

Research on Validity of Physiognomy in Criminal Investigation

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Abstract: This paper discusses the rationality of crime biology and analyzes the effectiveness of physiognomy in criminal investigation. Crime biology is an interdisciplinary field that studies the relationship between crime and biology, and its rationality involves the integration of multiple disciplines such as genetics, neuroscience, and behavior. In this context, we assess the potential value of crime biology in crime prevention, offender identification, and criminal justice. First, we explore the role of criminal biology in understanding criminal behavior. Through genetic research, the biology of crime can reveal the influence of genetic factors on the tendency of crime, and provide the basis for accurate crime prevention. At the same time, the development of neuroscience has led to a deeper understanding of the relationship between brain structure and criminal behavior, providing new perspectives for the management and prevention of crime. Secondly, this paper analyzes the effectiveness of physiognomy in criminal investigation. Although physiognomy has been widely used in history, its science has always been questioned. By reviewing relevant studies and cases, we evaluate the practical application value of physiognomy in criminal justice. We emphasize that the application of physiognomy in court must be scientifically verified and should not be based on subjective speculation. Finally, the future application of criminal biology and physiognomy in the field of law and criminal justice is prospected. The importance of interdisciplinary research is emphasized for a more comprehensive understanding of the phenomenon of crime. We call for the scientific method and ethical principles to be followed when applying biological and related science to criminal justice to ensure the fairness and accuracy of judicial decision-making. By exploring crime biology and physiognomy in depth, this paper aims to promote rational thinking in these fields and provide guidance for future research and practice.

1. Introduction

In today's society, crime remains a focal point of social security and public order. With the development of technology and societal changes, the understanding of crime is evolving. Crime is not only a social phenomenon but also a complex interplay of psychological, social, and biological factors. Therefore, understanding the roots of crime, crime prevention, and improving the efficiency of criminal justice are urgent priorities.

In this context, the emerging field of criminal biology has gained attention. Criminal biology is

an interdisciplinary field that seeks to explore the formation and development mechanisms of criminal behavior by integrating knowledge from biology, neuroscience, psychology, and sociology. This research focuses on the rationality of criminal biology, exploring its role in crime prevention, offender identification, and criminal justice.[1]

Crime has long been a topic of concern in society. Apart from the social costs of crime and its impact on individual victims, the study of characteristics of criminals has become a focus for scholars. In this regard, physiognomy, or the study of facial features related to crime, has generated widespread interest. While historically known as physiognomy, modern research emphasizes scientific methods and interdisciplinary studies.

Despite an increase in research on physiognomy in the past few decades, controversies and complexities persist. Some studies claim the ability to predict individual crime tendencies through facial features, while critics argue that this perspective oversimplifies the issue and is susceptible to subjective bias. The study of criminals' facial features involves not only natural sciences like psychology and biology but also factors from humanities such as culture, society, and ethics. Therefore, this paper aims to comprehensively explore the facial features of criminals, delving into the multidimensional aspects of physiognomy to provide new insights for research and societal practices in this field.

The primary objective of this study is to examine the rationality of criminal biology. In the process, we will delve into the applications of genetics, neuroscience, and behavior in the field of criminal research to gain a comprehensive understanding of the role of biological factors behind crime.

Secondly, we will analyze the effectiveness of physiognomy in criminal investigations. Although physiognomy has been widely used in certain cultures and historical periods, its scientific validity has always been debated. By reviewing relevant studies and cases, we aim to evaluate the practical value of physiognomy in criminal justice while emphasizing the necessity of scientific validation.

Through in-depth research on these two key issues, we aim to provide a comprehensive understanding of the rationality of criminal biology and physiognomy, offering strong guidance for future research and practical applications. In an era of rapid technological advancement, deepening our understanding of the nature of crime and enhancing crime prevention and judicial fairness are urgent societal needs.[2]

2. Criminal Biology Rationality

2.1. Definition and Scope

Criminal biology, as an interdisciplinary field, aims to explore the biological foundations of criminal behavior by delving into the intersections of biology, neuroscience, psychology, and sociology. It goes beyond the study of criminals' genes and nervous systems, encompassing environmental, social, and psychological factors. This comprehensive approach provides a deeper perspective to understand the formation and evolution of criminal behavior.

