Contemporary Morality: Moral Judgments in Digital Contexts

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Abstract

Nowadays, several of the situations in which we have to make decisions are in digital form. In a first experiment (N=1010) we showed that people's moral judgments depend on the Digital Context (Smartphone vs. PC) in which a dilemma is presented, becoming more utilitarian (vs. deontological) when using Smartphones in high conflict moral dilemmas. To provide additional evidence, we ran a second (N=250) and a third experiment (N=300), where we introduced time constraints and we manipulated time instructions. Our results provide an extended perspective on Dual-Process Models of Moral Judgment, as we showed that the use of smartphones, often assumed to be hurried which would be consistent with gut-feeling decision-making, increased the likelihood of utilitarian responses and decreased deontological ones. We suggest that the increase in utilitarian judgments is a result of inducing high construal, increasing psychological distance and giving rise to an abstract representation of actions. A fourth experiment (N=1211), where we measured psychological distance, provided some first evidence for our hypotheses. This is one of the first studies to look at the impact of the digital age on moral judgments and the results presented have consequences for understanding moral choice in our increasingly virtualized world.

Keywords: *moral judgment, behavioural ethics, decision-making, human-computer interaction.*

General Introduction

Context-Dependent Dual-Process Models in Moral Judgment

In this digital age, we spend a lot of time interacting with computer screens, smartphones and other digital gadgets. We buy online, work on the cloud, our social relationships are sometimes online-based, etc. Thus, the contexts where we typically face ethical decisions and are asked to engage in moral behaviour have changed. Nowadays, moral dilemmas are often presented digitally, that is, relevant information is presented through and decisions are made on a technological device.

A key distinction regarding moral judgments concerns deontological versus utilitarian decisions (Singer, 1991; Chaiken & Trope, 1999). Recent dual-process accounts of moral judgment contrast deontological judgments, which are generally driven by automatic/unreflective/intuitive responses, prompted by the emotional content of a given dilemma, with utilitarian responses, which are the result of unemotional/rational/controlled reflection, driven by conscious evaluation of the potential outcomes (Greene et al., 2001; Greene & Haidt, 2002; Greene et al., 2004; Koenigs et al., 2007). In this account, an individual's ethical mind-set (rule-based vs. outcome-based, *corresponding author of this manuscript*, 2015; Cornelissen et al., 2013) can play a central role. A deontological perspective evaluates an act based on its conformity to a moral norm (Kant, 1785/1959) or perhaps just a rule (such a law). By contrast a consequentialist/utilitarian perspective evaluates an act depending on its consequences (Mill, 1861/1998).

People often believe that judgments about "right" and "wrong" should be consistent and unaffected by irrelevant aspects of a moral dilemma or by its context. However, studies have shown, for example, that manipulations of the language (foreign vs. mother tongue) in which a moral scenario is presented can affect moral judgments through increasing psychological distance from the situation, and so inducing utilitarianism (Costa et al, 2014). The choice of deontological versus utilitarian judgments can vary depending on the emotional reactivity triggered by the

dilemma (Valdesolo & DeSteno, 2006; Wheatley & Haidt, 2005). As such, establishing which conditions favor each of these two influences is fundamental to understanding the psychology of moral choice.

The present study explores whether a Digital Context (i.e. using a digital device such a Smartphone or a PC, as hundreds of millions of individuals do every day) can have a systematic impact on these processes.

Construal Level Theory, Psychological Distance and Digital Contexts

Instead of relying on affect-centered explanations, we propose that the relationship between deontology and consequentialism would benefit from analyses in terms of information processing. How is the information relevant to deontological considerations different from that relevant to consequentialist considerations? What causes people to adopt one or the other mode of decision-making?

