Predicting Altruistic Behaviour by the Benefactor-Beneficiary Relationship

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Abstract
The evolution of altruism—costly behaviour by an individual (the benefactor) that benefits another individual (the beneficiary)—has been theorized as a function of kinship, reciprocity potential, shared group membership, and costly signalling. These benefactor-beneficiary relationships have predictive value for real-life altruistic acts. J. A. Palmer designed the Costly Signals Questionnaire (CSQ) to measure participants’ level of support for altruistic acts performed under the varying conditions of (1) close kin, (2) person who can reciprocate, (3) group co-members, and (4) anonymous strangers (representing costly signalling theory). After signing consent forms, participants (n = 465) were given an opportunity to perform an altruistic act anonymously (donate valuable raffle tickets) and then completed the CSQ and measures of altruism, empathy, and religiosity. Statistical analyses support CSQ reliability and revealed that the CSQ significantly predicted altruistic action; the other measures did not (although they significantly correlated with the CSQ). Participants’ support for altruistic acts ranked significantly from strongest to weakest: kin-based > reciprocity > shared group > anonymous stranger. The CSQ appears to be a reliable, valid instrument for predicting altruistic action and measuring support of altruism based on benefactor-beneficiary relationships per evolutionary theory.

Keywords
altruism, costly signals, empathy, group altruism, religiosity, inclusive fitness, kin-based, reciprocal altruism

A commonly understanding of altruism is behaviour done intentionally to help others. However, evolutionary biology defines altruism as costly or risky behaviour by a “benefactor” that benefits another individual, the “beneficiary.” Darwin (1871) and other scientists have sought to explain how altruistic behaviour evolved. Four commonly proposed evolutionary processes that explain how prosocial/altruistic acts facilitate survival of the benefactors’ genes in subsequent generations are kin-based selection, reciprocal altruism, group selection (Penner et al., 2005), and costly signals (Grafen, 1990).

The most evolutionarily ancient and common form of altruism across species is kin-based altruism, a genetically encoded tendency to behave altruistically toward close relatives. This preference to aid kin increases as the cost of acting altruistically increases (Fitzgerald et al., 2010). Kin-selection can be regarded as a sub-category of a more general phenomenon called inclusive fitness (Costa, 2013). Hamilton (1963) developed the concept of inclusive fitness, the idea that an organism’s genetic success can be enhanced by prosocial behaviours like altruism. His theory shows with mathematical precision that individuals within a species can best improve their own genetic legacy by aiding their close relatives as long as the gain conferred on the recipient is greater than the cost to the donor. The degree to which the altruist should incur cost is in direct proportion to the quantity of altruism promoting genes shared with the recipient.

A second evolutionary process, reciprocal altruism, proposed by Trivers (1971, 2005), explains altruism among unrelated individuals. Individuals receive aid with the implicit understanding that they will reciprocate, e.g., one chimpanzee will groom another, removing parasites from areas the receiver cannot reach, because later their roles will be reversed. For reciprocal altruism to work within a group, the members need to be able to identify and exclude cheaters who accept boons.

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but never return the favours. Maynard Smith (1982) created computer simulations that demonstrated how reciprocal altruism can evolve in a species that is completely selfish at the outset, which happens because reciprocal altruism enhances survival and reproductive success. The norm of reciprocity exists in all cultures (Schroeder et al., 1995) indicating that it is innate, species-typical human behaviour.

A third evolutionary process theorized to explain altruism is group selection, where groups that act prosocially are more likely to survive and pass along their genes than groups that do not act prosocially. Darwin (1871) proposed that a tribe with many members who were willing “to sacrifice themselves for the common good, would be victorious over most other tribes; and this would be natural selection” (p. 166). Yet due to the free movement of individuals into and out of groups, groups formed by multi-cellular species appear to lack the necessary temporal stability to be vehicles carrying replicators, i.e., genes (as conceptualized by Dawkins, 1976/1989, 1982). Group selection fell out of favour when Williams (1966) and Maynard Smith (1964) developed mathematical models showing it to be untenable. Group selection is still offered as an evolutionary explanation (Nowak et al., 2010), although it remains controversial and not widely accepted (Pinker, 2015). It should be noted that Hall et al. (2015) demonstrated that costly-signalling increases trust across religious affiliations and Fitzgerald and Wickwire (2012) found that group identifications plays a stronger role in trusting behaviour than in reciprocal altruism.

