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Approach and avoidance towards aggressive stimuli and its relation to reactive and proactive aggression

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ABSTRACT

This study assessed the association between indirectly measured behavioural approach- and avoidance-related tendencies on the one hand, and reactive versus proactive aggression on the other hand. Reactive aggression (i.e. the impulsive, anger-driven aggression expressed in response to threatening stimuli) was differentiated from proactive aggression (i.e. the more controlled aggression motivated towards obtaining specific goals). A mixed sample of 118 patients and healthy controls filled out a self-report measure to assess their degree of reactive and proactive aggression, and then performed an Approach Avoidance Task in which they were asked to pull or push a joystick in response to a format-feature of a series of pictures, irrespective of their contents. The pictorial stimuli used in this task included attack-related scenes and angry faces, along with neutral, positive and negative control stimuli. The results were controlled for the level of personality disorder pathology, gender, and age. The findings indicated that reactive but not proactive aggression was related to the relative behavioural tendency to approach attack-related scenes, along with positive stimuli. These findings reflect the hyper-reactivity of the approach-related reward system in reactive aggression, and further our knowledge into the distinct correlates and precursors of reactive and proactive aggression.

1. Introduction

Each day, we make numerous decisions about which stimuli to approach, and which to avoid. This study aims to assess the relationship between approach/avoidance behaviour and aggression. Living beings are generally motivated to approach positive stimuli, and avoid negative ones. The emotion of anger can be considered as an exception to this rule as it is the only negatively valenced emotion that is related to approach behaviour (Lazarus, 1991; Levenson, 1994). The anger-approach relationship is supported by three major lines of evidence. *First,* self-report studies (Harmon-Jones, 2003a, 2003b; Smits and Kuppens, 2005) have linked trait anger to increased scores on the Behavioural Activation System (BAS), the emotion system activated by rewarding triggers (Grey, 1994, 1987). *Second,* there are established biological links between anger and approach tendencies. Neuroimaging studies, for example, have coupled anger to the functioning of the left hemisphere, the hemisphere predominately involved in approach tendencies (Coan and Allen, 2004). For example, people with high trait-anger displayed greater left frontal brain activity when reacting to anger-producing pictures (Harmon-Jones, 2007). Greater left frontal activity was also observed in participants after being insulted, compared to being treated in a neutral fashion (Harmon-Jones and Sigelman, 2001). Likewise, anger has been related to increased testosterone levels, an hormonal correlate of approach inclination (see Carver and Harmon-Jones, 2009 for an overview). *Third,* several forms of psychopathology, such as narcissism, psychopathy and mania, all characterized by high anger, have been linked to approach tendencies (Arnett et al., 1997; Foster and Trimm, 2008; Meyer et al., 2001). Note that a recent study indicated that anger was merely related to the tendency to approach under the specific condition that approach served the goal to dominate or aggress (Bossuyt et al., 2014).

Aggression also has been linked to approach motivation. An increased level of self-reported physical aggression in students was shown to relate to self-reported BAS scores (Harmon-Jones, 2003a, 2003b). Likewise, students' level of trait anger predicted approach towards angry faces (Veenstra et al., 2016). A causal BAS-aggression relationship was established by showing that

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participants with higher BAS levels, who had been primed to approach by writing down concrete steps to complete a project, gave more negative hiring recommendations for a person doing a radio broadcast after being insulted (Harmon-Jones and Peterson, 2008).

A frequent differentiation based on distinct aggressive motives is that of reactive versus proactive aggression. Reactive aggression is an impulsive action to remove a (presumed) threat and is highly affective in nature. Proactive aggression is more controlled, and is instrumentally initiated to obtain a desirable goal, such as money, status or power (Dodge and Coie, 1987; Poulin and Boivin, 2000). Both aggression types have been linked to different forms of psychopathology and developmental precursors (Lobbestael et al., 2015; see Cima and Raine, 2009 for an overview), suggesting that distinct therapeutic approaches are required. To the best of our knowledge, there have been very few previous attempts to differentiate reactive aggression from proactive aggression in terms of their relationship to approach-related behaviour. We are aware of only one study (von Borries et al., 2012) investigating a related issue; specifically, von Borries et al. compared a psychopathic inmate group to a healthy control group and found that the level of proactive aggression within the psychopathic group predicted diminished avoidance of angry faces. Note that these findings were not controlled for the level of reactive aggression. von Borries et al., (2012) used the Approach Avoidance Task (AAT). The AAT is an indirect reaction time measurement of behavioural approach and avoidance tendencies; participants are presented with visual stimuli and instructed to push or pull a joystick in response to content-irrelevant features of the stimuli, such as whether pictures are rotated to the left or right (Cousijn et al., 2011). The idea behind the AAT is that participants will be quicker to push the stimulus away when instructed to do so if they are naturally inclined to avoid the presented stimulus (Rinck and Becker, 2007). Indirect evidence linking reactive aggression to approach stems from two studies that found self-reported trait anger to be positively related to BAS, because the items used to operationalize trait anger can be considered as more reactive than proactive in nature (Harmon-Jones, 2003a, 2003b; Smits and Kuppens, 2005).

