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An Implicit Association Test Study of Meritocratic Bias in Academic Achievement

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Abstract: *Meritocracy is a theory considering that social resources and status should be allocated according to individuals' talent, effort, and achievement. Its original aim was to challenge hereditary privilege and promote fair competition. Nevertheless, excessive adherence to meritocratic principles may foster elite arrogance and loser-shaming, resulting in obscure structural inequalities, and exacerbate social divisions. The sever competition and score-oriented educational values have contributed to the widespread acceptance of meritocratic biases in public perceptions. Existing studies, however, have primarily focused on explicit meritocratic beliefs, with limited attention paid to implicit meritocratic bias at the unconscious level. Adopting the Implicit Association Test (IAT) paradigm, this study investigates the current characteristics of implicit meritocratic bias among people. How demographic variables, including gender and age, are associated with such implicit attitudes are also discussed. The experimental results reveal that people exhibit significant implicit meritocratic bias. Individuals tend to automatically associate strong academic performance with positive moral qualities and poor academic performance with negative moral qualities. This effect is significant in both females and males. There is no significant gender difference is found in implicit meritocratic bias. In contrast, age has a significant impact. Comparatively older participants demonstrate markedly higher levels of implicit meritocratic bias. This study addresses limitations associated with measuring meritocratic beliefs solely through explicit scales and enriches empirical research on implicit stratification stereotypes in contemporary Chinese society. Its findings provide empirical evidence to inform efforts to reduce score-oriented cognitive biases which could help promote diversified educational evaluation systems, and foster more balanced social perceptions.*

Keywords: *Meritocracy, Bias, Implicit Association Test, Reaction-time experiment*

1. Introduction

The concept of meritocracy was first proposed by British sociologist Michael Young in his 1958 dystopian work *The Rise of the Meritocracy 1870–2033*[1]. The term carried strong critical connotations at first. Young used it to warn that a social system taking intelligence, effort and academic achievement as the sole criteria for resource allocation would strengthen the rigidification of social class structures. It would promote elite monopoly, rather than facilitate fair competition. The understandings of meritocracy in Western academia have undergone two major shifts. During the industrial era, sociologist Daniel Bell (1973) regarded meritocracy as a rational stratification mechanism for modern industrial societies[2]. He argued that it replaced hereditary privilege and promoted social mobility. This concept was considered as having neutral or positive implications. Hence, meritocracy was regarded as the dominant institutional logic for education, corporate recruitment and public selection across Western societies at that time. In the 1980s, the Thatcher and Reagan reforms in the United Kingdom and the United States promoted the idea that the success was determined by efforts as a core ideological principle. Since then, meritocracy has become deeply embedded in admissions, recruitment, and salary evaluation. Nevertheless, in the 21st century, Sandel's *The Tyranny of Merit* brought meritocracy back under critical discussions and proposed the concept of the tyranny of merit[3]. He argued that meritocratic narratives amplify the bias of internal attribution, while ignore structural inequalities such as family background and resource disparity. It would foster elite arrogance and lead to self-stigmatization among disadvantaged groups. Unlike Western meritocratic systems shaped by market competition, meritocratic culture in China has two unique origins. The first is its traditional cultural root. The ancient imperial examination system and the Confucian value of diligence and virtue have long linked academic performance with moral evaluation. This linkage formed a cultural association —— strong academic performance equals good moral conduct. The second comes from superimposed modern institutions. The unified college entrance examination takes scores as the core metric for evaluation. The intensified competition for admission has made score-centric

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evaluation increasing prevalent pervaded in families, schools and the general public. As a result, a localized educational meritocracy system has been formed[4] .

