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BEHAVIORAL ECONOMICS

Avoiding overhead aversion in charity

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Donors tend to avoid charities that dedicate a high percentage of expenses to administrative and fundraising costs, limiting the ability of nonprofits to be effective. We propose a solution to this problem: Use donations from major philanthropists to cover overhead expenses and offer potential donors an overhead-free donation opportunity. A laboratory experiment testing this solution confirms that donations decrease when overhead increases, but only when donors pay for overhead themselves. In a field experiment with 40,000 potential donors, we compared the overhead-free solution with other common uses of initial donations. Consistent with prior research, informing donors that seed money has already been raised increases donations, as does a $1:$1 matching campaign. Our main result, however, clearly shows that informing potential donors that overhead costs are covered by an initial donation significantly increases the donation rate by 80% (or 94%) and total donations by 75% (or 89%) compared with the seed (or matching) approach.

Imagine you are the head of a charity organization and you have just secured funds from a generous private donor to help launch a new fundraising campaign. How can you use this initial donation to maximize contributions from other potential donors? Traditionally, charities have used these financial gifts to solicit additional donations in two primary ways: (i) announcing the initial donation as seed money or (ii) using it in a "matching model" in which the charity uses the initial funds to match every new dollar donated. Here we propose a third alternative: using the initial donation to cover a charity's overhead costs (i.e., administrative and fundraising costs), thereby allowing all subsequent donations to be overhead-free and to go directly to the cause.

Researchers have extensively studied the two traditional uses of initial large donations—seed money and matching grants—and found them both to be effective in increasing donor contributions (*1*). Publicly announcing seed money increases the number of people who donate and the amount they give (*2*). Furthermore, seed money that covers a greater percentage of the total campaign goal results in a significant increase in contributions compared with seed money that covers a smaller percentage of the campaign goal (*3*). Consistent with theoretical predictions regarding the potential of seed money in fundraising (*4*), this increase in contributions has been attributed to social comparison (*5*–*7*) and to "goal gradient helping," whereby the closer a fundraising campaign comes to meeting its goal, the more likely people are to donate (*8*, *9*).

A parallel line of research shows that, like seed money, announcing a matching grant can increase the fraction of people who choose to donate and the amount they give, both in the laboratory (*10*–*12*) and in the field (*13*, *14*), though the matching level ($1:$1, $2:$1, or $3:$1) does not affect giving.

Our investigation focuses on a different aspect of fundraising campaigns: how donated funds will be used. Overhead ratios, measured by the proportion of donated funds spent on nonprogrammatic costs such as administrative and fundraising costs, have emerged as an important efficiency indicator for nonprofit organizations (*15*). Charity evaluators, such as Charity Navigator and CharityWatch, assign ratings to charities based largely on their relative spending on overhead, and evidence suggests that overhead-related measures may guide donation decisions, such that higher overhead spending decreases giving. In particular, it has been shown that donors strongly prefer charities with low overhead despite cost effectiveness, in part because overhead ratios are easier to evaluate (*16*, *17*).

Moreover, an examination of actual charitable giving data reveals a negative correlation between the amount donated and the amount organizations spend on administrative and fundraising costs, suggesting that individuals are sensitive to how charities spend their funds (*18*). As a result of individuals' aversion to large overhead expenditures, charities are increasingly under pressure to spend less on overhead and more on direct program costs. Ironically, reducing overhead spending has a negative impact on charities' ability to initiate fundraising campaigns, invest in long-term planning, and sufficiently support overall infrastructure, which ultimately undermines efforts to serve their causes effectively (*19*–*21*). The pressure from donors on charities to lower fundraising and overhead costs leads to several other negative consequences, such as underreporting of fundraising and overhead costs by charities and a tendency to only fund programs with low(er) overhead costs (*22*–*24*).

It is important to note that from a theoretical perspective, basing donation decisions on overhead is wrong. As the literature argues, donors should not care about levels of overhead costs (*25*, *26*). If donors are interested in efficiency, they should compare different funds producing the same good and select the one producing the good at acceptable quality at the lowest price. However, donors typically do not know the quality, nor the price, of the good produced. Instead, donors should look at changes in overhead costs rather than levels of costs (*25*).

