

Running Head: REVISITING THE PROBLEM WITH ALTRUISM

Revisiting the Problem with Altruism

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Abstract

The purpose of this thesis was to identify the evolutionary mechanisms by which non-kin, non-reciprocal and non-social, human altruistic behaviors were selected for, in contradiction with evolutionary theories that posit altruism as a violation of the basic tenants of the survival of self. Through review of relevant animal studies, children studies, behavioral studies and brain research, the author identifies a compelling link between empathy and true altruistic human behavior. Empirical examinations of empathy revealed it to be a highly heritable, selected for human behavior. Theoretical and empirical evidence has shown that altruism is behaviorally and neurologically linked to empathy and that empathy is a selected for, heritable evolutionary adaptation and therefore true altruistic behavior is an evolutionary side effect of empathy. The implications of this cumulative research indicate that all forms of altruistic behavior can be explained in the context of evolution and that the problem surrounding an evolutionary explanation for true altruism is not a problem at all.

Introduction

The concept of altruism in the context of evolutionary theory has been the subject of considerable research since the publication of Darwin's *On the Origin of Species* (1859). The term "altruism" was first coined by Auguste Comte (1798-1857), a French philosopher and founder of the 19th century positivism movement. Comte's ethical doctrine (1852) summed up altruism with the phrase "Live for others".

A more refined definition within the framework of evolutionary theory is the capacity to perform costly acts that confer benefits on others (Fehr and Fischbacher, 2003). It is this definition of altruism that has caused consternation in evolutionary circles. Altruism is a problem for evolutionary theory because its very existence is in direct conflict with the premise that biological and behavioral adaptations are selected to enhance an organism's reproductive success. The fact that altruistic behaviors do not enhance an organism's reproductive success, and yet exist among humans, is therefore problematic to this accepted definition of evolutionary theory.

Previous research and theories by Darwin on group altruism (1871), Hamilton on inclusive fitness (1963), and Trivers on reciprocal altruism (1971) have attempted to explain altruistic behaviors in humans, and have been successful within limited contexts. Hamilton's Inclusive Fitness theory explains altruistic behaviors in relation to genetic relations (kin) and Trivers' Reciprocal Altruism explains mutually beneficial altruistic behaviors. All existing theories, however, fail to address altruistic behaviors performed by non-relatives for which no benefit is gained by the altruist.

The research that follows posits that true altruistic behaviors beyond inclusive fitness, reciprocal altruism or social altruism are behaviorally and neurologically linked to empathy; that empathy is a selected for, heritable evolutionary adaptation; and that true altruism is therefore a side effect of empathy.

The problem with altruism

The problem defined

Altruistic behavior, much like Darwin's peacock problem, has troubled evolutionary biologists, evolutionary psychologists, and even Darwin himself since *On The Origin of Species by Means of Natural Selection* (Darwin, 1859) was first published.

The troubling factor, or the "problem", with altruistic behavior is that, much like the peacock problem, it runs counter to the very premise behind natural selection. The premise is that the biological and behavioral adaptations that enhance the reproductive success of an organism will be selected for. Altruistic behavior, putting the survival of someone else ahead of your own, does not enhance the likelihood of survival and/or reproduction but reduces or eliminates it. By this definition altruistic behavior should not exist within society today. The problem is that, not only does altruistic behavior exist, but it is universally considered to be an inherent human trait.

An operational definition of true altruism

Altruism can be defined as the capacity to perform costly acts that confer benefits on others (Fehr and Fischbaher, 2003), but this does not adequately define altruism within the context of "the problem", because it fails to clarify whether the costly acts are done for some

level of self-benefit. The problem, which is the unexplained conflict between self-preservation and the performance of costly acts, only exists when we amend the definition to include “with no benefit conferred to the altruist”. Therefore, true altruism is “The capacity to perform costly acts that confer benefits on others with no benefit conferred to the altruist.”

Does true altruism exist? A historical review

Group altruism

Darwin was the first to attempt to address this shortcoming when he proposed the theory of “Group Altruism” in his publication of *The Descent of Man* (Darwin, 1871). He theorized that groups of humans that behaved altruistically toward those within their own group would be more likely to survive and reproduce as a group, than groups who were not altruistic toward each other.

