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Emotional learning and the development of differential moralities: Implications from research on psychopathy

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Abstract

In this paper, we will argue that (1) four classes of norm can be distinguished from a neuro-cognitive perspective; (2) learning the prohibitive power of these norms relies on relatively independent emotional systems; (3) individuals with psychopathy show selective impairment for one of these emotional learning systems and two classes of norm: care-based and justice-based; and (4) while emotional learning systems are necessary for appropriate moral development/reasoning, they are not sufficient for moral development/reasoning.

Introduction

The goal of this paper is to consider a series of claims regarding the development of morality with particular relevance to psychopathy.

Psychopathy

Psychopathy is a disorder characterized by emotional deficits (reduced guilt and empathy) and an increased risk for antisocial behavior.¹ It is relatively developmentally stable from childhood into adulthood.² The assessment of psychopathy has proven efficacy for risk assessment.³

Psychopathy is not equivalent to the psychiatric diagnoses of conduct disorder or antisocial personality disorder. These DSM-IV diagnoses concentrate on the presence of antisocial behaviors rather than putative underlying causes such as emotion dysfunction. As such they capture a broader array of individuals.

Claim 1: most emotional expressions are reinforcers

Emotional expressions allow the rapid transmission of valence information to conspecifics. Thus, in social referencing studies, mothers display emotional reactions to novel objects in front of their children.⁴ Objects associated with their mother's happiness are approached and those associated with their mother's fear or disgust are avoided by the infant. Observational

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fear studies in non-human primates involve infant monkeys observing their mothers displaying emotional reactions to novel objects. Infants monkeys show fear towards those objects associated with maternal fear.⁵ Displays of disgust are also aversive reinforcers, particularly with respect to foods, allowing rapid taste aversion learning.⁶

Emotional displays also modify the observer's behavior. Displays of distress — sadness, fear and pain — typically reduce aggression and may discourage such displays in the future: they act as aversive reinforcers.⁷ Anger is typically used to curtail an other's behavior when social rules or expectations have been violated.⁸ Displays of anger serve as signals to modulate current behavior and trigger response change.⁷

Claim 2: different emotional expressions are processed by at least partially independent emotional learning systems

Considerable data indicate that at least partially independent systems process specific emotional expressions (for a meta-analytic review, see Ref. 9). The amygdala is critically involved in aversive conditioning.¹⁰ Consistent with the suggestion that fearful and sad expressions induce aversive conditioning, both initiate amygdala activity more reliably than anger or disgust.⁹ Moreover, the amygdala is now known to be necessary for observational fear learning.¹¹ In contrast, the insula is critical for taste aversion learning.¹² Fitting with the idea that disgusted expressions induce taste aversion learning,⁷ these expressions are also associated with increased insula activity.⁹ Inferior frontal/anterior insula cortex are critically involved in organizing response change.¹³ In line with the suggestion that anger expressions are critical for triggering response change,⁷ these expressions are particularly associated with increased activity within these regions.⁹

Claim 3: individuals with psychopathy show impairment in processing distress cues

Considerable data indicate that elevated psychopathic traits are associated with impaired processing of distress cues; i.e., the fear, sadness, and pain of others. Thus, data indicate that individuals with psychopathic traits show (1) impaired recognition of fearful and, to a lesser extent, sad facial expressions (for meta-analytic reviews of this literature, see Refs. 14,15); (2) impaired recognition of fearful and sad vocal tones;¹⁶ (3) impaired recognition of fearful body postures;¹⁷ (4) reduced autonomic responses to others' fear, sadness, and pain;^{18–20} (5) atypical EEG responses to others' pain;²¹ (6) reduced amygdala responses to fearful expressions;^{22–24} (7) reduced initiation of attentional priming, by the amygdala, in associated regions of temporal, parietal and posterior cingulate cortex;²⁵ and (8) reduced amygdala responses to others' pain.²⁶

Claim 4: individuals with psychopathy are relatively intact when processing anger and disgust expressions