In this paper, we test whether designating early large gifts to cover overhead costs increases donors' willingness to contribute to a charity. From an economic perspective, designating initial large gifts as seed money or using them to cover overhead costs is the same. Charities are interested in maximizing the total funds raised and are agnostic about whether overhead costs are covered by initial donations or are shared by all donors. Consumers, however, seem to have clear, strong preferences: They want their donations to be put to "good" use—in other words, for direct program costs.

We began our empirical investigation with a laboratory experiment that had three goals. First, we sought empirical support for our assertion above that an increase in overhead costs associated with a donation decreases giving. Existing evidence is limited, and it is important to document it in a scientific investigation. Second, we wanted to gain insight into what drives overhead aversion. Our third goal was to test our proposed solution in a controlled environment.

We recruited 449 undergraduates from a public university in southern California (35.19% female, mean age = 21.56) to complete a study for class credit in the spring of 2014. Using a between-participants design (see the supplementary materials for a detailed description of materials and methods), we randomly assigned participants

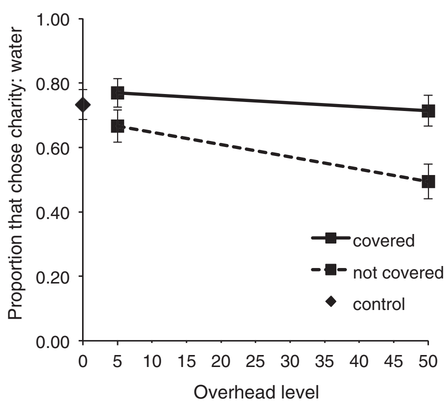

Fig. 1. Proportion of participants that chose charity: water by overhead level and by whether or not someone else covered the overhead. Error bars are ±1 SEM.

Table 1. The number of people who chose to donate by treatment and by amount donated.

Donation amount	Control	Seed	Match	Overhead
$20	297	396	373	726
$50	36	52	41	86
$100	3	27	27	43

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to one of five treatments. All participants were presented with two charities: (i) Kids Korps USA, described as "a nonprofit organization that engages young people in volunteerism and teaches them about leadership and civic responsibility," and (ii) charity: water, described as "a nonprofit organization that brings clean and safe drinking water to people in developing nations."

In all five treatments, we asked participants to decide which of the two charities should receive a $100 donation. Participants were informed that we would randomly choose the decision of one participant and implement it (i.e., make his or her specific donation), making decisions consequential. Participants were also told that there was no overhead associated with donations made to Kids Korps. For charity: water, we manipulated two aspects of the overhead associated with donations. First, we varied the overhead level associated with participants' donations. In treatment one, there was no overhead; in treatment two, the overhead associated with the donation was 5% (i.e., we sent $95 to charity: water if participants chose it); and in treatment three, the overhead was 50%. Note that if a participant chose charity: water, the organization was paid $100 in treatment one, $95 in treatment two, and $50 in treatment three. Our dependent measure was the proportion of donations given to charity: water. All studies reported here were designed such that they do not involve deception (i.e., we actually changed the overhead associated with a donation as described).

The results of the first three treatments support our assertion regarding overhead aversion. The majority of participants in the no-overhead treatment (73.33%) donated to charity: water. The proportion of participants who donated to charity: water in the 5%-overhead treatment decreased to 66.67%, though not significantly using a test of proportion ($z = 0.98$, $P = 0.33$). When overhead costs were 50%, only 49.43% of participants chose to donate to charity: water, which is significantly lower than the proportions observed in the no-overhead ($z = 3.27$, $P < 0.01$) and 5%-overhead ($z = 2.32$, $P = 0.02$) treatments. Probit regressions confirm the above results (see supplementary text and table S1). Estimated marginal effects show that participants in the 50% overhead treatment are 24% (or 17%) less likely to choose charity: water compared with those in the no-overhead (or 5%-overhead) treatment.

