

Implicit Discrimination in Hiring - real world evidence^{*}

by

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Abstract: This is the first study providing empirical support for a *new* form of discrimination, implicit discrimination, taking place in the labor market. A field experiment on ethnic discrimination in hiring is combined with a measure of employers' implicit performance stereotype toward Arab-Muslim men relative to Swedish men using the implicit association test (IAT).

We find a strong and statistically significant ethnic difference in the correlation between the implicit performance stereotypes and the callback rate for an interview. This suggests that implicit cognitive processes may exert a significant impact on employers' hiring decisions, offering new insights into labor market discrimination.

JEL classification: J64, J71

Key words: Implicit stereotypes, discrimination, exit from unemployment

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1. Introduction

Increasing attention has been given in economics to factors previously expected to be unrelated to productivity, such as beauty, and to non-cognitive skills, such as self-discipline, and how employers value these attributes.¹ Following this empirical line of research the search for *theories* explaining why employers attach prices to such characteristics have increased. In particular, explanations taken from the field of social psychology have gained momentum in economics.

Social psychologists (and economists) have long assumed that social behavior is under our conscious control and therefore can be accessed through explicit introspective evaluation. However, considerable evidence now supports the view that a person's attitudes and stereotypes in fact often operate in an implicit/automatic mode (see Nosek et al., 2007). Recently, it has been pointed out that such unconscious attitudes could possibly explain discrimination in the labor market, challenging the well-known concepts of "taste-based" and "statistical" discrimination.² In the article "Implicit Discrimination" the authors suggest that the unconscious mental associations or implicit attitudes of individuals, could coexist with explicit attitudes and underlie discriminatory behavior taking place in the labor market, and especially so in the hiring process (see Bertrand et al, 2005).³

The extent to which implicit discriminatory attitudes (or stereotypes) are in fact related to discriminatory behavior in the hiring situation *as such* has so far only been studied in laboratory settings. For instance, Ziegert and Hanges (2005), found that an implicit racist attitude, which interacted with a climate for racial bias, predicts discriminatory behavior, while an explicit counterpart does not. Thus, the present research is to our knowledge the first to study the predictive power of implicit stereotypes in a hiring situation taking place in a real world setting. In doing so we combine two research projects, one in economics and the other in social psychology. More specifically

¹ See e.g., Hamermesh and Biddle (1994) and Heckman and Rubinstein (2001) for research on the importance of beauty and non-cognitive skills in the labor market, respectively.

² See Altonij and Blank (1999) for an overview of taste-based and statistical discrimination theories.

³ In a recent study, Price and Wolfers (2007) find that more personal fouls are awarded against players when they are officiated by an opposite-race officiating crew than when officiated by an own-race refereeing crew. The nature of the penalty situation suggests that implicit attitudes might explain their results. However, they do not test for the referees' implicit attitudes.

the present research examines whether the extent to which employers possess more negative implicit performance stereotypes toward Arab-Muslim men relative to Swedish men predicts discrimination in the context of deciding which job candidates to call for an interview. Moreover, it examines whether implicit measures serve as better predictors than explicit measures.

The development of the implicit association test (henceforth IAT) in the 1990s has made it possible to measure an individual's implicit attitudes or stereotypes; see Greenwald et al (1998).⁴ The method was developed in order to capture people's automatic/implicit associations toward various target groups and concepts. An advantage of the method is that it is especially suitable for the study of socially sensitive topics (e.g., racial prejudice) that normally would not elicit honest responses among the participants. An increasing interest among researchers concerns its applicability with respect to predicting behaviors in various contexts (Lane et al., 2007; Poehlman et al., 2005). In fact, the IAT has been found to predict criterion measures ranging from, for instance, interracial friendliness and impression formation to anxious and shy behaviors, consumer choices, and voting. As regards implicit prejudice toward and stereotyping of Blacks, this has been found to predict the degree to which people make negative judgments of ambiguous behaviors performed by a Black target (Rudman & Lee, 2002). Furthermore, more implicit negative attitudes toward Blacks (as compared to Whites) successfully predicted more negative nonverbal behaviors, such as less speaking time and less smiling, during an interaction with a Black researcher relative to a White researcher (McConnell & Leibold, 2001). More related to the present research, Green et al. (2006) reported that implicit anti-Black attitudes and stereotypes predicted physicians' medical decisions in that they were more reluctant to prescribe medications to African-American patients diagnosed with the same condition as White American patients. However, although the predictive utility of the IAT has received increasing attention in the social cognitive domain, nothing is known about its applicability in a real-life hiring situation.

⁴ A recruiter's implicit attitude and implicit stereotype are measured using different IAT tests. However, existing evidence indicates that the two measures are highly correlated. While our study measures recruiters' implicit stereotypes, it might also, to some extent, pick up their implicit attitudes.

For this purpose, an IAT was first developed that measures implicit work performance stereotypes toward Arab-Muslim men relative to Swedish men. This was done in Agerström et al. (2007) on a sample of professional recruiters. These IAT results were then used to predict decisions made in the hiring process by the same sample of employers.

There were two main reasons for choosing the IAT as a method. Firstly, research on social cognition shows that people are often unaware of how they view and feel about various social target groups (Greenwald et al., 1998). That explicit measures may be poor indicators of actual discrimination is supported by Poehlman et al. (2005) who report that IAT measures out-predict explicit measures in the domain of stereotyping and prejudice, building a strong case for the use of implicit measures in conjunction with this type of research question. Secondly, questions regarding ethnicity and work performance were considered to be a socially sensitive matter, and it could be assumed that a substantial number of employers would not reveal their true perceptions of Arab-Muslims if explicit questionnaires were used.

