

Impact of Face Recognition on People's Implicit Attitudes and First Impression

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Abstract. Face recognition plays a vital role in human social interaction, which enables people to quickly identify others and form an impression in a few seconds. This paper focuses on the relationship between face recognition and implicit attitude, especially the way that instant judgment formed by facial features affects people's first impression. The study reviewed a series of recent experimental studies and meta-analysis, which explored the cognitive and judgment process behind face recognition. The methods discussed in this paper include rapid impression formation task and large-scale data survey, and pay attention to the strengths and limitations of these approaches, such as the diversity of samples and the challenge of measuring implicit processes. The results show that face recognition can strongly impact people's implicit bias and attitude, which often leads to helpful or harmful social judgments. Rapid evaluation based on appearance will reinforce stereotypes and lead to errors in trust or social evaluation, especially when identifying faces of different racial groups. The study concludes that understanding these unconscious recognition processes is essential for reducing prejudice and improving social harmony. By raising awareness about the risk of bias in face recognition and developing more targeted education and reflection, people can move towards more equitable and inclusive social interactions.

Keywords: Face Recognition, Implicit attitudes, First Impression

1. Introduction

Human face recognition is a fundamental part of daily social interactions. People rely heavily on facial features to identify others, explain emotions and form judgments. This process begins almost instantly upon seeing a face, and it is indispensable to live in a complex social environment. Studies have shown that facial recognition is not only a perceptual skill, but also closely related to individual's cognitive and emotional responses [1]. In modern society, communication between people is frequent and often brief, so the ability to quickly recognize faces and respond according to facial clues is very important.

The significance of face recognition in shaping social outcomes cannot be overstated. The first impression is often based on a brief glance, but it will affect the subsequent interaction, even the long-term relationship between people. A person's quick judgment of others' credibility, ability and popularity usually comes only from their facial features [2]. According to the study of Olivola et al, these fast and automatic social attributes from the face can be biased towards human choices in a

meaningful way, thus affecting decision-making in the fields of employment, legal judgment and interpersonal relationships [1]. In addition, the way people recognize and respond to faces is intertwined with broader social factors, such as ethnic groups, cultural backgrounds and individual differences.

The existing research on face recognition highlights several important gaps and limitations. A noteworthy problem is "other-race bias", which refers to the tendency of people to recognize and remember the face of their own race more accurately than other races [3]. This prejudice has real-life influence, including the error of witness identification and unconscious cultural exclusion. Existing studies have explored the reasons for this prejudice, which may be related to limited cross-racial experience and implicit social attitudes [3]. However, there are still many problems about how implicit attitudes and stereotypes affect the process of face recognition and the formation of first impressions. It is increasingly necessary to understand how these prejudices work, how they affect people's judgments, and how they can be alleviated in a multicultural social environment.

The theme of this paper focuses on the relationship between face recognition and implicit attitude, and its influence on people's first impression. This especially emphasizes how people make instant judgments about others based on facial features, and how this judgment is influenced by implicit bias. To address these issues, this paper reviews the current research results, including experimental research and meta-analysis, which focuses on the cognitive mechanism and broader social consequences of face recognition. In terms of methods, this paper will compare various methods used in previous studies, such as rapid impression formation task and large-scale survey data. It will also consider the shortcomings and limitations of these methods. The main purpose of this study is to understand more clearly how face recognition shapes people's implicit attitudes and first impressions. By synthesizing the existing research and determining the areas for further exploration, this paper aims to emphasize the important role of conscious efforts in reducing prejudice and improving social decision-making. Ultimately, the study seeks to foster people's understanding of the complexity behind face recognition and encourage a fairer and more accurate evaluation in the social background.

2. Overview of the face recognition

Human face recognition is a complicated cognitive process and an integral part of individuals daily social interaction. From recognizing familiar faces to understanding their emotions and attitudes, face recognition help individuals to continue to explore in a complex social environment. The core of face recognition is perceptual coding and memory retrieval. For example, when people look at a face, the brain will quickly process its visual features, such as eyes, nose and mouth, and the relationship between these features. This coding process is rapid and usually automatic, allowing people to easily identify key clues from facial appearance. Besides, people will also use feature analysis and global processing in face recognition. Although feature analysis focuses on a single element, such as the shape of eyebrows or the curve of lips, global processing will consider the whole face according to the spatial arrangement of features. This dual method enhances the ability of human beings to effectively recognize faces.

