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Original Article

Scope insensitivity: The limits of intuitive valuation of human lives in public policy

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ABSTRACT

A critical question for government officials, managers of NGOs, and politicians is how to respond to situations in which large numbers of lives are at risk. Theories in judgment and decision making as well as economics suggest diminishing marginal utility with increasing quantities of goods. In the domain of lifesaving, this form of non-linearity implies decreasing concern for individual lives as the number of affected people increases. In this paper, we show how intuitive valuations based on prosocial emotions can lead to scope insensitivity and suboptimal responses to lives at risk. We present both normative and descriptive models of valuations of lives and discuss the underlying psychological processes as they relate to judgments and decisions made in public policy and by NGOs.

1. Introduction

People in organizations often have to make decisions that affect the welfare of others. This includes allocations of resources (e.g., money, time, and services) by national and international organizations as well as by government agencies. In situations where the welfare of large segments of a population is threatened, both government and non-government organizations (e.g., charities; NGOs) are called upon to react. Recent examples of such large-scale threats include the ongoing humanitarian crises in Africa as well as armed conflicts (e.g., the civil war in Syria) and natural catastrophes (e.g., hurricanes and earthquakes). In response to such calamities, international humanitarian aid in 2011 consisted of both government-provided ($12.5 billion) and private voluntary ($4.6 billion) contributions (Global Humanitarian Assistance, 2013). In order to understand how managers, civil servants, politicians, and other administrators make decisions regarding the welfare of people whose lives are in danger, we need to better understand how people value the lives of others.

In this article we give examples of how human lives are valued and how this deviates from how they should be valued according to egalitarian norms. We argue that valuations of lives are prone to well-documented biases when done intuitively. Following dual process models, we define intuitive information processing to be primarily automatic and affective in nature and deliberative information processing to be controlled and reason-based (Evans, 2008; Kahneman, 2003; Stanovich & West, 2000). We first present two examples of valuations that follow normative moral principles, then contrast them with descriptive valuation models resulting from intuitive processing. Finally, we present a short study to demonstrate how variations in elicitation methods can lead to different valuations of lives and close with a discussion on how these valuations could be improved.

Experimental research has shown that valuations of lives are often scope insensitive, which is the tendency to be relatively unresponsive to the number of people at risk in large-scale humanitarian catastrophes. Scope insensitivity can lead to suboptimal decision outcomes in public policy. This is the case in situations where the goal is to improve the welfare of as many people as possible, but the decisions (and underlying valuations) do not correspond to this goal (Baron & Szymanska, 2011). Before examining the reasons for scope insensitivity, we briefly reflect on some normative aspects of valuations of life.

1.1. Normative valuations of lives

How should human lives be valued? This is a complex question whose answer depends largely on the adopted philosophical

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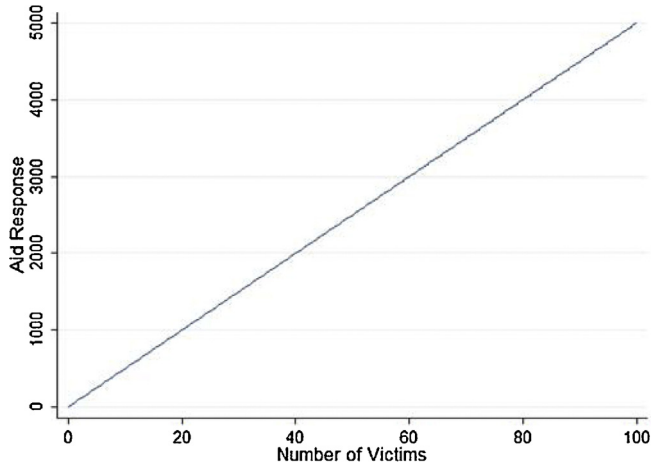

Fig. 1. Linear function.

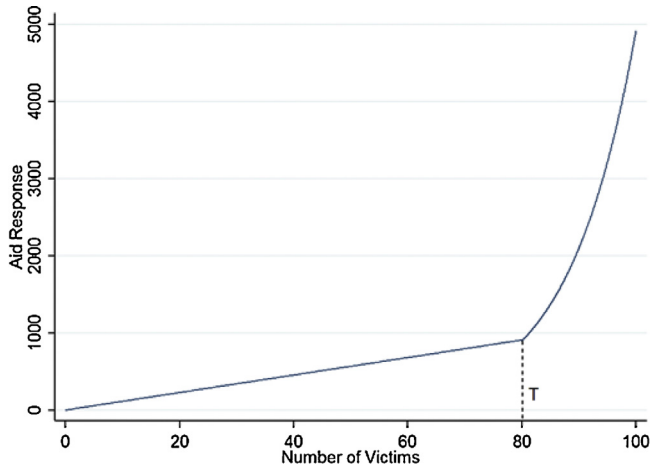

Fig. 2. Exponential function with threshold T.

