Moral emotions in predatory and impulsive offenders using implicit measures

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To date, no study has systematically investigated moral emotions in impulsive versus predatory psychopathy. Therefore, the objective of this study was to investigate whether these two subtypes of psychopathy differed in their sense of moral emotions. In the current study, 55 prison inmates completed two implicit computer tasks: one task measuring the association between moral cognitions of good and bad, while the other measured attentional biases regarding moral emotions of guilt and regret. Additionally, two questionnaires were administered, measuring psychopathy, and predatory and impulsive aggression. Results show that the predatory dimension best predicted a lack of moral cognitions of good and bad, while the general construct of psychopathy predicted a lack of guilt. The impulsive dimension was not specifically correlated with any of our measurements on moral cognitions. By investigating moral emotions and attentional biases in predatory and impulsive offenders, this study contributes to a better differentiation between diverse variations of psychopathy. Implications of the current findings in relation to treatment are discussed. (*Netherlands Journal of Psychology*, 63, 144-155.)

Keywords: Predatory; impulsivity; moral emotions; offenders

Psychopathy refers to a constellation of personality and behaviour characteristics that include a disregard for social norms and values, irresponsibility, dishonesty, emotional shallowness, and impulsivity (Cleckley, 1976). The lack of fear (Herpertz et al., 2001; Levenston, Patrick, Bradley & Lang, 2000; Patrick, Bradley & Lang, 1993)

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and moral emotions (e.g., guilt, regret and empathy; Cleckley, 1976; Hare, 1993; Intrator et al., 1997; Millon, 1981) often found in psychopathic offenders indicates that psychopathic offenders have difficulties in processing emotional information. Based on Cleckley's findings, Hare (1991) operationalised the Psychopathy Checklist (PCL-R), an instrument to assess fundamental characteristics of psychopathy. One major problem with the PCL-R is that it assumes a dichotomy approach to psychopathy and with this approach, all kinds of contradictions emerge. For instance, research indicating that psychopathic offenders are impulsive, reactive offenders (Stan-

ford, Ebner, Patton & Williams, 1994; Cornell, Warren, Hawk, Stafford, Oram & Pine, 1996; Colledge & Blair, 2001) seems to be at odds with studies reporting that impulsive delinquents demonstrate impaired frontal lobe functioning (Raine, Meloy, Bihrle, Stoddard, LaCasse & Buchsbaum, 1998; Yang, Raine, Lencz, Bihrle, LaCasse & Colletti, 2005). Moreover, studies by Spence et al. (2001; Spence, 2003) showed that during lying and deception, one of the core characteristics of psychopathy, the most active brain area is the frontal lobe. These discrepancies suggest that there may be more variations (e.g., subtypes) of psychopathy. One of the variations within psychopathy may be related to different types of aggression. Indeed, there is increased evidence suggesting that people who engage in impulsive and affective-driven aggression differ from people who show more goal-directed, predatory aggression (Raine et al., 1998). Reactive violence often occurs as a response to perceived threats or frustrations and goes along with high affective-physiological arousal and minimal cognitive processing (Chase, O'Leary & Heyman, 2001). Some studies have shown that impulsive offenders exhibited deficient prefrontal regulation, resulting in less control over their aggressive acts, and were more in a state of anger during their offence (Cornell et al., 1996; Raine et al., 1998).

In contrast to impulsive aggression, predatory (or instrumental, proactive, cold-blooded) aggression requires forethought and consists of a planned attack. The autonomic arousal is minimal and the behaviour is goal-directed towards achieving money, sexual opportunities or increased status (Blair, 2003). Psychopathic offenders often show a history of predatory aggression (Cornell et al., 1996; Porter, Woodworth, Earle, Drugge & Boer, 2003; Woodworth & Porter, 2002). They often carefully plan criminal acts, exhibit intact prefrontal functioning, and have an identifiable goal (Cornell et al., 1996; Raine et al., 1998). Although psychopathy has been associated with predatory aggression (e.g., Woodworth & Porter, 2002) one of the main features of psychopathy is impulsivity (Hare, 1991; Hare, Hart & Harpur, 1991). Therefore, most authors assume an impulsive-predatory dichotomy (Cornell et al., 1996; Blair, 2001; Vitaro, Gendreau, Tremblay & Oligny, 1998; Poulin & Boivin, 2000; Chase et al., 2001). However, in most of the mentioned studies, there were also impulsive offenders who carefully planned a crime, and denied a state of angry arousal at the time of the offence. Furthermore, there were predatory offenders (defined by history of a majority of planned crimes) who also acted impulsively in a state of anger (Cornell et al., 1996; Chase et al., 2001). This overlap indicates that the distinction between predatory and impulsive violence is not absolute. Since most of the above studies did not take classification measures of psychopathy or standardised impulsive and predatory dimension into account, the ex-

