

READING BETWEEN THE BARS

Brain Science Suggests New Considerations for the Legal System

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THE FOLLOWING REVIEW SURVEYS THE CURRENT ROLE OF INTENT IN DETERMINING BLAMEWORTHINESS IN THE CRIMINAL JUSTICE SYSTEM. THROUGH RESEARCH ON EMPATHY, STRESS AND THE FACTORS THAT CONTRIBUTE TO ANTISOCIAL PERSONALITY DISORDER, THE WORK AIMS TO COMMUNICATE THE NECESSITY FOR NEW TECHNOLOGY IN THIS FIELD. IN ORDER TO IMPROVE THE ACCURACY OF THE CRIMINAL JUSTICE SYSTEM IN ASSIGNING PUNISHMENT AND REHABILITATING OFFENDERS, THERE MUST BE CONSIDERATION FOR THE NATURE AND NURTURE THAT CONTRIBUTED TO THE INDIVIDUAL'S DECISION MAKING, NOT JUST THE CHOICES THEY MAKE OR THE EVIDENCE PRESENTED AGAINST THEM. PHILOSOPHER IMMANUEL KANT AFFIRMS THAT INTENTION IS THE TRUE INDICATOR OF CHARACTER, AND IF THE CRIMINAL JUSTICE SYSTEM WORKS TO EMPLOY NEUROTECHNOLOGY THAT IS MORE ACCURATE IN DETERMINING GUILT, SOCIETY CAN IMPROVE. CRIME RATES AND THE NUMBER OF PEOPLE IN PRISON WILL DECREASE, AS PREVENTATIVE MEASURES CAN BE TAKEN ONCE KNOWLEDGE IS SPREAD ABOUT THE ENVIRONMENTAL FACTORS THAT CAN BREED CRIMINALS. IGNORANCE OF THIS FUNDAMENTAL ASPECT OF CRIMINOLOGY WILL LEAD TO THE PROMOTION OF DISHONESTY IN OUR CULTURE, AS WELL AS CYCLICAL CRIME AS OFFENDERS MAY NOT BE RECEIVING THE HELP THEY NEED.

Philosopher Immanuel Kant prioritizes the assessment of motive over the examination of consequences. Kant's philosophy argues that despite the potentially negative outcomes of people's decision-making, society should view that individual neutrally if their intention was inherently "good." This philosophy is in opposition with current political and societal views regarding behaviors associated with crime.

At present, individuals are judged based primarily on one's actions and not one's intent. How does a court of law accurately assess an individual's "intent" related to allegations surrounding their criminal behavior in question? Personal testimony is currently the primary evidence presented in criminal cases to classify intention. Historically, technological advances have attempted to measure physiological properties like moisture through skin, conductance measurements, blood pressure, and changes in resting heart rate during interrogation. Together, these data were phenomenologically classified as viable lie detection methods admissible in court. Recently, there has been a surge in the development of engineering neurophysiological instruments with sophisticated computational neural modeling that aim to accurately predict the regions of the brain that activate during false memory recall (e.g., intentional lying) versus factual and personal accounts (e.g., truth-telling; citation).

As of now, current lie detector technology exists, but lacks test-retest reliability. One of the main goals of employing these lie detection methods in court is to provide support for the suspect's guilt rather than their innocence. The assessment of an individual's intent in the criminal justice system is widely used to determine the degree of murder and the levels of punishment. For example, A judge's sentence in murder trials is contingent on one's extent of premeditation, whereas verdicts surrounding murder cases regarding self-defense appear to evaluate intent heavily. Statistically speaking, less than ten percent of proper self-defense shootings lead to charges (Cruz, 2015 & U.S. Department of Justice, 1995). While first and second degree murder cases both include references to defendant intentionality, first degree murder is still classified as being perpetrated deliberately with premeditation (Degrees of Murder, 2017). Therefore, evidence-based measurements of intent should be required for defendant crime conviction. Utilizing emerging technological advances in cognitive neuroscience can serve as a reproducible and accurate method to assess an individual's character as opposed to using witness

testimony for a jury and a judge to evaluate an alleged criminal action. Thus, the burgeoning field of criminology has great potential to significantly improve its accuracy on assigning blameworthiness in an effort to expand societal thinking that being a "good" human is of value. Rather than pursuing a Machiavellian attempt to appear virtuous, one should actually be virtuous.

