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They know the words, but not the music: Affective and semantic priming in individuals with psychopathy

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Abstract

Previous work has indicated dysfunctional affect-language interactions in individuals with psychopathy through use of the lexical decision task. However, it has been uncertain as to whether these deficits actually reflect impaired affect-language interactions or a more fundamental deficit in general semantic processing. In this study, we examined affective priming and semantic priming (dependent measures were reaction times and error rates) in individuals with psychopathy and comparison individuals, classified according to the psychopathy checklist revised (PCL-R) [Hare, R.D., 1991. The Hare Psychopathy Checklist-Revised. Multi-Health Systems, Toronto, Ont.]. Individuals with psychopathy showed significantly less affective priming relative to comparison individuals. In contrast, the two groups showed comparable levels of semantic priming. The results are discussed with reference to current models of psychopathy.
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Keywords: Psychopathy; Affective priming; Semantic priming

1. Introduction

Psychopathy is characterized by a callous, shallow and manipulative affective-interpersonal style combined with antisocial and reckless behavior (Hare, 1991). In his book 'The mask of sanity' Cleckley (1976) observed that there is a discordance between the expressed and experienced values of emotions in individuals with psychopathy and used the term 'semantic dementia' to describe this observation. According to this term, individuals with psychopathy do represent the lexical meaning of emotions, but they do not experience their affective value; they ''know the words but not the music'' (Johns and Quay, 1962).

In line with this clinical description, research on the psycholinguistic processes of individuals with psychopathy has indicated that whereas they understand and apply the lexical meaning of emotional words, they do not experience the affective value attached to them. A clear demonstration of this dichotomy comes from a study by Hare et al. (1988) examining the use of affect-relevant semantic or non-affect-relevant information in the matching of words. In this study, participants were presented with word triads (e.g., ''warm, loving, wise'' and ''foolish, shallow, deep'') and instructed to select the two words that were closer together in meaning. Whereas the comparison individuals grouped words primarily according to their emotional information (e.g., polarity–foolish-shallow—both have a negative connotation), individuals with psychopathy grouped words primarily according to their non-emotional characteristics (e.g., antonym–deep-shallow). From this result Hare concluded that individuals with psychopathy ''appeared to base their judgments more on learned associations between the words than on their emotional significance''.

A more direct demonstration of the intact lexical representation, but reduced impact, of emotional words in individuals with psychopathy comes from studies using the lexical decision task. In lexical decisions (reporting whether or not a letter-string is a word), healthy individuals are faster (Strauss, 1983) at responding to emotional words relative to neutral words. However, individuals with psychopathy often do not show this speed advantage for emotional words (Lorenz and Newman,

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2002; Williamson et al., 1991). In addition, individuals with psychopathy show significantly less difference in event-related potential (ERP) between emotional and neutral words relative to comparison individuals (Williamson et al., 1991). That is, individuals with psychopathy show reduced affect-driven facilitation and physiological response for emotional words.

It is possible that the affective linguistic processing impairments do not reflect impairments in affect but rather a more generalized impairment in linguistic/semantic processing. Lorenz and Newman (2002) examined the influence of word frequency on lexical decision. They found that comparison individuals, relative to individuals with psychopathy, showed a significantly greater reaction time (RT) advantage for high-frequency relative to low-frequency words. However, it should be noted that this was driven by the comparison individuals' slow responses for low frequency items rather than by fast responses for high frequency items. Kiehl et al. (1999) examined the influence of word concreteness on lexical decision and found that individuals with psychopathy committed significantly more errors than comparison individuals identifying abstract words as words, although the two groups committed a comparable number of errors identifying concrete words as words. Moreover, in the same study Kiehl found that while the comparison individuals showed ERP differentiation between concrete and abstract words, the individuals with psychopathy did not (Kiehl et al., 1999). In a subsequent fMRI study, Kiehl et al. (2004) found that individuals with psychopathy showed a reduced neural response in right anterior superior temporal gyrus to abstract words (their response to these words was not significantly greater than baseline in this area) (Kiehl et al., 2004). In addition, Hare and Jutai (1988) found that individuals with psychopathy were less able to recognize a word as belonging to the abstract semantic category of ''living thing'' (though only if the word was presented in the right, not in the left, visual field) than comparison individuals (Hare and Jutai, 1988). In short, while there are indications of a psycholinguistic impairment in individuals with psychopathy beyond the influence of affect, the nature of this impairment is currently difficult to discern.