Face recognition is not only limited to identifying personal characteristics, but also extends to understanding emotions and intentions. Recognizing emotional expression is very important in today's social interaction, because it helps people to explain the feelings and intentions of others. For instance, smiling is regarded as a sign of friendliness and frowning as a sign of unhappiness. These emotional signals help individuals respond more appropriately during social interactions. This ability to quickly measure emotions enables human beings to adapt to their own behaviors in the

social environment, thus promoting smoother communication and cooperation with others. Additionally, face recognition supports social classification, allowing people to classify individuals into different categories according to age, gender, race and other social identifiers. While this classification process is useful for processing social information, it sometimes leads to the formation of stereotypes or some prejudices, which indirectly affects people's choices and judgments.

A prominent factor affecting the accuracy of face recognition is called “other-race effect”, which is revealed by poorer recognition of other-race faces compared with own-race faces, has been consistently observed [4]. This phenomenon is largely attributed to the familiarity and contact with one's own ethnic group, which highlights the crucial affect of social and environmental factors on face recognition ability. However, ethnic prejudice may create obstacles to cognition and interaction in a multicultural society. It emphasizes that people need to increase contact with different types of groups to improve the accuracy of facial recognition and reduce prejudice. Moreover, age is another influencing factor. For example, young adults usually perform better than older adults in accurately recognizing faces. This trend shows that the ability of face recognition may decline due to the increase of age [5]. Therefore, this point needs to be considered in the environment where accurate face recognition is crucial, such as security settings.

Apart from race and age, external conditions and background factors will also affect the accuracy of people's face recognition. For instance, lighting conditions or different angles will affect the results of facial processing to some extent. Because these factors may change people's perception of key facial features, thus making the process of facial recognition more complicated. In addition, the background also plays an important role. Familiar faces seen outside the social background may be more difficult to identify than those encountered in typical environments such as workplaces or social gatherings. This also highlights the versatility of face recognition and the interaction between perception and background factors in affecting accuracy.

Implicit attitude rooted in subconscious evaluation profoundly affects face recognition and social interaction. These attitudes are formed through personal experience and cultural background, and usually lead to people's actions and decisions involuntarily. For example, a person may subconsciously use other people's facial features to judge their personality characteristics such as their trustworthiness and competence [6]. Moreover, it is usually based on the person's own social experience, which will lead to implicit bias in evaluating others. However, this prejudice may distort people's cognition, thus affecting key decisions from hiring to relationship building. First impressions and implicit attitudes are closely linked, forming subconscious judgments that affect social interactions [6]. The first impression is the instant judgment formed by people when they meet for the first time, which relies heavily on facial expressions and nonverbal clues. Although the first impressions formed in these brief moments are not always accurate and may not reflect the true nature of individuals, they often guide the initial social interaction and attitudes between people. Therefore, people's first impressions also show the importance of facial cues in conveying social information.

In conclusion, face recognition is the core component of human cognition, which influences nearly every aspect of social interaction. From perceiving identity and emotion to overcoming racial prejudice, the interaction between cognitive process and social dynamics is obvious. With the continuous diversification of society, understanding and improving the ability of face recognition and reducing prejudice will be the key to cultivate a harmonious social environment.

3. Impact of face recognition on implicit attitudes

The way people unconsciously interpret others' faces can significantly affect their implicit attitudes. Implicit attitude is the automatic and unconscious association of human beings with different social groups. Facial recognition plays a vital role in how individuals perceive others and reduce existing stereotypes. According to research, when people see the faces of other races, their implicit prejudice will affect their view of credibility. The study of Cheung et al emphasizes that individuals have different ways to evaluate credibility, which depends on whether they recognize this face as belonging to their own race or other races. It is reported that a total of 401 white American participants and 397 black American participants participated in the experiment online through the prolific platform [7]. Moreover, all participants are between 18 and 40 years old, fluent in English, with normal vision or corrected to normal [7]. In the final sample, 276 white women, 55 white men, 201 black women and 79 black men provided their gender information [7]. When judging the faces of other races, people's social experiences and previous interactions will affect their evaluation, which may form an automatic association that is not based on reality. This prejudice may lead individuals to unfairly distrust or judge people who do not belong to their cultural or ethnic groups, thus aggravating social differences.

