in hiring decisions. Nonetheless, results might have been stronger had there been more pre-existing biases in the samples to work with. For instance, older adults might show more bias (and more variation in bias) than do typical undergraduates. Despite an attempt to oversample older adults, there were not enough data to examine the hypothesis that older adults would show more (or more variability in) biases. However, there is some evidence from other studies suggesting that older adults are more prone to

bias than are younger adults. Explanations include the idea that older adults grew up in an era more tolerant of bias, and the finding that older adults are less able to inhibit stereotypes compared to younger adults (Gosalkorale, Sherman, & Klauer, 2009).

Name matching was likewise both a strength and a potential weakness. Recall that the primary manipulation of candidate gender in the hiring decision task was accomplished through assigning first names at the top of candidate descriptions. The male and female names were matched on associations of age, competence, and attractiveness. Using matched names in the hiring task helped ensure that any gender effects discovered in hiring decisions were due exclusively to candidate gender and not due to name associations. Matching was thus a strength of the current study in that it helped eliminate alternative explanations for conclusions when expected relationships were found. Matching might also be considered a weakness, though, if it inappropriately weakened results. The issue is that some people (e.g., Dion, 1985) might consider name associations an integral rather than a confounding part of the pro-male bias and gender-job fit bias. For example, in the pretest, it was obvious that more male than female names were associated with high competence. A reasonable inference is that the population of male names likely has a higher mean competence association than the population of female names. If male and female names were drawn at random from the population of names, this systematic difference in name populations would contribute to a pro-male bias in hiring decisions. Matching names would reduce the pro-male bias by whatever portion is attributable to systematic differences in male vs. female name attributions. The implication is that any findings in the current studies might have been stronger had those systematic differences

in name associations not been controlled for.

Last but not least, the methodology of the current studies leaves room for other alternative interpretations. For Study 1, participants completed all materials within a single session. Exclusive reliance on self-report data at one point in time leaves Study 1 particularly vulnerable to common method effect explanations for findings (for a discussion of common method effects, see Lindell & Whitney, 2001). Essentially, an unmeasured within-person variable (e.g., cognitive ability, personality, response sets) might account for relationships between variables. Study 2 attempted to overcome that limitation by randomly assigning participants into one of several priming conditions. Had the manipulations had the intended effects, random assignment would leave few alternative explanations for results. However, the manipulations did not perform as expected. Consequently, Study 2 was also vulnerable to alternative explanations.

Potential for Future Research

The limitations of one study create the impetus for others. The current research contained several unexpected results that merit further attention. For example, why would Asians react differently to primes compared to White participants? In Study 2, priming male vs. female success affected the degree to which Asians showed a pro-male bias. The same primes affected the degree to which White participants showed a gender-job fit bias. Despite exploring several potential explanations for this finding – including Hofstede's (2010) cultural dimensions, model minority stereotype, gender proportions in the sample, and ethnic differences on sexism variables – no answer was forthcoming. Future research may want to first replicate the finding that Asians show differing reactions to primes, and

then either control for ethnicity-related effects and/or explore why they occur.

Another clear opportunity to contribute beyond the current research would be to produce the hitherto elusive double dissociation. For example, in Chapter 8 I recommended giving participants instruction sets rather than word-sorting primes in order to selectively affect each parameter. Put simply, it is still too early to give up trying to find a double dissociation. Future research might well succeed, firmly establishing independence of parameters and thus further clearing the path for process dissociation to become a popular tool for use in studies on sexism.

The potential of process dissociation in future sexism research is truly exciting. Because the pro-male bias and gender-job fit bias are often mutually confounded, researchers have until now been largely limited in what they can accomplish. Without isolation, all researchers could do was show that each bias existed, usually at a group level. Process dissociation removes the need for isolation, allowing researchers to quantify each bias at an individual level (Jacoby, 1991). This new ability should make it much easier to study mechanisms and individual difference variables.

The current studies present a tantalizing preview of what should be possible. Results from an IAT in Study 1 suggested that associations of males with career and females with household did not relate to pro-male bias. Future research should investigate what associations *do* relate. As suggested by Jackson et al. (2001), perhaps respect for males and/or lack of respect for females would be a better predictor of pro-male bias. The differential respect mechanism could be tested in several ways. A correlational study similar to Study 1 might administer the hiring task along with an agree/disagree measure

of respect for males and females. Alternatively or in addition to the agree/disagree measure of respect, an IAT might be used to assess gender/respect associations. To further the case for causality, a randomized manipulation study akin to Study 2 might purposefully manipulate respect levels and then see the effect on hiring decisions. As these examples show, process dissociation can be a handy tool in a researcher's tool belt.

One final note is that the benefits of process dissociation might not be limited to studies of sex-typed jobs. Other forms of discrimination in hiring decisions have been articulated beyond the pro-male bias and gender-job fit bias. One example is congruence with a participant's own gender or race. Decision-makers often favour candidates with a gender or race similar to their own (Bowen, Swim, & Jacobs, 2000; Kraiger & Ford, 1985; Levin et al., 2005; Stauffer & Buckley, 2005). The potential exists that these frequently studied variables might also be amenable to study using process dissociation. If so, process dissociation might become a broader tool in hiring discrimination research, applied in more contexts than just sex-typed jobs.

Conclusions – Summary of What has Been Gained

The introduction (Chapter 2) reviewed research on gender biases in hiring situations. It then introduced process dissociation as a way to overcome methodological problems in the measurement of bias. Chapter 3 described how my Masters research informed the current designs, which were then outlined in Chapter 4. Chapter 5 gave an overview of the doctoral research, which included a pretest (Chapter 6), correlational study (Chapter 7), and experimental manipulation study (Chapter 8). Chapter 9 summarized results and provided a more in-depth consideration of some of the limitations

of process dissociation, limitations of the current research, and where the research might lead. By way of concluding, it might be helpful to quickly summarize what has been gained.

First, besides developing materials and verifying perceptions of jobs, the pretest replicated and extended a study used by many to select names for use in research. Because it involved more recent and more comprehensive sources of information than did Kasof's (1993) original study, results of the pretest may thus be of interest to anyone who uses matched names in their research.