While this was a compelling (and only) theory for a time, later research by Maynard Smith (1964) identified that if a recessive altruistic allele were to survive via group selection it would have to continuously meet three critical and unlikely conditions. Groups would need to be reproductively isolated because infiltration by dominant non-altruistic allele carrying individual would eventually lead to elimination of the trait from the group. Groups would have to be started by few founders that were homozygotes or the group trait could not come into existence. And finally that altruistic groups could not be in competition for their food supply by non-altruistic groups – implying isolation. Continuously meeting all three of these conditions, though not impossible, is unlikely, establishing group selection of altruism to be a weak evolutionary force and unlikely to be a strong enough force for it to have persisted.

Mathematical models, specifically “The Price Equation”, subsequently provided mathematical

support for the weak force theory and group altruism was dropped as a legitimate explanation for true altruistic behavior (Frank, 1995).

Inclusive fitness

It wasn't until the 1930's that Haldane suggested (and in the 1960's that Hamilton precisely defined) inclusive fitness as a theoretical construct to address altruism. Inclusive fitness posits that all non-reciprocal altruistic behavior is directly related to genetic distance (how closely related the benefactor is to the altruist) and reproductive value (the age of the benefactor) (Hamilton, 1963). The genetic distance relationship was typified by J.B.S. Haldane who is reported to have said "I would give up my life for two of my brothers or eight of my cousins".

The main premise of inclusive fitness is that self-sacrifice, and thus the end of your personal reproductive potential, is justified only when the act of sacrifice results in the survival of your genetic code (or most of it) through those who survive as a result of your sacrifice. For this to be effective within the inclusive fitness theory, the altruist must be able to identify those to whom they are related (that is, possess kin recognition abilities).

Kin recognition strategies include association, odor recognition and classification. Association is a result of the family unit where one is surrounded by immediate and direct family members throughout infancy and childhood (Shepher, 1971). Odor recognition is the ability to detect kin based on smell. In a study of two-choice odor discrimination tests, fathers, grandmothers and aunts reliably identified the odors of garments worn by their neonatal relatives, and adult kin accurately discriminated between the odors of their siblings (Porter, Balogh, Cernoch, & Franchi, 1986). Classification systems are the universal symbolic

representations for those who are our relatives. This includes the mother, father, aunt, uncle, cousins and so on. These classification systems are universal across all languages and not only denote that there is a genetic relationship, but also the genetic distance between family members, for example the difference between a brother and a cousin (Jones, 2003a, 2003b).

Another feature of altruistic self-sacrifice that is directly related to inclusive fitness is the emotional closeness of kin, or the emotional bond one feels toward the person or persons that they are making a sacrifice for. Not surprisingly, there is a relationship between kin emotional closeness and genetic distance (Essock-Vitale & McGuire, 1985).

While inclusive fitness is accepted as a reliable explanation for altruistic behavior toward those to whom you are genetically related, it does not in any way address, or attempt to explain, altruistic behavior toward non-kin. Yet non-kin altruistic behavior exists and persists within society, so the “problem” of true altruism is unresolved by inclusive fitness.

Reciprocal altruism

Another predominant theory that addresses altruistic behavior is reciprocal altruism. Reciprocal altruism posits that all non-genetic altruistic acts are features of mutual survival, or increased access to resources, where the cost/benefit ratio dictates the behavior (Trivers, 1971). Essentially this means that I will help you because I believe that you will help me later, but only if the benefit of helping you is greater than the cost (risk) associated with it. Examples of this behavior can be found in warfare, where soldiers protect each other in dangerous circumstances because it increases the probability of mutual survival (Hoffman, 1981).

Reciprocal altruism provides no evolutionary basis to explain non-kin altruistic behavior when there is no benefit conferred to the altruist, and so true non-kin altruism remains unaddressed.

Social / learned altruism

Another theory that attempts to explain non-kin altruistic behavior does so through social reward and punishment or social altruistic behavior. This theory posits that people act altruistically because they believe that they will be socially rewarded (praised and raised in social status) for behaving altruistically and/or that they will be socially punished (diminished in social status) for not behaving altruistically.

