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On having very long arms: how the availability of technological means affects moral cognition

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ABSTRACT

Modern technological means allow for meaningful interaction across arbitrary distances, while human morality evolved in environments in which individuals needed to be spatially close in order to interact. We investigate how people integrate knowledge about modern technology with their ancestral moral dispositions to help relieve nearby suffering. Our first study establishes that spatial proximity between an agent's means of helping and the victims increases people's judgement of helping obligations, even if the agent is constantly far personally. We then report and meta-analyse 20 experiments elucidating the cognitive mechanisms behind this effect, which include inferences of increased efficaciousness and personal involvement. Implications of our findings for the scientific understanding of ancestral moral dispositions in modern environments are discussed, as well as suggestions for how these insights might be exploited to increase charitable giving. Our meta-analysis provides a practical example for how aggregating across all available data, including failed replication attempts, allows conclusions that could not be supported in single experiments.

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KEYWORDS Moral judgment; technological means; spatial distance; helping obligations; evolution of pro-social behaviour; meta-analysis

Introduction

Contemporary work in moral psychology often emphasises that our moral capacity is the product of evolutionary processes (e.g., Greene, 2013; Haidt & Joseph, 2007; Hauser, 2006; Mikhail, 2011; Nowak & Highfield, 2011). A corollary of this thesis is that our moral cognitions are attuned to environmental structures typically encountered by hunter-gatherer societies. Signatures of this legacy can still be seen in our empathic reactions towards needy others: we seem to care more about people in distress who are near us than about people who are far away, regardless of how much we could actually do to help relieve their suffering. Some argue that this is because the environment

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of our ancestors did not provide opportunities to help others at a distance (Hauser, 2006) and that, therefore, the plight of distant strangers fails to "push our emotional buttons" (Greene, 2003, p. 849). The result is a sharp contrast between what we intuitively feel inclined to do and what an impartial morality seems to require from us (Singer, 1972; Unger, 1996).

This contrast is a product of the drastic technological advances in our modern world. According to a popular metaphor, the *world is shrinking* as our action radiuses are extended through new technologies (Harvey, 1989; Kirsch, 1995). Almost instantaneously, we can transfer money all over the world to provide help. To the extent to which spatial distance becomes less constraining due to the availability of means for acting at a distance, the range of situations which we can safely exclude from our area of responsibility according to the ought-implies-can principle (i.e., we cannot be required to do what we cannot achieve; see Vranas, 2007) is reduced. The resulting additional moral demands are of a magnitude and of an abstractness that our limited, parochial capacities for empathic concern cannot appreciate.

Or can't they? We argue that modern technology does not only broaden the scope of our potential obligations, but also provides mechanisms to employ our ancestral moral dispositions in order to meet them. McLuhan (1962, 1966) has pointed out how historically the development of media has turned the world into a *global village*. It is now possible to observe people suffering on a different continent on a TV screen, while at the same time we might ignore an emergency in an apartment nearby. This development entails opportunities for triggering empathic reactions in response to a far wider range of incidences than those that can potentially have played a causal role in the evolution of our moral dispositions.

One mechanism that achieves this has long been exploited by charities and has also been subject to scientific research: confronting people with vivid, highly personalised stimuli depicting far-away suffering seems to engage empathic concern and lead to an increase in helping behaviour (Batson, 2011; Erlandsson, Björklund, & Bäckström, 2015; Kogut & Ritov, 2005a, 2005b, 2007; Loewenstein & Small, 2007; Small & Loewenstein, 2003; Small, Loewenstein, & Slovic, 2007). These findings can be interpreted as a demonstration of how the range of situations that trigger our sense of helping obligation can be expanded to novel situations by use of technological means. In what follows, we explore another mechanism by which technological means lead to increased helping obligations in cases of far-away suffering.

Location of means and moral obligation judgements

Our point of departure is that shrinking worlds imply *extending persons*: having the world at our fingertips implies having *very* long fingers. The philosopher Frances Kamm (2007) thoroughly analysed the relationship between

spatial distance and the duty to rescue. One of her results is that the relevant distance between a potential helper and the victim is the distance between both people's extended efficacious body parts. She then broadens the discussion to efficacious items belonging to the agent (i.e., the agent's means of helping) and likens them to largely extended arms which allow the agent to feel close to threats and victims who are actually located far away. Consequently, Kamm argues that the spatial distance between our means and potential threats or victims may play a similar role as the traditionally considered distance between the locations of agents and victims (see Nagel & Waldmann, 2013). This suggests another potent mechanism to trigger empathic concern across large distances in the modern world: not only can technological means be used to make victims look as if they were close to the agent, but also to make the agents feel as if *they* were close to the victim in virtue of having efficacious means that are already near.

As a philosopher, Kamm (2007) does not provide empirical data demonstrating that other people share her intuition that possessing near means increases obligations to let those means be used in order to help strangers; nor does she provide an account of how this phenomenon, if it exists, might be cognitively implemented in the minds of laypeople. In Study 1, we demonstrate the existence of this phenomenon by investigating a situation in which the location of the means of help vary while the agent is constantly far from the victims. As a test case, we will use a situation in which the agent can transfer money to victims in a far-away country either from a bank account in his hometown, or from a bank account in the country in which the victims are located. This study will reveal that the location of means matters morally despite the fact that the actions are highly similar (i.e., initiating the transfer of money from a remote place). We take this to demonstrate that the possession of near means in presence of modern logistic technologies (i.e., international banking) can lead to an extension of our domain of moral engagement to situations of far-away suffering which cannot possibly have contributed to the evolution of our capacity for empathic concern.

Studies 2 and 3 then turn to the question how this phenomenon is cognitively implemented. We propose and find empirical support for the model illustrated in Figure 1. It states that, under many ordinary boundary

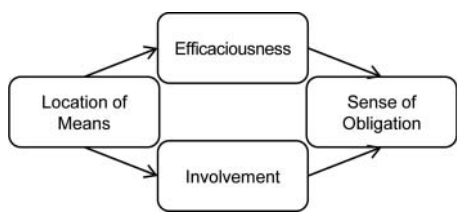

Figure 1. Graphical summary of the hypotheses.

conditions, possession of near means leads to the inference of two agent properties which in turn increase the degree to which the agent is judged to be obligated to help. The first are *efficaciousness* considerations. In the real world, means eventually have to be brought close to the victim in order to be of any help (i.e., for the agent to become efficacious in helping). The most potent medicine is not helpful if it is not ingested. Bringing means close from a distance usually requires costs, time, and effort. Therefore, it is often the case that near means are more efficacious than far means, other things equal. Whenever this is the case, agents with far means may be seen as less obligated to sacrifice their means because being able to help is commonly seen to be a prerequisite for a corresponding obligation to help (Vranas, 2007). We therefore decided to investigate efficaciousness considerations as potential mechanism underlying means-related distance effects in Study 2.