Darwin (1871, p. 83) extended the concept of evolved altruism beyond kin and reciprocation when he described the evolution of sympathy (i.e., empathy and altruism; Ekman, 2010) in humans as “one of the latest moral acquisitions” and a virtue that is “one of the noblest with which man is endowed” and that “seems to arise incidentally from our sympathies becoming more tender and more widely diffused, until they extend to all sentient beings.” This can be termed universal altruism because it extends toward everyone—including nonhumans. Darwin indicated that this would have evolved as an emergent property, where altruism generalizes toward all. Costly Signaling Theory (CST; Grafen, 1990) (Bereczkei et al., 2010) offers another explanation by positing that altruistic acts, particularly costly ones, signal the altruist’s high status and competence, resulting in increased survival and reproductive potential. The tendency to strive to appear to be a valuable (high-status) associate evolves along with the ability to evaluate potential associates (Tooby & Cosmides, 1996) (Soler, 2012). The higher the apparent status of benefactors as givers, the more likely it is that others will give goods and services to them (Fehr & Fischbacher, 2005) or be interested in them as mates (Iredale et al., 2008; Margana et al., 2019).

For the evolution of altruistic behaviour to occur, a genetic mechanism by which altruists are benefitted must exist (Fehr & Fischbacher, 2005), since the essence of the evolutionary process is selective gene survival. Due to their probabilistic nature, some mechanisms produce stronger evolutionary benefits than others. A benefactor’s altruism toward kin promotes the survival of the benefactor’s genes to the degree to which the beneficiary and the benefactor share genes encoded for altruism (Park, 2007). In contrast, the benefactor’s act of altruism toward a reciprocating beneficiary promotes the survival of the benefactor’s altruistic genes only if the beneficiary reciprocates. As expected, empirical studies show individuals are more likely to help close kin than distant kin, non-kin, and group co-members (Browning et al., 2012; Burnstein et al., 1994; Rachlin & Jones, 2008; Stewart-Williams, 2007).

In order to further study and illuminate the strength and relative preferences for the four primary types of evolved altruism (kin-based, reciprocating, group, and universal), while holding constant the cost of the altruistic acts, one of the authors created the Costly Signals Questionnaire (CSQ). If shown to be reliable and valid, the instrument could provide another way to support the evolutionary origins of altruism, demonstrate the relative strength of human altruistic predispositions, and provide an easy-to-administer method for the study of altruistic proclivities. The purpose of this study was to examine the reliability and validity of the CSQ, including testing the ability of the CSQ to predict a real-life act of altruism. Further, based on the foregoing discussion, we hypothesized:

- Respondents would express the most support for kin-based altruism and least support for universal altruism.
- Respondents’ level of support for altruism would predict real-life altruistic action toward an anonymous person, with universal altruism being the strongest predictor of such action, and kin-based altruism as the least strong.

**Method**

**Participants**

College undergraduate students (n = 465) from a midsize university in the southern United States volunteered to participate. Their ages ranged from 17 to 36 years (mean 18.5 years). Both men (n = 142) and women (n = 320) participated (n = 3 did not identify). Participants were part of a general subject pool of students taking introductory psychology, a required course for most majors. They were offered the incentive of extra credit in their class. No other information was given about the study until after the volunteers arrived at the study location.

