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## Brief article

## Mortality salience and morality: Thinking about death makes people less utilitarian

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## ABSTRACT

According to the dual-process model of moral judgment, utilitarian responses to moral conflict draw on limited cognitive resources. Terror Management Theory, in parallel, postulates that mortality salience mobilizes these resources to suppress thoughts of death out of focal attention. Consequently, we predicted that individuals under mortality salience would be less likely to give utilitarian responses to moral conflicts. Two experiments corroborated this hypothesis. Experiment 1 showed that utilitarian responses to non-lethal harm conflicts were less frequent when participants were reminded of their mortality. Experiment 2 showed that the detrimental effect of mortality salience on utilitarian conflict judgments was comparable to that of an extreme concurrent cognitive load. These findings raise the question of whether private judgment and public debate about controversial moral issues might be shaped by mortality salience effects, since these issues (e.g., assisted suicide) often involve matters of life and death.

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## 1. Introduction

Dual-process models of cognition (Evans, 2007; Evans & Over, 1996; Epstein, 1994; Kahneman & Frederick, 2005; Slovic, 1996; Stanovich, 1999) postulate that reasoning (Evans, 2007, 2008), moral judgment (Greene, 2007; Greene, Morelli, Lowenberg, Nystrom, & Cohen, 2008) and decision-making (Frederick, 2005; Kahneman & Frederick, 2005) can rely on two types of processing, one of which draws on limited cognitive resources. Contexts that deprive an individual of these resources will therefore disrupt effortful processing, and affect inferences, judgments and decisions. In this article, we investigate the specific context of mortality salience (being reminded of one's own mortality) on moral judgment. Besides its theoretical interest, this issue is important because moral conflicts may often involve issues of life and death, which can remind individuals of their own mortality.

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## 2. A dual-process approach to moral judgment

Moral judgment has been traditionally construed as a highly thoughtful, reasoned activity (Kohlberg, 1969; Turiel, 1983), only to be recast as a primarily emotional, intuitive affair (Blair, 1995; Haidt, 2001; Nichols, 2002, 2004). The dual-process approach to moral judgment (Greene, Sommerville, Nystrom, Darley, & Cohen, 2001; Greene, Nystrom, Engell, Darley, & Cohen, 2004) integrates these two perspectives, by suggesting that both automatic emotional responses and more controlled rational responses are involved in moral judgments. These two responses can conflict, as in the famous Footbridge dilemma (Thomson & Parent, 1986):

A trolley is hurtling down a track towards five people. You are on a bridge under which it will pass, and you can stop it by dropping a heavy weight in front of it. As it happens, there is a very fat man next to you – your only way to stop the trolley is to push him over the bridge and onto the track, killing him to save five.

From an utilitarian perspective, it can be morally acceptable in this case to kill one in order to save five. According to dual-process approaches to moral judgment, adopting the utilitarian perspective can be counterintuitive (as in the footbridge case) and requires to expend cognitive resources in order to inhibit the intuitive, emotional response that one should not intentionally kill an innocent bystander, whatever the circumstances (Greene et al., 2001).

Greene et al. (2008) demonstrated the resource demanding nature of utilitarian judgments by showing that reaction times for utilitarian responses on such dilemmas increased when participants were under concurrent cognitive load. Correlational data also suggest that utilitarian responses are more likely to be given by individuals with more rational (as opposed to intuitive) intellectual styles (Bartels, 2008), and by individuals with greater working memory capacity (Moore, Clark, & Kane, 2008). Recently, Suter and Hertwig (2011) gave support to the dual process model of moral judgment by highlighting the determinant role of time when processing responses to moral dilemmas. Participants were less likely to give utilitarian responses to conflict problems when under time pressure condition or when instructed to answer intuitively (as opposed to deliberately).

If utilitarian responses on Footbridge-type dilemma rely on the availability of cognitive resources, then any context that compromises the availability of these limited resources is likely to make moral judgments less utilitarian. In the next section, we introduce our context of interest, that of being reminded of one's own mortality.