tent to which the impulsive and predatory dimensions co-vary with psychopathy remains unclear. In an attempt to reconcile these two contrasting predispositions we propose that separate predatory and impulsive continuous dimensions will better explain different variations within psychopathic offenders.

In order to support the continuous model of predatory and impulsive dimensions, the disturbed emotional processing often demonstrated in psychopathic offenders should be related to distinct dimensions of psychopathy. Although some studies in psychopaths have focused on emotional language processing (Williamson, Harpur & Hart, 1991), and emotional picture processing (Herpertz et al., 2001), no studies to date have focused on comparing various emotional processing mechanisms in different variations of psychopathic offenders, especially using implicit measurements. Moreover, most research assessing moral beliefs in psychopathic individuals has employed explicit (i.e., self-report) measures, which have evident limitations (Cima, 2003; Cima et al., 2003). First, psychopathic individuals may not be aware of implicit attitudes and may lack introspective access to what motivates their behaviour. Second, forensic patients may present themselves in a socially desirable way (Cima, et al., 2003), depending on the juridical context (Cima, Pantus & Dams, 2007b). Therefore, unobtrusive assessment of automatic (i.e., preconscious) cognitions and motivation is of particular interest in forensic populations. More specifically, implicit measures are thought to get around access to conscious control (Greenwald, McGhee & Schwartz, 1998), are non-transparent and hard to mislead (Banse, Seise & Zerbes, 2001), and may be a more enhanced indicator of actual behaviour than explicit measures (Greenwald et al., 1998; McConnel & Leibold, 2001). In addition, several studies have demonstrated the value of implicit methods in relation to psychopathology (e.g., De Raedt, Schacht, Franck & De Houwer, 2006; Huijding, 2006; Roefs, & Jansen, 2002).

One example of a study revealing the additional value of implicit measures in offenders is the study by Gray, MacCulloch, Smith, Morris and Snowden (2003). This study investigated implicit beliefs about violence in different types of offenders (i.e., psychopathic murderers, psychopathic non-murderers, non-psychopathic murderers, and non-psychopathic non-murderers) using an Implicit Association Task (IAT; Greenwald et al., 1998). Results showed that the IAT effect was significantly lower in the psychopathic murderers, indicating that these types of offenders reveal abnormal cognitions regarding violence. Gray and colleagues suggested that IAT differences within the psychopathic groups (i.e., murderers versus offenders who committed other crimes) reflect two separate, stable populations of psychopathic offend-

ers (Gray et al., 2003). We hypothesise that the differences in violence beliefs are not due to the type of crime committed, but to the different types of offenders (e.g., impulsive versus predatory). In the current study we administer an IAT measuring the association between morally good and morally bad with positive and negative, respectively.

Besides the moral emotions of good and bad, psychopathic offenders often react with indifference to the violence they have committed rather than the distress, remorse and guilt shown by many non-psychopathic offenders (Hare, 2001). Therefore, this study will also examine attention regarding remorse and guilt in predatory and impulsive offenders. For this part, a moral dot probe task (Macleod, Mathews & Tata, 1986) was developed using neutral versus emotional (i.e., regret and guilt) words. An advantage of the dot probe task is that the results cannot be interpreted as a response bias, since participants have to give a neutral reaction (press a button on the keyboard) to a neutral stimulus (the dot). Therefore, this is a direct measurement of the way visual attention is divided

The implicit measures used in the present study (i.e., the moral IAT and moral dot probe) may provide us with an important insight into the criminal minds of these offenders. Moreover, since the more predatory, instrumental offenders are thought to be cold blooded and lack feelings of guilt and remorse (Cornell et al., 1996; Porter et al., 2003; Woodworth & Porter, 2002; Hare, 2001), and in order to support our dimensional model, we hypothesise that especially the predatory dimension will be related to poorer scores indicating abnormal cognitive moral beliefs.