While the assessment of approach-avoidance tendencies is extensively described in the anxiety and substance abuse literature (e.g. Cousijn et al., 2011; Fleurkens et al., 2014; Heuer et al., 2007), the topic has been neglected in the area of aggression. The current study is the first to assess indirect behavioural approach/avoidance correlates of reactive and proactive aggression. An AAT was used comprising attack-related pictures and angry faces, along with positive, negative, and neutral control stimuli, to assess the relationship with the level of reactive and proactive aggression. A mixed sample was used of patients with various psychiatric disorders and non-patient participants to ensure varying degrees of aggression and personality disorders, which we controlled for. Based on the observation that anger is uniquely related to reactive aggression (Dodge and Coie, 1987; Hubbard et al., 2010; Poulin and Boivin, 2000), and the established relationship between anger and approach-related behaviour (see Carver and Harmon-Jones, 2009 for an overview), we hypothesized that reactive aggression, but not proactive aggression, is related to approach-tendencies of both attack-related pictures and angry faces.

2. Method

2.1. Participants

The 118 participants included 53 adults from one psychiatric outpatient clinic in The Netherlands, and 65 participants from the general population. Exclusion criteria were alcohol intoxication during testing, the presence of a psychotic disorder, and age below 18 or above 65 years. Most participants were female (74.6%, versus 25.4% males) and unmarried (79.7%, versus 20.3% married). Mean age was 27.28 years ($SD = 11.04$, range 18–63). With respect to educational level, 1.7% completed only primary school, 44.9% completed high school or low-level vocational studies, 16.1% secondary education and 37.2% higher education. Of all participants, 61% had received no clinical diagnosis. The remaining 39% had received one or more clinical diagnosis of anxiety disorder (19.5%), mood disorder (27.1%), substance abuse or dependence (2.5%), eating disorder (6.8%), or somatoform disorder (9.3%). Sixty-seven percent received no personality disorder diagnosis. The remaining 33.1% received one or more personality disorder diagnosis: borderline (18.6%), avoidant (19.5%), obsessive-compulsive (3.9%), paranoid (4.2%), antisocial (2.5%), dependent (1.7%), while none of the remaining participants met other personality disorder criteria.

2.2. Materials

2.2.1. Clinical and personality pathology

DSM-IV clinical and personality diagnoses were assessed with the Dutch versions of the Structured Clinical Interview for DSM-IV Axis I and Axis II disorders (SCID I and SCID II: First et al., 1997, 1994). Previous studies have supported the reliability and validity of the SCID I and II (e.g. Lobbestael et al., 2011).

2.2.2. Reactive and proactive aggression

Reactive and proactive aggression were measured with the Reactive Proactive Questionnaire (RPQ: Raine et al., 2006). The RPQ consists of 23 items, 11 assessing reactive aggression (e.g. 'Reacted angrily when provoked by others'), and 12 assessing proactive aggression (e.g. 'Used physical force to get others to do what you want'), that are rated on frequency (0 = never, 1 = sometimes, 2 = often). The RPQ subscales and total scores have displayed good internal reliability (Cronbach's $\alpha > .75$; Cronbach's $\alpha > .84$ in the current sample); factor analyses have demonstrated that a two-factor solution outperformed a one-factor solution (Cima and Raine, 2009; Raine et al., 2006). The RPQ showed adequate convergent and criterion validity, and temporal stability (Cima et al., 2013).