**Measures**

**Costly Signals Questionnaire (CSQ).** The CSQ measures the strength of respondents’ support for altruistic acts performed within four categories of the benefactor-beneficiary relationship defined as:

- **Kin:** The beneficiary is close kin to the benefactor.
- **Reciprocal:** The beneficiary is not close kin or member of the same group, but could potentially reciprocate toward the benefactor.
• Group: The beneficiary is not close kin, but is a member of the same group (same club, religion, etc.) as the benefactor.
• Universal: The beneficiary is anyone who is not close kin, not a member of the same group, and provides no potential for reciprocity to the benefactor.

The CSQ systematized varies the benefactor-beneficiary relationship using statements of hypothetical situations that offer opportunities to act altruistically. The cost of the altruistic act is held constant under all four conditions of benefactor-beneficiary relationship by presenting the same situations to each (e.g., loaning one’s car to another). Only the benefactor-beneficiary relationship varies per condition (i.e., the car could be loaned to one’s kin, to someone who would reciprocate, to someone in a shared group, or to a complete stranger who could not or would not reciprocate). This allows a comparison of the participants’ altruistic preferences per benefactor-beneficiary relationship.

Eight different situations of costly altruism are stated within each of the four categories (32 total statements). Participants respond on a 5-point scale ranging from “1) Strongly Disagree” to “5) Strongly Agree” to each statement, e.g.:

- “People should be willing to freely share their automobile with a close relative.”
- “People should be willing to freely share their automobile with people who will contribute to car maintenance and buying gasoline.”
- “People should be willing to freely share their automobile with members of their church.”
- “People should be willing to freely share their automobile with total strangers.”

The group-based items on the CSQ are intended to be tailored for the participant population. For this study, they were couched in terms of religious group, because over 85% of this university’s current and recent subject pool have consistently rated themselves as moderately to strongly religious.

Self-Report Altruism Scale (SRA). The SRA questionnaire (Rushton et al., 1981) measures individual differences in altruistic behaviour in a behaviourally concrete manner. Participants respond to 20 statements describing various altruistic acts, expressing their level of agreement with each statement using a 5-point scale ranging from “0) Never” to “4) Very Often.” Sample statements are:

- I have given a stranger a lift in my car.
- I have bought “charity” holiday cards deliberately because I knew it was a good cause.

The SRA has shown very good reliability (Cronbach’s alpha ranging from 0.82 to 0.83) and validity (Aguilar & Cotrina, 2016; Rushton et al., 1981).

Basic Empathy Scale (BES). The BES (Jolliffe & Farrington, 2006) consists of 20 items: 9 assess cognitive empathy (the capacity to comprehend the emotions of another, e.g., “Usually, I know when people are happy”) and 11 measure affective empathy (the capacity to experience the emotions of another, e.g., “After being with a friend who is sad about something, I usually feel sad”). Participants express their agreement with each statement on a 7-point scale ranging from totally disagree (1) to totally agree (7). The BES shows very good internal consistency (Cronbach’s alpha ranging from α 0.79 to 0.85) and continues to be confirmed as an appropriate assessment of empathy (Carré et al., 2013).

Questionnaire presentation. The items of the CSQ, SRA, and BES were combined into one 72-item document with questions randomly interspersed. This presentation was intended to reduce social desirability responses.

Demographic survey: This asked for age, sex, and religiosity. Religiosity (REL) was measured with one question: “How religious would you say you are?” Participants responded on an 11-point scale ranging from “(0) Not at All” to “(10) Very.”

Raffle Tickets Donated. Raffle tickets, labelled with unique identifying numbers, represented a chance to win a $300 prize. In this geographic area, most students have economic need, and raffle tickets are perceived as very valuable. Thus the number of raffle tickets that a participant donated provided a concrete behavioural measure of real-life altruism—willingness to give away a valuable commodity to benefit a stranger.

Procedure

Participants completed consent forms after arriving at the campus classroom where the study took place. The signed consent forms were collected before the questionnaire packets were distributed to the participants. (None of the questionnaires had any identifying data; collecting them separately from the consent forms ensured anonymity and confidentiality of participants responses.)