Construal Level Theory (CLT) provides a framework of considerable potential relevance by linking mental representations to moral judgment. Individuals' judgments, decisions, and behaviours can differ as a function of construal levels. CLT proposes that the same event or object can be represented at multiple levels of abstraction (see Trope & Liberman, 2010, for a review). More weight is given to global, abstract features at high-level construal, whereas local, concrete features are more influential at low-level construal. According to CLT, psychological distance is a major determinant of what level of construal is activated. Distancing a target on any dimension of psychological distance (i.e., time, space, social, and hypotheticality) leads to greater activation of high-level construal (directing attention to end states) than low-level construal (Liberman et al., 2002). Crucially, high-level construal is often assumed to align with more utilitarian decision-making (Trope & Liberman, 2010). Indeed, Gong et al. (2012) examined the idea of whether a person focuses on actions or outcomes while making moral choices depends on the psychological distance from the moral situation. They found that when the situation is perceived as far off,

whether in time or space, consequentialist considerations loom larger; establishing that psychological distance from an event decreases deontological judgments and increases consequentialist choices. Furthermore, Aguilar et al. (2013) examined whether psychological distance gives rise to an abstract representation of actions that make goals more prominent and can help us ignore their immediate effects. In three experiments they confirmed that psychological distance increase consequentialism. In other words, that different manipulations of psychological distance increased participants' consequentialist choices. In a nutshell, higher psychological distance gives rise to an abstract representation of actions that makes goals more prominent and can help us ignore the immediate affective impact of actions. And conversely, deontological judgments are more associated with psychological closeness due to the link between low-level construal and a focus on means.

The way some of the technological devices we use nowadays influence our decision-making capabilities and behaviours is unclear. Could Digital Contexts induce different construal levels (through psychological distance)? From a historical perspective, Kiesler et al. (1984) and Walther (1996) were amongst the first to discuss how social psychological research might contribute to a deeper understanding of computer-mediated communication (CMC) specifically and of computers and technological change in society more generally. Although some of their studies indicated that CMC might be *impersonal*, a number of reports also showed a more personal CMC interaction, sometimes just as *personal* as face-to-face (FtF) interaction. They argued that perhaps the medium had no consistent effects but that different conditions surrounding CMC use lead to the contrasting results. More recently, Shaw et al., (2016) presented the first empirical study that explores some individual differences that exist between users of particular brands of smartphone devices. For example, in comparison to Android users, they found that iPhone owners are more likely to be female, younger, and increasingly concerned about their smartphone being viewed as a status object. Key differences in personality were also observed with iPhone users displaying lower levels of Honesty-Humility and higher levels of emotionality. In the present work, rather than focusing on

specific smartphone brands, we take a step back and we focus on smartphones, as a general technological device, and we use PCs as a control group.

There has been a lot of literature focusing on time stress and judgements (Svenson et al., 1985; Entin et al., 1990), but in specific, we are interested in the so called “narrowing effect”, which means that individuals channel or tunnel their focus toward a main task and ignore or filter out certain cues. For example, Svenson et al., (1985) showed in a series of studies this effect when people were asked to choose apartments. Among all the different elements to consider about an apartment (such as size, quality, and distance from work), people who were put under time pressure focused primarily on the distance from work and underweighted all other criteria. More importantly, there is evidence that people experience the "narrowing effect” when using smartphones in decision-making (Ariely, 2016). A narrowing effect is consistent with the idea that devices such as smartphones would increase psychological distance giving rise to an abstract representation of actions. In other words, the narrowing effect would seem to be aligned with a more utilitarian/ outcome-based mind-set, instead of a more emotional/ deontological one.

For this reason we asked ourselves whether Digital Context, smartphone vs. PC, might influence the relation between different levels of construal (psychological distance), thus affecting the likelihood of utilitarian vs. deontological judgments. A complicating consideration concerns the impact of time in moral decision-making on smartphones vs. PCs. In general, more hurried or time-pressured responses are thought to be aligned with more emotional/ gut feeling (i.e. deontological) decisions (i.e. Suter and Hertwig, 2011). Therefore, *if* smartphones are associated with more hurried or time-pressured responses (e.g., when serving as a default option for staying informed in a fast way, quickly checking email, getting from place to place, sharing moments in social media, sending brief messages, etc.), relative to PCs, then we would expect moral judgments on smartphones to likewise be biased towards deontological decisions. However, a contrasting perspective is our hypothesis that, even under conditions of time pressure, some digital contexts (i.e. Smartphones) could trigger utilitarian decision-making. We support this idea by the so called "narrowing effect”

introduced above and by the recent results from Kusev et al. (2016) that suggest that variation in accessibility of utilitarian information can produce variation in moral choices, with rational choices taking less time in certain conditions. This latter hypothesis gains credibility if we further consider that Smartphone use may not always be hurried or time-pressured (e.g., consider an individual in a train journey, using his/her smartphone to pass time).

