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Physical effort and the Sense of Moral Responsibility

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Abstract

Responsibility can be defined as the belief that one possesses the pivotal power to provoke or prevent subjective crucial outcomes (Rhéaume et al, 1995). Responsibility is crucial in the field of law (Haggard & Tsakiris, 2009). Institutions seeking to control individuals need to identify responsible agents to adequately punish or reward them (Lagnado & Channon, 2008). The present study is the first to empirically test the influence of task-unrelated physical effort on the sense of responsibility. The sense of responsibility was measured with a Likert-type response format. In Experiment 1, effort was manipulated independently of the task by requiring the participants to pull stretch bands of varying resistance levels. In Experiment 2, effort was manipulated by requiring the participants to press the keyboard either fast or slowly. Our results suggest the sense of responsibility is not significantly influenced by effort. However, the participants on average felt more responsible in moral dilemmas than in neutral dilemmas. Moreover, this effect was stronger for females who experienced a greater sense of responsibility than males. These results allow us to conclude that agency and responsibility might not be connected in the ways previously described in the literature.

Physical Effort and the Sense of Moral Responsibility

The sense of responsibility is an essential part of human cognition and functioning in the present-day society. Society requires that individuals can be held responsible for their actions and the consequences of those actions (Haggard & Tsakiris, 2009). The ascription of moral responsibility is found everywhere both in everyday social interaction and institutionalized social practices. The ways in which people understand and ascribe responsibility to themselves and others have been the focus of research of psychologists and cognitive scientists studying social cognition and the attribution of responsibility (Woolfolk, Doris, & Darley, 2006). Responsibility can be defined as the belief that one possesses the pivotal power to provoke or prevent subjective crucial outcomes. (Rhéaume, Freeston, Dugas, Letarte, Ladouceur, 1995). Both in everyday life and in the domain of law, the question of responsibility is crucial. Is the accused guilty of causing the victim's death? Is John guilty of betraying Laura? Such questions are critical both for the individual and for society at large. This question is also critical because an individual needs to know whether his/her ascription of responsibility is accurate or not. In this way the individual could take further appropriate action. Moreover, social institutions seeking to control individuals need to identify responsible agents to appropriately reward or punish them (Lagnado & Channon, 2008). Hence, responsibility essentially includes that one can be either blamed or honored for his/her behavior and this is only possible if we have standard expectations according to the norms in a group. Knowledge of social norms is intrinsically related to meta-representations of the form "I know that I should do this and should not do that, otherwise my teacher will be angry and disappointed". Thus, normative expectations presuppose an understanding of other people's expectations about one's actions: "She wants/expects me to do this and not that". (Synofzik, Vogerau & Newen, 2008). These normative expectations, and, hence, responsibility, are essentially a culturally dependent phenomenon. For instance, while suicide bombing is morally accepted in some radical ideologies, it is completely unacceptable in most cultures (e.g. North-American culture) (Synofzik, Vogerau & Newen, 2008).

Previous research in the domain of responsibility shows that the moral impact of action leads to an important emotive influence on decision making (Greene, Sommerville, Nystrom, Darley & Cohen, 2001). One of the most famous examples is the footbridge dilemma (Thomson, 1986). A runaway trolley is speeding down railroad tracks toward five workmen who will be killed if it proceeds on its present course. There is a large man standing on a footbridge spanning over the railroad tracks. The only way to save these five workmen is to push the large man off the footbridge and into the path of the trolley. Is this action morally acceptable? Most people say "No." (Greene, 2014). Another famous example is the 'switch'

dilemma: Once again a runaway trolley is headed for five workmen. These five workmen can be saved by changing the direction of the trolley into a different set of railroad tracks, one that has only one workman on it, but if you do this that workman will be killed. Is it morally acceptable to turn the trolley and thus prevent five deaths by sacrificing one? Most people say "Yes." (Greene, 2014). What makes it ok to sacrifice one individual to save five others in the switch dilemma but not in the footbridge dilemma? According to Greene (2014) there are two distinct operating psychological/neural systems at work. On the one hand, there is a system that thinks in utilitarian terms: it is better to save as many lives as possible. The operations of this system are more controlled for and tend to be unemotional. On the other hand, there is psychological/neural system that responds with a relatively strong, negative emotional response to the action in the footbridge dilemma, but not to the action in the switch dilemma (Greene, 2014). When this more emotional system is engaged, its responses tend to dominate people's judgments and therefore people tend to make utilitarian judgments in response to the switch dilemma, but not in response to the footbridge dilemma. Hence responsibility includes moral/emotive and utilitarian/rational aspects (Moretto, Walsh, & Haggard, 2011).

Furthermore, the concept of responsibility assumes a conscious prediction of the effect of one's action and a full voluntary control over the action at the time it is made (Haggard & Tsakiris, 2009). A defendant in court might argue that, although s/he broke the law, s/he should not be held fully liable for doing so, since his/her mental functioning was impaired or "diminished". By the same token, a judge might consider diminished responsibility in a sleep-walking assault and, therefore, reduce a sentence. This implies that conscious experience when performing an action is necessary for the ascription of responsibility (Haggard & Tsakiris, 2009). Furthermore, a judge might ask whether the accused planned the action in advance and had the intention to e.g. cause the victim's death. Specific conscious prediction of consequences of one's action is often held to increase responsibility (Lagnado & Channon, 2008). Additionally, previous research has shown that moral judgments and attributions of responsibility are highly dependent on the degree to which we perceive the actions of others to be intentional or focused on specific outcomes (Cushman, Young & Houser; 2006; Greene & Haidt; 2002; Lagnado & Channon, 2008). Perceptions of intentionality or sense of agency are arguably the most important factor by which we attribute responsibility (Alicke, 2000; Malle, 2004; Shaver, 1985).