It is found that employers' job interview callback rates for applicants with Arab-Muslim sounding male names are only weakly correlated with their explicit attitudes/performance stereotypes, but are negatively correlated in a statistically significant way with their implicit performance stereotypes.

The remainder of this article is outlined as follows. Section 2 presents the economic model of the probability of receiving a callback when recruiters have implicit and explicit attitudes and stereotypes. Section 3 presents the correspondence test and its results in more detail, while section 4 presents the implicit association test. Section 5 presents results where the main question concerns the extent to which the job interview callback rate can be predicted from the implicit performance stereotypes (the IAT score), explicit attitudes and stereotypes, respectively. The final section concludes the paper.

2. A model of implicit and explicit discrimination in hiring

Discrimination in the hiring process could possibly be a result of both conscious, as well as unconscious, negative stereotyping of the minority applicant group. Reading the Arab-Muslim name on a job application activates the recruiter's unconscious generalized

beliefs about that minority group. Given that these generalized beliefs toward the group in question (stereotypes) are negative, the recruiter may attach an implicit negative value to this job application, which results in the Arab-Muslim applicant having a lower probability of being called for an interview compared to a native Swedish applicant. Bertrand et al (2005) argue, based on results taken from social psychology, that implicit stereotypes/attitudes may be especially important determinants in the hiring situation when the employer is inattentive to the task, experiences time pressure and ambiguity, something that may characterize the hiring process in many instances. This study attempts to determine which form of stereotype, explicit or implicit, that is the most important determinant in the hiring situation of ethnic minorities.

Assume that the probability of a recruiter to giving a callback for a job interview to an application with a certain ethnicity attached to it has the following relationship for recruiter i receiving an application from ethnic group j :

$$(1) \quad \Pr(\text{Callback} = 1)_{ij} = X\beta_j + \delta_j; j=\text{Arab-Muslim or native Swede.}$$

where X is a vector of characteristics in the job application, which by construction of the experiment is the same for both ethnic groups, β_j is the vector of prices that recruiters attach to those characteristics for ethnic group j , while δ_j is an omnibus measure of the attitudes/stereotypes, explicit as well as implicit, towards group j .

In economics several forms of ethnic discrimination theories have been modelled (see the survey by Altonji and Blank, 1999) to explain δ_j . For our purposes we focus on two of these, preference based discrimination and statistical discrimination, both of which can be regarded as explicit forms of discrimination.⁵ As mentioned in the introduction the aim of this study is to test whether implicit forms of stereotypes are also important in the hiring situation. Hence, we can rewrite Equation 1 as:

⁵ For simplicity, even if both preference and statistical discrimination theories come in several forms we model each of them as a single measure. See Heckman (1998) for a discussion of the identification of the role of attitudes and stereotypes in the hiring situation using the situation testing methodology.

$$(2) \quad \Pr(\text{Callback} = 1)_{ij} = X\beta_j + \delta_j^{EP} + \delta_j^{ES} + \delta_j^I$$

where the three *discrimination* terms express the recruiter's explicit preferences, his/her explicit stereotypes, and his/her implicit stereotypes towards group j , respectively.

3. Correspondence testing – ethnic discrimination in hiring

Carlsson and Rooth (2007) tested for ethnic discrimination in hiring using the correspondence testing method (see Riach and Rich, 2002). When “correspondence testing” in conjunction with ethnicity, the researcher typically sends two job applications containing applicants with identical skills to advertised job openings with the only difference being group membership, which is signalled by the name of the applicant – one randomly assigned a Swedish name and the other an Arab-Muslim name. The extent of ethnic discrimination is quantified by the relative callback rates for interview between the two groups.

For the present study, the field experimental data from Carlsson & Rooth (2007) served as the behavioral criterion variable on which the employers' IAT scores were regressed. The behavioral data were collected between May 2005 and February 2006 by sending applications to job openings pertaining to twelve different occupations in the Stockholm and Gothenburg labor market areas. The selected occupations were both skilled and semi/unskilled and included a relatively high as well as a low ratio of immigrants. The selected occupations were computer professionals, business sales assistants, four categories of teachers (preschool, math/science and language in upper level compulsory school, and upper secondary school), accountants, nurses, construction workers, restaurant workers, shop sales assistants and motor-vehicle drivers.

The reason for focusing on the Arab-Muslim ethnic minority is that Swedish studies indicate that discrimination is worst towards individuals with such an ethnic background (see Lange, 2000, and Rooth and Ekberg, 2003). Since ethnicity is only signalled by means of changing the name on the application, the choice of names used in the experiment is crucial. Fortunately, there is a clear distinction between typical Swedish male names and Arab-Muslim male names. The most frequent Swedish and Arab-Muslim

male names occurring in Sweden were selected from Statistics Swedens' name register and randomly assigned to resumés.

The applications used in the experiment had to be realistic and yet not refer to any real persons. Thus, applicants had identical human capital within occupations and were of the same age (varied between 25-30 years old across occupations), had the same amount work experience (varied between two to four years across occupations), and had obtained their education in the same type of school, but at different Swedish locations. Through the educational information it was signalled that the Arab-Muslim named applicant was born in Sweden. Further, the application consisted of a quite general biography on the first page and a detailed curriculum vitae, including education and work experience, on the second page.⁶

In total Carlsson and Rooth (2007) replied to 1,552 job ads posted at the home-page of the Swedish Employment Agency, see Table A1 in appendix. In 1,030 cases, neither applicant was invited and in the remaining 522 cases at least one of the two applicants was invited for interview. Both applicants were invited in 239 cases. The Swedish-named applicant was invited in 217 cases whereas the Arab-Muslim named applicant was only invited in 66 cases. This shows that the callback rate of applications with a Swedish-sounding male name was fifty percent, or nine percentage points, higher than for applicants with an Arab-Muslim sounding name.