Second, Study 1 investigated relationships of biases with correlates. Results provided some evidence of validity in that relationships with expected correlates arose, and in that estimates of bias appeared to be uncontaminated by motivations to respond without sexism. Study 1 also produced some unexpected and interesting results that might serve as the impetus for future research.

Third, Study 2 showed that both parameters could be selectively influenced. The caveat is that the selective influences were not from the expected manipulations. These selective influences suggest that parameters may be independent, in which case future research should be able to achieve the full double dissociation. That is a laudable goal, because it would add to current results, providing strong evidence in support of the independence assumption of process dissociation in the context of hiring decisions.

Both studies involved several novelties to the way process dissociation is applied in research. Thus, the studies served a dual purpose. Evidence collected to validate the biases in a hiring context might also be viewed as proof of concept (or test of concept) for

the adaptations to process dissociation. Specifically, decisions can be complex, decisions do not require correct/incorrect outcomes, parameters do not have to represent controlled vs. automatic processes, multiple decisions are possible per trial, and processes can be reliably measured with a number of trials and decisions that is realistic in a hiring context.

Finally, the dissertation also explored the limitations of process dissociation in a hiring context. Effects of violations were explored using simulations. Results suggested that process dissociation estimates for bias in hiring decisions might be fairly robust to at least some violations of underlying assumptions.

Validity is never proven. Instead, the *Principles for the Validation and Use of Personnel Selection Procedures* suggest that validation involves a gradual accumulation of evidence from many sources (Society for Industrial and Organizational Psychology, 2003). Consistent with that view, the current dissertation neither proves nor disproves validity of process dissociation as it was applied to study bias in hiring decisions. Some evidence collected supports validity; more is necessary. Overall, results suggest that additional effort on this topic may be fruitful.

Will process dissociation ultimately prove useful in research on discrimination in hiring decisions? It is likely too early to tell. The current studies provide some supporting evidence. I eagerly anticipate further efforts to find out.

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APPENDIX A

Letter of Information Used in Pretest

Letter of Information
Identifying What Makes a Strong vs. Weak Résumé

Introduction

- You are being invited to participate in a research study that investigates factors influencing whether résumés are perceived as strong or weak.
- The purpose of this letter is to provide you with the information you require to make an informed decision on participating in this research.

Purpose
- The ultimate purpose of this research is to validate materials to be used in a future study on hiring decisions.

Procedures

- You will be asked to compare 10 résumés and to indicate the 3 strongest and 3 weakest résumés. This will be repeated for 4 different jobs.
- You will then have an opportunity to share your opinions of the résumés and the rating task by completing a brief questionnaire.
- Finally, you will be asked to indicate your views on 74 common English names.
- The study is expected to take approximately 1 hour and 30 minutes to complete.

Risks and discomforts
- There are no expected risks or discomforts associated with participation in this study.

Benefits to you

- You will gain experience in hiring research and an appreciation of what people who make hiring decisions might look for when comparing résumés.

Participation in this study is voluntary
- You may refuse to participate, refuse to complete any part of the study, or withdraw at any time without loss of promised credits, although if you leave within the first half hour you will receive only ½ credit.
- You have the right to be given all important information about the study and what you will be asked to do.
- You do not have to take part in this study if you do not want to.
- You do not waive any legal rights by signing this form.

Confidentiality

- The questionnaire responses provided by you are confidential. They will be stored in a secure location and will be seen only by the researchers of this study.
- If the results of this study are published, your name will not be used and no information that discloses your identity will be published.

Compensation

- You will be given 1.5 research credits for your participation in the study.

Contact Information

- If you have any questions about this study, please contact:

Rhys Lewis	Ph.D. Candidate	SSC 8400
Richard Goffin	Faculty	SSC 8406
Bertram Gawronski	Faculty	SSC 6324

APPENDIX B

Informed Consent Form Used in Pretest

<u>Consent Statement</u>
<u>Identifying What Makes a Strong vs. Weak Résumé</u>

I have read the Letter of Information, have had the nature of the study explained to me, and I agree to participate. All questions have been answered to my satisfaction.

Print Experimenter's Name: Experimenter's Signature: Date:

_____   _____   _____

Print Participant's Name: Participant's Signature: Date:

_____   _____   _____

APPENDIX C

Sample Resume Used in Pretest

Receptionist 1

Scores on Pre-Employment Tests

	Very Low	Low	Neutral	High	Very High
Intelligence	2				
Conscientiousness					5
Extraversion			3		
Agreeableness				4	
Openness			3		
Neuroticism			3		

(Scale: 1 2 3 4 5)

Work Experience

10/03 to Present	Receptionist Career Advancement Institute of Training • Answered multi-line phones, greeted visitors, assisted students in computer lab. • Conducted internet research for fund development. • Faxed attendance reports, made copies, filed students' folders and other documents, mail merge donation requests, performed maintenance of computers, and typed correspondence. • All duties were performed in a professional and cheerful manner exercising superior customer service. • Never missed a day and was never late.
07/00 to 10/03	Clerical Assistant Law Firm of Jackson Lawler • Answered multi-line phone system, directing calls as appropriate • Filed legal documents • Delivered and picked-up legal documents from the Court House • Accepted deliveries.

Education

09/03 to 08/05	Associates Degree in Clerical Administration Career Advancement Institute of Training
08/98 to 12/01	Administrative Assistant Diploma Marydale Technical College

Appendix D

Sample Response Sheet Used in Pretest

Response Sheet for Receptionist

Job Description

Receptionist
- Answer inquiries and obtain information for general public, customers, visitors, and other interested parties.
- Provide information regarding activities conducted at establishment; location of departments, offices, and employees within organization.

Definitions of Personality Traits

Intelligence	The ability to learn about, learn from, understand, and interact with one's environment.
Conscientiousness	A tendency to show self-discipline, act dutifully, and aim for achievement; planned rather than spontaneous behavior.
Extraversion	Energy, positive emotions, surgency, and the tendency to seek stimulation and the company of others.
Agreeableness	A tendency to be compassionate and cooperative rather than suspicious and antagonistic towards others.
Openness	Appreciation for art, emotion, adventure, unusual ideas, imagination, curiosity, and variety of experience.
Neuroticism	A tendency to experience unpleasant emotions easily, such as anger, anxiety, depression, or vulnerability; sometimes called emotional instability.