### 3. Mortality salience and cognitive resources

Human beings are aware of their inevitable physical death. Drawing on cultural anthropologist Becker (1973), Terror Management Theory (Greenberg, Pyszczynski, & Solomon, 1986) postulates that different lines of cognitive defenses are triggered when one is led to entertain the thought of one's eventual death, in order to manage the debilitating anxiety that might be provoked by this thought. The dual-process model of terror management theory (Goldenberg & Arndt, 2008; Hayes, Schimel, Arndt, & Faucher, 2010; Pyszczynski, Greenberg, & Solomon, 1999) proposes that people first attempt to actively suppress conscious thoughts of death out of focal attention, expanding cognitive resources in the process. After this first stage, they may engage other defenses aimed at buttressing self-esteem and faith in one's cultural world view. We are especially interested in this article in the first of these two stages, which is supposed to deplete cognitive resources.

Terror management theory has generated countless experimental studies (for a review, see Burke, Martens, & Faucher, 2010). Some data directly support the assumption that people suppress thoughts of death by relying on cognitive resources. Arndt, Greenberg, Solomon, Pyszczynski, and Simon (1997) found that individuals who were reminded of their mortality, but then denied access to cognitive resources by a cognitive load manipulation, displayed

greater accessibility of death-related thoughts. This finding suggests that people who could not use their cognitive resources (because of cognitive load), could not suppress death thoughts either (see also Wegner, 1992, 1994).

More recently, Gailliot, Schmeichel, and Baumeister (2006) found that individuals who were reminded of their mortality showed impaired performance on the Stroop task and on a reasoning task, which they took after a distraction task. The authors suggested that these individuals had been suppressing thoughts of death while taking the distraction task, thereby depleting their regulatory resources. Finally, Trémolière, De Neys, and Bonnefon (2012) investigated the effect of mortality salience on the belief-bias task (Evans, Barston, & Pollard, 1983), a common paradigm for investigating dual-process accounts of reasoning. Participants reminded of mortality showed impaired performance, as compared to participants reminded of physical pain. Overall, prior evidence suggests that mortality salience triggers effortful thought suppression, impairing performance on tasks that rely on limited cognitive resources.

### 4. The current research

In this article, we examine whether a mortality salience context (in which individuals are reminded of their physical mortality) makes moral judgments less utilitarian on moral dilemmas such as the Footbridge problem. Based on the assumption that mortality salience compromises the availability of cognitive resources, we predict that individuals under mortality salience will be less likely to give utilitarian responses to moral conflicts. We also predict that mortality salience will have no comparable effect on control scenarios wherein the utilitarian response does not conflict with an intuitive response. In a first experiment, we manipulate mortality salience by having participants think about death (vs. pain) before they read non-lethal harm scenarios. In a second experiment, we attempt to establish the extent to which Mortality Salience taps on cognitive resources, by comparing its effect on utilitarian responses to that of several levels of cognitive load.

### 5. Experiment 1

#### 5.1. Method

The 85 participants (59 women; mean age = 22.00, SD = 3.94) were recruited on campus at the University of Toulouse. Participants were randomly assigned to one of the two conditions of the mortality salience manipulation. Immediately after they were done with the mortality salience manipulation, participants judged the moral acceptability of the target action in the harm-conflict and harm-control versions of our two scenarios (that is, they read a total of four scenarios). The order in which scenarios appeared was counterbalanced across participants (eight different versions of the questionnaire were constructed).

To manipulate mortality salience, we used a French translation of the classic manipulation of Greenberg et al. (1990). Participants in the Death condition had to briefly

respond to the two following questions: 'Briefly describe the emotions that the thought of your own death arouses in you' and 'Jot down, as specifically as you can, what you think will happen to you physically as you die and once you are physically dead'. Participants in the Pain condition responded to similarly phrased questions about extreme pain. Extreme pain was chosen as a control in order to rule out the possibility that an effect in the Death condition might be due to aversive emotions.