The research assistants then explained that each participant would receive 10 raffle tickets for a prize drawing of $300 as a reward for completing the study. Participants were then given the questionnaire packet, which contained the tickets. Shortly after they began the demographic survey, a research team member interrupted them to announce a shortage of raffle tickets due to more participants volunteering than had been anticipated. Participants were asked if they would return some of their raffle tickets to be given to an anonymous participant (attending a different session) who would otherwise receive no tickets. Participants were told they could choose to give no tickets, or any number of their 10 tickets. They were asked to write on their paperwork how many raffle tickets they were donating and to leave the donated tickets in their packet before turning it in. The procedure ensured that their choice was anonymous and confidential.

The cash drawing was real, but the shortage of tickets was a ruse to provide a real-life opportunity for acting altruistically. In reality, and unknown to them, each participant had an equal chance of winning the raffle regardless of how many tickets
they donated. After the study was over, the drawing was held, and a participant received $300.

Results

Factor Analysis of the CSQ

Factorability of the CSQ was indicated by: (1) 30 of the 32 items correlated at least.3 with one or more other items; (2) the Kaiser-Meyer-Olkin measure of sampling adequacy was.902, above the commonly recommended value of.6; and (3) Bartlett’s test of sphericity was significant ($\chi^2 (496) = 7203.67, p < .0001$). Principal components analysis was used because the primary purpose was to identify and compute composite scores for the factors. Initial eigenvalues indicated that the first four factors explained 29.18%, 11.6%, 5.71% and 4.76% of the variance respectively. The fifth, sixth and seventh factors had eigenvalues just over one, and explained 3.81%, 3.70% 3.29% of the variance respectively. Using oblimin rotations of the factor loading matrix, a four-factor solution explaining 51.24% of the variance was preferred because of: (1) its previous theoretical support; (2) the “leveling off” of eigenvalues on the scree plot after four factors; and (3) the insufficient number of primary loadings and difficulty of interpreting the fifth factor and subsequent factors. The presence of correlations above.3 in the component correlation matrix indicated that it was appropriate to use an oblimin rotation for the final solution of four factors.

Reliability and Convergent Validity of the CSQ

Each of the four CSQ altruism subscales showed good internal consistency based on their Cronbach’s alpha ($\alpha$) scores: Kin-Based $\alpha = .747$, Reciprocal $\alpha = .72$, Group-Based $\alpha = .85$, and Universal $\alpha = .80$, as did the CSQ total ($\alpha = .92$). In this study, the SRA also showed very good reliability ($\alpha = 0.86$), as did the BES ($\alpha = 0.82$). Skewness values for the four CSQ altruism subscales were Kin-Based $= -.072$, Reciprocal $= .318$, Group-Based $= -.005$, and Universal $= .201$. Kurtosis values for the four CSQ altruism subscales were Kin-Based $= .075$, Reciprocal $= .82$, Group-Based $= .582$, and Universal $= .716$.

A Chi-Square goodness of fit test was used after verifying that it’s assumptions that the sample was randomly drawn from the population and each category contained more than 5 observations were met. The chi-square goodness-of-fit test for the four CSQ altruism subscales were as follows: Kin-Based ($\chi^2 = 358.04; df = 26; p < .0001$), Reciprocal ($\chi^2 = 503.87; df = 28; p < .0001$), Group-Based ($\chi^2 = 401.3; df = 31; p < .0001$), and Universal ($\chi^2 = 411.62; df = 29; p < .0001$).

Table 1 reports the correlations among the four CSQ subscales, the CSQ total (CSQ-T), the Self-Report Altruism Scale (SR-Altruism; SRA), the Basic Empathy Scales (BES), Religiosity (REL), and Raffle Tickets Donated (RAF). The four CSQ subscales and the CSQ total were significantly correlated with the SRA, BES (total), and REL, establishing convergent validity of the CSQ. The means, standard deviations, and ranges of all variables are also reported in Table 1.

