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The impact of numeracy on gain and
non-loss donation decisions

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1. INTRODUCTION

Individuals are many times confronted with appeals for donations from humanitarian aid organizations. Many of them use statistics to describe how many individuals are affected or how many individuals can be helped with a little donation. For example, many individuals in developing countries die from diseases, such as measles or polio. With a donation of just 50 dollars one can help 50 of these individuals to get the chance of being vaccinated and not to die (Doctors Without Borders, 2011). But not all donation requests are presented the same way. Some of them show how many individuals with the same problem, such as diseases or famine, can be helped with a specific amount of money, like the example above. Other ones perhaps do not present the absolute number of victims that could be helped, but precisely describe how much you can help a single victim with your contribution (World Vision, 2011). These examples show that appeals for donations can differ due to their presentation format. However, most of these appeals for donations use numerical information to describe the scale of tragedy. So another factor of the perception of appeals for donations are the numerical abilities of the individuals who read the donation request. Therefore, the interaction of the presentation format of the donation request and the numerical abilities has to be considered in the case of different donation behavior among individuals.

1.1. Effects of numeracy

Numeracy is the ability to process basic probabilities and numerical concepts (Fagerlin et al., 2007; Peters, 2008; Peters et al., 2006). However, many individuals are innumerate, which means they are experiencing difficulties processing numerical information (Kirsch, Jungeblut, Jenkins, & Kolstad, 2002). Even high-educated individuals often have poor numeracy skills (Lipkus, Samsa, & Rimer, 2001). Many studies showed that sufficient numeracy is needed to make good decisions in various domains (e.g. Hanoch, Miron-Shatz, & Himmelstein, 2010). For example, numeracy plays a key role in the perception, understanding and comprehension of risk in medical contexts (Ancker & Kaufman, 2007; Baker, Williams, Parker, Gazmararian, & Nurss, 1999; Davids, Schapira, McAuliffe, & Nattinger, 2004; Fagerlin, Zikmund-Fisher, & Ubel, 2005; Galesic, Garcia-Retamero, & Gigerenzer, 2009; Gigerenzer & Edwards, 2003; Keller & Siegrist, 2009; Lipkus et al., 2001; Nelson, Reyna, Fagerlin, Lipkus, &

Peters, 2008; Woloshin, Schwartz, Black, & Welch, 1999). It is also related to the perception of benefits of medical treatments (Schwartz, Woloshin, Black, & Welch, 1997; Weinfurt et al. 2003).

Research on the general effects of numeracy on information processing shows that individuals who have high numerical abilities consider information about probability more in their decisions than individuals with low numerical abilities (Dieckmann, Slovic, & Peters, 2009). Moreover, high numerate individuals pay more attention to numbers and comprehend them better (Peters et al., 2006; Peters, Dieckmann, Dixon, Hibbard, & Mertz, 2007; Schwartz et al., 1997). They also use deeper and more complex processing of numerical information (Hibbard, Peters, Dixon, & Tusler, 2007; Peters & Levin, 2008) and have a more precise representation of numbers (Peters, Slovic, Västfjäll, & Mertz, 2008). Low numerate ones on the other hand are more likely to be influenced by non-numerical information, for example emotions, their mood state or evaluative categories (e.g. good vs. bad) (Peters, 2008; Peters et al., 2009; Peters, Hibbard, Slovic, & Dieckmann, 2007). Therefore, high numerate individuals are better at interpreting the meaning of risk communication formats, which include numerical information (Bateman, Dent, Peters, Slovic, & Starmer, 2007; Schapira, Davids, McAuliffe, & Nattinger, 2004). They also retrieve more affective meanings from numerical information than low numerate individuals (Peters et al., 2006). As affect is important for the meaning of information and its usage in a decision (Damasio, 1994; Slovic, Finucane, Peters, & MacGregor, 2002), it is essential to know wherefrom individuals with different numerical abilities derive their affect for decisions. Affect can be derived either as a direct hit from an object or as a result of deliberation. High numerate individuals, who are better in dealing with numbers, derive their affect therefrom, whereas low numerate ones rather derive their affect from non-numerical information, such as verbal information (Peters et al., 2006; Peters et al., 2009). Therefore, more numerate individuals prefer risk presentations that include numerical information, whereas low numerate individuals rely more on non-numerical information (Gurmankin, Baron, & Armstrong, 2004).

1.2. Effects of presentation formats and individual differences

Numerical information is also used in appeals for donations (Doctors Without Borders, 2011; World Vision, 2011) to describe for example the number of affected individuals or how many victims could be helped with a determined amount of money. Numerical information as well as many other situational influences and mechanisms affect pro-social behavior. For example it was found that a single identified victim, about who additional information (e.g. name and age) is given, evokes stronger feelings and higher willingness to help than an unidentified victim (Kogut & Ritov, 2005a). Referring to this fact, a precise description of one single child is more effective than just showing an abstract number of victims, when it comes to a donation decision. Depending on the vividness of the presented victim, also two different information processing modes are activated. When the target is presented with additional information (e.g. age and name) the affective mode is activated, whereas for abstract targets the deliberative mode is used (Dickert & Slovic, 2009; Epstein, 1994). Thus, the vividness of the presented victim influences the donation behavior, because the stronger the evoked affective reactions are, the higher is the chance of help (Kogut & Ritov, 2005a; Kogut & Ritov, 2005b).

However, not all emotions affect the donation behavior in the same way. Research shows that both the decision to donate and the donation amount are affected basically by different emotions, both other-focused (i.e. empathic) and self-focused. The self-focused emotions are important for the initial donation decision (i.e. I donate vs. I do not donate), whereas the other-focused emotions are crucial for the donation amount (Dickert, Sagara, & Slovic, 2011).

In further studies it was tried to debias this identified victim effect by informing individuals about it (Small, Loewenstein, & Slovic, 2007). The information about this effect induces deliberative thinking, which further leads to lower sympathy and help for the identified victims, but shows no effect of sympathy or help for statistical ones (Small et al., 2007). So, the identified victim effect influences the donations as well as affective reactions. In the affective information processing mode more and higher donations are made (Dickert, Sagara et al., 2011).

Other results show that victims who are already specified (i.e. determined) get more help than victims who will be selected later (i.e. indeterminate) (Small & Loewenstein, 2003). Presentation of determined victims is more effective because it

makes the responsibility more salient and the risk perception can depend on the saliency (Douglas, 1992).

Not only the determination of victims, but also the presentation of saved victims, can be framed in a donation request. The victims who can be helped can either be presented as an absolute number or as a percentage. Due to the fact that individuals are more sensitive to a proportional change than to an absolute one (i.e. proportion dominance) (Stevens, 1975), they are willing to pay more if the proportion of saved victims is higher, even if the absolute number of saved victims is the same (Baron, 1997). Therefore, saving a life is valued better if fewer individuals are affected. Otherwise the help is perceived as a drop in a bucket and the value of live-saving drops (Fetherstonhaugh, Slovic, Johnson, & Friedrich, 1997). Further research showed that proportion dominance is also related to individual differences. Individuals with a rational way of thinking (i.e. individuals who think through their decisions before making a choice) show less proportion dominance than individuals with an experiential way of thinking (i.e. individuals whose choices depend strongly on their gut feeling) (Bartels, 2006).

How persuasive a pro-social appeal for donation is, also depends on individual differences regarding to the self-regulatory focus (Fransen, Fennis, Vohs, & Pruyn, 2009). The regulatory focus theory distinguishes between two independent self-regulatory orientations: promotion and prevention (Higgins, 1997). In the promotion focus goals are viewed as ideals (i.e. hopes) and success is experienced as gains, whereas in the prevention focus goals are viewed as ought (i.e. duties) and success is experienced as non-loss. Therefore, goals with a desirable end state (i.e. gains) are more compatible with the promotion focus, whereas avoidance goals (i.e. non-losses) are more compatible with the prevention focus (Higgins, 2002). These two combinations (i.e. gains and promotion focus as well as non-losses and prevention focus) produce a regulatory fit, which increases the task engagement (Higgins, 2000; Higgins, 2005) and the persuasiveness (Aaker & Lee, 2001; Cesario, Grant, & Higgins, 2004; Lee & Aaker, 2004; Monga & Zhu, 2004). Further information, which fits with the self-regulatory focus orientation, is processed easier (Labroo & Lee, 2006; Lee & Aaker, 2004). The regulatory fit theory is also valid in donation decisions. Individuals in the promotion focus donate more money when the goals of the charity are described as a positive outcome (i.e. gain) rather than as a prevention of a negative outcome (i.e. non-loss). For individuals in the prevention focus the opposite is found (Fransen et al., 2009).