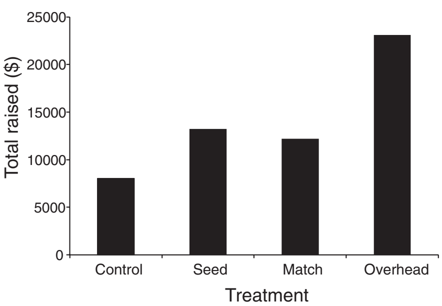

Fig. 2. Total amount raised by treatment.

Although not surprising, these results provide some of the first experimental evidence for the existence of overhead aversion. As noted above, the laboratory experiment was also designed to help us understand why people do not like overhead, which could guide future fundraising campaigns and allow organizations to increase contributions without lowering their overhead costs.

We can think of two main reasons for donors' overhead aversion. The first is that high overhead might imply that an organization is inefficient or even corrupt. In other words, potential donors may use a charity's overhead spending as a signal of the likelihood that the charity will deliver on its promises. The second possible explanation for why overhead plays such an important role in donors' behavior relates to the impact the donor wants to have on the cause she supports, often referred to in the literature on philanthropy as "efficacy" (*27*). Considered in the context of mental accounting (*28*), the utility potential donors receive from their donation might depend on the donation frame. In particular, individuals might feel that they made a greater impact when they know they are helping the cause directly as opposed to when their contribution pays the salary of a charity's staff member. This explanation is consistent with the theory of impact philanthropy, which proposes that donors are motivated by the opportunity to personally make a difference (*29*). According to this model, the impact philanthropist would prefer to target a specific charitable cause rather than overhead, because her perceived impact is greater.

To test which of the two potential explanations drives the overhead aversion observed in our data, our laboratory experiment included two additional treatments. Treatments four and five were similar to treatments two and three, respectively, with one important difference: In addition to providing information regarding the overhead associated with donations to charity: water (5% and 50%), we informed participants that "someone else already covered this cost for your contribution, so for every dollar you'll donate the entire $1 will go to 'charity: water.'"

If overhead is used as a signal of efficiency, then we should not observe a difference in overhead aversion between treatments two and four or treatments three and five, as the quality of this signal is the same. If, however, the observed overhead aversion is driven by a decrease in the perceived personal impact the donor experiences with respect to her donation, then the proportion of individuals choosing to donate to charity: water in treatments four and five would be similar to that observed in the no-overhead treatment (treatment one). After all, the personal impact of the donation on the cause is the same.

The results of all five treatments are presented in Fig. 1. As can be seen, the results reject the efficiency explanation and are in line with the personal impact explanation. In treatment five, at 50% covered overhead, 71.43% of participants donated to charity: water, which is not different from donations in treatment one (no overhead, $z = 0.29$, $P = 0.77$) and is significantly higher than those in treatment three (50% uncovered overhead, $z = 3.00$, $P < 0.01$). See table S1 for probit regression results that also include demographic (gender, age, donation frequency, and familiarity with the charity) controls.

The results of the laboratory experiment demonstrate that individuals are sensitive to overhead levels. As overhead increased, the proportion of individuals choosing to donate decreased significantly. Moreover, the effect disappeared when someone else covered the (same) overhead costs, suggesting that this aversion is driven by individuals' need to feel that their personal donation has a positive impact on the cause. Finally, the results provide initial support for our proposed solution: Offering individuals an overhead-free donation opportunity while holding overhead costs constant significantly increased donations to charity: water as if there was no overhead at all.

Although the charities we used in our experiment were real charities and participants' choices were consequential, our experiment was conducted with undergraduate students in a laboratory setting. Ultimately, however, we wanted to test the effect of an overhead-free donation opportunity on actual donations. To that end, we conducted a large field experiment with a foundation that specializes in education (*30*). The foundation purchased the right to send a one-time donation request letter to 40,000 potential U.S. donors who donated to similar causes in the preceding 5 years. Participation was limited to U.S. addresses; however, the charity does not have information regarding these donors' demographics. All letters were mailed on the same day during the spring of 2013 and included a nonstamped return envelope as well as a single-page solicitation. Participants were randomly assigned to one of four treatments: control, seed, match, or overhead (N = 10,000 participants per treatment).