Whether engaging in a simple motor action or social interaction, we feel we cause our own actions and their consequences. This feeling is usually referred to as self- agency and is essential for human self-perception and social communication (Renes, Vermeulen, Kahn, Aarts, & van Haren , 2013). We experience agency throughout our waking lives to the extent that we control the movement of our body in walking, talking, and other voluntary actions. In addition, we also feel and ‘know’ that we control these events; we have a ‘sense of agency’ to accompany the fact of our agency (Haggard & Tsakiris, 2009). The ability to sense or monitor our own agency is not only important for the “sense of self”, but is also the cornerstone for many of our legal and social systems (Bandura, 2001). We ascribe either blame or credit largely on the basis that an individual knows that s/he is the author of his/her actions and their subsequent effects (Hon, Poh, & Soon, 2013). A sense of agency allows people to choose between right or wrong actions. They do this either immediately or on subsequent occasions through learning about the moral consequences of their actions (Moretto et al., 2011). An accused’s first-person sense of agency often simplifies the process of establishing the facts of agency: “If I clearly know that I did it, then I should plead guilty and accept responsibility rather than evade it”. Equally, I may know that I did not perform the relevant action. Therefore, the social practices surrounding moral responsibility are closely related to the psychology of agency (Haggard & Tsakiris, 2009).

Research in the domain of agency not only revealed the connection between the sense of agency and the sense of responsibility, but also showed the effect that effort has on the sense of responsibility. Demanet and colleagues (2013) studied the influence of physical effort on sense of agency. In the authors’ experiment, the participants were let pull stretch bands of varying resistance levels to study the influence of effort on agency. However, there are no extensive data on the influence of physical effort on the sense of responsibility. Thus, the aim of this study is to investigate how physical effort influences the sense of responsibility. To this end, the participants in our experiment were requested to do computer tasks where they saw picture stimuli combined with a short story. This short story was either a moral dilemma (i.e. a difficult situation including people with usually two ‘bad outcomes’) or a neutral dilemma (a difficult situation including inanimate objects with usually two ‘bad outcomes’). The participants were asked to choose if they wanted to either intervene by pressing the CHANGE button or not to intervene and press the STAY button. The participants were made aware in advance whether to press the STAY or CHANGE button to obtain the

least negative outcome. After having seen the dilemmas, they were asked how responsible they felt for their decision (CHANGE or STAY) on a scale from one to ten.

We expected the participants to feel more responsible when effort was high compared to low. Based on the study by Moretto and colleagues (2011) who showed an enhanced sense of agency in moral compared to non-moral contexts, we hypothesized the same to be true for the sense of responsibility and expected the participants to feel a higher sense of responsibility for moral than for neutral dilemmas. Since females tend to be seen as more emphatic than males, we expected this effect to be stronger for women than for men (Toussain & Web, 2005). Physical effort was manipulated by requiring the participants to pull stretch bands of varying resistance levels. The sense of responsibility was measured using a 10-point Likert-type response format (Carifio & Perla, 2007), where 1 = *I feel not all responsible* and 10 = *I feel completely responsible*.

Experiment 1

Participants & Design. In Experiment 1, 101 students (37 males) aged 19 to 38 ($M = 22.08$, $SD = 3.13$) participated in return for either a course credit or a monetary compensation. The experiment had a one-way (high effort, low effort) between subjects design.

Effort manipulation. Effort was manipulated by using latex stretch bands (Thera-band®) of varying resistance levels. These stretch bands are typically used for exercise. The participants were asked to hold a stretch band in an ‘arm-wrestling’ position. The participants saw an example picture (see Figure 1 in Appendix A) and were told to hold the stretch band in the 90-degree angle pose for the entire duration of the experiment. The participants were randomly divided between the high and low effort conditions. In the high effort condition, the participants had to use much more force to maintain the stretch band in the required position as compared to the low effort condition. To generate comparable amounts of effort in all participants, different stretch bands were used for male and female participants (see Figure 2 in Appendix A). According to Demanet and colleagues (2013), the force needed to hold a stretch band at a low effort for female participants is ca. 28N in the low effort condition and 49N in the high effort condition. For male participants, the resistance values are 37N and 67N, respectively. An instruction screen was displayed before the start of the real experiment indicating which stretch band the participants had to hold for the entire duration of the experiment.

Stimuli. Six choice scenarios were presented during the experimental session. These scenarios were adapted from Haggard and co-authors (2011), both as text and as visual schematics (full scripts are provided in Appendix B). Three scenarios involved morally significant choices, whilst three others were purely economic (neutral, non-moral condition). In the familiarization session, one morally significant scenario was presented as an example, so the data collected with this picture were not used in the subsequent analysis. Picture stimuli (108x67 mm) portrayed the story content and two possible outcomes. An arrow on one branch of the dilemma showed which outcome was preselected. The most severe outcomes were always preselected. For example, 5 deaths are seen as the severe outcome in the trolley dilemma, while one death is a 'moderate' outcome. The participants were informed that pressing the STAY key would result in the event shown by the arrow, while pressing CHANGE would result in the other outcome.

Procedure. Experiment 1 was conducted on a computer in the Social Cognition Lab at Utrecht University campus. All testing took place in individual cubicles. The participants were not informed that this study dealt with effort or responsibility and were randomly assigned to either high or low effort condition. The participants were approached face to face or via social media and asked if they were willing to participate in a short study. At the start of the experiment, the participants were instructed to leave any valuables that could distract them in a locker (e.g. cellphones, mp3 players, food). The experimenter showed the participants how to hold a stretch band in the 90-degree angle and instructed them to finish the task in one trial. On the welcome page, the participants were instructed to imagine themselves in the moral dilemmas they were going to read and to press CHANGE if they wanted to intervene or STAY if they did not want to intervene. On the next two pages, the participants were again instructed how to hold a stretch band in the required position. Furthermore, the participants were asked to fill in their gender and, based on this criterion, the participants read on the next page which stretch band to hold for the entire duration of the block. After making either the change or stay response, the participants were asked to rate, on a 10-point Likert scale, how responsible they felt for their decision (where 1 = *I feel not all responsible* and 10 = *I feel completely responsible*).