viewpoint. What is considered normative may depend on several different criteria and goals pursued. Here we focus on two examples of normative principles that can be justified with egalitarian moral values and the goal of group survival. According to egalitarian moral perspectives (and various forms of utilitarianism), all lives should be valued equally (Baron & Szymanska, 2011; Dickert, Västfjäll, Kleber, & Slovic, 2012; Sinnott-Armstrong, 2011). In addition to this moral principle, it is also possible to acknowledge that losses of lives may sometimes be so large as to threaten the survivability of a population. In such cases, the value of each additional endangered life increases disproportionally (Slovic, Fischoff, & Lichtenstein, 1982).

If all lives are inherently of equal value, one would expect policy decisions to be faithful to this egalitarian moral principle whenever possible.[1] Such valuations are captured by a simple formula in which the level of response is given by $R = X \times N$, where R is the aid response (measured either in financial contributions, volunteer time, volunteer numbers, etc.), X is the response for one victim, and N is the number of victims. The resulting linear function is depicted in Fig. 1 and shows that each additional life at risk should increase resource allocation to the same extent. An underlying assumption of this valuation function is that the efficiency of lifesaving remains constant such that saving an additional life does not become cheaper if more lives are at risk. This assumption is reasonable in situations in which the impact of how much an additional dollar can do to save a life does not change (e.g., if the cost and effectiveness of an additional vaccine or a bowl of rice remains constant).

The second normative valuation function is illustrated in Fig. 2 and is linear until the number of lives at risk reaches a critical point T at which the sustainability of the group is threatened. After this point, the value of each additional life at risk increases exponentially, which can be modeled by a value function of $R = X \times N^b$, with $b = 1$ for all $N \leq T$ and $b > 1$ for $N > T$. As the number of lives at risk increases, progressively more aid is given to each one. Both functions can be considered normative because they represent valuations that are based on generally accepted moral principles (i.e., equality of lives and survival of the group). However, it should also be noted that other possible normative valuation functions exist. For example, if the goal is to save a specific number of lives in order to reach a critical threshold needed for the survival of a group, valuations might increase sharply until such threshold is reached and then level off or drop.[2,3]

1.2. Psychophysical numbing

Evidence exists that valuations of lives underlying aid responses do not always follow such normative models. As the number of lives at risk increases, people tend to exhibit valuations that become progressively less sensitive to changes in victim numbers. This diminished sensitivity to the value of life was documented by Fetherstonhaugh, Slovic, Johnson, and Friedrich (1997) by assessing individuals' willingness to aid groups of different sizes. In one study that compared the effect of the size of refugee camps, participants stated that it would be more beneficial to save 4500 lives when the size of the camp was smaller (11,000 refugees) compared to a larger camp (250,000 refugees). This suggests that respondents valued saving 4500 lives in the smaller camp more than saving the same amount when more lives were at risk. If each individual life that can be saved is valued to the same extent (as proposed by a linear valuation function), then the size of the refugee camp should not make a difference. However, the results by Fetherstonhaugh et al. (1997) suggest that participants were less sensitive to the number of lives when the proportion was low (2% saved) compared to high (41% saved).[4]

In accordance with similar insensitivity to changes in quantity in the domain of perception, Fetherstonhaugh et al. (1997) termed this type of valuation "psychophysical numbing". It can be captured by the mathematical formula of $R = X \times N^b$, with an exponential coefficient $0 < b < 1$. The diminishing sensitivity (with increasing quantity of a stimulus) gives rise to a distinct functional form which describes valuations of several domains, including visual and auditory perception, the value of money, as well as the value of human lives (see Fig. 3). Also known as diminishing marginal utility among economists (e.g., von Neumann & Morgenstern, 1944) and

[1] Naturally, constraints or competing objectives may prevent policy decisions to always follow such a principle.

[2] We would like to thank an anonymous reviewer for this suggestion.

[3] An entirely different philosophical approach to normative valuations was suggested by Taurek (1977), who asserted that the utility of saving one life cannot be meaningfully added to saving another life. According to this perspective, saving lives is not a utility-maximizing problem. Instead, the way lives should be valued is to give each life at risk the same chance of survival, regardless of how many lives are in danger. When given the chance to either save one or 50 people, an "equal chance" entails flipping a coin to determine who is being saved.

[4] Although not normative according to a linear valuation, an exponential normative model could in theory explain these findings if participants perceived the affected proportion of the smaller camp to be large enough to threaten the survivability of the entire camp.