Multiple studies have identified two categories of altruistic behavioral characteristics. One category of people acted altruistically more often and more consistently *when they knew they were being observed*, but were statistically less likely to do so when they believed they were unobserved. A second category of people behaved altruistically whether or not they knew they were being observed. A Hungarian study grouped subjects into public groups and anonymous groups and found that the response to the opportunity to provide help was twice as frequent in the public groups (Bereczkei, Birkas and Kerekes, 2010). A study of 8-10 year olds who were given an opportunity to help in a naturalistic setting (free-time play periods involving interaction with other children of the same age and mental status), found that one half responded by helping others (Severy & Davis, 1971). This is consistent with laboratory experiments where half of second to fourth grade students left an assigned task to help a crying child in the next room (Staub, 1970, 1971).

This research, while supporting the theory that some altruistic behaviors are learned (those who act when observed), also supports the “heritability” of non-kin, non-social altruistic behavior (those who respond whether they are observed or not), but fails to account for true altruism.

Does true altruism exist? A current perspective

Altruism in animal studies

If true human altruism exists in an evolutionary context, it is reasonable to expect that examples of non-kin, high cost altruistic acts could be observed in our closest genetic relatives, the non-human primates.

While this has been a controversial topic, Kagan (2000) argued in support of the hypothesis while de Waal (1998, 2008) argued against it, there is significant evidence for its existence. De Waal (2008) states the following in regards to chimpanzees, “For example, when a female reacts to the screams of her closest associate by defending her against a dominant male, she takes enormous risk on behalf of the other. She may very well be injured.” (de Wall, 2008, p.289)

Another more direct and compelling example comes from Goodall (1990) where she states:

In some zoos, chimpanzees are kept on man-made islands, surrounded by water-filled moles. . . Chimpanzees cannot swim and, unless they are rescued, will drown if they fall into deep water. Despite this, individuals have sometimes made heroic efforts to save companions from drowning---and were sometimes successful. One adult male

lost his life as he tried to rescue a small infant whose incompetent mother had allowed it to fall into the water. (Goodall, 1990, p.213)

These observations in chimpanzees provide strong indications that true high cost, non-kin altruistic behavior exists in higher order, non-human primates lending additional support to the claim that it is a non-learned innate and heritable trait.

Altruism in children studies

Is true altruism intrinsically or extrinsically motivated? Inclusive fitness theory would tell us that it must be extrinsically motivated, because Dawkin's theory of the selfish gene (1976) predicts that inclusive fitness always acts at the level of the gene, in that genes behave in a manner consistent with ensuring their own survival. This drive for survival and reproductive success by definition excludes the concept of self-sacrifice and is contrary to the survival of the altruistic trait. One way to determine if altruistic behavior is intrinsically or extrinsically motivated is to study the behavior in children before they have had the exposure and socialization that would create the extrinsic motivation.

Warneken & Tomasello (2008) evaluated the altruistic tendencies of 20-month-old children who have had the least exposure to social rewards for helping others than any other similar studies to date. They evaluated 36 children (16 girls and 20 boys) from 19 to 21 months of age, and from mixed socioeconomic backgrounds. The children were exposed to 3 helping conditions: a reward condition, a praise condition, and a neutral condition. In all of the conditions the children had access to, and played with, "distracter toys" so that the children had to stop playing and leave the toy in order to help. In the reward condition, a helping child was given a cube that was needed to operate an appealing toy. In the praise

condition, the child was given verbal praise for helping. In the neutral condition neither material nor social reward was offered for helping. The results, over repeated trials, found that “Children continued to help on a high level in the subsequent test phase when no material or social reward was offered and when helping entailed interrupting an attractive activity” (Warneken & Tomasello, 2008, p. 1787). In addition they found that the over-justification effect (reward) actually undermined their intrinsic motivation. “Children helped equally often after having experienced praise or a neutral response but helped less often after they received material rewards” (Warneken & Tomasello, 2008, p. 1787). This research indicates that altruism (in the form of desiring to help others, even strangers) is intrinsically present in children prior to socialization, and conflicts with theories that propose young children are oblivious to others needs and act prosocially only to receive concrete rewards (Bar-Tal, 1982; Cialdini, Baumann & Kenrick, 1981; Vovidio, Piliavin, Schroeder & Penner, 2006).