Methods

Participants

In total, 55 male prison inmates participated in this study. They were enrolled from several prisons in the Netherlands, de Geerhorst in Sittard, Overmaze in Maastricht, and de Koepel in Breda. Before the inmates were given an information letter about this study, the following exclusion criteria were taken into account: psychotic disorders; the use of any kind of medication; a history of traumatic brain injury; and current drug and/or alcohol dependence. Three participants were excluded from the study due to extreme error rates on the implicit tasks (see Results section for further explanation).

All participants were Caucasian, native Dutch speakers, and had the Dutch nationality. Their mean age was 32.1 (SD = 9.9). Most of them had finished lower vocational education (65%), or intermediate vocational education (35%).

Regarding their types of crime, 3 (6%) were convicted for murder or manslaughter, while 3 (6%)

had committed a sexual offence. Twenty (38%) were convicted for bodily harm, 7 (13%) for theft, and 19 (37%) for other crimes (i.e., fraud or robbery). Since all the delinquents had already been convicted and imprisoned for the crime committed at the time of this study, their mean length of time since incarceration always exceeded three months. Furthermore, of the 52 delinquents, 21 (40%) were first-time offenders, while 31 (60%) inmates were recidivists.

Ethics

The ethics committee of the Faculty of Psychology, Maastricht University, approved this study. Participants were recruited by means of an information letter, by which they could sign in for participation. After they had signed up for participation, they were contacted by the researchers for an appointment. In the information letter it was emphasised that participation was voluntary and that they were free to discontinue their participation at any given time. Before starting the study, all participants gave written informed consent.

Measures

Construction of the Implicit Association Test

The moral Implicit Association Test (IAT) used in this study was developed from Greenwald's Implicit Association Test (Greenwald, McGhee & Schwartz, 1998). The original IAT measures the extent to which two target concepts (e.g., flower and insect) are associated with two attributes (e.g., pleasant and unpleasant). When highly associated categories share the same response key (e.g., flower-pleasant and insect-unpleasant) performance is fast and accurate. Conversely, when negatively associated categories share a response key (e.g., flower-unpleasant and insect-pleasant) performance is slow and errors increase.

For our moral IAT, a wordlist of morally good and bad words was constructed. This wordlist was administered to 35 psychology students from Maastricht University, who were asked to judge whether a certain word belonged to either the morally good or the morally bad category on a VAS scale ranging from 0 to 100. Only the words indicated by 80% or more as belonging to a certain category were included in the IAT. These morally good and bad words are coupled with positive and negative words. The positive and negative words were selected from standard/reference tables (Hermans & De Houwer, 1994). In that study 145 Belgium psychology students judged 740 Dutch words regarding their familiarity and affectivity. The best-evaluated positive and negative words were used in the moral IAT. Furthermore, all words (morally good, morally bad, positive, and negative) were matched for the number of syllables and word length. In that

way, all word categories consisted of the same number of words, the same number of syllables per word, and the same word length. For trial 1, 2, and 4 (see below), 40 words were used, while for trial 3 and 5, 80 words were used. This moral IAT consisted of 20 morally good words (e.g., beloved, honest, loyal, sincere, and careful), 20 morally bad words (e.g., selfish, hostile, nasty, dishonest, and aggressive), 20 negative words (e.g., grief, injury, accident, workless, and funeral) and 20 positive words (e.g., humour, sun, party, flowers, and rainbow).

For this moral IAT, the left button of the computer keyboard had to be pressed when words were classified as being positive (e.g., love) or morally good (e.g., responsible) and the right key for negative words (e.g., sick) or morally bad words (e.g., lying; Greenwald, et al., 1998). In the congruent condition the same response key is assigned for both the negative and the morally bad words. In the incongruent condition positive and morally bad words share the same response key. The positive/negative words were presented in capital letters, whilst the moral words were presented in lowercase letters, as by standard IAT methodology (Greenwald et al., 1998). All experiments were presented on a windows computer and were controlled by Eprime software. Responses were taken via the keyboard of the computer, comprising two response buttons (Q and P). Response keys were counterbalanced, as were the congruent and incongruent trials (see below). The computer recorded all reaction times (RT) and errors. Words were presented on the centre of the screen, with each letter approximately 5 mm high. The viewing distance was 57 cm. All letters were white against a black background. Each word was presented on the screen and participants were required to respond as quickly as possible. As soon as the participant responded, the word disappeared and the next trial commenced 1200 ms later.

