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Nobody's watching? Subtle cues affect generosity in an anonymous economic game

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Abstract

Models indicate that opportunities for reputation formation can play an important role in sustaining cooperation and prosocial behavior. Results from experimental economic games support this conclusion, as manipulating reputational opportunities affects prosocial behavior. Noting that some prosocial behavior remains even in anonymous noniterated games, some investigators argue that humans possess a propensity for prosociality independent of reputation management. However, decision-making processes often employ both explicit propositional knowledge and intuitive or affective judgments elicited by tacit cues. Manipulating game parameters alters explicit information employed in overt strategizing but leaves intact cues that may affect intuitive judgments relevant to reputation formation. To explore how subtle cues of observability impact prosocial behavior, we conducted five dictator games, manipulating both auditory cues of the presence of others (via the use of sound-deadening earmuffs) and visual cues (via the presentation of stylized eyespots). Although earmuffs appeared to reduce generosity, this effect was not significant. However, as predicted, eyespots substantially increased generosity, despite no differences in actual anonymity; when using a computer displaying eyespots, almost twice as many participants gave money to their partners compared with the

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controls. Investigations of prosocial behavior must consider both overt information about game parameters and subtle cues influencing intuitive judgments.

Keywords: Altruism; Prosocial behavior; Dictator game; Cues; Reputation management

1. Introduction

Humans are remarkable for the extent of their cooperation with, and altruism toward, unrelated individuals. Such prosocial behaviors have been the focus of many recent investigations. Formal models reveal that cooperation and other forms of prosocial behavior can be sustained when agents have the ability to acquire information about actors' past actions, as this allows prosocial actors to behave in ways that reduce the opportunities for, and enhance the costs of, free-riding behavior that degrades cooperation (Leimar & Hammerstein, 2001; Nowak & Sigmund, 1998; Panchanathan & Boyd, 2003, 2004). This conclusion has been borne out by empirical results obtained using experimental economic games, methods that allow for the exploration of decision making in controlled social interactions involving opportunities for cooperation, punishment, trust, and generosity (Fehr & Gächter, 2002; Frank, Gilovich, & Regan, 1993; Milinski, Semmann, & Krambeck, 2002b; Yamagishi, 1986). Changes in the rules and parameters of these games often have substantial impact on the levels of prosocial behavior. For instance, cooperation and other forms of prosocial behavior can be sustained when players are given information about one another's choices in past rounds, assuming that there are opportunities to respond to that information in the game context (Barclay, 2004; Fehr & Gächter, 2000; Milinski, Semmann, & Krambeck, 2002a, 2002b). Strikingly, however, some prosocial behavior occurs even in games that preclude opportunities for players to establish reputations of any sort—some individuals continue to behave in a cooperative and/or altruistic fashion even in anonymous games that consist of just a single round of interaction (Gintis, Bowles, Boyd, & Fehr, 2003; see Henrich & Fehr, 2003, for a review).

Impressed by the level of cooperation that remains in the absence of opportunities for reputation formation, a number of investigators have argued that, in both experimental settings and the real world, reputational considerations can explain only some of the prosocial behavior observed in humans, because (a) players in economic games strategically alter their behavior as a function of the opportunities for reputation formation afforded by a given experimental game context, indicating that they understand how such opportunities vary, and yet (b) some level of prosociality frequently remains even when all opportunities for reputation formation have been eliminated (Gintis et al., 2003; Henrich & Fehr, 2003). These scholars thus argue that, while many individuals are motivated to behave in a prosocial manner by a concern with the social consequences of their actions, at least some individuals, some of the time, are also motivated to behave in this fashion, independent of the potential benefits or costs of such behavior. This pattern, often termed *strong reciprocity*, is thought to

have been produced by some form of group selection acting on ancestral human populations (Gintis, 2000; Gintis et al., 2003; Henrich & Fehr, 2003).

The claims made by proponents of strong reciprocity, including the argument for an evolutionary history of group selection, are bold indeed. Bold claims require substantial evidentiary support. We believe that existing findings from experimental economic games do not provide a clear portrait of the factors underlying human prosocial behavior. While we do not rule out the possibility that humans possess strong reciprocity motives, to the extent that existing findings can be accounted for using explanations that invoke a psychology of reciprocity or reputation, it is premature to claim the existence of evolved mechanisms dedicated to generating strong reciprocity behavior.

