

Individuals in the criminal justice system show differences in cooperative behaviour: Implications from cooperative games

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ABSTRACT

Background *The high rate of incarceration in the USA warrants continued exploration into understanding and ameliorating criminal behaviour. The growing use of cooperative games to measure developing prosocial behaviours has never been explored in a US criminal justice population.*

Aims *The aim of this study is to examine cooperative game play among offenders under supervision in the community. We hypothesised that the offenders would use more guarded and self-preserving strategies and be more likely to excel in short-lived interactions than law-abiding community citizens.*

Methods *Community supervised offenders (83) and general population comparison participants (41) were recruited by town centre adverts placed in popular shops. Using the supervision centres as venues, all participants were asked to complete four cooperative games (prisoner's dilemma, public goods game, ultimatum game and trust game), not knowing the identity of the other player who was always, in fact, the experimenter.*

Results *The offender and general population groups were similar in age (early 30s), sex (2/3 men), race (45% white) and IQ distribution (low average range). Offenders made lower offers in the ultimatum game, had lower scores in the prisoner's dilemma, made lower investments and offered lower returns in the trust game and contributed less in the public goods game.*

Conclusions *Even community-based offenders thus seem to have deficits in the kinds of gameplay, which are informed by theories of social cooperation, but the direction of relationship with offending remains unclear. The apparent deficits may reflect*

adaptation to a hostile environment where trust and reciprocity are not rewarded. It is also important to recognise that these community-based offenders did develop play indicative of trust and reciprocity, they just did so more slowly than the comparison group. This may have implications for allowing time for rapport to develop in supervisory relationships. Finally, offenders may benefit from learning that although more guarded behaviours may be adaptive in a rough neighbourhood or in jail, they may be maladaptive and limit their success in other settings such as the work place.
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Introduction

Seven million people are currently under criminal justice supervision in the USA, giving it the highest incarceration rate in the world (Bureau of Justice Statistics; BJS, 2012). Although drug addiction, poverty and mental illness are leading causes of incarceration (Ludwig et al., 2001; BJS, 2006a, 2006b; Inciardi, 2007), the inability to cooperate, or to behave in a way that maximises joint 'payoff' in lieu of individual gain, may also contribute to both incarceration and recidivism. Indeed, various personality deficits or temperamental traits in line with this have been demonstrated (Egan et al., 2000; Longato-Stadler et al., 2002; Roberts et al., 2008; Edens, 2009; Listwan et al., 2010). There is also evidence that learned cognitive distortions, perhaps from the culture of the criminal justice system, may foster uncooperative behaviour (Walters, 2007; Bulten et al., 2009). Understanding the rules that offenders live by may be an important step in helping them – both to protect them from the harsh environment and cultural influences they are generally accustomed to and to enable them to contribute to society.

The best current techniques for studying cooperative behaviour are game theory based paradigms, such as games of cooperation (e.g. the prisoner's dilemma, public goods game, ultimatum game and trust game). Such paradigms operationalise complex social interactions into distinct categories. Game theory, as well as much of economics, operates under the assumption that people are motivated entirely by their own self-interest.

Other interpretations of social behaviour paint a far more prosocial view, postulating that people have evolved to act in moral or prosocial ways (Haidt, 2007, 2008; Haidt and Bjorklund, 2008; Schnall et al., 2008). The theory underlying the development and proliferation of these prosocial behavioural states claims that although individuals engaging in these acts may put themselves at a disadvantage when doing so, groups composed of strong altruists will raise the fitness of each other (Gintis et al., 2008; Wilson, 2012). Thus, although strong altruism and other notions of prosocial behaviour may not appear advantageous at the individual level, groups of altruists will out-compete groups of selfish individuals.

Although these games have not previously been used to measure behaviour in a US criminal justice population, they have provided meaningful clinical information about broadly related populations, such as individuals with borderline personality disorder, young people with externalising behaviours, social phobia or autism (King-Casas et al., 2008; van den Bos et al., 2010; Sharp et al., 2011; King-Casas and Chiu, 2012; Sharp, 2012).