Analysis. Action choices and the sense of responsibility were collected using Inquisit (Version 4.0). Furthermore, these data were analyzed using SPSS (version 22.0).

Results (Experiment 1)

The impact of physical effort on the feelings on responsibility for moral and neutral dilemmas was investigated using a multivariate analysis of variance (MANOVA). Before performing the MANOVA, Pearson correlations were calculated between the dependent variables in order to test the MANOVA assumption that the dependent variables would be correlated with each other in the moderate range (i.e. .20 – .60; Meyer, Gampst, & Guarino, 2006). There was a positive correlation ($r = .60, n = 99, p = <.001$) between moral and neutral responsibility rates, suggesting the appropriateness of MANOVA. Inspection of the skewness, kurtosis, and Shapiro-Wilk statistics indicated that the assumption of normality was supported. Additionally, the Box's M value of 2,18 was associated with the p value of 0.55, which was interpreted as non-significant based on Huberty and Petoskey's (2000) guideline (i.e., $p < .005$). Thus, the covariance matrices between the groups were assumed to be equal for the purposes of MANOVA.

Main Statistical Analysis. Before conducting the MANOVA, Z-scores were calculated to check for outliers. Two participants were excluded from the analysis because they had absolute Z values of 3.30 or greater, which are seen as outliers (Fidell & Tabachnick, 1993). The internal consistencies of the neutral and moral items were assessed using Cronbach's alpha. Both moral and neutral questions were found to be highly reliable ($0.7 \leq \alpha < 0.9$) (Kline, 2000). The responses were analyzed using one-way multivariate analysis of variance (MANOVA) to test the hypothesis that people would feel more responsible for moral dilemmas than for neutral dilemmas when effort is high as compared to when effort is low. To analyze the responses, mean scores were computed for the moral and neutral conditions. Contrary to the expectation, there was no main effect for condition (Wilks' $\lambda = .973, F(1,99) = 1.33, p = 0.269, \eta^2 = 0.027$). The multivariate effect size was estimated at 0.027, which implies that only 2.7 % of the variance in the dependent variable was accounted for by the level of effort. The participants did not significantly report more sense of responsibility in the high effort condition vs. low effort condition. As expected, the participants on average felt more responsible for moral dilemmas ($M=7.97, SE=0.18$) than for neutral dilemmas ($M=6.21, SE=0.23$) and this difference was significant $t(100) = 9.01, p <.05$. Also, a marginally significant difference was observed in the mean responsibility scores of males and females, with the latter scoring higher ($p = 0.09$).

Exploratory Data Analysis. To further examine these unexpected results, some explorative research was undertaken. An inspection of the distribution of the question ‘How hard was it for you to hold the stretch band?’ (1= ‘not hard at all’; 10= ‘very hard’) revealed that the data were almost normally distributed. Furthermore, a multivariate analysis of covariance (MANCOVA) was conducted to test the hypothesis that people would feel more responsible for moral dilemmas than for neutral dilemmas when effort is high compared to when effort is low after controlling for the BIF questionnaire. The covariate, the BIF Questionnaire, was non-significantly related to the moral and neutral responsibility ratings among all participants (Wilks’ $\lambda = .971$, $F(1,99) = 1.43$, $p = 0.244$, $\eta^2 = 0.029$). The same was true for the Locus of Control Questionnaire (Wilks’ $\lambda = .972$, $F(1,99) = 1.37$, $p = 0.258$, $\eta^2 = 0.028$), suggesting that the BIF and Locus of Control Questionnaire did not bias the relationship between responsibility and effort. Moreover, the statistical analysis focused on CHANGE, rather than on STAY responses, as the two responses are complementary. The vast majority of the participants made change responses (78%, $SD = 1\%$).

Discussion (Experiment 1)

The main goal of Experiment 1 was to test whether the participants would feel more responsible for moral and neutral dilemmas when effort was high compared to low. Effort was manipulated using stretch bands of varying resistance levels. Contrary to the expectation, no main effect for condition was observed: the participants did not feel more responsible for moral and neutral dilemmas when effort was high. This does not cohere with the existing body of the literature on agency. For instance, Demanet and colleagues (2013) found that, under the condition of increased physical effort, the sense of agency is enhanced. Moral responsibility is closely associated with the psychology of agency (Haggard & Tsakiris, 2009). Therefore, with the increase of physical effort, one would expect the sense of responsibility to increase as well. As expected, the participants on average felt more responsible for moral dilemmas than for neutral dilemmas. This is in line with the previous research on agency and the sense of responsibility (e.g. Moretto et al., 2011). Congruently with the expectation, females scored higher than males on the sense of responsibility for both moral and neutral dilemmas. This is in line with previous research on gender differences in empathy and guilt, where women are reported to score higher on empathy than males (Toussain & Web, 2005). Moreover, women are more capable of imagining themselves in the other’s place and, therefore, they probably feel more responsibility than males (Hoffman,

1977). As expected, the participants made significantly more change responses than stay responses. This shows that the participants understood the dilemmas and made more utilitarian decisions, which, in turn, coheres with the research by Haggard and co-authors (2009).