The potential applicability of conventional explanations to the prosociality exhibited in experimental economic games becomes apparent when one attends to the nature of human decision making. We suggest that a failure to adequately consider individual decision-making processes, rather than overall patterns of behavior, has generated unnecessary confusion in debates about the nature of human prosociality. While a number of complex models have been developed to explain overall patterns of prosociality (Fehr & Schmidt, 1999; Gintis, 2000; Rabin, 1993), few specific testable predictions have been made regarding the stimuli that function as inputs for psychological mechanisms involved in the decision-making processes giving rise to such patterns (but see Kurzban, 2001).

In exploring the impact of various stimuli on the decisions underlying experimental economic game behavior, it is useful to consider the distinction drawn in the decision-making literature between, on the one hand, reasoning that operates on explicit propositional knowledge and, on the other hand, intuitive judgment processes that employ information that can be difficult to verbalize and/or outside of conscious awareness (Chaiken & Trope, 1999; Chase, Hertwig, & Gigerenzer, 1998; Greene & Haidt, 2002; Sloman, 2002). While both information represented as explicit propositional knowledge and tacit cues can serve as inputs in human decision-making processes, there is good evidence that much decision making primarily involves implicit inferences based on limited but specific information (see Haidt, 2001). In a related manner, much decision making appears to exhibit a type of cognitive modularity (see Barrett, in press, for a review), with decisions resulting from the interaction of independent psychological mechanisms, each of which takes a particular type of information as its input. As a result, under some circumstances, the nature of decision-making processes makes possible the apparent conflicts between the outputs of the various psychological mechanisms involved. For example, subtle but cognitively salient and/or evolutionarily relevant cues can produce effects that seem at odds with propositional knowledge, leading to apparent magical thinking, cognitive biases, or emotional misattribution in experimental contexts (Chase et al., 1998; Forgas & Vargas, 2000; Rozin, Millman, & Nemeroff, 1986; Schwarz & Clore, 1983).

Numerous instances of real-world behavior suggest that it is important to take the evolved, modular nature of decision-making processes into account. For example, consider the fact that many people support professional sports teams, often at considerable expense, despite explicit knowledge that they will not share any of the material benefits of a team's victories. This behavior is potentially explicable in terms of the power of ethnic marker-like team

names, paraphernalia, and so on to serve as inputs to psychological mechanisms that mediate coalitional behavior. Because of the benefits of coordinating, cooperating, and forming alliances with individuals who share one's culture, natural selection likely favored an elaborate set of mechanisms dedicated to detecting ethnic or coalitional markers and advertising one's own affiliation (McElreath, Boyd, & Richerson, 2003; Navarrete, Kurzban, Fessler, & Kirkpatrick, 2004). Professional sports teams exploit these mechanisms by presenting cues that shape decision making via intuitive and affective responses. At a propositional level, fans may understand fully well that it is the athletes and owners, not the fans, who reap the real rewards of victory; yet, cues in the form of logos emblazoned on hats and tee shirts nonetheless may serve as inputs to psychological mechanisms that make them feel like "part of the team," producing a willingness to pay to demonstrate their affiliation.

In economic games, participants are presented both with (a) information that is readily represented as propositional statements, available for use by explicit reasoning processes, and (b) contextual cues that likely play a role in more tacit or intuitive assessments. Overt statements concerning the rules and parameters of economic games unquestionably have enormous influence on decision making and behavior in these experiments. However, it has also been shown that behavior in economic games can be substantially affected by other types of information, such as perceptions of the physical attractiveness, gender, facial similarity, or emotional expressions of partners (DeBruine, 2002; Eckel & Wilson, 2003; Scharlemann, Eckel, Kacelnik, & Wilson, 2001), factors that are external to the game itself. Information of this sort likely shapes resulting behavior via affective influences and intuitive judgments, rather than entering into overt strategic calculations aimed at maximizing monetary gain.

Proponents of strong reciprocity argue that prosociality in experimental economic games cannot be explained solely in terms of the individual benefits of establishing and maintaining a reputation as a cooperative actor, because some prosocial behavior occurs even when the game structure precludes reputation formation. Previous economic experiments have manipulated economic incentives and have adjusted game rules and parameters to provide *real* anonymity or eliminate *real* opportunities for reputation formation within experimental contexts (Andreoni & Petrie, 2004; Hoffman, McCabe, Shachat, & Smith, 1994; Hoffman, McCabe, & Smith, 1996; Milinski et al., 2002a, 2002b; Wedekind & Braithwaite, 2002). Importantly, however, such experiments have not eliminated all, or even most, of the stimuli that likely constitute input for evolved mental mechanisms that calibrate prosocial behavior as a function of the potential reputational consequences.