By subtracting the reaction time for the incongruent condition from the congruent condition, the IAT effect is calculated (Greenwald et al., 1998; Karpinski & Hilton, 2001; De Houwer, 2003). Pilot evaluations were run to ensure that non-criminals participants (n = 10) understood the task comments.

Trial blocks

The moral IAT consisted of five blocks. The first block comprised 40 trials in which attribute words were presented (i.e., positive and negative words). Block 2 was identical to block 1 for the appropriate targets words (i.e., morally good and morally bad words). Block 3 consisted of 80 trials, in which all word categories (positive, negative, morally good, and morally bad words) were presented in a random order. Block 4 was identical to block 2, with the reversal of the response buttons. Block 5 was identical to block 3, except that the response buttons for the target

dimension remained reversed. Since previous research has demonstrated that the order of presentation of the congruent and incongruent conditions may influence the size of the IAT effect (Greenwald et al., 1998), this study counterbalanced these trials. More specifically, for half of the participants, block 3 consisted of the congruent condition, in which the 'easy' association was presented (morally good-positive), whereas the other participants received the incongruent condition (morally good-negative) at block 3 and the congruent condition at block 5.

Internal consistency in the current sample was low for the positive and negative attributes (0.34 and 0.29, respectively). For the targets, Cronbach's alphas were moderate. For morally good, the internal consistency was 0.54, while for morally bad it was 0.45 (table 1).

Construction of the dot probe task

In the dot probe task, participants press a button in reaction to a dot, which appears behind either the neutral word or the emotional word. The dot probe (Macleod, Mathews & Tata, 1986) is an instrument measuring three different stages of attention: focusing of attention, retaining attention, and shifting attention. It is than investigated whether participants' attention is drawn quicker, or just shifts away from certain word categories (MacLeod et al., 1986).

For our moral dot probe task, the same procedure for developing the wordlist was followed as for the moral IAT task. Another wordlist was administered to the same 35 psychology students of Maastricht University in which they were asked to judge whether a certain word belonged to either the regret category or the guilt category on a scale of 0 to 100. Only the words indicated by 80% or more as belonging to a certain category were included in the dot probe task. The neutral words were selected from the standard tables (Hermans & De Houwer, 1994). Furthermore, all words (regret, guilt, and neutral) were matched for the number of syllables and word length. In total there were 72 trials, consisting of 4 x 18 pairs of words. Eighteen neutral words were used (e.g., table, page, paper, clothes, and magazine), and 18 emotional words containing 9 regret words (e.g., despair, excuse, sad, regret, and excuse), and 9 guilt words (e.g., guilty, confession, victim, and remorse). Each word is shown 4 times in a specific matched pair (neutral and emotional). Pilot evaluations were run to ensure that non-criminal participants (n = 10) understood the task instructions.

Since psychopathic offenders demonstrate a lack of regret, guilt and shame (Cleckley, 1976; Hare et al., 1991), this moral dot probe task was developed to investigate whether psychopathic offenders demonstrate a shift in attention away from these moral emotions. In the moral dot probe task emotional and neutral words are

paired (Mogg, Bradley, Dixon, Fisher, Twelftree & McWilliams, 2000). A fixation point in the middle of the computer screen marks the start of each trial and vanishes when the word-pairs appear on the screen. Both a neutral and emotional word is presented simultaneously on the screen, localised above and below the fixation point. The locations of the neutral and emotional words are alternated. Each letter of the words was approximately 5 mm high, with a viewing distance of 57 cm. All letters were white against a black background, preceded by a fixation cross that disappeared after 500 ms. Each word-pair was presented on the screen 750 ms after the fixation cross, followed by a dot replacing one of the words (above or below). Participants were required to respond as quickly as possible to this dot, by pressing the Q if the dot replaced the upper word and a Z when the dot replaced a lower word. As soon as the participant responded, the dot disappeared and the next trial commenced. When participants did not react within 2500 ms, feedback was given that they had responded too slowly. Feedback was also given as to the correctness of the response, but only when participants pressed the wrong key. The task started with a practice trial of 6 trials (12 words).

