Management Science

Publication details, including instructions for authors and subscription information:
http://pubsonline.informs.org

When Performance Trumps Gender Bias: Joint vs. Separate Evaluation

Iris Bohnet, Alexandra van Geen, Max Bazerman

To cite this article:
Iris Bohnet, Alexandra van Geen, Max Bazerman (2016) When Performance Trumps Gender Bias: Joint vs. Separate Evaluation. Management Science 62(5):1225-1234. http://dx.doi.org/10.1287/mnsc.2015.2186

MANAGEMENT SCIENCE
Vol. 62, No. 5, May 2016, pp. 1225–1234
ISSN 0025-1909 (print) | ISSN 1526-5501 (online)

http://dx.doi.org/10.1287/mnsc.2015.2186

When Performance Trumps Gender Bias: Joint vs. Separate Evaluation

Iris Bohnet
John F. Kennedy School of Government, Harvard University, Cambridge, Massachusetts 02138, iris_bohnet@harvard.edu

Alexandra van Geen
Erasmus School of Economics, 3062 PA Rotterdam, Netherlands, vangeen@ese.eur.nl

Max Bazerman
Harvard Business School, Harvard University, Boston, Massachusetts 02163, mbazerman@hbs.edu

Gender bias in the evaluation of job candidates has been demonstrated in business, government, and academia, yet little is known about how to overcome it. Blind evaluation procedures have been proven to significantly increase the likelihood that women musicians are chosen for orchestras, and they are employed by a few companies. We examine a new intervention to overcome gender bias in hiring, promotion, and job assignments: an "evaluation nudge" in which people are evaluated jointly rather than separately regarding their future performance. Evaluators are more likely to base their decisions on individual performance in joint than in separate evaluation and on group stereotypes in separate than in joint evaluation, making joint evaluation the profit-maximizing evaluation procedure. Our work is inspired by findings in behavioral decision research suggesting that people make more reasoned choices when examining options jointly rather than separately and is compatible with a behavioral model of information processing.

Data, as supplemental material, are available at http://dx.doi.org/10.1287/mnsc.2015.2186.

Keywords: gender; behavioral economics; decision making; performance evaluation; laboratory experiments
History: Received February 11, 2014; accepted November 10, 2014, by Uri Gneezy, behavioral economics.
Published online in *Articles in Advance* September 29, 2015.

1. Introduction

Gender-based discrimination in hiring, promotions, and job assignments is difficult to overcome (e.g., Neumark et al. 1996, Riach and Rich 2002). In addition to conscious taste-based or statistical discrimination (Becker 1978), gender biases are automatically activated as soon as evaluators learn the sex of a person. Biases lead to unintentional and implicit discrimination that is not based on a rational assessment of the usefulness of sex in predicting future performance (e.g., Banaji and Greenwald 1995, Bertrand et al. 2005). For example, a science faculty rated a male candidate who applied for a laboratory manager position as significantly more competent and hireable than an otherwise identical female candidate, and this differential evaluation was moderated by the faculty's preexisting bias against women (Moss-Racusin et al. 2012).

Effective mechanisms to decrease the impact of such biases are blind evaluation procedures. For example, many major orchestras have musicians audition behind a curtain. These methods have proven to substantially decrease gender discrimination in the selection of musicians for orchestras (Goldin and Rouse 2000). Other attempts at overcoming gender biases include diversity training, which surprisingly seems to have had little impact (Dobbin et al. 2007). Gender quotas on search and evaluation committees have had mixed results, given that stereotypes tend to affect both male and female evaluators (Bagues and Esteve-Volart 2010, Moss-Racusin et al. 2012). Quotas—e.g., for political bodies, corporate boards, or senior management—are effective in increasing the fraction of members from underrepresented groups. And, with enough exposure to counterstereotypical evidence, quotas have been shown to affect gender stereotypes (Beaman et al. 2009, 2012; Dasgupta and Asgari 2004). However, in some cases, quotas had negative effects on performance (Matsa and Miller 2013).

This paper suggests a new intervention aimed at overcoming biased assessments: an "evaluation nudge," in which people are evaluated jointly rather than separately regarding their future performance.[1]

[1] A nudge is any aspect of choice design that is based on psychological insights into how our minds work and that alters people's behavior in a predictable way without restricting the freedom of individual choice. For nudges more generally, see Thaler and Sunstein (2008).

We expect cognitive shortcuts, such as group stereotypes, to have less of an impact when multiple candidates are presented simultaneously and evaluated comparatively than when evaluators look at one person at a time.

Our work builds on earlier research in psychology suggesting that evaluation modes affect the quality of decisions by making evaluators switch from more intuitive decision making in separate evaluation to more reasoned choices in joint evaluation. This often is attributed to the System 1/System 2 distinction, where people are assumed to have two distinct modes of thinking that are variously activated under certain conditions: the intuitive and automatic System 1 and the reflective and reasoned System 2 (Kahneman 2011, Stanovich and West 2000). Specifically, it has been suggested that the lack of comparison information available in separate evaluation leads people to invoke intuitively available internal referents (Kahneman and Miller 1986), focus on the attributes that can be most easily calibrated (Hsee et al. 1999), and rely more on emotional desires than on reasoned analysis (Bazerman et al. 1998; for an overview, see Bazerman and Moore 2013).