Because some individual-level selection arguments regarding prosociality may previously have been misconstrued (cf. Henrich & Fehr, 2003), it is important to note here that we are not arguing that information represented as explicit, propositional statements does not constitute input for mechanisms that mediate prosocial behavior, nor are we suggesting that human psychology is insensitive to information that would allow individuals to distinguish public situations from private ones, to recognize the difference between iterated and noniterated interactions, or to differentiate acquaintances from strangers. On the contrary, the heart of our argument is that, given the substantial costs and benefits entailed by these distinctions, natural selection can be expected to have shaped human psychology to be exquisitely sensitive to cues that are (or were, under ancestral conditions) informative with

respect to the likely profitability of cooperation in a given situation. The question at issue, thus, does not concern whether humans possess psychological mechanisms that function to assess details of social contexts, but rather what types of information constitute inputs for these mechanisms. To explore this question, we sought evolutionarily relevant cues that could be expected to have effects on decision making, similar to those of propositional knowledge regarding the observability of each player's choices. We selected and manipulated two different types of cues–auditory and visual–that, over the course of human evolution, would have reliably indicated the potential observability of one's behavior.

Hearing the activities of other human beings in one's vicinity typically indicates that others are present, and hence, that one's behavior may be observable; conversely, the absence of such sounds serves as a potential indication that one is alone. To manipulate cues that index current degree of privacy, we therefore asked participants in an anonymous economic game to wear noise-reducing earmuffs during game play. While indicative of the presence of others, auditory cues provide a relatively indirect index of the extent to which one is currently being observed, because on the one hand, others may be close enough to be audible yet not attentive to one's actions, and on the other hand, silent observation is possible. In contrast, the presence of eyes facing in one's direction provides a more direct indication that one's actions are being observed. Accordingly, in addition to manipulating exposure to auditory cues, we also subtly presented participants with a stylized representation of eyes to examine the impact on prosocial behavior of a direct visual cue of observability.

2. Methods

2.1. Participants

Via email and paper announcements inviting participation in "Experimental Economic Games" for money, we recruited 248 undergraduates, aged 19–36 years (mean=22.32, S.D.=3.66), 48.2% female, at the University of California, Los Angeles. Registration for scheduled experimental sessions took place on a web site maintained by the California Social Science Experimental Laboratory (CASSEL) and ensured that participants registered only once. Experimenters were not involved in the recruitment process. Each participant was paid US$5 in addition to earnings in the economic game.

2.2. Game play

For each experimental session, approximately 20 participants were seated randomly in a computer laboratory, with both unoccupied stations and vertical desk-dividers separating each individual from the other participants. Once seated at their stations, participants had no direct visual or verbal contact with one another, and all procedures took place under conditions of strict anonymity; information about the identities of the participants was not available to other participants or to experimenters. Consent documents and instructions were read aloud by a researcher, whereafter all subsequent procedures took place on individual computers on a

closed network. The rules and procedures made it clear to participants that their participation was anonymous and noniterated, and that they would have no opportunities for direct interaction with other participants. Procedures and rules were described in neutral terms (e.g., rules explained that "Player 1 can make a decision about whether to transfer any portion of the money to Player 2 in whole dollar increments").

Each participant was randomly designated as either Player 1 or 2 and was paired with another participant to play a single-round dictator game (see Camerer, 2003). Player 1 received a US$10 endowment and had 20 s to allocate any whole-dollar portion of it, ranging from US$0 to 10, to Player 2, keeping the remainder. Upon the completion of the dictator game, participants filled out demographic questionnaires, then exited the computer laboratory and received payment in private using a self-selected identifier employed to track earnings under conditions of anonymity.