Early research suggested that facial shapes might reflect an individual's nature and behavioral tendencies. For example, theories proposed that a concave forehead or wide cheekbones might be associated with more impulsive or aggressive behavior. By observing and psychologically testing individuals with different facial structures over an extended period, researchers attempted to find correlations between facial features and criminal tendencies. The idea of individuals being born criminals, as proposed by Italian scholar Lombroso, also finds some scientific basis.[3]

2.2. Predictive Role of Facial Features in Criminal Tendencies

Modern research employs more scientific methods, such as facial recognition technology and neuroimaging, to decipher the potential role of facial features in criminal tendencies. Researchers use large datasets and advanced statistical methods to quantitatively analyze facial features and attempt to establish predictive models revealing an individual's likelihood of criminal behavior.

Facial studies not only focus on static facial structures but also include dynamic facial expressions. By observing changes in facial expressions, researchers seek to understand the relationship between facial expressions and emotional states and how this relationship correlates with criminal tendencies. For instance, certain facial features may be linked to traits such as indifference or violence.

Gaze is considered one of the most expressive and informative aspects of facial features. Through eye-tracking technology and neuroimaging, researchers attempt to interpret the role of gaze in facial features and explore its potential connection with criminal tendencies. This involves a comprehensive analysis of factors such as attention, anxiety, and social skills.

By deeply studying the association between facial features and criminal tendencies, we can gain a more comprehensive understanding of the potential role of physiognomy in criminology. However, it is important to note that this field still faces many controversies and challenges, including methodological limitations and sample biases. In subsequent research, we will further examine these issues to ensure a more accurate and comprehensive understanding of physiognomy in criminology.[4]

2.3. The Role of Genetics in Criminal Biology

A core focus of criminal biology is the role of genetics in the tendency toward criminal behavior. Through the analysis of twin and family studies, researchers have found that criminal behavior may be partially related to genetics. The presence of specific genes may increase an individual's susceptibility to impulsive, aggressive, and other potential criminal behaviors. This provides a new perspective that interprets criminal phenomena not solely as a social cause but as a result of the interweaving of biology and genetics. Studies indicate that individuals with low-activity MAOA-L gene may have an increased risk of developing aggressive and antisocial behavior.

2.4. Contributions of Neuroscience

Advancements in neuroscience allow for a deeper understanding of the relationship between brain structure and criminal behavior. Through techniques like functional magnetic resonance imaging (fMRI), researchers can observe the activity levels of specific brain regions during criminal behavior. For example, abnormal activity in the prefrontal cortex is associated with defects in decision-making and behavioral inhibition, potentially leading individuals to engage in criminal behavior. This in-depth neuroscience research provides a new biological perspective to explain criminal behavior. The prefrontal brain structure plays a central role in regulating aggressive behavior. The mechanisms involved in this regulation are still broadly understood, but a decrease in neural density appears to play a role at the cellular level. This finding suggests that complex neural networks are essential for social behavior, and the loss of neural "hardware" can lead to information processing defects, potentially promoting violent and functional disorders.[5]

3. Application of Criminal Biology in Crime Prevention and Governance

The application of criminal biology extends beyond explaining the causes of criminal behavior to

crime prevention and governance. By understanding an individual's biological predisposition to criminal behavior, more targeted preventive measures can be implemented. For example, individuals with specific genetic markers or neurological abnormalities could receive more personalized mental health interventions to mitigate or prevent potential criminal behavior. This proactive application makes criminal biology not just an explanatory theory but a powerful tool for crime prevention and social governance.

In summary, criminal biology, through in-depth studies in genetics and neuroscience, provides a more comprehensive and profound understanding of criminal behavior. This biological research depth offers new perspectives for crime prevention and governance, promising to play a crucial role in future societal security construction.

3.1. Historical Review of Physiognomy

Physiognomy, Face reading, as an ancient cultural tradition, has been widely utilized since the ancient Greek and Roman periods. Observations based on facial features such as shape, lines, and colors were believed to reveal an individual's character, destiny, and potential criminal tendencies. However, with the progress of scientific methods and the rise of modern psychology, face reading gradually lost its academic and scientific standing. The concept of face reading traces back to ancient physiognomy, and it has been manifested in various cultures. Ancient physiognomy sought to interpret an individual's character, destiny, and behavior through facial features and structure. In traditional Chinese physiognomy, facial features are considered to have subtle connections with the natural order, while in the West, physiognomy was once a popular field of study used for predicting individual destinies.[6]

With the continuous advancement of scientific research methods, modern criminal physiognomy emphasizes objectivity and systematicity. Research methods from multiple fields such as psychology and biology have been introduced, gradually freeing criminal physiognomy from purely subjective physiognomical frameworks. In recent years, researchers have attempted to find scientific connections between facial features and criminal behavior through facial recognition technology and big data analysis, driving the development of this field.