Due to lack of sufficient knowledge about the human brain, the range of assessment of intention in the court of law is limited. Currently, there is a lack of technology that accurately evaluates culpability. In a study testing the effects of perceived efficacy of detection in the Guilty Actions Test, which uses a polygraph, guilty participants responded more confidently if the accuracy of the polygraph was perceived to be lower. If trust in the accuracy of the test decreases, accuracy could decrease because the defendant under investigation may respond to questions more confidently and be perceived to be telling the truth even though they are not (Zvi & Elaad, 2016). In order to unequivocally assign blame and accurately assess the culpability of an individual, it is important to consider other predictive factors of intent, apart from the inherently variable physiological responses to a set question list.

There are a variety of factors that lead people to commit random and heinous crimes. Perhaps the criminal justice system should assess blameworthiness in individuals who feel remorse, apathetic, and pleasure from their crimes



A PORTRAIT OF IMMANUEL KANT (COURTESY OF WIKIMEDIA COMMONS)

“Results from several studies have found that remorse, in part, is genetically encoded...”

separately. A defendant who is genuinely pleased and self-confident about the crime they committed may not exhibit the physiological responses relevant to the common set of results obtained from traditional lie detector tests because these data appear to be largely based on underlying guilt. For example, if an individual (e.g., a sadist) has a neurobiological disposition to feel pleasure from their crimes, the reward circuitry of the brain may not produce similar dopaminergic (DA-ergic) responses to questions surrounding a specific crime relative to a normal individual's brain responses. Interestingly, some individuals move past simply feeling apathetic about their crimes and actually exhibit an intense sense of pleasure surrounding their deviant behavior. This may have a neurological basis in an area of the brain's reward system, such as the nucleus accumbens (or NAcc) where Dopamine (DA) is released during both pleasure and pain. Prior research has found trait-associated hypersensitivity to pharmacologically induced DA release in the NAcc enhanced the possibility that impulsive-antisocial traits might be linked to reward-related information processing biases in this forebrain region (Buckholtz et al., 2010). This study provided convincing evidence by testing NAcc DA activity during monetary reinforcement to evaluate underlying impulsive and antisocial behaviors - a trait associated with psychopathy. Impulsive-antisocial personality temperaments predicted excess neurochemical and functional engagement of the mesocorticolimbic NAcc DA response to reward processing. Mounting research in rodents suggests that mesocorticolimbic DA release is critical for the expression of aggressive behavior (Buckholtz et al., 2010). Violence is a significant behavioral correlate of impulsive-antisocial personality traits although other work demonstrates the two are not synonymous.

Even in situations where a defendant on trial appears irrefutably guilty, society should still be responsible for routinely examining biological and/or environmental factors that may have contributed to predisposition to criminal behavior. Regularly employing these types of assessments of defendants on trial could provide better data-driven verdict assessment and provide more accurate evidence-based therapeutic treatment through rehabilitation whether when incarcerated or released back into society.

Results from several studies have found that remorse, in part, is genetically encoded, forcing some individuals to experience a heightened sense of emotional connections with others. Thus, the expression of high levels of empathy is a significant predictor that an individual is less likely to commit crimes and more likely to experience intense feelings of remorse or guilt. There are two types of empathy--cognitive empathy, which appears to be environmentally conditioned, and affective empathy, which may be genetically determined. Cognitive empathy is recognition of suffering and distress in another person whereas affective empathy is an emotional reaction (Young et al., 2015). Therefore, the multifactorial origin of empathy should be routinely considered in court because most law enforcement classifies cognitive behavior, like intentionality, as emerging from either nature or nurture.

To empirically investigate the role of empathic response levels in at-risk individuals, researchers used VERA-2 (Victim Empathy Response Assessment) to measure victim empathy among mentally disordered offenders. The results from this work substantiated VERA-2 as a valid assessment for measuring victim empathy among offenders exhibiting mental illness. Therefore VERA-2 could represent a promising assessment to predict an individual's risk to display criminal-like behavior in childhood. VERA-2 may represent an essential assessment method to determine precautionary measures to lower the crime rate and to protect vulnerable individuals from straying down this destructive path (Young et al., 2015).

