Psychopaths fail to automatically take the perspective of others

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Psychopathic individuals display a chronic and flagrant disregard for the welfare of others through their callous and manipulative behavior. Historically, this behavior is thought to result from deficits in social-affective processing. However, we show that at least some psychopathic behaviors may be rooted in a cognitive deficit, specifically an inability to automatically take another person's perspective. Unlike prior studies that rely solely on controlled theory of mind (ToM) tasks, we employ a task that taps into automatic ToM processing. Controlled ToM processes are engaged when an individual intentionally considers the perspective of another person, whereas automatic ToM processes are engaged when an individual unintentionally represents the perspective of another person. In a sample of incarcerated offenders, we find that psychopathic individuals are equally likely to show response interference under conditions of controlled ToM, but lack a common signature of automatic ToM known as altercentric interference. We also demonstrate that the magnitude of this dysfunction in altercentric interference is correlated with real-world callous behaviors (i.e., number of assault charges). These findings suggest that psychopathic individuals have a diminished propensity to automatically think from another's perspective, which may be the cognitive root of their deficits in social functioning and moral behavior.

theory of mind | psychopathy | altercentric interference | automatic theory of mind | controlled theory of mind

Successful social interaction requires the ability to understand what other people are thinking. This ability, often referred to as a "theory of mind" (ToM), helps individuals predict and interpret others' behaviors, develop meaningful social relationships, communicate effectively, and engage in appropriate moral reasoning (1–5). ToM processing is critical in normal social interactions, and thus it makes sense that ToM dysfunctions characterize a variety of psychiatric disorders, from autism to schizophrenia (6–8).

Surprisingly, previous work suggests that ToM deficits are not typically characteristic of one well-known psychiatric disorder: psychopathy. Psychopathy is defined by antisocial behavior paired with callousness, low empathy, and low interpersonal emotions (9). Psychopathic individuals commit two to three times more violent and nonviolent crimes than nonpsychopathic individuals, recidivate at a much higher rate, and are responsible for a disproportionate share of the estimated $2.34 trillion in annual costs associated with crime in the United States (10). Researchers have described psychopathic individuals as "emptied souls" (11) and "unscrupulous" (12), and some clinicians have designated psychopathy as the syndrome of "moral insanity" (13).

Given the extreme antisocial behavior that psychopathic individuals exhibit, one might initially expect psychopathy to be characterized by deficits in ToM capacities. Nevertheless, research indicates that psychopathic individuals show relatively normal performance on classic ToM tasks (14–17).* Individuals with psychopathy perform well on first- and second-order false belief tasks, which require them to understand that another person's beliefs may differ from their own (14, 16). Psychopathic individuals also succeed when asked to report the mental states of characters in relatively complex stories, such as those involving social faux pas (16, 17). These and other findings support the idea that psychopathic individuals perform normally when asked to take another person's perspective, despite the fact that their real-world behavior seems contrary to normal perspective taking.

Here, we examine an alternative explanation for the apparently normal performance of psychopathic individuals on ToM tasks. Specifically, we explore the possibility that previous work on ToM in psychopathy fails to tap into a critical component of normal ToM processing: our tendency to take others' perspective automatically. Our experiment builds on the recent insight that neurotypical adults represent the perspective of others using two distinct types of ToM processes: controlled and automatic (1). These two types of ToM processes differ in the extent to which they are engaged intentionally (29, 30). Controlled ToM processes are engaged when an individual deliberately considers the thoughts or feelings of another person. With automatic ToM processes, an individual represents the thoughts or feelings of another person without intending to do so (1), even in cases where such processing is irrelevant to the task at hand.

In one general population study of this type of automatic ToM processing (31), participants see images of a human-like avatar in a room with dots on the walls and are asked to report either the number of dots they see (automatic) or the number of dots the avatar sees (controlled). Results show that participants are adept at reporting the number of dots the avatar can see, but they are slower to do so when they see a different number of dots than the

Significance

Psychopathic individuals behave in callous and antisocial ways that suggest that these individuals fail to consider what others are thinking (i.e., theory of mind). However, most empirical studies of psychopathy find that, despite their behavior, psychopathic individuals have an intact theory of mind: they successfully predict other's perspectives. Here, we show that psychopathic individuals have a previously unobserved cognitive deficit that might explain their pattern of destructive and antisocial behavior. We report that psychopathic individuals fail to automatically take the perspective of others, but can deliberately take the perspective of others. These findings suggest that psychopathic individuals have the ability to take the perspective of others but lack the propensity to do so.