Your Hiring Recommendations

Which candidate would you recommend be sent a job offer?

1st Choice: _____

If your first choice is unavailable, then a job offer should be sent to:

2nd Choice: _____

If both your first and second choices are unavailable, then a job offer should be sent to:

3rd Choice: _____

Weakest Candidates

Please list the three weakest candidates (in no particular order)

_____   _____   _____

Appendix E

Questionnaire Administered After Hiring Decision Task in Pretest

Follow-Up Questionnaire

Demographics

Your gender: M   /   F

Your age: _____

Your ethnicity: _____

Your UWO participant ID code: _____

Time Standards

How long did it take you to complete the hiring task for all 4 positions?   _____ minutes

Was 60 minutes enough time to make selection decisions? (Circle your answer)

1	2	3	4	5
Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree

When conducting this study again in the future, how many minutes should be given to participants to select the top 3 and bottom 3 candidates for each position?

Answer: _____ minutes

Gender & Prestige Associated with the Jobs

For each of the four jobs, please:
1. Rate the degree to which the job is indicative of traits stereotypically associated with males (e.g. realistic, powerful, headstrong) versus females (e.g. helpful, modest, anxious).

2. Rate the prestige of the job.
   Definition of prestige: "The level of respect at which a [job] is regarded by others" (American Heritage Dictionary, 2006).

3. Estimate the gender composition of the position (what percentage of people in the job do you think are male?).

Child Care Worker:
- Attend to children at schools, businesses, private households, and child care institutions.
- Perform a variety of tasks, such as dressing, feeding, bathing, and overseeing play.

Stereotypicality	Prestige	Estimated % that is male (e.g., 95%)
1 2 3 4 5 6 7 Indicative of stereotypically feminine traits Indicative of stereotypically masculine traits	1 2 3 4 5 Very low prestige Very high prestige	_____ %

Lead Computer Programmer:
- Supervise and coordinate the activities of other computer programmers.
- Convert project specifications and statements of problems and procedures to detailed logical flow charts for coding into computer language.
- Develop and write computer programs to store, locate, and retrieve specific documents, data, and information.
- May program web sites.

Stereotypicality	Prestige	Estimated % that is male (e.g., 95%)
1 2 3 4 5 6 7 Indicative of stereotypically feminine traits Indicative of stereotypically masculine traits	1 2 3 4 5 Very low Very high prestige prestige	_____ %

Receptionist
- Answer inquiries and obtain information for general public, customers, visitors, and other interested parties.
- Provide information regarding activities conducted at establishment; location of departments, offices, and employees within organization.

Stereotypicality	Prestige	Estimated % that is male (e.g., 95%)
1 2 3 4 5 6 7 Indicative of stereotypically feminine traits Indicative of stereotypically masculine traits	1 2 3 4 5 Very low Very high prestige prestige	_____ %

Mechanical Engineer
- Perform engineering duties in planning and designing tools, engines, machines, and other mechanically functioning equipment.
- Oversee installation, operation, maintenance, and repair of such equipment as centralized heat, gas, water, and steam systems.

Stereotypicality	Prestige	Estimated % that is male (e.g., 95%)
1 2 3 4 5 6 7 Indicative of stereotypically feminine traits Indicative of stereotypically masculine traits	1 2 3 4 5 Very low Very high prestige prestige	_____ %

APPENDIX F

Questionnaire Measuring Impressions of First Names Used in Pretest

First Name Preferences

Please rate the following first names on (a) whether someone with that name would make a good employee, and (b) whether you think it is a good name. Circle your answer.

	I believe this individual would be a good employee.							I think this is a good name.						
	Strongly Disagree		Neither Agree nor Disagree			Strongly Agree		Strongly Disagree		Neither Agree nor Disagree			Strongly Agree	
Deborah	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Fred	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Sam	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Donald	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Michael	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Laura	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Diane	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Barbara	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Thomas	1	2	3	4	5	6	7	1	2	3	4	5	6	7
James	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Edith	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Donna	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Brenda	1	2	3	4	5	6	7	1	2	3	4	5	6	7
John	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Helen	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Jane	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Patricia	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Greg	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Lisa	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Christopher	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Elizabeth	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Pamela	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Carol	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Susan	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Theresa	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Christine	1	2	3	4	5	6	7	1	2	3	4	5	6	7
George	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Steven	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Linda	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Alice	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Charles	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Elaine	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Robert	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Andrew	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Walter	1	2	3	4	5	6	7	1	2	3	4	5	6	7

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	I believe this individual would be a good employee.							I think this is a good name.						
	Strongly Disagree			Neither Agree nor Disagree			Strongly Agree	Strongly Disagree			Neither Agree nor Disagree			Strongly Agree
Frank	1	2	3	4	5	6	7	1	2	3	4	5	6	7
William	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Debby	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Sharon	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Suzanne	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Ted	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Arthur	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Mary	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Gail	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Anne	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Kevin	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Carl	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Eric	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Jennifer	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Karen	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Gary	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Mark	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Peter	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Ronald	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Michelle	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Edward	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Dennis	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Richard	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Brian	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Patrick	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Lawrence	1	2	3	4	5	6	7	1	2	3	4	5	6	7
David	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Matthew	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Joseph	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Jack	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Sandra	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Ruth	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Katherine	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Sarah	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Dan	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Sally	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Paul	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Alan	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Andy	1	2	3	4	5	6	7	1	2	3	4	5	6	7

APPENDIX G

Debriefing Form Used in Pretest

Debriefing Form
Identifying What Makes a Strong vs. Weak Résumé

The study you just participated in is pretesting materials for use in a future study. The ratings and feedback you provided will be used to (1) equalize the résumés as much as possible, (2) identify an appropriate time constraint for the selection task, (3) verify that the positions are viewed as expected, and (4) match male names with female names that have similar competence and attractiveness ratings.