The second variable we focus on can be termed *involvement* considerations. In the real world, people usually do not store their possessions in random places. Most of the times there is a reason for people's things to be in their place. If someone has money in a bank in a remote country, this may indicate that he is to a considerable degree personally involved with that country. Maybe he has visited the place in the past and intends to do so again in the future. At the very least, he seems to be profiting from the local financial system. From such hypotheses, which can be generated from the presence of near but not far means under otherwise constant boundary conditions, substantial reasons for increased helping obligations can be generated, ranging from personal relationships with the victims or their relatives to social responsibilities resulting from participation in the local financial system. Note that these reasons are neither analytically implied by spatial proximity of means, nor are they explicitly manipulated in Study 1 – and yet, they may contribute to the observable effects. This possibility will be explored meta-analytically in Study 3.

Study 1

In the first experiment, our aim was to demonstrate that the location of an agent's means can influence the degree to which people judge the agent to be obligated to let these means be used in order to help needy strangers. We also demonstrated that this effect is stable across evaluation modes (separate vs. joint evaluation; see Hsee & Zhang, 2010).

Method

Participants

Eighty subjects (56 females, 23 males, 1 unidentified, mean age 23.8 years, SD = 6.47) from the University of Göttingen, Germany, participated in the

experiment as part of a sequence of unrelated computer-based studies. The subjects received course credit or €8/h for participation. The sample size was determined a priori based on experience with previous studies run under similar conditions. Data collection was quit as soon as the pre-determined sample size was reached, independently of the contents of the data collected up to that point.

Design, materials, and procedure

After reading a short instruction to their task, participants were randomly allocated to one of three conditions. Two of them were separate evaluation conditions in which participants read scenarios containing only one agent whose means of helping were located either close to the needy victims (*separate_near*, $n = 27$) or far from them (*separate_far*, $n = 27$). The third condition was a joint evaluation condition (*joint*, $n = 26$) in which the scenario description contained two agents, one of which possessed means of helping that were located near the victims, while the other agent's means were located far from the victims (analogous to the contrast between the two separate conditions). The scenario in the separate_near [*separate_far*] conditions read as follows (translated from German):

> Daniel lives in Göttingen. A couple of years ago, he has opened a new bank account at a bank in Haiti [*Göttingen*]. Ever since, Daniel's money has been lying in a branch of this bank in Haiti [*Göttingen*]. One day, Daniel hears in the news that several children in Haiti have been infected with a rapidly progressing disease. If these children do not receive medical treatment, they will die within the next few days. Daniel could contribute to saving the children by instantly transferring €20 via internet from his bank account in Haiti [*Göttingen*] to a local donation account [*to a donation account in Haiti*].

In the joint condition, a second agent (Thomas) was introduced who was indistinguishable from Daniel except for his name and for the location of his means:

> Daniel and Thomas both live in Göttingen, but they have never met each other. A couple of years ago, both have independently opened a new bank account. Daniel has opened his new account at a bank in Haiti. Ever since, Daniel's money has been lying in a branch of this bank in Haiti. Thomas, by contrast, has opened his new account at a bank in Göttingen. Ever since, Thomas's money has been lying in a branch of this bank in Göttingen.

The remainder of the joint scenario was as in the separate conditions, except that "Daniel" was replaced by "Daniel and Thomas." The order in which both agents were introduced in the joint condition and the allocation of names to distances were counterbalanced across participants. In all conditions, the scenario was accompanied by a world map indicating the locations of the needy children and of the agents' means.

After having read the scenario, subjects proceeded to the next screen on which they expressed their sense of obligation using a rating scale. The wording of the *Obligation* question (translated from German) was "according to your opinion, how strongly should Daniel [*Thomas*] feel obligated to transfer €20 from his bank account in Haiti [*in Göttingen*] to the donation account?", followed by a 6-point rating scale ranging from "not at all" (1) to "very strongly" (6). In the separate conditions, subjects received only one rating scale referring to the single agent who was present in the scenario. In the joint condition, they received two identical rating scales right above one another, one for each agent present in the scenario. The order of the scales matched the order in which both agents were introduced in the scenario. Following this main dependent variable, three further questions were asked in random order on the following three screens, each in a format analogous to the Obligation question. A *Distance* question, asking "how large do you perceive the physical distance between Daniel's [*Thomas's*] money and the suffering children to be?" (very small [1] to very large [6]), served as a manipulation check. An *Efficaciousness* question asked: "Suppose Daniel [*Thomas*] decided to transfer the money. How likely do you believe he would succeed in helping the children?" (very unlikely [1] to very likely [6]). Finally, an *Involvement* question asked "How strongly do you perceive Daniel [*Thomas*] to be personally involved with Haiti?" (not at all [1] to very strongly [6]).

Results

The results for all four dependent variables are summarised in Figure 2. Agents possessing near means are judged to be more strongly obligated to help than agents possessing far means both in separate evaluation mode, $t(52) = 3.10$, $p < .01$, $d = .83$, and in joint evaluation mode, $t(25) = 3.89$, $p < .001$, $d = .36$.[1] Effects on the Distance variable demonstrate that the manipulation was clearly effective in separate evaluation mode, $t(52) = -2.76$, $p < .01$, $d = -.74$, and especially under direct comparison of both distances in joint evaluation mode, $t(25) = -8.61$, $p < .001$, $d = -2.52$. As for the potential mediators, efficaciousness estimates were not affected by the distance manipulation in this particular scenario in either evaluation mode, $t(52) = 1.17$, $p = .25$; $t(25) = 1.44$, $p = .16$. By contrast, the location of means seemed to have strong involvement implications for our subjects: they inferred the agent possessing near means to be much more personally involved with Haiti than the agent possessing far means in both evaluation modes, $t(52) = 3.98$, $p < .001$, $d = 1.07$; $t(25) = 7.15$, $p < .001$, $d = 1.64$. The order in which the agents were introduced in the scenario description in

[1] All effect sizes *d* reported in this article are bias-corrected (Bonett, 2009) and standardized with SD_{pooled}, both for independent and repeated measures. See also methods section of Study 3.