Not every appeal for donation is written in the same way. One might be framed in a more positive way than another. In donation decisions as well as in many other areas, a negative framed message is more effective than a positive framed one, because negative information attracts more attention and is more persuasive (Chang & Lee, 2010). However, the effectiveness of a framed message in a donation decision also depends on the quality of the given information. When abstract information is given, a negative framed message is more effective than a positive one, whereas when an anecdotal description is given, a positive framed message achieves more effectiveness (Das, Kerkhof, & Kuiper, 2008).

Summarizing, presentation formats and individual differences affect the pro-social behaviour not only individually, but also affect it by its interactions. For example the differences in the donation behaviour, when a donation request is presented in an absolute or percentage format, depend also on the individual difference of either the rational or the experiential way of thinking (Bartels, 2006). Another example for the interaction of presentation format and individual differences affecting the donation behaviour is, that depending on the individual differences regarding the self-regulatory focus, the valence of the framed donation request has a different impact on the donation behaviour (Fransen et al., 2009).

1.3. Effects of the interaction between numeracy and presentation formats

Further studies (Dickert, Kleber, Peters, & Slovic, 2011; Dieckmann et al., 2009; Peters, Dieckmann et al., 2007; Peters et al., 2006) show that low numerate compared to high numerate individuals are more influenced by the presentation format. They rated the same risk higher when it was presented in a frequency format (i.e. 10 out of 100) than in a probability format (i.e. 10%), whereas high numerate individuals rated the risk equally (Peters et al., 2006). Individuals with differing numerical abilities are influenced through positive versus negative framing (e.g. 74% correct vs. 26% incorrect) in the presented donation message differently as well. The framing effect for individuals with low numeracy is stronger than for those with high numeracy (Peters et al., 2006).

Therefore, not only various presentation formats, but also individual differences, such as the self-regulatory focus or numerical abilities of individuals, and the interaction between these “external” (i.e. presentation format) and “internal” (i.e. individual differences) factors, can influence the donation behavior. The present study also focuses

on the influences of different presentation formats on individuals with different numerical abilities.

1.4. Aim of the current study and derivation of the hypotheses

The aim of the current study is to examine the effects of numeracy on the influence of gain and non-loss frames in donation decisions. The help for the donation recipients of the donation request was presented either in a gain (i.e. help 7 victims to live) or in a non-loss (i.e. help 7 victims not to die) frame. Both, the decision to donate and the donation amount are affected by emotions (Dickert, Sagara et al., 2011). When irrelevant information about donation requests is perceived (e.g. negative verbal information) rather than numerical information, the affective information process is triggered more. As low numerate individuals more often rely on the narrative information rather than on the numerical information in decision situations (Gurmankin et al., 2004; Peters, Hibbard et al., 2007; Peters, 2008; Peters et al., 2009) the following hypotheses are derived:

(H1) Presenting the donation request in the non-loss frame format leads to higher affective reactions (i.e. other-focused as well as self-focuses emotions), the lower the numeracy of the individuals is.

(H2) Further it is expected, that when presenting the donation request in the non-loss frame format more frequent donations (H2a) and higher donation amounts (H2b) will be made, the lower the numeracy of the individuals is.

(H3) Finally, it is hypothesized that the affective reactions mediate the effect between numeracy and the donation behavior when the donation request is presented in the non-loss frame format. In particular the self-focused emotions should mediate the willingness to donate (H3a), whereas the other-focused emotions should mediate the donation amount (H3b).

The effects mentioned above, should particularly appear for individuals who have a high chronic prevention focus, because of their regulatory fit (Fransen et al., 2009).

2. METHOD

2.1. *Participants and Design*

One hundred eighty three German-speaking participants ($M_{\text{age}} = 24.6$, $SD_{\text{age}} = 4.42$; 66% female) took part in this study. The duration of the study was approximately 18 minutes. It was conducted as an online study via computer. Each participant was randomly assigned to one of the two experimental framing conditions (i.e. gain framing or non-loss framing).

The presentation format frame was manipulated either as gain (i.e. help 7 victims to live) or as non-loss (i.e. help 7 victims not to die). Further the numeracy of the participants was measured with questionnaires. The dependent variables were the donation decision, the donation amount and the affective reactions of the participants. The chronic self-regulatory focus, which was also measured with a questionnaire, was included as control variable.

2.2. *Material and Procedure*

At the beginning of the study, participants were asked to read the following donation request: “Please imagine, you got 20 Euros and had the option to donate some of this money for an international aid organization for children or to keep the money. This aid organization for children was given an Austrian seal approval and works in developing countries. Its aim is to supply seriously ill children from a little African village with needed medication.”

The two experimental conditions differed only in the last sentence of the donation request. In the condition with a gain frame the last sentence was: “With your donation you can help 7 out of 14 sick children to be healed”, whereas in the condition with a non-loss frame the last sentence was: “With your donation you can help 7 out of 14 sick children not to die”. Afterwards participants indicated, whether they wanted to donate money for that project or not. If they decided to donate money, they further had to specify how much money they wanted to donate.

Then, the affective reactions were measured with six items on a 9-point scale ranging from 1 (I do not agree at all) to 9 (I completely agree) (Dickert, Sagara et al., 2011). Four of these six items measured other-focused emotions (i.e. concern,

compassion, sympathy referring to the victims), whereas the other two items measured self-focused emotions (i.e. feeling well or remorse when a donation was or was not made).

Next, numeracy was also measured objectively with 15 items, where individuals' skills to transform frequencies in probabilities and vice versa were assessed (Peters, Dieckmann et al., 2007).

Afterwards, participants' chronic self-regulatory focus was measured with 18 items on a 9-point scale ranging from 1 (not at all true for me) to 9 (very true for me) (Lockwood, Jordan, & Kunda, 2002).

Finally demographic data (i.e. age, gender, degree, position, monthly income, monthly available money) and if participants regularly donate for non-profit organizations (binary variable: yes / no) were assessed.

3. RESULTS

3.1. Preliminary data analysis

Fourteen participants were removed from the analyses. The reasons were either that they were younger than 18 years of age (two participants) or they interrupted the online questionnaire, so that the effectiveness of the manipulation might have been lost (five participants). Participants whose duration to complete the survey was under nine minutes ($SD < 1$, seven participants) were also excluded from the analyses. Finally, 169 participants remained for the analyses.

The numeracy scores ($M = 12.7$, $SD = 1.62$) of the participants ranged between 6 (40% correct) and 15 (100% correct). To reduce its skewness ($z(skew) = 2.37$, $p < .001$) for the regression analyses, numeracy scores were non-linear transformed (i.e. x^3 , $z(skew) = 1.78$, $p = .003$). Individuals were further classified into three groups: low numeracy (with a score from 6 to 12, $n = 65$), middle numeracy (with a score of 13, $n = 46$) and high numeracy (with a score from 14 to 15, $n = 58$), which were used for the t-Tests.

The donation amounts ($M = 17.6$, $SD = 4.57$) were skewed ($z(skew) = 5.66$, $p < .001$) and therefore non-linear transformed (i.e. x^4 , $z(skew) = 5.78$, $p < .001$) as well. The optimal exponent for the transformation to reach the best approach to normal distribution and homoscedasticity for the regression analyses was detected with the Box-Cox Transformation (Osborne, 2010).

For the six items, which measured the affective reactions, a principal component analysis with orthogonal rotation (varimax) was conducted. The sampling adequacy ($KMO = .792$) as well as the correlations between the items, $\chi^2 (15, N = 169) = 398.5$, $p < .001$, were good enough to accept this analysis. Two components, which had eigenvalues over kaiser's criterion of 1, were extracted and explain 73.8% of the variance. Given the items that cluster on the same components, the first component represents the other-focused emotions, whereas the second component represents the self-focused emotions. Therefore two different affective reaction scales were formed with acceptable reliabilities (Cronbach's $\alpha = .808$ and Cronbach's $\alpha = .738$, respectively).

For the regression analyses the variables were standardized and therefore acceptable tolerances were provided ($VIF < 2.10$).

3.2. Effects of frame format and numeracy on affective reactions

To test hypothesis 1 (i.e. presenting the donation request in the non-loss frame format should lead to higher affective reactions, the lower the numeracy of the individuals is) multiple linear regression analyses with non-linear transformed numeracy, frame format (gain vs. non-loss), the interaction between them and chronic self-regulatory prevention and promotion focus (as covariates) were conducted. For the further analyses t-Tests were used.