Children and adults with elevated psychopathic traits show intact processing of angry and disgusted expressions. Thus, there are no indications of impairment for the recognition of these expressions (for meta-analytic reviews of this literature, see Refs. 14,15). Moreover,

fMRI studies have failed to find any indications of reduced responsiveness to angry expressions in youth with psychopathic tendencies (disgust expressions have not been tested).^{22,25,27} It should also be noted that individuals with psychopathy are unimpaired in “cognitive empathy”; they show no impairment in the representation of the mental states (thoughts, beliefs and intentions) of others.²⁸

Claim 5: a developmental consequence of these partially independent emotional learning systems is the development of different norm systems

The domain theorists were the first to distinguish moral norms and conventional norms.^{29,30} However, on the basis of neurobiology, four distinct forms of norm can be distinguished: care-based, conventional, disgust-based and fairness-based.³¹ We will consider the first three here and return to fairness-based norms in Claim 10.

Care-Based Norms

Care-based norms concern actions that might harm others (including the theft or damage of others' property). The amygdala allows conditioned stimuli (including representations of moral transgressions) to be associated with unconditioned stimuli.³¹ In addition, the amygdala is critically involved in responding to the distress-cue reinforcers (i.e., the sadness, fear, and pain of others). Lesions of the amygdala disrupt observational learning of valence.¹¹ In short, the individual learns that care-based norm violations are bad because they are associated with punishment—the victim's distress. The importance of the amygdala in care-based moral judgments can be seen through the repeated demonstrations of amygdala activity during the processing of care-based norms.^{32–34}

Disgust-Based Norms

Disgust-based norms cover those norms associated with others' disgust reactions. Disgust displays are often used when considering the actions related to bodily functions and activities discordant with the displayer's religion.³⁵ Use of disgust displays allows the development of disgust-based norms where the emotional force behind the proscribed actions is disgust.³¹ As described above, disgust expressions engage the insula,³⁶ a region critical for taste aversion learning.¹² Disgust-based transgressions are likewise associated with increased insula activation.³⁷

Conventional Norms

Conventional norms cover actions that cause social disorder and challenge established hierarchies (e.g., talking in class). It is argued that angry expressions (or expectations of others' anger) guide the individual away from committing conventional transgressions (particularly in the presence of higher-status individuals).³⁸ Dorsomedial and inferior frontal cortex/anterior insula cortex are particularly responsive to angry expressions⁹ and hierarchy cues.³⁹ These regions are consistently activated when behavior needs to be altered.¹³ Moreover, these regions show activity when participants consider conventional transgressions.⁴⁰

Claim 6: because psychopathy is associated with impairment in the amygdala's role in responding to/learning from fearful, sad, and pain expressions, individuals with the disorder come to represent care-based transgressions as less aversive than healthy individuals

Considerable work indicates that care-based norm judgments are disrupted in individuals with psychopathy. Thus, youth and adults with psychopathy show significant impairment on the moral/conventional distinction task.^{41,42} They show a significantly reduced distinction in their judgments between care-based and conventional transgressions. In addition, individuals with psychopathic tendencies show reduced endorsement of care-based norms^{43,44} and consider actions that harm others,⁴⁵ even accidentally,⁴⁶ as more permissible than comparison individuals. In line with the idea that (1) the motivational force against care-based transgressions relies on the amygdala's role in the association of the representation of the transgression with the fear/sadness/pain of the victim, and (2) individuals with psychopathy are impaired in this process,³¹ work has shown reduced amygdala activity during care-based reasoning in individuals with psychopathic traits.^{47–49}

Claim 7: because psychopathy is not associated with impairment in the insula's role in responding to and learning from disgusted expressions and the inferior frontal cortex's role in responding to angry expressions, individuals with the disorder should represent disgust-based and conventional transgressions relatively appropriately