Outside the USA, there has been some application of paradigms from game theory in offender samples with mixed results. A comparison of female prisoners with female students in Germany showed no differences in cooperation rates in a sequential prisoner's dilemma game, but prisoner cooperation rates exceeded student cooperation rates in a simultaneous prisoner's dilemma (Khadjavi and Lange, 2013). A series of experiments using the dictator game in Norway, indicated no differences between prisoners and the general population (Birkeland et al., 2013), whereas, in Denmark, an internet-based study of the Dictator game comparing people with and without a self-reported prison record found no differences between these groups. One explanation advanced is that the prison environment may itself contribute to compliance and submission in such games. The paradigms may be of more use in a more natural environment – the community – and in the USA, for example, 70% of individuals in the criminal justice system are residents here.

Our aim, therefore, was to examine cooperative game play among offenders under supervision in the community. We hypothesised that offenders would use more guarded and self-preserving strategies, as evidenced by struggling in situations where trust and reciprocity were required for success, and excelling in situations where interactions were short lived and exploitation would not be punished, than law-abiding community citizens.

Method

Ethics

This study was approved by the Institutional Review Board of the University of Alabama at Birmingham.

Sample

Eighty-three offenders under community supervision, such as parole, probation, community corrections or drug court, and 41 individuals who were not currently under criminal justice supervision were recruited from the same community by posting flyers around the city centre, such as in laundromats and grocery stores. There were the survivors from an initial recruitment of 146 individuals who consented to participate in the study. Seven consecutive cases had to be dropped because of experimenter error; a further 15 were excluded from analysis because

of missing data. The latter was generally because participants had not allowed enough time, or had not previously used a computer and were unable to do so in time to complete the task.

Procedures

The experiments were conducted at a Treatment Alternatives for Safer Communities monitoring site for individuals under community corrections supervision. Those who were under supervision came to the building to meet with their case managers and undergo urine drug tests and then joined this experiment. All received \$8 for showing-up for the study, then an additional payment of \$3–\$12 based on their participation.

After collection of demographic and IQ data, the games were presented – in the same order for each participant. In all cases, they were anonymous so that the participant could not see the person(s) they were playing with and had no knowledge of any of their characteristics, including sex, age or race. They played a single round ultimatum game, an iterated prisoners dilemma (10 rounds), a four player public goods game with punishment (10 rounds), and a single round trust game. Before each game was played, the participants were informed that they would be allowed to play a practice version of the game that did not count towards their earnings. For each practice game, the experimenter explained the rules and then allowed the participants to enter answers. Finally, the experimenter explained the actual game would be identical to the practice; only the participant would be playing against a real person and not a computer and could earn money. The participants were informed that they were to play a set of four computer games against either other participants or against a researcher, and that they would not know who they played until the experiment ended. For all the data presented in this paper, the participants played against a researcher who used an identical strategy for each game in order to standardise the game play. There is an established precedent for this technique (Eiser and Bhavnani, 1974; Betz, 1991; Leite, 2011). The participants were debriefed following the study.

Measures

Demographics

Participants completed a standard questionnaire about race, education, sex, age and criminal justice involvement.

IQ

The participants' IQ was assessed with the Shipley-2 (Shipley Institute of Living Scale), a two-part test. The first part is a 40-item vocabulary test and the second part is 20-item problem solving test composed of word and number puzzles. The combination of these two subtests provides a full-scale IQ estimate.

Cooperative games

The *ultimatum game* is played between two players. The first player is given 100 points and asked to divide them with a second player, first proposing shares for each person. The second player then chooses to accept or reject the offered shares. If the second player accepts the shares, both participants keep the points. If the second player rejects the shares, neither of them gets anything. For this experiment, the participant was always the one making the offer, and the experimenter was always the one accepting or rejecting the offer. The variable of interest for this game was the number of points that the participant offered to donate. The experimenter accepted all offers except those of 20 or fewer points. The literature indicates that this is the point where most people in the Eastern USA will reject an offer (Oosterbeek et al., 2004).

