The Exploring Mechanisms of the Formation of Altruistic Behaviors

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Abstract. Altruism is essential to the world. If people do something on account of caring for others more, it is altruistic. Evolution motivates kin altruism. Reciprocal altruism is essential to human society. There also exists altruism that has nothing to do with gene correlation, like vernacular altruism. Different kinds of altruism have different motivations. The glow effect exists because people want to experience again the warm glow they feel when being altruistic, though the neural base needs to be studied. A costly long-term investment is a more complex altruistic behavior in the real world. It can be explained by selective investment theory, which discusses the importance of relationships. What's more, altruism has its neurological base. The amygdala volume of people with altruistic trait may be more significant. They may also have more excellent neural activity in regions concerning caring and empathy, like midbrain periaqueductal gray and anterior insular. These neurological findings also lay the foundation for some people to be more altruistic than others. Future research can enlarge the investigation on the practical use of altruism, like discovering how to activate people's altruistic behaviors and what people can do to cultivate and preserve altruism.

Keywords: Altruism; Kin Selection Theory; Glow Effect; Amygdala.

1. Introduction

In 2023, many natural disasters took place in China, such as the earthquakes in Yunnan and Sichuan and the flood in north area. Many people volunteered to help victims in these regions or donated supplies and money. These altruistic behaviors saved many lives and promoted post-disaster reconstruction. Above is just one example that altruism plays its role. Altruism is very important for human society to develop. As a result, it is necessary to dig out all the myths about altruism so that people can learn how to make altruism perform to the greatest extend. What is the origin of altruism? Why do people behave altruistically under certain circumstances? Is there any neurological base for people to be altruistic or more altruistic than others? The current article will do a general overview of altruism to give some probable directions about future studies and give suggestions to those who might be distressed regarding altruism.

2. Literature Review

2.1. Definition of Altruism

Different psychologists and sociologists have different views on what altruism is. The current paper will define altruism, aligning with Piliavin and Charng (1990), which states that if people take some actors out of care more for others instead of for themselves, they are altruistic [1].

Altruistic behavior is conscious, voluntary behavior that benefits others and has no apparent selfish motive [2]. College students are the country's hope, whose altruistic behaviors partly reflect the future of society [2]. Society should pay attention to the formulation of altruism among college students.

People's behaviors are formed by people's recognition of the objective world [2]. Since entering the period of social transformation, college students have experienced polar distortions in terms of recognition of both self and others, which is reflected by their extreme distrust towards altruism and very narrow concept of egoism [2]. Eventually, this leads to the weakening of altruistic behaviors among young people [2]. As a result, in the future, changing college students' social perceptions of self and others may be an effective strategy to increase their altruistic behaviors [2].

2.2. Types of Altruism

One primary type of altruism is kin/genetic altruism, which can be called evolutionary altruism [3]. It is explained by kin selection theory, formulated by Hamilton's rule: the closer the kinship, the stronger the animals' tendency to cooperate and present altruistic behaviors [3]. The rule is quantified and illustrated by the formula $C < rB$ (C: the cost for the donor to be altruistic; r: the weight of genetic correlation between the donor and the recipient; B: the benefit for the donor from being altruistic) (Hamilton et al., 2007). A study that tested European grandparents' preference for child care reflects the theory [4]. Results show that the probability of looking after grandchildren from highest to lowest is maternal grandmothers, maternal grandfathers, paternal grandmothers, and finally paternal grandfathers [4]. The certainty of paternity also plays a role [4].

Reciprocal altruism is also a common type of altruism. It is defined that people will alter their roles between those who cost something to benefit others and those who benefit from repeated altruistic actions [5]. To form and preserve reciprocal altruism, the cost should not be too much [6]. Moreover, the chances of being altruistic and getting benefits should take turns [6]. Also, the system should be able to find and punish those free riders [6]. In addition, there are some necessary psychological factors to generate reciprocal altruism, such as the capability of delayed gratification, time estimation, and knowing how to quantify times of cooperation [5]. In all, reciprocal altruism is essential to human society.