We informed participants in the control treatment about the foundation's new initiative to promote educational projects in different locations in the United States and that the program cost per location was $20,000. Participants were not given a specific geographical location for the project and were told that the foundation is interested in sponsoring as many projects for which it can raise money.

Participants were asked to give $20, $50, or $100. The pledge form included the following statement: "Our goal in this campaign is to raise money for the projects. Implementing each project costs $20,000. Your tax-deductible gift makes a difference. Enclosed is…" Participants were asked to check a box to indicate their donation amount.

The letter in the seed treatment further informed participants that the foundation had already secured $10,000 for the project from a private donor. The added text read, "A private donor who believes in the importance of the project has given this campaign seed money in the amount of $10,000. Your tax-deductible gift makes a difference. Enclosed is…"

We told participants in the match condition that a donor had offered a matching grant of up to $10,000 and that the matching rate would be

$1:$1. The added text read, "A private donor who believes in the importance of the project has given this campaign a matching grant in the amount of $10,000. The matching grant will match every dollar given by donors like you with a dollar, up to a total of $20,000…"

Finally, we told participants in the overhead treatment that a donor had given a $10,000 grant to cover all of the overhead costs associated with raising the funds needed for the project. The added text read "A private donor who believes in the importance of the project has given this campaign a grant in the amount of $10,000 to cover all the overhead costs associated with raising the needed donations…"

Result 1, donation rate: Overall, 336 individuals (3.36%) in the control treatment donated (fig. S1). This number increased to 475 (4.75%) in the seed treatment, and the difference is significant using a test of proportion ($z = 4.98$, $P < 0.001$). In the match treatment, 441 (4.41%) chose to donate, which is significantly higher than donation rates in the control treatment ($z = 3.84$, $P < 0.001$) but not statistically different from donation rates in the seed treatment ($z = 1.15$, $P = 0.25$). Response rate in the overhead treatment was 855 (8.55%), higher than any of those observed in the other three treatments ($z = 15.51$, 10.78, and 11.89 for the difference from control, seed, and match, respectively; all $P < 0.001$).

Result 2, amount donated: Most individuals donated $20 (see Table 1), and the $20 donations also accounted for most of the money collected (74% in control, 60% in seed, 61% in match, and 63% in overhead). In the overhead treatment, 726 (7.26%) individuals donated $20, which is significantly greater than the proportion of individuals who donated $20 in the control (297, 2.97%), seed (396, 3.96%), and match (373, 3.73%) treatments ($z = 13.77$, 10.14, and 10.95, respectively; all $P < 0.001$). In addition, although the proportions of individuals who donated $20 in the seed and match treatments are not significantly different from each other ($z = 0.85$, $P = 0.40$), they are significantly greater than the proportion of individuals who donated $20 in the control treatment ($z = 3.83$ and 2.99 for the difference from control, respectively; all $P < 0.01$). This pattern persists with respect to $50 donations: 86 (0.86%) individuals in the overhead treatment donated $50, which is significantly greater than in the control (36, 0.36%), seed (52, 0.52%), and match (41, 0.41%) treatments ($z = 4.54$, 2.90, and 4.01, respectively; all $P < 0.01$). The difference in the proportion of individuals choosing to donate $50 in each of the latter three treatments was not significant (all $P > 0.05$). Finally, 43 (0.43%) participants donated $100 in the overhead treatment, which is significantly greater than the number of participants who donated $100 in the control (3, 0.03%, $z = 5.90$, $P < 0.001$), seed (27, 0.27%) and match (27, 0.27%) treatments (both $z = 1.92$, both $P = 0.05$). Finally, although the proportions of individuals who donated $100 in the seed and match treatments are not significantly different from each other, they are significantly greater than the proportion of individuals who donated $100 in the control treatment (all $z = 4.39$, all $P < 0.001$).

