



# The role of Gray's revised RST in the P–psychopathy continuum: The relationships of Psychoticism with a lack of fear and anxiety, and increased impulsivity

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## ARTICLE INFO

### Article history:

Received 16 April 2010

Received in revised form 19 July 2010

Accepted 19 July 2010

Available online 14 August 2010

### Keywords:

Behavioural inhibition system  
Behavioural activation system  
Reinforcement Sensitivity Theory  
Psychoticism  
Psychopathy

## ABSTRACT

Gray's revised Reinforcement Sensitivity Theory (rRST; Gray & McNaughton, 2000) may play a role in explaining deficits in Psychoticism (P) and psychopathy (Corr, 2010). In this paper, we examine the relationships of P with anxiety, fear, impulsivity and reward reactivity in normal populations to assess whether these associations mirror the hypothesized role of RST motivations in psychopathy. Two-hundred and twelve participants completed measures of Psychoticism, impulsivity and rRST motivations (BIS-anxiety, FFFS-fear and BAS). BIS-anxiety mediated the association of P with FFFS-fear and BAS-fun seeking. An exploratory factor analysis distinguished between trait impulsivity (P, impulsivity and BIS) and reward reactivity (BAS-reward responsiveness and BAS-drive). Subsequent moderation analyses showed that whilst neither BIS nor BAS moderated the P–impulsivity link, the association between P and impulsivity was more pronounced in individuals with raised levels of FFFS-fear. Findings are discussed in terms of the roles of fear versus anxiety and impulsivity versus reward reactivity in the P–psychopathy continuum.

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## 1. Introduction

Individuals scoring high on P are impersonal, emotionally indifferent with a shallow affect, lacking empathy, guilt and remorse. They show deficits in cognitive and attentional domains that are reflected in their reckless, antisocial and aggressive tendencies (Eysenck, 1992). It is not surprising, then, that P is associated with offending behaviour, and a large corpus of work examining P has been conducted within forensic populations (e.g. Eysenck & Eysenck, 1976), associating P with some of the affective, cognitive and behavioural features seen in psychopathic populations (Howarth, 1986; see also Corr (2010) for review), and supporting Eysenck's view that psychopathy is at the extreme end of the P dimension (Eysenck & Eysenck, 1976). Recently, Corr (2010) suggested that Gray's revised Reinforcement Sensitivity Theory (rRST; Gray & McNaughton, 2000), namely the roles of fear, anxiety and reward reactivity, may be key in explaining the underlying neurological mechanisms for P and psychopathy.

While the roles of fear, anxiety and reward reactivity have been established as possible underlying core deficits in the development of psychopathic tendencies, little work has demonstrated empirically the association between these rRST components with Psychoticism. Subsequently, this paper examines the link between Psychoticism and the rRST assessing the associations of P with (i)

reduced anxiety and fear, and (ii) increased impulsivity and reward reactivity. Following Corr's (2010) discussion on the P–psychopathy continuum, the extent to which these associations mirror the established and theoretical relationships of primary and secondary psychopathy with a lack of anxiety and fear, and raised levels of impulsivity and reward reactivity, respectively, will be discussed.

### 1.1. Eysenck's continuity hypothesis: the Psychoticism–psychopathy continuum

Investigating the extent to which a lack of fear and anxiety and higher levels of impulsivity found amongst psychopaths (e.g. Hare, 1970), are seen in those high in P in normal populations is important for three main reasons. First, while most research has investigated the role of Psychoticism in criminal populations, less is known of the role of P in cognitions, emotions and behaviour in non-forensic populations. Second, whilst the Psychoticism construct has been extensively validated in criminal and clinical populations applying the continuity approach (Eysenck & Eysenck, 1976), the association of Psychoticism with core deficits associated with psychopathy (Corr, 2010) has not been investigated to the same extent. Finally, if the core deficits typically demonstrated in psychopathy are seen in high P individuals within normal populations, this lends support to the continuity hypothesis (Ferguson, 2009). This investigation is important as one of the main debates in the literature refers to a categorical versus dimensional model for psychopathy. The dimensional view sees psychopathy at the

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extreme end of one or several continuous normal personality traits (Edens, Marcus, Lilienfeld, & Poythress, 2006; Walters, Brinkley, Magaletta, & Diamond, 2008). Subsequently, this paper examines the associations of Psychoticism with underlying deficits highlighted in the psychopathy literature in normal populations.

### 1.2. Linking primary and secondary psychopathic deficits to Psychoticism

Hare et al. (1990) described two correlated factors of psychopathic tendencies. The first is concerned with deficits in affective (e.g. lack remorse, guilt and empathy, shallow affect) and interpersonal style (e.g. superficial charm, callousness and deceitfulness), whilst the second is associated with antisocial behaviour (e.g. impulsivity, aggression, recklessness). Although psychopathy has been generally seen as a unitary construct (Hare & Neumann, 2008), some researchers argue that these two factors define specific variants of psychopathy – namely primary and secondary psychopathy, respectively (Skeem, Poythress, Edens, Lilienfeld, & Cale, 2003). Although Hare (1982) showed that P was related to psychopathy in male prison inmates, P correlated only with the impulsive and antisocial aspects of secondary psychopathy. However, P is defined by affective deficits (e.g. Eysenck, 1992) also ascribed to primary psychopathy.