This said, several limitations of Experiment 1 should be noted. First, it is possible that the requirement of holding the band simultaneously with the computer task increased the demand for mental effort; e.g. to resist the urge to release the stretch band (Demanet, 2013). Moreover, this increased demand for mental effort might be seen as a cognitive load, the manipulation of which is reported to selectively interfere with utilitarian judgments (Greene, Morelli, Lowenberg, Nystrom & Cohen, 2008). Secondly, pairwise comparisons revealed that the difference between the low effort and high effort conditions is non-significant, meaning that it would be really difficult to find any differences with statistical testing between the conditions. Thirdly, contrary to our expectation, the subjective experience of effort (measured by asking participants ‘how hard was it for you to hold the stretch band?’) did not yield any significant differences between the low effort and high effort conditions. Thus, the difference between the two conditions appears to be too small. Fourthly, people have different strength; therefore, their subjective experiencing of what is light or heavy can vary considerably across different participants. The inclusion of a strength measurement was beyond the scope of the present study. Fifthly, precise elongation levels of the stretch bands were not checked in the present study. This could have induced different resistance levels between the participants. In future research, it would be recommendable to measure exactly at what elongation level different participants hold the stretch bands. Finally, most, if not all, participants in Experiment 1 were Dutch, which might be a serious limitation, because, as shown in a recent study by Costa, Foucart, Hayakawa, Aparici, Apesteguia (2014), people using a foreign language make substantially more utilitarian decisions (e.g. choosing to save five lives by sacrificing one life) when faced with moral dilemmas. This potential limitation is accounted for in Experiment 2.

Experiment 2

Participants & Design. In Experiment 2, 80 students participated in return for either a course credit or a monetary compensation. The experiment had a one-way (high effort, low effort) between subjects design.

Effort manipulation. Effort was manipulated by letting the participants press the keyboard. The participants were randomly divided between the low and high effort conditions. In the low effort condition, the participants had to press the spacebar slowly (once every 1250 milliseconds). In the high effort condition, the participants had to press the spacebar fast (once every 250 milliseconds).

Stimuli. The six choice scenarios used in Experiment 1 were presented in Experiment 2 during the experimental session.

Procedure. Experiment 2 was conducted on a computer in the Social Cognition lab at Utrecht University campus. All testing took place in individual cubicles. The participants were not informed about the purpose of the study and were randomly assigned to either the high or low effort condition. The participants were recruited identically as in Experiment 1 (see 'Experiment 1') and, at the start of the experiment, were instructed to leave any valuables that could distract them in a locker (e.g. cellphones, mp3 players, food). On the welcome page, the participants received the instruction to do two tasks simultaneously: namely, read the dilemmas while, at the same time, follow a certain rhythm by pressing the spacebar with their left hands. First, a familiarization trial took place where the participants had the chance to practice. After the instructions, they had to press the ENTER button and were explained to go on with the second task. In the latter task, it was explained that they had to imagine themselves in the dilemmas while simultaneously making the same rhythm they had just learned. After each dilemma, the participants were asked to rate, on a 10-point Likert scale, how responsible they felt (where 1 = *I feel not all responsible* and 10 = *I feel completely responsible*).

Analysis Action choices and the sense of responsibility were collected using Inquisit (Version 4.0). Furthermore, these data were analyzed using SPSS (version 22.0).

Results (Experiment 2)

The impact of physical effort on the feelings on responsibility for moral and neutral dilemmas was investigated using two separate one-way analyses of variance (ANOVA). No significant outliers were found ($Z > 3.30$; see Fidell & Tabachnick, 1993). For the moral condition, the inspection of skewness -0.553 ($SE=0.27$), kurtosis -0.683 ($SE=0.53$), and Shapiro-Wilk statistics indicated that the assumption of normality was supported. The same was true for the neutral condition with the skewness value of -0.288 ($SE=0.27$) and the kurtosis value of -0.103 ($SE=0.53$). Moreover, Levene's test indicated equal variances ($F=0.04$, $p=0.85$) for the moral and negative conditions ($F=0.26$, $p=0.61$).

Main Data Analysis. Before conducting the ANOVAs, Z-scores were calculated to check for outliers. No participants were excluded from subsequent analysis, because there were no absolute Z values of 3.30 or greater, which would have been seen as outliers (see Fidell & Tabachnick, 1993). The responses were analyzed using two one-way multivariate analyses of variance (ANOVAs) to test the hypothesis that people would feel more responsible for moral dilemmas than for neutral dilemmas when effort is high compared to when effort is low. To analyze the responses, mean scores were computed for the neutral and moral conditions. Contrary to the expectation, there was no main effect in the neutral ANOVA for condition ($F(1,79) = 0.812$, $p= 0.370$, $\eta^2=0.01$). The same was true for the moral condition ($F(1,79) = 0.132$, $p= 0.718$, $\eta^2=0.002$). As expected, the participants on average felt more responsible for moral dilemmas ($M=7.16$, $SE= 0.21$) than for neutral dilemmas ($M=6.04$, $SE=0.21$) and this difference was significant ($t(80) = 4.13$, $p <.05$).

Discussion (Experiment 2)

The main question of Experiment 2 was about the influence of effort on the sense of responsibility in moral and neutral dilemmas. This was measured by letting the participants press the spacebar either really fast or slowly. Contrary to the expectation, no significant effect for condition was observed: specifically, the participants did not feel more responsible for moral and neutral dilemmas when effort was high compared to low. This contradicts previous research on effort (Demantet, 2013) and responsibility (Moretto et al., 2011). As expected, the participants on average felt more responsible for moral than for neutral dilemmas. This coheres with previous research on agency and the sense of responsibility (e.g. Moretto et al., 2011).

Experiment 2 has several limitations. First, after the experiment, some participants mentioned that they had not properly understood the instruction ‘keep pressing the spacebar whilst reading the dilemmas’. This might have biased the data. Second, there is no available study supporting the idea that effort could be manipulated by pressing keys on the keyboard. Therefore, further research is needed to replicate our finding to make them more reliable. Third, pairwise comparisons did not show any significant differences between the slow and fast conditions, meaning that it would be really difficult to find any differences with statistical testing between the conditions at all.

General Discussion

This research was the first to study the effects of physical effort on the sense of responsibility for moral and neutral dilemmas. The main goal of the two experiments was to check whether the manipulation of task-unrelated physical effort would induce a higher sense of responsibility in the participants. Unfortunately, the data did not support this effect in either of the two experiments. This contradicts earlier research on effort and agency. Specifically, Demanet and colleagues (2013) found that, under the condition of increased physical effort, the sense of agency enhances. Moral responsibility is intrinsically related to the psychology of agency (Haggard & Tsakiris, 2009). Moreover, according to Synofzik and co-authors (2008), the ascription of moral responsibility can be seen as a meta-representation of a judgment of agency which, in turn, is the conceptual representation of the sense of agency. In this context, it is surprising that the sense of responsibility did not increase with an increase in physical effort.