A significant conclusion drawn from the results of this investigation was that acceptance of violence and remorse for the index offense were the best predictors of both cognitive and affective empathy. Empathy levels negatively correlated with antisocial personality disorder and patterns of violent cognition. This experimental evidence suggests that people who display characteristics associated with antisocial personality disorder have an increased risk for criminal behavior, possibly due to their lack of empathy.

There is a societal tendency toward acceptance of simple explanations. Multifactorial causality complicates the situation. But if one is to attain a complete picture of the truth, they must examine from many different angles. Results

from prior work examining levels of empathy among animals and infants suggests that cognitive empathy is instinctive (Buckholtz et al., 2010). Therefore, empathic responding may represent an inherent quality that some animals possess. Individuals that fail to feel empathic are considered atypical emotional responders and a specific limbic circuit involving the amygdala and NAcc may underlie these patterns of emotive responding relative to neuro-typical individuals experiencing empathy on a frequent basis.

A common misconception in the criminal justice system is an ideology that individuals actively “choose” to perpetuate criminal activity. However, if the capacity to display empathy is an inherent emotional state humans possess and the developmental capacity for their brains to construct neuronal circuitry controlling these emotional responses, we as a society have a social responsibility to utilize reliable assessment tools to more accurately predict and prevent violence and criminal activity.

To what extent can we blame biology for people’s shortcomings? Perhaps people act a certain way due to their tragic fate of developing an antisocial disorder or a brain tumor. However, one can examine this debate from multiple angles. One perspective could defend the individual, questioning how anyone could blame the life choices of someone with a tumor affecting the way their brain functions by enacting in socially inappropriate or law-breaking types of behavior. Others could question whether the tumor brought out a underlying behavior that unveiled a problematic set of personality traits. In this case, intent becomes irrelevant because one side of the person—the facade they present to the world—may represent an individual bearing good intentions, while another dimension of their character, masked beneath by more rational parts of the brain, may have malicious intentions and exhibit sociopathic tendencies. In fact, there are personality traits recognizable to anyone, not just psychoanalysts, that correlate with psychopathy and predict adolescent crime. Using the Psychopathy Checklist, a large adolescent sample of justice-involved youth were assessed using item response theory. “Impulsivity” and “irresponsibility” were the most likely to be rated high, and “failure to accept responsibility” was endorsed more frequently to describe adolescent girls. Adolescent boys were more closely coupled with “grandiose sense of self-worth” and “lacks goals” (Tsang et al., 2015).

In the article *Neurocriminology: implications for the punishment, prediction and prevention of criminal behavior*, the multifactorial causes and consequences for acts of criminal behavior are thoroughly discussed. Antisocial personality disorder, which is highly correlated with criminality, can develop as early as in the womb. For example, if pregnant women consume drugs or alcohol, specifically nicotine, there is empirical evidence supporting a significant relationship between exposure to these teratogens in the womb and criminal behavior in adulthood. Juvenile delinquency and aggressive behavior have also been linked to lead exposure in multiple studies. Poor prenatal care, including drug use and poor nutrition, can be correlated with the development of antisocial personality characteristics in children (Glenn & Raine, 2014). How does this affect our current views on blameworthiness? Is it just to blame an individual for their mother’s poor prenatal care? Even after birth, reinforcement of these cognitive changes can occur from a negative social environment. If children are not exposed to a positive social environment (e.g., home, community) throughout development, these young children may be at an increased risk of lacking affective empathy (Glenn & Raine, 2014). One of the functional roles of displaying empathy is to aid in the establishment of interpersonal relationships and bring individuals closer together as a community, so the whole may be stronger than its component parts. If people develop in an environment that dampens their empathy, or are born with neural circuits that don’t process empathy in a neuro-typical fashion, they are essentially powerless against the society that



A DEMONSTRATION OF A LIE DETECTOR TEST (COURTESY OF WIKIMEDIA COMMONS)

they live in. We, as a society, should become more aware and understanding of people who lack empathy.