Bazerman et al. (1992) provided the original demonstration of preference reversals between joint and separate evaluation. In a two-party negotiation, they had study participants evaluate two possible negotiation outcomes—an even split of a smaller pie and a disadvantageous uneven split of a larger pie that still made both parties better off—either one at a time or jointly. When presented separately, most people preferred the equal split; when presented jointly, most preferred the money-maximizing alternative. Later studies on joint versus separate preference reversals found that brand name was more important than product features and price when people evaluated products separately rather than jointly (Nowlis and Simonson 1997); people were willing to pay more to protect animal species when evaluating separately and to invest in human health when evaluating the two causes jointly (Kahneman et al. 1993); and people were willing to pay more for a small portion of ice cream in a tiny, overfilled container when evaluating separately but for a large portion of ice cream in an underfilled huge container when evaluating the two serving options jointly (Hsee et al. 1999).

The focus of our study is to apply these insights to a new domain, the evaluation of people. In addition, we offer a new perspective on how to model a potential change in candidate assessments depending on the evaluation mode, a simple behavioral model of information processing. We assume that evaluators influenced by stereotypes start out by overweighting the importance of the characteristics of the group that the candidate belongs to. When evaluators receive more information on the candidate's individual past performance, they update their beliefs. By definition, in joint evaluation, more potentially counterstereotypical data points are available than in separate evaluation, thus providing evaluators with more information to update their stereotypical beliefs. The difference in the amount of available information could lead evaluators to choose a lower-performing stereotypical person in separate evaluation, but a higher-performing counterstereotypical person in joint evaluation.

We employ laboratory experiments to examine whether evaluating candidates jointly rather than separately leads to individual performance playing a more important role than group stereotypes. In our experiments, we had subjects assume the roles of either evaluators or candidates. Evaluators assessed the likely future performance of candidates either in separate or joint evaluation of their performance. Specifically, they were informed of candidates' past performance and their sex (plus a number of filler characteristics) and asked to decide whether given candidates were suitable for given jobs, either evaluating them separately or jointly, in one of two sex-typed tasks, a math or a verbal task.

Most studies that measure explicit gender attitudes find that females are believed to be worse at math and better at verbal tasks than males (Perie et al. 2005, Price 2012). Implicit association tests measuring people's implicit attitudes report math and verbal skills to be associated with maleness and femaleness, respectively (Nosek et al. 2002, Plante et al. 2009). The evidence on actual performance differences between the genders is mixed and varies by country and population, sometimes finding support for a gender gap in the expected direction, sometimes finding no gender differences, and, in recent years, sometimes finding a reversal of the gender gap in mathematics in several countries (Guiso et al. 2008). Despite the mixed evidence, we expect gendered beliefs to be sticky and these tasks to create stereotype-advantaged and stereotype-disadvantaged groups, with men being stereotype advantaged in the math task and women in the verbal task. In addition, we expect that members of these groups will be affected by these biases even when at the individual level, conditional on the information available on the individual, gender is not informative and should not impact the evaluation.

We made a number of design choices to be able to test the impact of the evaluation mode as cleanly as possible. First, we decided to focus on cases where evaluators were faced with a dilemma, with stereotypes favoring one candidate and performance information favoring another candidate. Thus, in joint evaluation, we always studied mixed gender pairs with different performance scores. In addition, we

restricted ourselves to performance levels close to the average performance level in the group with relatively small performance differences across candidates. Finally, performance was easily measurable, and this information was available in our context. Clearly, in an organizational context, additional complexities come into play.[2]

In our experiment, gender stereotypes had a strong and significant impact on evaluators' candidate assessments even though gender was not correlated with task performance. Evaluators were significantly more likely to focus on group stereotypes in separate than in joint evaluation, and to focus on the past performance of the individual in joint than in separate evaluation. This gender gap in separate evaluation and performance gap in joint evaluation makes joint evaluation the profit-maximizing evaluation procedure.

Our experimental findings have implications for the design of hiring and promotion procedures. Both joint and separate evaluation procedures are common for such decisions. Based on a recent survey of senior business executives in U.S. companies with more than 1,000 employees (Penn et al. 2012), in 30% of all promotion decisions, only one candidate was considered. For hiring decisions, we rely on the literature on sequential versus nonsequential searches, building on Stigler (1961). In sequential search, a firm screens each applicant upon arrival and offers the job to the first applicant whose productivity exceeds a certain threshold. In nonsequential searches, a firm pools a number of applicants, screens them, and offers the job to the best person in the pool. The former search strategy resembles separate evaluation and the latter joint evaluation. Recruitment strategies vary with firm and job characteristics, but overall, about half of the hiring procedures studied seem to correspond to sequential (separate evaluation) and half to nonsequential (joint evaluation) searches (van Ommeren and Russo 2013, Oyer and Schaefer 2011). Unfortunately, neither the promotion nor the hiring literature has examined the gender impacts of the different hiring and promotion strategies.

Organizations may seek to overcome biases in hiring, job assignment, and promotion because they want to maximize economic returns. They may worry about the inaccuracy of stereotypes in predicting future productivity, or they may hold gender equality as a goal in itself. Introducing joint rather than separate evaluation procedures may enable them to nudge evaluators toward taking individual performance information into account rather than gender stereotypes.

Our paper is organized as follows: §2 offers a conceptual framework, §3 describes the experimental design, §4 reports our experimental results, and §5 concludes.