3.2. Scientific Issues of Face Reading

Face reading has long been questioned in terms of its scientific validity. One of its main issues is subjectivity and the lack of standardized measurement methods. The interpretation of facial features is often based on the observer's subjective experience, lacking objective and replicable measurement standards. This poses serious methodological challenges for face reading in modern scientific research, leading to widespread skepticism about its application in criminal justice.

According to the classification of juvenile crimes in the 1940s and 1950s, American scholar Sheldon proposed a connection between juvenile crimes and physique. He categorized individuals into endomorphic, mesomorphic, ectomorphic, and balanced types. It was found that mesomorphic individuals accounted for 60.7% of juvenile offenders. However, due to their robust physique and energetic nature, mesomorphic individuals were more likely to engage in criminal behavior when faced with unfavorable conditions, all other factors being equal.[7]

3.3. Practical Application of Face Reading in Criminal Justice

Despite face reading losing its standing in the modern scientific community, some studies and cases still attempt to demonstrate its practical value in criminal justice. By reviewing relevant research and cases, we evaluate the actual effectiveness of face reading in criminal identification

and investigation. However, it is important to note that these studies often have methodological flaws, making it challenging to draw universally applicable conclusions. Many police officers, while investigating cases, rely on their keen sense of criminal intuition, leading to targeted searches and swift case resolutions. For instance, aspects such as body posture while walking, the shape of protruding ear bones, and the intensity of gaze can provide insights into individual personality traits.

Genetics, the information storage segment of DNA, carries the basic structure and functions of human life. In families where parents exhibit criminal tendencies or behavior, genetic inheritance may predispose minors to become "born criminals." Two famous family crime studies in the United States include the Juke family study by sociologist Richard Dugdale and the Kallikak family study by psychologist Henry Goddard. Dugdale found that among over 500 individuals in six generations of the Juke family, more than 140 were criminals. He believed in the "criminal gene," passed down through generations, leading to a significantly higher crime rate among family members. This is because genes typically determine potential personality traits, increasing the likelihood of criminal behavior.

3.4. Limitations and Controversies of Face Reading

The application of face reading faces various limitations and controversies. Firstly, the interpretation of facial features is subjective, and different observers may reach different conclusions, reducing its reliability. Secondly, the shape and features of facial features may have different interpretations in various cultures and societies, challenging its cross-cultural universality. Most importantly, the scientific validity of face reading has been deeply questioned in the development of modern psychology and biology, posing significant challenges to its application in criminal justice. The predictive value of Lombroso's view that criminals are born has lost its relevance, as he later acknowledged the influence of the social environment on criminals, adjusting the proportion of born criminals in the criminal population to one-third.

Overall, while face reading remains influential in certain cultures, its scientific validity and practical value in criminal justice are subject to considerable controversy. In the next step, we will compare criminal biology and face reading to comprehensively assess their roles in the field of criminal justice.

4. Comparison of Criminal Biology and Face Reading

4.1. Necessity of Scientific Validation

4.1.1 Scientific Foundation of Criminal Biology

Criminal biology is based on modern research methods in genetics and neuroscience, providing a more scientific and objective theoretical foundation. Through large-scale twin studies and neuroimaging technology, criminal biology can offer more objective and replicable data, establishing a solid basis for the biological interpretation of criminal behavior. For instance, antisocial personality disorder, determined by genetics, is associated with violent behavior. This disorder, characterized by a lack of remorse and sympathy for victims, is part of the diagnostic criteria for violent criminal behavior. Psychopathy, a core structure of antisocial personality disorder, is related to frontal lobe dysfunction (Herpertz & Sass, 2000), and its statistical relationship with violent behavior is influenced by genetic factors, alcohol consumption, and age (Tikkanen et al., 2011). Only a subgroup of patients meeting the criteria for mental illness consistently shows a strong association with violence, especially recurrent violent crimes (Bonta et al., 1998; Coid & Yang, 2011). The connection between antisocial personality disorder and violence is also confirmed

in significant comorbidity among male patients with major psychiatric disorders (Moran & Hodgins, 2004). In a meta-analysis of violent offenders, mental illness itself is slightly negatively correlated with violent crime (Moran & Hodgins, 2004).