2.3. Experimental manipulations

Each participant participated in one of five experimental conditions. In Silent conditions, participants wore a sterilized pair of Howard Leight (QM24+) sound-reducing earmuffs, presented to the participant in a closed plastic bag. In Nonsilent conditions, no earmuffs were provided. In Eyespots conditions, players used computers displaying two stylized eye-like shapes on the desktop background, along with familiar desktop icons (see Fig. 1). To reduce demand characteristics, the eyespots were designed to appear as if they were an integral part of the desktop display. In No-eyes conditions, the word "CASSEL" was displayed across the same portion of the screen, using the same color scheme as the eyespots (see Fig. 1). These two manipulations were crossed to produce four conditions: Silent/No-eyes; Nonsilent/No-eyes (also termed Control it presented circumstances characteristic of many laboratory economic experiments); Silent/Eyespots; and Nonsilent/Eyespots. In a fifth condition, Skewed-eyes, the desktop background displayed a skewed version of the Eyespot shapes in which the left and right eyespots were not in the same horizontal plane, creating a less face-

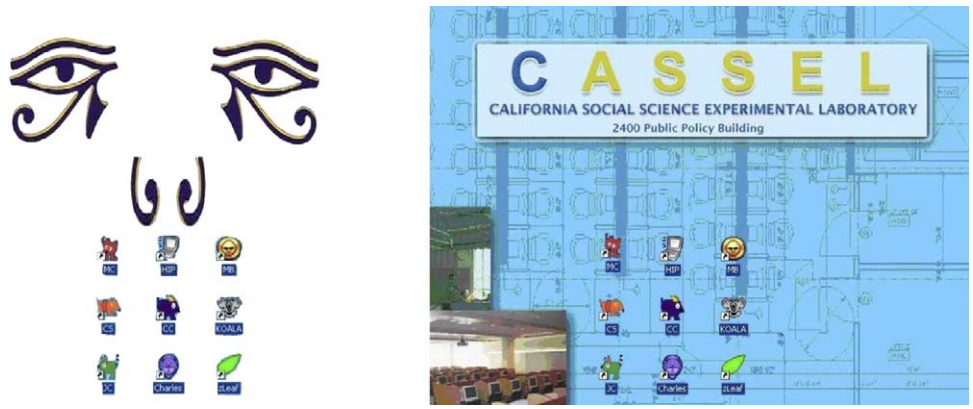

Fig. 1. Eyespots (left) and control (right) desktop displays.

like image on the desktop. Participants in the Skewed-eyes condition did not wear earmuffs. Only the donning of earmuffs and/or the desktop backgrounds on participants' computers varied depending on the experimental session. Instructions and all other features of the context remained the same.

3. Predictions

We predicted that the earmuffs and eye-like shapes would have opposite effects on generosity in the dictator game, as measured by the allocations of Player 1 participants. The earmuffs were expected to eliminate auditory cues of the presence of others, producing intuitive assessments of enhanced privacy and thus reductions in allocations. Conversely, the stylized eyespots were expected to provide cues of the presence of observers, thus leading to increased allocations. Because eyes facing in one's direction are a more direct cue that one is under observation than are noises made by others in one's vicinity, we expected eyespots to have a greater absolute impact on allocations than earmuffs would. Correspondingly, we expected that combining earmuffs and eyespots would reduce, but not eliminate, the positive influence of the latter on allocations. Lastly, because eyes are normally aligned with one another, we predicted that skewing the eyespots would degrade their stimulus value, thus lowering their impact on allocations relative to the influence of horizontally aligned eyespots.

4. Results

Pooling results across all conditions, the average allocation by Player 1 participants to their partners was US$2.85 (S.D.=2.51), 28.5% of their endowment. Of the Player 1 participants, 69.4% allocated something to their partners. There were no overall differences between the mean offers of men and women, nor did we find interaction effects between gender and experimental condition.

Examining allocations across conditions, overall, Player 1 participants gave an average of 20 cents more from one condition to the next as cues of observability increased. Because, as typically occurs, the distributions of allocations from the dictator game were not normally distributed, we examined allocations using nonparametric tests; results reveal systematically higher allocations in some conditions compared with others. While the values for mean allocations suggest that the earmuffs had some negative impact on allocations, this effect was quite small and was not statistically significant. Likewise, although mean values suggest that, as predicted, participants presented with skewed eyespots allocated less money than did those presented with horizontally aligned eyespots, this difference did not reach significance. The increases in allocations across conditions noted above largely result from higher allocations in conditions with eyespots compared with allocations in conditions without them. Pooling results from the three eyespots conditions (Nonsilent/Eyespots, Silent/Eyespots, and Skewed-eyes) and comparing them with the pooled results from the two conditions lacking eyespots