All experiments were presented on a windows computer and were controlled by Eprime software. Responses were taken via the keyboard of the computer, comprising two response buttons (Q; above and Z; below). Wordlists were counterbalanced. The computer recorded all reaction times (RT) and errors. The words were matched on length and number of syllables (Mogg, et al., 2000). After viewing the words the dot appeared, and the participant had to press a button. The idea behind this task is that non-criminal controls respond quicker when the dot appears behind an emotional word (attention is drawn faster to this category of words) than when it appears behind a neutral word (Asmundson, Carleton & Ekong, 2005). Since the instrumental offenders have demonstrated a lack of guilt and remorse (Hare, 2001), we also expect the predatory offenders to demonstrate a lower difference in RTs between the neutral and emotional (i.e., regret and guilt) words, indicating an attentional bias shifting away from these emotional words.

Trial blocks

The moral dot probe consists of one practice trial (12 emotional words, 6 per emotional category, and 12 neutral stimuli) and 1 block of 72 trials (18 neutral, 9 regret, and 9 guilt words).

Internal consistency in the current sample was excellent. For guilt, internal consistency was 0.94, for regret it was 0.95.

Psychopathic Personality Inventory (PPI)

The PPI (Lilienfeld & Andrews, 1996) was administered to all participants to determine whether they had more or less psychopathic traits. This 187-item instrument is a self-report measurement intended to measure psychopathic features. The PPI was originally designed to measure the core personality features of psychopathy among non-criminal populations, but it turned out to be a good screening instrument among criminal populations as well (Jelicic, Merckelbach, Timmermans & Candel, 2004). For each item, respondents rate themselves on a 4-point scale (1 = false, 2 = somewhat false, 3 = somewhat true, 4 = true). A total score can be obtained by summing across items. Internal consistency in the current sample was excellent (Cronbach's alpha = 0.91), for the PPI total score. For the subscales, Cronbach's alpha's were good, ranging from 0.74 to 0.87.

Reactive Proactive Questionnaire (RPQ)

The RPQ (Raine et al., 2006) was used to indicate predatory (proactive) and impulsive (reactive) dimensions. The RPQ consists of 23 items of which 12 items make up the proactive subscale (for example 'How often have you got others to gang up on someone else?') and 11 make up the reactive subscale (for example 'How often have you got angry or mad or hit others when teased?'). For each item, respondents rate themselves on a 3-point scale (0 = never, 1 = sometimes, 2 = often). Earlier studies have shown good internal reliabilities for total RPQ, reactive and proactive subscale scores all excess 0.81 (Raine et al., 2006). The RPQ demonstrated good construct validity, convergent validity, criterion validity, and discriminant validity (Raine et al., 2006). Internal consistency in the current sample was excellent (Cronbach's alpha = 0.92). For the reactive subscale internal consistency was 0.86, for the proactive subscale it was 0.87.

Procedure

Participants were recruited by an information letter, which was distributed by the institution's psychologist. By filling in the participation form, they agreed to be invited to the research sessions. In both sessions participants were administered 1 implicit task and 1 questionnaire. In the first session participants received an information letter, and were given the opportunity to ask questions about the study. After providing informed consent all participants filled out the PPI and completed the IAT. At the second session they were administered the dot probe task and the RPQ. Tasks were counterbalanced. After finishing both sessions, participants received a financial compensation of € 10.

Statistical analysis

To investigate whether psychopathy was related to predatory and/or impulsive aggression, a Pearson correlational analysis was conducted between the PPI total scores and RPQ subscale scores. The central question in the current study was whether there is a relationship between the impulsive and predatory dimensions and a lack of moral emotions (reflected in a lower IAT effect; lower difference within the dot probe task) and how psychopathy is interconnected to this relationship. We therefore performed a linear regression with proactive aggression, reactive aggression, and psychopathy as predictors and the IAT effect as the dependent variable. The first step consisted of entering the PPI total scores. Secondly, the predatory and impulsivity scores were entered into the model. Thirdly, by backward regression, the interaction variables were put into the model (i.e., psychopathy X proactive aggression and psychopathy X reactive aggression). With regard to the moral emotions of guilt and regret (i.e., dot probe task),

a linear regression with the difference between the mean RT of the neutral words versus the mean RT of the emotional words (e.g., regret and guilt) as dependent variable was performed. To examine whether a lack of moral emotion was related to type of crime (Gray et al., 2003), a one-way analysis of variance (ANOVA) was performed with group (violent and non-violent crimes) as independent variable and the IAT effect as the dependent variable.