The widespread of meritocracy generates negative impacts for both the society and individuals. At the macro level, meritocracy reinforces the bias which encourages the public to attribute academic success and failure entirely to individual talent and effort. The structural factors such as family socioeconomic status, access to educational resources, and regional disparities are overlooked. This, in turn, perpetuates educational inequality, exacerbates social class rigidity, and intensifies intergroup divisions[4][5]. Individuals with strong meritocratic beliefs are also more likely to implicitly stigmatize academically disadvantaged students. They may attribute these students' difficulties entirely to personal laziness or moral deficiencies. These biases undermine social empathy[6][7] . In education, the stereotypical association between academic performance and moral character distorts multidimensional systems of moral education and evaluation. Teachers and parents may consciously or unconsciously make negative moral judgments about students with low grades while favoring high-achieving students in resource allocation. The levels of acceptance, and evaluative feedback would also be affected. Such biases undermine fairness in educational processes [8][9]. For students, being evaluated solely on academic sores can impose a substantial psychological burden. Academically struggling students may internalize feelings of shame associated with failure, develop low self-esteem and self-doubt. They may face an increased risk of psychological difficulties, including anxiety and depression[10][11] . These dynamics can trap society in an endless cycle of competition for educational advancement, narrow the range of socially accepted measures of personal worth, and weaken individuals' motivation to pursue diverse pathways of personal development[3].

Although meritocratic ideas and practices have a long history, it didn't capture the attention of academic research until the beginning of the 21st century. Existing studies, however, have some methodological limitations in their measurement approaches. Many studies rely on self-report to measure attitudes, which can only capture individuals' conscious meritocratic beliefs that they may deliberately modify or present in a socially desirable manner[12][13]. Such methods primarily measure explicit attitudes and cannot adequately capture unconscious, automatic implicit cognitions. They cannot fully eliminate the influence of social desirability bias. Participants may modify their responses. To address these limitations, the present study adopts a reaction-time experimental approach and the Implicit Association Test (IAT) paradigm to investigate people's implicit meritocratic bias. It also incorporates demographic variables, including gender and age. The study aims to leverage the IAT to establish the basic characteristics of implicit meritocratic bias among current individuals and identify potential differences across age and gender groups. The results could contribute empirical evidence at the implicit level to the study of meritocratic beliefs in contemporary Chinese society. It also provides insights for addressing implicit score-based stereotypes.

2. Method

2.1 Participant

The experiment was conducted in Shanghai, China. 20 participants (M = 30.60, SD = 11.95) were recruited in total, including 14 females and 6 males. Before the experiment began, the experimental procedure and the general purpose of the study were introduced to each participant. All participants volunteered to take part in the experiment after signing the consent form.

2.2 Stimulus

The present study adopted the Implicit Association Test (IAT). The program was developed using PsychoPy software. The aim was to assess participants' implicit meritocratic bias. The experimental stimuli consisted of two types which were conceptual images and attribute words. The conceptual images were standardized in style, size, and aspect ratio. They were divided into two categories —— high academic achievement and low academic achievement. Images in the high-achievement category included elements such as admission letters from prestigious universities, trophies, and certificates of achievement. Images in the low-achievement category included scenes such as incorrect homework, or poor exam results. The attribute words were also divided into two categories —— positive words and negative words. Positive words described favorable personal traits, such as optimism, conscientiousness, responsibility, diligence, or self-discipline. Negative words described unfavorable personal traits, such as irritability, laziness, lack of discipline, and arrogance.

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2.3 Design and procedure

The present study used a within-subject design. Each participant completed both compatible and incompatible tasks. After signing the consent form, participants were invited to sit in front of a computer. After carefully reading the experimental instructions, they used the A and L keys to respond to the stimuli. Each participant completed five consecutive blocks. To minimize the effects of task order and practice on performance, the presentation order of the compatible and incompatible tasks was randomized across all participants. In the compatible condition (Block 2 and 3), positive words were paired with high academic achievement, while negative words were paired with low academic achievement (Table 1). In the incompatible condition (Block 4 and 5), positive words were paired with low academic achievement, while negative words were paired with high academic achievement (Table 1). Only data from Block 3 and 5 were included in the analysis. The other blocks were designed to familiarize participants with the experimental procedure and facilitate learning of the concepts and attributes. Detailed information about the experimental procedure is listed in Table 1.