2. Conceptual Framework

Our evaluation nudge builds on the observation in behavioral decision research that people make more reasoned decisions in joint than in separate evaluation modes. Various potential psychological mechanisms have been proposed to account for this phenomenon (summarized by Bazerman and Moore 2013). We suggest that in addition to providing new reference points, making goods and people more easily evaluable or focusing evaluators' attention on what they should be doing instead of what they want to do, joint evaluation also provides evaluators with more data than separate evaluation. Thus, evaluators have more information available to update their (possibly biased) beliefs in joint than in separate evaluation. A Bayesian-like model of information processing may illustrate this. We assume that evaluators are informed of candidate(s)' individual past performance in a given task, their sex, and the average past performance of the pool of candidates. Based on the information received, evaluators have to decide whether to "hire" the candidate(s) presented to them for future performance in the task or go back to the pool and be allocated a candidate at random. Evaluators are paid based on their candidates' future performance, and thus have an incentive to select who they believe to be most productive, based on that candidate's future expected performance. Evaluators either evaluate one candidate at a time (separate evaluation) or two candidates at a time (joint evaluation). In both conditions, evaluators hire one candidate only, either by selecting one of the candidates presented or by going back to the pool and being allocated a random candidate.

A "behavioral" Bayesian model of information processing that allows evaluators to take irrelevant group characteristics into account, can explain an increase in the likelihood that evaluators choose higher-performing candidates in joint compared to separate evaluation. Evaluating more than one person at a time implies having more data points available on the candidate's relative performance to update prior biased beliefs. If the new information is counterstereotypical, it could theoretically shift beliefs enough for the evaluator to choose a counterstereotypical person for a given job in joint but not in

[2] In organizations, evaluators might well be confronted with various candidates of the same sex or the same performance levels where the basis of their decision is impossible to pin down. Also, performance likely is harder to measure in the field than in the lab and a candidate's gender may be more or less salient. And we expect (and hope) performance to trump gender bias in more extreme situations where large performance differences exist.

separate evaluation. We provide the formal proof for this result in Online Appendix A (available as supplemental material at http://dx.doi.org/10.1287/mnsc.2015.2186) and derive the following empirically testable hypothesis:

Hypotheses 1. *Gender gap in separate evaluation and performance gap in joint evaluation*: *Candidates are more likely to be selected for future performance based on their gender when evaluated separately and based on their past performance when evaluated jointly.*

To test whether choices of evaluators are indeed based on biased expectations of future performance rather than on a preference for men for stereotypically male and women for stereotypically female tasks (taste-based discrimination), we present current-round performance information and ask evaluators whether they want to be paid based on the presented candidate's performance in the current round or be allocated a random person from the pool. We focus on the condition in which we expect most discrimination to take place, separate evaluation, and the candidates we expect to be most discriminated against, the higher-performing candidates from stereotype-disadvantaged groups. If there is no taste-based discrimination, they should be equally likely to be chosen as the higher-performing candidates from the stereotype-advantaged group. We do not expect taste-based discrimination in our context.

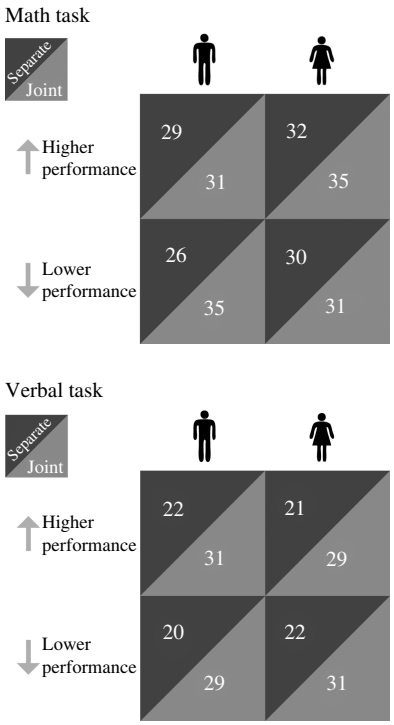
3. Experimental Design

Our experiment was conducted in the Harvard Decision Science Laboratory. We had 180 subjects participate as "candidates" in a math or a verbal task. Three hundred and twenty-eight subjects assumed the role of "evaluator," selecting one of the candidates for future performance in the task. All were American college students. We employed equal numbers of male and female evaluators. All our participants were identified by code numbers and remained anonymous to each other and to the experimenter.

We employed a $2 \times 2 \times 2 \times 2$ experimental main (between-subjects) design in which the key treatment condition of interest was the evaluation mode, joint or separate. In addition, we varied the individual candidates' past performance levels and their gender. Finally, candidates participated in either a math or a verbal task, with men being the stereotype-advantaged group in the math task and women the stereotype-advantaged group in the verbal task. Figure 1 provides an overview of our design and indicates the number of evaluators in each cell.

The experiment was programmed and conducted in two stages, using z-Tree software (Fischbacher 2007; sample instructions are included in Online Appendix B). In stage 1, candidates participated in either a verbal or a math task and were paid based on their performance. In stage 2, evaluators were informed of candidates' past performance and their gender and then were asked to select a candidate for future performance in the same task.

Figure 1 **Main Experimental Design: Number of Evaluators per Treatment Cell**



In stage 1, the candidates participating in the verbal task engaged in a word-search puzzle. They were given a list of 20 words and were instructed to mark as many of the words as they could find in three minutes in a matrix containing letters (Bohnet and Saidi 2012). Most letters appeared in random order, but some formed words, and participants could search horizontally, vertically, and diagonally. On average, the 100 candidates participating in this task found 10 words (standard deviation (SD) = 3.81) in the first round and 12 words (SD = 4.56) in the second round.

The math task involved correctly adding as many sets of five two-digit numbers as possible (Niederle and Vesterlund 2007, Niederle et al. 2013). On average, the 80 candidates who participated in this task solved 10 problems correctly (SD = 3.09) in the first round and 10 problems (SD = 3.35) in the second round. After completing their task, participants filled out a short demographic questionnaire (most importantly for us, indicating their gender). Candidates then were paid based on their performance and were not informed of stage 2 of the experiment.