Results

Psychopathy, proactive and reactive aggression

To investigate the relationship between psychopathy and the impulsive and predatory dimensions, a Pearson correlational analysis was conducted. As can be seen in table 1, psychopathy scores were significantly related to both the reactive aggression dimension and the proactive aggression dimension.

Table 1	Pearson correlation analysis, Cronbach's alpha, and mean (SD) scores of psychopathy (PPI total), predatory aggression (P-agg), impulsive aggression (R-agg; RPQ), IAT effect, and dot probe task (n = 52).					
	PPI total[r]	P-agg[r]	R-agg[r]	IAT effect [r]	Mean (SD)	Cronbach's alpha
PPI total	-	0.57*	0.52*	-0.29*	436.7 (49.1)	0.91
P-agg	0.57*	-	0.74*	-0.40*	5.7 (4.7)	0.87
R-agg	0.52*	0.74*	-	-0.26	10.7 (4.6)	0.85
IAT effect	-0.29*	-0.40*	-0.26	-	0.30 (0.24)	0.39
Morally good[a]	-0.30*	-0.46*	-0.35*	0.85*	2.64 (0.06)	0.54
Morally bad[a]	-0.27	-0.29*	-0.17	0.85*	2.62 (0.05)	0.45
Positive[a]	-0.30*	-0.39*	-0.19	0.87*	2.60 (0.5)	0.34
Negative[a]	-0.14	-0.25	-0.20	0.85*	2.63 (0.06)	0.29
Dot probe Regret	0.03	-0.09	0.04	-0.05	2.48 (0.5)	0.95
Dot probe Guilt	-0.34*	-0.31*	-0.28*	0.06	2.48 (0.5)	0.94

[r] = correlation; [a] = incongruent trials minus congruent trials; * p < 0.01.

Moral emotions of good and bad

Regarding the average error rates, participants made significantly more errors in the incompatible trials than in the compatible trials, 17.3 and 4.3% respectively ($t(55) = 15.45$; $p < 0.001$).

Although a percentage error rate of 17% is high, this could be explained by the fact that this task is relatively difficult for forensic patients. To determine whether any participants should be excluded for further analysis we used the average overall percentage of errors above 25% as criterion (e.g., Heider & Skowronski, 2007; Knutson, Wood, Spampinato & Grafman, 2006). Therefore three participants were excluded for further analysis.

Only RTs on data collection trials with correct responses were analysed (block 3 and 5). All RTs were log-transformed to normalise the data (see Greenwald et al., 1998). Participants were faster at the congruent blocks ($M = 10.48$; $SD = 0.21$) than on the incongruent blocks ($M = 10.78$; $SD = 0.20$). Paired sample t-test demonstrated a significant difference on mean RTs for congruent and incongruent blocks ($t(51) = 9.19$; $p < 0.001$).

Mean RTs on the moral IAT are demonstrated in table 1. Linear regression analysis indicates that there was no significant interaction effect of psychopathy X predatory ($p = 0.887$) or psychopathy X impulsivity ($p = 0.604$) in relationship with the IAT effect. The only significant predictor of the IAT effect was, as expected, the predatory dimension. This is shown in table 2, in that there was a negative relationship between the predatory dimension and the moral IAT effect. The percentage explained variance was 17%, with a large effect size: $d = 0.90$. Neither the impulsive dimension, nor psychopathy were related to the moral IAT effect.

Moral emotions of guilt and regret

Mean RTs on the moral dot probe task are demonstrated in table 1. Percentage of errors made by the participants was 1.8% in the emotional and 3.0% in the neutral target blocks. Linear regression indicates that there was no relationship between difference in attention for neutral versus regret words for the impulsive dimension ($B = 0.00$; $SE B = 0.00$; $\beta = 0.21$; $p > 0.05$), or for the predatory dimension ($B = -0.00$; $SE B = 0.00$; $\beta = -0.30$; $p > 0.05$), and the level of psychopathy ($B = 0.00$; $SE B = 0.00$; $\beta = 0.03$; $p > 0.05$). However, for the difference in RT between neutral and guilt words, the only relationship that emerged was with psychopathy (table 3), indicating that individuals scoring high on the PPI demonstrate the lowest difference in RT on the dot probe task for neutral versus guilt words. Percentage explained variance was 12% ($d = 0.72$).