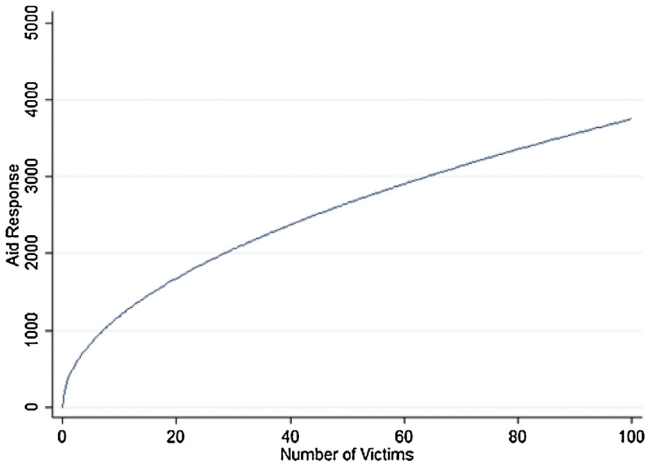

Fig. 3. Psychophysical numbing function.

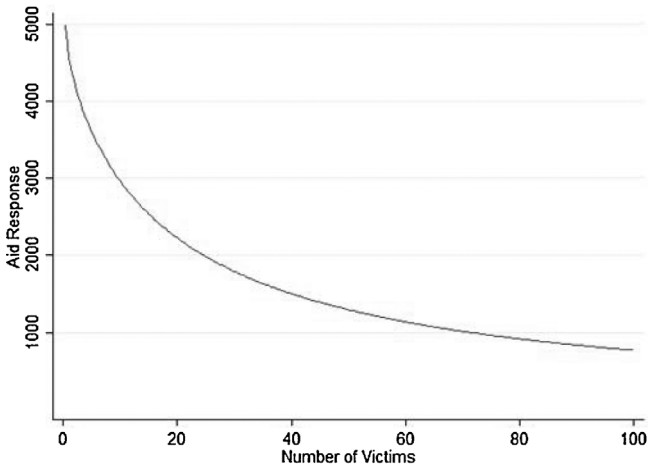

Fig. 4. Psychic numbing function.

depicted as a concave value function in prospect theory (Kahneman & Tversky, 1979), psychophysical numbing implies that saving an additional life is always valued less than the previous life (for a similar argument see Andreoni, 2007). This insensitivity is at odds with the normative models presented earlier. A valuation pattern with decreasing marginal utility can be appropriate for typical market goods and is generally considered rational among utility theorists. However, applying the concept of diminishing marginal value in the domain of humanitarian aid can lead to unwanted consequences. Besides valuing each additional life less than the previous life, more weight is given to saving higher proportions rather than a higher absolute number of lives.

Nonetheless, evaluating the quality of humanitarian aid by the proportion of lives saved seems to hold intuitive appeal. Research on proportional reasoning shows that people can prefer helping a larger proportion of victims even if this means helping a smaller absolute number (Bartels, 2006; Bartels & Burnett, 2011). Furthermore, making people aware of this tradeoff does not seem to change their preferences. One reason for this "proportion dominance" is related to the fact that proportions are intuitively easier to understand than absolute numbers (e.g., Slovic, Finucane, Peters, & MacGregor, 2002). Indeed, proportions assert stronger influence on valuations when the quantity to be judged is not readily evaluable by itself (Hsee & Zhang, 2010; Hsee, 1996, 1998), as is the case for valuations of lives (Slovic, 2007; Slovic, Zionts, Woods, Goodman, & Jinks, 2013). For example, a humanitarian aid intervention program saving 80% of lives at risk is clearly good whereas an intervention program saving a specific absolute number of lives (e.g., 80) is difficult to evaluate without additional information (such as the group size of all that are affected or the number of lives saved by another intervention program). Proportions carry inherent affective meaning that informs valuations but they can give rise to scope insensitivity when large changes in proportions are needed to subjectively feel the difference and take action.

1.3. Psychic numbing and the role of emotions in scope insensitivity

Psychophysical numbing describes the lack of scaling of humanitarian responses with respect to an increasing number of lives at risk. However, it cannot explain situations in which people fail to respond entirely. This can be the case when people are confronted with humanitarian crises that affect large groups of victims (e.g., genocides, wars, or famines). An example is the genocide in Darfur, which has evoked little public concern. This is especially problematic on the level of government institutions and non-government organizations. However, these seemingly uncaring responses are also evident in judgments and decisions made by individuals.