In stage 2, evaluators in both the verbal and the math tasks were asked to choose a candidate, knowing that they would be paid based on that candidate's

round 2 performance. They could either choose the candidate presented to them or go back to the pool and accept a randomly selected person. They had the candidate's round 1 performance and his or her gender available as a basis for their decision, and were informed that, on average, evaluators in the pool had provided 10 correct answers (as was the case for both tasks). The candidates presented to the evaluators were either average or slightly below-average performers, having provided either 10 or 9 correct answers in the first round. We chose first-round performance scores at and below the mean performance level of the pool to make sure that our results were not driven exclusively by evaluators' risk (or loss) aversion.

In the separate-evaluation condition, evaluators were presented with either a male or a female candidate who was either an average or below-average performer. We randomly selected four candidates of the required gender–performance combinations from our pool, with identical filler characteristics: male–10, female–10, male–9, and female–9. In the joint-evaluation condition, evaluators were presented with a male and a female candidate simultaneously, drawing from the same candidates used in the separate-evaluation condition. The candidates differed on both gender and past performance, leading to two possible combinations: male–10/female–9 and male–9/female–10. We did not include same-sex pairs to create a dilemma for evaluators where the stereotype pointed them in one and the individual performance in the other direction. For example, in the math task, we expect that in a male–10/male–9 pair, male–10 would clearly dominate male–9, whereas in a male–9/female–10 pair, evaluators would be torn. We also did not include mixed-sex/same-performance-level pairs, although arguably, a male–10/female–10 pair would have provided us with interesting information on the power of stereotypes when performance was not an issue. Because all previous joint–separate studies and our model of information processing assume a conflict between the attributes, we did not include this condition. We acknowledge, however, that given that gender is the only variable that differs in this condition, with everything else being identical, gender is likely more salient than in separate evaluation and even than in our existing joint-evaluation condition with mixed-sex and mixed-performance-level pairs. Gender salience may either lead to an increase in stereotypical choices or to reactance and a decrease in stereotypical choices, thus truly making this an empirical question beyond the scope of this paper.

To make the gender attribute less salient without creating any additional demographic variation, we took advantage of the demographic similarity of our candidates and provided evaluators with truthful filler information on their candidates' characteristics. In addition to learning a person's sex and past performance, evaluators were also informed that he or she was a student, American, and from the greater Boston area. Despite these efforts, we cannot exclude the possibility that a person's sex was more salient than in an evaluation context outside of the lab. At the same time, presenting rather precise performance indicators compared to most performance measures in the field and using fewer possible criteria than typical in practice provides a conservative test for the impact of gender stereotypes. Heuristics likely play a more important role in situations where performance cannot be objectively measured (Stainback et al. 2010) and where multiple criteria for evaluation are available because they allow evaluators to focus on specific criteria only to justify their biased decisions (Norton et al. 2004). In our design, it seems difficult to justify neglecting individual performance information collected for the same task in the previous round.

After the experiment was completed, evaluators participated in an incentivized risk-attitude assessment task (Holt and Laury 2002) and completed a short questionnaire that collected basic demographic information. Evaluators were paid based on their decisions, i.e., either the chosen candidate's second-round performance or the randomly allocated candidate's second-round performance. They received $1 for every correct answer that the candidate provided. Evaluator earnings varied between $17.80 and $34.75, which included a $10 show-up fee, experimental earnings, and the payment for the risk-attitude assessment task.

In addition to our main experiment, we ran a small control experiment in which we informed evaluators about candidates' present rather than past performance with an additional 110 subjects. Specifically, evaluators were informed of a candidate's second-round performance and then had to decide whether or not to select this candidate and be paid based on the candidate's performance in the second round or go back to the pool and accept a randomly allocated candidate. This experiment was designed to distinguish belief-based from taste-based discrimination. Whereas in our main experiment both motives could lead to gender-biased decisions, in the control experiment, only taste-based discrimination was possible. We replicated the separate-evaluation conditions, in which we expected gender to be most prevalent, and used average performers, the group we were most concerned about being discriminated against. For separate evaluation, 23 evaluators participated in the male math condition, 27 in the female math condition, 33 in the male verbal condition, and 27 in the female

verbal condition. Other than giving evaluators information about candidates' present rather than past performance, the control study was run identically to our main experiment.

After participants had made their decisions, learned their outcomes, and given us their demographic information, they presented their code number and were given a sealed envelope containing their earnings.

4. Results

We first present candidates' performance in the two tasks, then examine what roles gender and individual performance played in the two different evaluation modes, and finally examine alternative explanations.

4.1. Candidates' Performance

We first examine whether or not having gender-stereotypical beliefs was accurate in our context. There were no significant gender differences in performance on either task, although directionally, the small differences we did observe accord with stereotypical assumptions.[3] Thus, ex post, statistical discrimination was unwarranted. In addition, information on group characteristics in our experiment was always combined with individual performance information. Conditional on this performance information, stereotypes were completely irrelevant for predicting future performance.