Table 2	Linear regression with the IAT effect as dependent variable (n = 52).		
	B	*SE B*	β
Step 1			
Constant	0.91	0.29	
PPI total	-0.001	0.001	-0.29
Step 2			
Constant	0.59	0.32	
PPI total	0.00	0.00	-0.10
RPQ impulsivity	0.01	0.01	0.09
RPQ predatory	-0.02	0.01	-0.41*

PPI = Psychopathic Personality Inventory; RPQ = Reactive Proactive Questionnaire; R^2 = 0.17; * p < 0.05.

Table 3	Linear regression with the difference in reaction times between neutral and guilt words as dependent variable (n = 52).		
	B	*SE B*	β
Step 1			
Constant	0.05	0.03	
PPI total	0.00	0.00	-0.34*
Step 2			
Constant	0.04	0.03	
PPI total	0.00	0.00	-0.23
RPQ Impulsivity	0.00	0.00	-0.06
RPQ Predatory	-0.00	0.00	-0.13

PPI = Psychopathic Personality Inventory; RPQ = Reactive Proactive Questionnaire; R^2 = 0.12; * $p < 0.05$.

Type of crime

Of the 55 delinquents, 15 had committed a violent crime and 37 were convicted for a non-violent crime. There was no significant difference on the moral IAT effect for violent versus non-violent crimes ($F(1, 50) = 1.81$; $p > 0.05$).

Discussion

In the present study it was hypothesised that two subtypes of psychopathic offenders may be differentially related to a lack of moral emotions. In agreement with findings from earlier research (Chase et al., 2001; Cornell et al., 1996), this study demonstrated that psychopathy is related to both predatory as well as impulsive forms of aggression. Therefore, in contrast to earlier research suggesting psychopathy as a dichotomy (e.g., Hare, 1991), a dimensional model of psychopathy explains the different variations within psychopathic offenders. Moreover, as expected, the predatory dimension was related to the moral IAT effect, indicating that these types of offenders lack an association between good and bad. Neither the impulsive dimension nor the extent of psychopathy were related to the moral IAT effect. This is in line with findings that impulsive offenders are more emotional and reactive, while the predatory offenders demonstrate callous unemotional traits (Chase et al., 2001; Cornell et al., 1996; Hare et al., 1991), resulting in a lack of moral emotions such as good and bad. Interestingly, this relationship seems independent of psychopathic characteristics. One explanation might be that the PPI may not be a valid

instrument to measure psychopathic characteristics. However, the fact that Poythress, Edens and Lilienfeld (1998) found the PPI was significantly related to the PCL-R (Hare, 1991) argues against such an explanation. Another explanation may be that psychopathic traits are not related to a lack of moral emotions, but specifically the predatory, instrumental dimension is what makes offenders unemotional and non-aware of good and bad. Further research should clarify this issue.

In contrast to earlier research in which it had been demonstrated that non-criminal participants show faster reaction times on dot probe tasks in reaction to emotional stimuli than in reaction to neutral stimuli (Asmundson, Carleton & Ekong, 2005), participants in the current study demonstrated no difference in RT between neutral and emotional stimuli. Moreover, the only significant relationship on the dot probe task was between psychopathy and guilt words, indicating a shift of attention away from the guilt words. Earlier research has demonstrated that offenders often externalise their behaviour in order to avoid responsibility (Cima et al., 2007a). The results of the moral dot probe task suggest that although offenders may show feelings of regret, they do not feel guilty. This is an important finding because, consequently, if they do not feel guilty at all, they might not be able to modify their behaviour in response to blame (Greenspan, 2003). Moreover, their lack of feeling guilt might be related to attributing behaviour of others as hostile. In line with this, a study by Vitale, Newman, Serin, and Bolt (2005) showed that the tendency to make hostile attributions was related to increasing levels of psych-

opathy. These results indicate that more research is needed to understand the mechanisms underlying aggressive, hostile behaviour in psychopathic offenders.

Furthermore, results imply that in contrast to the findings of Gray et al. (2003), and Snowden, Gray, Smith, Morris and MacCulloch, et al. (2004), there was no difference between delinquents who committed violent crimes and non-violent crimes with respect to abnormal moral beliefs. We hypothesised that it would not be the type of crime but the different dimensions, especially the predatory dimension (unemotional, cold blooded), which might be related to the moral IAT effect.