Given the great extent that humans are capable of caring for individual lives, it is surprising that one should remain passive and silent when large numbers of lives are threatened. It seems as though people are not able to multiply the caring they feel for one individual by the number of people at risk (Slovic, 2010). In fact, being confronted with too much suffering can lead to the collapse of compassion, which is responsible for the inactivity in the face of large catastrophes. To model this breakdown of compassion, Slovic (2007) has proposed a "psychic numbing" function, which is presented in Fig. 4. It follows a functional form similar to an inverse exponential function $R = X \times N^{-b}$, with $0 < b < 1$. According to this valuation model, humanitarian aid responses are largest when only few lives are at risk and decrease as the number increases. This valuation model was developed to describe emotional reactions toward people in need, however since people's willingness to help is often based on emotions it can also reflect aid responses.

To understand why and when compassion collapses in the face of large victim numbers, it is helpful to look at how pro-social emotions are generated as well as regulated. Ample evidence exists that emotions like sympathy and compassion are stronger when it is easy to visually attend to or mentally imagine the victims. For example, presenting victims alone rather than as part of a larger group usually creates more pro-social emotions (Dickert & Slovic, 2009; Dickert, Kleber, Peters, & Slovic, 2011; Dickert, Sagara, & Slovic, 2011; Loewenstein & Small, 2007; Slovic & Västfjäll, 2010; Small, Loewenstein, & Slovic, 2007). This is especially the case when the focus is on identified single victims versus large groups of victims (Kogut & Ritov, 2005a,b, 2007; Slovic, 2007). Neuroscientific evidence shows that the emotional reward center of the brain, the striatum, was more activated for identified victims (compared to non-identified victims), and further, that this activation predicted how much participants were willing to donate (Genevsky, Västfjäll, Slovic, & Knutson, 2013). Also, when victims are perceived as a coherent unit (Hamilton & Sherman, 1996; Smith, Faro, & Burson, 2013) and physically or psychologically close (Batson, 1990; Loewenstein & Small, 2007) usually prosocial emotions are stronger. Sympathy is also easier to evoke through sudden changes (compared to long-lasting effects) in the wellbeing of others (Small, 2010). Together, this evidence suggests that contextual information enhances the generation of prosocial emotions when this information highlights the pressing need of a few identified victims.

In situations where many people need help, prosocial emotions may not be sufficiently generated in the first place or

regulated down to reduce empathic overload (Cameron & Payne, 2011; Rubaltelli & Agnoli, 2012). Some evidence exists that other, sometimes highly pertinent information has similar deleterious effects on the generation of pro-social emotions and valuations of individual lives. For example, presenting information in the form of background statistics about the numbers of lives at risk can decrease people's willingness to contribute to charitable causes. Small et al. (2007) presented an identified single victim together with background statistics about a general humanitarian aid crisis and found that financial contributions to the single victim decreased compared to when the victim was presented without statistics. These authors argue that information about identified single victims is processed affectively whereas adding non-affective information such as background statistics leads to stronger deliberative processing that reduces sympathetic responses. These examples also show that the effects of emotional valuations are not always ideal. Emotions direct attention to what is considered the most pressing need, but they may also create scope insensitivity. Too much or too little emotional involvement can lead to failure to react as well as compassion collapse.[5]

It is quite possible that valuations ascribed to the identified and single victim effects are also related to the perceived efficacy of potential donors. Some evidence suggests that proportion dominance in charitable giving is mediated by the perceived utility of a donation (Erlandsson, Björklund, & Bäckström, 2013). Apparently, saving a higher percentage of lives is sometimes seen as more useful. As donors do like to feel that their donation makes a difference, describing general humanitarian aid projects in more detail led to an increased willingness to donate in Cryder, Loewenstein, and Scheines (2013). Conversely, situations in which the perceived efficacy of a donation is undermined by contextual information suggesting that helping responses are likely to be fruitless decrease caring and prosocial action. Research has shown that information about other victims (i.e., the number of victims that cannot be helped) can create a state of pseudo-inefficacy which demotivates helping (Västfjäll, Slovic, & Mayorga, submitted for publication). Pseudo-inefficacy and compassion collapse can explain why and when valuations become scope insensitive and follow a psychic numbing function. In a recent study, participants' compassion toward children in need decreased as soon as more than one child was in danger (Västfjäll, Slovic, Mayorga, & Peters, 2014). This is in line with the notion that both emotional reactions and perceived efficacy are greatest when only few lives are at risk, which can lead to an intuitive preference for lifesaving interventions that benefit smaller groups of affected people.