3.1 Participants in the IAT experiment

The IAT data was collected, among the recruiters in the experiment discussed in the previous section, between August 2006 and January 2007. Hence, there is a large time delay between the employers' completion of the IAT test and their hiring process decision. However, Lane et al (2007) show that an individual's IAT scores are strongly correlated over time ($r > 0.5$).

The first step was to locate the firm's recruiter and, more exactly, the person who was responsible for selecting candidates to invite for an interview for exactly the job we

⁶ It should be pointed out that written job applications being sent by e-mail are very common in Sweden and we have used job application exemplars available at the web page of the Swedish Employment Agency as templates.

applied for in the field experiment. This was achieved by calling the firm at the number included in the job ad. This was an extremely laborious task, reaching approximately only four recruiters a day. When reached they were informed that we were interested in this specific job vacancy and that we had followed its progress. However, we did not reveal that we had sent fictitious applications. We then informed them that our project intended to study the recruitment process in general and that their participation included first taking a “sorting test” on the computer and then answering a short, also computer-based, questionnaire, without revealing that we intended to measure their attitudes towards/stereotypes of Arab-Muslim minority males.

In an attempt to increase participation and to ensure their focus on the task employers/recruiters were offered a participation reward of 300 SEK (approximately 33 euros or 38 dollars). They were then told that the reward for participation implies a total devotion to our study for approximately a total of ten minutes during which they were not allowed to be disturbed. They were allowed to choose whether to participate on a computer at work or at home. Still, recruiters were found to be a very busy group and were hard to convince to participate in the study. A total of 729 employers/recruiters were invited to participate, see Table 1.⁷ Fifty-three percent, or 392 employers, were not located, stated that the recruiting decision was not his/hers or not his/hers exclusively or were simply not interested in participating. Hence, 337 employers agreed to participate. However, in the end only 193 employers, or twenty-six percent, finally completed the IAT and the questionnaire. If focusing on each group/category (rows 1 through 4) separately we find that it is a similar share, around 30 percent, of the firms that have participated in taking the IAT, except for the category *neither invited* for which only 19 percent participated.⁸ Also, since a much smaller fraction of the group *neither invited* were invited to participate in the study we need to use weights in the analysis of the data. These weights are calculated according to the within group occupational distribution of

⁷ Attempts were made to contact all employers in the first three categories (*only Swedish applicant*, *only Arab-Muslim applicant* and *both*), while a random sample of 294 employers were selected for contacting in the last group (*neither invited*).

⁸ This could be expected since this group also was found to be especially difficult to get in contact with.

the field experiment and therefore also correct for participation differences across groups and occupations.⁹

*** Table 1 ***

3.2 Selective participation

Since three out of four sampled recruiters never participated in taking the IAT it is possible that there was selective participation, which could bias the estimated correlation between the implicit/explicit measures and the callback rate. However, three facts, other than that participation is similar in the experimental subgroups, indicate that selectivity is not an issue. Non-participation seems to be unrelated to the employer/recruiter knowing what we intended to study. We failed to locate or reach approximately twenty-five percent of the recruiters (we stopped trying to contact them if not reached within one month's time) and another twenty-five percent directly stated, without us having informed them about the project, that they did not have time to participate. Hence, these groups were probably unaware of our purpose, but could of course still be selective. What about those who agreed to participate but never did? It is clear that no one started taking the IAT (which is needed in order to realize what the test is about) and then decided to withdraw. Instead, almost half of the recruiters not participating stated that they experienced problems with starting the program for firm Internet security reasons.¹⁰ Hence, since they did not start taking the IAT, they were also unaware of our intentions.

Even so, participation can be selective. However, the IAT scores of the recruiters, both as regards the mean and variance, are almost identical to the ones found for a student sample with zero attrition, see Agerström et al (2007). Even more convincing, comparing the distribution of observable characteristics of participants and non-participants shows they are very similar, see Table A2 in appendix. The ethnic difference in callbacks for interview is of about the same magnitude in the participants and non-participants sample

⁹ For example, for the nursing occupation we received “neither invited” from 87 employers to whom applications were sent and only 5 of these eventually completed the IAT. The weight was then calculated as 87/5. Such weights were calculated for all occupations within each group/category. The overall results do not change when using a weighting scheme based only on the group distribution.

¹⁰ Many companies have Internet firewalls that do not allow for plug-ins as required by the web-based IAT.

and so is the occupational distribution. In a regression of a participation dummy on these characteristics, only the estimates for the occupations “motor vehicle drivers” and “teachers at upper secondary school” and the callback rate for native Swedes are statistically significant (but not the ethnicity difference).

3.3 Explicit attitudes and stereotypes

The explicit measures used in the experiment were developed based on the measures used in Nosek et al. (2005), and included the *feeling thermometer*, the *hiring preferences* task, and the *performance stereotype rating* task. The two former are expected to capture recruiters’ explicit attitudes, while the latter their explicit performance stereotype, of Arab-Muslim men compared to Swedish men. These questions appeared on the screen after the IAT had been completed.

The *feeling thermometer* asked the participants to rate their positive or negative feelings on a ten-point scale (1 = very negative feelings, 10 = very positive feelings) toward Arab-Muslim men and Swedish men, and then a difference between the two scales was calculated.