Another type of altruism is more dispositional and reflective [1]. Some researchers use vernacular altruism to define such kind of altruism [7]. Vernacular altruism is based on people’s motives to benefit others and does not have to deal with gene correlation [7]. People with vernacular altruism may have some common gene factors and are disposed to participate in impulsive altruistic behaviors [1]. Many examples in reality can illustrate this kind of altruism. For example, some people will jump into a river to rescue a drowning child without hesitation. Some people will continually donate their money to poverty-stricken areas. This kind of altruism may also be highly associated with empathy.

As human is such complex creature, dividing altruism into different types by different criteria is necessary for investigating the psychological mechanisms of human beings. Still, future research may need to investigate under what condition people may change from one type to another and how to elicit the change from one type to another so that altruism and some certain altruistic behaviors can be activated if t These may enhance people’s willingness to be altruistic and thus make the society a kinder place.

2.3. Motivations of Altruism

One type of motivation is the glow effect, which means even if people do not expect a reward after altruistic behaviors, they may do it again because they want to experience the sense of happiness triggered by altruistic behaviors [8]. The following studies can support such motivation. In one study, when participants received a windfall and spent it as the experimenters had required, those who spent money on others promoted more happiness than those who spent money on themselves [9]. In the second study, compared to the trials in which participants encountered silhouettes when participants encountered photographs of orphans, the activity in regions associated with positive arousal, mainly represented by nucleus accumbens, predicted increased donations [10]. The neural base of this kind of motivation may need further investigation.

However, in real life, people do not just perform altruistic behaviors to feel the warm glow [8], to pass down their genes according to kin selection theory [3], or to benefit from others in the future according to reciprocal altruism [6]. People will present costly long-term investments (CLI), like raising young kids [11]. Researchers use a more complex selective investment theory (SIT) model to explain this phenomenon [11]. First, researchers argue that indiscriminate CLI will lead to exploiting people doing that kind of altruistic behavior [11]. As a result, they explain CLI by SIT from a more evolutionary perspective [10]. The overall logic of SIT to support the occurrence of CLI is the following. Fitness interdependence is a necessary premise of CLI, which is based on common genes and mutual needs and has neurohormonal affinity [11]. Fitness interdependence among different

relationships has different weights, regulated by both environmental and internal conditions, such as hormonal [11]. The preference and promotion for fitness interdependence is from social bonds, a complicated memory complex of emotional and cognitive factors [11].

In real life, there might be plenty of motivations behind one altruistic behavior. Moreover, some people may do seemingly altruistic things to get what they want, especially psychopaths. It may be more practical for future studies to find out how to combine different motivations in some events to make people more generous, like encouraging people to donate money. Also, the investigation of the motivation of altruism can lay the foundation for psychological education about altruism, like telling impulsive people to be altruistic at any time and not to judge themselves too hard if they do not present altruistic behaviors for some reason. This does not prove that they are bad people. There are more reasonable motivations waiting to be recognized.

2.4. Evidence of Altruism

In addition to real-life altruistic examples, many studies have proven that there is a neurological base for people to be altruistic or more altruistic than others. For example, the brain structure and neural activity may differ between altruistic and ordinary people.

In one research, researchers used both structural magnetic resonance imaging (sMRI) and functional magnetic resonance imaging (fMRI) to find the differences in the brain between extremely altruistic people and ordinary people, as well as behavioral tasks [12]. When doing fMRI scanning, they let participants randomly watch different facial emotion expressions: faces with anger, fear, and joy and faces with neutral expressions, and then asked them to match these faces with their sex. During MRI scanning, participants underwent a face-emotion recognition task, which required them to categorize each face into one of six emotions. Researchers found out that compared to the control group, extremely altruistic participants who have donated organs to strangers have a larger volume of right amygdala and a more significant response to the face of fear in right amygdala, which may refer to increased recognition ability to this kind of emotion [12]. It is easy to understand that people better at recognizing fear of others will be more likely to notice other people's needs in an emergency and thus tend to look after others [12]. Future studies can enlarge the sample size and include other kinds of altruistic behaviors and other emotional clues to test the results under a universal condition.