The impairment of individuals with psychopathy on the moral/conventional distinction task has been attributed to impaired processing of care-based transgressions and intact processing of conventional transgressions.⁴² However, more direct evidence of intact processing of conventional transgressions in psychopathy was provided by the “social situations task.” In this task, participants are asked to rate the appropriateness of actions, some of which are conventional transgressions known to induce anger.³⁸ Individuals with psychopathy showed appropriate endorsement of the conventional transgressions, a finding replicated using the Moral Foundations Questionnaire in both subclinical⁴³ and clinical psychopathic populations.⁴⁴ These latter two studies also showed appropriate endorsement of disgust-based norms in individuals with psychopathy.^{43,44}

Claim 8: ventromedial prefrontal cortex allows the representation of reinforcement values: Information critical for successful (including norm-based) decision making

The idea here is that emotional learning systems allow norms to acquire emotive force, force which guides attitudes towards these norms. These emotional learning systems are thought to feed reinforcement expectancy information to ventromedial prefrontal cortex (vmPFC), which represents this information, allowing appropriate decision making. Considerable data

show a role for vmPFC in both the representation of reinforcement information⁵⁰ and in responding to norms.^{34,51} Importantly, this activity is modulated by the transgression's severity.³⁴ Considerable data show that activity within vmPFC is modulated by the magnitude of the reinforcement expectancy.⁵⁰

Claim 9: moral reasoning requires more than the architecture outlined above

Emotion-based learning systems allow the development of judgments of “badness”. However, as has been noted,⁵² they cannot generate judgments of immorality. An individual killing five people and a car crash killing five people are both bad events but only the first would be classified as immoral. Immorality judgments require more than just an emotional response. Nichols has proposed that judgments of immorality require the participant to also access semantic knowledge that the act is considered immoral. Alternatively, or additionally, immorality judgments may rely on intent information. Intent information becomes progressively more important for morality judgments with age.⁵³ By adulthood, actions are considered immoral if they are intended to harm even though harm is not caused.⁵⁴

Claim 10: the development of appropriate justice norms may rely on distress cue sensitivity even if the response to other's unfairness does not

Justice norms cover decisions regarding the allocation of resources. Allocations regarded as unfair elicit anger.⁵⁵ Considerable work has examined justice reasoning in the context of tasks such as the Ultimatum and Trust games. A proposer suggests an allocation of resources and the subject decides whether or not to accept the offer and/or punish the proposer for the offer's unfairness.⁵⁶ The greater the difference in the allocation of resources between the players, the greater the sense of the offer's unfairness and the greater the amount that the subject is prepared to punish.⁵⁷

Unfair offers by proposers elicit activity within both anterior insula cortex (AIC) and dorsomedial frontal cortex (dmFC^{55–57}) that has been related to the subject's anger at the offer⁵⁵ and the attempt to organize behavioral change.³⁸ Notably, though this form of response is also seen to conventional transgressions (see above). Yet data from the moral/conventional distinction literature shows that justice norms are processed like care-based norms and unlike conventional norms.^{29,30} Moreover, individuals with psychopathic traits have been reported to show reduced endorsement of justice norms but intact endorsement of conventional norms.^{43,44}

In other words, the systems involved in endorsing justice norms may be at least partially different from those responsive to unfair resource allocations. We suggest that the representation of an unjustly treated individual is associated with their distress. Thus, the unfairness transgression is processed like a care-based transgression. In contrast, witnessing an unfair allocation of resources, particularly to the self, results in anger and a motivation to challenge (or punish) the actions of the allocator. Of course, the above speculation is in need of empirical investigation.

Conclusions

Four classes of norm are distinguished here: care-based, disgust-based, social conventions, and justice-based. Learning their prohibitive power relies on relatively independent emotional learning systems that can be selectively impaired, leading to a reduced ability to acquire the prohibitive power of specific forms of norms (e.g., the reduced prohibitive power of care-based and justice-based norms for individuals with psychopathy). However, the emotion-based systems alone do not allow full moral development. Culturally-specified rules regarding morality and the representation of intent information become critical for judgments of immorality.

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