1.4. Valuation preferences

We conducted a small study to examine if people have systematic preferences for specific valuation functions and whether this depends on how the valuation preferences are elicited. The study was not designed to test which valuation function is best in all kinds of situations and under all possible circumstances. It was designed to provide a simple example of how stated preferences for valuations can be disconnected from actual choice behavior in lifesaving contexts. As the nature of normative and descriptive valuation models is of special interest for public policy decisions, we wanted to see whether preferences of individual people can be reversed depending on the elicitation method (Lichtenstein & Slovic, 2006). Specifically, we aimed to test (1) whether specific valuation functions are preferred over others when using ratings as elicitation method, (2) which function people would choose, and (3) which valuation function best describes actual allocations by NGOs and government agencies. Finally, we gave participants a choice scenario in which they could choose to save a higher proportion of victims versus a larger number of victims to see whether their revealed preferences would match their stated preferences.

In the study, we asked participants ($n = 41$; $M_{age} = 22.9$; 68% female) recruited from the University of Vienna to imagine working for a charitable organization and being responsible for the allocation of funds in an African village facing a severe food shortage. Participants were told that they could distribute a maximum of 5000 donated Euros and that 100 people live in the village. The distribution of donations can follow one of three different plans (Programs A–C). In a within-subjects design, we then presented three different valuation models to all participants which depicted functions similar to those presented in Fig. 1 (Program A: linear valuations), 3 (Program B: psychophysical numbing), and 4 (Program C: psychic numbing). The details of each valuation function were explained under the figures (e.g., valuations increase at a constant rate in Fig. 1, increase at a decreasing rate in Fig. 3, and decrease in Fig. 4; for details see Appendix A). For each function, participants rated how much they agreed that the donation money should generally be distributed as depicted in the figures (on a scale from 1 = do not agree at all to 7 = agree very much), which we interpreted as their "normative preferences". Next we asked participants to choose one of these functions as their preferred option to distribute the donation money, which we interpreted as their stated "subjective preference". After that, participants judged how donations are actually allocated in such a context, which we interpret as "judged allocations". Finally, we presented the same participants with a different decision scenario unrelated to the first in which they were asked to choose between two charitable programs providing food to people in need. "Project A" provided food for 102 out of 115 people at risk of starvation, whereas "Project B" provided food for 105 out of 247 people at risk of starvation. This task followed the typical format of proportion dominance studies (e.g., Bartels, 2006; Fetherstonhaugh et al., 1997), and assumes that the cost for both programs is the same. A linear valuation function should favor Project B, since saving 105 lives is better than saving 102.

A repeated measured analysis of variance showed that participants' normative preferences differed significantly between the valuation functions $F(2,80) = 46.3$, $p < .001$, $\eta_p^2 = .537$. As can be seen in Fig. 5, preferences were higher for the linear function compared to the psychophysical and psychic numbing functions. Also, to indicate their subjective preference participants chose the linear function significantly more often than the psychophysical function, X^2 (1, $N = 41$) = 10.8, $p = .001$ (and no one chose the psychic numbing function; see Fig. 6). When asked which function best describes actual allocations by NGOs, participants' choices were also not equally distributed, X^2 (2, $N = 40$) = 5.2, $p = .076$. Specifically, in this case most participants selected the psychophysical function. Lastly, the results of the second choice scenario between the two charitable projects indicated that most participants preferred the project which saved the higher proportion, X^2 (1, $N = 36$) = 4.0, $p = .045$ (see Fig. 7), which is consistent with the psychophysical function.

These results suggest that, on average, although participants prefer a linear valuation function when asked about their normative and subjective preferences, they do not necessarily apply these preferences when given a choice scenario in which saving a higher proportion is pitted against saving a higher number of victims. This proportional response is consistent with psychophysical numbing and is likely driven by the intuitive appeal of proportion dominance (i.e., helping a larger proportion feels better) and the relative insensitivity of saving 105 versus 102 lives. The results of our small study serve as a demonstration of how stated preferences are not always

[5] See Grant and Schwartz (2011) for a similar argument on various psychological constructs that follow a non-monotonic inverted-U shape.

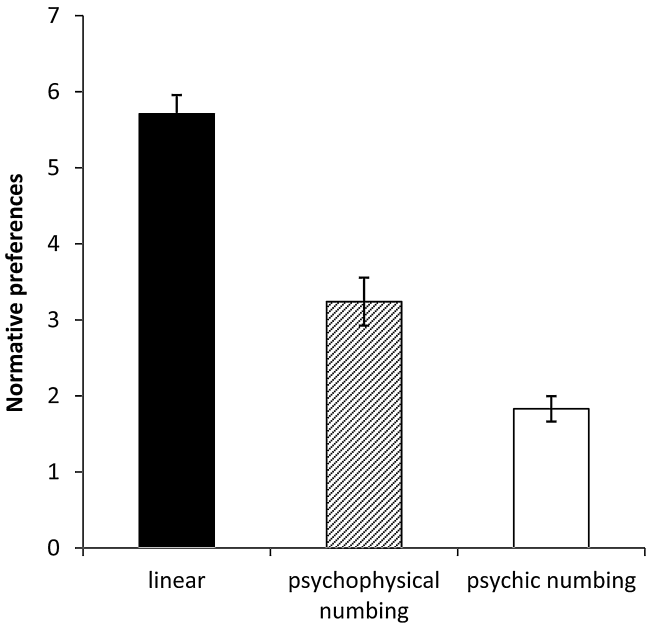

Fig. 5. Normative preferences (ratings). Error bars denote standard errors of the mean.