The *Hiring preference rating* asked the participants to choose which groups they prefer when hiring people. Rather than being directly related to the IAT, hiring preferences were supposed to measure actual explicit preferences in hiring, which could be related to discrimination. For the ethnicity studies, the employers had to choose one of five alternatives (e.g. “When hiring staff I strongly prefer Swedish men to Arab-Muslim men”) ranging from strong preference for Arab-Muslim relative to Swedish men (coded as -2), to a strong preference for Swedish relative to Arab-Muslim men (coded as +2), with a neutral intermediate alternative (coded as 0).

The *performance stereotype rating* task was constructed in the same manner as the *hiring preference* task, thus consisting of five alternatives (e.g. “Swedish men perform much better at work than Arab-Muslim men”) with a neutral intermediate, but this time the participants were instructed to indicate how well Arab-Muslim and Swedish men perform at work compared with each other.

Table 2 shows that half of the employers explicitly state that they prefer hiring (54%), or have more positive feelings towards (45%), a majority Swedish male over an Arab-

Muslim minority male, while a clear majority (77 percent) state that there are no productivity differences between the two. Hence, these answers indicate the existence of quite strong explicit negative attitudes toward the Arabic minority, but less of a negative explicit productivity stereotype toward the same group. Since the share reporting negative attitudes toward the Arab-Muslim minority is quite high perhaps the measurement error in this variable is less of an issue when interpreting the empirical results in section 5.

*** Table 2 ***

4. The IAT and implicit stereotypes

The Implicit Association Test (IAT) has been developed within social psychology to measure implicit attitudes and stereotypes towards various groups. It is a computer based test designed to specifically measure individual differences in relative associations between two concepts. It was first introduced by Greenwald et al. (1998) and has since become a widely used measure, particularly in socially sensitive areas such as attitudes and stereotypes toward social groups.¹¹

The specific IAT test used in the present research was the Arab-Muslim performance stereotype IAT found in Agerström et al. (2007). In this computer based version participants first classify/sort, as fast as possible, Swedish and Arab-Muslim sounding names appearing in the middle of the screen according to the (target) category to which they belong, “Arab-Muslim men” or “Swedish men”. In the next part of the IAT the participants now instead classify words that are found being associated with high and low work productivity. These include words such as “lazy”, “slow”, “efficient” and “hard-working”. In the third step names and high/low work productivity words appear at random. The intuitive idea is that it will be easier, and hence, go faster, to classify names and words that are compatible than those that are incompatible. The IAT measures every latency in response to the presented stimulus. For example, when two categories are “easily” associated in terms of their nominal features (Arab-Muslim names + low work productivity and Swedish names + high work productivity) the participant classifies the

¹¹ See <http://implicit.harvard.edu> for a test version of the IAT.

stimuli much faster and with fewer errors than when they are not associated. A total of sixty stimuli are presented for the compatible and incompatible part, respectively. The difference in response latencies, or rather a recalculation of this difference gives the association strength, e.g. the IAT effect/score, between the compatible and incompatible parts.

Greenwald et al (2003, 2006) have given bounds for the power of the IAT score with respect to negative implicit stereotypes towards the Arab-Muslim minority, where below 0.15 is non-existent, 0.15-0.35 slight, 0.35-0.60 moderate, and an IAT-score over 0.60 is strong.¹² The IAT scores of the 193 recruiters participating in this study show that a very clear majority associate words signalling negative productivity, such as “lazy” and “slow”, with belonging to the Arab-Muslim minority. In fact, as many as seventy-seven percent have an IAT score above 0.15 (see Figure 1).

5. Results

The empirical analysis starts by investigating the correlation between the implicit stereotype measure, i.e. the standardised IAT score, and the explicit attitude and stereotype measures, measuring relative preferences for and expected work productivity of majority Swedes and the Arab-Muslim minority, see Table 3. We find a slight positive and statistically significant correlation, ranging between 0.15 and 0.31, between the IAT score and the explicit statements. The correlations among the explicit measures are around 0.3 for the *feeling thermometer* and the *hiring preference* and for the *hiring preference* and the *performance stereotype* but nonexistent for the *performance stereotype* and the *feeling thermometer*. Hence, these correlations indicate that the Arab-Muslim performance stereotype IAT measures something that is related to, but far from the same as, the explicit measures.¹³ Since the *feeling thermometer* and the *hiring preference* yield similar results when included in the regressions we exclude the *feeling thermometer* from the rest of the analysis.

¹² These bounds closely correspond to a conservative version of the bounds of the more familiar Cohen's d.

¹³ It should be mentioned that the correlation between the implicit stereotype score and the explicit measures also is low ($r < 0.2$) in a student sample, a group that has less incentives to misreport their explicit statements, see Agerström et al (2007).

*** Table 3 about here***

The next step is to analyze to what extent the implicit and explicit measures correlate with behavior, e.g., the employers' decisions regarding whom to call for an interview, according to the model in Section 2. In doing so we analyze ethnic differences in the probability of a callback for interview using probit regressions (reporting marginal effects) and how this difference varies when introducing the implicit and/or explicit discrimination measure(s) into the regression. The data include 193 observations for Arab-Muslim and Swedish sounding applications, respectively, which are stacked together into the 386 applications being analyzed. All estimations are clustered on the level of the firm and weighted according to Table 1. The standardised IAT score is used, while the binary explicit measures are coded as one if having an attitude/stereotype in favour of native Swedish men over Arab-Muslim men and as zero otherwise.