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*Psychopathic individuals do show deficits in their ability to understand what others are feeling (18–25; but see refs. 26 and 27), but this capacity to represent others' feelings appears to be distinct from capacity to represent what others see and believe, as ToM capacities are often defined in the classic literature (28).

Table 1. Sample characteristics and zero-order correlation among key variables

Characteristic	*n*	Minimum	Maximum	Mean	SD	1.	2.	3.	4.	5.	6.	7.	8.
1. Age	106	21.00	67.00	36.32	10.70	–							
2. Race	106					−0.005	–						
White	38												
Black	62												
Asian	1												
Pacific Islander	4												
Mixed	1												
3. Shipley estimated IQ	106	75.00	128.00	104.54	10.95	0.056	−0.387**	–					
4. PCL-R Total Score	106	5.30	37.00	23.72	6.74	0.113	0.031	−0.062	–				
PCL-$R \leq 20$	28	5.30	20.00	14.89	3.91								
PCL-$R \geq 30$	22	30.00	37.00	32.59	2.07								
5. No. assault	106	0.00	10.00	1.60	2.06	0.151	0.134	−0.164	0.254**	–			
6. No. property crimes	106	0.00	101.00	3.91	12.51	0.190	0.023	−0.015	0.304**	0.089	–		
7. Altercentric interference	106	−195.65	369.73	79.31	85.29	−0.093	0.144	−0.327**	−0.166	−0.148	−0.049	–	
8. Egocentric interference	106	−200.58	410.23	116.60	78.60	0.002	0.073	−0.109	−0.011	−0.032	−0.370*	0.225*	–

Correlations including Race used Spearman's ρ; all other correlations used Pearson's *r*. *$P < 0.05$, **$P < 0.001$.

avatar; that is, participants experience egocentric interference, overrepresenting their own perspective when the avatar's perspective is different from their own. Importantly, participants also perform worse at reporting their own perspective on the number of dots when the avatar's perspective is different from their own. In this case, participants unintentionally experience altercentric interference: they are automatically affected by the avatar's perspective even when this other perspective hurts their own performance. This pattern is replicated in other studies (31–34), suggesting that people automatically and irresistibly represent others' perspectives even when it runs counter to their goals.

We hypothesize that psychopathic individuals may lack the normal human tendency to automatically take the perspective of others. To test this, we presented incarcerated males with the visual perspective-taking task described above (31). Participants completed a life-history interview assessing psychopathy using the Psychopathy Checklist-Revised (PCL-R) (35). We also inventoried real-world criminal behavior, also through self-report and official record. Finally, in *Supporting Information*, we provided additional analyses using a separate controlled ToM task (faux pas stories task) (36), that was more similar to tasks used in prior research on psychopathy, to replicate previous work demonstrating that psychopathic individuals performed well on measures of controlled ToM processing (*Supporting Information*).

Methods

Participants. Participants included 106 male offenders from a high-security correctional institution in Connecticut (see Table 1 for sample characteristics and zero-order correlations). We used a prescreen of institutional files and assessment materials to exclude individuals who: were not between the ages of 18 and 75; scored below 70 on a brief measure of IQ [Shipley Institute of Living Scale (37)]; performed below the fourth-grade level on a standardized measure of reading [Wide Range Achievement Test-III (38)]; had diagnoses of schizophrenia, bipolar disorder, psychosis, not otherwise specified; were currently taking psychotropic medication; or had a history of medical problems (e.g., uncorrectable auditory or visual deficits, head injury with loss of consciousness greater than 30 min, seizures, neurological disorders) that may impact their comprehension of the materials. Additionally, individuals were excluded if they did not self-identify as a particular race due to the importance of matching the participant with an avatar of the same race (see *Perspective-Taking Task*, below). The Yale University Human Investigation Committee approved the procedures used in the present study. All participants provided written informed consent.

Measures.