Regarding what makes a good résumé, research suggests that different occupations require different approaches to how résumés are presented. Ross and Young (2005) recommend the following:

- Grades should be presented only if GPA is high (above 3.25).
- References may or may not be desired depending on the occupation, with some employers preferring the "references available upon request statements.
- When included, references should be provided on a separate page.
- Some occupations desire résumés no longer than 1 page, while others want 2 pages or more, while still others prefer that résumé length be determined by the amount of information & experience being communicated.
- All résumés should be highly polished and edited. Errors or typos immediately detract.
- Résumés should typically contain, among other things, the candidate's phone number, address, previous job responsibilities, dates of employment, job titles, previous employers, certifications and degrees earned, achievements and accomplishments, and objectives.
- Applicants are strongly encouraged to discuss with knowledgeable professionals the résumé content and design preferences of their specific field.

Thank you very much for your participation. If you have any questions about the study, now or in the future, please do not hesitate to contact one of the researchers listed below:

Rhys Lewis   Ph.D. Candidate
Dr. Richard Goffin   Ph.D
Dr. Bertram Gawronski Ph.D.

If you have questions about your rights as a research subject, you should contact the Director of the Office of Research Ethics at ethics@uwo.ca or 661-3036.

Below we have provided some references to journal articles about processes influencing selection decisions, in case you would like to learn more about our study.

References
Ross, C. M., & Young, S. J. (2005). Resume preferences: Is it really "business as usual"? *Journal of Career Development, 32*, 153-164.
Thoms, P., McMasters R., & Roberts, M. R. (1999). Resume characteristics as predictors of an invitation to interview. *Journal of Business and Psychology, 13*, 399-356.
Banis, W. (2000). How to win the resume battle. In *The job guide: The student(s) guide to top companies*. Toronto, Ontario, Canada: Simplicity Corporation.

APPENDIX H

Letter of Information Used in Study 1

What Makes a Strong Resume
Letter of Information

<u>Purpose of study</u>

To validate a tool to be used in future studies on hiring decisions.

<u>Procedures</u>

You will be asked to compare 10 résumés and to indicate the 3 strongest candidates. This will be repeated for 4 different jobs.
You will then be asked to complete some individual difference measures followed by a word sorting task.
The study is expected to take approximately 2 hours to complete.

<u>Risks and discomforts</u>
There are no expected risks or discomforts associated with participation in this study.

<u>Participation in this study is voluntary</u>
You may refuse to participate, refuse to complete any part of the study, or withdraw at any time without loss of promised credits. However, if you leave early without completing the tasks the number of credits you receive may be prorated (e.g., ½ credit for the first half hour, 1 credit for the 1st hour).
You have the right to be given all important information about the study and what you will be asked to do.
You do not have to take part in this study if you do not want to.
You do not waive any legal rights by continuing.

<u>Confidentiality</u>
The questionnaire responses provided by you are confidential. They will be stored in a secure location and will be seen only by the researchers of this study.

If the results of this study are published, your name will not be used and no information that discloses your identity will be published.

<u>Compensation</u>
You will be given 2 research credits for your participation in the study.

<u>Contact Information</u>
If you have any questions about this study, please contact:

Rhys Lewis	Ph.D. Candidate
Richard Goffin	Ph.D.
Bertram Gawronski	Ph.D.

APPENDIX I

Consent Statement Used in Study 1

<u>Consent Statement</u>
<u>What Makes a Strong Résumé?</u>

I have read the Letter of Information, have had the nature of the study explained to me, and I agree to participate. All questions have been answered to my satisfaction.

Print Experimenter's Name: Experimenter's Signature: Date:

_____   _____   _____

Print Participant's Name: Participant's Signature: Date:

_____   _____   _____

APPENDIX J

Demographics Form Used in Study 1

Demographics

Sona research participant ID code:
What/where is this ID code?

Gender: ◯ Male ◯ Female

Age:

Part-time work experience: ___ years

Full-time work experience: ___ years

Ethnicity:
(Check all that apply)
- ☐ White / Caucasian
- ☐ Aboriginal or American Indian
- ☐ Asian
- ☐ Black or African origin
- ☐ Hispanic, Latino or Spanish origin
- ☐ Pacific Islander
- ☐ Other

(Continue)

APPENDIX K

Instructions for Making Hiring Decisions Used in Study 1

Play the role of a human resource professional:

- Imagine that your job is to make hiring decisions.
- Your salary and status are tied to the performance of people you hire. If people you hire do well, you get paid more. If they fail, you might be demoted.

Task:

- Select the top 3 candidates for each job.
- There are 4 jobs in total, each with 10 people applying to them.

Time:

- 1 hour to finish all hiring decisions (roughly 12-15 minutes per job).
- That works out to a just over 1 minute per resume to review the resume and make any notes.
- There will be a timer at the bottom right of the screen that can help you keep track of time.

Are you ready to begin?

- What colour are the booklets that the researcher gave you? [Select a colour ⇕]

(I'm ready! Let's start!)

APPENDIX L

List of 40 Most Common Non-Minority Surnames Used in the Hiring Task

Job	Name	Rank in 2000 U.S. Census	% White
Child Care Worker	Thomas	14	55.53
	Walker	28	61.25
	Campbell	43	76.47
	Collins	52	73.92
	Morris	56	75.92
	Miller	6	85.81
	Jackson	18	41.93
	Wright	34	68.3
	Williams	3	48.52
	Carter	46	60.51
Mechanical Engineer	Taylor	13	67.8
	Robinson	27	51.34
	Hill	41	66.83
	Parker	51	71.49
	Murphy	58	85.05
	Davis	7	64.73
	Thompson	19	72.48
	Baker	38	82.08
	Johnson	2	61.55
	Phillips	47	78.95
Receptionist	Anderson	12	77.6
	Clark	25	76.84
	Nelson	40	80.29
	Turner	49	66.67
	Cook	60	83.52
	Wilson	10	69.72
	Harris	24	53.88
	Adams	39	76.17
	Smith	1	73.35
	Evans	48	70.65
Lead Computer Programmer	Moore	16	68.85
	Hall	30	75.11
	Mitchell	44	63.55
	Edwards	53	65.16
	Stewart	54	71.78
	Jones	5	57.69
	Martin	17	77.47
	Allen	32	70.24
	Brown	4	60.71
	Roberts	45	79.56