When we regress the callback dummy on only the ethnic indicator variable we find an almost identical result as in Carlsson and Rooth (2007) using the full sample of 2,878 observations. Applications with an Arab-Muslim name attached to them have ten percentage points lower probability of being called for interview compared to applications with a Swedish name.

To investigate which, if any, of the implicit and explicit attitude and stereotype variables are correlated with the ethnic difference in callbacks, we regress the callback dummy on the explicit and implicit attitude/stereotype measures and the interaction of those measures with the ethnic dummy, see Model A through G in Table 4. The extent to which the included measures are associated with ethnic differences in callbacks is captured by the interaction effect, reported as a marginal effect.¹⁴ In Carlsson and Rooth (2007) it was found to be important to control for the sex of the recruiter. Hence, this variable, together with the recruiters' age, are included as controls in all models except A and D. Model D through G also control for occupation fixed effects and the interaction of these with the ethnic dummy. One could expect that the inclusion of occupation fixed

¹⁴ These are the estimated marginal changes in the probability for the continuous variables and estimated discrete changes for dummy variables.

effects would weaken the association strength of the implicit/explicit stereotype measures and the callback rate since stereotypes might be more important in certain occupations.

*** Table 4 about here***

When including only the implicit stereotype measure, the ethnic difference in callback for interview is dampened from ten to five percentage points, see Model A. Hence, the implicit measure explains half of the ethnic difference in callback for interview on its own. The estimate of the implicit stereotype measure further implies that recruiters with an implicit negative stereotype appear to treat applications with an Arab-Muslim name more negatively. The probability of a callback for interview is close to zero, and statistically insignificant, for Swedish named applications, but five percentage points lower and statistically significant for Arab-Muslim-named applications, when comparing recruiters with a one standard deviation difference in the implicit stereotype score. The economic interpretation of this estimate is that the probability to invite job applicants with Arab-Muslim male names is, on average, five percentage points lower for recruiters that have at least a moderate implicit low-performance stereotype toward Arab-Muslim men in Sweden as compared to recruiters who have no such stereotypes.

This result is very robust, and is basically unchanged, when the explicit attitude and stereotype measures, as well as sex and age of the recruiter, are included into the model, see Model C, which is the specification that corresponds to Equation 2 in section 2. The results are also unchanged when occupation fixed effects are included, see Models D through F, which implies that the association between the implicit stereotype measure and the ethnic difference in callbacks for interview is the same within as between occupations. A priori we would expect the “effect” of an implicit stereotype to vary across occupations. However, because we do not know what this stereotype is, it could take on several forms having the same “effect” on the ethnic difference in callback rates across occupations within this specific sample.

In the second column, Model B, the explicit attitude and stereotype measures along with the sex and age of the recruiter are included. The coefficient for the Arab-Muslim indicator drops from ten to four percentage points. Hence, even if neither of the other

included variables are statistically significant they explain more than half of the ethnic difference in callback for interview.

While the point estimates for some of the explicit measures are large, indicating that these variables might be economically important, they are estimated with a low precision. In fact, none of the explicit measures are statistically significant in Table 4.¹⁵ For the *hiring preference* measure we find a positive correlation with the probability of being called for interview for Swedish named applications, while this correlation is lower and close to zero for Arab-Muslim-named applications, see Model B. This result is basically unchanged when we include the implicit stereotype measure (Model C) and include occupation fixed effects (Model E and F).

For the *performance stereotype* measure we find an even stronger, but instead negative, correlation with the probability of being called for interview for Swedish named applications. This correlation is about the same for Arab-Muslim-named applications. These estimates are unchanged when including the implicit stereotype measure. However, it changes when occupation fixed effects are included in that the correlation decreases more for Swedish as compared to Arab-Muslim named applications.

As for the *other* variables male recruiters appear to treat applications with an Arab-Muslim name more negatively. The probability of being called for interview is five percentage points lower for Swedish named applications, and another eight percentage points lower for Middle Eastern-named applications, when a male, as opposed to a female, is responsible for which candidate to call for an interview. However, we find no difference in the treatment of Swedish and Arab-Muslim named applications between recruiters of different age.

Non-linearities in the implicit measure

Non-linear effects of the implicit stereotype measure have so far been neglected. When introducing a square of the standardized IAT score into the regression model F, and interacted with the Arab-Muslim indicator, we find that the ethnic difference in callbacks

¹⁵ This does not change if we include the explicit variables one by one or if we use the excluded *feeling thermometer*.

is much stronger for values of the standardized IAT effect above 2, i.e. for strong negative attitudes, see Model G in Table 4 and Figure 2.¹⁶

5. Conclusion

This study is the first, to the best of our knowledge, to examine the relation among implicit stereotypes, explicit attitudes/stereotypes, and discriminatory behavior in a real hiring situation. We find strong and consistent negative correlations between the IAT score and the probability that the firm/recruiter invited the applicant with an Arab-Muslim sounding name for an interview. The results show that the probability to invite job applicants with names such as Mohammed or Reza decreases by five percentage points when the recruiter has at least a moderate negative implicit stereotype toward Arab-Muslim men in Sweden. On the contrary, no such statistically significant correlations are found for the explicit measures and the probability to invite job applicants with Arab-Muslim sounding names. Combined with the results in Åslund and Rooth (2005) it seems as if recruiters' hiring decisions are not affected by their explicit negative attitudes towards the Arab-Muslim ethnic group when hiring, but rather are affected by the implicit performance stereotypes of the group. What those performance stereotypes really consist of, acting above the information about schooling and past experience found in the job application, needs to be further analysed.