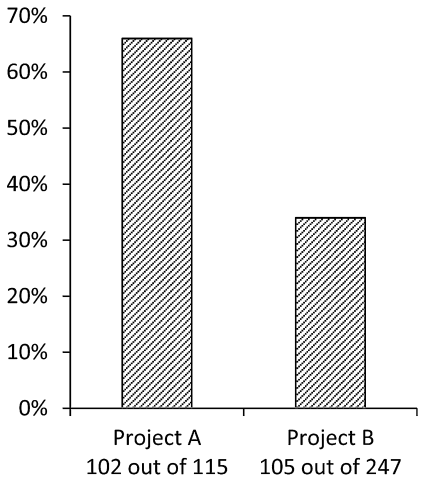

Fig. 7. Preferences for lifesaving projects.

connected to choices in lifesaving contexts, even when being aware of the different valuation functions. In situations where more lives and more money are at play, a divergence between valuations and choices could fail to accomplish the goal of saving as many people as possible. One of the questions that research needs to answer regarding results such as these is how people can be made more scope sensitive (i.e., more linear in their valuations).

1.5. Ways to increase scope sensitivity

Suggestions to increase scope sensitivity may be based on improving decision makers' affective responses as well as engaging appropriate deliberative responses. Note that affective responses and deliberation should not be seen as completely separate mental processes for this purpose, as increased deliberation can also lead to stronger affective responses and vice versa. Although prosocial emotions are bounded (i.e., one cannot feel limitless compassion; Batson, 1990; Batson, O'Quin, Fultz, Vanderplas, & Isen, 1983), it is possible to raise emotional concern for victims of large-scale catastrophes by vivid descriptions of affected single individuals. Narratives, personal stories of victims, and visual images generally motivate helping responses more than using abstract numerical figures. When faced with large numbers that are difficult to mentally represent, people may sometimes imagine a representative and more vivid prototype that keeps their emotions engaged (Kahneman & Frederick, 2005). While some evidence exists that affect-rich stimuli tend to decrease scope sensitivity (Hsee & Rottenstreich, 2004; but see Gong & Baron, 2011), in the context of lifesaving it might be useful to enhance affective processing. Emotions based on moral intuitions can be a good guide in valuations when only few lives are at risk, and if these intuitions do not scale up well other steps need to be taken to keep emotions aroused when many lives are at risk (Slovic et al., 2013).

Other attempts to increase scope sensitivity are based on more careful deliberation and reflection. This should especially be the case for public policy decisions that are complex and deal with multiple conflicting objectives besides lifesaving. Perhaps the most direct way of counteracting scope insensitivity could be to increase individual and public awareness of its existence and influence on decisions. However, it is likely that merely informing people about the negative effects of intuitive valuations on giving is not sufficient. Small et al. (2007) found that debiasing participants by informing about the identified victim effect actually decreased donations to the identified victim rather than increase donations toward unidentified statistical victims. Another way to engage deliberative

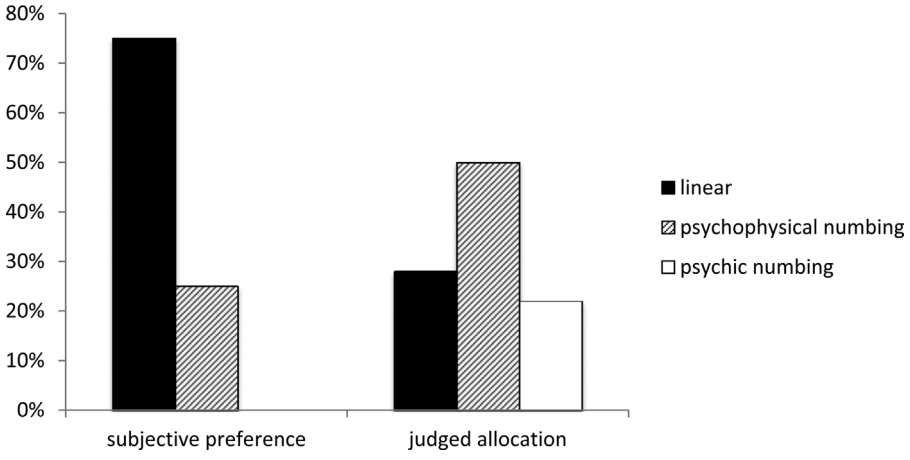

Fig. 6. Subjective preference (choices) and judged allocations (by NGOs).