Table 1 reports the regression results of individual past (first-round) performance and gender on future (second-round) performance for both tasks. Columns (1) and (3) show that first-round performance was highly correlated with second-round performance, whereas the gender of the candidate was irrelevant for second-round performance in both tasks. In columns (2) and (4), we control for potential gender differences in the relationship between first- and second-round performance and include an interaction term between the two variables. For example, the strong first-round performance of a candidate from a stereotype-disadvantaged group could be due to luck and thus be less predictive of future performance than the same performance by a member of a stereotype-advantaged group (and vice versa for low performance). Columns (2) and (4) suggest that first-round performance was equally predictive of future performance for both genders.[4]

4.2. Evaluators' Choices

We start by aggregating across both evaluation modes and both performance levels. In the math task ($N = 183$), the likelihood that the stereotype-disadvantaged candidate, i.e., the woman, was chosen was 0.41, and the likelihood that the stereotype-advantaged man was chosen was 0.44. In the verbal task ($N = 145$), the likelihood that the stereotype-disadvantaged man was chosen across conditions was 0.38, whereas the likelihood that the stereotype-advantaged woman was chosen across conditions was 0.48. Thus, evaluators had a slight preference for men in math tasks and for women in verbal tasks, but these differences are not significant. The sex of the evaluator did not matter in the verbal task, but played a more important role in the math task, with female evaluators more likely to choose a given candidate than male evaluators (also confirmed in the regression analysis of Table 2).[5]

Looking at the two evaluation modes separately, we find that these differences were entirely driven by the stereotype-advantaged group being preferred in separate evaluation. Figure 2 shows our results for each evaluation mode, task, gender, and performance level. In separate evaluation, the gender gaps in the likelihood of being selected are apparent, with the stereotype-advantaged group being favored in both the math and the verbal tasks. In joint evaluation, a performance gap emerged, with the higher- performing candidates being more likely to be selected than lower performers. Performance does not seem to matter in separate evaluation in the math task (but, in addition to gender, is relevant in the verbal task), and gender does not seem to matter in either task in joint evaluation.

[3] In the math task, performance levels were as follows: round 1, men, mean = 10.63, SD = 3.41; women, mean = 10.33, SD = 2.78; $p = 0.67$; round 2, men, mean = 10.63, SD = 3.57; women, mean = 9.95, SD = 3.13; $p = 0.37$. In the verbal task, performance levels were as follows: round 1, men, mean = 9.82, SD = 4.05; women, mean = 10.98, SD = 3.49; $p = 0.13$; round 2, men, mean = 12.46, SD = 4.27; women, mean = 12.08, SD = 4.87; $p = 0.68$. There are no significant differences in variance across the genders, and the distributions in performance are not significantly different according to Kolmogorov–Smirnov tests.

[4] In addition to controlling for the gender-specific randomness of performance across rounds, we also examined the possibility of gender-specific learning across rounds. On average, and across both genders, little learning between rounds took place in the math task, whereas candidates in the verbal task performed significantly better in the second than in the first round, with men finding 2.64 and women 1.1 words more on average in the second than in the first round. However, the gender difference in learning was not significant, including in generalized least squares regressions on performance in both rounds. Similar to the above results, average performance across both rounds was similarly correlated with the first-round performance of men and women in both tasks.

[5] In the math task, the likelihood that a male candidate was chosen by male evaluators was 37%, and by female evaluators, 50% ($X^2(1) = 2.12$, $p = 0.15$). The likelihood that a female candidate was chosen by male evaluators was 26%, and by female evaluators, 51% ($X^2(1) = 7.57$, $p < 0.05$). In the verbal task, the likelihood that the male candidate was chosen by male evaluators was 39%, and by female evaluators, 38% ($X^2(1) = 0.03$, $p = 0.87$). The likelihood that a female candidate was chosen by male evaluators was 38%, and by female evaluators, 39% ($X^2(1) = 2.38$, $p = 0.12$).

Table 1 The Effect of Past Performance and Stereotypes on Future (Second-Round) Performance

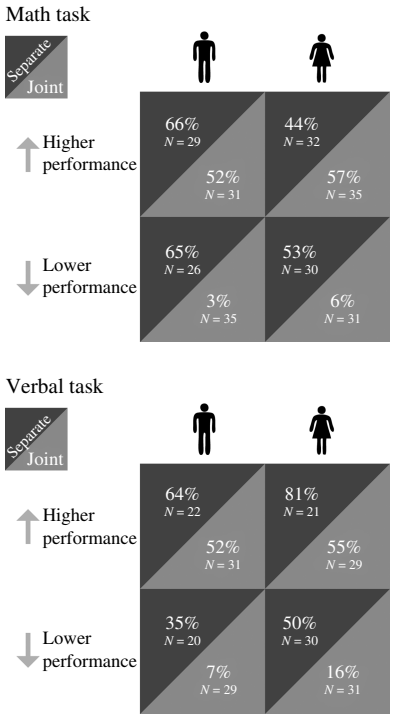
	Math Task		Verbal Task	
	(1)	(2)	(3)	(4)
First-round performance	0.849***	0.797***	0.708***	0.813**
	(0.08)	(0.15)	(0.10)	(0.15)
Male candidate	0.420	−0.481	1.201	3.118
	(0.46)	(1.91)	(0.77)	(2.42)
First-round performance × Male		0.086		−0.183
		(0.17)		(0.20)
Constant	1.189	1.723	4.311*	3.158
	(0.97)	(1.66)	(1.35)	(1.95)
N	80	80	100	100
R^2	0.6217	0.6232	0.3423	0.3478

Notes. Each specification is an ordinary least squares regression. Robust standard errors are in brackets. The dependent variable is the number of correctly added sequences in round 2 for the math task and the number of words found in round 2 for the word task.

*Significant at the 10% level; **significant at the 5% level; ***significant at the 1% level.