The other-focused emotions were predicted significantly, $F(5, 163) = 2.22$, $p = .055$, $R^2 = .064$, by the chronic self-regulatory promotion focus ($\beta = .194$, $p = .017$) and marginally by the frame format ($\beta = .130$, $p = .091$). This indicates that presenting a donation request in the non-loss frame format ($M = 6.08$, $SD = 1.94$) leads to higher other-focused emotions than in a gain frame format ($M = 5.58$, $SD = 1.90$). However, a trend for this effect only appeared for the group of low numerate individuals (gain: $M = 5.45$, $SD = 1.71$, non-loss: $M = 6.02$, $SD = 1.90$), $t(63) = -1.26$, $p = .211$ but not for the group of high numerate ones (gain: $M = 5.76$, $SD = 1.97$, non-loss: $M = 6.24$, $SD = 2.01$, $p = .372$) (see Figure 1). All other effects remained non-significant (see Table 1).

Table 1: Multiple linear regression analysis for the prediction of other-focused emotions by numeracy, frame format and self-regulatory focus

Predictors	β	p
Self-regulatory prevention focus	.041	.606
Self-regulatory promotion focus	.194	.017
Frame format	.130	.091
Numeracy	.086	.417
Interaction of frame format and numeracy	-.078	.461

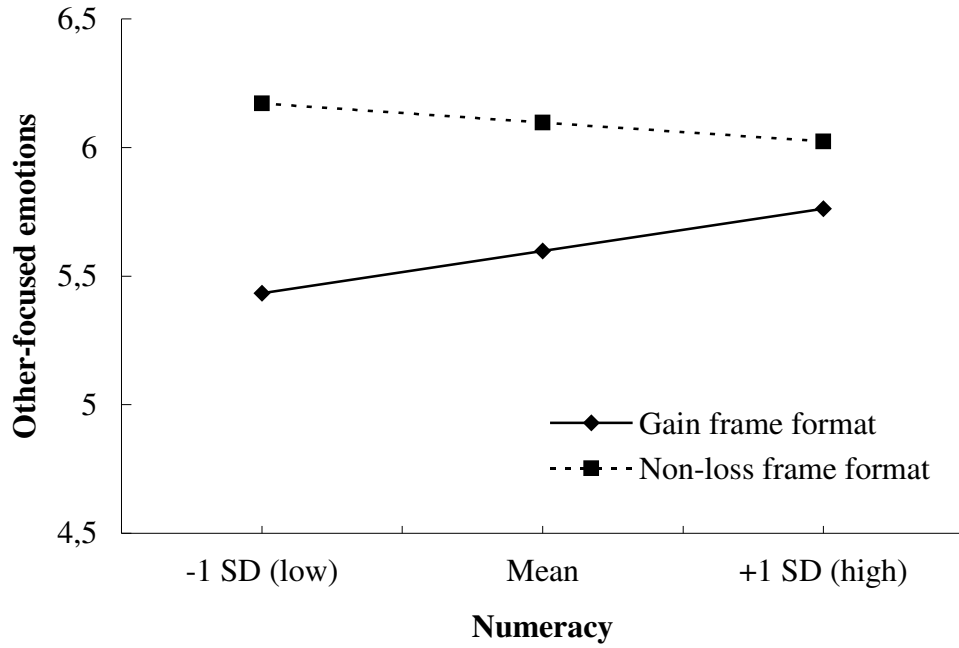


Figure 1: Regression lines of numeracy and other-focused emotions by frame format conditions

Further the self-focused emotions were predicted significantly, $F(5, 163) = 2.70$, $p = .023$, $R^2 = .076$, by the chronic self-regulatory prevention focus ($\beta = .203$, $p = .011$) (see Table 2).

Table 2: Multiple linear regression analysis for the prediction of self-focused emotions by numeracy, frame format and self-regulatory focus

Predictors	β	p
Self-regulatory prevention focus	.203	.011
Self-regulatory promotion focus	.102	.202
Frame format	-.088	.249
Numeracy	-.023	.830
Interaction of frame format and numeracy	.043	.685

Additional simple regression analyses separately for gain and non-loss frame format, with non-linear transformed numeracy and chronic self-regulatory prevention and promotion focus (as covariates) were conducted. Only in the simple regression analysis for the non-loss frame format the self-focused emotions were predicted

significantly, $F(3, 89) = 2.68$, $p = .052$, $R^2 = .083$, by the chronic self-regulatory prevention focus ($\beta = .251$, $p = .019$). This indicated that only in the non-loss frame format condition, self-focused emotions increase when the chronic self-regulatory prevention focus increases, while in the gain frame format condition no significant effect was found ($p = .287$) (see Table 3).

Table 3: Simple linear regression analysis (separately for non-loss and gain frame format) for the prediction of self-focused emotions by numeracy and self-regulatory focus

Predictors	Non-loss frame format		Gain frame format	
	β	p	β	p
Self-regulatory prevention focus	.251	.019	.131	.287
Self-regulatory promotion focus	.080	.460	.141	.252
Numeracy	.039	.708	-.031	.787

3.3. Effects of frame format and numeracy on the willingness to donate

A multiple logistic regression analysis with non-linear transformed numeracy, frame format, the interaction between them and chronic self-regulatory prevention and promotion focus (as covariates) was conducted to test hypothesis 2a (i.e. presenting the donation request in the non-loss frame format should lead to a higher willingness of individuals to make a donation, the lower the numeracy of the individuals is). The willingness to make a donation was predicted significant by numeracy ($B = 1.13$, $p = .019$), $\chi^2(5, N = 169) = 8.84$, $p = .116$, $R^2 = .113$. All other effects remained non-significant (see Table 4).

Table 4: Multiple logistic regression analysis for the prediction of willingness to donate by numeracy, frame format and self-regulatory focus

Predictors	B	p
Self-regulatory prevention focus	.006	.984
Self-regulatory promotion focus	-.025	.934
Frame format	-.838	.268
Numeracy	1.13	.019
Interaction of frame format and numeracy	-.605	.327

Contrary to the expectations, it revealed that the willingness to donate increases with higher numeracy. Further simple logistic regression analyses, separately for gain and non-loss frame format, with non-linear transformed numeracy and self-regulatory prevention and promotion focus (as covariates) were conducted. Although the interaction of numeracy and framing (in the multiple logistic regression) was not significant ($p = .327$), the simple logistic regressions showed that the influence of numeracy on the willingness to donate only appears when the donation request was presented in a gain frame format ($B = 1.21$, $p = .016$), whereas when it was presented in a non-loss frame format no significant effect of numeracy was found ($p = .152$) (see Table 5) This indicated that only in the gain frame format condition numeracy affects the willingness to donate contrary to the expectations, while in the non-loss frame format condition no significant influence of numeracy was found.

Table 5: Simple logistic regression analysis (separately for non-loss and gain frame format) for the prediction of willingness to donate by numeracy and self-regulatory focus

Predictors	Non-loss frame format		Gain frame format	
	B	p	B	p
Self-regulatory prevention focus	-.241	.536	.493	.376
Self-regulatory promotion focus	-.160	.668	.139	.777
Numeracy	.560	.152	1.21	.016

3.4. Effects of frame format and numeracy on the donation amount

To test if presenting the donation request in a non-loss frame format leads to higher donation amounts, the lower the numeracy of the individuals is (i.e. hypothesis 2b), a multiple linear regression analysis with non-linear transformed numeracy, frame format, the interaction between them and chronic self-regulatory prevention and promotion focus (as covariates) was conducted. The donation amount was predicted significantly, $F(5, 148) = 1.93$, $p = .092$, $R^2 = .061$, by the frame format ($\beta = .164$, $p = .042$). This indicates that in the non-loss frame format in comparison to the gain frame format higher donation amounts are made. All other effects remained non-significant (see Table 6 – step 2). However, these multiple linear regression analysis was also conducted as a hierarchical regression analysis. Before the interaction of frame format and numeracy was entered as predictor, the donation amount was predicted significantly, $F(4, 149) = 2.36$, $p = .056$, $R^2 = .060$, by the frame format ($\beta = .162$, $p = .045$) and numeracy ($\beta = -.150$, $p = .062$). This indicated that the lower numeracy is, the higher donation amounts are made (see Figure 2 as well as Table 6 – step 1).