Prediction of Real-Life Altruistic Action

A standard multiple linear regression was calculated to predict the number of raffle tickets returned based on these measures of potential prosocial behaviour: CSQ total, the SR-Altruism scale, and the BES total (the sum of BES cognitive empathy and BES affective empathy). These measures accounted for a significant amount of the variance in the number of raffle tickets returned ($F(3, 458) = 2.995, p = .03, R^2 = .019, R^2_{Adjusted} = .013$). However, only the CSQ total significantly predicted the number of raffle tickets returned ($Beta = .142, t(461) = 2.85, p = .005$). The SR-Altruism scale and the BES total did not ($Beta = .002, t(461) = .036, ns$ and $Beta = -.002, t(461) = -.45$, $ns$ respectively).

A standard multiple linear regression was calculated to predict raffle ticket return based on three of the CSQ subscales: Kin-Based Altruism, Reciprocal Altruism, and Universal Altruism. The CSQ Group-Based Altruism subscale was excluded because of its multicollinearity issues, i.e., it had Pearson’s correlations of.78 with CSQ Kin-Based Altruism and.74 with CSQ Universal Altruism (as per Tabachnick & Fidell, 2001, p. 84). The three CSQ subscales accounted for a significant amount of the variance in the number of raffle tickets returned ($F(3, 464) = 4.36, p = .005, R^2 = .027, R^2_{Adjusted} = .021$). The CSQ Universal Altruism subscale significantly predicted the number of raffle tickets returned ($Beta = .178, t(467) = 2.93, p = .004$), whereas CSQ Kin Based Altruism and CSQ Reciprocal Altruism did not ($Beta = -.070, t(467) = 1.16, ns$ and $Beta = .039, t(467) = .70, ns$ respectively).

Comparison of Altruistic Support by Benefactor-Beneficiary Category

The level of altruistic support on the four CSQ benefactor-beneficiary categories varied significantly [one-way repeated measures ANOVA, Wilkes’ Lambda = .447, $F(3, 462) = 190.45, p < .0005$, multivariate partial eta squared = .553]. Pair-wise comparisons with Bonferroni adjustment revealed that Kin-Based Altruism scores were significantly higher than Reciprocal Altruism scores, which were significantly higher than Group-Based Altruism scores, which were significantly higher than Universal Altruism scores. The mean scores for the four types of altruism all differed significantly from each other ($p < .01$ level, 2-tailed), as reported in Table 1.

Discussion

This study tested a new measure of altruism, the CSQ. It was also found to be a reliable measure of altruism that was able
Table 1. Correlations and Descriptive Statistics (n = 448): CSQ Scales, Self-Report Altruism, Empathy, Religiosity, and Raffle Tickets.