APPENDIX M

Sample Resume Used In Study 1

Michelle Turner

Scores on Pre-Employment Tests

	Very Low	Low	Neutral	High	Very High
Intelligence	▬▬ (2)				
Conscientiousness	▬▬▬▬▬▬▬▬ (5)				
Extraversion	▬▬▬▬ (3)				
Agreeableness	▬▬▬▬▬▬ (4)				
Openness	▬▬▬▬ (3)				
Neuroticism	▬▬▬▬ (3)				

```
          1        2        3        4        5
```

Work Experience

10/03 to Present	Receptionist Career Advancement Institute of Training

- Answered multi-line phones, greeted visitors, assisted students in computer lab.
- Conducted internet research for fund development.
- Faxed attendance reports, made copies, filed students' folders and other documents, mail merge donation requests, performed maintenance of computers, and typed correspondence.
- All duties were performed in a professional and cheerful manner exercising superior customer service.
- Never missed a day and was never late.

07/00 to 10/03	Clerical Assistant Law Firm of Jackson Lawler

- Answered multi-line phone system, directing calls as appropriate
- Filed legal documents
- Delivered and picked-up legal documents from the Court House
- Accepted deliveries.

Education

09/03 to 08/05	Associates Degree in Clerical Administration Career Advancement Institute of Training
08/98 to 12/01	Administrative Assistant Diploma Marydale Technical College

APPENDIX N

Response Sheet for Hiring Decision Task Used in Study 1

Child Care Provider:

- Attend to children at schools, businesses, private households, and child care institutions.
- Perform a variety of tasks, such as dressing, feeding, bathing, and overseeing play.

Notes

The spaces below are provided to help you take notes. Take as many or as few notes as you like.

Person	Reasons in favor of hiring this person	Reasons against hiring this person
Theresa		
Edward		
Christopher		
Sarah		
Alice		
Diane		
Gary		
Frank		
Susan		
Alan		

Your Hiring Recommendations

Which candidate would you recommend be sent a job offer? [1st choice]

If your first choice is unavailable, then a job offer should be sent to: [2nd choice]

If both your first and second choices are unavailable, then a job offer should be sent to: [3rd choice]

(Continue to next job)

APENDIX O

Instructions Used to Administer Sexism Items in Study 1

Questions About Society

Below is a series of statements concerning men and women and their relationships in contemporary society. Please indicate the degree to which you agree or disagree with each statement on a 1 (Strongly agree) to 7 (Strongly disagree) scale.

APPENDIX P

Instructions Used to Administer Motivation to Respond Without Sexism Items in Study 1

Questions About Yourself

Below is a series of statements with which you may agree or disagree. Please indicate the degree to which you agree or disagree with each statement on a 1 (Strongly agree) to 9 (Strongly disagree) scale.

APPENDIX Q

Stimulus Materials for the Implicit Association Test in Study 1

Male Names
Jack
Stephen
Dan
Michael
James
Andy
Patrick
William
Greg
Carl

Female Names
Gail
Mary
Sharon
Laura
Jennifer
Deborah
Jane
Suzanne
Helen
Barbara

Male Sex-Typed Jobs
Mechanical Engineer
Lead Computer Programmer
Bricklayer
Plumber
Construction Worker
Truck Driver
Firefighter
Supervisor
Police Officer
Electrician

Female Sex-Typed Jobs
Receptionist
Child Care Worker
Nurse
Librarian
Flight Attendant
Secretary
Dancer
Cashier
Dental Assistant
Hairstylist

Career-Related Words
Desk
Salary
Economy
File
Laptop
Management
Fax-machine
Company Car
Business
Competition

Household-Related Words
Children
Diapers
Kitchen
Fridge
Duster
Laundry
Vacuum Cleaner
Cloth
Ironing Board
Bucket

APPENDIX R

Debriefing Form Used in Study 1

<u>Debriefing Form</u>
<u>What Makes a Strong Résumé?</u>

The study you just participated in is validating a tool for use in future studies. The resumes were taken from actual resumes posted online, which were subsequently modified to remove identifying information and to make the resumes more equal in strength. The ratings you provided will be used to identify variables that correlate with the degree to which gender enters hiring decisions. These variables include your implicit degree of association between genders, jobs, career items, and household items (measured by the word sorting tasks that you completed). Two separate gender influences are being investigated. First, it is well known that males are typically advantaged in the workplace and in hiring decisions. Second, in jobs that are typically associated with one gender (e.g., most nurses are female), having a gender consistent with the job conveys an advantage. Because the male advantage is ubiquitous in society, and because most jobs have some degree of sex-typing, researchers have struggled to isolate one influence without contamination from the other. The current research is pioneering a method for measuring both influences without the need to isolate them.

Regarding what makes a good résumé, research suggests that different occupations require different approaches to how résumés are presented. Ross and Young (2005) recommend the following:
- Grades should be presented only if GPA is high (above 3.25).
- References may or may not be desired depending on the occupation, with some employers preferring the "references available upon request statements.
- When included, references should be provided on a separate page.
- Some occupations desire résumés no longer than 1 page, while others want 2 pages or more, while still others prefer that résumé length be determined by the amount of information & experience being communicated.
- All résumés should be highly polished and edited. Errors or typos immediately detract.
- Résumés should typically contain, among other things, the candidate's phone number, current address, previous job responsibilities, dates of employment, job titles, previous employers, certifications and degrees earned, achievements and accomplishments, and objectives.
- Applicants are strongly encouraged to discuss with knowledgeable professionals the résumé content and design preferences of their specific field.

Thank you very much for your participation. If you have any questions about the study, now or in the future, please do not hesitate to contact one of the researchers listed below:

Rhys Lewis	Ph.D. Candidate
Dr. Richard Goffin	Ph.D.
Dr. Bertram Gawronski	Ph.D.

If you have questions about your rights as a research subject, you should contact the Director of the Office of Research Ethics at ethics@uwo.ca or 661-3036.

Below we have provided some references to journal articles about processes influencing selection decisions, in case you would like to learn more about our study.