The current results indicate that psychopathic offenders demonstrate deficits in moral emotions, suggesting that they might fail to understand the moral aspects of the world. Important implications of these findings could be at first that treatment should no longer focus on trying to change one's sense of good and bad (since these feelings do not seem to be present), but rather provide insight into what these concepts, in particularly 'morally bad', mean. In other words, explaining the differences between for instance what is kind-hearted and what is evil. Secondly, studies have demonstrated that offenders demonstrate externalised attribution styles (e.g., Wallace, Vitale & Newman, 1999; Cima et al., 2007a). In line with this, the dot probe results of the present study indicate that treatment could focus on the lack of guilt by changing these externalised (hostile) attribution style.

The present study suffers from some restrictions. First, there has been some debate about the validity of implicit measurements. For instance, De Houwer (2002) argued that some of the limitations of the IAT are that this task only reflects the relative strength of associations. In this case, morally good and bad opposed to positive and negative. Furthermore, since the IAT effects are malleable, the IAT cannot be used to measure stable, context-independent dysfunctional associations. Additionally, the IAT might reflect societal views rather than personal views. In line with this, Bosson, Swann and Pennebaker (2000) investigated the reliability and validity of several implicit measures to assess implicit self-esteem and found that the different implicit measures did not correlate highly with each other, or with explicit measures of self-esteem. However, other studies have demonstrated that implicit self-esteem outperformed explicit self-esteem in predicting people's spontaneous and/or affectively driven responses, indicating the significance of using implicit measurements (e.g., Greenwald & Farmham, submitted; Spalding & Hardin, 2000). Likewise, several studies demonstrated the value of implicit methods in relation to psychopathology (e.g., De Raedt, et al., 2006; Gray, 2003; Huijding, 2006; Roefs & Jansen, 2002). Secondly, this sample demon-strated relatively high average error rates on the incongruent blocks of the IAT. However, error rates around 17% have been found before (e.g., Tush & Wiers, 2007). Moreover, there is no clear guideline regarding an acceptable percentage of errors made on the IAT. Some investigators used an error rate of 20% as excluding criterion (e.g., Karpinski & Steinman, 2006), while others used error rates higher than 26% (Knutson, Wood, Spumpinato & Grafman, 2006) and 40% (Heider & Skowronski, 2007) as exclusion criterion. Therefore, in the current sample those participants displaying an average error rate of 25% or higher were excluded from further analysis.

Thirdly, although the PPI has demonstrated to be a reliable and valid instrument to measure psychopathic traits (Jelicic et al., 2004), it remains a self-report inventory. Given the nature of the population being studied (e.g., social desirability, underreporting, denial; Cima et al., 2003), one might expect certain response biases. We therefore have plans to repeat the current study using the PCL-R (Hare, 1991). In doing so, we might find an answer for the fact that psychopathy does not seem to play a role in the moral IAT. Fourth, this study did not use a non-criminal comparison group. Although we piloted the implicit measures within 10 non-criminal controls, we could not compare the results of the offender group with non-criminal participants. A replication should therefore include a non-criminal comparison group. Fifth, since the correlation between the two subscales of the RPQ was very high, we could have performed a factor analysis to demonstrate that these two subscales reflect two different constructs. Unfortunately, the number of participants in the present study was too low to conduct a factor analysis. However, future studies using the RPQ should take this point into account. Six, it would have been interesting to investigate whether there would be a difference between moral emotions on an explicit level versus an implicit level. In doing so, we would be able to examine whether especially the predatory offenders would demonstrate moral emotions on an explicit level (answering in a social desirable way). This would have given some insight into whether they are aware of their lack of moral emotions such as good and bad. Therefore, in the follow-up study, also explicit measures, such as for instance the Moral Judgment Questionnaire, will be administered. Finally, results demonstrated that all concepts (i.e., psychopathy, predatory, and impulsivity) were interrelated, suggesting a dimensional model. However, only the predatory dimension explained the IAT effect, while psychopathy was only related to less attention to emotions of guilt. Since the impulsive dimension was not related to a lack of moral emotions, these results seem to support the idea that especially psychopathic, cold blooded, and predatory characteristics are

important in relation to deficits in moral emotions.

In sum, the results show that predatory offenders, whether psychopath or not, demonstrate a lack of moral emotions of good and bad, while psychopathic offenders, either predatory and/or impulsive, show a lack of guilt.

Author's note

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