Lower levels of anxiety have been regarded as a key feature of psychopathy (Lykken, 1957; Newman & Brinkley, 1997) and the prominent ‘lack of fear’ hypothesis assumes that psychopaths’ lack of fear results in their inability to learn following punishment (Fowles, 1980). Moreover, more recent studies show that the punishment processing deficit is associated with primary psychopathy (Sutton, Vitale, & Newman, 2002), whilst secondary psychopathy is linked to higher levels of anxiety and punishment sensitivity (see Skeem et al. (2003) for review). Using rRST constructs (following Corr (2010)), the current study examines whether those high in P demonstrate deficits associated more with primary (lower anxiety and fear) or secondary psychopathy (higher anxiety and fear).

### 1.3. The distinction between fear and anxiety in P and primary psychopathy

Despite conceptual differences between the constructs of anxiety and fear, research has conflated these two when examining psychopathy (Lilienfeld, 1994). Recent revisions of Gray’s RST (Gray & McNaughton, 2000) however, highlighted the need to distinguish fear and anxiety in personality research (Corr & McNaughton, 2008). According to the rRST, fear and anxiety are mediated by two separate but interacting brain systems: the fight-flight-freeze system (FFFS) linked to simple avoidance behaviour for aversive/punishment contingencies and the behavioural inhibition system (BIS) linked to conflict detection and risk assessment via inhibition of ongoing behaviour during approach and/or avoidance conflicts. Subsequently, the BIS mediates approach and avoidance behaviour. Corr (2010) argued that the core deficits seen in both P and psychopathy may result from a dysfunction in BIS. However, despite strong evidence for a link between reduced BIS/anxiety and primary psychopathy in the literature (Corr, 2010; Newman & Brinkley, 1997), Hare and Neumann (2008) argue that psychopathy is only weakly related to reduced anxiety and more associated with a lack of fear. Nevertheless, they emphasised that investigating the interactive roles of both fear and anxiety may help to explain specific deficits associated with psychopathy.

Concerning Psychoticism, it was recently shown that P is negatively associated with BIS and FFFS in normal populations as measured by a revision of Carver and White’s (1994) BIS/BAS scales (Heym, Ferguson, & Lawrence, 2008). However, in line with the rRST, the lack of fear and punishment sensitivity in P may be med-

iated by the BIS. Subsequently, the association of P with deficits in anxiety and fear warrants further investigation. The current study uses Heym et al.’s (2008) revision, where following confirmatory factor analysis BIS was split into two factors: BIS-anxiety (four items) and FFFS-fear (three items). This structure was a better fit to the data than the unitary BIS scale or an alternative structure (e.g. Johnson, Turner, & Iwata, 2003; Poythress et al., 2008) and demonstrated good internal reliability and discriminant validity with regards to Eysenck’s PEN. The Carver and White (1994) scales are the most commonly used instruments to measure RST constructs and as a result, the findings of the current study will be comparable across findings in the wider literature.

### 1.4. Distinguishing between BAS-reward reactivity and trait impulsivity

The third system specified within the rRST – the behavioural approach system (BAS), regulates appetitive motivation and responds to signals of reward or non-punishment, and is thought to facilitate impulsivity (Gray, 1982). Both, impulsivity and BAS are linked to Psychoticism (Pickering & Gray, 1999) and secondary psychopathy (Newman, MacCoun, Vaughn, & Sadeh, 2005), and an increased BAS may therefore underlie the relationship between P and impulsivity. However, Smillie, Jackson, and Dalgleish (2006) argue that BAS is more associated with reward reactivity than P-related trait impulsivity. Indeed, evidence suggests that P is strongly and consistently related to fun seeking (BAS-FS), only weakly to drive (BAS-DR) and negatively to reward responsiveness (BAS-RR; Heym et al., 2008; Smillie et al., 2006). Subsequently, Smillie et al. (2006) proposed a distinction between reward reactivity incorporating BAS-DR and BAS-RR versus trait impulsivity incorporating BAS-FS, P and impulsiveness. Indeed, as BAS-RR encompasses future-oriented planning and management of uncertainty (Heym et al., 2008), it is contrary to the notion of P-related recklessness and rash impulsiveness. Conversely, BAS-FS items are associated with instant gratification and lack of future contemplation, therefore conceptually more strongly linked to P (Eysenck & Eysenck, 1976). Consequently, prior associations of P and secondary psychopathy with BAS may be due to the conflation of impulsivity and reward reactivity items within BAS scales.

Further, it has also been suggested that impulsivity may be caused by a deficiency in behavioural inhibition (Fowles, 1987). Indeed, according to the rRST, a deficient BIS should lead to reduced avoidance/increased approach in response to novel or conflicting stimuli without consideration of consequences, which may explain the reckless impulsive behaviour associated with P and secondary psychopathy. Consequently, a deficient BIS in high P individuals would lead to impaired risk assessment and account for the (i) negative association of P with FFFS and (ii) positive association of P with BAS. However, a deficient BIS leading to reduced punishment sensitivity (FFFS) was argued to underlie deficits in P akin to primary psychopathy, whereas the impulsive antisocial style associated with secondary psychopathy is thought to be related to increased levels of anxiety or fear (e.g. Skeem et al., 2003). Indeed, contrary to primary psychopathy, secondary psychopathy has been associated with greater psychophysiological responsivity towards threat (Vanman, Mejia, Dawson, Schell, & Raine, 2003). This suggests that high levels in FFFS may underlie impulsivity in secondary psychopathy, and thus, potentially P. In the extant literature, therefore, the roles of BIS and FFFS in the P–impulsivity link are unknown.

The current study will further examine the association of P with the rRST variables and in doing so, tease apart the roles of (i) anxiety and fear, and (ii) impulsivity and reward reactivity in P, and their moderating impact as underlying mechanism in the P–impulsivity link. Although the definition of P maps conceptually onto

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