<u>References</u>
Ross, C. M., & Young, S. J. (2005). Resume preferences: Is it really "business as usual"? *Journal of Career Development, 32*, 153-164.
Thoms, P., McMasters R., & Roberts, M. R. (1999). Resume characteristics as predictors of an invitation to interview. *Journal of Business and Psychology, 13*, 399-356.
Banis, W. (2000). How to win the resume battle. In *The job guide: The student(s) guide to top companies*. Toronto, Ontario, Canada: Simplicity Corporation.

APPENDIX S

Letter of Information and Informed Consent Statement Used in Study 2

Experience vs. Education: What do Employers Value Most?
Informed Consent

This study forms the core of my doctoral dissertation. Please take your time and answer honestly.

The study should take half an hour. If you do not have 30 un-interrupted minutes right now, please come back to the study later.

Procedures
You will be asked to complete a short (2 minute) sentence unscrambling exercise
You will be presented with summary scores for 12 job candidates and asked to identify the 3 strongest. This will be repeated for 4 different jobs.

Compensation
The study is expected to take 30 minutes to complete, for which you will receive ½ a research credit.

Benefits & Risks
You will gain experience in hiring research and an appreciation of what people who make hiring decisions might look for in job candidates.

There are no expected risks or discomforts associated with participation in this study. You can refuse to answer questions or withdraw at any time without loss of promised credits.

Confidentiality
Your responses are confidential. They will be stored in a secure location and will be seen only by the researchers of this study.

If the results of this study are published, your name will not be used and no information that discloses your identity will be published.

Contact Information
If you have any questions about this study, please contact Rhys Lewis (Ph.D. Candidate).

To begin the study, please enter your information below.

By continuing, you acknowledge that you have read the letter of information and consent to participate in the study.

APPENDIX T

Demographics Items Used in Study 2

Demographics

Sona research participant ID code: [_____]
What/where is this ID code?

Gender: ○ Male ○ Female

Age: [____]

Part-time work experience: [____] years

Full-time work experience: [____] years

Ethnicity: ☐ White / Caucasian
(Check all that apply)   ☐ Aboriginal or American Indian
                                      ☐ Asian
                                      ☐ Black or African origin
                                      ☐ Hispanic, Latino or Spanish origin
                                      ☐ Pacific Islander
                                      ☐ Other

APPENDIX U

Sentences Used as Primes in Study 2

Sentences used to prime male/female success at work (* Sentences contain a prime)

<u>Scrambled</u>	<u>Unscrambled</u>
*impressive was success [his/her] professionally	[his/her] success was impressive
monitor computers new need they	they need new computers
about with work [she/he] talked	[she/he] talked about work
*off advance career [his/her] took	[his/her] career took off
profits dramatic up are quarterly	quarterly profits are up
*was [James/Jane] exceptional promoted quickly	[James/Jane] was promoted quickly
employees better perform satisfied is	satisfied employees perform better
*[David/Emily] commissions large ability earns	[David/Emily] earns large commissions
*is knowledgeable invaluable expertise [his/her]	[his/her] expertise is invaluable
employers smart hoping hire wisely	smart employers hire wisely
growth solid requires consistently foresight	solid growth requires foresight
*work excelled [he/she] job at	[he/she] excelled at work

Sentences used to prime gender-congruent/gender-incongruent trait associations

<u>Scrambled</u>	<u>Unscrambled</u>
*was hospitals nurse [Jane/James] a	[Jane/James] was a nurse
monitor computers new need they	they need new computers
about with work they talked	they talked about work
*gentle always was pillow [she/he]	[she/he] was always gentle
profits dramatic up are quarterly	quarterly profits are up
*command leads [his/her] he team	[he/she] leads his team
employees better perform satisfied is	satisfied employees perform better
*[he/she] math excelled calculated at	[he/she] excelled at math
*respected brave courage everyone [his/her]	everyone respected [his/her] courage
employers smart hoping hire wisely	smart employers hire wisely
growth solid requires consistently foresight	solid growth requires foresight
*skilled was socially [Emily/David] talk	[Emily/David] was socially skilled

APPENDIX V

Screen Shot of Sentence Unscrambling Task Used in Study 2

Sentence Unscrambling Task

Instructions

Each sentence has 5 words in a nonsense order. Four of the words can be unscrambled to create a viable sentence, while **one word needs to be ignored**.

The goal is to unscramble the words to make a viable sentence. Type your answer in the appropriate text box.

	Scrambled	**Unscrambled**
Example	job the employability new is	the job is new

The example sentence can be unscrambled to "the job is new".
In this example, "employability" was the word that was ignored.

Now you try...

1.	was hospitals nurse James a	James was a nurse ✓
2.	monitor computers new need they	they need new monitor ✗
3.	about with work they talked	
4.	gentle always was pillows he	
5.	profits finance up are quarterly	
6.	command leads her she team	
7.	employees better perform satisfied is	
8.	she math excelled calculated at	
9.	respected brave courage everyone her	
10.	employers smart hoping hire wisely	
11.	growth solid requires consistently foresight	
12.	skilled was socially David talk	

(Continue to next part of study)

APPENDIX W

Instructions for Making Hiring Decisions Used in Study 2

Instructions for Making Hiring Decisions

Play the role of a human resource professional:

- Imagine that your job is to make hiring decisions.
- Your salary and status are tied to the performance of people you hire. If people you hire do well, you get paid more. If they fail, it reflects poorly on you.
- From the many people who applied, you and your assistants have narrowed the pool of final candidates down to just 12 people.
- You and your assistants have scored each person based on their work experience, level of education, extracurricular activities, personality, interview performance, and resume quality. Please make the final hiring decisions based on these summary scores.

Task:

- Select the top 3 candidates for each job.
- There are 4 jobs in total, each with 12 people applying to them.

Time:

- 20 minutes to finish all hiring decisions (roughly 5 minutes per job).
- There is no penalty for taking longer than 20 minutes to make decisions, but you will still only receive half a research credit.
- A timer at the bottom right of the screen will help you keep track of time.

I'm ready! Let's start!