Empathy-altruism

The Empathy-Altruism hypothesis posits that feelings of empathic emotion can lead to the altruistic motivation to help (Toi & Batson, 1982). While this is not a new concept to either philosophy or psychology, and was shelved by the egoistic-centered psychological mainstream in the 1920s, it was revived as a valid theoretical construct in the late 1970s and early 1980s and was the subject of much research.

The original premise was that one would act altruistically toward another who was in observable pain because their empathy caused them personal pain. The “altruistic” behavior was not true altruism because it was done for the selfish purpose of relieving one’s own suffering and less out of concern for the other person (Smith, Keating and Scotland, 1989).

The missing link

The empathy-altruism link

The premise of the Empathy-Altruism theory is that the greater empathy one feels towards a person in distress, the greater the likelihood that they will act altruistically. Toi and Batson (1982) state that:

Several social psychologists (Aronfreed, 1970; Batson, Darley, & Coke, 1978; Coke, Batson, & McDavis, 1978; Hoffman, 1975, 1981; Krebs, 1975) have recently resurrected the question of the existence of altruism, and moreover, they have proposed an answer in the affirmative. Specifically, these researchers have suggested that the motivation to help is altruistic to the degree that it is evoked by an empathic emotional response to the victim's distress (feeling sympathy, compassion, soft heartedness, etc.) (Toi and Batson, 1982, p. 282)

Toi and Batson (1982) subsequently manipulated the levels of empathy with the goal of measuring the altruistic response. Their results indicated that empathic priming had a direct impact on the altruistic response. Subjects in the low empathy condition helped less when escape was easy rather than when it was difficult, suggesting that their helping efforts were directed at relieving their own distress. However, subjects in the high empathy condition displayed a high rate of helping even when escape was easy, suggesting that the helping was an altruistic act whose purpose was to relieve the distress of the person in need.

A second group of studies by Batson, Dyck, Brandt, Batson, Powell, McMaster, and Griffitt (1988) used five experiments to test the empathy-specific reward hypothesis (the

premise that people act altruistically to gain some reward) and the empathy-specific punishment hypothesis (the premise that people act altruistically to avoid punishment).

Three of the experiments were designed to test the empathy-specific punishment hypothesis using various techniques providing justification for not helping. Two of the experiments were designed to test the empathy-specific reward hypothesis.

In the empathy-specific punishment experiments 120 students (60 men, 60 women) from an introductory psychology course served as the subjects. The study manipulated justification for not helping with high and low empathy conditions creating a 2 (low vs. high empathy) X 2 (low vs. high justification) factorial design. The subjects learn of a young woman's need by listening to a (fake) radio newscast and are then provided with the unexpected chance to help her. Empathy was manipulated by having the subjects take one of two perspectives while listening. One group was asked to focus on the technical aspects of the broadcast (low empathy). The other group was asked to imagine how the person in need feels (high empathy). Justification for not helping was manipulated by presenting the subjects with a signup list to help that contained spaces for 8 volunteers. In one group 5 of the 7 spaces were already filled in with people who had volunteered to help (low justification). In the second group only 2 of the 7 spaces were filled with people who had volunteered (high justification). Under the high justification for not helping condition, 60% of those in the high empathy condition volunteered to help compared to only 15% of those in the low empathy condition. Results are summarized in the table below:

Proportion of Subjects in Each Justification Condition Who Helped in Low- and High-Empathy Conditions:

<u>Justification Condition</u>	Low Empathy		High Empathy	
	<u>%</u>	<u>M</u>	<u>%</u>	<u>M</u>
Replication Condition (no justification info)	0.35	0.45	0.70	1.20
Low justification for not helping	0.55	0.85	0.70	0.95
High justification for not helping	0.15	0.20	0.60	0.80