Table 6: Multiple hierarchic linear regression analysis for the prediction of the donation amount by numeracy, frame format and self-regulatory focus

Predictors	Step 1		Step 2	
	β	p	β	p
Self-regulatory prevention focus	-.107	.209	-.107	.209
Self-regulatory promotion focus	.102	.233	.105	.221
Frame format	.162	.045	.164	.042
Numeracy	-.150	.062	-.110	.334
Interaction of frame format and numeracy	not entered		-.057	.615

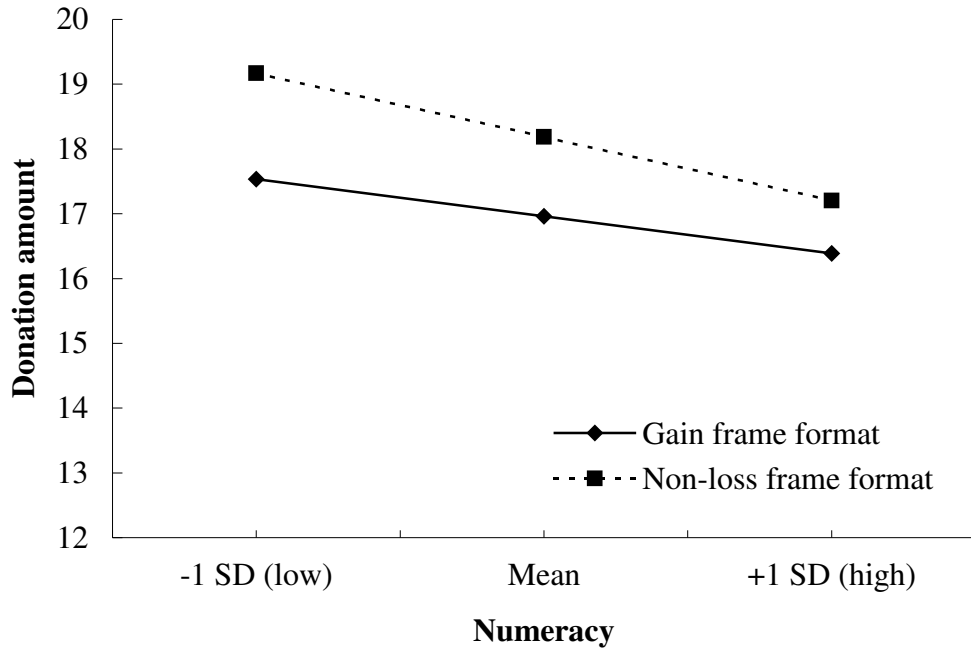


Figure 2: Regression lines of numeracy and donation amounts by frame format conditions

Further simple linear regression analyses, separately for gain and non-loss frame format, with non-linear transformed numeracy and self-regulatory prevention and promotion focus (as covariates) showed that the effect of numeracy ($\beta = -.203$, $p = .069$) on the donation amount only appears when the donation request is presented in the non-loss frame format. The donation amount of a donation request, which was presented in the gain frame format, was not significantly predicted by the numeracy of the individuals ($p = .389$) (see Table 7).

Table 7: Simple linear regression analysis (separately for non-loss and gain frame format) for the prediction of the donation amount by numeracy and self-regulatory focus

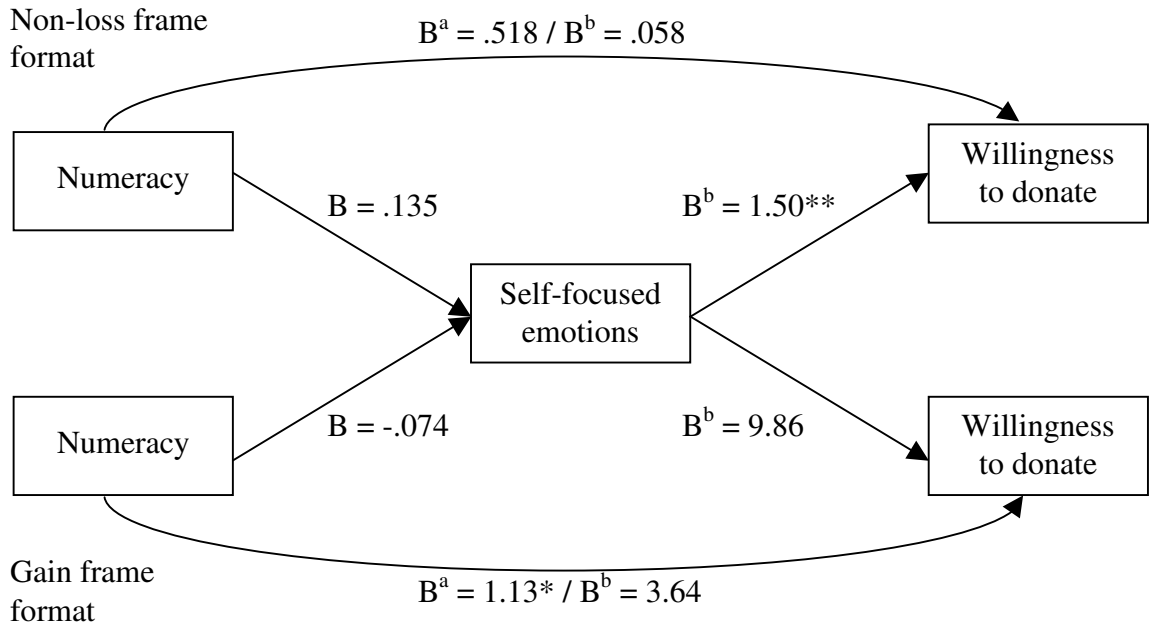
Predictors	Non-loss frame format		Gain frame format	
	β	p	β	p
Self-regulatory prevention focus	-.146	.214	-.070	.588
Self-regulatory promotion focus	.127	.284	.087	.499
Numeracy	-.203	.069	-.106	.389

3.5. Effects of the affective reactions on the link between numeracy and donation behaviour

To test the influence of the affective reactions on the link between numeracy and donation behaviour (i.e. hypothesis 3), mediation analyses separately for the gain and the non-loss frame format were conducted. For the mediation analyses the regression approach regarding to Baron and Kenny (1986) was used. Further bootstrapping was used to test the indirect effect of the mediation (Preacher & Hayes, 2008).

First, two mediation analyses (separately for the gain and non-loss frame format) with non-linear transformed numeracy as predictor variable, self-focused emotions as mediator variable and the willingness to donate as the criterion were conducted. For the condition in which the donation request was presented in the gain frame format, a significant influence of numeracy on the willingness to donate (i.e. step one of the mediation analysis) was found, $B = 1.13$, $p = .018$, indicating that the willingness to donate increases in the gain frame condition with higher numeracy. However, no further significant direct effects were found in this mediation analysis for the gain frame format (see Figure 3). The indirect effects remained non-significant as well (95% CI [-.003, .002]). This indicated that when presenting a donation request in the gain frame format, the self-focused emotions do not mediate the effect of numeracy on the willingness to donate.

Further for the non-loss frame format condition, a significant effect of the self-focused emotions on the willingness to donate with controlling for numeracy was found, $B = 1.50$, $p = .004$, indicating that in the non-loss frame condition the willingness to donate rises with an increase of the self-focused emotions. All other direct effects in this mediation analysis for the non-loss frame format remained non-significant (see Figure 3). The indirect effects were also not significant (95% CI [-.0004, .0006]). So, the self-focused emotions cannot be confirmed as a mediator variable between numeracy and the willingness to donate in the non-loss frame format condition.



$^{**} p < .01$, $^* p < .05$

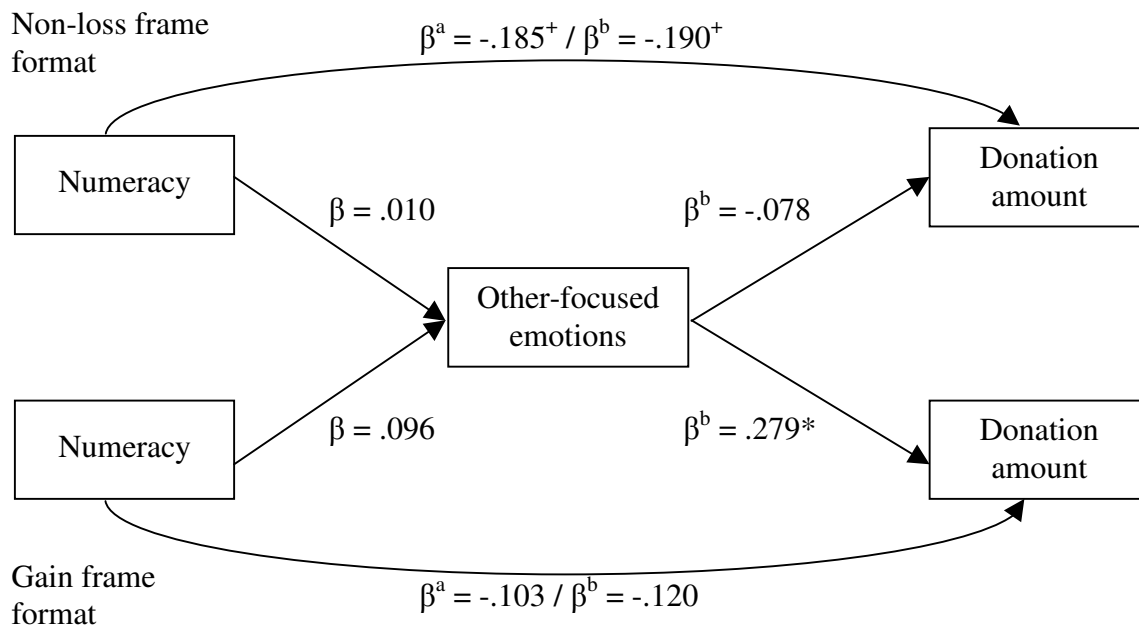
^a Regression coefficients without the mediator (self-focused emotions) as predictor