Aggregating across both tasks, the following gender and performance gaps can be observed, supporting our hypothesis: Across both tasks and when evaluated separately ($N = 202$), the likelihood that a candidate from the stereotype-advantaged group was chosen was 0.65, and the likelihood that someone from the stereotype-disadvantaged group was chosen was 0.49 ($X^2(1) = 5.45$, $p < 0.05$). In joint evaluation ($N = 126$), stereotypes did not matter at all: 32% of the evaluators chose a candidate from the advantaged group, and 30% chose a candidate from the disadvantaged group. (The remainder of the evaluators, 38%, decided to go back to the pool.)[6]

Figure 2 Percentage of Candidates Selected in Separate and Joint Evaluation



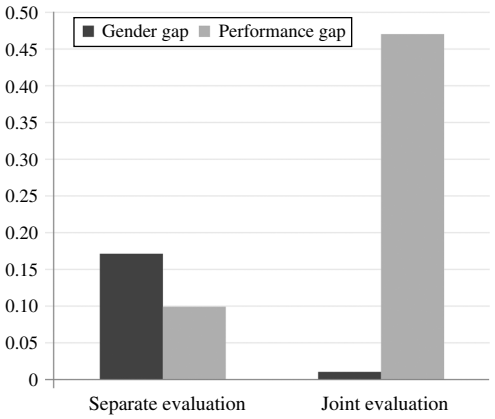
Higher-performing candidates were more likely to be chosen in joint but not in separate evaluation. Across both tasks and when evaluated jointly, the likelihood that a higher-performing candidate was chosen was 0.54, and the likelihood that a lower-performing candidate was chosen was 0.08 ($X^2(1) = 43.13$, $p < 0.01$). In separate evaluation, performance differences hardly mattered: 62% of the evaluators chose a higher-performing candidate, and 52% chose a lower-performing candidate ($X^2(1) = 0.37$, $p = 0.58$).

Figure 3 shows the gender and performance gaps graphically. In separate evaluation, evaluators were 16 percentage points more likely to choose a candidate from the stereotype-advantaged rather than from the stereotype-disadvantaged group ($p < 0.05$), and in joint evaluation, evaluators were 46 percentage points more likely to choose the higher- rather than the lower-performing candidate ($p < 0.01$). The gender gap completely disappears in joint evaluation.

A regression analysis in Table 2 controlling for the relevant covariates confirms these insights. Gender only affected decisions in separate evaluation (column (1)), and performance only affected decisions in joint evaluation (column (2)). Members of the

[6] Generally, the likelihood that a given candidate was chosen was higher with separate than with joint evaluation. We attribute this to the number of options available in separate versus joint evaluation. If evaluators had chosen randomly, a given candidate would have been chosen by 50% of the evaluators in separate evaluation and by only 33% in joint evaluation. Thus, compared to random selection, the stereotype-advantaged candidates were significantly more likely to be chosen than what a random process would have predicted in separate ($X^2(1) = 9.18$, $p < 0.01$) but not in joint evaluation ($X^2(1) = 0.16$, $p = 0.69$). The likelihood that stereotype-disadvantaged candidates were chosen did not differ from chance in either mechanism (for separate, $X^2(1) = 0.04$, $p = 0.8445$; for joint, $X^2(1) = 0.59$, $p = 0.4424$).

Figure 3 Gender and Performance Gaps in Separate and Joint Evaluation Across Both Tasks



stereotype-advantaged group were significantly more likely to be chosen in the separate-evaluation mode, but not in the joint-evaluation mode. In contrast, higher-performing candidates were only favored in joint but not in separate evaluation. Columns (3) and (4) include controls for the risk attitudes and the gender of the evaluator. Male and more risk-tolerant evaluators were less likely than female and more risk-averse evaluators to select a given candidate than to go for the random option. Both of these results accord with intuition.

4.3. Alternative Explanation: Taste-Based Discrimination

We did not find any evidence for taste-based discrimination in our control experiment. Across the two tasks, the likelihood that a member of the stereotype-advantaged group was chosen was 0.46, and the likelihood that a member of the stereotype-disadvantaged group was chosen was 0.48. Specifically, instead of going back to the pool, in the math task ($N = 50$), 35% of the evaluators chose the male candidate and 41% chose the female candidate; in the verbal task ($N = 60$), 55% chose the male and 56% the female candidate. None of these differences are significant; women and men were just as likely to be chosen for both tasks.

5. Conclusions

This paper examines whether an "evaluation nudge," namely, evaluating candidates jointly rather than separately, can overcome gender-biased assessments of job candidates that favor men for male-typed tasks and women for female-typed tasks, even if gender is not predictive of future performance and more reliable individual performance measures are available. We employ a setting where there is a conflict between the individual performance information favoring one of the candidates and the group stereotype favoring the other candidate. Our results apply to these kinds of settings. We find that when evaluators are tasked with choosing a candidate for future performance in a math or a verbal task, a joint-evaluation mode helps them focus on individual performance, irrespective of candidates' gender and evaluator bias: evaluators were significantly more likely to choose the higher-rather than the lower-performing candidate in this mode. In contrast, in separate evaluation, evaluators were heavily influenced by a candidate's gender, even though gender was not predictive of future performance and individual past performance was: they

Table 2 The Effect of Past Performance and Stereotypes on Candidate Selection, Marginal Effects at Mean