The *prisoner's dilemma* is also played between two individuals. For each round, the players have two choices – to cooperate or defect. If they both cooperate, they both get 3 points. If they both defect, they both get 1 point. If one of them cooperates while the other defects, then the one who cooperates gets zero points, whereas the one who defects earns 5 points. Therefore, the optimal choice for each individual in each round is to defect; both players can, however, earn the most total points if they consistently cooperate. The game was played continuously so that the participants had the opportunity to see the other's decisions and modify their strategy accordingly. The experimenter played a tit-for-tat strategy, meaning the experimenter always cooperated on the first turn. The experimenter then always took the same action as the first player in the subsequent rounds. We were interested in the number of times the participant chose to cooperate rather than defect.

The *public goods game* included punishment and was the most complicated of the four cooperative games played during this experiment. There were four players. Each was given an initial endowment of 20 points at the start of each round, and then the option of keeping their endowment or contributing all or a part of it to a public fund that grows at a rate of 40% of their investment, but the fund is split among the players. Therefore, for the fund to be mutually beneficial, all the players have to invest heavily. If all of them invest heavily, they will all make the most money. If only one player invests while the others keep their entire endowment, then the player who invests basically supports the others and makes very little money. This is essentially the same contrast as is observed in the prisoner's dilemma; however, this game allows for more players to participate, and it allows the participants to use punishment. The punishment option allows players to subtract earnings from the other members at a small cost to themselves. Specifically, players can subtract 3 points from another player's earnings for the cost of one point to themselves. This acts as an incentive to contribute highly to the public good. Typically, people will use the punishment option on players whose contributions are smaller than theirs in an effort to increase that player's level of contribution. For this game in this study, the

experimenter played the role of the three other players. Punishment was withheld until round 6. The different amounts contributed gradually converged, all contributing 17 points starting at round 5 and continuing until round 10. Rapid convergence on a relatively high level of contribution is typical of the public goods games with punishment (Fehr and Gächter, 2002). More specifically, the experimenter played the role of a high contributor (18 points in round 1, 18 points in round 2, 19 points in round 3 and 19 points in round 4); an average contributor (12 points in round 1, 15 points in round 2, 17 points in round 3 and 17 points in round 4); and a low contributor (0 points in round 1, 6 points in round 2, 12 points in round 3 and 15 points in round 4). The participants received 3 punishment points in rounds 6 and 7 if they contributed less than 17 points and 9 punishment points in rounds 8 through 10 if they contributed less than 17 points. We were interested in the number of points the participants earned, the amounts that they invested and the amount of punishment points they allocated.

The *trust game* is a two player game, but required the participant to play the role of both investor and trustee, both investing and returning points. In this version, the participant and experimenter made offers and returned points simultaneously. Each player was first given a choice of either keeping 10 points or investing some with the other player. If either player chooses to invest points, then the amount invested was multiplied by 3. Therefore, the other player receives three times the amount of points invested. The player receiving the points then has the choice of either keeping all the points or returning a portion of them to the first player. The safest decision for the first player is to keep all their points, because the second player has the opportunity of keeping all the points for themselves, but each player stands to benefit the most if the first player invests all their points and the other player then returns half of the sum invested. Our interest for this game was the number of points the participant invested and returned. For the purpose of standardisation, the experimenter always offered 5 points and always returned 50% of whatever the participant offered, rounding up when uneven amounts were offered (e.g. if the participant offered 7 points, they would be multiplied by 3 to 21, then the experimenter would return 11 points and keep 10).

Analyses

Bivariate comparisons were used to compare offender and general population groups scores, using analysis of variance for continuous variables and Chi-squares for categories between subject comparisons, and the McNemar test to assess multiple rounds of games.