Our expectation was that the participants would feel more responsible for moral dilemmas than for neutral dilemmas. Since in the former type of dilemmas, the participants had to choose between life and death situations which would induce more guilt and, therefore, the participants would post-hoc infer more responsibility than in neutral dilemmas where they only had to choose between losing either one or five inanimate objects. This is in line with previous research on agency and the sense of responsibility (Moretto et al., 2011) where an enhanced sense of agency, in moral as compared to non-moral contexts, was found; since agency is related to responsibility, one would expect the same to hold true for responsibility.

Furthermore, we expected females to score higher than males on the sense of responsibility both for moral and neutral dilemmas, since women generally tend to be seen as more empathetic. This coheres with research on gender differences with regard to empathy

and the feelings of guilt, with women scoring higher on the feelings of empathy than men (Toussain & Web, 2005). Moreover, women have a greater capability to imagine themselves in the other's place and, therefore, they probably feel more responsibility than males (Hoffman, 1977). In this context, our research provides an additional insight to these findings by showing that the feelings of guilt also account for higher feelings of responsibility as tested with dilemmas.

The results of the two experiments reported in the present study do not, however, show an increase in the sense of responsibility under the condition of increased effort. This result provides a new theoretical perspective on the key findings in the literature about agency and responsibility. It contradicts the findings reported by Haggard and colleagues (2009) where the connection between these two variables was demonstrated. If further research replicates the findings of the present study, we might cautiously conclude that the two variables are not related in the causal way described by Haggard and co-authors (2009). Generally speaking, we might also infer that effort does not operate on responsibility in the same way as on agency (Demanet, 2013).

The inspection of the dilemmas revealed that the participants made significantly more change responses than stay responses. The participants highly favored utilitarian responses over emotional responses (for example, choosing to save five lives instead of one). This pattern of results is in line with previous research by Moretto and colleagues (2011) who found that, in predictable trials (i.e. where their participants explicitly knew in advance whether to press the CHANGE or STAY key to obtain the less negative outcome), people made change responses in the majority of cases. The predictable action outcome of the dilemma was always the most severely negative outcome (e.g. five deaths instead of one). This indicates that, as expected, the participants acted to avoid negative outcomes (Moretto et al., 2011).

The two experiments reported in the present study have, however, several limitations. Previous research suggests that impersonal dilemmas do not have sufficient emotive content to switch decision-making away from utilitarian (change response) toward non-utilitarian choices (stay response) (Ciaramelli, Muccioli, Ladavas, E., & di Pellegrino, 2007; Greene et al., 2001; Moretto et al., 2009). Moreover, according to Greene and colleagues (2008), only high-conflict dilemmas (e.g. smothering one's baby to save many people) are suitable for examining the conflict between utilitarian and non-utilitarian judgment processes, whereas this research only focused on low-conflict situations. The inspection of the data shows the

dilemmas were low-conflicting, because change and stay responses were evenly distributed. This effect clearly deserves further investigation. Furthermore, we only asked explicitly how responsible participants felt about the different dilemmas. Hence, the responses may have been influenced by the participants' expectations and interpretation of the experiment (Gawronski, Lebel, & Peters, 2007). Moreover, this reflective kind of reasoning asked for with an explicit question might be different than a pre-reflective kind of reasoning associated with implicit evaluations (David, Newen, & Vogeley, 2008; Synofzik, Vosgerau, & Newen, 2008).

Most of the dilemmas used in this research are impersonal. An interesting avenue for future research would be to test the influence of effort on sense of responsibility using personal dilemmas (e.g. 'imagine one of your best friends, family member in a life dead situation') whilst using the same paradigm. Another thing to be aware of are the levels of resistance for different participants. When measuring effort, it is important to know exactly at what elongation level the participants hold the stretch bands, since, if uncontrolled for, this might induce various kinds of resistance. Furthermore, a strength measurement, for instance, measured with a handgrip task (Mathiowetz, Kashman, Volland, Weber, Dowe, & Rogers, 1985), could control for possible strength differences between the participants. Another possibility is to use an implicit measure of the sense of responsibility instead of the explicit measure used in the present study. Intentional binding might be an appropriate method (Haggard, 2009). According Lagnado and Channon (2008), there is a strong association between intentional binding and responsibility. In this way, the measure of responsibility is much less susceptible to the effect of a potential experimenter demand.

Finally, the two experiments reported in the present paper have solely focused on negative outcomes (i.e. in terms of losing either one thing or life or losing five things or lives). This is an adequate approach if the main focus is on the feelings of responsibility; however, a deeper understanding of the causal connection between effort and the sense of responsibility for neutral and moral dilemmas would greatly benefit from looking at positive outcomes (e.g. gaining something) as well.

To summarize, the results of the two experiments reported in the present study allow us to conclude that the sense of responsibility is not significantly influenced by effort. This is an interesting finding, because this might show that agency and responsibility are not connected in the ways previously described in the literature. However, the severity of the outcome in a dilemma, either neutral or moral, is of a significant importance for the sense of

responsibility. This effect is stronger for women who feel a greater sense of responsibility than males for both moral and neutral dilemmas. These results enhance our knowledge and understanding of effort and responsibility. In the years to come, an augmentation of knowledge in the field of responsibility and effort will be increasingly important for the fields of law and mental disorders.

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Appendices

Appendix A



Figure 1. Experimental setup: ‘arm-wrestling’ pose adopted for the effort manipulation.