	(1) Separate	(2) Joint	(3) Separate plus controls	(4) Joint plus controls
First-round performance	0.099	0.462**	0.117	0.472***
	(0.07)	(0.06)	(0.07)	(0.06)
Stereotype advantage	0.165**	0.009	0.164**	0.008
	(0.07)	(0.07)	(0.07)	(0.07)
Math	−0.009	−0.043	0.018	−0.040
	(0.07)	(0.05)	(0.07)	(0.05)
Risk tolerance			−0.059***	−0.002
			(0.02)	(0.01)
Male evaluator			−0.099	−0.199***
			(0.07)	(0.05)
N	202	252	202	252
Pseudo-R^2	0.0271	0.2201	0.0664	0.2579

Notes. Each specification is a Probit regression, with marginal effects reported in percentage points. The dependent variable in the separate treatment is the selection of a given candidate. In the joint treatment, we score two outcomes for each individual, namely, whether the employer selected the higher (1) or the lower (2) performer. This implies a total of 252 outcomes. Robust standard errors are in brackets and adjusted for clustering at the employer level. Risk tolerance is measured by the number of risky choices made in a lottery identical to that in Holt and Laury (2002).

**Significant at the 5% level; ***significant at the 1% level.

were significantly more likely to choose men for the math task and women for the verbal task.

In our setting, discrimination was based on biased beliefs about future performance rather than taste. In a control treatment, we could exclude taste-based discrimination. Thus, although there might well be taste-based discrimination in organizations, our findings cannot speak to this question. Joint evaluation may affect choices by providing additional data that evaluators can use to update their stereotypical beliefs about a group to which a candidate belongs. By definition, an evaluator has more data points available in a joint than in a separate evaluation. If these data points provide counterstereotypical information, they may shift an evaluator's beliefs about the group enough to make him or her choose counterstereotypically.

Our work is in line with extensive work in behavioral decision making suggesting that people may evaluate products differently in joint and in separate evaluation. This research attributed differences in decision outcomes to a switch in judgment modes from a more intuitive mode based on heuristics in separate evaluation to a more reasoned mode when comparing alternatives in joint evaluation (Bazerman and Moore 2013, Paharia et al. 2009, Gino et al. 2011).

Our findings have implications for organizations that want to decrease the likelihood that hiring, promotion, and job-assignment decisions will be based on irrelevant criteria triggered by stereotypes. Joint evaluation is common for many hiring decisions but rare for job assignments and for promotion decisions. Organizations concerned about discrimination in this later phase might want to review how, for example, career-relevant jobs are assigned or how promotion decisions are made. According to the Corporate Gender Gap Report 2010 (Zahidi and Ibarra 2010), in most countries, fewer than 10% of career-relevant jobs are held by women. In many academic fields, including economics, controlling for performance, women are less likely to be granted tenure than men (Ginther and Kahn 2004, 2009).

Organizations can move from separate-evaluation to joint-evaluation procedures to promote more accurate decision making and maximize performance. In addition to being a profit-maximizing decision procedure, joint evaluation is also a fair mechanism, because it encourages judgments based on people's performance rather than their demographic characteristics. Companies concerned about discrimination might choose to review how job candidates are evaluated, how jobs are assigned, and how promotion decisions are made. Our work suggests that organizations can nudge evaluators toward taking individual performance information rather than gender stereotypes into account.

Supplemental Material

Supplemental material to this paper is available at http://dx.doi.org/10.1287/mnsc.2015.2186.

Acknowledgments

The authors thank Pinar Dogan, Chris Muris, Farzad Saidi, Katie Shonk, and Richard Zeckhauser, as well as the participants of seminars at Harvard University, Tilburg University, the University of California, Berkeley, the MOVE conference in Barcelona, and the Maastricht Behavioral and Experimental Economics Symposium in Maastricht for many helpful comments. The authors also thank Sara Steinmetz for her research assistance. Financial support from the Women and Public Policy Program at Harvard Kennedy School and the Women's Economic Opportunity Initiative of ExxonMobil are gratefully acknowledged. I. Bohnet thanks the University of Sydney's U.S. Studies Center for their hospitality during her sabbatical.

References

Bagues M, Esteve-Volart B (2010) Can gender parity break the glass ceiling? Evidence from a repeated randomized experiment. *Rev. Econom. Stud.* 77(4):1301–1328.

Banaji MR, Greenwald AG (1995) Implicit gender stereotyping in judgments of fame. *J. Personality Soc. Psych.* 68(2):181–198.

Bazerman MH, Moore DH (2013) *Judgment in Managerial Decision Making*, 8th ed. (John Wiley & Sons, Hoboken, NJ).

Bazerman MH, Loewenstein GF, White SB (1992) Reversals of preference in allocation decisions: Judging an alternative versus choosing among alternatives. *Admin. Sci. Quart.* 37(2):220–240.

Bazerman MH, Tenbrunsel AE, Wade-Benzoni K (1998) Negotiating with yourself and losing: Making decisions with competing internal preferences. *Acad. Management Rev.* 23(2):225–241.

Beaman L, Duflo E, Pande R, Topalova P (2012) Female leadership raises aspirations and educational attainment for girls: A policy experiment in India. *Science* 335(6068):582–586.

Beaman L, Chattopadhyay R, Duflo E, Pande R, Topalova P (2009) Powerful women: Does exposure reduce bias? *Quart. J. Econom.* 124(4):1497–1540.

Becker GS (1978) *The Economic Approach to Human Behavior* (University of Chicago Press, Chicago).

Bertrand M, Chugh D, Mullainathan S (2005) Implicit discrimination. *Amer. Econom. Rev.* 95(2):94–98.

Bohnet I, Saidi F (2012) Informational differences and performance: Experimental evidence. Working paper, Harvard University, Cambridge MA.