2.2.3. Approach avoidance Task (AAT)

Participants were presented with pictures belonging to one of six categories: attack-related scenes (e.g. a man pointing a gun towards the lens, a man holding an axe ready to attack, and a snake opening his mouth to bite); neutral scenes (e.g. someone holding a stick, and a water hose); angry faces (mouth closed); neutral faces; positive scenes (e.g. smiling faces, a happy cartoon snake, and someone holding a lollypop); and negative scenes (e.g. sad faces, a man crying in despair, and a drunk, slovenly man). The faces were selected from the NimStim database (Tottenham et al., 2009). The attack-related, neutral, positive and negative scenes were selected or created for the purpose of the current study, and visually matched regarding the number of people or animals, size, composition style and colour. Each category contained 10 pictures. All stimuli were resized to 331 mm × 249 mm. Participants were required to either push the joystick away from them, or pull the joystick towards themselves based on the content-irrelevant feature of whether the pictures were tilted to the right or to the left (Cousijn et al., 2011). All pictures were rotated 3 degrees. The AAT contained a zooming mechanism: when pulling the joystick, the picture size increased, and when pushing it the picture size decreased (Heuer et al., 2007). This was done to mimic a more realistic approach and avoidance action. Reaction times were recorded; faster pushing and slower pulling indicated an avoidance preference towards a stimulus, while faster pulling and slower pushing indicated an approach preference. To enable the

participant to become accustomed to the task requirements, the task started with eight practice trials comprising grey squares tilted to the left or right containing the instruction to either push or pull, followed by the appearance of 12 grey squares without these instructions. Each stimulus was presented four times, twice tilted to the right, and twice tilted to the left. The total task consisted of 240 trials (6 categories x 10 slides, presented 4 times). Stimuli were presented in a mixed, random order. In total, there were eight different version of the AAT; four sets with a different stimulus order, with one version where participants were instructed to pull the joystick when the pictures were tilted to the right, and push when tilted to the left, and one version with inversed instructions. The picture stayed on the screen until the push or pull response was complete, which is when the reaction time was recorded. This implies that the final reaction time of a trial was logged once the joystick was completely pushed or pulled. After the first response, a feedback screen appeared for 1000 ms – a white screen for the correct answer, and a red cross when the response was incorrect. Error trials were repeated until a correct response was obtained. The next trials started immediately after the feedback screen. The AAT was programmed and presented using E-prime 2 software. A Pro Flight 2 joystick by Logic 3 was used and positioned between the participant and the computer screen. The task lasted ~ 15 min. The stimuli scene sets that were created for the purpose of this study were rated by an independent sample (N=20), who correctly classified 84.7% of the stimuli as attack-related, 80.3% as neutral, 80.4% as positive and 89.3% as negative. The mean intensity of the attack-related stimuli was rated 72.90 on a 0–100 mm VAS scale for the attack-related stimuli (SD=8.39); 64.80 (SD=6.31) for the neutral stimuli; 66.72 (SD=6.44) for the positive; and 80.36 (SD=9.42) for the negative stimuli.

2.3. Procedure

Patients were invited to participate in this study by their therapists who provided a general description of the study and an information letter. Patients were contacted by the researcher if they indicated they were willing to participate. Non-patients were recruited from the general population via flyers and advertisements in local newspapers. The therapists of the health care settings made the SCID diagnoses of the patients during intake, whereas the experimenters conducted the SCID interview with all non-patients. The experimenters were two graduate students in psychology, who were extensively trained over two days, and scored audiotapes of 10 SCID interviews under supervision before testing independently. Training resulted in the researchers having excellent interrater agreement (Lobbestael et al., 2011). Patients were tested in the clinic where they were treated, and nonpatients were tested in the university laboratory. After obtaining informed consent, participants were interviewed with the SCID-I and SCID-II. Next, they filled out the RPQ, and performed the AAT. Finally, participants were debriefed, thanked for their participation, and given a 10 Euro honorarium for their participation. The protocol and consent form were approved by the Ethics Committee Psychology of Maastricht University.