^b Regression coefficients with numeracy and self-focused emotions as predictor

Figure 3: Mediation analysis (separately for non-loss and gain frame format) for the prediction of the willingness to donate by numeracy (as predictor) and self-focused emotions (as mediator)

Second, two more mediation analyses (separately for the gain and non-loss frame format) were conducted. Thereby the predictor variable was non-linear transformed numeracy, the mediator variable was the other-focused emotions and the criterion was the donation amount. The first mediation analysis was conducted for the gain frame format condition. For this, a significant effect was of the other-focused emotions on the donation amount with controlling for numeracy was found, $\beta = .279$, $p = .020$, indicating that in the gain frame format condition the donation amount rises when the other-focused emotions increase. However, no further significant direct effects were found in this mediation analysis for the gain frame format (see Figure 4). The indirect effects remained non-significant as well (95% CI [-3.57, 9.37]). Thus, the other-focused emotions do not mediate the effect of numeracy on the donation amount in the gain frame format.

For the non-loss frame condition a significant effect of numeracy on the donation amount was found without the mediator as predictor ($\beta = -.185, p = .092$) as well as with the mediator as predictor ($\beta = -.190, p = .085$), indicating that in this frame format the donation amount rises with decreasing numeracy. All other direct effects in this mediation analysis for the non-loss frame format remained non-significant (see Figure 4). The indirect effects were also not significant (95% CI [-.638, 5.65]). Therefore, in the non-loss frame format the other-focused emotions are not a mediator variable either.



** $p < .01$, * $p < .05$, + $p < .10$

^a Regression coefficients without the mediator (self-focused emotions) as predictor

^b Regression coefficients with numeracy and self-focused emotions as predictor

Figure 4: Mediation analysis (separately for non-loss and gain frame format) for the prediction of the donation amount by numeracy (as predictor) and other-focused emotions (as mediator)

4. DISCUSSION

Most donation requests include numerical information to inform individuals about the purpose for which their donation will be used. This information could refer to the number of individuals who are affected by a natural disaster or a disease in a developing country. Another possibility is to inform the reader of the donation request about the number of victims that could be helped with a specific donation amount. Never mind which information is emphasized by the donation request, in the majority of cases this information will be presented with numbers. Therefore, it is important to understand how individuals perceive and comprehend this numerical information and which interpretations they derive from the donation request. However, another important factor of presenting a donation request is, how its aim is phrased. This could be either in a way where the gain is emphasized (i.e. help children to live) or in another way where the focus is on the avoidance of a loss (i.e. help children not to die). Therefore, this study was conducted to examine the effect of the presentation format of an appeal for donations and the numeracy of individuals on their pro-social behaviour.

The results of this study demonstrated that the presentation of the donation request in the non-loss frame format (i.e. where the avoidance of the loss is emphasized) evokes higher other-focused feelings (i.e. empathy for the victims) than a presentation in the gain frame format (i.e. where the focus is on the winning), especially for low numerate individuals. Such a difference, however, was not found for individuals with high numeracy. One explanation of this outcome is, that individuals with low numeracy experience difficulties to comprehend the given numerical information (Peters et al., 2006; Peters, Dieckmann et al., 2007; Schwartz et al., 1997). Therefore, they cannot derive the same extent of meaningful information of the numbers (i.e. help 7 out of 14 children) as individuals with high numerical abilities (Peters et al., 2006). On this account, low numerate individuals derive their information about the donation appeal mainly from its narrative information (i.e. live vs. not to die) (Gurmankin et al., 2004; Peters et al., 2006; Peters et al., 2009), which triggers the affective information process. For individuals with low numeracy it is therefore important, whether the appeal for donation is framed in a gain or a non-loss format, because this affects their information processing (Chang & Lee, 2010). For individuals who have high numerical abilities this framing effect was not found, because they derive their information from the given

numbers rather than from irrelevant verbal information of the framing of the donation request (Peters et al., 2006). Therefore, they are not so easily affected by the presentation format of the donation request, because the core numerical information does not change through the two presentation formats.

Further results of the study showed that presenting an appeal for donation in a non-loss frame format leads to higher donation amounts, the lower the numeracy of the individuals is. This numeracy effect does not appear in the gain frame format condition. An explanation for this is, that the donation amount depends on the other-focused emotions that are derived from the donation request (Dickert, Sagara et al., 2011). The lower the numeracy of individuals is, the more they derive their meanings about the donation request from the narrative framing and therefore, produce higher other-focused emotions that lead to higher donation amounts (Dickert, Sagara et al., 2011; Peters et al., 2006; Peters et al., 2009). Whereas the higher the numeracy of individuals is, the more abstractly they process the information of a donation request (Dickert, Kleber et al., 2011). Thereby the focus is more on the numerical and not on the narrative information. This difference of information processing is particularly evident when the donation request is framed in a non-loss format.

In contrast to the expectations no effect of numeracy and the presentation format of the donation request were found on the self-focused emotions. Only the prevention focus influenced the self-focused emotions, whereby this effect was only found when the donation request was presented in the non-loss frame format. One explanation for this could be the regulatory fit (Fransen et al., 2009). Individuals, who have a high prevention focus, also have a regulatory fit with a donation request that is presented in the non-loss frame format. In this case their task engagement as well as their suggestibility increase (Aaker & Lee, 2001; Cesario et al., 2004; Higgins, 2000; Higgins, 2005; Lee & Aaker, 2004; Monga & Zhu, 2004). Due to this higher suggestibility, individuals with a regulatory fit might have higher self-focused emotions. An explanation for the absence of an effect of numeracy and the presentation format could be, that self-focused emotions are more robust to information processing manipulations than other-focused emotions (Dickert, 2008).

Further, in contrast to the assumptions no effect of numeracy on the willingness to donate was found when the donation request was presented in the non-loss frame format. One explanation for this might be, that the decision of whether to donate is a more serious one than the decision of how much to donate. Maybe the power of the

framing of the donation request was too weak to have an effect on such a serious decision. Another explanation might be, that the decision which had to be made, was only hypothetical and not real. A surprising effect, contrary to the expectations was found in the gain frame format condition. There the willingness to donate rises, the higher the numeracy is. It might be the case that also other influencing factors, such as how effective the donation request is perceived (Dickert, Kleber et al., 2011), effect the decision about the willingness to donate. These influencing factors might have more weight in the decision making than the numeracy or the frame of the presentation format.

Also in contrast to the expectations, the affective reactions do not mediate the effect between numeracy and the pro-social behavior (i.e. neither the willingness to donate nor the donation amount) when the donation appeal was presented in the non-loss frame format. The explanation in case of the failed mediation analysis for the willingness to donate might be, that the self-focused emotions are not so easily influenced by the presentation format (Dickert, 2008). Therefore after a manipulation the self-focused emotions might still be unchanged, even though an effect on the willingness to donate had already been made.

In the mediation analysis of the donation amount, the assumed mediator (other-focused emotions) could not be confirmed either. One explanation for this might be, that the other-focused emotions only exist as mediator variable for low numerate individuals, which can be derived of the results of hypothesis one. Individuals with high numerical abilities might have other important factors (i.e. numerical information), which influence their decision about the donation amount.