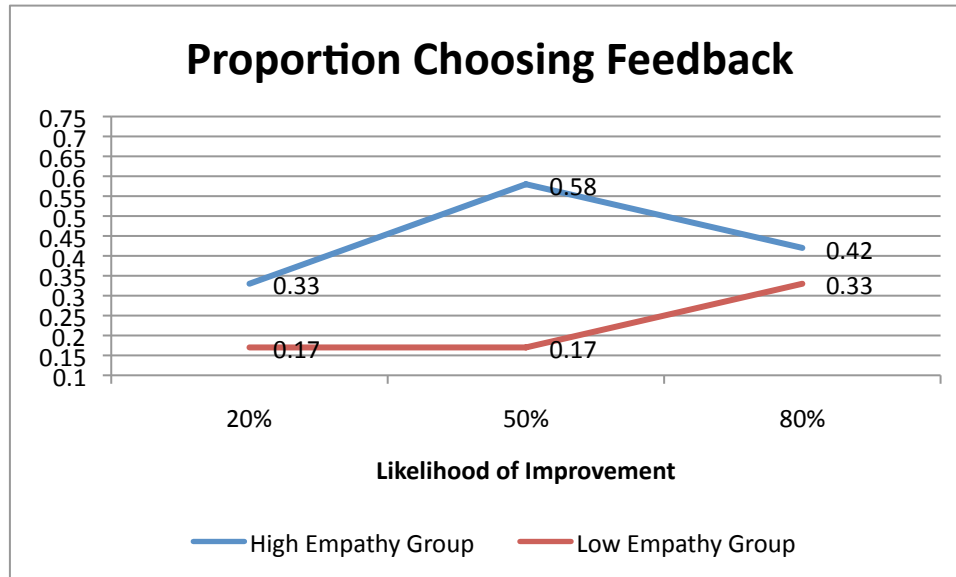
Note: N = 20 (10 men, 10 women) per cell. Means are for the scaled measure of helping (0 = no helping, 1 = 1 to 2 hr, 2 = 3 to 5 hrs, 3 = 6 to 8 hrs, 4 = 9 to 10 hrs)

In the empathy-specific reward experiments a situation was created where subjects were confronted with a person in need and told they could perform a task at little or no cost to them that would relieve the victim's need. Later half learned that by chance they would not be performing the helping task. Two experimental manipulations produced a 2 (low vs. high empathy) X 2 (no prior relief of victim's need vs. prior relief) X 2 (perform the helping task vs. not perform) factorial quasi-experimental design. The dependent measure was change in self-reported mood after subjects were or were not allowed to help the victim. The prediction was that high empathy subjects would feel better if they were the cause of the victim's relief than if they were not. However, both mood and performance data were consistent with the subjects goal of having the victim's need reduced regardless of whether it was a result of their own actions or the actions of others.

All of the experiments failed to establish strong links to either the reward or the punishment premise and ultimately the researchers concluded:

When the results of all five studies are considered, a remarkably consistent pattern emerges. Using different need situations, techniques for operationalizing empathy, and dependent measures, our results consistently conformed to the pattern predicted by the empathy-altruism hypothesis. In no study did the results show a pattern predicted by either the empathy-specific reward or the empathy-specific punishment hypothesis. (Batson et al., 1988, p.75)

In a third study, Batson, Batson, Slingsby, Harrell, Peekna and Todd (1991) performed three experiments designed to test if altruistic acts were driven by the need for self-pleasure (empathic joy). Subjects were primed into low and high empathy conditions through perspective taking activities similar to the Batson et al., 1988 study. Subjects were presented with hearing about the circumstances of a person in need, and then were given one of three pieces of information about the likelihood of the person's positive outcome. This created a 2 (low empathy, high empathy) X 3 (20%, 50%, 80% likelihood of improvement) factorial design. The subjects in each cell were then asked if they wanted to get an update about the person in need's condition or hear about someone else. The researchers predicted that if feeling empathy for a person in need evoked an egoistic motivation for empathic joy then the high empathy group would show a linear relationship between the request for feedback and the likelihood of improvement. Alternatively if the motivation for empathy was altruistically motivated then there would not be a linear relationship, but that the majority of feedback requests would come from the 50% group as it represented the group with the least certainty of outcome. The results are summarized in the graph below.