2.4. Data preparation and statistical analyses

Data from all participants were merged into one sample across all analyses. Error trials were removed from the AAT. AAT scores were corrected for outliers by removing reaction times below 200 ms, above 2000 ms, and more than three standard deviations from the individual participant's mean reaction times (see also Cousijn et al., 2011). Bias scores were calculated for each of the six AAT categories by subtracting the mean approach reaction time from the mean avoidance reaction time. A positive bias score thus indicated approach bias (i.e. faster approach compared to avoidance), while a negative bias score indicated avoidance bias (i.e. faster avoidance compared to approach). The reliability of the AAT was investigated by calculating Cronbach's alpha for each bias score with the individual bias-score per stimulus. Findings showed the following α values: 0.23 (attack-related scenes); −0.09 (neutral scenes); 0.36 (angry faces); −0.10 (neutral faces); 0.25 (positive); and 0.32 (negative). These values were fairly poor, but not unusual for reaction time tests (Ataya et al., 2012a, 2012b). To test whether reactive and proactive aggression were associated with the AAT bias scores, we conducted 6 separate linear regression analyses (backward procedure) with reactive aggression and proactive aggression as predictors and the AAT bias scores as the dependent variable.[1] Next to gender and age, the continuous summed criterion scores of the personality disorder traits were added to the model as covariates to allow drawing aggression-specific conclusions. This was done by forcing these 3 variables in the models in a first step of the regression analyses, using the enter method. Because of the explorative nature of our analyses, results were not corrected for multiple testing, in order to avoid type II errors (Gelman et al., 2012; Rothman, 1990).

3. Results

The mean score of reactive aggression was 6.88 (SD=4.66, range 0–20). The mean score of proactive aggression was 1.39 (SD=2.51, range 0–14). Reactive aggression scores were positively related to proactive aggression scores, $r=0.70$, $p<0.001$, which is comparable to correlations obtained in previous studies ($r=0.67$; Brown et al., 1996; $r=0.70$; Cima and Raine, 2009; $r=0.76$; Dodge and Coie, 1987).

The mean reaction times for pull and push conditions, mean bias scores, and mean percentage of correct responses for each AAT stimulus category are presented in Table 1. Paired sample *t*-tests showed that bias scores of the attack-related scenes were higher than those of the angry faces, neutral faces and the positive AAT categories, $t(127)=2.94$, $p=0.004$; $t(127)=3.82$, $p<0.001$; $t(127)=2.74$, $p=0.007$ respectively, and that the bias score of the neutral face was smaller compared to that of the negative AAT category, $t(127)=-2.37$, $p=0.02$. There were no significant differences between the other bias scores, $p's>.05$.

Preliminary analyses indicated no violation of the assumption of normality, linearity, multicollinearity and homoscedasticity (maximum Cook's distance=0.35, maximum standardised residual=3.11). Analyses of the AAT bias scores showed that reactive aggression was positively predicted by biases towards attack-related scenes, while proactive aggression was negatively predicted by this bias. Reactive aggression also predicted bias scores towards the positive category. All of these findings were controlled for the levels of personality disorder trait scores, gender and age (see Table 2).[2] R^2 values indicate that the AAT bias scores of the aggressive scenes and the positive stimuli explained 7–8% of the variance of reactive and/or proactive aggression. Taken together, these findings imply that reactive aggression is related to a

[1] In order to limit the number of tests performed, we refrained from analyzing the impact of the predictors on the relative bias scores (e.g. attack-related versus neutral scenes).

[2] Because several PDs are characterized by heightened levels of anger which might result in an artificial constraint on the amount of construct relevant variance being predicted by the RPQ scales, we followed the suggestion of a reviewer to test whether results remained invariant when not controlling for PD traits. Findings show that the results remained the same, whether in- or excluding PD traits, gender and/or age.

Table 1
Mean percentage correct responses for the complete sample and mean reaction times for pull and push conditions for each AAT stimulus category.

AAT categories	% Correct responses	Mean (SD) RT pull	Mean (SD) RT push	Mean (SD) bias score
Attack-related scenes	94.4	836.27 (173.36)	901.50 (165.60)	62.23 (85.59)
Neutral scenes	95.8	839.97 (172.92)	892.09 (168.57)	52.12 (72.96)
Angry faces	95.7	824.01 (156.57)	865.23 (158.85)	41.23 (73.80)
Neutral faces	96.6	816.95 (154.35)	854.22 (154.95)	37.27 (65.93)
Positive	95.2	835.78 (166.50)	875.49 (162.19)	39.70 (77.29)
Negative	94.9	838.88 (172.35)	894.75 (164.54)	55.86 (78.91)

Note: RT=reaction time.

Table 2
Results of the backward regression analyses with reactive and proactive aggression as predictors and Approach Avoidance Task (AAT) bias scores as dependent variables, controlled for PD trait score, gender and age.