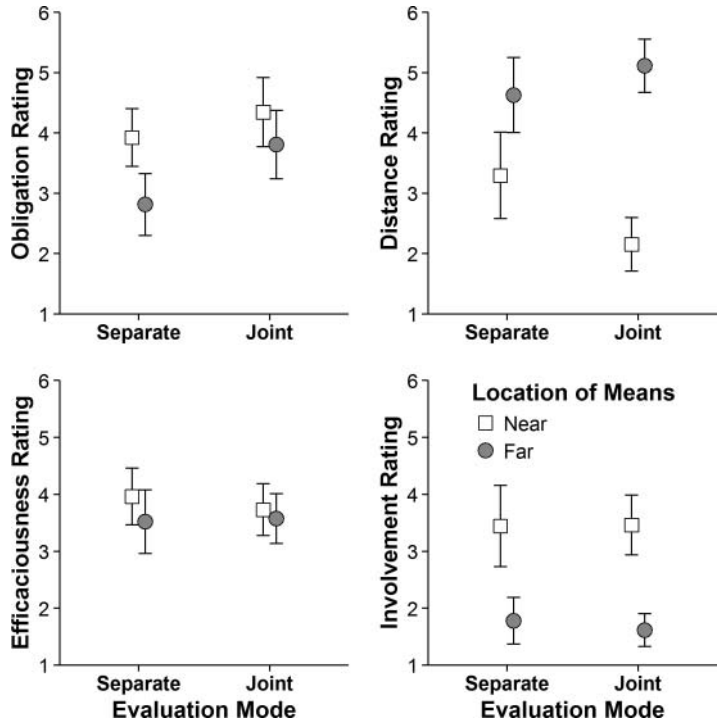

Figure 2. Results of Study 1 by dependent variable and condition. Error bars indicate 95% CIs.

the joint evaluation condition did not affect responses on any of the variables (no main effects or interactions with the distance manipulation). Bonferroni correction for the two tests conducted on each variable does not change any of these conclusions.

Discussion

In this experiment, we have demonstrated that the location of an agent's means can have a considerable effect on the degree to which this agent is judged to be obligated to help, even if the particular action required for helping (making an online transfer of a fixed amount of money from a remote place) is kept constant. The large effect of our location manipulation on inferred personal involvement suggests that such considerations might be a powerful mediator of the observed effect. Before we investigate this possibility in Study 3, we will first look in more depth at the efficaciousness factor, which was not affected in this study but might well play an important role under slightly different boundary conditions.

Study 2a

Being at least minimally efficacious is usually considered a necessary precondition for being obligated to help (ought-implies-can principle, e.g., Vranas, 2007). In the scenario of Study 1, we implemented boundary conditions (availability of online banking) under which increased distance of means does not impede efficaciousness. Even in our modern world with all its technical advances, however, bringing far means close often requires costs, time, and effort. The aim of Study 2 was to demonstrate experimentally that efficaciousness considerations can mediate means-related distance effects when this mechanism (the upper causal pathway in Figure 1) is isolated.

To test this mediational claim, we manipulated the location of means under different boundary conditions. In one condition (*covarying*), increased distance of means implied decreased efficaciousness. In other conditions (*constant*), boundary conditions were set such that efficaciousness remained constantly high or low, regardless of the distance manipulation. If the effect of the location of means on moral obligation judgments was mediated via efficaciousness considerations, the effect should be replicated in the covarying condition but not in the constant conditions, as in the latter distance should be screened off from obligation by fixing the mediator at a constant value (cf. Pearl, 2000).

Method

Participants

We recruited 282 subjects from Great Britain via an online database paying them with an online-voucher worth £0.50. As previous experience told us that online data tend to be noisier than laboratory experiments in this domain, we ran a larger sample than in Study 1. Data collection was quit as soon as the pre-determined sample size was reached.

Design, materials, and procedure

The scenario and procedure were very similar to the joint evaluation condition in Study 1. The scenarios always contained two agents that were introduced in counterbalanced order and differed only in the location of their means and in their names. To test whether efficaciousness considerations can mediate the effect of the location of means on obligation judgements, we extended the description by explicating three different boundary conditions that were administered between-subjects. In the first condition, *covarying*, the boundary conditions were set such that spatial proximity of means implied increased efficaciousness. This was achieved by specifying the available means of transportation as follows: "The local donation account does not support online-banking, so both [agents] would have to have their bank

send a cheque to the charity organisation by mail." This meant that means (money) that are already near the suffering children would reach those children sooner (and thus be more efficacious) than means that were still far; the causal link between proximity and efficaciousness is intact. In this condition, we therefore expected a clear effect of the location of means on obligation judgements, with near means leading to higher ratings than far means. In the two other conditions, the boundary conditions were set such that the causal link between distance and efficaciousness was disabled by fixing the mediator at a constant value. In the condition *constant_high*, the donation account supported online banking, so both near and far means could be transported to the victims equally efficaciously. Here, we expected equally high obligation ratings for both agents as the location of means is not indicative of efficaciousness (similar as in Study 1). In a third condition, *constant_low*, the local Haitian infrastructure was described to be in a bad condition, making it unlikely that either agent's means would reach the children in due time and thus making both agents equally *in*efficacious regardless of the location of their means. We expected equally low obligation ratings for both agents under these boundary conditions. In sum, this resulted in a 2 (location of means: near vs. far, within-subject) by 3 (efficaciousness: covarying vs. constant_high vs. constant_low, between-subjects) mixed design.

As shown in Study 1, it can be expected that nearness of means may lead to inferences not only of increased efficaciousness but also of increased involvement in this kind of situation (see also Study 3). This has to be avoided here in order to isolate the efficaciousness mechanism. In order to block the lower causal pathway in Figure 1, in the beginning of the scenario description we explicated the causal process by which the agents' means had ended up in their respective locations in a constant way across all agents in all conditions. This causal process made clear that the agents did not have any control over the current location of their means, making the location un-diagnostic for the agents' personal involvement. The process was always specified as follows:

> Imagine two British people who have never met each other, Dave and John. Some years ago, both have opened a new bank account at a large international bank to increase their interest rates. Ever since, employees of the bank have been variably locating Dave's and John's money on their branches in different countries. Since a couple of days, Dave's money has been lying in a branch of this international bank in Haiti. John's money, by contrast, has been lying in a branch of the same international bank in his hometown in Britain since a couple of days.