4.1.2. Scientific Validation Challenges of Face Reading

In contrast, face reading faces significant challenges in scientific validation. Its interpretations often rely on subjective observations and traditional beliefs, making it difficult to prove its effectiveness through scientific experimentation. The lack of unified standards and objective measurement methods makes face reading vulnerable to scientific validation challenges, severely limiting its application in the field of criminal justice.

4.2. Reliability and Replicability Comparison

4.2.1. Reliability of Criminal Biology

Criminal biology studies typically utilize advanced technologies such as DNA analysis and neuroimaging, ensuring high reliability and replicability. Scientific research often yields similar results in different laboratories and environments, making criminal biology research more trustworthy. For example, a study by Beaver, Boutwell, Barnes, Vaughn, and DeLisi (2012) measured psychiatric features and criminal system encounters in a national sample of males and females. They concluded that there is a close connection between psychiatric patients and criminal outcomes, without gender, age, or racial influences. Limited experts have presented evidence of unique genetic risks associated with defendants and crime, with the most common being a low-activity gene variant, monoamine oxidase A (MAOA). This variant is related to aggression and antisocial behavior. In the early 1990s, a Dutch family was found, with male members exhibiting abnormally high aggression and antisocial criminal behavior, linked to a rare mutation resulting in complete absence of monoamine oxidase A (Brunner et al., 1993). This enzyme is responsible for breaking down key neurotransmitters in the brain, including serotonin. While a functionally inactive monoamine oxidase A gene is rare (no other cases have been reported), there are also common gene variants with varying transcriptional efficiency. Variants in the low-activity monoamine oxidase (MAOA-L) gene are less efficient and therefore result in more efficient high-activity variants (MAOA-H)

The concentration of serotonin in the brain is higher. This suggests that genes may play a role in predicting crime.

4.2.2. Reliability dilemma of physiognomy

There are great problems in the reliability of physiognomy. Since the interpretation of facies relies primarily on the subjective experience of the observer, different observers may reach radically different conclusions, reducing its reliability. At the same time, the characteristics and meanings of facial features may also be different in different cultures, which further reduces its reliability in different social contexts.

4.3. Consideration of social and legal acceptability

4.3.1. Social acceptance of criminal biology

With the development of biology and neuroscience, crime biology has gradually gained a high degree of recognition in academia and society. Its scientificity and objectivity make its theory more

acceptable, and its application in the field of criminal justice has also gained some support. Biological predispositions are formed not only by genetic and epigenetic determinants, but also by perinatal influences such as hypoxemia, infection, hormones and possibly a host of other lesser-known factors, as well as disorders of brain function acquired through trauma, infection, toxic or degenerative effects and even tumors. The above medium level of social influence is influenced by changes in the immediate family environment of the individual at the most basic level, the overall social environment of the superiors, and finally by political influences.

4.3.2. The social acceptability challenge of physiognomy

In contrast, physiognomy is less accepted in modern society. With the progress of scientific method, people are more inclined to accept conclusions based on objective evidence and scientific research, while there is greater suspicion of subjective observation and ancient traditional physiognomy. Its use in the courts has also been questioned by legal professionals and judges, challenging its social acceptance.

4.3.3. Future Outlook

On the whole, criminal biology has more advantages than physiognomy in scientificity, reliability and social acceptability. In the future, we expect to see more research on the biology of crime to provide a more precise and scientific approach to criminal justice. However, we also emphasize that in applying the biology of crime, the scientific method and ethical principles must be followed to ensure the fairness and accuracy of judicial decision-making.

5. Future Outlook

5.1. The importance of interdisciplinary research

One of the future research directions is to further strengthen the interdisciplinary cooperation between criminal biology and other disciplines. By integrating research from multiple disciplines, including biology, neuroscience, psychology, and sociology, we can gain a more complete understanding of the phenomenon of crime. This comprehensive research is expected to provide a more comprehensive and profound understanding, and provide a more forward-looking perspective for crime prevention, crime identification and judicial decision-making. In the field of crime biology research, when the research purpose has changed from trying to find the biological causes of all crimes to focusing on the biological causes of a single crime type, it shows that contemporary crime biology theory does not advocate biological determinism, but recognizes that some biological characteristics only increase the likelihood of committing certain kinds of behavior, such as violent crime. From the perspective of current research fields, such as genes, neurotransmitters, brain mechanisms, etc., the research perspective is more refined, the research methods are more advanced, and the mechanism of violent crime is more clearly understood, which is brought by the progress of technology. However, the more in-depth research, the more found that the study of a single biological factor is of little significance, in the case of other variables can not be controlled, but there will be contradictory results, and multi-factor biological research is the trend of future research.