| Variables                              | CSQ-K | CSQ-R | CSQ-G | CSQ-U | CSQ-T | SRA  | BES-C | BES-A | BES-T | REL  | RAF  |
|----------------------------------------|-------|-------|-------|-------|-------|------|-------|-------|-------|------|------|
| CSQ Kin-Based Altruism (CSQ-K)         | -     |       |       |       |       |      |       |       |       |      |      |
| CSQ Reciprocal Altruism (CSQ-R)        | .517**| .422**|       |       |       |      |       |       |       |      |      |
| CSQ Group-Based Altruism (CSQ-G)       | .780**| .510**| .434**|       |       |      |       |       |       |      |      |
| CSQ Universal Altruism (CSQ-U)         | .613**| .524**| .738**| .334**|       |      |       |       |       |      |      |
| CSQ Total (CSQ-T)                      | .861**| .741**| .908**| .859**| .517**|      |       |       |       |      |      |
| Self-Report Altruism (SRA)             | .288**| .288**| .254**| .332**| .288**|      |       |       |       |      |      |
| Cognitive Empathy (BES-C)              | .314**| .223**| .230**| .211**| .288**|      |       |       |       |      |      |
| Affective Empathy (BES-A)              | .178**| .079  | .155**| .120**| .162**| .137**|      |       |       |      |      |
| Empathy Total (BES-T)                  | .262**| .150**| .212**| .177**| .241**| .247**| .636**| .936**| -     |      |      |
| Religiosity (REL)                      | .290**| .121**| .437**| .343**| .358**| .078  | .108**| .157**| .167**| -    |      |
| Raffle Tickets Donated (RAF)           | .059  | .096* | .136**| .135**| .137**| .044  | .033  | .001  | .013  | .035 | -    |
| M                                      | 25.69 | 23.64 | 22.94 | 21.30 | 93.46 | 53.80 | 34.05 | 40.47 | 74.50 | 6.61 | 3.13 |
| SD                                     | 4.47  | 4.35  | 5.32  | 4.89  | 16.07 | 10.90 | 3.07  | 6.71  | 8.24  | 2.50 | 3.37 |
| Range                                  | 13–40 | 11–40 | 8–40  | 8–40  | 43–160| 29–92 | 21–41 | 18–54 | 44–94 | 0–10 | 0–10 |

*p < .05 level (2-tailed). **p < .01 level (2-tailed).

Note: Although 465 people participated in this study, not all participants answered all questions; therefore this table reports the valid n of 448.
to predict a real-life altruistic act. Further, using the CSQ, this study compared the strength of participant’s support for altruistic action under the conditions of the different types of benefactor-beneficiary relationships and found significant differences. The results provide support for the several of the most widely studied evolutionary mechanisms of altruism, as well as new information about their relative influence on altruistic cognition.

**Reliability and Convergent Validity of the CSQ**

The CSQ’s scales were each shown to be internally consistent, meaning that the items of each scale are likely measuring the same domain. When compared with measures of self-reported altruism, empathy, and religiosity, the CSQ was shown to significantly correlate with all three, supporting its convergent validity. As expected, correlations were found between all of the measures of prosocial behaviour.

Empathy was significantly correlated with the four subscales of the CSQ and the other measure of altruism (SRA). Religiosity was also significantly correlated with empathy and the CSQ subscales, but not with the SRA. Clearly the capacity for empathy, both cognitive and affective, plays a critical role in determining an individual’s altruistic leanings, no matter which benefactor-beneficiary relationship is supported the most.

**Prediction of Real-Life Altruistic Action**

Language provides a window into the behavioural evolution of our species that is not available with nonhuman life forms. We can assess the relative altruistic preferences of our participants simply by asking them, yet self-reports can be biased by social desirability and other influences (Elliot et al., 1996; Furnham & Henderson, 1982), so it is important to establish the ability of a measure to predict real-life action. Regression analyses showed the CSQ to be a statistically significant predictor of real-life altruism—donating raffle tickets to benefit others. Self-reported altruism, empathy, and religiosity were significantly correlated with the CSQ subscales, but did not predict altruistic action in this study. These findings suggest that individuals who report themselves as altruistic or empathic or who identify as religious may tend to believe that they are more altruistic than they actually are. This may be due to social desirability reporting, self-delusion, or some other cause. Whatever the source of the discrepancy between self-reports and actual action, the CSQ appears to be more robust and immune to such an effect.

CSQ items require respondents to focus on the degree to which they support altruistic action within a certain benefactor-beneficiary relationship. Therefore, the respondent is not focused on whether they would perform the action, but rather how strongly they support it. For this reason, the CSQ may elicit more reliable or honest answers than other measures.

The best predictor of real-life altruistic action in this study was the CSQ Universal Altruism subscale. This was expected because the real-life altruistic opportunity was for the benefit of an unknown person, and the Universal Altruism subscale items describe altruistic acts that benefit anonymous strangers. This finding also helps demonstrate that the raffle ruse was a valid representation of real-life altruism for this study.