PCL-R. We first assessed all participants for psychopathy using the PCL-R (35). This measure used information gleaned from a life-history interview and a review of institutional files to score the participant on the presence of 20 different items. A score of 0, 1, or 2, was given for each item according to the degree to which a characteristic was present. Thus, PCL-R total scores ranged from 0 to 40. Additionally, a diagnostic cut score can be obtained by categorizing participants on whether their PCL-R total score is 20 or below (nonpsychopath) or 30 or above (psychopath). The reliability and validity of the PCL-R has been well established (35, 39). In this study, we obtained reliability ratings for 29 randomly selected participants. The interrater reliability for PCL-R total score was 0.99.

Criminal charges. During the interview, we asked all participants to report on their criminal convictions. This self-report was confirmed using official State of Connecticut Department of Correction files and mittimus reports. We focused on assault charges as these charges specifically represent an example of a crime that involved direct social interaction between the perpetrator and victim.

Perspective-taking task. We presented participants with the computer-based response-time task developed by Samson et al. (31). Participants were shown pictures of a human avatar in a room. The avatars were designed using Adobe Fuse CC v2015.1.0 and Adobe Photoshop CC v2015.5.1. We matched participant race and avatar race. All White participants viewed an avatar whose skin color was White, Black participants viewed an avatar whose skin color was Black, Asian and Pacific Islander participants viewed an avatar whose skin color was beige, and the mixed-race participant viewed the avatar whose skin color visually match theirs based on self-identification (in this case Black). All avatars wore khaki prison uniforms, which were similar in appearance to the uniforms worn by the participants. The avatar always appeared on the screen in profile facing either the right or left wall of the room. Up to three red dots were depicted on the walls of the room. Depending upon the orientation of the avatar and the positioning of the dots, the avatar was able or unable to see all of the dots in the room (Fig. 1).

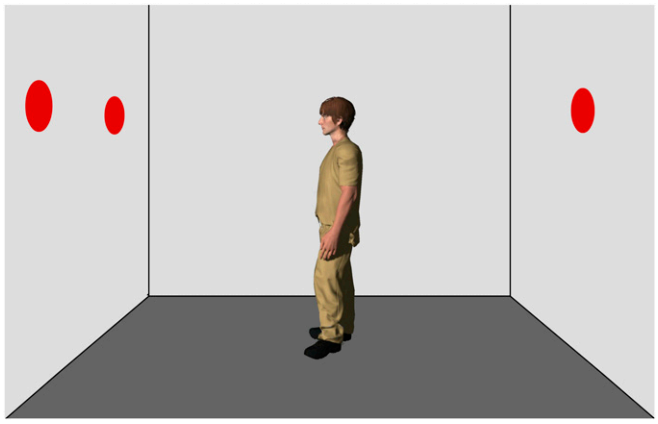

Fig. 1. Example of the stimuli depicting the avatar. Note that in this example, the avatar and the participant would have inconsistent perspectives because the participant would be able to see three dots in the room, whereas the avatar would only see two dots in the room.