Overall, the campaign raised $8040 through the control treatment (mean donation $M = \$0.80$, $SD = 4.82$ per solicitation) (Fig. 2). The amount raised in the seed treatment [$13,220 ($M = \$1.32$, $SD = 7.36$ per solicitation)] was 64% higher than that in the control treatment. An intention-to-treat analysis revealed that this difference was significant [$t(19998) = 5.89$, $P < 0.001$]. The amount collected in the match treatment was $12,210, 52% more than in the control treatment [$t(19998) = 4.85$, $P < 0.001$, $M = \$1.22$, $SD = 7.12$ per solicitation]. This amount was not significantly different from the amount collected in the seed treatment [$t(19998) = 0.99$, $P = 0.32$]. Finally, the foundation raised $23,120 ($M = \$2.31$, $SD = 9.39$ per solicitation) in the overhead treatment—a significant increase relative to the control [188%, $t(19998) = 14.29$, $P < 0.001$], seed [75%, $t(19998) = 8.30$, $P < 0.001$], and match [89%, $t(19998) = 9.26$, $P < 0.001$] treatments.

Conditional on giving, the average amounts donated in the seed, match, and overhead treatments ($27.83, $27.69, $27.04, respectively) are significantly greater than the amount donated in the control treatment ($23.93; all $P < 0.01$); however, they are not statistically different from each other. Hence, the difference between the control and the other three treatments results from both the extensive margin (i.e., the number of people who choose to donate) and the intensive margin (i.e., the amount given by donors). In contrast, the difference in total amount donated between the seed, match, and overhead treatments comes from the extensive margin only. We did not predict this result, which could be an important aspect to study in future research.

It is important to note that field experiments are a major tool in finding a "treatment effect" (i.e., changes between treatments) rather than the actual size of the effect. For example, converging evidence shows that adding a match offer to the solicitation increases giving, but the specific levels differ across experiments and sometimes even within an experiment. In one such experiment (*13*), the authors report an overall difference of 19% (compared with the 52% increase we report in this paper) but find that adding a matching grant affected only some groups of donors, not all. On the other hand, a paper testing the effect of seed money (*3*) finds that an increase in seed money from 10 to 67% increases giving sixfold (compared with the increase of 64% in our experiment). Despite these different effect sizes, which are driven by factors such as the different characteristics of the groups of potential donors and participants used in different experiments, the treatment effect is similar.

The results of our field and laboratory experiments support the importance of perceived personal impact in the decision to donate. The notion of perceived personal impact relates to the theory of "warm glow," which suggests that impure altruism guides an individual's decision to give (*31*): Donors care not only about helping the cause but also about how doing so makes them feel (*32*) and the way it reflects on their self-identity (*33*–*36*). In the context of our overhead result, impure altruism would predict that the warm glow a donor experiences when helping the recipient of the donation is greater than the warm glow he or she receives from helping to cover the charity's overhead costs.

Recently, nonprofit organizations have been trying to convince donors to place less weight on overhead cost information. In an open letter to the donors of America (*37*), the executives of three leading U.S. charity evaluators argue that "The percent of charity expenses that go to administrative and fundraising costs—commonly referred to as 'overhead'—is a poor measure of a charity's performance." An important effort in this direction is being led by Dan Pallotta, a founder of multiday charity events such as 3-day cancer walks, who proclaims (*38*), "It's no wonder that the public demands low overhead instead of impact. We've never told them that the two things are not correlated."

In this paper, we propose one way to bypass individuals' reluctance to donate due to overhead-related concerns: overhead-free donations. A prominent example of this approach is charity: water, a nonprofit that has split into two separate organizations: "charity: water," which accepts donations that go entirely to program expenses, and "The Well," which fundraises for charity: water and has its costs paid for by larger wealthy donors.

An open question that we cannot address with the current data regards the overall effect of using the overhead-free method for donations. Is it going to increase overall giving to charities or simply shift giving from other charities? Furthermore, this method could exacerbate the unpopularity of overhead costs among donors, causing a race to the bottom among nonprofit organizations soliciting gifts to cover overhead costs. Another question we cannot address fully with the current data is whether the mere mention of overhead triggers changes in behavior compared with a situation in which overhead is not mentioned at all. Is it better to draw donors' attention to the existence of overhead or to ignore it altogether? The answer to this question may depend on donors' lay expectations or beliefs about overhead as well as the value they put on transparency in organizations. This would be an important question to address in future research.