AAT bias score	Reactive aggression		Proactive aggression		R^2
	β	p	β	p	
Attack-related scenes	.30*	.03	−0.30*	.03	.07
Neutral scenes	.06	.61	−.02	.86	.03
Angry faces	.04	.70	−.11	.42	.03
Neutral faces	.15	.30	−.09	.39	.007
Positive	.28*	.01	−.13	.32	.08
Negative	.16	.27	−.18	.08	.06

Note: Standardized β coefficients are shown;
* $p < 0.05$.

stronger tendency to approach attack-related scenes while proactive aggression is related to avoid these threatening scenes. Furthermore, reactive aggression is also related to approaching positive pictures.

4. Discussion

The current study was set up to assess the relationship between reactive and proactive aggression on the one hand, and approach and avoidance tendencies towards angry and aggressive stimuli (i.e. attack-related scenes and angry faces) on the other hand. The main findings were that reactive aggression was positively associated with a relative approach tendency of attack-related scenes when compared to avoidance, while the opposite was found for proactive aggression. Reactive aggression also predicted increased relative approach towards positive stimuli.

Our primary hypothesis was confirmed that reactive aggression is associated with relative approach of attack-related scenes. This implies that reactive aggression potentiates the goal to approach both people and animals in an attack-pose. Surprisingly, we found no such correlation between reactive aggression and approach towards angry faces. One likely explanation for this finding is that angry faces merely communicate the desire to confront another person aggressively, but are silent as to who will win this confrontation. In contrast, the attack-related pictures we used in the current AAT were more extreme (i.e. a person with clenched fists or holding a gun), and thus not only suggest threat (as angry faces do), but also dominance. Recent theories suggest that people are motivated to confront and overcome such dominance cues (especially if there are indications that their approach is successful in forcing the opponent into submission, Wilkowski and Meier, 2010), and that the presence of anger additionally motivates to overcome such social challenges (Berkowitz and Harmon-Jones, 2004). Given anger is inherent to reactive aggression, it is therefore not surprising that reactive aggression showed to be related to increased relative approach of attack-related scenes. Another part of evidence indirectly suggesting that dominant cues can trigger reactive aggression, stems from a study by Lobbestael et al., (2014) showing reactive aggression was related to grandiose narcissism, which in turn related to increased Testosterone levels, which is a well-established correlate of dominant behaviour (see Archer, 2006).

Reactive aggression also predicted relative approach towards positive stimuli. This is in line with studies showing that both anger or high responsiveness to provocation and positive affect are related to increased BAS activity (Carver, 2004; Carver and White, 1994; Harmon-Jones and Peterson, 2008, 2003a, 2003b; Gable et al., 2000). Likewise, both anger and the positive emotions of joy and interest have been shown to be related to left cortical activity (see Coan and Allen, 2003 for a review). Our findings imply that reactive aggression relates both to increased approach of attack-related scenes in a threatening context, and to approach towards rewarding stimuli in an appetitive context. However, the approach-tendencies did not generalize to all stimuli (here not to angry faces).

We did not expect proactive aggression to relate to an approach bias towards aggression related stimuli in the AAT, which was supported by a lack of relation between the raw proactive aggression score and AAT attack-related bias scores. Unexpectedly, using the residual scores, we found an inverse relationship between proactive aggression and bias towards attack-related scenes. This suggests that, independent of aggression, a goal-oriented motivation generally relates to a relative avoidance of attack-related scenes. When this goal is achieved through the use of aggression, is it is not related anymore to behavioural approach or avoidance of aggressive scenes. We suggest that future studies investigate whether the current finding can be replicated or not. It is important to keep in mind that both reactive and proactive aggression were simultaneously added as predictors in the regression analyses to specifically determine the unique variance explained by either two. This implies that the unique aspects of reactive aggression (i.e. controlled for proactive aggression) predicted approach towards attack-related stimuli, while the unique aspect of proactive aggression (i.e. controlled for reactive aggression) predicted the opposite. Assessing correlations of the unique aspects of reactive and proactive aggression is considered the gold standard in aggression literature. This statistical approach likely explains the seemingly contrasting findings of von Borries et al. (2012) who found that the level of proactive aggression incrementally increased diminished avoidance of angry faces in psychopathic inmates. Because the results of von Borries et al. (2012) were not controlled for the level of reactive aggression, their findings could also have been driven by the overall concept of aggression instead of by the specific proactive nature of this aggression. The current findings provide further evidence for a valid distinction between reactive versus proactive motivation for aggression, and are in line with previous studies denoting distinct (neuro)cognitive, physiological, and affective correlates of both aggression types (for an overview see Cima and Raine, 2009). Specifically, our study is the first to demonstrate distinct indirect behavioural approach/avoidance correlates of reactive and

proactive aggression.