There is a neurological basis underlying all decision-making, yet the criminal justice system continues to judge people based on their decisions and actions. Societies operate civilly when social order and specific laws are enforced to maintain order and prevent chaos. However, is it possible that the majority of individuals incarcerated were born with neuronal functioning making them more vulnerable to life stressors and/or criminally defined behavior? There must be a social order established to convince people to behave in the established “normal” way, but one must also consider the implications on our society if everyone that is born with a certain mind sets up in our country’s prison cells. What is normal and abnormal and who should establish what defines these two states of mind? Each society determines what is socially acceptable and the people that behave in a manner that does not align with this code of conduct generally become outcasts and criminals. Because people’s attitudes form judgment about what is “normal” versus “abnormal”, social stigma is pervasive across cultures and different societies around the world. Due to the social stigma associated with admitting to oneself that he or she is struggling with mental faculties, the majority of those struggling with mental health problems internalize their issues instead of getting the help needed to live a content and healthy lifestyle. These implicit and explicit biases often lead to social exclusion and individuals can develop severe agoraphobia which socially isolates individuals. The lack of social support and interaction exacerbates the consequences of their underlying mental health conditions.

In a study, stress is assessed as a catalyst for criminal behavior in individuals who are more vulnerable to develop a mental illness. Results from this study indicated that prolactin was a predictor of psychosis transition. As both subjects who underwent their first episode of psychosis and subjects with prodromal symptoms of psychosis report more stressful life events, it is possible that stress plays a role in the risk of developing psychotic behavior. Stress over the course of one’s life can create an environment that does not nurture the at-risk mind in a way that leads them to develop empathy and careful decision-making. As previously discussed, negative environmental experiences and life adversity can significantly impact the expression of affective empathy. Without this state of mind, people are increasingly at risk to commit crimes because they lack the ability to feel for

their victims. The classical diathesis-stress model of schizophrenia has been used to suggest that psychosocial stress activates the hypothalamic-pituitary-adrenal (HPA) axis, which induces cortisol release and enhances DA neurotransmission, contributing to the emergence of psychosis in vulnerable individuals. Thus, stress can serve as a significant trigger in the nervous system to amplify psychosis in at-risk individuals (Labad et al., 2015).

Stress is generally experienced as something external that can lead to impulsive, out-of-control behavior. Impulsive tendencies can also originate from traits underlying antisocial behavior in psychopathy and be triggered by an overactive DA reward system (Buckholtz et al., 2010). Findings using fallypride positron emission tomography and blood oxygen level-dependent functional magnetic resonance imaging revealed that impulsive antisocial psychopathic traits selectively predicted DA release in the NAcc. It rewards anticipated neural activity in response to pharmacological and monetary reinforcers. Thus, coupled with a lack of empathy, psychopathic individuals can be predisposed to criminal behavior, particularly violent offenses. Recent research on the neural substrates of psychopathy have focused on deficiencies in the capacity to process emotion and have emphasized that dysfunction in neuronal connectivity between the amygdala and ventromedial prefrontal cortex is a critical dysfunction to deficient fear processing and empathy.

Psychopathy is often confused with sexual sadism, individuals who gain joy and pleasure from the pain of others. The typical Hollywood depiction of a serial killer combines the two. However, in a recent study, scientists scanned the brains of violent sexual offenders and found that when viewing pictures of pain, the sadists showed greater activation in their amygdala compared with other types of sexual offenders. Furthermore, when viewing these graphic images, sadists rated the pain experienced by the victims as more intense than the non-sadists did. The more intense sadists perceived the pain was, the greater their neuronal activation in the insula-- a brain region involved in monitoring one’s own feelings and bodily states. Together, this evidence suggests that there is a physical translation of pain in victims to pleasure in sadists witnessing the pain (Szalavitz, 2012).