Do these results imply the entry of an alternative discrimination theory not yet proved to be important in the field of economic research or is it just the "old" theories working but in a new disguise? Our answer is a cautious yes to the first statement. The measured implicit stereotypes of the recruiters predict the probability that employers will call an applicant with an Arab-Muslim sounding name for an interview, while our explicit discrimination measures do so to a much lesser extent. Furthermore, we find only weak

¹⁶ A related issue is whether recruiters who have both a stronger implicit negative stereotype and an explicit such are less likely to callback an Arab-Muslim applicant compared to recruiters with only one of them being strong. This implies analyzing whether there is an ethnic difference for the interaction effect between the implicit stereotype and the explicit attitude and stereotype measures. However, no such correlation being significantly different from zero was found. These results are available upon request. Also, the non-linear pattern in Figure 2 was unaltered when excluding the occupation fixed effects from the regression.

correlations between the IAT score and the explicit measures, which suggest that the employers may conceal or are unaware of how they actually perceive Arab-Muslims.

Regardless of whether the employers are aware of their stereotypical beliefs regarding work performance but decide to conceal them, or simply have no mental access to them, the present study shows the applicability of the IAT in the context of predicting hiring decision outcomes. Although the IAT has been found to predict deliberate decisions over which there is cognitive control (e.g., voting preference), implicit measures are generally acknowledged to be of value if one wants to predict spontaneous acts that are difficult to control; especially acts related to prejudice and stereotyping (Poehlman et al., 2005). Since it could be assumed that the decisions related to the hiring process are far from always under cognitive control but rather automatic in nature when, for instance, gut-feelings are activated, and stress enters the equation, this makes an even more convincing case for using the IAT. The central idea behind this is that a test that measures automatic associations should be a good predictor of behavior that takes place in situations where deliberate and more time consuming cognitive processes are mitigated. Whether the IAT is particularly useful as a predictor in hiring situations with high levels of ‘automaticity’ is a topic for future research.

In conclusion, our study highlights that much can be gained by combining research methods in social psychology with applied research in economics. Our research shows that the IAT can be a very powerful tool for predicting discriminatory behavior in the hiring situation. Moreover, it demonstrates the utility of the IAT when it comes to predicting ecologically valid behavior with “real-world” relevance for the labor market and the economy. Elucidating the role played by implicit cognitive processes in the hiring process offers new insights into labor market discrimination. Understanding the “forces” underlying discrimination is crucial in order to eventually be able to create a fair labor market.

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Figures:

Figure 1. The distribution of the non-standardized IAT score for implicit stereotypes against Arab-Muslim minority men relative to native Swedish men.

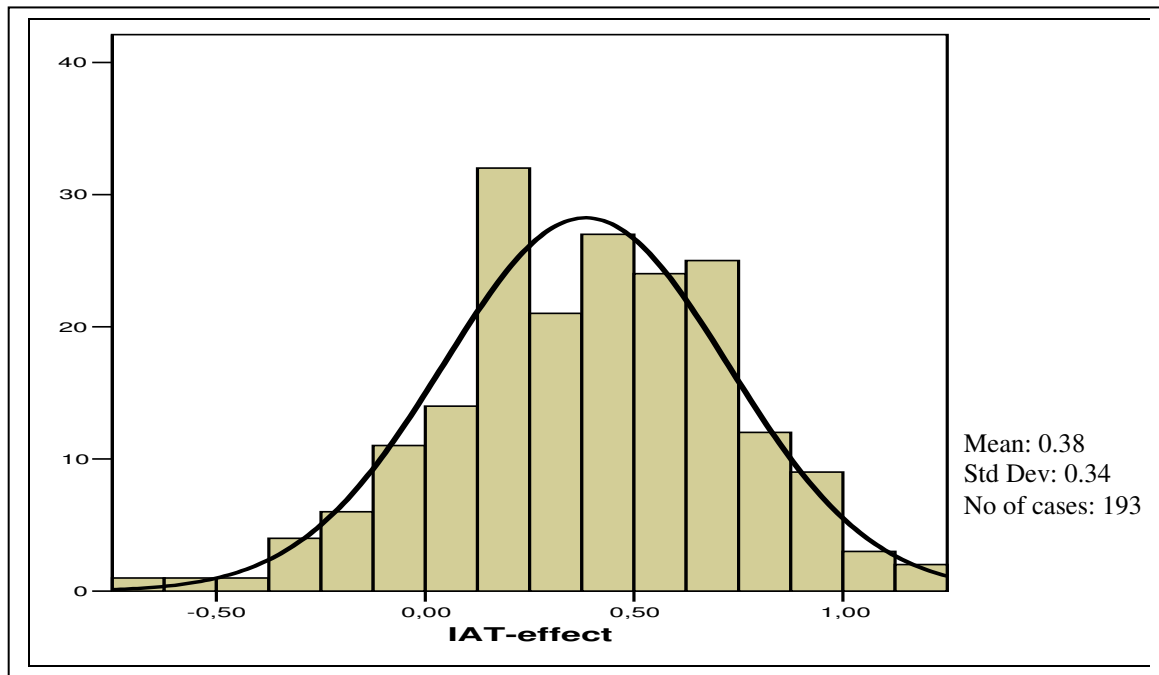
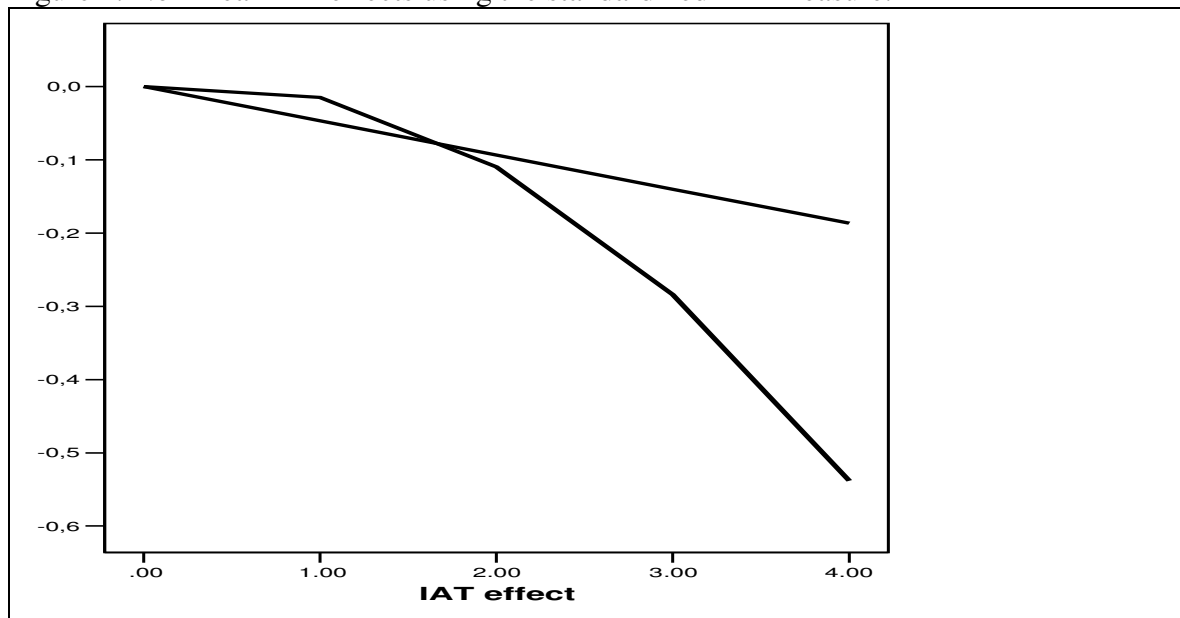