The cognitive process involved in face recognition will further amplify these implicit biases. Chen et al studied the differences between individuals' processing of foreign faces and their own faces. Their research shows that people are more likely to regard recognized faces as a whole when their own ethnic groups are involved [8]. While when they see the faces of other ethnic groups, they tend to focus on specific features [8]. This change in processing may lead to the reinforcement of stereotypes and prejudices, because looking at others through fragmented information usually intensifies preconceived ideas about these people based on their appearance.

Besides, social status judgment based on facial features may also appear. Pandeirada et al explored how individuals perceive social dominance from facial features. Such judgments often stem from implicit bias, which links some facial features with authority or power [9]. For instance, if a person's face embodies the characteristics that are traditionally considered as "dominant", such as raised eyebrows or stern expression. People may unconsciously think that this face is more capable of leadership, regardless of the person's actual competence or character [9]. This may lead to inequality in the workplace, because individuals may be favored or ignored based on unconscious bias formed by facial recognition.

Moreover, cultural and social factors also play an important role in forming these implicit attitudes. Personal contact environment, including media reports, family education and community interaction, all affect individual's perception and response to different faces. When people see faces from different races, deep-rooted cultural stereotypes in society will be manifested in their subconscious. For example, if the dominant media narrative consistently portrays a particular ethnic group as dangerous or untrustworthy, people may unconsciously accept these prejudices, resulting in misjudgments when encountering faces from this group. Therefore, when people's facial recognition is combined with these prejudices, it may lead to unfair treatment or misjudgment of some groups, thus aggravating systematic discrimination.

The challenge of implicit attitudes formed by facial recognition is that they operate under the surface of people's conscious awareness and often violate their strongly held principles of equality and fairness. Many people would like to believe in the ideals of justice and non-discrimination. However, their automatic judgment is shaped by social norms and personal experiences, which may lead to prejudice against others and is only based on their appearance. Therefore, recognizing the profound influence of facial recognition on these implicit attitudes is the key first step to eliminate

the persistent stereotypes and prejudices in society. In order to solve these prejudices, improving cognition and education can make people more aware of their own automatic judgment and the potential factors that shape it. For instance, initiatives designed to promote media diversification can effectively change public perceptions. When the media widely reports successful people from different cultural backgrounds, such as Africans, Europeans and Asians, it may help to eliminate existing stereotypes. Similarly, community activities that encourage people to participate in cultural exchanges such as festivals or seminars can enable people to establish contacts at the individual level and break the preconceived ideas related to different races or ethnic groups. By acknowledging and actively challenging these hidden prejudices, it is essential to build a more inclusive society, in which people judge individuals according to their actual personality and ability rather than preconceived ideas related to appearance.

4. Impact of face recognition on first impression

The initial judgment based on the first impression will significantly affect the establishment of interpersonal relationships and the decisions made. When meeting someone for the first time, people's brains usually quickly evaluate their facial features and emotional expressions to form a preliminary evaluation. This rapid judgment based on social conditioned reflex helps individuals to quickly judge whether another person is trustworthy or potentially threatening. For example, a person with a warm smile and open, expressive body language is usually considered friendly and safe, which makes others more inclined to actively establish relationships with them. On the contrary, a person with a stern expression may be wrongly judged as unfriendly, which may hinder the development of their relationship. These direct perceptions affect everything from personal interaction to career development. Because in the interview, the interviewer's decision may be influenced by the applicant's first impression, which includes not only oral communication, but also facial expression and perceived emotional state. However, although such judgments can simplify some social decisions, they also carry the risk of prejudice and misjudgment, because most of them may be based on stereotypes or unfounded assumptions. Therefore, realizing the limitations of this initial judgment on others and consciously making changes can bring more equitable social interaction and decision-making results.