Again they found that the results were similar to the earlier Batson et al. (1988) and the Toi and Batson (1982) studies. None of the three experiments produced the expected self-pleasure results, but instead were consistent with the empathy-altruism hypothesis.

The cumulative results of these studies indicate that altruistic behavior resulting from empathetic feelings is not driven by self-reward, social reward, or social punishment.

Empathy-altruism-egalitarianism

The empathy-altruism research discussed earlier established that there is a clear link between empathy and altruism but Van Lange (2008) wanted to determine if empathy also triggered selflessness or egalitarian justice. Within these studies altruism was considered to be a concern only for others outcomes, selflessness was considered to be a decrease in concern for ones own outcomes, and egalitarianism was considered to be a concern with the equality of outcomes. One could certainly argue that empathy could trigger more (or similar) pro-social behaviors than altruistic behaviors.

The research strategy was to manipulate empathy and measure the resultant altruistic, selfless, and egalitarian behaviors. Three models were used: *Empathy Activates Only Altruism*, *Empathy Activates Altruism and Selflessness*, *Empathy Activates Altruism and Egalitarianism* (Van Lange, 2008).

Surprisingly, empathy resulted in an increase in altruistic motivation but resulted in no significant effect on selflessness or egalitarian behaviors. Based on the results of the studies, the author concluded that:

Activation of empathy triggers altruistic motivation, revealed in an increasing concern for another person's outcomes, in situations that are relatively neutral, without any strong situational demands to helping. At the same time, it does not seem to trigger selflessness or egalitarianism. (Van Lange, 2008, p.773)

fMRI studies

More recently, fMRI studies have identified neurological activity in the task-related motor cognition area of the inferior frontal cortex when observing a task performed by someone else. This brain activity was almost identical to the neurological activity of the person performing the motor tasks. These mirror neurons, in effect, show the same neurological activity involved in performing the task being observed without actually performing it. This "mental imitation activity" is not limited to motor functions but has also been found to be active in emotional interpersonal cognition. This is, in essence, the neural ability to "imitate" how someone else feels – or in other words, empathize (Schulte-Ruther, Markowitsch, Fink & Piefke, 2007)

Schulte-Ruther et al. used fMRI to further explore the role, impact and implications of mirror neuron activity in face-to-face interactions related to empathy. “Empathy is based upon processes of psychological inferences about other persons’ mental and emotional states occurring within a specific social context” (Schulte-Ruther et al., 2007, p. 1354). They measured 26 subjects (12 men and 14 women) by presenting them with 192 computer generated facial images that were half male, half female and had expressions of anger, fear, and neutrality. When presented with an image, the subjects were asked to concentrate on either their own feelings (self) from the computer generated face they were viewing, or on the emotional state that appeared to be expressed by the computer generated face (other). The results indicated that human Mirror Neuron Systems (hMNS) were active in key areas of the brain when the angry and fearful faces were displayed.

The reaction times (the time between when the image was displayed and brain activity was detected) were also measured. There were no differences in the processing time between angry and fearful emotions, but there was a significant time difference in processing the “self” vs. “other” tasks. Shulte-Ruther et al. (2007, p. 1359) found that the “...reaction times were significantly faster in the other – than in the self-task”

The difference in reaction times could indicate that it is easier to process emotional responses (react) to the emotions of others, than it is to process our own emotional responses.

They conclude that:

We show evidence for an hMNS engagement in an empathy-related experimental paradigm without explicit motor component (e.g., imitation), corroborating the view

that mirror neuron mechanisms are not only involved in motor behavior but also act as key players in emotional interpersonal cognition. (Schulte-Ruther et al., 2007, p. 1369)

Mirror neurons, empathy & the limbic System

A study by Iacoboni (2008) indicates that mirror neuron structures “communicate” with our emotions (via fMRI). He states: “These results clearly supported the idea that mirror neuron areas help us understand the emotions of other people by some form of inner imitation” (Iacoboni, 2008, p. 119). Additional work by Iacoboni (2007, 2008) and Carr, Iacoboni, Bubeau, Mazziotta & Lenzi (2003) show that mirror neurons send signals to the limbic system and thus to our emotional centers. Iacoboni (2008) also notes that the mirror neuron system is affected by early care-taking experiences, as is also supported by the research that follows.