The entire procedure took approximately 5–10 minutes per participant. Participants who completed the full test received a small gift. After all participants had completed the experiment, their keypress and reaction-time data were exported for subsequent analysis.

Table 1: The IAT procedure

	Task	Frequency	Response key	
			A	L
1	Attribute Words Recognition	10	Positive	Negative
2	Conceptual Photos Recognition	10	High Academic Performance	Poor Academic Performance
3	Attributive Words + Conceptual Photos Joint Task	20	Positive + High Academic Performance	Negative + Poor Academic Performance
4	Reverse Conceptual Photos Recognition	10	Poor Academic Performance	High Academic Performance
5	Attributive Words + Reverse Conceptual Photos Joint Task	20	Positive + Poor Academic Performance	Negative + High Academic Performance

2.4 Data analysis

The experimental data were cleaned before statistical analysis. Incorrect responses and outlier reaction time which were excessively long or short were excluded. The results of reaction time, D value and IAT score were shown in Table 2. To assess participants' implicit attitudes toward meritocracy, independent-sample t-tests were used to compare reaction time between the compatible and incompatible tasks. D-scores were calculated at the same time. Furthermore, to investigate potential gender and age differences in implicit attitudes, separate paired-sample t-tests were conducted to compare performance between the compatible and incompatible tasks within the female and male groups. Similar analyses were conducted in the younger and older age groups. D-scores were also calculated for each group.

3. Result

3.1 T-test Analysis of IAT Reaction Time

The between-group t-test demonstrated that participants showed significantly shorter ($p<0.01$) reaction time in the consistent task (*M=1.45, SD=0.37*) compared to the non-consistent task (*M=2.32, SD=0.47*). This significant difference ($p<0.01$) was also observed among male (*consistent task: M=1.51, SD=0.29; non-consistent task: M=2.36, SD=0.32*) and female subjects (*consistent task: M=1.41, SD=0.39; non-consistent task: M=2.29, SD=0.56*) . Younger (*consistent task: M=1.46, SD=0.27; non-consistent task: M=2.14, SD=0.46*) and comparatively older participants (*consistent task: M=1.45, SD=0.43; non-consistent task: M=2.49, SD=0.43*) also exhibited significant difference.

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3.2 D value of implicit attitudes

In the implicit association task, participants generated a calculated D-value of 1.47 and an IAT score of 0.87. Female participants had a D-value of 1.38 and an IAT score of 0.87. Male participants had a D-value of 1.67 and an IAT score of 0.86. Younger participants had a D-value of 1.39 and an IAT score of 0.69. Older participants had a D-value of 1.58 and an IAT score of 1.05.

3.3 T-test Analysis of IAT Score

The T-test revealed a significant difference ($P<0.01$) in IAT scores between younger and older participants. Oder participants ($M=1.69, SD=0.34$) had significantly higher scores than the younger participants ($M=0.69, SD=0.56$). However, this difference was not found when conducting separate t-test for female and male participants.

Table 2: The Reaction Time, IAT Score and D Value for Participants

	Consistent task RT(s)	Consistent task RT(s)	IAT score	D value
All	1.45	2.32	0.87	1.47
Male	1.51	2.36	0.86	1.67
Female	1.41	2.29	0.87	1.38
Younger	1.46	2.14	0.69	1.39
Older	1.45	2.49	1.05	1.58

4. Discussion

This study aimed to investigate the current status of implicit meritocratic bias among people and further explore the influence of demographic characteristics, such as gender and age, on implicit attitudes. The analysis of the Implicit Association Test (IAT) data revealed that participants generally exhibited a strong implicit meritocratic bias. They demonstrated strong automatic associations between high academic achievement —— good moral character and low academic achievement —— poor moral character. No significant difference was found between male and female participants. Both groups showed similar tendencies. However, age had a significant impact on participants' implicit attitudes. Older participants exhibited stronger implicit meritocratic bias than younger participants.