To summarize, we hypothesize that Smartphones (vs. PCs) have the effect of channeling or tunneling the focus toward a main task at the expense of certain cues. This should induce high construal, increase psychological distance and give rise to an abstract representation of actions, thus biasing towards more utilitarian judgments. There is a potentially conflicting hypothesis, according to which, if Smartphone use is consistently hurried and time-pressured that would instead reveal a deontological bias. We first tested this prediction using three versions of the well-known Trolley Problem (Switch, Fat Man, Balanced; Thomson, 1985; see Methods sections). To provide additional support we also ran a second and a third experiment where we introduced a Time Constraint (10 seconds vs. Unlimited Time to respond) and where we manipulated Time Instruction, relating to how participants were given information about the time constraints for reaching a decision (Instructing Unlimited Time vs. No Time Instruction). Finally, as a first exploratory examination, we ran one last experiment where we directly explored differences in psychological distance.

Pilot Study

This research is primarily based on two versions of the Trolley Problem, the Switch version and the Fat Man version (see shortly), as these have been extensively shown to lead to utilitarian and deontological judgments, respectively (Greene, 2001). But, we also wanted to identify a scenario, in which the relative utilitarian and deontological influences would be reasonably well-balanced. It is possible that Digital Context does affect the balance between deontological and

utilitarian choices, but predominant influences in the original scenarios are too strong and so suppress any effect. To obtain a Balanced version of the task we ran this pilot study.

Method

Sample

Forty-two experimentally naïve students at City University London received course credit for participating in the study (31 women, 11 men; mean age=20 years, *SD*=3.1).

Materials and Procedure

The experiment, designed in Qualtrics and run in a lab, lasted approximately 5 minutes. A Fat Man version of the Trolley Problem was presented. We modified the Fat Man scenario (briefly, one has to push a man onto the train tracks to avoid killing some workmen) by asking participants how many workmen they would need to save to be justified in taking the action. The aim was to maintain the emotionality of one of the choices but to increase the utilitarian weight of the other one by increasing the lives one could save. We refer to this scenario as the “Balanced” dilemma.

The dilemma presented a scenario like this: “You are standing on a footbridge over a trolley track. You can see a trolley hurtling down the track, out of control. You turn around to see where the trolley is headed, and there are some workmen on the track that exists under the footbridge. What do you do? You know of one certain way to stop an out-of-control trolley: drop a really heavy weight in its path. But where to find one? It just so happens that standing next to you on the footbridge is a big fat man, a really big fat man. He is leaning over the railing watching the trolley; all you have to do is to give him a little shove, and over the railing he will go, onto the track in the path of the trolley.” Participants are normally asked to make a choice between (A): You can shove the man onto the track in the path of the train, killing him. Or (B): You can refrain from shoving the man onto the track, letting the workmen die. Instead, we asked participants not to choose one of the options but to write how many workmen would need to be saved, so that they would be undecided between Choice A and Choice B. In other words, how many "lives saved" would be needed, so that they do not know what to do, whether to shove the man (so killing him) or refrain from shoving the

man and letting the workmen die. Participant responses on the specific number of workmen to be saved were the dependent variable in this pilot. From the results of this experiment, we then specified the settings of the Balanced version of the Trolley Problem, in Experiment 1.

Results Pilot Study

Participant responses had a mean score of 150, a median of 15, a mode of 2 and a range of 998. Based on these considerations, we decided to adopt the median response, 15 workers, for designing a corresponding balanced scenario. We so aimed to maintain the emotionality of one of the choices and to increase the utilitarian value of the other one, so that the scenario would have neither a utilitarian nor an emotional predominant bias. We used this Balanced version of the Trolley Problem together with the Switch and Fat Man dilemmas in Experiment 1.