Selection

Attachment security and altruism

In 2005, Mikulincer, Shaver, Gillath & Nitzberg conducted research relating attachment security to caregiving and altruism (2005) in both Israel and the United States. The premise of the research was that those who score high in attachment avoidance will distance themselves from others suffering resulting in decreased empathy and altruistic helping, while those with higher levels of attachment security have reduced needs for self-protection and self-enhancement allowing them to shift resources to care-giving and taking the perspective of others which underlie altruistic helping. The study participants were 90 undergraduate students from the University of California, Davis (68 women and 22 men ages 19 – 30) and 90 Israeli undergraduates from Bar-Ilan University (68 women and 22 men ages

18 – 33) all of whom were screened based on attachment scores. Across all the studies there were no significant differences in attachment scores as a function of gender, nationality, or condition. Each of the groups were split into 3 groups of thirty and subliminally primed (for 20 ms) with one of three sets of names that they had previously provided that represented either a) security enhancing attachment figures, b) close relationship partners who were not secure base figures or c) acquaintances who were not close. Each of the subjects were then individually exposed to another participant (confederate) who had been asked to perform non-dangerous but sufficiently stressful tasks that some participants may not want to complete them. At one point during the observation, the confederate becomes so distressed that she is unable to continue and is allowed to take a break. At this point the subjects complete questionnaires to evaluate compassion, personal distress, willingness to help the other person complete the tasks. The experimenter then interrupts and asks if the participant would replace the confederate for the remaining tasks – and that the confederate would have to continue if they said no.

Across all the studies in both the U.S. and Israel the participants that were subliminally primed with security enhancing attachment figures were:

... more likely actually to relieve her distress by taking over the remaining aversive tasks than participants in the two control conditions. Because this contextual activation was accomplished at the subliminal level, we inferred that the observed prosocial effects of attachment security did not require conscious mediation or deliberation. Rather, the attachment-caregiving link seems to be made at a preconscious, automatic level. (Mikulincer et. al, 2005, p. 824)

These studies are relevant because they suggest that higher levels of attachment security trigger innate care-giving behavioral traits, while low levels of attachment security rely on social constructs of reward and feedback that lie outside of themselves. An important conclusion of this work was:

The cumulative evidence from the five experiments when combined with correlational evidence assembled in previous studies (Gillath et al., 2005) indicates that the sense of attachment security, whether established in a person's long-term relationship history or nudged upward by subliminal or supraliminal priming, makes altruistic caregiving more likely (Mikulincer et al., 2005, p. 836).

These results support attachment theory, which suggests that well-attached persons have innate caregiving behavioral traits. It also suggests a possible adaptive mechanism in that those with high attachment (and thus greater altruistic tendencies) would have been more likely to survive and reproduce than those with low attachment. In addition they concluded that:

Unlike selfish gene theories of human behavior (e.g., Dawkins 1976/1989), which discourage us from imagining that evolution equipped *Homo sapiens* with a capacity for compassion and care, our findings and reasoning suggest that the same caregiving behavioral system that evolved to assure adequate care for vulnerable dependent children can be extended to include care and concern for other people in need, even if we often care more for people with whom we are closely related, either psychologically or genetically (Mikulincer et al., 2005, p. 836).

Female mating strategies

A seminal study of mating preferences by Buss, Abbott, Angleitner, Asherian, Biaggio, and Blanco-Villasenor (1990) (across thirty-seven cultures) identified that the single most important feature desired in a sex partner by both women and men was mates who were “kind and understanding”.

The Oxford Dictionary of Difficult Words (Hobson, 2004) defines empathy as: “The ability to understand and share the feelings of another.” The premise of the Buss study is that a trait, desire, or characteristic that is universally preferred across cultures, languages, ages, countries, continents and islands **must** be the result of selection and, as it is also the number one desired attribute in mates, it follows that empathy was, and is, highly selected for sexually.