Our moral scenarios were adapted from the high conflict moral dilemmas used in Greene et al. (2004), but framed with a non-lethal harm content in order to avoid to trigger mortality salience in our control pain group. Conflict scenarios were such that the utilitarian response conflicted with an intuitive deontic response. In the control version of the scenarios, the utilitarian response was congruent with the intuitive, deontic response. For example, the conflict version of the Crying Baby scenario read:

Leo is a civilian during war. He and his six children are hidden in the cellar of their house. If the enemy sees them, they will all be captured and tortured. The youngest child is still a baby. Enemy soldiers are searching the house when the baby starts to cry. Leo puts his hand over the baby's mouth so that the noise does not attract the enemy soldiers' attention. The only possibility for Leo not to get caught with his children is to leave his hand on the baby's mouth, which will deprive him of air for a few minutes and will have serious consequences on his mental and respiratory systems.

*Is it morally acceptable that Leo decides to smother his baby in order to save his five other children?*

In the control version of the scenario, the action that Leo could take to save everyone from torture was to give the baby a pacifier.

In addition to the Crying Baby scenario, the experiment used a Captive Soldier scenario with a comparable structure. These two scenarios were selected based on a pretest conducted with 58 independent participants. This online pretest assessed the moral acceptability of the target action of eight non-lethal harm conflict and non-lethal harm control scenarios. In order to avoid floor effects (since we predict that mortality salience will decrease moral acceptability), we retained from this pre-test the two scenarios whose conflict version had an acceptability of at least 50%. In both cases, the acceptability of the control version was about 100%.

## 5.2. Results

Fig. 1 displays the percentage of utilitarian responses in the Pain and Death conditions, for control and conflict problems. Visual inspection suggests that utilitarian responses were more frequent for control problems, which is unsurprising. More importantly, it also suggests the expected effect of mortality salience on conflict problems: Utilitarian responses were less frequent on conflict problems when participants were under mortality salience.

An analysis of variance confirmed that utilitarian responses were less frequent overall for conflict problems,



Fig. 1. Percentage of utilitarian responses in the pain and death thought groups, for control and conflict problems. Errors bars indicate standard errors of the mean.

$F(1, 83) = 87.46, p < .001, \eta_p^2 = .51$ . More importantly, the analysis detected a significant interaction effect,  $F(1, 83) = 6.89, p = .01, \eta_p^2 = .08$ . This interaction supported our prediction that mortality salience would decrease the frequency of utilitarian responses to conflict problems,  $t(83) = 3.03, p = .003$ , but not to control problems,  $t(83) = 1.04, p = .30$ . Participants who were reminded of their future death before the experiments were less likely to give utilitarian responses on conflict problems, even when these problems did not involve to kill in order to save lives, but to harm in order to protect others from harm.

In our second experiment, we seek to assess the amount of cognitive resources consumed by mortality salience, by comparing its effect to that of several levels of cognitive load. As we already mentioned, proponents of the dual-process approach to moral judgment observed an effect of cognitive load on utilitarian response latencies (Greene et al., 2008). However, these authors failed to find an effect of cognitive load on the frequency of utilitarian responses, and hypothesized that their manipulation of load might not have been powerful enough to evoke this effect. Given that we do observe this effect with a mortality salience manipulation, we hypothesize that mortality salience might be the equivalent of a very high cognitive load. This is what we seek to confirm in Experiment 2.

## 6. Experiment 2

### 6.1. Method

The 115 participants (84 women; mean age = 23.77,  $SD = 5.08$ ) were recruited on campus at the University of Toulouse. The material and procedure were the same as in Experiment 2, except that participants were randomly assigned to one of three levels of cognitive load (low, high, very high).

To manipulate cognitive load, we used the Dot Memory Task (Bethell-Fox & Shepard, 1988; De Neys, 2006; De Neys & Verschuere, 2006; Miyake, Friedman, Rettinger, Shah, & Hegarty, 2001), a standard spatial storage task. Following the mortality salience manipulation and before each problem, participants briefly saw a matrix in which some cells were filled with dots. Participants were instructed to memorize the position of the dots (which was different every

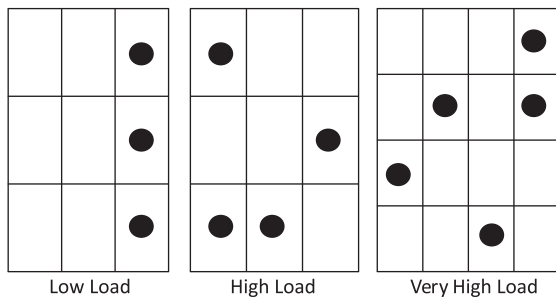


Fig. 2. Example of dot matrices used in the three load conditions.

time). Once finished solving with the moral problem, they had to reproduce the dot configuration in an empty matrix.