4.1. Limitations and Future Directions

In this study participants first had to make a donation decision and afterwards they had to assess their other-focused and self-focused emotions about the victims, who were mentioned in the donation appeal. This order was chosen, because otherwise, if confronting the individuals with the affect first, the focus of the individuals would have been on their affect and not on the donation appeal. This could have influenced their decisions about their willingness to donate and their donation amount. For future research it might be helpful to go the other way around, first assess the affective

reactions and afterwards confront the participants with the donation decision, to see what differences might appear.

Further, the proportion of the number of victims (i.e. 7) and affected children (i.e. 14), which was used in the donation request, was exactly fifty percent. This ensured that not anybody could have thought that the donation appeal is good (or bad) because more (or less) than half of the affected children can be helped. Additional research might use other proportions or another magnitude of the victims and affected children, to compare their findings.

Furthermore, the amount that could have been donated was limited (i.e. 1 to 20 euros). The donation appeal also informed the individuals that they got 20 euros and that they could donate all or a part of this money but they did not have to. This information in the donation appeal and the derived borders, ensured that not the actual income or the available money influence their donation decisions. Further studies are well-advised to have an open answer format with no boundaries for the donation amount there, to notice the differences that it makes.

4.2. Conclusion

Whether to donate or not and how much, these are the important questions for readers of an appeal for donation. But there are many factors that influence these decisions. Recent research of pro-social behavior and numeracy analyzes many of these factors. The results of this study extend this research by showing that numeracy of individuals and the presentation format of the donation request have an influence on the donation amount. It was shown that with a donation request that is presented in a format where the focus is on the avoidance of a loss, the donation amount rises with the decrease of the numerical abilities of the individuals. An important implication of this finding for fundraising campaigns is therefore, to note that a message of a donation request which is framed in a non-loss way might lead to higher donation amounts, but also to consider that this does not apply for everyone. Charity-organizations, which consider these concerns, might have a better chance in the competition of fundraising campaigns.

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APPENDICES

A. Abstract

Individuals are often confronted with donation appeals and many factors influence their donation behaviour. This study investigates the influence of numeracy and different presentation formats of the donation appeals as well as the underlying mechanisms on the donation behaviour. Participants ($N = 183$) were given information about the people in need and how they could help them, either in a gain frame format or in a non-loss frame format. Their willingness to donate, their donations amount and their affective reactions were measured. The results demonstrated that the empathy of individuals with lower numeracy was suggestible to changes in presentation format (i.e. rises in the non-loss frame format), whereas high numerate individuals were not influenced. It was also shown that if a donation appeal was presented in a non-loss frame format the donation amount rose more, the lower the numeracy of the individuals is. These results provide a further insight on the influencing factors of donation behaviour. In many cases, framing a donation appeal in a non-loss way might lead to higher donation amounts, but this does not apply for every individual case.

B. Zusammenfassung

Es gibt viele verschiedene Spendenaufrufe, mit denen wir oftmals konfrontiert werden. Dabei wird unsere Reaktion auf diese Spendenaufrufe und insbesondere unser Spendenverhalten von vielen verschiedenen Faktoren beeinflusst. Diese Studie untersucht den Einfluss der numerischen Fähigkeiten auf das Spendenverhalten, wie unterschiedliche Präsentationsformen von Spendenaufrufen das Spendenverhalten beeinflussen und auf welche Mechanismen dies zurückzuführen ist. Die Versuchspersonen ($N = 183$) bekamen Informationen über die bedürftigen Personen und darüber, wie sie ihnen helfen könnten. Diese Informationen wurden entweder in einem Gewinn- oder Nicht-Verlust-Fokus präsentiert. Es wurden die Spendenbereitschaft und -höhe, sowie die affektiven Reaktionen der Versuchspersonen erfasst. Die Ergebnisse zeigten, dass die Empathie der Versuchspersonen mit niedrigen numerischen Fähigkeiten durch die Präsentationsformate beeinflusst werden. Ihre Empathie stieg, wenn die Informationen im Nicht-Verlust-Fokus präsentiert wurden. Versuchspersonen mit hohen numerischen Fähigkeiten wurden nicht beeinflusst. Ebenfalls zeigte sich, dass ein Spendenaufruf, welcher im Nicht-Verlust-Fokus präsentiert wird, die Spendenhöhe ansteigen lässt. Dieser Effekt zeigte sich insbesondere bei den Versuchspersonen mit niedrigen numerischen Fähigkeiten. Diese Ergebnisse erweitern unser Verständnis über die Einflussfaktoren auf das Spendenverhalten. Ein Spendenaufruf, welcher die Informationen im Nicht-Verlust-Fokus präsentiert, kann zu höheren Spendenbeiträgen führen. Zu beachten gilt allerdings, dass dies nicht immer, sondern nur unter bestimmten Bedingungen gilt.

C. Questionnaire

C.1. Choice scenarios

Gain frame format condition

Bitte stellen Sie sich vor, Sie bekämen 20 Euro und hätten die Möglichkeit damit für eine internationale Kinderhilfsorganisation eine Spende zu tätigen oder das Geld zu behalten. Diese Kinderhilfsorganisation besitzt das österreichische Spendengütesiegel und arbeitet in Entwicklungsländern mit dem Ziel, schwer kranke Kinder aus einem kleinen afrikanischen Dorf mit den benötigten Medikamenten zu versorgen. Mit Ihrer Spende helfen Sie 7 von 14 erkrankten Kindern geheilt zu werden.

Non-loss frame format condition

Bitte stellen Sie sich vor, Sie bekämen 20 Euro und hätten die Möglichkeit damit für eine internationale Kinderhilfsorganisation eine Spende zu tätigen oder das Geld zu behalten. Diese Kinderhilfsorganisation besitzt das österreichische Spendengütesiegel und arbeitet in Entwicklungsländern mit dem Ziel, schwer kranke Kinder aus einem kleinen afrikanischen Dorf mit den benötigten Medikamenten zu versorgen. Mit Ihrer Spende helfen Sie 7 von 14 erkrankten Kindern nicht zu sterben.

C.2. Donation items

Willingness to donate

Wären Sie bereit für dieses Projekt Geld zu spenden? __ Ja __ Nein

Donation amount

Wieviele Euro würden Sie für dieses Projekt spenden? [0-20 Euro] _____ Euro

C.3. Affect items (Dickert, Sagara et al., 2011)

Bitte geben Sie an, wie sehr Sie den folgenden Aussagen zustimmen. [1-9]

(Stimme überhaupt nicht zu = 1, Stimme vollkommen zu = 9)

1. Ich bin besorgt um die sieben Kinder.
2. Ich empfinde Mitgefühl mit den sieben Kindern.
3. Ich empfinde Mitleid mit den sieben Kindern.
4. Mir liegen die sieben Kinder sehr am Herzen.
5. Ich würde mich durch eine finanzielle Spende besser fühlen.
6. Wenn ich nichts spende, hätte ich ein schlechtes Gewissen.

C.4. Numerical information items – Part 1

In welchem Ausmaß haben Sie bei der am Beginn präsentierten Spendenentscheidung, die folgenden Informationen verwendet? [1-9]

(nie verwendet = 1, sehr viel verwendet = 9)

1. Anzahl der Kinder, denen durch die Spende geholfen werden kann
2. Anzahl der Kinder, denen durch die Spende nicht geholfen werden kann
3. Anzahl der Kinder, die betroffen sind

Wie wichtig sind Ihnen die folgenden Informationen generell bei Spendenentscheidungen? [1-9]

(gar nicht wichtig = 1, sehr wichtig = 9)

1. Anzahl der Kinder, denen durch eine Spende geholfen werden kann
2. Anzahl der Kinder, denen durch eine Spende nicht geholfen werden kann
3. Anzahl der Kinder, die betroffen sind

Wie wichtig waren Ihnen bei Ihrer Spendenentscheidung die folgenden Informationen aus dem Text der Spendenbeschreibung? [1-9]

(gar nicht wichtig = 1, sehr wichtig = 9)

1. Es kann 7 Kindern geholfen werden.
2. Es sind 14 Kinder betroffen.
3. Die Spendenorganisation besitzt ein Spendengütesiegel.
4. Es handelt sich um schwer kranke Kinder.