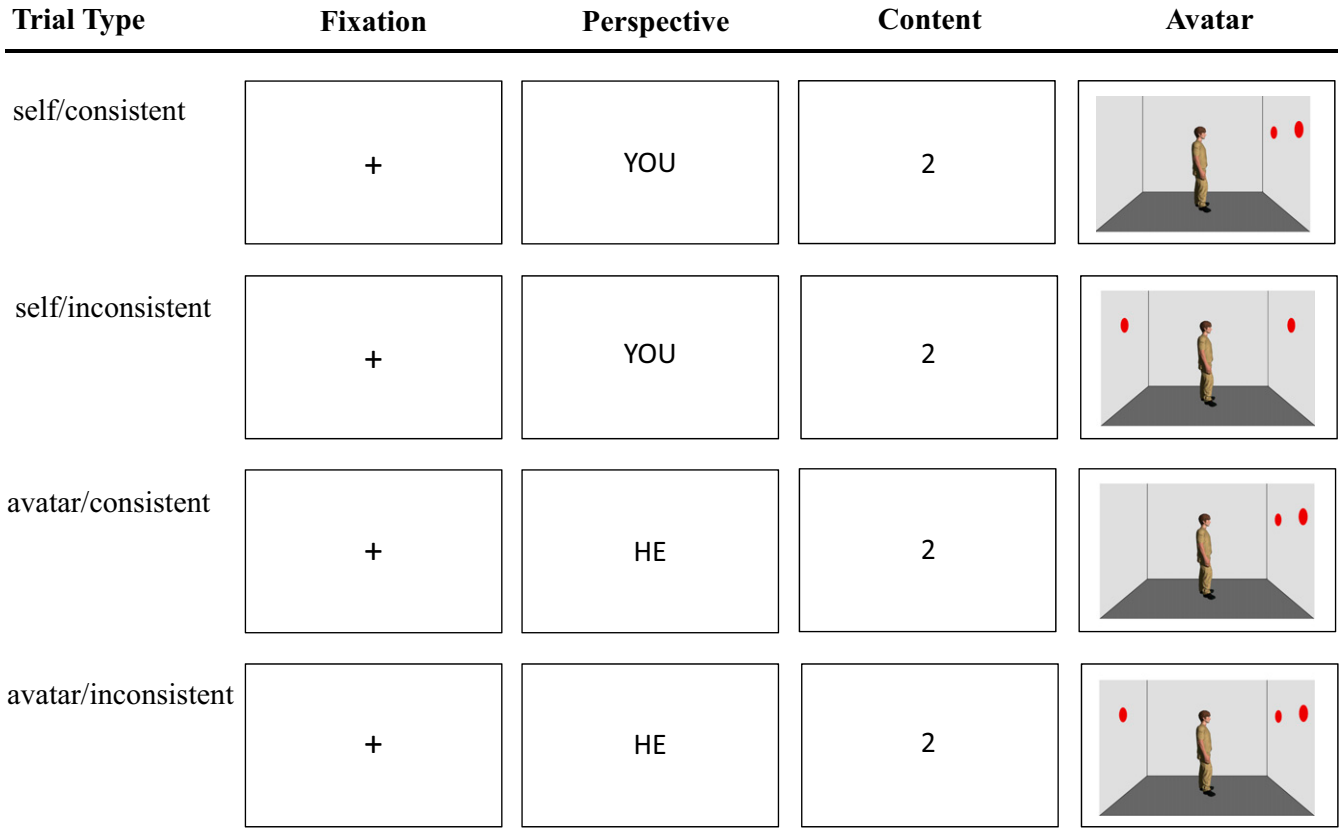

Fig. 2. Example of the sequence of stimuli participants saw in the four critical trial types. The text on the "Perspective" screen indicated whether the participant should adopt his self-perspective (automatic) or the perspective of the avatar (controlled). The text on the "Content" screen indicated the specific number of dots that the participant should look for and verify were seen from either his self-perspective or the perspective of the avatar. Note that in each of these examples, the correct response would be "yes," because the indicated content matches the indicated perspective.

On each trial, participants judged either their own visual perspective (self-trials; i.e., automatic) or the visual perspective of the avatar (avatar trials; i.e., controlled). Specifically, participants were asked to verify the number of dots that either they (self) or the avatar could see. Sometimes the participant and the avatar could see the same number of dots (consistent trials), and sometimes they could see different numbers of dots (inconsistent trials). This design resulted in four trial types: self-consistent, self-inconsistent, avatar-consistent, and avatar-inconsistent (Fig. 2). Each trial included four stimuli, presented in the center of the screen in the following order: (*i*) a fixation cross indicating the start of the trial, (*ii*) a word indicating whether participants should adopt their perspective (YOU) or the perspective of the avatar (HE), (*iii*) a number (0–3) specifying the content to be verified, and (*iv*) a picture of the avatar in a room. Stimuli *i–iii* each appeared for 750 ms, and each one was followed by a blank screen for 500 ms. After the final stimulus, participants had 2,000 ms to indicate whether the picture matched the specified perspective and content (by pressing the P-key, indicating "yes"), or that it did not match the specified perspective and content