It becomes clear that both agents had the same intentions, took the same actions, profited from the same financial processes, and so on. The location of their means is the product of temporary and arbitrary circumstances that are not in any way related to any differences in decisions for which the agents could be held accountable. Variations in distance are thus not diagnostic for the agents' personal involvement in any of the conditions.

The same four dependent variables as in the joint condition of Study 1 were used. As before, after having answered the Obligation question on the first screen, subjects received the Distance, Efficaciousness, and Involvement questions in random order. We expected a clear effect of the location manipulation on the Distance variable in all three conditions. The Efficaciousness question serves to verify whether the between-subjects manipulation of the available transportation mechanisms did indeed have the intended moderating effect on the relationship between location of means and the proposed mediator, efficaciousness. We expected a clear effect of the location manipulation in the covarying condition, but no effect in either constant_high or constant_low, closely tracking the pattern of obligation ratings. Finally, the Involvement question was used to assess whether our instructions were effective in decoupling the location of means from personal involvement considerations. We expected the variation of the location of means not to affect this variable in any of the three conditions. On a final screen, subjects were additionally given a simple transitivity task as attention test. Failure on this task served as exclusion criterion.

Results

Thirty-nine participants dropped out before reaching the final screen or failed the attention test and were therefore excluded from all analyses. The descriptive results of the remaining sample ($N = 243$, 153 female, mean age 36.8 years, $SD = 9.63$) on all four dependent variables are summarised in Figure 3. The results of a two-way mixed ANOVA for all four dependent variables are summarised in Table 1. The location of means affected obligation ratings in the covarying condition in which spatial distance was correlated with efficaciousness, but ceased to do so in the constant_high and constant_low conditions in which efficaciousness was kept constant. This pattern confirms our mediation hypothesis. Inspection of the remaining dependent variables reveals that, as expected, only differences in efficaciousness ratings closely track differences in obligation ratings (see patterns in Figure 3 and interaction terms in Table 1). Furthermore, the efficaciousness ratings indicate that our manipulations of the boundary conditions had the intended effects. The distance ratings were strongly affected in all three conditions, indicating that the location manipulation was successful. Involvement ratings were similar for both agents in all conditions, although the agent with near means was considered to be slightly more personally involved than the agent with far means. This effect, however, did not interact with the manipulation of the boundary conditions. Finally, the order in which the agents were introduced in the scenario description did not affect responses on any of the variables (no main effects or interactions).

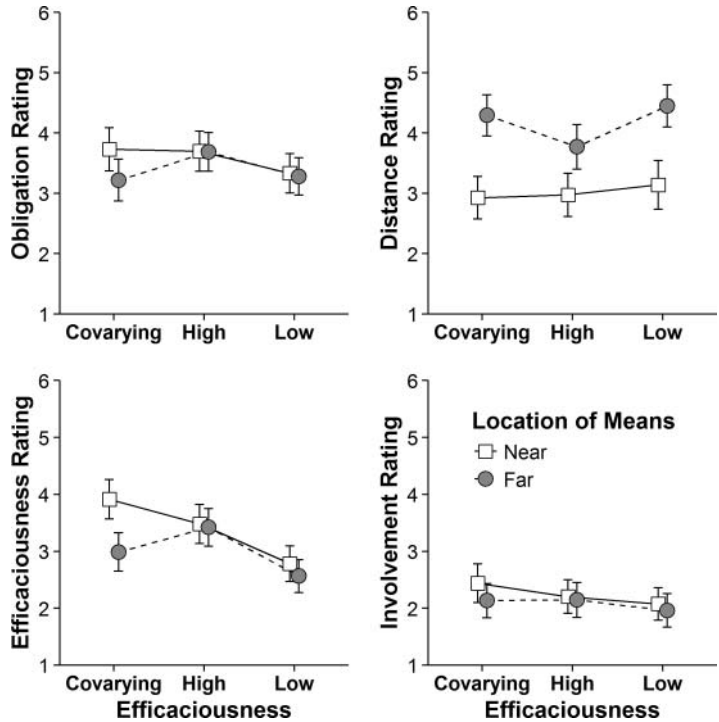

Figure 3. Results of Study 2a by dependent variable and condition. Error bars indicate 95% CIs.

Table 1. Results of the mixed ANOVA on the data of Study 2a.

	Distance (RM)		Efficaciousness (IM)		Dist. × Effic.	
Dependent variable	$F_{1, 240}$	η_g^2	$F_{2, 240}$	η_g^2	$F_{2, 240}$	η_g^2
Obligation	13.64**	.004	1.38	.011	9.64**	.006
Distance	89.03**	.108	1.93	.011	2.22	.006
Efficaciousness	42.44**	.018	7.86**	.056	18.92**	.016
Involvement	10.68**	.003	.80	.006	2.32	.001

Note: IM = independent measures, RM = repeated measures, η_g^2 = generalised eta-squared. **$p < .01$.

Discussion

In this experiment, we have demonstrated that one way in which nearness of means can increase moral obligation judgements is via efficaciousness considerations. When bringing far means close requires time, agents owning far means are seen to have a reduced obligation to help, reminiscent of the ought-implies-can principle. However, technical advances of the modern age produce increasingly efficient logistic means of communication and

transportation that decouple their location from the ease of their implementation. Under such conditions, the location of means becomes irrelevant for moral obligation judgements (provided that it is also not strongly indicative of personal involvement).

Study 2b

In Study 2a, we manipulated efficaciousness-related boundary conditions by introducing different logistic means in the different between-subjects conditions. The covarying condition involved regular mail, constant_high involved online-banking, and constant_low involved online-banking in combination with obstacles in the local infrastructure. While each of these boundary conditions applied equally to both agents within each condition, this additional information may reduce comparability across conditions. We therefore replicated the study with a direct, explicit manipulation of efficaciousness, omitting details about logistic means. This lead to scenarios that are more abstract, but better comparable across conditions.

Method

Participants, design, materials, and procedure

We recruited and compensated 278 subjects as in Study 2a. Design, materials, and procedure were largely identical to Study 2a. The only difference was that concrete information about the available logistic means was omitted from the situation descriptions. Instead, we directly manipulated efficaciousness. In the covarying condition, subjects read that increased distance of means implied reduced efficaciousness:

> Since Dave's money is already located in Haiti, it is very likely that it will be available for the children in due time. Dave's donation would almost certainly contribute to saving the children. Since John's money, by contrast, is still located in Britain, it is very unlikely that it will be available for the children in due time. John's donation would almost certainly not contribute to saving the children.