APPENDIX X

Screen Shot of Hiring Decisions Tab in Study 2

APPENDIX Y

Debriefing Form Used in Study 2

Experience vs. Education: What do Employers Value Most?
Debriefing

Description of study

The study you just participated in is validating a tool for use in future studies. Your responses will be used to identify the degree to which gender enters hiring decisions. Two separate gender influences are being investigated. First, there is widespread concern that males may have an overall advantage in the workplace and in hiring decisions. Second, in jobs that are typically associated with one gender (e.g., most nurses are female), having a gender consistent with the job conveys an advantage.

The sentence unscrambling task that you completed was intended to prime you to respond to the hiring task in a way that relates one of these gender advantages. Each participant receives one of four possible sets of sentences. Depending on the sentences you received, they were designed to increase or decrease either the male-advantage or the gender-job match advantage.

Because the male advantage is thought by many to be ubiquitous in society, and because most jobs have some degree of sex-typing, researchers have struggled to isolate one influence without contamination from the other. The current research is pioneering a method for measuring both influences without the need to isolate them.

What do employers value most?

Surveyed human resource professionals report that what most influences hiring decisions is job experience. They report education as slightly less influential, followed by extracurricular activities. The importance of personality, interview performance, and resume quality were not investigated in this survey, though other studies have found that even minor defects in a resume (e.g., a typo, odd formatting) greatly decreases a candidate's chances for success.

Studies also show that having one quality can make up for the lack of another. For example, possessing a high education with many extracurricular activities can sometimes make up for having less job experience.

However, it is important that the qualifications be relevant. Employers are more likely to hire people with relevant work experience and irrelevant education than people with irrelevant work experience and a relevant education. Also, business-related extracurricular activities and activities that display leadership skills are more helpful than are social-related extracurricular activities.

Contact Information

Thank you very much for your participation. If you have any questions about the study, now or in the future, please do not hesitate to contact one of the researchers listed below:

Rhys Lewis	Ph.D. Candidate
Richard Goffin	Ph.D.
Bertram Gawronski	Ph.D.

If you have questions about your rights as a research subject, you should contact the Director of the Office of Research Ethics at ethics@uwo.ca or 661-3036.

Below we have provided some references to journal articles about factors influencing hiring decisions, in case you would like to learn more.

Further References

Cole, M. S., Rubin, R. S., Feild, H. S., & Giles, W. F. (2007). Recruiters' perceptions and use of applicant resume information: Screening the recent graduate. Applied Psychology: An international Review, 56, 319-343.

Davison H. K. & Burke, M. J. (2000). Sex discrimination in simulated employment contexts: A meta-analytic investigation. Journal of Vocational Behavior, 56, 225-248.

Knouse, S. B. (1994). Impressions of the resume: The effects of applicant education, experience, and impression management. Journal of Business and Psychology, 9, 33-45.

Nemanick, R.C., & Clark, E.M. (2002). The differential effects of extracurricular activities on attributions in résumé evaluation. International Journal of Selection and Assessment, 10, 206-217.

APPENDIX Z

Ethics Approval for Pretest

Department of Psychology The University of Western Ontario
Room 7418 Social Sciences Centre,
London, ON, Canada N6A 5C1
Telephone: (519) 661-2067 Fax: (519) 661-3961

Use of Human Subjects - Ethics Approval Notice

Review Number	08 10 23	Approval Date	08 10 28
Principal Investigator	Rick Goffin/Rhys Lewis	End Date	09 10 27
Protocol Title	Identifying what makes a strong vs. weak resume		
Sponsor	n/a		

This is to notify you that The University of Western Ontario Department of Psychology Research Ethics Board (PREB) has granted expedited ethics approval to the above named research study on the date noted above.

The PREB is a sub-REB of The University of Western Ontario's Research Ethics Board for Non-Medical Research Involving Human Subjects (NMREB) which is organized and operates according to the Tri-Council Policy Statement and the applicable laws and regulations of Ontario. (See Office of Research Ethics web site: http://www.uwo.ca/research/ethics/)

This approval shall remain valid until end date noted above assuming timely and acceptable responses to the University's periodic requests for surveillance and monitoring information.

During the course of the research, no deviations from, or changes to, the protocol or consent form may be initiated without prior written approval from the PREB except when necessary to eliminate immediate hazards to the subject or when the change(s) involve only logistical or administrative aspects of the study (e.g. change of research assistant, telephone number etc). Subjects must receive a copy of the information/consent documentation.

Investigators must promptly also report to the PREB:
a) changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
b) all adverse and unexpected experiences or events that are both serious and unexpected;
c) new information that may adversely affect the safety of the subjects or the conduct of the study.

If these changes/adverse events require a change to the information/consent documentation, and/or recruitment advertisement, the newly revised information/consent documentation, and/or advertisement, must be submitted to the PREB for approval.

Members of the PREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the PREB.

Clive Seligman Ph.D.

Chair, Psychology Expedited Research Ethics Board (PREB)

The other members of the 2008-2009 PREB are: David Dozois, Bill Fisher, Riley Hinson and Steve Lupker

CC: UWO Office of Research Ethics

This is an official document. Please retain the original in your files

APPENDIX AA

Ethics Approval for Study 1

Department of Psychology The University of Western Ontario
Room 7418 Social Sciences Centre,
London, ON, Canada N6A 5C1
Telephone: (519) 661-2067Fax: (519) 661-3961

Use of Human Subjects - Ethics Approval Notice

Review Number	09 09 11	Approval Date	09 09 17
Principal Investigator	Rhys Lewis/Rick Goffin	End Date	10 04 30
Protocol Title	What makes a strong resume?		
Sponsor	n/a		

This is to notify you that The University of Western Ontario Department of Psychology Research Ethics Board (PREB) has granted expedited ethics approval to the above named research study on the date noted above.