The current study increases our insight into indirectly assessed approach and avoidance tendencies in aggression, helping to disentangle the distinct correlates of reactive and proactive aggression. Another strong aspect of the current study is that results were controlled for the level of personality disorders; consequently, the established approach correlates are more specific for reactive aggressive behaviour and less so for a broader presence of deviant personality traits. However, several drawbacks hamper the generalizability of the current findings. *First,* the reliability levels of the AAT stimulus categories were low; while not uncommon for implicit reaction-time based measures, it is a limitation of the current study. In part, the complexity of the presented visual sciences may activate multiple lexical and visual categories. Presenting such complex stimuli in random order may partly explain the poor reliability. A second cause of these low reliability levels could be our intentional selection of heterogeneous items within the categories, for example, people holding weapons or putting up their middle finger, and animals on the verge of attacking in the attack-related scenes, and positive pictures of objects and animals but also smiling faces in the positive category. In this way, we potentially sacrificed internal consistency for the sake of validity. Importantly, the ratings of the scenes by an independent sample did confirm that the pictures in the current AAT were representative for the different categories. *Second,* there were relatively few participants with high levels of aggressive behaviour. While this is not extremely problematic, given the reasonable range of reactive and proactive aggression scores in the current sample and the continuous nature of aggression, replication studies in forensic samples with higher aggression levels are necessary.

In contrast to the field of anxiety and substance abuse disorders, this is one of the first studies to assess approach-avoidance tendencies in the area of aggression. Being the first study to address the link between reactive-proactive aggression and approach motivation towards angry and aggressive stimuli, its findings require replication in independent samples, using different stimuli of, for example, attack-related or aggressive scenes. Another promising avenue would be to use an alternative behavioural measure of approach and avoidance, for example, where participants are required to move their symbolic self towards or away from certain stimuli (Krieglmeyer and Deutsch, 2012). While this measure has higher internal consistency than the AAT (Field et al., 2011), it is also a less indirect measure (cf. De Houwer, 2003a, 2003b; Wiers et al., 2013).

Our findings again (for an overview see Cima and Raine, 2009) suggest that reactive and proactive aggression are shaped by different processes and thus may require unique therapeutic approaches. One promising avenue for reactive aggression would be to therapeutically lower the tendency to approach aggressive stimuli. The behavioural enactment of approach can be considered as a reflection of the sixth and final step in Crick and Dodge's social information processing model (Crick and Dodge, 1996). Previous studies have provided empirical support for the theory that reactive (and not proactive) aggression is already associated with biases in the two first phases of information processing, namely, that of increased attention towards threatening stimuli (Brugman et al., 2015) and hostile interpretation of ambiguous stimuli (Lobbestael et al., 2013). Thus, the observed approach towards attack-related stimuli characteristic for reactive aggression is probably preempted by early processing biases. In the case of reactive aggression, it might therefore be therapeutically advantageous to intervene in those first two phases of information processing, for example by using cognitive bias modification training with the goals of training attention away from threatening stimuli, or replacing hostile interpretations by more benign ones (Hawkins and Cougle, 2013). Alternatively, directly targeting the automatic approach tendencies could be attempted, as has been done successfully in alcohol-dependent patients (Eberl et al., 2013; Wiers et al., 2011), with preliminary positive results for social stimuli in social anxiety (Rinck et al., 2013). The current findings suggest that therapeutically abolishing behavioural tendencies towards specific stimuli does not appear to be a promising avenue for the diminishment of proactive aggression. Instead, proactive aggression has been shown to be uniquely correlated to positive evaluations of outcomes (i.e. step 5 of the SIP model; Crick and Dodge, 1996; Walters, 2007). Therefore, it would be more fruitful to focus therapeutically on altering these positive outcome expectancies in the case of proactive aggression.

Taken together, the current findings show that reactive and proactive aggression are related to distinct behavioural approach- and avoidance- tendencies. Specifically, reactive – and not proactive – aggression is associated with the relative tendency to approach both attack-related scenes and positive stimuli, that likely reflects hyperreactivity of an approach-related reward system.

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