(Silent/No-eyes and Nonsilent/No-eyes), on average, participants in an eyespot condition allocated US$3.14 (S.D.=2.33), or 31.4%, significantly more than allocations from participants in a No-eyes condition, which averaged US$2.38 (S.D.=2.74), or 23.8% (Mann–Whitney $U=1423.0$, $n_1=77$, $n_2=47$, $P=.039$). Comparing only the control condition (Nonsilent/No-eyes), which presented circumstances typical of dictator game experiments, with our full Eyespots condition (Nonsilent/Eyespots), allocations were over 55% higher in the presence of eyespots: Participants in the control condition allocated an average of US$2.45 (S.D.=3.05), or 24.5% overall, while participants in the Eyespots condition allocated an average of US$3.79 (S.D.=2.47), or 37.9% overall, a significant difference (Mann–Whitney $U=172.5$, $n_1=22$, $n_2=24$, $P=.038$).

A perhaps underappreciated fact about allocations in the dictator game is that differences in mean offers tend to result largely from differences in the numbers of individuals who allocate any money at all (see Camerer, 2003). Consistent with this, the observation suggests that our results are primarily driven not by higher allocations in the presence of cues that index the presence of others, but rather by the effect that such cues have on the number of participants who allocate money. We therefore examined the probability of allocating across our experimental conditions (see Fig. 2). A logistic regression reveals a significant positive relationship between the addition of cues that index the presence of potential observers and the probability that Player 1 will allocate money to a partner [$\chi^2(4,N=124)=12.256$, $P=.016$]. Again, the significance of this relationship is driven primarily by the difference between the probability of giving in conditions with eyespots and the probability of giving in conditions lacking them. A large majority (79.2%) of the participants in the eyespots conditions allocated something, while only about half (53.2%) of the participants in the conditions without eyespots allocated money, a significant difference [$\chi^2(1,N=124)=9.304$,

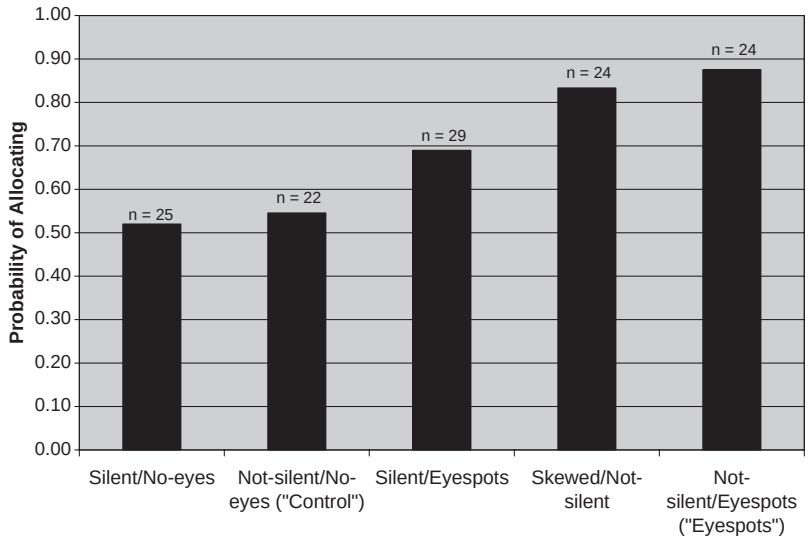

Fig. 2. Proportion of Player 1 participants in each condition who allocated money to Player 2 participants.

Table 1
Allocations by Player 1 participants

	Mean allocation (US$)	Proportion allocating	Logistic regression odds ratio
Silent/No-eyes	2.32 (2.49)	0.52	–
Nonsilent/No-eyes ("Control")	**2.45 (3.05)**	**0.55**	1.10
Silent/Eyespots	2.72 (2.34)	0.69	2.05
Skewed-eyes	3.00 (2.11)	0.83	4.61
Nonsilent/Eyespots ("Eyespots")	**3.79 (2.47)**	**0.88**	6.45
Eyespots conditions	3.14 (2.33)	0.79	–
No-eyes conditions	2.38 (2.74)	0.53	–
Total	2.85 (2.51)	0.69	–

Standard deviations are in parentheses. In bold are the Control and (unadulterated) Eyespots conditions. Increasing odds ratios indicate increased probability of allocating across experimental conditions compared against Silent/No-eyes.