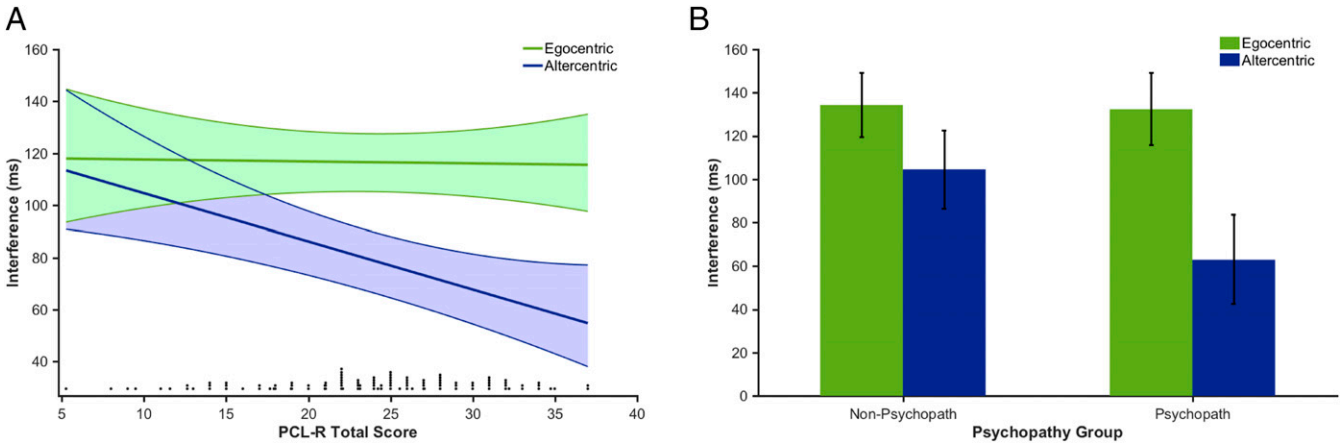

Fig. 3. (*A*) Participants high on psychopathy displayed less altercentric interference than participants low in psychopathy, but no difference was observed on measures of egocentric interference. Error bands represent 1 SE and along the *x* axis a dot plot represents the count of PCL-R score. (*B*) Participants who meet the diagnostic criteria for psychopathy displayed less altercentric interference than nonpsychopathic participants, but there was no difference between groups in egocentric interference. Error bars represent 1 SE.

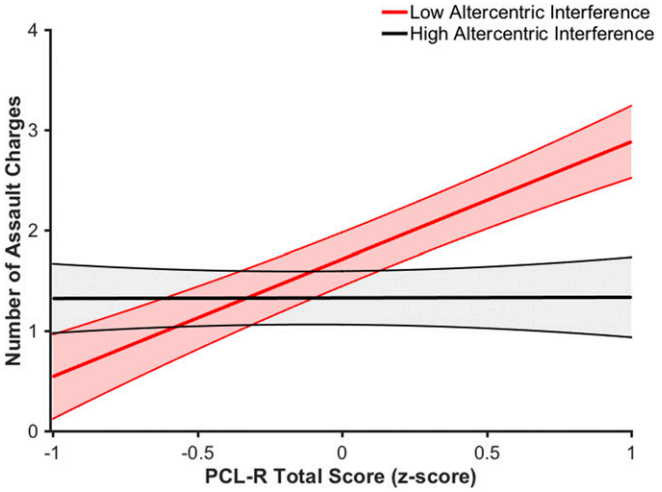

Fig. 4. Participants with a combination of high PCL-R scores and low altercentric interference (1 SD below the mean) had more assault charges, compared with participants with high PCL-R scores and high altercentric interference (1 SD above the mean). Error bands indicate 1 SE.

(by pressing the Q-key, indicating "no"). If the participant did not respond within 2,000 ms, he simply advanced to the next trial. Participants did not receive any trial-by-trial feedback about their performance.

Trials were presented in three blocks, each consisting of 48 trials. Within each block, the four trial types were presented equally often, the correct answer was "yes" and "no" equally often, and the direction the avatar was facing was counterbalanced. Each block also included four filler trials in which there were no dots on the walls of the room. These filler trials were included to ensure that the correct response to the perspective "YOU" and perspective content "0" would sometimes be "yes." Before beginning the experimental trials, each participant completed 26 practice trials. On these practice trials, participants were given performance feedback if their response was incorrect or if they responded too slowly. The entire procedure was conducted using Inquisit 5.1 software, which measures reaction times with millisecond accuracy.