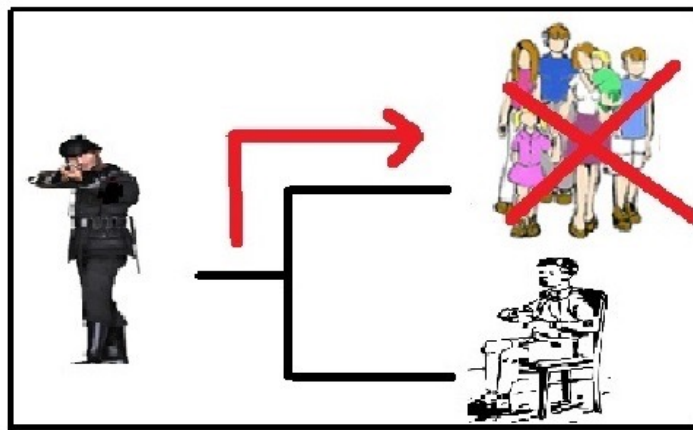
	Male	Female
Light	Red stretch band	Yellow stretch band
Heavy	Black stretch band	Green stretch band

Figure 2. Stretch bands for male and female participants.

Appendix B

Pictures and text used in study 1.

Familiarization session, moral script.



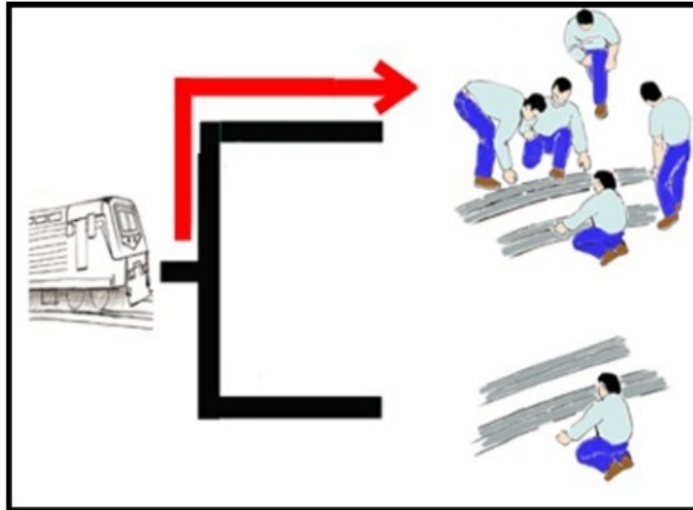
Example

You are an inmate in a concentration camp. A sadistic guard is about to hang your son who tried to escape and wants you to pull the chair from underneath him. He says that if you don't do it he will not only kill your son but some other innocent inmate as well. You don't have any doubt that he means what he says. Press change if you want to intervene (and pull the chair) or stay if you don't

change

stay

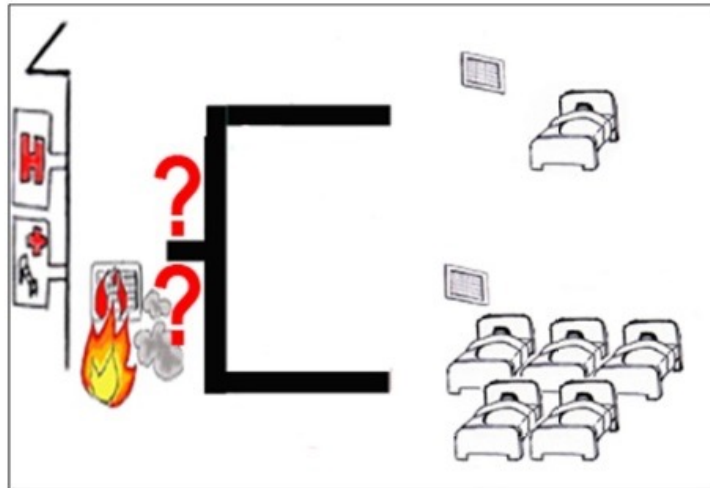
Moral script, Trolley.



Trolley

You are at the wheel of a runaway trolley quickly approaching a fork in the tracks. There is a group of 5 railway workmen on the tracks. On the other track there is 1 workman. If you do nothing the trolley will proceed on the track where the group of 5 workmen is, causing their deaths. The only way to avoid the deaths of these 5 workmen is to change the direction of the trolley. If you hit a switch on your dashboard that will cause the trolley to proceed to the other track, causing the death of 1 workman. Do you want the trolley to stay on its present course where there are 5 workmen OR do you want to change the direction of the trolley to the other track where there is 1 workman? Press the button to "change" or "stay".

Moral script, Factory.



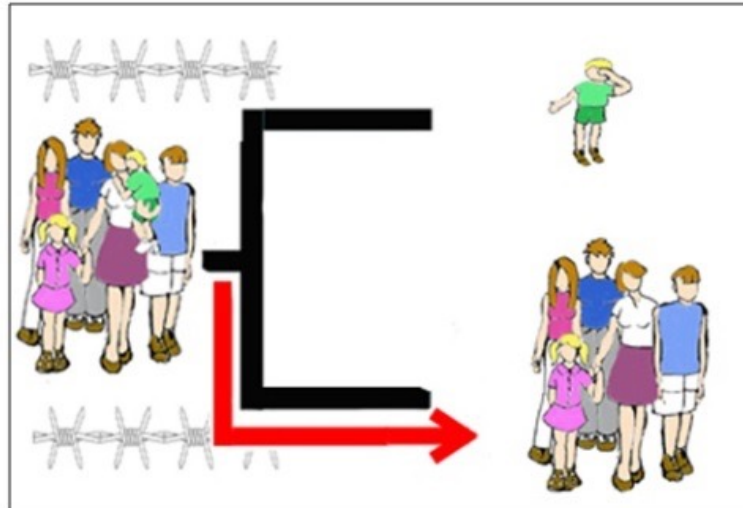
Hospital

You are the late-night watchman in a hospital. Spilled chemicals are rising up through the hospital's ventilation system. In one room of the hospital there are 5 patients. In another room there is 1 patient. If you do nothing the spilled chemicals will rise up into the room containing the 5 patients and cause their deaths. The only way to avoid the deaths of these patients is to change the direction of the spilled chemicals by hitting a switch connected to a fire vent. This will cause the spilled chemicals to change direction and enter the other room containing the 1 patient causing his death. Do you want the fumes and fires to stay on their present course where there are 5 patients OR do you want to change the direction of the fumes and fires to the other room where there is 1 patient?

change

stay

Moral script, Commander.