C.5. Subjective numeracy scale items (Fagerlin et al., 2007)

1. Wie hilfreich finden Sie beim Lesen eines Zeitungsartikels Tabellen und Diagramme? [1-6]

(überhaupt nicht hilfreich = 1, sehr hilfreich = 6)

2. Wenn Ihnen jemand etwas über die Eintrittswahrscheinlichkeit eines Ereignisses erzählt, bevorzugen Sie dabei Wörter (z. B. es passiert selten) oder Zahlen (z. B. die Wahrscheinlichkeit beträgt 1%, dass es passiert)? [1-6]

(Ich bevorzuge immer Wörter = 1, Ich bevorzuge immer Zahlen = 6)

3. Wenn Sie eine Wettervorhersage hören, bevorzugen Sie dass die Vorhersagen Wahrscheinlichkeiten (z. B. zu 20% regnet es heute) oder nur Wörter (z. B. es gibt eine geringe Wahrscheinlichkeit, dass es heute regnet) beinhalten? [1-6]

(Ich bevorzuge immer Wahrscheinlichkeiten = 1, Ich bevorzuge immer Wörter = 6)

4. Wie oft finden sie numerische Informationen hilfreich? [1-6]

(nie hilfreich = 1, sehr oft hilfreich = 6)

C.6. Objektive numeracy scale items (Peters, Dieckmann et al., 2007)

1. Stellen Sie sich vor, dass mit einem fairen 6-seitigen Würfel 1000 Mal gewürfelt wird. Von 1000 Würfeln, wie oft würde dabei eine gerade Zahl geworfen werden? _____ Mal

2. In einer Lotterie beträgt die Chance einen Preis von 10 Euro zu gewinnen 1%. Wie hoch ist Ihrer Meinung nach die Anzahl der Personen, die 10 Euro gewinnen würden, wenn 1000 Personen ein Los für diese Lotterie haben? _____ Personen

3. In einer Lotterie beträgt die Chance, ein Auto zu gewinnen 1 zu 1000. Wie viel Prozent der Lotterielose dieser Lotterie gewinnen ein Auto? _____ Prozent

4. Welche von den folgenden Nummern repräsentiert das größte Risiko, eine Krankheit zu bekommen? __ 1 in 100 __ 1 in 1000 __ 1 in 10

5. Welche von den folgenden Nummern repräsentiert das größte Risiko, eine Krankheit zu bekommen? __ 1% __ 10% __ 5%

6. Wenn das Risiko, eine Krankheit zu bekommen, für Person A 1% in 10 Jahren ist, und das Risiko zweimal so hoch für Person B ist, wie hoch ist das Risiko für Person B?
 _____ Prozent in _____ Jahren
7. Wenn das Risiko, eine Krankheit zu bekommen, für Person A 1:100 in 10 Jahren ist, und das Risiko zweimal so hoch für Person B ist, wie hoch ist das Risiko für Person B?
 _____ in _____ Jahren
8. Wenn die Chance, eine Krankheit zu bekommen 10% ist, wie viele Personen würden diese Krankheit erwartungsgemäß bekommen?
 A: Von 100? _____ Personen
 B: Von 1000? _____ Personen
9. Wenn die Chance, eine Krankheit zu bekommen 20 von 100 ist, wäre dies das Gleiche wie diese Krankheit mit einer Chance zu wieviel Prozent zu bekommen?
 _____ Prozent
10. Die Chance, eine Virusinfektion zu bekommen ist 0,0005. Von 10000 Personen, wie viele werden sich erwartungsgemäß infizieren? _____ Personen
11. Welche der folgenden Nummern repräsentiert das größte Risiko, eine Krankheit zu bekommen? ___ 1 von 12 ___ 1 von 37
12. Nehmen Sie an, dass eine Bekannte von Ihnen wegen einem Knoten in der Brust sich einer Mammographieuntersuchung unterzieht. Von 100 Frauen, haben 10 tatsächlich Brustkrebs und 90 haben keinen Brustkrebs. Von den 10 Frauen, die tatsächlich Brustkrebs haben, werden 9 von der Mammographie korrekt diagnostiziert und 1 fälschlicherweise so diagnostiziert, dass sie keinen Brustkrebs hat. Von den 90 Frauen, die keinen Brustkrebs haben, werden 81 korrekt durch die Mammographie diagnostiziert und 9 inkorrekt diagnostiziert, dass sie Brustkrebs haben. Die unten angeführte Tabelle fasst all diese Information zusammen. Stellen Sie sich vor, das Ergebnis der Mammographie Ihrer Bekannten ist eine Diagnose auf Brustkrebs. Was ist die Wahrscheinlichkeit, dass sie tatsächlich Brustkrebs hat?

	Mammographie diagnostiziert Brustkrebs	Mammographie diagnostiziert keinen Brustkrebs	Summe
Hat tatsächlich Brustkrebs	9	1	10
Hat tatsächlich keinen Brustkrebs	9	81	90
Summe	18	82	100

_____ von _____

13. Stellen Sie sich vor, dass Sie ein Seminar belegen, bei dem Ihre Chance, während der ersten Woche eine Frage gestellt zu bekommen 1% ist, und dass diese Chance sich jede Woche verdoppelt (d.h., dass Sie eine 2%ige Chance in der zweiten Woche haben, eine 4%ige Chance in Woche 3, eine 8%ige Chance in Woche 4, etc.). Wie hoch ist die Wahrscheinlichkeit, dass Ihnen in Woche 7 eine Frage gestellt wird?

_____ Prozent

14. Nehmen wir an, dass von jeden 10000 Ärzten in einer bestimmten Region einer mit dem SARS-Virus infiziert ist. In der gleichen Region gibt es eine bestimmte Risikogruppe, von denen jeweils 20 von 100 Personen auch mit dem Virus infiziert sind. Ein Virustest gibt ein positives Resultat (d.h., Virus ist vorhanden) für 99% von den infizierten und in 1% von den nicht-infizierten Personen wider. Ein zufällig ausgewählter Arzt und eine zufällig ausgewählte Person der Risikogruppe in dieser Region werden beide positiv auf diese Krankheit getestet. Bei wem ist die Krankheit wahrscheinlicher?

___ Beide hatten positive Testergebnisse für SARS und die Wahrscheinlichkeit, die Krankheit tatsächlich zu haben, ist demnach für beide gleich.

___ Beide hatten positive Testergebnisse für SARS und die Wahrscheinlichkeit, die Krankheit tatsächlich zu haben, ist größer für den Arzt.

___ Beide hatten positive Testergebnisse für SARS und die Wahrscheinlichkeit, die Krankheit tatsächlich zu haben, ist größer für die Person aus der Risikogruppe.

C.7. Numerical information items – Part 2

Versuchen Sie bitte, sich nun an die numerischen Informationen des Spendenaufrufes, welcher am Beginn der Umfrage dargeboten wurde zu erinnern.

1. Wievielen Kindern konnten Sie durch Ihre Spenden helfen? _____
2. Wievielen Kindern konnten Sie durch Ihre Spende nicht helfen? _____
3. Wieviele Kinder waren betroffen? _____

C.8. Donation attitude items

Bitte geben Sie im Folgenden an, wie Ihre generelle Einstellung zum Spenden ist. [1-6]

(Stimme gar nicht zu = 1, Stimme vollkommen zu = 6)

1. Ich glaube, dass Spenden hilft, das Leben von Menschen in Not zu verbessern.
2. Ich würde regelmäßig spenden, wenn mir die finanziellen Mittel zur Verfügung ständen.

C.9. Chronic self-regulatory focus items (Lockwood, Jordan, & Kunda, 2002)

Inwiefern treffen folgende Aussagen auf Sie zu? [1-9]

(trifft gar nicht zu = 1, trifft teils-teils zu = 5, trifft völlig zu = 9)

1. Im Allgemeinen verwende ich viel Energie darauf, negativen Ergebnissen (z.B. Scheitern in einer Prüfung oder gesundheitliche Schäden) in meinem Leben vorzubeugen.
2. Ich habe oft Angst davor, Anforderungen und Erwartungen nicht gerecht zu werden.
3. Ich stelle mir häufig vor, wie ich meine Hoffnungen und Sehnsüchte erreiche.
4. Ich habe oft Befürchtungen und Ängste über meine Zukunft.
5. Ich denke oft an die Verwirklichung meiner Ideale und Träume in der Zukunft.
6. Mein Ziel ist meist der Erfolg.
7. Ich habe oft die Befürchtung, dass ich meine Ziele z.B. in der Schule, dem Studium oder dem Beruf verfehle.
8. Ich denke oft darüber nach, wie ich Erfolg z.B. in der Schule, dem Studium oder dem Beruf erreiche.
9. Ich denke oft an Dinge oder Ereignisse, vor denen ich Angst habe.
10. Ich denke oft darüber nach, wie ich ein mögliches Scheitern verhindern kann.