Participants in the low load condition saw very easy  $3 \times 3$  matrices similar to that presented in the left panel of Fig. 2. Participants in the high load condition saw difficult  $3 \times 3$  matrices similar to that presented in the central panel of Fig. 2. The  $3 \times 3$  matrices were presented for 850ms. Participants in the very high load conditions saw extremely difficult  $4 \times 4$  matrices similar to that in the right panel of Fig. 2. To make their task feasible, these matrices were shown for 2 s. We recorded the number of correctly located dots for each participant and each matrix.

## 6.2. Results

A Mahalanobis distance computation identified five multivariate outliers which were removed from subsequent analyses, leaving a final sample of 110 participants. We mainly focus our analysis on conflict problems, but present descriptive statistics for no conflict problems in Table 1.

Participants showed adequate performance in the Dot Memory Task. The mean number of correctly localized dots was 3 out of 3 under low load, 3.5 out of 4 under high load, and 3.2 out of 5 under very high load.

Overall, we conducted an ANOVA in which the problem type, the condition and the cognitive load were entered as independent variables and where the dependant variable was the percentage of utilitarian responses. Unsurprisingly, the analysis confirmed one more time that utilitarian responses were less frequent overall for conflict problems,

Table 1

Percentage (and SD) of utilitarian responses for conflict problems as well as no conflict problems as a function of experimental condition and cognitive load. The SD for each condition is the SD of the individual subject percentages of utilitarian responses.

	Pain	Death
<i>No conflict problems</i>		
Low	97.50 (11.18)	97.37 (11.47)
High	97.83 (10.43)	97.73 (10.66)
Very high	100.00 (0.00)	95.83 (14.34)
<i>Conflict problems</i>		
Low	55.00 (35.91)	39.47 (31.53)
High	58.70 (35.84)	43.18 (31.98)
Very high	35.71 (30.56)	12.50 (22.61)

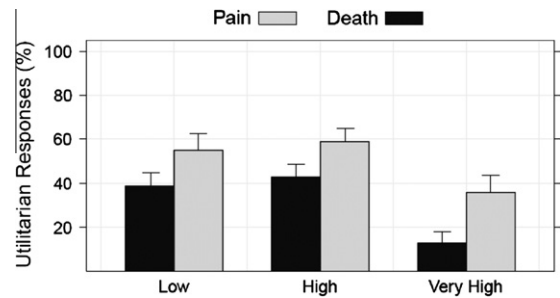


Fig. 3. Percentage of utilitarian responses for conflict problems as a function of mortality salience condition and cognitive load. Errors bars indicate standard errors of the mean.

$F(1, 109) = 290.16, p < .001, \eta_p^2 = .74$ . Second, a significant interaction was detected between problem type and condition,  $F(1, 109) = 6.18, p = .015, \eta_p^2 = .056$ , which replicates the effect found in Experiment 1. The analysis also detected a significant interaction between problem type and cognitive load,  $F(1, 109) = 5.59, p = .005, \eta_p^2 = .097$ , suggesting that cognitive load did impact the frequency of utilitarian responses to conflict problems but not to no conflict problems.

We now specify our results on conflict problems, which are our focus in this experiment. Fig. 3 displays the percentage of utilitarian responses for conflict problems as a function of experimental condition and cognitive load. Visual inspection suggests that we replicated the finding of Experiment 1: Overall, participants who thought about death gave less utilitarian responses to conflict problems than participants who thought about pain. Visual inspection also suggests that the frequency of utilitarian responses is left untouched until participants are under very high load, at which point it falls sharply, by about 20 points. Notably, the effect of mortality salience appears to be comparable to that of very high load: Mortality salience decreases the frequency of utilitarian responses by about 20 points, just as does very high load.