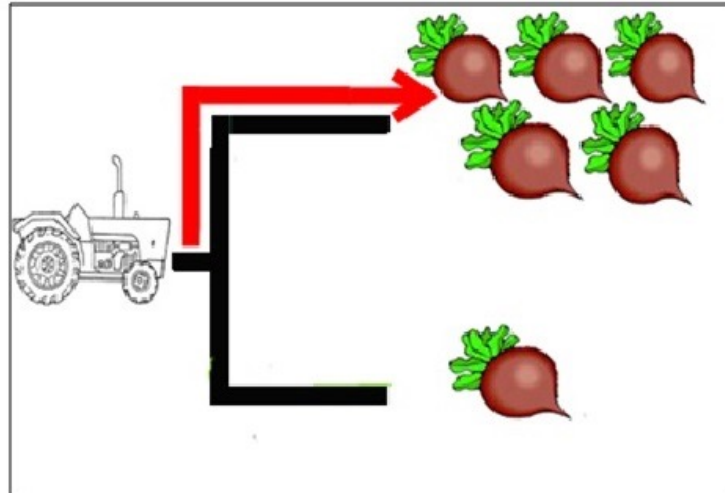
Wartime

It is wartime. You and your 5 children are living in territory that has been occupied by the enemy. You are taken to enemy headquarters with your family. The commander informs you that there are two prison camps, Camp A and Camp B. He has already decided that you and your family will go to the Camp A where you and 3 of your children will be killed and only the youngest will survive. However the commander also tells you that if you pay him he could change the original destination and move your family to Camp B where your youngest son will be killed but you and other 4 children will survive. Do you want to stay with the commander's original decision to send you to Camp A (4 die and 1 is saved) or do you want to change to Camp B (1 dies and 4 are saved) by bribing the commander?

change

stay

Non moral script, Turnips.



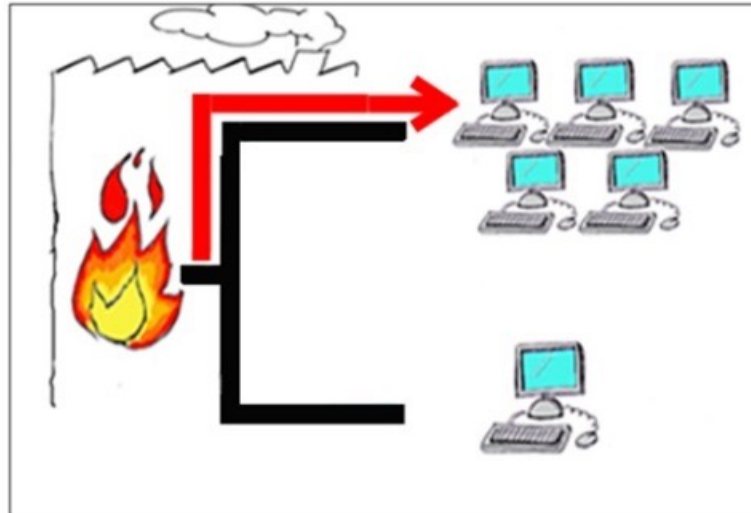
Turnip

You are a farm worker monitoring an automatic turnip-harvesting machine. The machine is out of order and is approaching two diverging paths. On one path the machine will destroy 5 bushels of turnips. On the other path the machine will destroy up only 1 bushel of turnips. If you do nothing your turnip-harvesting machine will go on the path with 5 bushels of turnips. If you want to change the direction of the machine you have to hit a switch on your remote control. Do you want the machine to stay on its present course and so mash up 5 bushels of turnips OR do you want to change the direction of the machine to the other path and so lose only 1 bushel of turnips.

change

stay

Non-moral script, Factory.



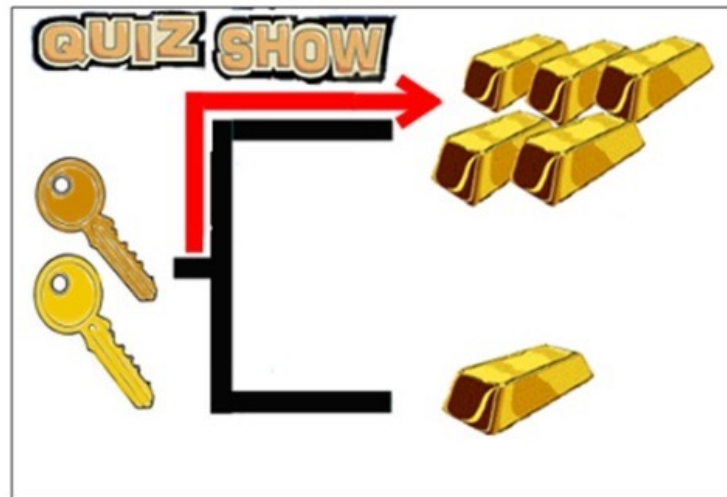
Factory

You are the late-night watchman in a factory. You see fumes and fires spreading into the factory. In one room of the factory there are 5 important electronic devices. In another room there is 1 important electronic device. If you do nothing the fumes and fires will rise up into the room containing the 5 electronic devices and will destroy them. The only way to avoid the destruction of these 5 electronic devices is to change the direction of the fumes and the fires. If you hit a switch connected to a fire door, the fumes and fires will change direction and enter the other room containing the single electronic device. If you do not hit the switch the 5 electronic devices will be destroyed. Do you want the fumes and fires to stay on its present course destroying 5 electric devices OR do you want to change the direction of the fumes and fires to the other room where there is 1 device.

change

stay

Non-moral script, Quiz.