Finally, we would like to note that we are not suggesting halting efforts to explain the importance of overhead costs and how they can be used to improve the effectiveness of charities. However, we believe such efforts entail a prolonged uphill battle that may ultimately prove futile. Instead, to increase current charitable giving, we propose an approach that simultaneously addresses individuals' concerns and increases overall giving. This method allows organizations to focus their efforts on convincing a handful of big donors that their money is best spent on overhead, which supports the development and maintenance of strong infrastructure, rather than trying to change the perceptions of the general public.

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SUPPLEMENTARY MATERIALS

www.sciencemag.org/content/346/6209/632/suppl/DC1
Materials and Methods
Supplementary Text
Fig. S1
Table S1
Additional Data Tables S1 and S2

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EARTH HISTORY

Low Mid-Proterozoic atmospheric oxygen levels and the delayed rise of animals

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The oxygenation of Earth's surface fundamentally altered global biogeochemical cycles and ultimately paved the way for the rise of metazoans at the end of the Proterozoic. However, current estimates for atmospheric oxygen (O_2) levels during the billion years leading up to this time vary widely. On the basis of chromium (Cr) isotope data from a suite of Proterozoic sediments from China, Australia, and North America, interpreted in the context of data from similar depositional environments from Phanerozoic time, we find evidence for inhibited oxidation of Cr at Earth's surface in the mid-Proterozoic (1.8 to 0.8 billion years ago). These data suggest that atmospheric O_2 levels were at most 0.1% of present atmospheric levels. Direct evidence for such low O_2 concentrations in the Proterozoic helps explain the late emergence and diversification of metazoans.

It remains unclear whether the appearance and diversification of animals are linked to a change in environmental oxygen (O_2) levels or if this dramatic shift in the structure and complexity of the biosphere simply reflects the timing of genetic and/or developmental innovation independent of any environmental control (*1*–*4*). Quantitative constraints on O_2 levels during the mid-Proterozoic [1.8 to 0.8 billion years ago (Ga)]—the long interval leading up to the Cambrian explosion in animal life (*5*, *6*)—are required to compare atmospheric oxygen levels with the absolute O_2 requirements for metazoan physiology (*3*, *5*). Such a comparison is essential for delineating the potential role of Earth's oxygen cycle in the early evolution of animal life.

The appearance of terrestrial red-beds and the disappearance of detrital pyrite beds indicate oxidative processes in terrestrial environments after ~2.4 Ga and a permanent rise in atmospheric O_2 concentrations above the very low values characteristic of the Archean atmosphere (<0.001% of the present atmospheric level or PAL) (*6*, *7*). However, these observations provide only a crude lower estimate for mid-Proterozoic atmospheric O_2 of ~1% PAL. The most widely accepted upper limit on mid-Proterozoic atmospheric O_2 is ~40% PAL, which is an estimate based on the inferred temporal and spatial extent of anoxia in the Proterozoic ocean combined with steady-state physicochemical models of ocean ventilation (*8*, *9*).

Chromium (Cr) isotopes may provide a much needed additional constraint on Proterozoic O_2 levels (*10*). Chromium exists in two primary redox states at Earth's surface—oxidized Cr(VI) and reduced Cr(III). Because Cr within the crust is hosted within rock-forming minerals predominantly as Cr(III), the initial Cr reservoir for terrestrial weathering will be stable under reducing conditions. In addition, Cr undergoes only limited fractionation during typical non-redox–dependent transformations (*11*–*13*), but the oxidation and reduction of Cr induce large isotope fractionations. At equilibrium, Cr(VI) species will be enriched in the heavy isotope, ^{53}Cr, by over 6‰ relative to the parent Cr(III) reservoir (*13*), although environmental fractionations are likely kinetic and are unlikely to reach this full equilibrium value (*12*, *14*). Chromium oxidation occurs predominantly through the dissolution of Cr(III)-bearing minerals in terrestrial soils and subsequent reaction with manganese (Mn) oxides [e.g.,

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