Experiment 1

The objective was to explore whether a manipulation of the Digital Context (Smartphone vs. PC) can have an impact on moral judgment. Specifically, we wanted to test the hypothesis that making moral judgments using a Smartphone increase the number of utilitarian responses in comparison to when using a PC.

Method

Sample

A total of 1010 participants, all US residents, were recruited on-line and received $1 for doing the task (482 women, 528 men; mean age=31.7 years, *SD*=9.6). Sample sizes were based on extant research (Hofmann et al. 2014; Suter & Hertwig, 2011) and were determined prior to the start of the experiments; the stopping rule for data collection was enforced automatically, as data collection was done through the Amazon Mechanical Turk platform.

Materials and Procedure

The study was designed in Qualtrics, run on Amazon Mechanical Turk and lasted approximately 10-15 minutes. Digital Context (Smartphone vs. PC)[1] and Version of the Trolley Problem (Switch vs. Fat Man vs. Balanced) were manipulated between participants. We used the frequency of Utilitarian vs. Deontological Responses as the dependent measure.

Participants were randomly told to switch to a Smartphone or a PC after reading and agreeing the general instructions on Amazon Mechanical Turk. Having a smartphone was a pre-requisite to participate in the experiment. Participants in the Smartphone condition had to respond to all questions from their smartphone devices. As a manipulation check for this condition, we tracked and verified through Qualtrics that the responses were indeed made from an iPhone, Android, Windows Phone or Blackberry.

Participants were randomly allocated to one of these six conditions: (1) Smartphone/Switch; (2) Smartphone/Fat Man; (3) Smartphone/Balanced; (4) PC/Switch; (5) PC/Fat Man; (6) PC/Balanced.

One third of the participants (327 Participants) on each Digital condition were presented with the Fat Man version of the Trolley dilemma, where one imagines standing on a footbridge overlooking a train track. A small incoming train is about to kill five people and the only way to stop it is to push a heavy man off the footbridge in front of the train. This will kill him, but save the five people. A utilitarian analysis dictates sacrificing one to save five; but this would violate the moral prohibition against killing. Imagining physically pushing the man is emotionally difficult and therefore people typically avoid this choice (Thomson, 1985). According to our hypotheses, participants would be more likely to opt for sacrificing one man to save five when dealing with such moral dilemma using a smartphone in comparison to a PC, since this would induce high construal, increase psychological distance and give rise to an abstract representation of actions, which is aligned with more utilitarian judgments under time pressure.

[1] In the Smartphone condition participants could do the experiment with the following devices: iPhone, Android, Windows Mobile Phone and BlackBerry. In the PC condition participants could use a desktop or a laptop computer. No tablets were allowed.

Another third of participants (313 Participants) were presented with the Switch dilemma, where the trolley is headed towards the five men, but you can switch it with a lever to another track, where it would kill only one man. People are more willing to sacrifice the one man by pulling the switch than by pushing him off the footbridge and the extensively supported explanation is that pulling the switch is less emotionally aversive.

The last third of participants (314 Participants) were presented with the Balanced version of the Trolley Problem. The Balanced dilemma had a setting similar to that in the Fat Man version, but with a different number of people one could save (15 instead of 5), so that utilitarian choice would increase.

All participants first completed a filler task (10 trivia questions) before responding to one of the versions of the Trolley Problem. A "catch question" was introduced in the experiment, to control for attention during the task (i.e. "If you are paying attention to this question please select answer '36' from the options below"). Then, participants were presented with one of the three moral scenarios (Switch, Fat Man or Balanced) where they had to choose between Choice A (utilitarian) or Choice B (deontological). In all cases the dilemma was presented with both text and an illustration. Subsequently, participants completed another filler task (10 trivia questions). Finally, participants were asked to complete The Big Five Inventory (John et al., 1991) questionnaire, which is considered a quick (44-items), reliable, and accurate measure of the five dimensions of personality. We considered that the impact of digital content on moral choice could also interact with personality characteristics (Penner et al., 1995; Ozer & Benet-Martínez, 2006) but the results did not lead to firm conclusions and therefore will not be reported further. In Figure 1a we illustrate the experimental paradigm used for the Smartphone condition and in 1b the three moral conditions.