These types of feelings are probably highly correlated with blameworthiness because it appears that individuals feel no remorse for crimes they commit. However, these feelings are also neurochemical in nature. So can our society

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blame sadists for feeling a way their brain chemistry makes them feel? Moral ignorance does not preclude blameworthiness, and yet society treats these individuals as outcasts because their code of morals, or lack thereof, does not align with the general consensus for what is perceived to be acceptable. It is widely accepted in society that one should prevent harm on others. A truly virtuous person would be averse to doing anything to an innocent person that would cause great suffering. Blameworthiness appears to have a lot more to do with choice, as culprits perpetrating acts of violence are generally viewed to have consciously “chosen” to inflict the pain and suffering to others. Perhaps the criminal justice system should consider applying novel brain imaging tools being developed in neuroscience to assess mental faculties that are associated with an individual’s neurological predispositions prior to deciding blame. In summary, the body of work reviewed in this paper appears to indicate that often biology is to blame, but present knowledge of the human brain is still in its infancy and it would be difficult to persuade the U.S. courts to evaluate multiple dimensions of a person’s brain, DNA, body, and personality when deciding sentencing and punishment in criminal trials.

Proper surveying of the biological and environmental factors that contribute to an individual’s predisposition to crime may change the perception of intentionality in the criminal context and help reframe the justice system. Information brought forth to a trial about a defendant’s history could lead jurors and judges to consider the environment that may have contributed to the criminal behavior an individual is being accused of. Not only could it help the defendant’s case, but this change in law policy may also have a much larger impact by allowing the government to implement preventative measures and allowing society to gain critical knowledge about how to decrease crime rate. For example, if pregnant mothers knew how serious the implications could be on their child’s future if they consume drugs of abuse or alcohol in excess during pregnancy, they may be more averse to doing so. If it becomes public knowledge that stress can unleash underlying psychotic behavior, perhaps society will attempt to decrease the stresses they put on every individual in an effort to signifi-

cantly reduce and ultimately eradicate crime.

Empathy and stress are common psychological terms most people understand. These emotional states are critically involved in decision-making, particularly in terms of behavior that can be punishable by law enforcement. Therefore, the judiciary system should initiate mandatory rehabilitation policy to improve the processing of affective empathy in individuals convicted or even accused, given the significant psychological trauma caused from being a suspect. Target populations that society should focus on providing ample resources for treatment and high-level behavioral healthcare represent individuals currently incarcerated, about to be released, people on parole and individuals out of prison and reintegrated into society. Perhaps one type of treatment could involve cognitive behavioral therapy to reduce psychological trauma caused by harmful life experiences in an effort to re-establish empathic responding.

Other viable treatment options may involve multiple sessions of deep introspection in an individual to accurately understand and predict life events that are likely to trigger antisocial patterns of behavior. These behaviors include drug/alcohol relapse, violence, stealing, lying, cheating, etc. This introspection treatment would be done out of a concerted effort to make the individual conscious of what types of social and work environments are less stressful in order to prevent re-entry into prison or criminal behavior choices in the first place. Finally, the criminal justice system should continue to employ technology developed in the field of neuroscience to more accurately assess patterns of brain activity related to particular types of antisocial behaviors that may predict culpability. For example, perhaps individual differences in DA kinetics in the NAcc represent an accurate biomarker that predicts those individuals that are more vulnerable to displaying patterns of antisocial behavior during intense, stressful life experiences (Buckholtz et al., 2010 & Labad, 2015). If measuring levels of dopamine and testing responses to images of victims in pain more accurately represents the type of criminal the individual is defined as, judges and jurors may more accurately be able to assign blame to culprits and

prevent the destruction of lives due to a condition individuals are unable to control.

Ultimately, self-control is generally what is being assessed with regard to measuring intent in the criminal justice system. Those who are declared “mentally ill” and are institutionalized rather than incarcerated are classified as being out of control and should not be held accountable for alleged crimes they have committed. Mental illness is not clinically diagnosed in every individual convicted of a crime. However, if an insanity defense is currently the only argument justified to acquit an individual and not place blame for the alleged crime, the legal system should reassess how individuals with a clinically-based diagnosis of a specific challenge in mental functioning should be defended during trial. Perhaps one day there will be a precise neurological assessment that is reliable enough to determine whether or not an individual accused of a crime has issues with their brain’s decision-making hardware that can lead to misguided judgment and lack of self-control. If that were to be the case, could the same argument be made that all people convicted of crime were out of control because they lacked cognitive or affective empathy when they committed the alleged illegal activity?

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