In affective/semantic priming tasks the degree to which the target word is related to the prime word determines the degree to which the RT response to the target word is facilitated or inhibited. These priming effects are robust and are found whether the prime and target words are associatively or categorically related to each other (Becker, 1980; Hutchison, 2003; Neely, 1991). Models of semantic memory can be divided into two broad frameworks (Hutchison, 2003): Holistic models (e.g., Anderson, 1983; Collins and Loftus, 1975) and the more recent distributed/connectionist models (e.g., McClelland and Rumelhart, 1985; Plaut and Booth, 2000; Rogers et al., 2004). Holistic models of semantic memory suggest that ''holistic representations (i.e., nodes) of concepts reside in a semantic network.'' These ''nodes share connections with other nodes of similar meaning.'' In contrast, within distributed models of semantic memory, ''the units of a network are not whole words but simple, highly interconnected features'' (Hutchison, 2003, p. 785). Distinguishing between these frameworks has proven to be difficult empirically (Hutchison, 2003) and will not be attempted here. However, we will ground our study within the Rogers et al. (2004) computational model because the mathematics of such computational models allow the possibility of greater predictive precision.

Within distributed models of semantic memory such as that of Rogers et al. (2004), semantic priming of the concept CAT by the concept DOG can occur because there is an overlap between the units (neurons) coding the features that make up the two concepts (e.g., fur, claws). This means that there is partial activation of the units that make up the semantic representation of CAT by the word DOG. Emotional words can be considered conditioned stimuli; through learning they have acquired affective and motivational significance. Conditioned stimuli generally elicit amygdala activation (e.g., Buchel et al., 1998; Critchley et al., 2002) as do emotional words (Hamann and Mao, 2002; Nakic et al., 2006). The suggestion is that the representation of the word, including its semantic representation, is associated with the activation of affect representations (neurons within the amygdala that respond to reinforcement) such that the representation of the word can come to activate these affect representations. Under this suggestion, affect representations are an additional set of input features that can feed into the semantic layer (cf. Rogers et al., 2004). Within the semantic layer, concepts of emotional words will share features that code the concept's valence. Affective priming of the concept SNAKE by the concept GUN can occur within this account therefore because there is an overlap between the units (neurons) coding the affective features that make up the two concepts (e.g., negative affect).

Interestingly, current models of psychopathy might predict that individuals with psychopathy will only present with reduced priming for certain word group relations. Thus, in accounts emphasizing the reduced ability of individuals with psychopathy to process punishing cues due to reduced anxiety or fear (Fowles, 1980, 1988; Lykken, 1957; Patrick, 1994) this reduced ability results in the weakened representation of aversive conditioned stimuli (CS). In other words, the connections between a negative word representation (e.g., MURDER) and semantic feature units coding negative affect should be weaker relative than in healthy individuals. However, the connections between a positive word representation (e.g., LOVE) and semantic feature units coding positive should be similar in strength to, or stronger than, those of healthy individuals. Fowles (1988, p. 377) has suggested that individuals with psychopathy 'show no deficit in reward learning' while Patrick and colleagues concluded from their work with the augmentation of the startle reflex that 'psychopathy involves (a) normal or perhaps enhanced appetitive reactivity, and (b), defensive reactivity that is weak but not wholly absent' (Levenston et al., 1996). These accounts then would predict that individuals with psychopathy should show reduced affective priming for negative target words, but normal or increased, affective priming for positive target words.

The integrated emotion system (IES) model (see, for full details of this model, Blair, 2004) might be considered an extension of these accounts. The IES model consists of a series