Data Analysis. Error rates were calculated by determining the percent of trials that had to be removed from response time analyses because the participant either: (*i*) failed to respond within the 2-s window; (*ii*) responded incorrectly; (*iii*) responded faster than 200 ms (for a discussion of this procedure, see ref. 40); or (*iv*) the response was over three SDs from the participant's mean correct response time for that trial type (for a discussion of this procedure, see ref. 41). Participants who had more than 20% of trials excluded were not included in any analyses.

To normalize the distribution of the response data, we natural log-transformed response times. Then, each participant's mean response for each of the four trial types (self-consistent, self-inconsistent, other-consistent, and other-inconsistent) was calculated. A measure of altercentric interference was calculated by subtracting each participant's mean response time on self-consistent trials from his mean response time on self-inconsistent trials. We calculated a measure of egocentric interference by subtracting each participant's mean response time on other-consistent trials from his mean response time on other-inconsistent trials. Although analyses were performed on log-transformed response times, for ease of understanding we report means (where appropriate in the text) and graph the raw response time data.

Results

Visual Perspective-Taking Task Effects. First, we conducted a repeated-measures general linear model (GLM) with perspective (self vs. avatar) and consistency (consistent vs. inconsistent) as within-subjects factors. Replicating previous research, we found a significant main effect of both perspective [$F(1, 105) = 5.467$, $P = 0.021$, 95% CI (0.001, 0.148)] and consistency [$F(1, 105) = 248.51$, $P < 0.001$, 95% CI (0.607, 0.765)]. Perspective affected response times such that participants were faster to verify the content of their perspective [mean = 898.27 ms, 95% CI (861.31, 935.24)] than they were to verify the content of the avatar's perspective [mean = 906.95 ms, 95% CI (871.45, 942.46)]. Consistency affected response times such that participants were faster to verify the perspective content when the two perspectives were consistent [mean = 853.64 ms, 95% CI (820.20, 887.07)] compared with when the two perspectives were inconsistent [mean = 951.59 ms, 95% CI (912.78, 990.40)].

Second, to examine differences in interference across conditions, we ran a repeated-measures GLM with interference type (altercentric vs. egocentric) as a within-subjects factor. Replicating previous research, we found a significant effect of interference type [$F(1, 105) = 21.73$, $P < 0.001$; 95% CI (0.059, 0.296)]. Participants displayed less interference when asked to take their own perspective [mean = 79.31 ms, 95% CI (62.88, 95.74)] than when they were asked to take the perspective of the avatar [mean = 116.60 ms, 95% CI (101.47, 131.74)]. Furthermore, to confirm that participants experienced both altercentric and egocentric interference, we tested the effects of consistency on self-perspective trials and avatar-perspective trials, separately. On self-perspective trials, we found that participants were significantly slower to respond to inconsistent trials compared with consistent trials [$F(1, 105) = 76.97$, $P < 0.001$. 95% CI (0.2811, 0.5329); consistent: mean = 858.62 ms, 95% CI (824.46, 892.78); inconsistent: mean = 937.93 ms, 95% CI (896.68, 979.18)]. On avatar-perspective trials, we found that participants also were significantly slower to respond to inconsistent trials compared with consistent trials [$F(1, 105) = 273.36$, $P < 0.001$, 95% CI (0.632, 0.780); consistent: mean = 848.65 ms, 95% CI (814.64, 882.66); inconsistent: mean = 965.26 ms, 95% CI (926.80, 1,003.71)]. Thus, as a group, participants experienced both altercentric and egocentric interference, and showed more interference on the avatar perspective trials.

Psychopathy Effects. We explored the relationship between psychopathy and perspective-taking using a GLM with interference type (altercentric vs. egocentric) as a within-subjects factor and psychopathy and Shipley IQ (*z*-scored)[†] as continuous covariates. There was no main effect of PCL-R total score [$P = 0.116$, 95% CI (0.000, 0.091)]. However, there was a significant interaction between interference type and psychopathy [$F(1, 103) = 5.07$, $P = 0.026$; 95% CI (0.003, 0.127)]. As predicted, PCL-R total score was significantly and negatively associated with altercentric interference [B = −0.003, SE = 0.001, 95% CI (−0.005, −0.001), $z = -2.14$, $P = 0.033$] (Fig. 3*A*). Replicating previous research that psychopathy was unrelated to performance on controlled ToM, we found that there was no relationship between PCL-R total score and egocentric interference [B = 0.000, SE = 0.001, 95% CI (−0.002, 0.002), $z = -0.22$, $P = 0.827$].[‡]