Figure 2. Nonlinear IAT effects using the standardized IAT measure.



Note: The graph shows the predicted lowering of the hiring probability as the standardized IAT score increases. A standardized IAT effect of 2 is equivalent to having a strong implicit negative stereotype (IAT score > 0.6). The calculations are based on the estimates in Table 4, Models F and G, respectively.

Tables:

Table 1. Participation in the two experiments and weights used in the analysis.

Called for interview Different outcomes	Correspondence testing	IAT: Invited	Participated (share %)	Weights: (SD)
Only Swedish applicant	217	184	56 (30)	3.6 (2.0)
Only Arab-Muslim applicant	66	59	18 (31)	2.9 (1.3)
Both	239	192	62 (32)	3.2 (1.5)
Neither invited	1,030	294	57 (19)	17.3 (17.4)
Total	1,552	729	193 (26)	

Note: From the field experiment we included all recruiters/companies from the original data (1,552) that were found in Statistics Sweden's firm register. The reason why all firms were not invited to participate is because they have not been located in the register (due for example to close downs). Since only a fraction (29%) of the group "neither invited" were invited to participate in taking the IAT we need to use weights in the analysis. The weights are group and occupation specific. For instance, a specific weight has been calculated for recruiters who belonged to the group "only Swedish applicant" and the occupation "computer specialist". Hence, these weights also correct for participation differences across groups and occupations.

Table 2. Explicit measures and their discrete counterparts. 193 cases.

Explicit measure	Values					
	<0	0	1	2	3-4	>4
Feeling thermometer:	18	87	36	26	17	9
Discrete version	-	105	88	-	-	-
Hiring preference:	1	87	85	20	-	-
Discrete version	-	88	105	-	-	-
Performance stereotype:	6	164	16	7	-	-
Discrete version	-	170	23	-	-	-

Note: The weights from Table 1 are used.

Table 3. Correlation matrix showing the relationship between the Arab-Muslim performance stereotype IAT score and the three explicit measures and their discrete counterparts. 193 cases.

Variables	1	2	3	4
(1) Stereotype IAT	1	0.22*	0.31*	0.17*
(2) Discrete Feeling thermometer (if >0 eq 1)	0.22*	1	0.36*	0.13
(3) Discrete Hiring preference (if >0 eq 1)	0.31*	0.36*	1	0.37*
(4) Discrete Performance stereotype (if >0 eq 1)	0.17*	0.13	0.37*	1

Note: * $p < 0.05$. The weights from Table 1 are used.

Table 4. The correlation between the callback rate for interview and the implicit and explicit attitude and stereotype measures. Percentage points.