Results

Table 1 shows the sample characteristics. There were no significant differences between the two groups in race, gender, age, marital status, education, IQ or

Table 1: Demographic characteristics of the criminal justice and comparison groups

		Criminal justice mean (SD) or %	Comparison mean (SD) or %	<i>p</i>
IQ		82.9 (19.5)	86.1 (21.7)	0.428
Age		35.7 (10.1)	32.8 (10.4)	0.139
Race (white)		35 (42.7%)	19 (46.3%)	0.700
Sex (male)		56 (68.3%)	26 (63.4%)	0.589
Education	Less than high school	23 (28.0%)	5 (12.2%)	0.090
	High school	32 (39.0%)	16 (39.0%)	
	Greater than high school	27 (32.9%)	20 (48.8%)	
Marital status	Never married	50 (61.0%)	28 (68.3%)	0.596
	Married	9 (11.0%)	6 (14.6%)	
	Divorced/separated	20 (24.4%)	6 (14.6%)	
	Widowed	3 (3.7%)	1 (2.4%)	
Ever treated for mental illness		26 (31.7%)	10 (24.4%)	0.400
Received therapy for mental illness		16 (19.5%)	6 (14.6%)	0.506

Note: The continuous variables of age and IQ are expressed as means and standard deviations, whereas the categorical variables are expressed as numbers and percentages and were analysed via Chi-square.

history of mental illness. The participants were mostly non-white, with an average age in the early to mid-thirties, two-thirds were men, most were single and up to a third had previously been treated for mental illness. IQ was in the low average range.

Table 2 shows the between-group mean differences in game scores. Except in the public goods game and the trust game total scores, the offender group consistently scored significantly fewer points. In the ultimatum game, the offenders offered significantly fewer points than the comparison group. The lower overall points score in the prisoner's dilemma earned by the offenders was due to the fact that they cooperated only 34.8% of the time,

Table 2: Mean comparisons in game performance for the criminal justice versus the comparison group

	Criminal justice mean (SD)	Comparison mean (SD)	Effect size η^2	<i>p</i>
Offer in ultimatum game	46.0 (17.4)	53.9 (17.7)	0.043	0.023
Prisoner's dilemma total score	22.5 (3.9)	24.1 (4.0)	0.036	0.035
* Prisoner's dilemma percentage cooperation	34.8%	46.3%	0.076	<0.001
Public goods game total score	240.4 (71.8)	243.3 (56.8)	0.000	0.829
Trust game total score	15.3 (4.4)	15.9 (4.7)	0.004	0.465
Trust game return	5.0 (3.7)	6.8 (5.7)	0.033	0.047
Trust game invest	3.6 (2.9)	5.2 (2.8)	0.063	0.005

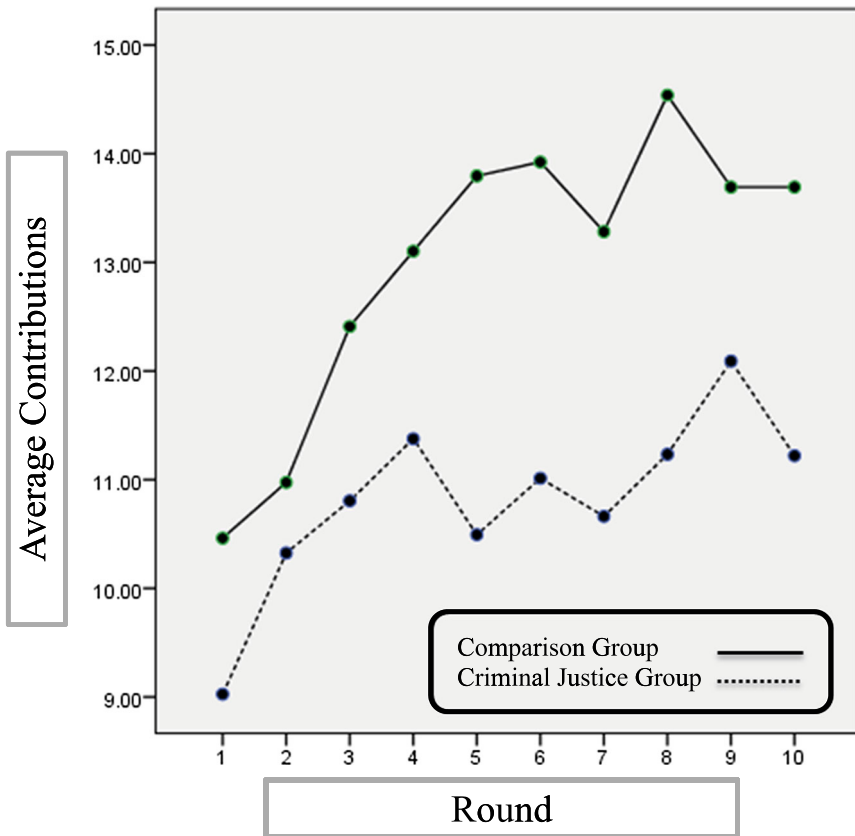
Note:

*The variable prisoner's dilemma percentage cooperation is expressed as a percentage and not a mean, additionally the effect sizes are expressed in η as opposed to η^2 .

whereas the general population group cooperated 46.3% of the time. Although there were no overall differences in the public goods game scores, there were differences in the play styles of the two groups. Both groups tended to contribute more over time ($p < 0.001$; partial $\text{Eta}^2 = 0.063$); Figure 1, however, shows that the community corrections group contributed significantly less over time than the comparison group ($p = 0.038$; partial $\text{Eta}^2 = 0.037$). Similarly, equivalent scores in the trust game also masked differences in the style of play. The offenders offered fewer points and returned fewer than the comparison group.

Discussion

As expected, we found deficits in cooperative behaviours among community supervised offenders compared with a general population comparison group.



Note: this figure shows that the criminal justice group contributed significantly less over time compared to the comparison group. There was no interaction between time and group.

Figure 1: Average contributions per round in the public goods game

Specifically, individuals under criminal justice supervision demonstrated a style of behaviour in cooperative games that was marked by a low level of trust, a tendency for 'self-preservation' (lower contributions in the public goods game, lower returns in the trust game and lower offers in the ultimatum game) and difficulty recognising and sustaining reciprocity (less cooperation in the prisoner's dilemma and lower contributions in the public goods game).

This strategy of low trust, self-preservation and low reciprocity varied in its success based on the payoff contingencies of the game that was played. The criminal justice group was more successful in the ultimatum game, but less successful in the prisoner's dilemma. The literature has typically shown that more self-preserving strategies work better in the short run (Cooper et al., 1996) but tend to break down during longer sustained interactions (Axelrod, 1984; Fehr and Gächter, 2002), thus undermining social affiliations and relationships. Reciprocity has been called the foundation of collaboration, and this principle was demonstrated in the public goods game where the comparison group was largely able to assimilate into the other players' style of play, who used high levels of contributions and low levels of punishment, but the offender group could not. In the trust game, the offender group's lower initial investments and lower returns would have produced fewer points for the other player, and the high level of defection in the prisoner's dilemma would also reduce overall gains for the other player. Thus, whereas the criminal justice strategy of low trust, self-preservation and low reciprocity was never the optimal strategy for the other player, neither was it for the offender in longer term situations.

It is important to recognise that although the general strategy used by the criminal justice group is not the optimal strategy under ideal conditions, it may be the optimal strategy given the rules of their world. Offenders tend to believe in an unjust world (Walters, 2007) and reported doubts in the abilities of society to protect them. Their solution has been a self-preserving strategy made up of low levels of cooperation (Longato-Stadler et al., 2002), high proactive and reactive aggression (Egan et al., 2000; Henry, 2009), and a low concern for the well-being of others (Edens, 2009). The cooperative game literature describes 'free riders' in much the same way. A free rider is an individual who seeks to profit from group collaboration at a level less than their contribution. This same body of literature has repeatedly shown that individual free riders (less cooperative individuals) will outperform groups of cooperators in situations where simple bilateral reciprocity is the mechanism influencing the accumulation of resources. Further, models have shown that as free riders attain a critical mass, they can outperform and replace cooperators, and soon the entire group is largely composed of free riders after cooperative strategies have been exploited into near extinction. These models seem to have played out very accurately in the criminal justice system where large numbers of people with self-preserving strategies have been collected and low trust and self-preservation have become adaptive based on the rules of the wider