Accordingly, in the constant_high [*constant_low*] conditions, we explicitly stipulated both agents' means to be equally [*in*]efficacious despite varying degrees of spatial distance to the victims:

> Although Dave's money is already located in Haiti while John's money is still located in Britain, in both cases it is equally [*un*]likely that it will be available for the children in due time. Both helpers' donations would almost certainly [*not*] contribute to saving the children.

We expected the same pattern of results as in Study 2a for all four dependent variables.

Results and discussion

Thirty-five participants dropped out before reaching the final screen or failed the attention test and were therefore excluded from all analyses. The descriptive results of the remaining sample ($N = 243$, 139 female, mean age 38.6 years, SD = 7.99) on all four dependent variables are summarised in Figure 4. The results of a two-way mixed ANOVA for all four dependent variables are summarised in Table 2. They look very similar to those of Study 2a (compare Figures 3 and 4). Most importantly, obligation ratings were again affected by the distance manipulation in the covarying condition but not in the constant conditions, demonstrating once more that efficaciousness considerations can mediate means-related distance effects on judgements of moral obligation. Taken together, the findings of Studies 2a and 2b show that this pattern is stable across more concrete but less well controlled and more abstract but better controlled situation descriptions.

Study 3

We will now turn to a second potential cognitive mediator of means-related distance effects on moral obligation judgement. Agents owning near means

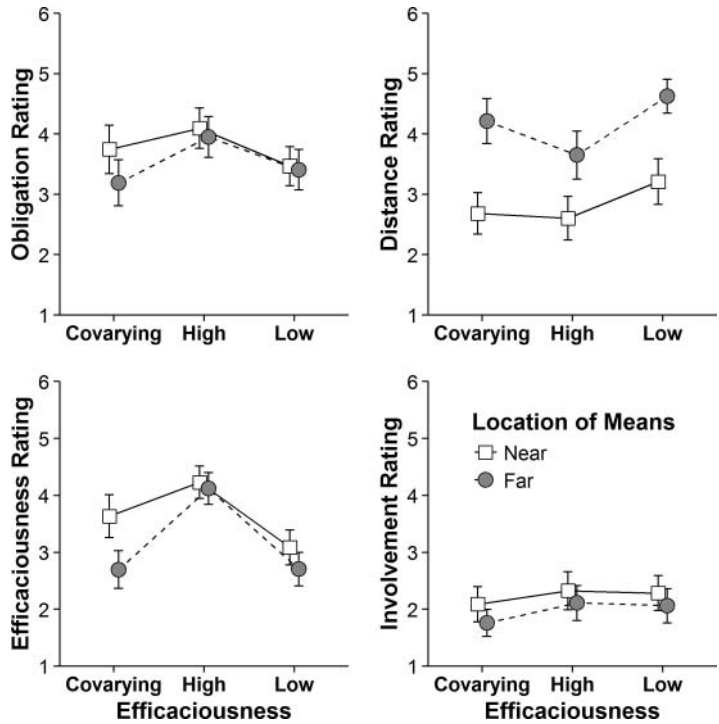

Figure 4. Results of Study 2b by dependent variable and condition. Error bars indicate 95% CIs.

Table 2. Results of the mixed ANOVA on the data of Study 2b.

	Distance (RM)		Efficaciousness (IM)		Dist. × Effic.	
Dependent variable	$F_{1, 240}$	η_g^2	$F_{2, 240}$	η_g^2	$F_{2, 240}$	η_g^2
Obligation	18.10**	.006	3.71*	.028	6.49**	.004
Distance	102.27**	.143	7.90**	.039	1.24	.004
Efficaciousness	47.19**	.027	21.06**	.131	14.34**	.014
Involvement	15.96**	.009	1.20	.009	.32	.000

Note: IM = independent measures, RM = repeated measures, η_g^2 = generalised eta-squared. *$p < .05$, **$p < .01$.

are often personally involved with the area around their means and the people living there. Thus, subjects may feel that agents are more obligated to help because of their assumed personal ties to the area where they have stored their possessions. The finding in Study 1 that involvement ratings were increased in the presence of near means indicates that subjects draw this inference spontaneously without corresponding explicit information. Study 3 will test the mediating role of personal involvement experimentally while concurrently keeping constant efficaciousness in all conditions, blocking the upper causal pathway from Figure 1 in order to isolate the involvement mechanism.

Method

We made many attempts to test the mediating role of personal involvement. Some of them were successful, but some others merely trended in the right direction without reaching statistical significance. Facing the current concerns in the field of psychology about the suspected instability of published effects and overestimation of true effect sizes due to publication bias and related problems (e.g., Bohannon, 2014; Ioannidis, Munafò, Fusar-Poli, Nosek, & David, 2014; Nosek & Lakens, 2014; Open Science Collaboration, 2015; Spellman, 2012), we decided to report a meta-analysis of all our experiments (see Cumming, 2014). This allows us to base our overall conclusions about the existence and size of effects on all available data and to investigate potential moderators across studies. Over and above the conclusions it allows with regards to the psychological question at hand, the following meta-analysis might also be of more general methodological interest as it demonstrates how variable the outcomes even of high-powered direct replication attempts can be when the target effects are relatively small. It also gives an impression of the amount of data that is necessary to reach satisfying levels of confidence in such cases.

Characterisation of the contrasts from the underlying experiments

The goal of all experiments was to isolate the involvement mechanism. Accordingly, the efficaciousness mechanism (the upper causal pathway in

Figure 1) was blocked by stating that efficient online-banking was available in all conditions. Studies 1 and 2 have shown that under these boundary conditions subjects do not infer increased efficaciousness from near means. Therefore, it is unlikely that this mechanism can account for any effects obtained in this set of studies.

The experiments entering into this meta-analysis had heterogeneous designs. Some involved simple comparisons like Study 1, some employed the two-by-three design from Study 2, and many used a classical two-by-two design in which location of means and personal involvement were manipulated orthogonally, either between-subjects or within-subject. For the purpose of this meta-analysis, we broke down the experiments into separate pair-wise contrasts of theoretical interest. All of these contrasts are statistically independent, even where they come from the same experiment (for example, they might represent two non-interacting main effects from a two-by-two design). The dependent variable in all these comparisons was an obligation rating on a 6-point scale, similar to those in Studies 1 and 2.