The data analysis revealed that implicit meritocratic bias widely existed among individuals. The underlying logic of the IAT is that social and cultural associations repeatedly reinforced over time. These associations stored in semantic memory networks which formed pathways that can be activated automatically[14] (Greenwald, 1998). In the Chinese educational system, academic excellence has long been associated with being obedient, well-behaved, and morally upright. However, poor academic performance has often been linked to being mischievous or having poor moral character[4]. Through repeated reinforcement by schools, families, and the media over several decades, these associations may have become deeply embedded in public cognition. Consequently, the pairings of high academic achievement —— positive moral character and low academic achievement ——negative moral character may function as implicit semantic associations that do not require conscious processing. This is why participants responded significantly faster when these concepts were paired in the IAT which indicates a strong implicit bias.

The emergence of meritocratic bias can be explained through system justification theory. Proposed by Jost and Banaji[5], this theory suggests that individuals have a psychological tendency to defend, support, and rationalize existing social systems, economic structures, and political institutions. Even when doing so may sacrifice their own interests. Meritocracy is the core concept of this theory. It claims that resources and rewards are allocated according to individuals' ability, effort, and performance. This legitimizes existing social hierarchies and inequalities. When people endorse the associations between high academic achievement —— good moral character and low academic achievement —— poor moral character they may unconsciously accept and rationalize a social order in which academic achievement serves as a mechanism of social selection. Under this framework, high achievers are perceived as more deserving of positive moral evaluations and higher social status, whereas low achievers are seen as deserving of a disadvantaged position. These implicit associations can make social inequalities appear fair, reasonable, or even natural. Furthermore, meritocratic beliefs may reinforce the fundamental attribution error. People tend to overlook external situational constraints. As a result, high-achieving individuals may be presumed to be disciplined and morally upright. Meanwhile, low-achieving

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individuals may be perceived as lazy and morally deficient. In this way, educational stratification is psychologically legitimized[15] .

The present study also investigated the influence of demographic variables, including gender and age, on implicit meritocratic bias. The gender-based analysis revealed that both female and male participants exhibited significant meritocratic bias. There was no statistical difference between the two groups. This finding may reflect the pervasive influence of meritocracy as a dominant cultural ideology. Individuals of different genders are exposed to similar cultural narratives over a long period. Individuals of all genders are subject to the normative pressures associated with meritocratic values. This shared socialization is the potential reason of the absence of significant gender differences. Previous studies offered similar perspectives. They argued that meritocracy functions as dominant legitimizing ideologies that extend across society, rather than being confined to a particular gender. Automatic associations between academic performance and moral character may not vary substantially by gender[6][16] . During the formative years, both boys and girls are exposed to educational evaluation systems that emphasize academic performance. Families and schools use academic achievement to evaluate students. This standard is consistent for female and male students. Another study also found no significant gender differences in implicit negative stereotypes among male and female students or adults.

The age-group analysis revealed a different pattern. Although both younger and older participants exhibited implicit meritocratic bias, the older group demonstrated significantly higher levels of implicit bias than the younger group. This finding suggests a potential generational pattern in implicit meritocratic bias. Political socialization theory proposes that individuals experience a critical period of attitude formation during their life course which is typically from adolescence to early adulthood (approximately 12–25). Social values, ideologies, and culture encountered during this period tend to be relatively enduring and may remain influential for decades[17][18] . This process involves the influence of schools, family socialization, peer groups, media, and so on. The norms of a particular historical period may become internalized as foundational cognitive schemas. These schemas could serve as reference frameworks for subsequent information processing and value judgments.