**Comparison of Altruistic Support by Benefactor-Beneficiary Category**

A vast amount of empirical support for both Hamilton’s theory of inclusive fitness and Trivers theory of reciprocal altruism has been amassed across numerous species over the past several decades (Palmer & Palmer, 2002). In this study, participants showed the strongest support for kin-based altruism and second-strongest support for reciprocal altruism. This provides further validation of these theories in respect to our own species.

Group-based altruism was the third strongest supported of the four benefactor-beneficiary relationships. These results are aligned with the famous old proverb that “blood is thicker than water.” Group altruism could have arisen from the general psychological predispositions that facilitate kin-based and reciprocal altruism. Throughout human history and prehistory, individuals typically spend a great deal of time in proximity to close kin, especially during early ontogeny. DNA being a very recent discovery, we can assume that the psychological algorithms that facilitate altruism toward kin are based on processing stimuli related to the propinquity of other people, and propinquity of members is a common characteristic of groups.

As expected, participants gave the least amount of support to universal altruism—benefiting a complete stranger. This is also consistent with the findings from studies using dictator games to investigate universal altruism. These studies show that few people behave altruistically (Eckel & Grossman, 1996) (Bekkers, 2007), and that when they do it may in part be an artifact of the experimental protocols (Bardsley, 2008). These findings support the idea that the evolution of universal altruism would exert a relatively weak influence on an individual’s ability to pass this genetic predisposition along. If universal altruism evolved as a costly signal of status or competence and/or exists because of cognitive generalization and cultural reward, then those processes might not confer as strong of an influence as the evolutionary processes behind kin-based, reciprocal, and group-based altruism. In addition, learned behaviours and attitudes and other proximate processes could be a greater influence upon the development of group-based and universal altruism than genetic encoding of altruistic traits.

**Conclusion**

Based on the CSQ’s prediction of real-life altruistic action in this study, as well as its correspondence to other measures of prosocial behaviour, the CSQ provides a reliable and valid assessment of a person’s altruistic leanings. In particular, the CSQ Universal Altruism subscale may be a good predictor of actual altruistic action toward a stranger.
Participants’ strength of preference for altruistic action based on the type of benefactor-beneficiary relationship followed a clear pattern:

kin-based > reciprocity > shared group membership > anonymous stranger

These differences were significant, demonstrating that human valuation of altruism within the benefactor-beneficiary relationship categories varies by type and is predictive of altruistic action. These findings reflect and support the main theoretical frameworks regarding the evolution of altruism and provide further information about their relative strengths of effect.

Understanding how altruism operates, how it evolved, and how it develops within an individual’s lifespan have ramifications not only for academic study, but for important practical application, as well. Simply knowing that our natural tendency is to help kin much more than strangers can serve as a catalyst for change. The human being can make a conscious decision to be more giving, more caring, and more universally altruistic toward all living things.

Declaration of Conflicting Interests
The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding
The author(s) received no financial support for the research, authorship, and/or publication of this article.

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**Appendix**

**Costly Signals Questionnaire:**

**Instructions:** Please read each question carefully and check the appropriate circle for each question. There are no right or wrong answers. The scale ranges from strongly disagree to strongly agree OR never to very often.