We categorised the resulting $m = 31$ independent pair-wise comparisons into three different manipulation types which, taken together, provide an experimental test of the mediational claim that location of means affects moral obligation judgement via inference of personal involvement (the lower causal pathway from Figure 1). The three manipulation types establish that (1) the independent variable affects the dependent variable when the mediator is left free to covary (*Thick Distance Manipulation*), that (2) the mediator affects the dependent variable at constant levels of the independent variable (*Isolated Involvement Manipulation*), and that (3) the independent variable ceases to affect the dependent variable at constant levels of the mediator (*Isolated Distance Manipulation*). We will now explain in detail what was done in each manipulation type. The manipulation types are furthermore visualised in Figure 5.

The first manipulation type is called Thick Distance Manipulation (compare Figure 5, upper panel). Its function is to establish that the independent variable (location of means) affects the dependent variable (obligation rating) when the potential mediator is not controlled for (i.e., involvement is left free to covary). In this type of contrast, we explicitly manipulated location of means, but provided no information about the agents' personal involvement with the area around their means. The findings from Study 1 indicate that under these conditions, subjects spontaneously infer that near means imply personal involvement. Technically, what is explicitly manipulated is distance only; effectively, what is manipulated seems to be distance plus personal involvement – hence the name Thick Distance Manipulation. Accordingly, we expect considerable effects of this manipulation type on moral obligation ratings according to the lower causal pathway of Figure 1. For example materials for a within-subject Thick Distance Manipulation, you can refer back to the

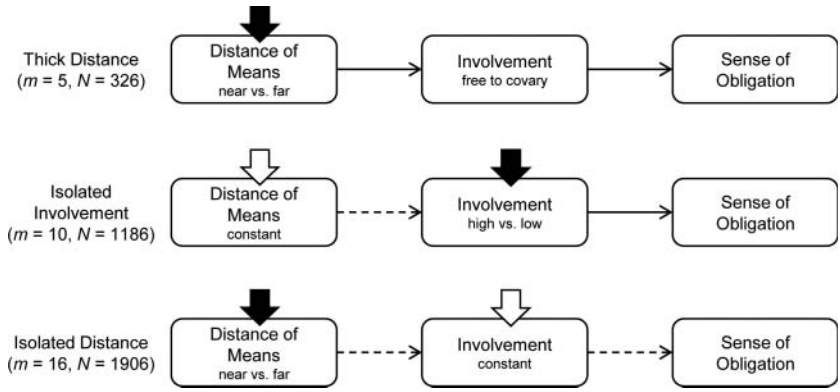

Figure 5. Experimental interventions on distance of means and personal involvement in the different manipulation types entering into the meta-analysis. Thick black arrows indicate explicit manipulations of a variable. Thick white arrows indicate that the variable has been explicitly kept constant. Thin solid arrows indicate assumed causal relationships that can manifest themselves in the given contrast. Thin dotted arrows indicate assumed causal relationships that are disabled by the respective experimental interventions. m = number of comparisons conducted of the respective manipulation type, N = total number of subjects in these comparisons.

scenario description in the joint evaluation condition of Study 1 which enters into this meta-analysis as Experiment 19.

The second manipulation type is called Isolated Involvement Manipulation (compare Figure 5, middle panel). Its function is to establish that the mediator (involvement) causally affects the dependent variable (obligation rating) when the independent variable (location of means) is kept constant. In this type of contrast, we explicitly manipulated personal involvement while the compared agents' means were located at a constant distance from the victims. Note that this important causal test is lacking from conventional correlational mediation analysis (Baron & Kenny, 1986) where the mediator is not experimentally manipulated. As our hypothesis states that involvement is the more proximal cause of increased obligation ratings compared to the location of means, we expect effects of this manipulation type on obligation ratings that are similar in size as those of Thick Distance Manipulations. The following example of a between-subjects Isolated Involvement Manipulation is taken from Experiment 2.2 in the meta-analysis (translated from German, high involvement condition [*low involvement condition*]).

> Some years ago, you have opened a bank account at a bank in Kenya. Your reason for this was that you have travelled to Kenya several times for holidays. [*Your reason for this was the favourable interest rates*.] Ever since, part of your money has been lying in a branch of the bank in Kenya. Since you intend to go to Kenya again in the future, you still entertain this account today. [*Since your*

account has proven profitable, you still entertain it today. However, you have never been to Kenya yourself and have had no other ties to this country.] (…)

Finally, the third manipulation type is called Isolated Distance Manipulation (compare Figure 5, lower panel). Its function is to establish that the independent variable (location of means) ceases to affect the dependent variable (obligation rating) when the mediator (involvement) is kept constant. In this type of contrast, we explicitly manipulated the location of means while the compared agents' personal involvement was explicitly kept constant. As our hypothesis states that the location of means is the more distal cause of increased obligation ratings compared to personal involvement, we expect its effect to be screened off at constant levels of personal involvement. Accordingly, we expect essentially zero effects of this manipulation type on obligation ratings, and substantially smaller effects than those of the other two manipulation types. For example materials for Isolated Distance Manipulations, you can revisit the scenario description of the constant_high and constant_low conditions in Studies 2a and 2b which are combined and enter into the meta-analysis as Experiments 16 (Study 2a) and 20 (Study 2b).

Taken together, this pattern of results would indicate that the effect of Thick Distance Manipulations in obligation ratings is completely mediated via inferences of personal involvement (given that efficaciousness considerations are kept constant).

Summary of study characteristics

We included $m = 31$ independent comparisons of obligation ratings under the influence of the different manipulation types. In total, the data are based on responses from $N = 2232$ subjects. The factors that will be analysed as potential moderators of effect size across the 31 comparisons are visualised in Figure 6, together with the effect sizes and 95% confidence intervals for the obligation measure obtained in each comparison. The comparisons are numbered chronologically in the order in which they were conducted (between January 2010 and August 2015). Comparisons that share the same experiment number have been calculated from the same data (representing two independent main effects from a two-by-two design[2]). Dot brightness and shape in Figure 6 indicate the manipulation type of each comparison (see above) which is the moderator of greatest theoretical interest. The background brightness and structure in Figure 6 indicate whether the respective data was collected on the Göttingen University campus or in an online setting with a British sample, as well as whether the contrast is based on a

[2]The only exception is Experiment 5 where all 121 participants received two separate scenarios one after the other in counterbalanced order. Comparison 5.2 contains the respective within-subject contrast. Comparison 5.1 is the between-subjects contrast of only the first scenario rating between both counterbalancing groups.