In another study that used fMRI, researchers compared the activity of the amygdala and the connections between amygdala and midbrain periaqueductal gray (PAG) between organ donors and control groups [13]. The amygdala plays an essential role in detecting stress [13]. The bidirectional connections between the amygdala and PAG contribute to people's selection of response towards distress [13]. PAG is related to different functions concerning survival, like defensive behaviors and parental care [13]. Researchers let participants complete a decision-making task while conducting brain scanning. Participants encountered cues that subliminally elicited distress in half of the trials, while the other half were neutral. After each cue, they read a scenario that told a story about a vulnerable person. Then, they were asked to report how much empathy they felt for the person by pressing different buttons. In the second experiment, researchers used sMRI with diffusion tensor imaging. Results show that organ donors presented more significant activity in the left amygdala and had increased fractional anisotropy in the tract of the left amygdala and PAG white matter [13]. These may suggest that when meeting people in vulnerable conditions, extremely altruistic people will show enhanced care-oriented responses, supported by recruitment of regions related to parental care [13]. Both groups show a higher empathy rating towards the person in the scenario following the distress cue than in the scenario following the natural cue [13]. As there is no difference between the results, further studies may need to pay more attention to the shortcomings of self-report measurement and find more accurate and objective measurements [13].

In another study, researchers conducted an empathetic pain task among individuals who delivered costly altruistic behaviors, like donating their kidneys to strangers and ordinary people [14]. They also used fMRI to capture participants' brain activities. In this research, participants would first watch a partner experience a potential painful pressure on the correct thumbnail for two runs through live

videos. In each trial, a sound might indicate whether there was a risk for pressure, followed by a period to anticipate for 6 s, 9 s, 12 s, or 15 s. Then, a sound would tell participants and their partners if there would be pressure. In the third run, participants would experience it on their own. Results show that compared to control groups, extremely altruistic participants would activate more significant self-other overlap of neural representation in bilateral anterior insula (AI), related to feeling threatened or painful when seeing their partner suffering the painful pressure [14]. Although both groups presented overlap in the right AI and bilateral inferior parietal cortex, only the altruistic group showed overlap in the left AI, middle cingulate cortex, thalamus, sputamen, and dorsomedial prefrontal cortex [14]. The result may suggest that people's altruism may be highly associated with their capability of empathy, which can be reflected by neural representation in the brain [14].

Future studies can divide altruism into trait-like altruism and state-like altruism. Whether altruistic personality exists and how it is presented should be investigated and determined. How to cultivate an altruistic personality and what factors may influence it also need to be studied. Psychologists and sociologists need to know whether this kind of personality can be cultivated and preserved in daily life as it is integral to the development of human beings. For state-like altruism, what is the base to elicit it needs more investigation. Whether there is a difference in neural activities between these two kinds of altruism may also need to be determined.

3. Suggestions

Psychologists and sociologists have studied altruism for a long time. It may be a trend now to combine self-report measures, behavioral tasks, and neurological tasks to investigate the mechanism of altruism, especially the link between real-world behaviors and neural activities.

However, it is sad that many events have shaken humanity like people being cheated in swindling cases and animals being tortured by cruel people. There might not exist one hundred percent faithful saints. However, there is still a strong possibility for human beings to enlarge the kindness buried in their genes and affect each other to be more friendly and altruistic, thus making the world a better place.

Everywhere, people are being scolded for being too altruistic or costing too much to spread kindness. However, it is not their fault to be 'silly' or act like a 'pushover,' not to mention extraordinary altruism is not silly. Their brains are built to be more altruistic, and their behaviors will bring more happiness to the world. Accept who they are and let everyone live according to their wishes. People also pretend to be nice to get what they really want from others, especially those psychopaths. The public should not treat them differently as long as they are not harming others.

4. Conclusion

Altruism is essential to the development of humans. Being altruistic means people do something by caring more for others instead of for themselves. Different psychologists and sociologists define many kinds of altruism. Among them, kin altruism, illustrated by Hamilton's rule, reciprocal altruism, and vernacular altruism may be the most basic types. Different altruism may lay on different motivations. It may be as simple as the passing down of genes, glow effect, and reciprocity or be as complicated as the selective investment theory, which involves fitness interdependence and social bonds. Altruism can not only be captured by external behaviors and personal feelings but also be presented by brain structure and neural activities. The amygdala volume among altruistic people may be larger than among ordinary people. Brain regions associated with detecting negative expression, caring, and empathy may be activated more among altruistic individuals. People need to envisage the reality of altruism and together dig out the kindness within humanity.

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