	Model:						
	A	B	C	D	E	F	G
Arab (job applicant)	-0.050* (0.027)	-0.042 (0.121)	-0.049 (0.121)	-	-	-	-
Implicit measures:							
IAT	0.022 (0.030)	-	0.018 (0.030)	0.008 (0.029)	-	-0.000 (0.027)	-0.022 (0.037)
IAT*Arab	-0.046** (0.020)	-	-0.046** (0.020)	-0.045* (0.024)	-	-0.047* (0.026)	0.025 (0.034)
IAT ²							-0.012 (0.016)
IAT ² *Arab							-0.040** (0.017)
Explicit measures:							
Hiring preference	-	0.072 (0.069)	0.062 (0.070)	-	0.068 (0.061)	0.067 (0.061)	0.062 (0.060)
Hiring preference*Arab	-	-0.056 (0.055)	-0.029 (0.060)	-	-0.051 (0.047)	-0.028 (0.052)	-0.029 (0.052)
Performance stereotype	-	-0.124 (0.085)	-0.126 (0.084)	-	-0.035 (0.087)	-0.035 (0.086)	-0.039 (0.084)
Performance stereotype*Arab	-	-0.009 (0.098)	-0.001 (0.097)	-	-0.032 (0.083)	-0.035 (0.081)	-0.049 (0.076)
Other variables:							
Male recruiter	-	-0.051 (0.070)	-0.047 (0.069)	-	-0.047 (0.062)	-0.046 (0.062)	-0.042 (0.061)
Male recruiter*Arab	-	-0.082 (0.050)	-0.088* (0.049)	-	-0.118** (0.048)	-0.123** (0.048)	-0.110** (0.049)
Age of the recruiter	-	0.000 (0.003)	0.000 (0.003)	-	-0.005* (0.003)	-0.005* (0.003)	-0.005* (0.003)
Age of the recruiter*Arab	-	-0.002 (0.002)	-0.001 (0.002)	-	-0.003 (0.003)	-0.003 (0.003)	-0.002 (0.003)
Occupation fixed effects	No	No	No	Yes	Yes	Yes	Yes
Occupation fixed effects *Arab	No	No	No	Yes	Yes	Yes	Yes
No of cases	386	386	386	386	386	386	386

Notes: (***), (**) and (*) indicate the one, five and ten percent level of significance, respectively. Each column shows the estimates from a regression of the callback rate on the set of variables given in the rows of the first column. The estimates are marginal effects reported after the dprobit command in STATA 9. The weights from Table 1 are used in all models. The p-value of the F-test in Model G of the joint significance of the IAT and IAT² and IAT*Arab and IAT²*Arab is 0.77 and 0.02, respectively. In columns D through G the estimate of the Arab indicator variable is discarded since it now corresponds to only one of the included occupations.

Appendix:

Table A1. Aggregated results for the correspondence testing

	Jobs No.	Neither Invited No.	At least one invited No.	Equal Treatment No.	Only Swedish- sounding name invited No.	Only Arabic- sounding name invited No.	Callback rates			χ^2
							Swedish- sounding name (4 + 5)/(1)	Arabic- sounding name (4 + 6)/(1)	Relative (Swedish)/ (Arabic)	
Computer professionals	106	71	35	9	14	12	0.22	0.20	1.10	0.2
Teachers (math and science) ^a	42	16	26	17	7	2	0.57	0.45	1.26	2.8
Business sales assistants	278	164	114	57	39	18	0.35	0.27	1.28	7.7***
Preschool Teachers	184	64	120	76	36	8	0.61	0.46	1.33	17.8***
Accountants	186	155	31	10	14	7	0.13	0.09	1.41	2.3
Nurses	150	95	55	30	20	5	0.33	0.23	1.43	9.0***
Teachers - upper secondary school	64	41	23	10	11	2	0.33	0.19	1.75	6.2**
Teachers (language) ^a	60	26	34	9	19	6	0.47	0.25	1.87	6.8***
Construction workers	64	44	20	7	12	1	0.30	0.12	2.38	9.3***
Restaurant workers	140	128	12	3	8	1	0.08	0.03	2.75	5.4**
Motor-vehicle drivers	78	59	19	6	13	0	0.24	0.08	3.17	13.0***
Shop sales assistants	200	167	33	5	24	4	0.14	0.04	3.22	14.3***
Total	1,552	1,030	522	239	217	66	0.29	0.20	1.50	83.7***

Source: Table from Carlsson and Rooth (2007).

Notes: The null hypothesis is “Both individuals are treated unfavorably equally often”, that is, (5) = (6). The critical value of the χ^2 at the one percent level of significance is 6.63 (***) and at the five percent level of significance is 3.84 (**). (a) Upper level of compulsory school.

Table A2. Selective participation. Means of characteristics for participants and non-participants and a participation regression of participation (0/1 variable) in taking the IAT on a set of recruiter/company characteristics.

	Mean of characteristics		Estimate
	Participants	Non-participants	
Callback rate Arab-Muslim	0.41	0.32	0.011 (0.038)
Callback rate native Swede	0.56	0.50	0.075* (0.038)
Male responsible for hiring	0.56	0.61	-0.009 (0.028)
Number of employees at workplace<20	0.49	0.57	-0.001 (0.037)
Occupations:			
Shop sales assistants	0.11	0.10	b.m.
Construction workers	0.03	0.03	-0.049 (0.108)
Motor vehicle drivers	0.02	0.05	-0.154* (0.091)
Business sales assistants	0.15	0.20	-0.092 (0.064)
Preschool teachers	0.17	0.15	-0.033 (0.038)
Teachers (science)	0.06	0.03	0.114 (0.100)
Teachers (language)	0.06	0.05	0.009 (0.087)
Teachers (upper secondary school)	0.12	0.04	0.250* (0.086)
Cleaning	0.04	0.04	0.011 (0.096)
Computer specialists	0.05	0.07	-0.074 (0.082)
Accountants	0.07	0.12	-0.105 (0.071)
Restaurant workers	0.03	0.03	-0.044 (0.107)
Nurses	0.09	0.09	0.050 (0.074)
No of cases	193	536	729

Notes: The first and second columns give the means of observable characteristics of participants and non-participants, respectively. The third column gives the estimates from a regression of the participation dummy, being one if having taken the IAT and zero otherwise, on the observable characteristics in the field experimental data (standard errors in parentheses). *) indicates the ten percent level of significance.