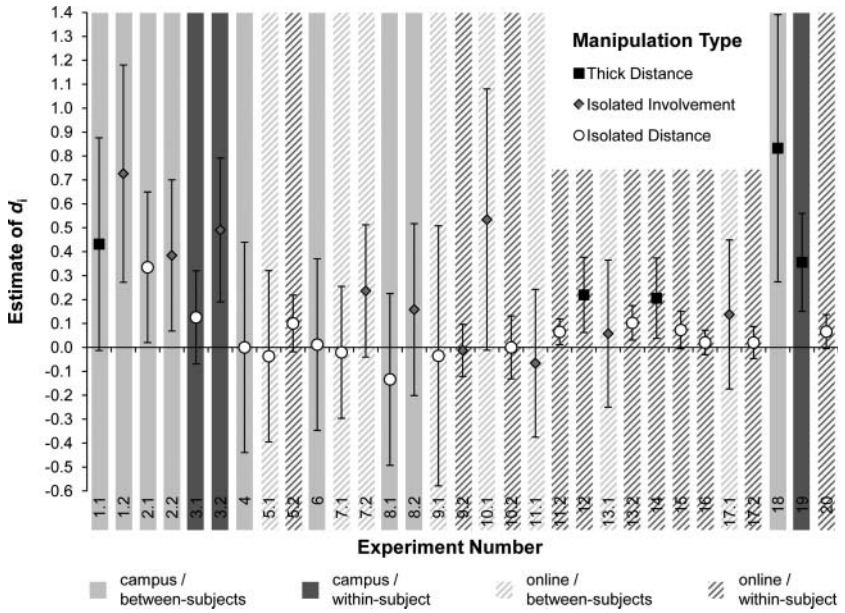

Figure 6. Estimates of individual effect sizes d_i and 95% confidence intervals for the 31 comparisons entering into the meta-analysis. Dot brightness and shape indicate the manipulation type (see Figure 5). Background brightness and structure indicate methodological study characteristics. See text for further details.

between-subjects or on a counterbalanced within-subject design. Apart from these differences, only minor aspects of the boundary conditions varied between the studies. For example, in some studies the suffering children were in Haiti, in others they were in Kenya. Some studies used a second person perspective in the scenario description (i.e., the subjects were asked to imagine being in the situation themselves), others used a third person perspective. The amount of money to be donated also varied slightly across the studies. None of these minor factors affected the results systematically.

Model and analysis

The 31 contrasts were meta-analysed in accordance with the recommendations of Bonett (2009). As all individual experiments are based on highly homogenous materials and procedures, we decided to assume a fixed-effects model and to test whether certain study characteristics moderate the effect size using planned linear contrasts. $\hat{\delta}_i$ and $\text{var}(\hat{\delta}_i)$ of the individual comparisons were estimated according to Equations 5 and 6 in Bonett (2009). All effect sizes, including those based on repeated-measures designs, were standardised with SD_{pooled} in order to obtain estimates in a comparable

metric across designs (Morris & DeShon, 2002). The individual estimates were then aggregated into an unweighted average serving as point estimate of the global effect size (Bonett, 2009, Equation 2). The 95% CI around this point estimate was obtained by applying Equation 10 in Bonett (2009). Contrasts testing for potential moderators of effect size with their 95% CI were calculated according to Equation 18 in Bonett (2009).

Results

The individual effect size estimates of the 31 comparisons are visualised in Figure 6 together with their 95% CIs. It can be seen that Thick Distance and Isolated Involvement Manipulations tend to yield larger effect size estimates than Isolated Distance Manipulations, but also that the confidence intervals of the individual effect sizes are very broad, and that the point estimates vary considerably across comparisons even within the same manipulation type.

To test our mediational claim, we first analysed aggregated effect size estimates separately for the different manipulation types (see Figure 7, left column). The aggregated effect size from Thick Distance contrasts, $\overline{d}_{\text{ThDist}} = .409$, 95% CI [.254; .565], $m = 5$, $N = 326$, and from Isolated Involvement contrasts, $\overline{d}_{\text{IsInv}} = .265$, 95% CI [.155; .374], $m = 10$, $N = 1186$, are both larger than zero, while the aggregated effect size from only the Isolated Distance contrasts does not differ noticeably from zero despite high precision of the estimate, $\overline{d}_{\text{IsDist}} = .043$, 95% CI [−.024; .110], $m = 16$, $N = 1906$.

We then analysed moderator effects of the different study characteristics for the complete set of 31 experiments (i.e., the average increase in effect size as a result of a variation in the respective moderator variable across

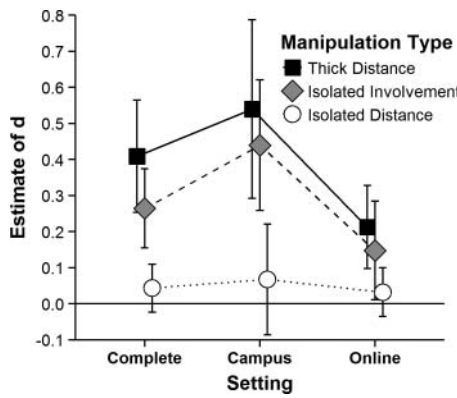

Figure 7. Aggregated effect size estimates (with 95% CIs) of the three different manipulation types as a function of the experimental setting. "Complete" is the aggregate of "Campus" and "Online" settings.

experiments, again accompanied by 95% CIs). Thick Distance and Isolated Involvement Manipulations yielded larger effect sizes than Isolated Distance Manipulations, both individually, contrast = .366, 95% CI [.196; .535] for Thick Distance and contrast = .221, 95% CI [.093; .350] for Isolated Involvement, and in combination, contrast = .269, 95% CI [.158; .381]. Thick Distance Manipulations did not differ strongly from Isolated Involvement Manipulations, although there seems to be a slight tendency for Thick Distance Manipulations to yield larger effects, contrast = .144, 95% CI [−.046; .335]. Taken together, these findings show that the usual influence of the location of means on obligation ratings vanishes when personal involvement is experimentally controlled, supporting our mediation hypothesis.