| Kin-Based Altruism                                      | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|----------------------------------------------------------|-------------------|----------|---------|-------|----------------|
| 1. People should be willing to donate a kidney to a close relative. | ![ ] | ![ ] | ![ ] | ![ ] | ![ ] |
| 2. People should be willing to forgive a close relative who physical assaults them in a fit of anger. | ![ ] | ![ ] | ![ ] | ![ ] | ![ ] |
| 3. People should be willing to forgive a close relative who steals a substantial amount of money from them. | ![ ] | ![ ] | ![ ] | ![ ] | ![ ] |
| 4. People should be willing to forgive a close relative who becomes sexually involved with their significant other. | ![ ] | ![ ] | ![ ] | ![ ] | ![ ] |
| 5. People should be willing to risk their life to save their close relative from certain death. | ![ ] | ![ ] | ![ ] | ![ ] | ![ ] |
| 6. People should be willing to give a substantial amount of money to their close relative even when they know they will not be repaid. | ![ ] | ![ ] | ![ ] | ![ ] | ![ ] |
| 7. After hurricane flooding people should be willing to freely share their bedroom with a close relative. | ![ ] | ![ ] | ![ ] | ![ ] | ![ ] |
| 8. People should be willing to freely share their automobile with a close relative. | ![ ] | ![ ] | ![ ] | ![ ] | ![ ] |

**Reciprocal Altruism**

| Reciprocal Altruism                                      | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|----------------------------------------------------------|-------------------|----------|---------|-------|----------------|
| 1. People should be willing to donate a kidney to a stranger provided there is a substantial monetary reward. | ![ ] | ![ ] | ![ ] | ![ ] | ![ ] |
| 2. People should be willing to forgive a physical assault by a stranger provided there is substantial monetary compensation. | ![ ] | ![ ] | ![ ] | ![ ] | ![ ] |
| 3. People should be willing to forgive the theft of valuables provided that the thief returns a sum of money which is much more than the value of the stolen items. | ![ ] | ![ ] | ![ ] | ![ ] | ![ ] |
| 4. People should be willing to forgive a stranger who becomes sexually involved with their significant other if they provide a huge cash settlement for pain and suffering caused. | ![ ] | ![ ] | ![ ] | ![ ] | ![ ] |
| 5. People should be willing to risk their life for those people who are likely to return the favour. | ![ ] | ![ ] | ![ ] | ![ ] | ![ ] |
| 6. People should be willing to give a substantial amount of money to those who can repay with interest. | ![ ] | ![ ] | ![ ] | ![ ] | ![ ] |
| 7. After hurricane flooding people should be willing to share their home with people who would do the same for them. | ![ ] | ![ ] | ![ ] | ![ ] | ![ ] |
| 8. People should be willing to share their automobile with people that will contribute to car maintenance and buying gasoline. | ![ ] | ![ ] | ![ ] | ![ ] | ![ ] |

**Group-Based Altruism**

| Group-Based Altruism                                      | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|----------------------------------------------------------|-------------------|----------|---------|-------|----------------|
| 1. People should be willing to donate a kidney to a person who is a member of their church. | ![ ] | ![ ] | ![ ] | ![ ] | ![ ] |
| 2. People should be willing to forgive a physical assault upon their person by a member of their church. | ![ ] | ![ ] | ![ ] | ![ ] | ![ ] |
| 3. People should be willing to forgive the theft of valuables from them by a member of their church. | ![ ] | ![ ] | ![ ] | ![ ] | ![ ] |
4. People should be willing to forgive a member of their church who becomes sexually involved with their significant other.
5. People should be willing to risk their life to save a member of their church from certain death.
6. People should be willing to give a substantial amount of money to members of their church even when they know they will not be repaid.
7. After hurricane flooding people should be willing to freely share their home with members of their church.
8. People should be willing to freely share their automobile with members of their church.

**Pure Altruism**

1. People should be willing to anonymously donate a kidney to a total stranger they will never meet.
2. People should forgive anyone who has physically assaulted them and keep their decision to forgive to themselves.
3. People should forgive anyone who has stolen from them and keep their decision to themselves.
4. People should forgive anyone who becomes sexually involved with their significant other and keep their decision to themselves.
5. People should be willing to risk their life to save a total stranger and never discuss their heroic act with anyone.
6. People should be willing to give a substantial amount of money to a stranger in need and never tell anyone about their generosity.
7. After hurricane flooding people should be willing to freely share their homes with total strangers.
8. People should be willing to freely share their automobiles with total strangers.