The study by Willis and Todorov explored the speed at which the face forms the first impression, which demonstrated that the human mind can make judgments in as short as 100 milliseconds [2]. The study included exposing participants to various facial stimuli and measuring their responses to perceived attractiveness, competence and aggression [2]. The sample includes men and women from different socio-economic status, and the age is carefully controlled to prevent prejudice. The researchers adopted the rapid exposure paradigm, and they asked participants to judge a specific feature of the target face, such as credibility immediately after seeing it, which allowed them to capture the first impression judgment in real time [2]. The final result reveals that participants have amazing ability to make consistent judgments on faces in a short time. This shows that facial features have a direct, possibly subconscious, influence on the perception of credibility and competence.

Furthering this exploration, Olivola and Todorov critically examined people's first impressions and questioned the diagnostic value of appearance-based reasoning, referring to how accurately facial appearance predicts actual behavior. This study reaffirms the diversity of samples and the balance of demographics, focusing on the concepts of facial credibility and perception [10]. By using advanced analysis methods, researchers have studied the correlation between the initial face judgment and the subsequent behavior or the results in the social environment [10]. Interestingly,

their findings reveal the disconnect between facial impressions and actual characteristics or behaviors, which shows that although people often rely on facial clues, this dependence may be easily affected by misinformation and prejudice. This study emphasizes an important limitation of human social cognition, that is, people tend to over-interpret facial features as reliable signals, which often leads to wrong assumptions in the decision-making process. It urges people to reconsider the importance attached to the first impression, and advocates balancing more cautious explanations with extra contextual information.

In a more recent study, Pandeirada et al investigated how evaluations of trustworthiness from faces are influenced by relevant individual variables, such as gender and age [5]. This study included a large number of samples with balanced sex ratio and different social backgrounds to ensure a comprehensive analysis. In the experiment, participants judged many facial stimuli, and their responses were related to personal factors such as education level and personality traits. Through the study, researchers found that personal variables significantly affect the credibility of faces. Participants with higher level of education or have extroverted personality traits tend to have a higher degree of willingness to trust others, while those who with low education level or show more cautious personality traits are usually more cautious in placing trust in others [5]. Therefore, the results show that people's judgment of facial expressions is not only rapid, but also closely related to individual psychological factors, which adds a layer of complexity to the interpretation of hints under social background.

In summary, first impressions based on facial clues are significant in shaping social interactions. They can be used as a quick reference for people to form judgments, but they are easily influenced by facial features and personal psychological state, which leads to inaccuracy. To address these issues, people should cultivate a more comprehensive consciousness. For example, giving priority to the overall understanding of a person rather than just based on the first impression when making decisions, which can effectively help individuals reduce prejudice. In addition, these existing studies emphasize the importance of careful evaluation of facial appearance and advocate the need to include a wider range of background and personal information in the decision-making process. Methodological approaches vary from immediate impression capture to analysis on deeper psychological connections. Each method has its limitations such as sample diversity, subjective measurement, and influence of uncontrollable personal factors. Therefore, future research should provide a richer scope for understanding the dynamic relationship between facial cues and social perception by integrating longitudinal studies that observe how initial facial judgments evolve with time and further interaction.

5. Discussion and future direction

Face recognition and perception are inherently complex processes, which will significantly affect social interaction and judgment. Humans have historically relied on visual cues from face to quickly assess the intentions, characteristics and emotions of others. Although these instant judgments can simplify social communication, they often aggravate prejudice and lead to unfair stereotypes and misunderstandings. Solving these issues needs a comprehensive approach centered on awareness and education, and supported by continuous scientific research.

Cultivating people's consciousness is the first step to reduce the bias of face recognition. Researchers are increasingly emphasizing that individuals need to realize their implicit bias, which stems from the automatic and unconscious processing influenced by social stereotypes. Paying attention to these prejudices can make people critically examine their intuitive judgments through reflective practices and structured training, and also interact with others more fairly. Educational

strategies can play a key role in this process. By helping students identify their prejudices and providing them with ways to resist these tendencies, personal inclusiveness can be enhanced and biased judgments can be reduced. Scientific research also needs to keep up with the progress in understanding face perception. For example, the study of Hehman et al has made great contributions to this field. Their work aims to build a comprehensive facial impression model and outline the current understanding and gap. Their research acknowledges the bias in facial recognition, and examines how facial features and expressions are perceived from the perspective of various social groups' subordination, such as race, nationality and gender [11]. This shows that face impression is not only based on visual characteristics, but also closely intertwined with individual factors.