The PREB is a sub-REB of The University of Western Ontario's Research Ethics Board for Non-Medical Research Involving Human Subjects (NMREB) which is organized and operates according to the Tri-Council Policy Statement and the applicable laws and regulations of Ontario. (See Office of Research Ethics web site: http://www.uwo.ca/research/ethics/)

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Clive Seligman Ph.D,

Chair, Psychology Expedited Research Ethics Board (PREB)

The other members of the 2008-2009 PREB are: David Dozois, Bill Fisher, Riley Hinson and Steve Lupker

CC: UWO Office of Research Ethics

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APPENDIX AB

Ethics Approval for Study 2

Department of Psychology The University of Western Ontario
Room 7418 Social Sciences Centre,
London, ON, Canada N6A 5C1
Telephone: (519) 661-2067Fax: (519) 661-3961

Use of Human Subjects - Ethics Approval Notice

Review Number	09 10 28	Approval Date	09 10 22
Principal Investigator	Rhys Lewis/Rick Goffin	End Date	10 04 30
Protocol Title	Experience vs. education: What do employers value most?		
Sponsor	n/a		

This is to notify you that The University of Western Ontario Department of Psychology Research Ethics Board (PREB) has granted expedited ethics approval to the above named research study on the date noted above.

The PREB is a sub-REB of The University of Western Ontario's Research Ethics Board for Non-Medical Research Involving Human Subjects (NMREB) which is organized and operates according to the Tri-Council Policy Statement and the applicable laws and regulations of Ontario. (See Office of Research Ethics web site: http://www.uwo.ca/research/ethics/)

This approval shall remain valid until end date noted above assuming timely and acceptable responses to the University's periodic requests for surveillance and monitoring information.

During the course of the research, no deviations from, or changes to, the protocol or consent form may be initiated without prior written approval from the PREB except when necessary to eliminate immediate hazards to the subject or when the change(s) involve only logistical or administrative aspects of the study (e.g. change of research assistant, telephone number etc). Subjects must receive a copy of the information/consent documentation.

Investigators must promptly also report to the PREB:
a) changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
b) all adverse and unexpected experiences or events that are both serious and unexpected;
c) new information that may adversely affect the safety of the subjects or the conduct of the study.

If these changes/adverse events require a change to the information/consent documentation, and/or recruitment advertisement, the newly revised information/consent documentation, and/or advertisement, must be submitted to the PREB for approval.

Members of the PREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the PREB.

Clive Seligman Ph.D.

Chair, Psychology Expedited Research Ethics Board (PREB)

The other members of the 2009-2010 PREB are: David Dozois, Bill Fisher, Riley Hinson and Steve Lupker

CC: UWO Office of Research Ethics

This is an official document. Please retain the original in your files

VITA

Name: Rhys J. Lewis

Place of Birth   Brentwood Bay, British Columbia, Canada

Post-secondary Education and Degrees

2006-2010   Ph.D., Psychology (Industrial/Organizational)
                         The University of Western Ontario
                         London, Ontario Canada

2004-2006   M.Sc., Psychology (Industrial/Organizational)
                         The University of Western Ontario
                         London, Ontario, Canada

2000-2003   B.Sc. Honours with Distinction, Psychology
                         University of Victoria
                         Victoria, British Columbia, Canada

Honours and Awards

2006-2010   Social Science and Humanities Research Council of Canada
                         (SSHRC) Doctoral Fellowship Award

2006   Leola E. Neal Award, awarded for the most outstanding Masters
                         thesis. The University of Western Ontario, Department of Psychology

2005-2006   SSHRC Canada Graduate Scholarship – Master's

2003   British Columbia Psychological Association's Gold Medal Award
                         (2003), awarded to the top student graduating in Psychology at the
                         University of Victoria

2001   Howard Petch Scholarship, awarded to the top student in the Faculty
                         of Social Science at the University of Victoria

2000   Co-op Sus Tabata Gold Medal Award for Psychology, awarded to the
                         top high school student in Victoria, British Columbia entering a
                         Psychology program

Related Work Experience

2006 - ongoing   Senior Research Consultant
Sigma Assessment Systems Inc.

2009 - ongoing   President and CEO
Better Tenant Screening Inc.

2006-2007   Lab Coordinator for Research Methods in Psychology (Psych 280E)
The University of Western Ontario

2005-2006   Research Associate with Richard Goffin
University of Western Ontario

2004-2006   Lab Instructor for Research Methods in Psychology (Psych 280E)
The University of Western Ontario

Publications & Conference Presentations

Lewis, R. J., Carswell, J., Ilic, T., Illiescu, D., Pepper, S., & O'Brien, J. (2011, April). *Risks for leader derailment: A unique contribution beyond full-range leadership.* Poster presented at the annual conference of the Society for Industrial and Organizational Psychology, Chicago, IL.

Lewis, R. J., Carswell, J., O'Brien, J., & Thussu, S. (2010, April). *Predisposed to derail: The personality correlates of risk for derailment.* Poster presented at the annual conference of the Society for Industrial and Organizational Psychology, Atlanta, GA.

Lewis, R. J., & Carswell, J. (2010, April). *Who cares about justice? Trait moderators of justice/counterproductivity relationships.* Poster presented at the annual conference of the Society for Industrial and Organizational Psychology, Atlanta, GA.

Sheppard, L. D., Goffin, R. D., Lewis, R. J., & Olson, J. (2009, August). *The effect of target attractiveness and rating method on the accuracy of trait ratings.* Poster presented at the annual conference of the American Psychological Association, Toronto, ON.

O'Neill, T. A., Lewis, R. J., & Hambley, L. A. (2008). Leading Virtual Teams: Potential Problems and Simple Solutions. In J. Nemiro, M. M. Beyerlein, L. Bradley, & S. Beyerlein (Eds.), *The Handbook of High Performance Virtual Teams: A Toolkit for Collaborating Across Boundaries.* San Francisco, CA: Jossey-Bass.

Poole, A., Carswell J., Lewis R. J., Powell, D. M. J, & Marcus, B. (2008, April). *The relation of emotional intelligence to counterproductive workplace behavior: Does emotional intelligence have a dark side?* Poster presented at the annual conference of the Society for Industrial and Organizational Psychology, New York, NY.

Lewis, R. J., Goffin, R. D., & Olson, J. (2007, April). *Self/Other comparisons: Can they make better raters?* Poster presented at the annual conference of the Society for Industrial and Organizational Psychology, New York, NY.