society in which they live. Furthermore, models of free riding have shown that after free riding strategies become dominant, it can be very difficult to reintroduce cooperation as long as the rules of the game remain the same (Hofbauer and Sigmund, 2003). Thus, although individual free riders cannot produce as much as groups of cooperative individuals, free riding may be the only viable strategy when living in an environment saturated with other free riders.

Our study had several limitations. First, the design is not optimal as it is not clear how participants viewed the games, as they knew they may have been interacting with a researcher. The use of deception or allowing participants to play against other participants would have been ideal, as it could have provided for a more pure account of behaviour. Secondly, criminal justice status was the variable delineating the groups, but type and seriousness of offence were not examined. Thirdly, this was not a study of antisocial personality or criminal mindsets, it was an examination of how a group under coerced supervision cooperates in comparison with a group not under supervision. Although there were no between-group differences in sex, age or race. However, no data was collected on certain other demographic variables which have been shown to predict arrests (e.g., family size, socio-economic status), therefore these variables could not be controlled for in the analyses. Our study cannot help with direction of relationships – deficiencies observed in cooperative behaviour may play a causal role in offending, but it may be that being a member of the criminal community harms capacity for trust or prosocial reciprocity. That said, the fact that individuals under supervision are using less adaptive strategies probably makes it more difficult for them to reintegrate into society. In addition, although significant differences were found between the offender and wider community group, a larger sample size would have provided more power to check for confounders.

Our study has several strengths, too. It is one of the first to employ multiple games and show that the effectiveness of playing strategies was contingent on the rules of the game being played. Furthermore, our results are relevant to both the understanding and treatment of individuals under criminal justice supervision, perhaps especially in the community. The public goods game indicated that trust was being established, it was just occurring at a slower rate in the offender group, so a longer period spent building rapport may be necessary to establish trust with offenders. Further research should examine whether this experimental strategy will help the management of offenders, perhaps indirectly, by improving understanding of their needs and maybe directly be enhancing supervision assessments.

References

- Axelrod R (1984) *The Evolution of Cooperation: Revised Edition*. New York: Basic books.
- Betz B (1991) Response to strategy and communication in an arms race-disarmament dilemma. *Journal of Conflict Resolution* 35: 678–690.