11. Ich bin eher darauf ausgerichtet, mögliche Einbussen zu vermeiden, als Gewinne zu erzielen.
12. Mein Hauptziel z.B. in der Schule, dem Studium oder dem Beruf ist es zur Zeit, meine Ambitionen zu verwirklichen.
13. Mein Hauptziel z.B. in der Schule, dem Studium oder dem Beruf ist es zur Zeit, ein Versagen zu vermeiden.
14. Ich betrachte mich selbst als jemanden, der hauptsächlich bestrebt ist, seine Hoffnungen, Ziele und Wünsche zu verwirklichen.
15. Ich betrachte mich selbst als jemanden, der hauptsächlich bestrebt ist, an ihn gestellte Erwartungen, Verantwortlichkeiten und Verpflichtungen zu erfüllen.
16. Im Allgemeinen verwende ich meine Energie darauf, Positives im Leben (z.B. Erfolg, körperliche Fitness) zu erreichen.
17. Ich denke häufig an tolle Dinge, von denen ich hoffe, dass sie mir passieren werden.
18. Im Grossen und Ganzen bin ich eher darauf ausgerichtet, Erfolge zu erreichen als Misserfolge zu vermeiden.

C.10. Demographic items

1. Alter: _____
2. Geschlecht: ☐ männlich ☐ weiblich
3. höchster Schulabschluss: ☐ Pflicht- / Hauptschule ☐ Kolleg
☐ Lehre ☐ Fachhochschule
☐ Fachschule ☐ Universität
☐ Matura
4. derzeitiger Beruf: ☐ Angestellter ☐ Hausfrau / -mann
☐ Arbeiter ☐ in Pension
☐ selbstständig ☐ arbeitslos
☐ in Ausbildung (Student, Lehrling, Schüler)
5. monatliches Einkommen (netto): _____ Euro
6. monatlich zur Verfügung stehendes Geld (nach Abzug der Fixkosten): _____ Euro
7. Spenden Sie regelmäßig für gemeinnützige Zwecke? ☐ ja ☐ nein

D. Additional Analyses

D.1. Replications

For the derivation of the hypothesis, important results of previous research were replicated for the current sample.

It appears that the willingness to donate increases with higher self-focused emotions (see Table 8) and the donation amount increases with higher other-focused emotions (see Table 9). This result replicates the findings of Dickert, Sagara et al. (2011), which indicate that the self-focused emotions are important for the initial donation decision, whereas the other-focused emotions are important for the donation amount.

Table 8: Effect of self-focused emotions on the willingness to donate

Predictors	B	p
Self-focused emotions	2.00	.000

Table 9: Effect of other-focused emotions on the donation amount

Predictors	β	p
Other-focused emotions	.117	.148

Further, it revealed that the importance of non-numerical information (i.e. verbal information) influences the affective reactions (Peters et al., 2006). These results could be replicated as well. The higher the importance of non-numerical information was the higher were the affective reactions (see Table 10).

Table 10: Effect of the importance of non-numerical information on the affective reactions

Predictors	β	p
Importance of non-numerical information	.314	.000

Furthermore, studies have shown that the subjective and objective numeracy measuring correlate, $r = .680$ (Fagerlin et al., 2007). In this study the correlation between the subjective and objective numeracy measuring was moderate, $r = .331$, $p = .000$.

D.2. Descriptive Analyses

Table 11: Descriptive analyses of demographic data – Part 1

Variables	MD	SD	Min	Max
Age	24.5	4.05	18	48
Income	693	767	0	6,000
Available money	341	401	0	3,500

Table 12: Descriptive analyses of demographic data – Part 2

Variables	Category	Frequencies	Percentage
Gender	Male	57	33.7 %
	Female	112	66.3 %
School education	Compulsory education	1	0.6 %
	Apprenticeship	4	2.4 %
	Specialized school without A-levels ("Fachschule")	3	1.2 %
	Matura	122	72.2 %
	College	6	3.6 %
	University of Applied Science ("FH")	2	1.2 %
	University	32	18.9 %
Current job	Employee	24	14.2 %
	Worker	1	0.6 %
	Self-employed	4	2.4 %
	Housewife / -man	1	0.6 %
	In education (student, apprentice)	138	81.7 %
	Unemployed	1	0.6 %
Donate regularly	Yes	42	24.9 %
	No	127	75.1 %

D.3. Effects of frame format and chronic self-regulatory focus on affective reactions, the willingness to donate and the donation amounts

As a result of the regulatory fit (Higgins, 2002), presenting the donation request in the gain frame format should lead to higher affective reactions, more frequent donations and higher donation amounts, the higher the chronic self-regulatory promotion focus of the individuals is. However, presenting the donation request in the non-loss frame format should lead to higher affective reactions, more frequent donations and higher donation amounts, the higher the chronic self-regulatory prevention focus of the individuals is.

To test the regulatory fit of the chronic self-regulatory focus and the frame format condition multiple linear and logistic regression analyses respectively, with frame format (gain vs. non-loss), chronic self-regulatory prevention and promotion focus respectively, were conducted.

No significant interactions were found (see Table 13-20).

Table 13: Multiple linear regression analysis for the prediction of other-focused emotions by frame format and self-regulatory promotion focus

Predictors	β	p
Self-regulatory promotion focus	.123	.277
Frame format	.130	.087
Interaction of frame format and self-regulatory promotion focus	.109	.337

Table 14: Multiple linear regression analysis for the prediction of other-focused emotions by frame format and self-regulatory prevention focus

Predictors	β	p
Self-regulatory prevention focus	.030	.798
Frame format	.134	.083
Interaction of frame format and self-regulatory prevention focus	.088	.460

Table 15: Multiple linear regression analysis for the prediction of self-focused emotions by frame format and self-regulatory promotion focus

Predictors	β	p
Self-regulatory promotion focus	.173	.133
Frame format	-.102	.184
Interaction of frame format and self-regulatory promotion focus	-.009	.935

Table 16: Multiple linear regression analysis for the prediction of self-focused emotions by frame format and self-regulatory prevention focus

Predictors	β	p
Self-regulatory prevention focus	.174	.135
Frame format	-.087	.252
Interaction of frame format and self-regulatory prevention focus	.079	.500

Table 17: Multiple logistic regression analysis for the prediction of the willingness to donate by frame format and self-regulatory promotion focus

Predictors	B	p
Self-regulatory promotion focus	.218	.601
Frame format	-.236	.673
Interaction of frame format and self-regulatory promotion focus	-.346	.529

Table 18: Multiple logistic regression analysis for the prediction of the willingness to donate by frame format and self-regulatory prevention focus

Predictors	B	p
Self-regulatory prevention focus	.337	.445
Frame format	-.229	.684
Interaction of frame format and self-regulatory prevention focus	-.602	.286

Table 19: Multiple linear regression analysis for the prediction of the donation amount by frame format and self-regulatory promotion focus

Predictors	β	p
Self-regulatory promotion focus	.069	.565
Frame format	.161	.047
Interaction of frame format and self-regulatory promotion focus	-.024	.843

Table 20: Multiple linear regression analysis for the prediction of the donation amount by frame format and self-regulatory prevention focus

Predictors	β	p
Self-regulatory prevention focus	-.047	.711
Frame format	.153	.060
Interaction of frame format and self-regulatory prevention focus	-.034	.786

E. Erklärung

Hiermit erkläre ich, Magdalena Mayr, dass ich diese Arbeit selbständig verfasst habe, dass ich die verwendeten Quellen und Hilfsmittel vollständig angegeben habe und dass ich die Stellen der Arbeit – einschließlich Tabellen, Karten und Abbildungen –, die anderen Werken oder dem Internet im Wortlaut oder dem Sinn nach entnommen sind, auf jeden Fall unter Angabe der Quelle als Entlehnung kenntlich gemacht habe.

F. Curriculum Vitae

Personal Data

Name	Magdalena Mayr
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Education

since 2011	Vienna University of Technology, Bachelor Medical Informatics
since 2006	Medical University of Vienna, Diploma Human Medicine
since 2005	University of Vienna, Diploma Psychology
2000 – 2005	HTBLVA Spengergasse, EDP and Organization – Network Engineering, Vienna
1996 – 2000	BG Bernoulli, Vienna
1992 – 1996	Elementary School, Groß-Enzersdorf

Professional Development

2010 – 2011	University of Vienna: Research Assistant
2007 – 2008	IBG: Statistical Analyses and Data Management
2006 – 2007	AGES (Dept. Strategy and Marketing): Event Management and Administration of the Client Database
2004 – 2005	KAV: Development of a Risk Analysis Tool

Skills and Qualifications

Languages	German (native), English (fluent)
EDP	Windows, Linux, MS Office, C / C++, Java, SQL, CCNA 1-2, IT-Essentials 2, SPSS