[†]Given the complexity of the visual perspective-taking task, we included IQ as a covariate to address the impact of cognitive ability on task performance. Additionally, in supplemental analyses we examined the impact of other cognitive processes such as working memory (using Digit Backwards) and motor inhibition/task switching (using Trails B) on task performance. The interaction between interference type and Digit Backwards scores was not significant [$P = 0.138$, 95% CI (0.000, 0.104)], the main effect of Digit Backwards scores was not significant [$P = 0.151$, 95% CI (000, 0.084)], and the psychopathy-altercentric interference effect remained significant [B = −0.003, $P = 0.024$, 95% CI (−0.005, −0.003)]. The interaction between interference type and Trails B time was not significant [$P = 0.638$, 95% CI (0.000, 0.052)], the main effect of Trails B time was not significant [$P = 0.413$, 95% CI (0.000, 0.062)], and the psychopathy-altercentric interference effect remained significant [B = −0.003, $P = 0.037$, 95% CI (−0.005, −0.001)]. Finally, we examined two contextual factors that also may impact cognitive functioning: years of incarceration on the current bid and substance abuse [using the Addiction Severity Index (42)]. The interaction between interference type and years of incarceration was not significant [$P = 0.581$, 95% CI (0.000, 0.056)], the main effect of years of incarceration was not significant [$P = 0.056$, 95% CI (0.000, 0.128)], and the psychopathy-altercentric interference effect remained significant [B = −0.003, $P = 0.019$, 95% CI (−0.005, −0.004)]. The interaction between interference type and years of substance use was not significant [$P = 0.762$, 95% CI (0.000, 0.037)], the main effect of years of substance use was not significant [$P = 0.485$, 95% CI (0.000, 0.054)], and the psychopathy-altercentric interference effect remained significant [B = −0.002, $p = 0.049$, 95% CI (−0.005, 0.000)]. Therefore, the psychopathy-related effects observed in altercentric interference were not due to variation in cognitive abilities.

[‡]There was no relationship between PCL-R score and accuracy on this task ($P = 0.749$). Thus, participants higher and lower on the PCLR were similarly able to respond correctly.

Examination of the PCL-R as a categorical between-subjects factor variable revealed no main effect of psychopathy group [$P = 0.128$, CI (0.000, 0.203)]. The interaction between interference type and psychopathy was not significant: $F(1, 47) = 3.30$, $P = 0.08$; 95% CI (0.000, 0.228) (Fig. 3*B*). However, given the a priori hypotheses, we examined the simple main effects within interference type. Consistent with the findings above, participants who met criteria for psychopathy displayed less altercentric interference compared with those without psychopathy [$P = 0.031$, $\text{mean}_{\text{psychopath}} = 60.96$ ms, 95% CI (24.89, 97.03), $\text{mean}_{\text{nonpsychopath}} = 106.56$, 95% CI (74.06, 138.00)]. There was no relationship between psychopathy diagnosis and egocentric interference [$P = 0.906$, 95% CI (−0.39, .043)].

Psychopathy, Perspective-Taking, and Real-World Behavior. To model the association between perspective-taking and psychopathy for predicting real-world behavior, we used a negative binomial regression (model used for count data) to predict the number of assault charges. First, the main effect of PCL-R total score was significantly and positively related to the number of assault charges [B = 0.048, SE = 0.018, 95% CI (0.014, 0.084), Wald $\chi^2 = 7.12$, $P = 0.007$]. Neither altercentric [B = −1.49, SE = 1.17, 95% CI (−3.79, 0.813), Wald $\chi^2 = 1.61$, $P = 0.205$] nor egocentric interference [B = −0.497, SE = 1.55, 95% CI (−3.54, 2.54), Wald $\chi^2 = 0.102$, $P = 0.749$] interference were directly related to the number of assault charges. Second, the interaction between psychopathy and altercentric interference was a significant predictor of assault charges [B = −0.402, SE = 0.203, 95% CI (−0.800, −0.003), Wald $\chi^2 = 3.901$, $P = 0.048$] (Fig. 4), indicating that the greatest number of assault charges resulted from a combination of high psychopathy scores and low automatic ToM processing.[§] Moreover, the interaction between psychopathy and egocentric interference also was a significant predictor of assault charges [B = −0.721, SE= 0.256, 95% CI (−1.22, −0.218), Wald $\chi^2 = 7.90$, $P = 0.005$]. It is not surprising that someone with lower levels of controlled ToM (i.e., egocentric interference) and high levels of psychopathy would show higher levels of antisocial behavior. However, it is important to note that only altercentric interference and psychopathy had a direct link (see *Psychopathy Effects*, above).