5.2. Rational application of law and criminal justice

Future research should focus on how to more effectively apply findings from crime biology to law and criminal justice practice. By developing clear guidelines and standardized operating

procedures, the rational use of biological evidence can be ensured. In addition, training programs to give legal professionals a deeper understanding of the interpretation and application of biological evidence contribute to the feasibility and effectiveness of the biology of crime in the judicial field. Social stereotypes about physical appearance can seep into the justice system, influencing the decisions of judges, juries, and law enforcement agencies. This facial bias may lead to stricter penalties or higher levels of suspicion for individuals with certain facial characteristics. By studying the manifestation of physiognomy in judicial decision-making, we can assess the actual impact of physiognomic criminology on society.

5.2.1. The importance of scientific method and ethical principles

The importance of scientific method and ethical principles must be emphasized while promoting the study of crime biology. The rigor of scientific method is the key to ensure the reliability of research conclusions, and the observance of ethical principles is the basis to protect the rights and interests of research participants. Research on the biology of crime must focus on transparency and reproducibility, while ensuring respect for the subjects and protection of privacy.

5.2.2. Innovative research direction of crime biology

Future research could explore innovative research directions in crime biology, such as the application of deep learning techniques in the analysis of neuroimaging data, the discovery and validation of biomarkers, and the ethical and legal issues of gene editing technology. These research directions are expected to bring new breakthroughs in the field of crime biology and improve its application level in crime prevention and criminal justice.

5.2.3. Public education and science communication

Finally, public education and science communication are an important part of promoting the application of crime biology. By disseminating the basic principles and results of the biology of crime to the public, society's understanding and acceptance of the field can be enhanced. Science communication can help to break down the information barrier between criminal biology and the public, and encourage society to more actively support the application of criminal biology in the field of crime.

Considering the role of criminal biology and physiognomy in the field of criminal justice, we emphasize the advantages of criminal biology in scientificity, reliability and social acceptance. In the future, through interdisciplinary research, rational application to legal practice, adherence to scientific methods and ethical principles, and continued innovative research directions, crime biology is expected to better serve society and bring new progress to the field of crime prevention and criminal justice. Violence has always been an important feature of human history. The reasons are as varied as any other condition of human life. The psychiatric perspective presented here, based on a biopsychological model, can help improve understanding of many aspects of problems that can be addressed with specific therapeutic interventions. When adopting tailored interventions for aggressive and violent patients, psychiatrists and psychologists should be aware of all possible causes and mediating factors for this behavior. Not only is there hope, but there is evidence that, contrary to pessimistic assumptions, the ongoing process of "civilization" is leading to a generally more peaceful world in the long run.

6. Conclusion

As two different methods, criminal biology and physiognomy have attracted wide attention in the

field of criminal justice. By comparing and analyzing them, we conclude that the science, reliability and social acceptability of criminal biology are more conducive to its application in criminal justice. However, we also highlight the unique place of physiognomy in history and culture, and its social influence despite its difficulties in modern scientific validation.

In future research, interdisciplinary collaboration will be key to advancing the biology of crime. Integrating knowledge from multiple disciplines, including biology, neuroscience, psychology, and sociology, can provide us with a more comprehensive explanation of criminal behavior and bring research closer to the real social context. Such interdisciplinary research is expected to bring more accurate and powerful tools to the field of criminal justice, and improve the scientific and fair judicial decision-making.

In the application of criminal biology, the scientific method and ethical principles must be emphasized. Ensuring transparency and reproducibility of research while protecting the rights and interests of research subjects is key to the role of criminal biology in criminal justice. Public education and scientific communication are also indispensable in promoting the development of this field, and by disseminating knowledge about the biology of crime to the public, society can enhance its understanding and acceptance of its application.

To sum up, criminal biology, as a new research field, provides us with an opportunity to understand the phenomenon of crime more deeply. With continued research and innovation, we can expect to see more scientific, actionable approaches to bring substantial improvements to the criminal justice field in the future.

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