We performed an ANOVA with the percentage of utilitarian responses to conflict problems as the dependant variable, the independent variables being cognitive load and the mortality salience condition. First, the analysis detected a main effect of mortality salience,  $F(1, 110) = 8.04, p = .005, \eta_p^2 = .07$ . Second, the analysis detected a main effect of cognitive load,  $F(2, 110) = 6.03, p = .003, \eta_p^2 = .10$ . Specifically, post hoc *t*-test analysis did not detect any difference between the low and high load conditions but detected a significant difference between low load and very high load ( $p = .023$ ), as well as between high load and very high load ( $p = .005$ ). As it is visually clear in Fig. 3, the analysis did not detect an interaction between cognitive load and mortality salience,  $F(1, 108) = 0.14, p = .87, \eta_p^2 = .003$ .

## 7. Discussion

We predicted and experimentally demonstrated that individuals under mortality salience would be less likely to give utilitarian responses to moral conflicts. Utilitarian

responses were less likely if participants considered their own death before responding to a harm-based conflict. We also compared the effect of mortality salience to that of different levels of cognitive load, and found that it was comparable to a very high load level. This also allowed us to demonstrate an heretofore unobserved effect of cognitive load on utilitarian responses, confirming that previous failures to obtain the effect were likely due to too weak a manipulation of load.

This last finding is consistent with the hypothesis that counterintuitive utilitarian responses do not require to mobilize a vast amount of cognitive resources, although they do imply some measure of cognitive effort (Greene et al., 2008). It thus take a high degree of cognitive load to impact on the likelihood of a utilitarian response on a Footbridge-type problem, as shown in Experiment 2. This high degree of cognitive load, however, seems readily achieved by mortality salience. In our own research on mortality salience and reasoning biases (Trémolière et al., 2012), we already observed that the effect of mortality salience seemed at least twice that of a standard dot matrix task. The current results further support the contention that mortality salience puts cognitive resources under very significant duress, with predictable consequences on a broad range of high-level mental activities.

Other explanations of our findings could be considered, though, that would be consistent with a dual-process approach to moral reasoning without committing to the notion that mortality salience mobilizes cognitive resources. One possibility is that rather than depriving people of cognitive resources, mortality salience has a motivational effect, encouraging people to switch from an analytic to an intuitive, experiential mindset (Simon et al., 1997). Another possibility is that mortality salience makes people more emotional (and thus less utilitarian), independently of any effect on their cognitive resources. Some data, though, would speak against both explanations. Trémolière et al. (2012) did not find any evidence that a switch to an experiential mode of processing mediated the effect of mortality salience on reasoning biases, and mortality salience has regularly been found not to trigger increased emotional arousal (Rosenblatt, Greenberg, Solomon, Pyszczynski, & Lyon, 1989; Arndt, Allen, & Greenberg, 2001).

Another interpretation of our findings would consider that whenever mortality concerns are made salient, the emphasis on moral values will get stronger, at the expense of rational, utilitarian calculations, because these values are a component of people's existential anxiety buffers. Previous studies showed for example that mortality salience increased negative reactions to moral transgressors (e.g., Florian & Mikulincer, 1997) because it led people to increase alignment to their moral values. In that sense, our effects would not necessarily be mediated by the mobilization of cognitive resources, since they could involve the second line of defense of the dual-process model of terror management theory. Note though that these previous results were obtained after a delay or distraction task, specifically aimed at prompting this second line of defense. Our protocol intentionally avoided this delay or distraction in order to focus on the first line of defense, which terror

management theory assumes to mobilize cognitive resources. Our findings are thus consistent with the dual-process specification of terror management theory, but we must acknowledge that they cannot on their own rule out a uni-process account of the effect of mortality salience on moral judgment.

Irrespective of the precise processing specification underlying the effect of mortality salience, our findings have worrying implications for public debate (and private judgments) about controversial moral issues. We now know that mortality salience may prevent people from giving their full cognitive attention to moral conflicts, and it is arguably the case that many controversial moral issues which have entered the public debate (e.g., assisted suicide), involve matters of life and death. Our findings raise the worrying question of whether private judgment and public debates about these issues might be shaped by mortality salience effects, rather than by a full reflective attention to the available arguments.

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