Quiz

You are participating in a quiz on a TV show and you win 10 bars of gold. But then you make a wrong response and so lose part of your winnings. To define the amount of your loss the host starts another game. There are two keys, one to room A and one to room B. You have the key to room B. In room A there is a message that says 'You LOSE 1 bar of gold', the other message in room B says 'You LOSE 5 bars of gold'. The host offers you the key to room A. Do you want to stay with the original key to room B OR do you want to exchange it for the other key to room A?

change

stay

Appendix D

The Behavior Identification Form

Any behavior can be described in many ways. For example, one person might describe a behavior as "writing a paper," while another person might describe the same behavior as "pushing keys on the keyboard." Yet another person might describe it as "expressing thoughts." This form focuses on your personal preferences for how a number of different behaviors should be described. Below you will find several behaviors listed. After each behavior will be two different ways in which the behavior might be identified. For example:

1. Attending class

a. sitting in a chair

b. looking at a teacher

Your task is to choose the identification, a or b, that best describes the behavior for you. Simply place a checkmark next to the option you prefer. Be sure to respond to every item. Please mark only one alternative for each pair. Remember, mark the description that you personally believe is more appropriate for each pair.

1. Making a list

a. Getting organized

b. Writing things down

2. Reading

a. Following lines of print

b. Gaining knowledge

3. Joining the Army

a. Helping the Nation's defense

b. Signing up

4. Washing clothes

a. Removing odors from clothes

b. Putting clothes into the machine

5. Picking an apple

a. Getting something to eat

b. Pulling an apple off a branch

6. Chopping down a tree

a. Wielding an axe

b. Getting firewood

7. Measuring a room for carpeting

a. Getting ready to remodel

b. Using a yard stick

8. Cleaning the house

a. Showing one's cleanliness

b. Vacuuming the floor

9. Painting a room

- a. Applying brush strokes
- b. Making the room look fresh

10. Paying the rent

- a. Maintaining a place to live
- b. Writing a check

11. Caring for houseplants

- a. Watering plants
- b. Making the room look nice

12. Locking a door

- a. Putting a key in the lock
- b. Securing the house

13. Voting

- a. Influencing the election
- b. Marking a ballot

14. Climbing a tree

- a. Getting a good view
- b. Holding on to branches

15. Filling out a personality test

- a. Answering questions
- b. Revealing what you're like

16. Tooth brushing

- a. Preventing tooth decay
- b. Moving a brush around in one's mouth

17. Taking a test

- a. Answering questions
- b. Showing one's knowledge

18. Greeting someone

- a. Saying hello
- b. Showing friendliness

19. Resisting temptation

- a. Saying "no"
- b. Showing moral courage

20. Eating

- a. Getting nutrition
- b. Chewing and swallowing

21. Growing a garden

a. Planting seeds

b. Getting fresh vegetables

22. Traveling by car

a. Following a map

b. Seeing countryside

23. Having a cavity filled

a. Protecting your teeth

b. Going to the dentist

24. Talking to a child

a. Teaching a child something

b. Using simple words

25. Pushing a doorbell

a. Moving a finger

b. Seeing if someone's home

Score one point for each of the following:

1. a , 2. b, 3.a, 4.a, 5.a, 6.b, 7.a, 8.a, 9.b, 10.a, 11.b, 12.b, 13.a, 14.a, 15.b, 16.a, 17.b, 18.b, 19.b, 20.a, 21.b , 22.b, 23.a, 24.a, 25.b.

A high score = Higher level alternative (why the action is performed, the motives behind the action, and the meanings of the action).

A low score = Lower level alternative (how to do the action, the means of achieving the action, and the details of the action).

Appendix E

Locus of Control Questionnaire

Click either a or b next to the one statement that best describes how you feel. You can always go back to a question and change your answer.

1.

- a. Many of the unhappy things in people's lives are partly due to bad luck
- b. People's misfortunes result from the mistakes they make.

2.

- a. One of the major reasons why we have wars is because people don't take enough interest in politics.
- b. There will always be wars, no matter how hard people try to prevent them

3.

- a. In the long run, people get the respect they deserve in this world.
- b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he tries.

4.

- a. The idea that teachers are unfair to students is nonsense.
- b. Most students don't realize the extent to which their grades are influenced by happenings.

5.

- a. Without the right breaks, one cannot be an effective leader
- b. Capable people who fail to become leaders have not taken advantage of their opportunities

6.

- a. No matter how hard you try, some people just don't like you.
- b. People who can't get others to like them don't understand how to get along with others

7.

- a. I have often found that what is going to happen will happen.
- b. Trusting to fate has never turned out as well for me as making a decision to take a definite course of action.

8.

- a. In the case of the well prepared student, there is rarely, if ever, such a thing as an unfair test.
- b. Many times exam questions tend to be so unrelated to course work that studying is really useless.

9.

- a. Becoming a success is a matter of hard work; luck has little or nothing to do with it.
- b. Getting a good job depends mainly on being in the right place at the right time.

10.

- a. The average citizen can have an influence in government decisions.
- b. This world is run by the few people in power, and there is not much the little guy can do about it.

11.

- a. When I make plans, I am almost certain that I can make them work.
- b. It is not always wise to plan too far ahead because many things turn out to be a matter of luck anyway.

12.

- a. In my case, getting what I want has little or nothing to do with luck.
- b. Many times we might just as well decide what to do by flipping a coin.

13.

- a. What happens to me is my own doing.
- b. Sometimes I feel that I don't have enough control over the direction my life is taking.

Score one point for each of the following:

1.a, 2. b, 3.b, 4.b, 5.b, 6.a, 7.a,8.b, 9.b, 10.b, 11.b, 12.b, 13.b

A high score = External Locus of Control.

A low score = Internal Locus of Control.