



Original Article

Benefit valuation predicts gratitude[☆]Daniel E. Forster^a, Eric J. Pedersen^a, Adam Smith^{a,b}, Michael E. McCullough^a, Debra Lieberman^{a,*}^a Department of Psychology, University of Miami, USA^b Department of Psychology, Kobe University, Japan

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ABSTRACT

Gratitude is an emotion that promotes cooperative relationships and is elicited when an act reveals that an actor values the recipient, especially when the benefit conferred is greater than the recipient expected. But, recipient expectations might vary depending on how much the benefactor is perceived to value the recipient – all else equal, the greater the benefactor is perceived to value the recipient's welfare, the greater the recipient's expectations of benefit delivery. Thus, at a given benefit level, it might be easier to exceed the threshold of expectation in a relationship for which the recipient holds low expectations (e.g., a stranger) as compared to a relationship for which the recipient holds high expectations (e.g., a sibling). This leads to the prediction that cognitive representations of welfare valuation *inversely* correlate with gratitude: The greater the expected welfare valuation, the more difficult it is to exceed expectations of benefit delivery and, therefore, the less felt gratitude. To test this prediction, we conducted two experiments in which subjects estimated how much they perceived a particular person in their social network to value the subject's welfare. Next, subjects estimated how grateful they would feel if this person provided them with differing levels of benefits. Contrary to our model, we found that gratitude was predicted by the magnitude of the benefit, but not by the recipient's perception of the benefactor's valuation of the recipient.

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1. Introduction

Forming cooperative relationships with non-kin is a component of human social life. Because the problems of forming cooperative relationships almost surely formed a selective regime for humans as the species was evolving (Delton, Krasnow, Cosmides, & Tooby, 2011), natural selection plausibly designed in humans specialized information-processing mechanisms – cognitive adaptations – that enable people to make decisions about relationship formation and maintenance that would have, on average, increased ancestral humans' access to the benefits of cooperation and decreased the risk of exploitation (Tooby & Cosmides, 1996; Trivers, 1971).

Various features of human cognition have been posited as adaptations for regulating the formation and maintenance of cooperative relationships. These include, among others, the ability to reason about who has cheated in a social exchange (Cosmides, 1989), anger (Sell, Tooby, & Cosmides, 2009), an appetite for punishing individuals who have imposed costs on the self (Krasnow, Cosmides, Pedersen, &

Tooby, 2012; Pedersen, Kurzban, & McCullough, 2013), and mechanisms for forgiveness and reconciliation (McCullough, Kurzban, & Tabak, 2012). Over the past fifteen years, evidence has accumulated to suggest that gratitude is also a viable candidate for inclusion on this list (McCullough, Kimeldorf, & Cohen, 2008). Gratitude is an emotion that is typically evoked when one receives costly, unexpected, and intentionally rendered benefits, and is thought to play a key role in regulating the initiation and maintenance of social relationships (Bartlett, Condon, Cruz, Baumann, & Desteno, 2012; DeSteno, Bartlett, Baumann, Williams, & Dickens, 2010; Lim, 2012; McCullough, Kilpatrick, Emmons, & Larson, 2001; McCullough et al., 2008; Tooby & Cosmides, 2008; Trivers, 1971). Here we begin to investigate the nature of the proximate mechanisms that enable gratitude to perform this function. Specifically, we examined whether gratitude is affected by how much a beneficiary believes a benefactor values the beneficiary's welfare.

1.1. Causes and effects of gratitude

One way to understand the function that gratitude evolved to perform is to examine the types of information that gratitude-producing cognitive systems appear to process efficiently and how that information affects behavior (see Sperber, 1994; Williams, 1966). Researchers have found that gratitude responses are sensitive to the benefits received by the recipient and the costs incurred by the actor (McCullough et al., 2008; Tesser, Gatewood, & Driver, 1968), the extent to which the act was voluntary and intentional (Tesser et al., 1968;

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Tsang, 2006), and how the benefit received compares to other available benefits (Wood, Brown, & Maltby, 2011). Furthermore, researchers have found that experiencing gratitude predicts recipients' willingness to act prosocially toward the benefactor (Algoe, 2012; Algoe, Haidt, & Gable, 2008; Bartlett et al., 2012; Bartlett & DeSteno, 2006; DeSteno et al., 2010; McCullough et al., 2008). Taken together, gratitude appears to be caused, at least in part, by the perception that an actor is *willing to incur costs to raise the beneficiary's welfare* – that is, the actor demonstrates that he or she *values* the beneficiary. Therefore, the function of the resultant gratitude might be to signal to the benefactor that an act was indeed perceived as a benefit, and that the beneficiary has increased his or her value of the benefactor, thus reinforcing the benefactor to continue providing benefits to the beneficiary and strategically foreshadowing the beneficiary's intent to return benefits in the future (Bartlett et al., 2012; DeSteno et al., 2010; McCullough et al., 2001).

The reciprocal process of receiving and then returning welfare-enhancing benefits within a dyad can increase the degree to which the two individuals are willing to forego benefits, or incur costs, in order to deliver benefits to each other. Over the course of many such exchanges of benefits, the two members of the dyad might begin to regulate their behavior toward each other not on the basis of the value of any single benefit that they might be able to receive from their partners, but rather, *from their respective partners' overall propensity to provide benefits*. As a consequence, a relationship that begins with the exchange of goods can develop into a relationship based on partners' perceived regard for each other's welfare, which humans typically recognize as friendships (Barclay, 2013; Hruschka, 2010).