$P=.002$]. Comparing only the standard control condition with our unadulterated eyespots condition (Nonsilent/Eyespots), we see that nearly all participants in the latter gave money to their partners (21 out of 24, or 87.5%), while only half of those in the control condition did so (13 out of 25, or 52.0%), a significant difference [$\chi^2(1,N=45)=6.724$, $P=.01$]. Table 1 summarizes the results.

5. Discussion

Laboratory economic experiments often focus on the effects of changes in the formal rules and parameters of the economic interactions at issue, with little attention paid to the cues of observability provided by the environment in which these interactions occur. Reversing this emphasis, in a series of laboratory dictator games, we manipulated subtle cues–the availability of human sounds and the presence of stylized eye-like shapes on a computer screen–that we predicted would impact mental mechanisms that evolved to calibrate prosocial behavior as a function of the reputational consequences thereof. While reducing exposure to auditory cues of the presence of other individuals did correspond with an absolute decrease in allocations, this effect was small and not statistically significant. However, the presence of stylized eyespots, a more direct and specific cue of observability, induced significantly more generosity. Mean allocations in our Eyespots condition were both higher than those in our Control condition and higher than offers in many previous dictator games, which typically range from 15% to 30% overall (Camerer, 2003). The larger mean allocation in the presence of stylized eyespots is primarily a consequence of the greater number of individuals who allocated money to their partners when their computers displayed this cue. This increase in the number of allocators is consistent with the conclusion that (a) many types of input relevant to questions of anonymity and observability influence prosocial behavior, and (b) individuals differ with regard to their sensitivity to various types of such input. Economic games often reveal substantial variation in behavior among players, a factor that significantly affects social dynamics in

laboratory settings (Kurzban & Houser, 2001) and likely has similar consequences in the real world. Our results suggest that this variation may stem, in part, from individual differences in the respective impacts of diverse cues regarding the reputational consequences of current behavior.

Our findings are consistent with the modularist proposition that the decision-making processes that shape human prosocial behavior are sensitive to a variety of forms of input and do not exclusively employ information, such as that concerning game parameters, that is likely represented as propositional knowledge. If, as we believe, the affective systems motivating prosocial behavior serve the ultimate goal of creating and maintaining individually profitable social relationships (Fessler & Haley, 2003), then human perceptual and decision making systems ought to be especially sensitive to cues of the presence of others. In particular, humans are innately attuned to the presence of faces, and, as stimuli, eyes play an important role in this regard (Batki, Baron-Cohen, Wheelwright, Connellan, & Ahluwalia, 2000; Slater & Johnson, 1998), presumably because eyes facing in one's direction have served as reliable indicators of attention directed toward oneself both over the course of human evolution and in typical modern contexts.

Our results challenge the claim that, because participants are clearly responsive to changes in game parameters that determine opportunities for reputation formation, prosocial behavior in anonymous noniterated economic games cannot be explained with reference to reputational factors (Henrich & Fehr, 2003). The issue is not simply whether participants consciously recognize and respond to overt factors that determine real opportunities for reputation management (they do), but rather whether experimental contexts also present other forms of information, inputs that are processed by psychological mechanisms that manage reputations independent of explicit reasoning. Because prior investigations did not manipulate or control for information of the sort explored here, the aforementioned position leads to premature and, we believe, probably incorrect conclusions regarding the nature of human prosociality. Indeed, as is true of many investigations of human behavior, economic experiments often present participants with cues concerning the presence of observers that are far richer than what we manipulated in our experiment—which, uncontrolled, may, in part, explain the relative capriciousness of allocations in past dictator game experiments (see Camerer & Fehr, 2004). Participants frequently come face-to-face with experimenters and other participants, providing complex stimuli likely to influence intuitive judgments as to whether one's actions are observable. Moreover, shared language, similar styles of dress, and familiar comportment and patterns of interaction indicate to participants that those around them are members of the same social group, a fact which, in ancestral populations, would have corresponded to an increased likelihood of, and greater consequences associated with, future interaction. If natural selection shaped the mind to attend to a variety of sources of information about the consequences of social behavior, then manipulation of these and similar factors should affect levels of prosociality. It may thus be possible to arrive at a more complete understanding of the factors contributing to human cooperation and altruism by systematically exploring how, mediated by individual differences, decision making is influenced by cues which, for most of human history, have provided information about the social ramifications of various courses of action.

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