processes would be to make the numbers of lives at risk more evaluable (Slovic et al., 2013). This could include presenting comparative statistics of victim numbers as well as the predicted impact of a humanitarian aid intervention. Statistics can be brought to life by making them more descriptive, splitting number of victims into women, children, elderly, victims of assault, etc. A more indirect way to increase scope sensitivity is based on the fact that people like to be consistent in their evaluations (Ariely, Loewenstein, & Prelec, 2003), which can lead to a more deliberative approach to valuations by means of calculations. For example, Hsee, Zhang, Lu, and Xu (2013) propose that initial scope insensitivity can be turned into scope consistency by first asking about valuations of a single life and then about valuations of multiple lives. Providing a valuation for one life can lead people to realize that their valuation for *N* lives is not linear and correct for this by increasing their valuations. Another recent approach found that while people are insensitive to the number of lives at risk, they may not be as insensitive to the number of fatalities that have already occurred (Evangelidis & van den Bergh, 2013). This could imply that the number of fatalities informs decision makers about the severity of the humanitarian aid crisis more than the number of lives at risk does.

At the decision-making level of government agencies and NGOs, other institutional changes and rational organizational structures may also increase scope sensitivity and help to avoid falling prey to the limits of moral intuitions when many lives are in danger. Public policy is more than a simple reaction toward issues related to risks. Usually government agencies and NGOs have to choose between many different courses of action and evaluate different tradeoffs, all of which should be done reflectively. For example, organizations can make use of cost-benefit analyses or implement a threshold model which automatically triggers action when a specific number of lives are at risk (Slovic et al., 2013). It is not always clear, however, how costs and benefits should be measured, calculated and weighted in decisions. Possible costs include money, time, the lives of rescue workers, international political consequences, and other negative implications of (in)actions. Benefits include (among others) the improvement in nutrition, health and safety, and general standard of living.[6] If valuations of these dimensions are done ad hoc and intuitively, they may be inconsistent and biased (e.g., Kahneman, Slovic, & Tversky, 1982). Requiring officials to give reasons for inaction as well as action in the face of humanitarian crises would encourage a more reflective approach to public policy and could reduce these inconsistencies. Decision analysis and using a consequence matrix for clarifying the intervention tradeoffs could also be a useful tool to reach this goal (Slovic, Västfjäll, & Gregory, 2012). However, calibrating the right level of aid responses is a particular challenge for public policy. Some evidence exists that although knowledge and commitment to problems within a particular domain can reduce biases in valuations, it may not increase scope sensitivity (Markowitz, Slovic, Västfjäll, & Hodges, 2013).

A decision strategy that can potentially help organizations avoid an inefficient allocation of funds for charitable projects would be to use the average impact (i.e., benefit) as well as the marginal benefit of each additional dollar invested (Baron & Szymanska, 2011). If the goal is to help as many people as possible (or increase welfare to the maximum extent), the valuation of lives can be captured as a utility maximizing problem within the framework of most forms of utilitarianism. According to this perspective, to assure that funds are used in the best possible way organizations should use them to maximize the welfare of all people affected. Humanitarian aid projects that help more people at the same or lower cost of less efficient projects should therefore be preferred because they have a higher average impact. Conversely, the idea of using the marginal benefit per additional dollar invested is based on the observation that charitable organizations and projects have specific target funding levels, at which the available funds are used optimally. Additional funding might do more good in projects or organizations that have not reached this optimal level.

[6] The tradeoff between costs and benefits obviously includes many more dimensions. For example, age, income, and nationality may also be considered when deciding how to allocate funding to people in need (e.g., Li et al., 2010).

2. Concluding remarks

In this article, we presented four different ways to value the lives of others and argued that intuitive valuations can lead to scope insensitivity, which represents a deviation from normative valuations. An important assumption in this depiction of valuations is that they underlie and guide decisions regarding the welfare of others. It is possible, of course, that valuations of life are not always reflected in the amount of help (i.e., money, food, medicine, education, etc.) given to people in need. Moreover, an implicit assumption in most research on the effects of victim numbers on donations is that the effectiveness of an additional dollar spent remains constant regardless of the total number of people in need. It is likely that this is not always the case. For example, if funding is used to build a well to provide clean water, the effectiveness of the spending depends on how many people benefit from it. Also, certain costs remain fairly constant regardless of the amount of people in need (e.g., the transportation costs of food for one or one-hundred people). In order to efficiently allocate resources, charity organizations and institutions need to consider these fixed costs in their calculations of how much a life is worth to them. Indeed, the valuation of lives is only one consideration in responses to risk (Fischhoff, Lichtenstein, Slovic, Derby, & Keeney, 1981). Some evidence exists that people tend to evaluate programs to save human lives by their cost-effectiveness (e.g., the number of lives saved per money unit), but only if this dimension is easy to evaluate (Caviola, Faulmüller, Everett, Savulescu, & Kahane, 2014).