1.2. Partner choice as a solution to an evolutionary problem

At first glance, the proposition that gratitude motivates the delivery of benefits to another individual appears to present an evolutionary problem: A design feature that promotes individuals to deliver benefits to others should *reduce* rather than raise its bearer's lifetime reproductive success unless the act of delivering those benefits leads to additional reproductive benefits later in time for the donor, or the increased reproductive success of the donor's genetic relatives (West, Griffin, & Gardner, 2007). We posit that gratitude, and the return of benefits that it motivates, evolved because it solved the problem of securing cooperative partners that provide unique and valuable benefits.

The extent to which individual candidates for cooperative interactions can deliver benefits to potential recipients is limited by the finite nature of those donors' time and resources. In part, this limitation is caused by the fact that resource acquisition is a highly variable trait (both within and between humans; Altman, 1984; Apicella, Marlowe, Fowler, & Christakis, 2012; Gurven, Kaplan, & Gutierrez, 2006), but it is also caused by within-person and between-person variation in people's *needs* for others' assistance (Hill, Hawkes, Hurtado, & Kaplan, 1984; Kaplan, Hill, Lancaster, & Hurtado, 2000). As a result, people should also vary in both their ability and their propensity to deliver benefits to others, as well as their need for acquiring cooperative partners who might be in a position to render assistance to them (due to temporary and chronic variations in body condition, physical strength, illness, and other reversals of fortune; Tooby & Cosmides, 1996). Therefore, individuals that engage in mutually beneficial cooperative interactions with conspecifics might also evolve adaptations that enable them to make fitness-positive decisions related to whether, when, and to whom to deliver benefits. In turn, potential recipients of a cooperator's generosity should possess adaptations that motivate them to present themselves as the best possible candidates for receiving such benefits (Roberts & Sherratt, 1998). (Of course, cooperators and recipients are not actually two distinct populations, and therefore adaptations for both delivering and receiving benefits should be operating within the mind of all humans.)

On the basis of this reasoning, Barclay (2013) argued that natural selection should favor cooperative strategists who are motivated to

seek out other cooperative strategists in an attempt to entice those potential interaction partners to deliver some of their limited benefits. In this “competitively cooperative” environment, the people with the highest capacity for delivering benefits will be most sought after by conspecifics and will also have the greatest influence over other cooperators' willingness to deliver benefits. Essentially, potential recipients would reap the most benefits by successfully outcompeting others' “bids” for the time and resources of potential donors. In support of this conjecture, model-based simulations of the evolution of cooperation have indeed shown that cooperators fare much better when they can preferentially choose to interact with other cooperators (Bergstrom, 2003; Wang, Suri, & Watts, 2012).

Other existing evidence supports this conjecture as well. For instance, people tend to associate with those who share a similar capacity and disposition for cooperation: Among hunter-gatherers for whom success in resource acquisition is closely linked to physical strength, strong people tend to befriend other strong people whereas weak people tend to befriend other weak people (Apicella et al., 2012). An adaptation for engaging in this type of “assortative cooperation,” which is conceptually similar to mate-choice models based on the concept of assortative mating (Barclay, 2013), should motivate people to make bids, through acts of benefit-delivery, for the cooperation of people who have a high capacity for cooperation and who demonstrate potential for cooperating with the bidder. Consistent with this claim, Apicella et al. (2012) also discovered that people generally are motivated to direct benefits to strong people rather than weak people, as if they use some of their surplus resources as a way of signaling their interest in establishing relationships with the best possible cooperation partners.¹

1.3. Gratitude as an emotional adaptation for partner choice

Gratitude appears to fit the bill as an adaptation that would enable individuals to succeed in navigating a sea of potential cooperators. As stated above, gratitude tends to be elicited when recipients of a beneficent act perceive that benefits were intentionally delivered (Tesser et al., 1968; Tsang, 2006). This suggests that a dedicated cognitive program for producing gratitude should motivate recipients to return benefits to benefactors that appear to hold a generous disposition *toward the recipient* – that is, those whose actions imply a propensity for delivering benefits into the future.

We propose that gratitude evolved for its ability to focus attention on benefactors' generosity directed toward the recipient and to subsequently motivate the recipient to signal regard for the benefactor; that is, by making a bid for the benefactor's further cooperative actions. The currency for such bids could be explicit acts of benefit delivery (e.g., you helped me yesterday, so I will do my best to help you when you need it in the future), but they might also involve acknowledgement of receiving the benefit (e.g., “Thank you”), promises to return benefits (e.g., “I owe you one”), signaling one's enjoyment of the benefit, or even praising the benefactor (Watkins, Scheer, Ovnicek, & Kolts, 2006). By acknowledging the receipt of the benefit, both the benefactor and recipient will know that the other party knows that the act benefited the recipient and that the recipient has signaled (perhaps accurately) that he or she is inclined to return benefits to the benefactor in the future.

For the purpose of the present experiments, we were interested in the factors that influence when gratitude is experienced, specifically the recipient's expectations about a benefactor's disposition to be

¹ As a caveat, it is important to point out that the decision-making processes, and the consequences thereof, of choosing cooperative partners may or may not be consciously available: In the same way natural selection favored mechanisms for feeling genuine disgust at the prospect of mating with a sibling, even though the detrimental evolutionary consequences of the act are not necessarily known or understood by all people (Lieberman, Tooby, & Cosmides, 2007), natural selection has likely favored people who were appropriately motivated to cooperate with others who would later cooperate with the initiator of cooperation, despite being completely unaware of the evolutionary consequences.

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