Dasgupta N, Asgari S (2004) Seeing is believing: Exposure to counterstereotypic women leaders and its effect on the malleability of automatic gender stereotyping. *J. Experiment. Psych.* 40: 642–658.

Dobbin F, Kalev A, Kelly B (2007) Diversity management in corporate America. *Contexts* 6(4):21–28.

Fischbacher U (2007) z-Tree: Zurich toolbox for ready-made economic experiments. *Experiment. Econom.* 10:171–178.

Gino F, Schweitzer ME, Mead NL, Ariely D (2011) Unable to resist temptation: How self-control depletion promotes unethical behavior. *Organ. Behav. Human Decision Processes* 115(2): 191–203.

Ginther DK, Kahn S (2004) Women in economics: Moving up or falling off the academic career ladder? *J. Econom. Perspect.* 18(3):193–214.

Ginther DK, Kahn S (2009) Does science promote women? Evidence from academia 1973–2001. Freeman R-B, Goroff D-G, eds.

Science and Engineering Careers in the United States: An Analysis of Markets and Employment (University of Chicago Press, Chicago).

Goldin C, Rouse C (2000) Orchestrating impartiality: The impact of blind auditions on female musicians. *Amer. Econom. Rev.* 90(4):715–741.

Guiso L, Monte F, Sapienza P, Zingales L (2008) Culture, gender, and math. *Science* 320(5880):1164–1165.

Holt CA, Laury SK (2002) Risk aversion and incentive effects. *Amer. Econom. Rev.* 92:1644–1655.

Hsee CK, Blount S, Loewenstein GF, Bazerman MH (1999) Preference reversals between joint and separate evaluations of options: A review and theoretical analysis. *Psych. Bull.* 125(5):576–590.

Kahneman D (2011) *Decisions, Fast and Slow* (Farrar, Straus and Giroux, New York).

Kahneman D, Miller D (1986) Norm theory: Comparing reality to its alternatives. *Psych. Rev.* 93(2):136–153.

Kahneman D, Ritov I, Jacowitz KE, Grant P (1993) Stated willingness to pay for public goods: A psychological perspective. *Psych. Sci.* 4(5):310–315.

Matsa DA, Miller AR (2013) A female style in corporate leadership? Evidence from quotas. *Amer. Econom. J.: Appl. Econom.* 5(3): 136–169.

Moss-Racusin CA, Dovidio JF, Brescoll VL, Graham MJ, Handelsman J (2012) Science faculty's subtle gender biases favor male students. *Proc. Natl. Acad. Sci USA* 109(41): 16474–16479.

Neumark D, Bank RJ, Van Nort KD (1996) Sex discrimination in restaurant hiring: An audit study. *Quart. J. Econom.* 113(3): 915–941.

Niederle M, Vesterlund L (2007) Do women shy away from competition? Do men compete too much? *Quart. J. Econom.* 122(3): 1067–1101.

Niederle M, Segal C, Vesterlund L (2013) How costly is diversity? Affirmative action in light of gender differences in competitiveness. *Management Sci.* 59(1):1–16.

Norton MI, Vandello JA, Darley JM (2004) Casuistry and social category bias. *J. Personality Soc. Psych.* 87(6):817–831.

Nosek B, Banaji M, Greenwald AG (2002) Math = male, me = female, therefore math ≠ me. *J. Personality Soc. Psych.* 83(1): 44–59.

Nowlis SM, Simonson I (1997) Attribute-task compatibility as a determinant of consumer preference reversals. *J. Marketing Res.* 34(2):205–218.

Oyer P, Schaefer S (2011) Personnel economics: Hiring and incentives. Card D, Ashenfelter O, eds. *Handbook of Labor Economics* Vol. 4B (Elsevier, San Diego, CA), 1769–1823.

Paharia N, Kassam KS, Greene, JD, Bazerman MH (2009) Dirty work, clean hands: The moral psychology of indirect agency. *Organ. Behav. Human Decision Processes* 109(2): 134–141.

Penn S, Berland Associates, Inc. (2012) The Capstone Project. Accessed July 16, 2012, http://bit.ly/1UHuiRz.

Perie M, Moran R, Lutkus AD (2005) NAEP 2004 trends in academic progress: Three decades of student performance in reading and mathematics. National Center for Education Statistics, Office of Educational Research and Improvement, U.S. Department of Education, Washington, DC.

Plante I, Theoret M, Favreau OE (2009) Student gender stereotypes: Contrasting the perceived maleness and femaleness of mathematics and language. *Educational Psych.* 29(4): 385–405.

Price CR (2012) Gender, competition and managerial decisions. *Management Sci.* 58(1):114–122.

Riach PA, Rich J (2002) Field experiments of discrimination in the market place. *Econom. J.* 112:480–518.

Stainback K, Tomaskovic-Devey D, Skaggs S (2010) Organizational approaches to inequality: Inertia, relative power, and environments. *Annual Rev. Sociol.* 36:225–247.

Stanovich KE, West RF (2000) Individual differences in reasoning: Implications for the rationality debate? *Behavioral Brain Sci.* 23:645–665.

Stigler GJ (1961) The economics of information. *J. Political Econom.* 69(3):213–225.

Thaler RH, Sunstein CR (2008) *Nudge: Improving Decisions About Health, Wealth, and Happiness* (Yale University Press, New Haven, CT).

van Ommeren J, Russo G (2013) Firm recruitment behaviour: Sequential or non-sequential search? *Oxford Bull. Econom. Statist.* 76(3):432–455.

Zahidi S, Ibarra H (2010) The corporate gender gap report 2010. Report, World Economic Forum, Geneva, Switzerland.