The older participants in the present study were mostly born between the 1950s and the 1980s. Their formative years were close to the restoration of China's National College Entrance Examination (Gaokao) in 1977 and the subsequent decades. During this historical period, the social selection function of the education system was highly strengthened. The scarcity of education resources established an almost deterministic link between academic achievement and individual social mobility. In this background, the education system formed a link among academic performance, effort, and moral character. High academic achievement was regarded as an objective indicator of individuals' effort. In turn, qualities associated with effort, such as diligence and perseverance, were directly related to positive moral attributes. Conversely, poor academic performance was attributed to an improper attitude or a lack of self-discipline which resulted in negative moral evaluations. For older participants, these implicit associations had been activated repeatedly over several decades. As a result, it was difficult for them to modify this association even under the exposure to counterexamples. This interpretation is consistent with the attitude persistence hypothesis, which suggests that basic political and social attitudes formed during critical developmental periods tend to remain relatively stable throughout life[17] . In contrast, the younger participants in this study were born between the 1990s and the early 2000s. They were often considered as the "digital native" generation[19]. The cultural environments in which they grew up differed substantially from those experienced by older generations. On the one hand, since the 1990s, China's basic education reforms have gradually emphasized quality-oriented education and challenged an excessive focus on examination scores. The goal of promoting students' holistic development has also been incorporated into official educational policies. On the other hand, Western educational theories, including the theory of multiple intelligences, were also introduced into China[20]. In addition, the widespread adoption of the internet enabled younger generations to access a broader range of information beyond traditional mainstream culture. This information included critiques of score-oriented education and discussions that challenged its underlying assumptions. During sensitive periods of cognitive development, such exposure may have provided young people with more counter-stereotypical examples. Repeated exposure to counterexamples that challenge an existing stereotype can significantly weaken its implicit strength[21][22]. For younger generations, such counterexamples may appear extensively during critical developmental periods. Consequently, their implicit associations between academic achievement and moral character were partially deconstructed. Hence, the speed and automaticity of these associations among younger participants were activated weaker. From this perspective, the age-related difference in IAT scores study may reflect the cumulative effects of cognitive socialization experienced by the two generations under different historical conditions.

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The present study also has several limitations that should be addressed in future research. First, all participants were recruited from Shanghai. The sample did not include individuals from other cities, towns, or rural areas with different levels of access to educational resources. Regional differences in culture and educational priorities may contribute to variations in the strength of implicit meritocratic bias. Future research could include participants from first-, second-, and third-tier cities, as well as towns and rural areas. Cross-regional comparisons could generate more comprehensive results. Second, the present study investigated only two demographic variables, age and gender. It did not include socioeconomic indicators such as income or parental educational attainment. As a result, the potential moderating effects of other social factors on implicit bias could not be investigated. Future studies could incorporate other indicators and investigate the interaction between social class and age to provide a more detailed understanding of the factors associated with implicit meritocratic bias.

5. Conclusion

The present study aimed to investigate people's implicit meritocratic bias and further examine the effects of demographic variables, such as gender and age, on implicit attitudes. The reaction-time experiment employed an Implicit Association Test (IAT) paradigm. Data analysis revealed that meritocratic bias was widespread among individuals currently. Participants demonstrated strong associations between high academic achievement —— good moral character and low academic achievement —— poor moral character. The analysis of gender differences found no significant difference in the strength of meritocratic bias between male and female participants. This suggests that implicit meritocratic bias is not significantly affected by gender. However, the analysis of age groups revealed significant age-related differences. Older participants showed significantly stronger bias than younger participants. By using IAT, this study revealed automatic associations between academic achievement and moral character underlying implicit meritocratic bias among. Previous research mainly relied on explicit scales to measure meritocratic beliefs. This study thereby enriches the findings of implicit bias. Meanwhile, it also provides cross-cultural empirical evidence for system justification theory in East Asian examination-oriented educational culture. Furthermore, the study explored the effects of two demographic variables, gender and age, on implicit hierarchical stereotypes. This distinction helps clarify the differences in the mechanisms underlying achievement-related stereotypes. It makes contributions to theories of intergenerational cognitive entrenchment. The findings reveal the widespread presence of unconscious meritocratic bias in contemporary society and highlight a deep-seated tendency to evaluate individuals primarily based on academic performance. These results provide a psychological basis for promoting quality-oriented education, alleviating excessive academic competition, and advancing educational equity. They may also offer insights for psychological interventions to help reduce self-doubt and emotional difficulties among students who struggle academically as a result of stereotypical evaluations.

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