Current scientific achievements in face recognition research have provided valuable frameworks. These frameworks are helpful to analyze the complex interaction among facial features, emotional expression and social group classification. The researchers found subtle differences in different aspects of the face that affect perception. For example, impact of perceived personal emotional states on the interpretation of credibility, and the relationship between certain characteristics and stereotypical judgments such as ability or aggression. This basic knowledge opens the way for developing new technologies to reduce these biased impressions, especially through artificial intelligence and machine learning applications.

Despite these advancements, there are still many areas that need further study to enhance understanding and reduce stereotypes. A key area is to explore the cultural differences in people's facial perception. Although most of the existing research focuses on the western cultural background, it is very important to understand how the face recognition bias is manifested in the global population. It includes investigating the cultural norms of different countries and how multicultural interaction can shift the stereotypical perceptions of people.

Moreover, expanding research to examine the development of face recognition can provide profound insights. For instance, to further understand at which stage of people's growth prejudice is most likely to form, and how it evolves throughout childhood and adolescence, which can inform early educational interventions. This can let the education system know when it is most effective to interfere with people's cognition. Therefore, the implementation of educational programs for young people can enable future generations to develop more diversified and less biased social concepts. Another area that can be further explored is the intersection of technology and face recognition. With the increasing popularity of facial recognition technology, researchers should focus on how to design these systems to ensure that they will not continue or expand people's existing stereotypes, and minimize prejudice and discrimination.

Overall, awareness and education play a vital role in reducing the prejudice related to face recognition technology, which is a necessary effort to promote a fairer and more inclusive society. Recent studies have provided valuable insights on how individuals perceive and evaluate faces, but many fields still need further exploration. Future research should focus on bridging the existing knowledge defects, especially on understanding cross-cultural differences and promoting advanced technology to help people better understand the social and cognitive mechanisms. By combining scientific theory with modern educational strategies, people can have a deeper understanding of diversity. This method not only promotes people's empathy and inclusiveness in various social and cultural backgrounds, but also can be used to benefit all members of society more fairly.

6. Conclusion

This paper discusses the complex topic of face recognition and its influence on implicit attitude and first impression. Face recognition plays a fundamental role in facilitating human social interaction.

People usually form their initial judgments according to other people's facial features. These quick judgments play a key role in people's daily interactions, because they shape the way people understand, trust or dislike others. Current research on face recognition has gone beyond simple recognition and entered the field of cognition and emotion, which shows how the individual brain processes the target face in a fast and meaningful way. The existing research and experiments show that face recognition greatly affects the implicit attitude and first impression of individuals towards others. People usually rely on appearance to quickly make judgments about dominance, trustworthiness and social characteristics. Although these hasty judgments are sometimes helpful, they can also lead to prejudice and unfair treatment. The existence of "other-race bias" further proves that it is often more difficult for people to accurately identify faces different from their own ethnic groups, which may limit their social interaction and cultural exchange. Therefore, personal experience, educational background and even brief contact with others all can play an important role in the formation of these cognitive processes.

Based on these results, this paper puts forward several practical measures. First of all, individuals and researchers should pay more attention to the automatic bias in the process of face recognition, and realizing these biases is the first step to reduce their influence on judgment. In addition, it is significant to develop training or education strategies to increase people's experience to get along with different racial groups. This kind of effort is helpful to improve the accuracy of facial recognition and social fairness. Furthermore, the future research and practice in real life should be devoted to creating an environment in which quick judgment can be tested and balanced by conscious thinking. Only through the improvement of self-awareness and the more inclusive change of thought can people effectively reduce the negative impact of prejudice in social decision-making.

The significance of this study is that it helps people understand how deeply face recognition affects their lives. It emphasizes that face recognition is not only a perception of facial features, but also a factor that can affect social trust, interpersonal relationship and critical moment judgment. Realizing the limitations and potential risks of unconscious bias can help the society move towards greater fairness and stability. By encouraging individuals and the society to reflect on the formation process of their prejudices and reduce their stereotypes, this paper aims to cultivate a more diverse and inclusive society to improve the quality of people's social interaction.

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