Discussion

Psychopathic individuals exhibit a shocking disregard for the welfare of other people, readily using others as a means to achieve their own selfish ends. The present results demonstrate that psychopathic individuals may lack the natural human ability to automatically represent the perspective of others. Participants who are high on psychopathy are less affected by the perspective of another agent than participants who are low on psychopathy. We also find that for individuals high on psychopathy, levels of altercentric interference are predictive of real-world criminal behavior (i.e., number of assault charges).

Our finding of reduced altercentric interference in psychopathic individuals is especially interesting, given that psychopathy is associated with abnormalities in selective attention that prioritize the processing of goal-relevant information and limits the processing of goal-irrelevant information (43, 44). Psychopathic individuals appear able to represent others' perspectives in a relatively typical manner when doing so is goal-conducive and yet are able to ignore others' perspectives when it is not goal-conducive. This pattern may make it difficult for psychopathic individuals to naturally represent the knowledge and belief states of others in nongoal-relevant situations, something that nonpsychopathic individuals do automatically. This combination of relatively intact deliberative ToM but impaired spontaneous ToM may allow psychopathic individuals to use information about others mental states to achieve their own ends, while at the same time avoid the "cost" of automatically representing others' mental states, resulting in callous and chronic criminal behavior.

Several methodological and conceptual limitations should be noted. First, the present sample is limited to male offenders, thus it is unclear whether or how gender may impact the relationship between ToM and psychopathy. Second, although we interpret the reduced altercentric interference in psychopathic individuals as reflecting differences in their tendency to automatically represent others' mental states, it is possible that psychopathic and nonpsychopathic individuals are just as likely to represent the avatar's perspective, but that psychopathic individuals more quickly select between the two conflicting perspective representations. Although we cannot rule out this latter interpretation, it is not supported by participants' performance on egocentric interference trials. That is, if psychopathic individuals are simply better at selecting between two conflicting perspective representations, then they also should be better able to report the avatar's perspective when their own perspective is different (i.e., less egocentric interference), but they do not. Thus, it seems that the psychopathy-related decreased altercentric interference effect is best explained by differences in the likelihood (i.e., propensity) of representation rather than the efficiency of selection.

In sum, the present study demonstrates that psychopathic individuals are less likely to automatically represent the visual perspective of another agent despite a preserved ability to deliberatively take their perspective. Our data provide additional support for the idea that the maladaptive behavior of psychopathic individuals may result from attention dysfunctions that prioritize a goal-relevant perspective. These dysfunctions represent a significant departure from typical human cognition and contribute to the psychopathic individual's unrelenting predatory behavior.

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[§]The interaction between PCL-R score and altercentric interference does not predict the number of property crime charges (a crime not involving direct social interaction), $P = 0.955$, 95% CI (−0.143, 0.776). Thus, the relationship between psychopathy and altercentric interference appears specific to predicting crime involving social interaction. It is important to consider whether the model effect for assaults is statistically different from the model effect of property crimes. Statistics based on the normal distribution (frequentist statistics) are incapable of assessing whether the model for the null-hypothesis (H0) predicting the absence of a relationship is more probable than the alternative model (H1) predicting the presence of a correlation. Therefore, we computed log-transformed Bayes Factors (BF10) to assess support for H0 or H1. The BF10 was 0.044 for the model predicting the number of property crimes, indicating that the lack of relationship is about 22 times more likely to be true. For the model predicting the number of assaults, the BF10 was 72.21, thus providing decisive evidence in favor of the positive relationship between the psychopathy-altercentric effect and the number of assaults. These results substantiate the validity of the main real-world behavior findings from an alternative statistical framework.

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