Sexual selection for moral virtues

Miller (2007) proposed that human moral traits (including empathy) have evolved through sexual selection. His premise is that positive moral traits are sexually attractive because they serve, not only as good signaling indicators of good partner / parent abilities, but also as indicators of mental fitness. He explains that:

Moral virtues may function as good genes indicators by being difficult to display impressively if one has a high mutation load that impairs the precision of body and brain development. For example, displaying a sophisticated, empathetic social intelligence requires the development of a complex Theory of Mind, which might be easily disrupted by a variety of mutations associated with autism, schizophrenia, mental retardation, social anxiety, and language impairments (Baron-Cohen 2002;

Shaner et al. 2004; Keller and Miller 2006). Thus, a conspicuously expert level of empathy may function as a sort of neurogenetic warranty. (Miller, 2007, p101)

This type of sexual selection for empathetic and altruistic behavior is most readily observed in human courtship generosity expressed towards ones stepchildren and in-laws. “Since this sort of courtship generosity is directed at non-relatives and is not expected to be reciprocated, it is hard to explain through kin selection or reciprocal altruism, and it qualifies as evolutionary altruism by traditional definitions” (Miller, 2007, p105)

These studies have clearly established that there is compelling evidence to indicate that empathy is a selected for trait through attachment security (Mikulincer et al., 2005), universal mate preference (Buss 1990), sexual selection and good gene signaling (Miller 2007).

Discussion

The varied research reviewed within this thesis identify specific puzzle pieces in addressing the problem with altruism. It is only when they are viewed as a whole that the pieces fall together to form a logical and coherent evolutionary explanation for the non-kin, non-reciprocal, and non-social altruistic behaviors in human society.

Observations of higher order primates (de Waal, 2008. Goodall, 1990), research with un-socialized children (Warneken & Tomasello, 2008) and behavioral studies of adults (Toi & Batson, 1982. Batson et al., 1988. Batson et al., 1991) have clearly established that true altruistic behaviors have a strong heritable feature that can only be explained through selection.

Multiple studies that manipulated and primed empathy showed a remarkably consistent correlation between empathy and altruistic behaviors (Mikulincer et al., 2005. Van Lange, 2008). fMRI research established that the neurological activity surrounding empathy is tied almost exclusively toward the desire to act in ways to relieve the suffering of non-kin regardless of a complete lack of self-benefit (Schulte-Ruther et al., 2007. Carr et al., 2003. Iacoboni, 2008). The combined results of these experiments strongly supports the first hypothesis that there is a behavioral and neurological link between empathy and altruism.

Research in both the U.S. and Israel established that higher levels of attachment security also resulted in higher levels of altruistic behavior, indicating that well attached people have greater innate empathetic care giving behavioral traits (Mikulincer et al., 2005). This indicates that the adaptive mechanisms that evolved to assure adequate care for vulnerable children extends to others in need (even non-kin). The universal desire for mates with empathetic traits (Buss et al., 1990), and the research that suggests that complex empathetic behavior is a signal for genetic health (Miller, 2007), clearly supports the second hypothesis that empathy is a selected, heritable, evolutionary adaptation.

If empathy and altruism are linked, and empathy is selected for, then a plausible explanation based on the presented literature is that altruistic behaviors are selected for as a side effect of empathy.

The implications of this cumulative research indicate that all forms of altruistic behavior can be explained in the context of evolution and that the problem surrounding an evolutionary explanation for true altruism is not a problem at all.

One of the historical problems with behavioral research especially as it relates to evolution is that we are trying to establish theories to explain behaviors that, if true, were acted upon hundreds of thousands of years ago. As such, many theoretical constructs can only be supported by a lack of evidence of its opposite. To avoid this kind of negative confirmation I used as much converging evidence as I could find to support my hypothesis.

The most compelling research I found was in brain imaging and activity technologies. This technology, still in its infancy, cuts through the negative confirmation by providing physical proof of evolutionary characteristics and behaviors that are hard wired into our brains. As this emerging technology advances the possibilities for expanding our understanding of the relationship between behavior and brain structure/function explode with possibilities.

Future research into the altruism-empathy link through the use of brain imaging technology holds great promise to unlock the understanding and power of selfless human giving behaviors.

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