- Birkeland S, Cappelen AW, Sørensen EØ, Tungodden B (2013) An experimental study of prosocial motivation among criminals. *Experimental Economics* 1–11. DOI: 10.1007/s10683-013-9380-x
- Bulten E, Nijman H, Staak C (2009) Measuring criminal thinking styles: The construct validity and utility of the PICTS in a Dutch prison sample. *Legal and Criminological Psychology* 14: 35–49.
- Bureau of Justice Statistics (2006a) Drug use and dependence, state and federal prisoners, 2004. Available at: <http://proxychi.baremetal.com/csdp.org/research/dudsfp04.pdf> [22 January 2013]
- Bureau of Justice Statistics (2006b) Mental health problems of prison and jail inmates. Available at: http://www.nami.org/Content/ContentGroups/Press_Room1/2006/Press_September_2006/DOJ_report_mental_illness_in_prison.pdf [22 January 2013]
- Bureau of Justice Statistics (2012) Correctional populations in the United States, 2011. Available at: <http://bjs.ojp.usdoj.gov/content/pub/pdf/cpus11.pdf> [22 January 2013]
- Cooper R, DeJong DV, Forsythe R, Ross TW (1996) Cooperation without reputation: experimental evidence from prisoner's dilemma games. *Games and Economic Behavior* 12: 187–218.
- Edens JF (2009) Interpersonal characteristics of male criminal offenders: Personality, psychopathological, and behavioral correlates. *Psychological Assessment* 21: 89.
- Egan V, McMurrin M, Richardson C, Blair M (2000) Criminal cognitions and personality: what does the PICTS really measure? *Criminal Behaviour and Mental Health* 10: 170–184.
- Eiser JR, Bhavnani KK (1974) The effect of situational meaning on the behaviour of subjects in the Prisoner's Dilemma Game. *European Journal of Social Psychology* 4: 93–97.
- Fehr E, Gächter S (2002) Altruistic punishment in humans. *Nature* 415: 137–140.
- Gintis H, Henrich J, Bowles S, Boyd R, Fehr E (2008) Strong reciprocity and the roots of human morality. *Social Justice Research* 21: 241–253.
- Haidt J (2007) The new synthesis in moral psychology. *Science* 316: 998–1002.
- Haidt J (2008) Morality. *Perspectives on Psychological Science* 3: 65–72.
- Haidt J, Bjorklund F (2008) Social intuitionists answer six questions about moral psychology. *Moral Psychology* 2: 181–217.
- Hofbauer J, Sigmund K (2003) Evolutionary game dynamics. *Bulletin of the American Mathematical Society* 40(4), 479–519.
- Inciardi JA (2007) *The War on Drugs IV*. Boston: Pearson, Allyn & Bacon.
- Khadjavi M, Lange A (2013) Prisoners and their dilemma. *Journal of Economic Behavior & Organization* 92: 163–175.
- King-Casas B, Chiu PH (2012) Understanding interpersonal function in psychiatric illness through multiplayer economic games. *Biological Psychiatry* 72(2), 119–125.
- King-Casas B, Sharp C, Lomax-Bream L, Lohrenz T, Fonagy P, Montague PR (2008) The rupture and repair of cooperation in borderline personality disorder. *Science* 321: 806–810.
- Leite FP (2011) Larger reward values alone are not enough to entice more cooperation. *Thinking & Reasoning* 17: 82–103.
- Listwan SJ, Piquero NL, Van Voorhis P (2010) Recidivism among a white-collar sample: does personality matter? *Australian & New Zealand Journal of Criminology* 43: 156–174.
- Longato-Stadler E, af Klinteberg B, Garpenstrand HAK, Orelund L, Hallman J (2002) Personality traits and platelet monoamine oxidase activity in a Swedish male criminal population. *Neuropsychobiology* 46: 202–208.
- Ludwig J, Duncan GJ, Hirschfield P (2001) Urban poverty and juvenile crime: Evidence from a randomized housing-mobility experiment. *The Quarterly Journal of Economics* 116: 655–679.
- Oosterbeek H, Sloof R, Van De Kuilen G (2004) Cultural differences in ultimatum game experiments: Evidence from a meta-analysis. *Experimental Economics* 7: 171–188.
- Roberts A, Yang M, Zhang T, Coid J (2008) Personality disorder, temperament, and childhood adversity: findings from a cohort of prisoners in England and Wales. *The Journal of Forensic Psychiatry & Psychology* 19: 460–483.

- Schnall S, Haidt J, Clore GL, Jordan AH (2008) Disgust as embodied moral judgment. *Personality and Social Psychology Bulletin* **34**: 1096–1109.
- Sharp C, Ha C, Fonagy P (2011) Get them before they get you: trust, trustworthiness, and social cognition in boys with and without externalizing behavior problems. *Development and Psychopathology* **23**: 647–658.
- Sharp C (2012) The use of neuroeconomic games to examine social decision-making in child and adolescent externalizing disorders. *Current Directions in Psychological Sciences* **21**: 183–188.
- van den Bos W, Westenbergh M, van Dijk E, Crone EA (2010) Development of trust and reciprocity in adolescence. *Cognitive Development* **25**: 90–102.
- Walters GD (2007) Correlations between the psychological inventory of criminal thinking styles and World-View Rating Scale in male federal prisoners. *Criminal Behaviour and Mental Health* **17**: 184–188.
- Wilson EO (2012) *The Social Conquest of Earth*. New York: WW Norton & Company.

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