When only looking at the numbers of affected people, it is difficult to understand why some humanitarian catastrophes generate a greater aid response than others. For example, in 2010 the humanitarian aid response in the aftermath of the earthquake in Haiti (which affected an estimated 3 million people) was more than 3 billion dollars. In the same year, the flood in Pakistan (which affected an estimated 20 million people) received only 2.2 billion dollars (Global Humanitarian Assistance, 2013). The valuation of a single life was 10 times higher in Haiti than in Pakistan. It is, of course, possible that aid in Pakistan was more available and more efficient in helping affected people than in Haiti, which cautions against using only the volume of financial contributions as a proxy for valuations.

Perhaps like few other decision making domains, the valuation of lives is inherently intertwined with issues of morality, normativity and rationality. These valuations are often guided by moral intuitions which are, in turn, influenced more by emotions rather than rational considerations (Haidt, 2007). In the specific case of valuations underlying public policy decisions, one would expect that each individual life at risk should be given the same consideration and value, which is a moral principle to which most individuals in western countries would probably agree to. Nonetheless, intuitive tradeoffs and the limits of moral intuitions underlying scope insensitivity in lifesaving contexts can often lead to non-normative and irrational valuations (Reyna & Casillas, 2009). We would also like to point out that deviations from normative models can present a particular problem for public policy when it has to justify the reasons for allocation decisions to the public. It is not always clear which normative standards should guide decisions, though. For example, it is possible to argue for proportion dominance to

represent a form of normative valuation when the goal is to save an entire group. From this perspective, it makes sense to maximize proportions when otherwise the existence of the threatened group is on the line.

Future research should aim at generating a better understanding of the reasons and mechanisms of scope insensitivity and ways to reduce it. The search for scope sensitivity could look at how tradeoffs between lives and money are done in complex public policy decisions regarding the welfare of others. One interesting way forward would be to model the affective and cognitive processes underlying such valuations. Given the link to perceptual theories and already existing evidence of attention as an important driver of valuations (e.g., Dickert & Slovic, 2009), process models could improve our understanding on how and when valuations deviate from normative expectations. Future research might also examine the extent to which experts (i.e., public policy makers) can protect themselves against intuitive valuations of human lives. Scope insensitivity presents a unique challenge for public policy and managers of government and non-government organizations. It is our hope that research will provide some answers to guide public policy decisions and reduce scope insensitivity in this important risk domain.

Conflict of interest

The authors declare no conflict of interest.

Appendix A. Materials

Instructions:

Please imagine that you work for a charity organization and are responsible for distributing donations in a village in Africa in which 100 people live that face a severe food shortage. You have up to 5000 Euros available but do not exactly know how many of the 100 people are affected and need help. Three programs to combat the food shortage are available (Program A–C). They differ in the amount of money distributed depending on how many people are at risk of starvation. Your task is to choose one of these programs. Each of them will alleviate the hunger of the affected people (although not necessarily to the same extent) and costs different amounts of money, depending on the number of people in need of help.

Program A (Fig. 1):

Here donations will be distributed in a way such that the amount increases at a constant rate the more needy persons exist.

Program B (Fig. 3):

Here donations will be distributed in a way such that the amount increases the more needy persons exist, but at a decreasing rate.

Program C (Fig. 4):

Here donations will be distributed in a way such that the amount is high if only few needy persons exist but decreases overall if the number of needy persons increases.

Please indicate how much you agree to each of these statements:

	Do not agree						Agree very much
1. Donations should generally be distributed according to Program A	1	2	3	4	5	6	7
2. Donations should generally be distributed according to Program B	1	2	3	4	5	6	7
3. Donations should generally be distributed according to Program C	1	2	3	4	5	6	7

If you had to choose one of these projects, which one would you choose?
O Program A O Program B O Program C
In your opinion, which of these Programs describes actual allocation of donations by NGOs in the above situation best?
O Program A O Program B O Program C

Please now imagine a situation in which you want to donate to a humanitarian cause. Please indicate which of the following two projects you would rather donate to. Both of these projects are designed to support a specific number of people with food who are at risk of starvation.
□ Project A saves 102 people of 115 people at risk of starvation.
□ Project B saves 105 people of 247 people at risk of starvation.

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