Additional analyses revealed that the setting of the experiments had a clear influence on effect sizes, with the campus setting yielding larger estimates than the online setting, contrast = .222, 95% CI [.099; .345]. To make sure this important moderator did not interact with the moderating effects of manipulation type, we re-ran the moderation analysis separately for both settings (see middle and right columns in Figure 7). It becomes evident that the difference between the settings lies mainly in larger effect sizes of Thick Distance and Isolated Involvement Manipulations in the campus setting than in the online setting. The general pattern of the results (i.e., larger effects for Thick Distance and Isolated Involvement Manipulations than for Isolated Distance Manipulations and essentially zero effects for the latter) remains stable across both settings. Thick Distance and Isolated Involvement manipulations yielded larger effect sizes than Isolated Distance manipulations even in the online setting, contrast = .132, 95% CI [.005; .285], although the effects are clearly much smaller than in those obtained on campus.

Finally, over the whole data set, there seems to be a slight trend for between-subjects comparisons to yield larger effect sizes than within-subject comparisons, contrast = .078, 95% CI [−.025; .181]. However, this trend disappears when the moderating role of study design is analysed separately for both types of setting, contrast = −.019, 95% CI [−.212; .174] in the campus setting and contrast = .023, 95% CI [−.116; .161] in the online setting. The setting, by contrast, continues to moderate effect sizes both within the subset of between-subjects comparisons, contrast = .204, 95% CI [.013; .396], and of within-subject comparisons, contrast = .246, 95% CI [.105; .387]. This indicates that the trend for design to moderate effect sizes across the whole data set only reflects the fact that we conducted more between-subjects experiments in the campus setting and more within-subject experiments in the online setting.

Discussion

In this meta-analysis, we have demonstrated that the location of means can affect sense of obligation even when efficaciousness is controlled for, and

that this effect is mediated by inferences of personal involvement. In the absence of explicit information to the contrary, people seem to infer from the fact that an agent possesses means in a particular location that he is personally involved with the area around this location. This inference gives rise to an intuition of increased obligations to make use of these means in order to help victims living in the respective area. If such personal involvement is independently manipulated or held constant, the location of means becomes irrelevant for moral obligation judgements (provided that increased distance does not reduce efficaciousness).

More generally, this study demonstrates the merits of meta-analysis as a method for primary data analysis across replication attempts (Cumming, 2014). It generates realistic and reliable estimates of relatively small effects, while at the same time it does not lead to the conclusion that *any* difference is substantial, even if many high-powered studies are underlying the estimate. Furthermore, given a sufficient amount of data, it allows for the quantification of the size of influence of methodological moderators such as experimental design or study setting. This information is valuable for the planning of future studies in the domain.

General discussion

We have demonstrated that agents are judged to be obligated to help needy strangers when they possess means of helping that are located close to the victims, even if the agents themselves are located in a far-away country. Agents are viewed as obligated to help when the nearness of their means suggests that the help would be highly efficacious, or when it signals that their owner is personally involved with the surrounding area. These findings have interesting implications both for our theoretical views about how evolved moral dispositions play out in a vastly restructured modern environment and for our societal efforts to enhance cognitions that might increase people's inclination to donate money in order to relieve far-away suffering.

The annihilation of space in modern times (Harvey, 1989) provides a formidable test case to study how ancient cognitive dispositions interact with changing environmental affordances. Our findings indicate that, even if we assume that our capacity for empathic concern has evolved as an adaptation to selective pressures arising in a very limited set of close-up helping situations (Greene, 2003; Hauser, 2006), we are by no means restricted to applying it to those situations only. It seems plausible that, if our capacity for empathic concern evolved because of the fitness-enhancing consequences of helping kin (Hamilton, 1964) or of helping people who could be expected to reciprocate in the future (Trivers, 1971), spatial proximity was a necessary prerequisite for any of these selection mechanisms to get off the ground (see Nowak & Highfield, 2011). However, the fact that spatial proximity was a necessary

enabling condition for the selection of prosocial behaviour to occur does not imply that proximity per se got encoded as a morally relevant factor in our cognitive system (see also evidence in Nagel & Waldmann, 2013). Modern technologies that decouple spatial distance from its practical implications, both in terms of perception and action, can make far-away suffering appear in such a way that our parochial capacity for moral concern becomes responsive to it. The main point we want to make is thus not that our ancestral moral dispositions keep us from acting morally in a spatially restructured modern world. Rather, it is that the availability of efficient technological means allows us to put some of our parochial moral dispositions to use for causes they could not possibly have been selected for (see Baumard, André, & Sperber, 2013, for a description of the independent selection mechanisms according to which our appreciation for *impartial* moral requirements like fairness may have evolved).

It goes without saying that we have been concerned with only a very specific aspect of the processes underlying people's moral cognition. The effects demonstrated here stand next to many other cognitive and emotional pathways to prosocial cognition and behaviour that have been well established by other researchers in the field (e.g., Algoe & Haidt, 2009; Batson, 2011; Dickert, Sagara, & Slovic, 2011; Erlandsson et al., 2015; Schnall & Roper, 2012; Schnall, Roper, & Fessler, 2010; Tscharaktschiew & Rudolph, 2015) and that are potentially applicable to a wider range of situations. However, the current rapid development of technological means of communication and transportation have so pervasive an impact on our day-to-day reality that it seems warranted to look in detail at their implications for our moral lives. Our work provides a better understanding of a quite specific, but nonetheless extremely prevalent type of morally relevant situation.

Even though it is not guaranteed that our experimental findings generalise one-to-one to complex real-world settings and to actual donation behaviour, they seem to suggest novel ways in which charity campaigns could attempt to trigger intuitions of moral helping obligations towards distant strangers in need. They indicate that feelings of helping obligation can be increased by making people feel efficacious in helping and personally involved with the area around the suffering strangers. Campaigns could try to induce these feelings by activating the knowledge that today the availability of efficient logistic means enables efficacious action at a distance, and that the same technological developments also create a global village (McLuhan, 1962) with meaningful social interdependencies across the globe. The metaphor of means as very long arms may be a powerful image to evoke the intuition that these qualities actually apply personally to the individual recipients of the campaign. The fact that in the era of online-banking our means are physically located in space only in a very limited sense may allow some leeway to affect people's representations of how close their means (and, in virtue of them,

they personally) are to those who need them, even if they do not physically have a bank account in a distant country. Campaigns could try to generate the impression that, in a sense, the potential helpers already have their fingers in the neighbourhood of the victims – that all they need to do is take hold in order to rescue someone from suffering.

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