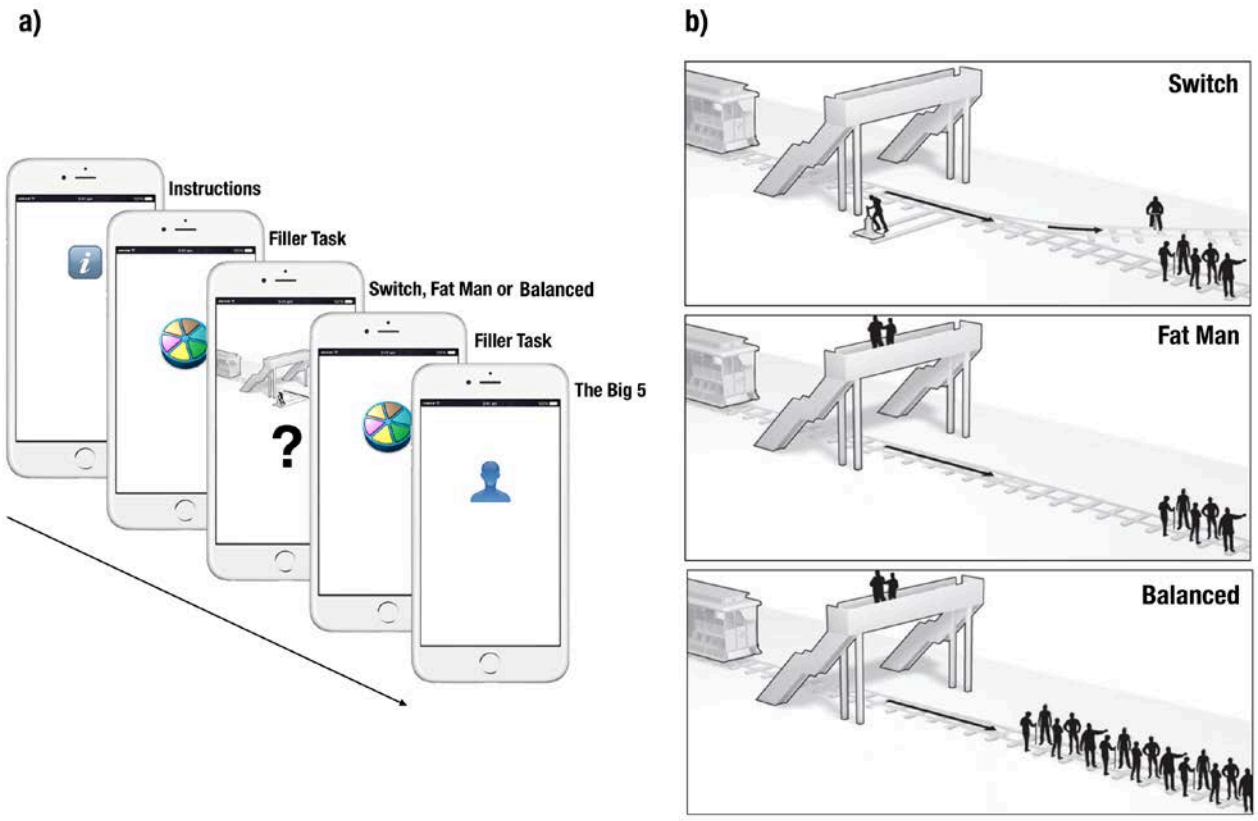

Fig. 1. A) The experimental paradigm used in the Smartphone condition in Experiment 1. B) The illustrations used in each of the three moral conditions (Switch, Fat Man and Balanced).

Results Experiment 1

We excluded participants whose first language was not English, as Costa et al., (2014) showed that the use of a foreign language (instead of a mother tongue) in a moral scenario increases psychological distance and induces utilitarianism when making moral judgments. We also excluded those participants who did not answer the catch question correctly. A total of 56 participants out of 1010 were thus excluded (the numbers of participants per condition, for all experiments, are reported in the Supplemental Material).

We first compared the percentage of Utilitarian Responses for the two Digital Contexts (Smartphone[2] vs. PC) on each of the three Versions of the Trolley Problem that were employed (Switch vs. Fat Man vs. Balanced; Figure 2).

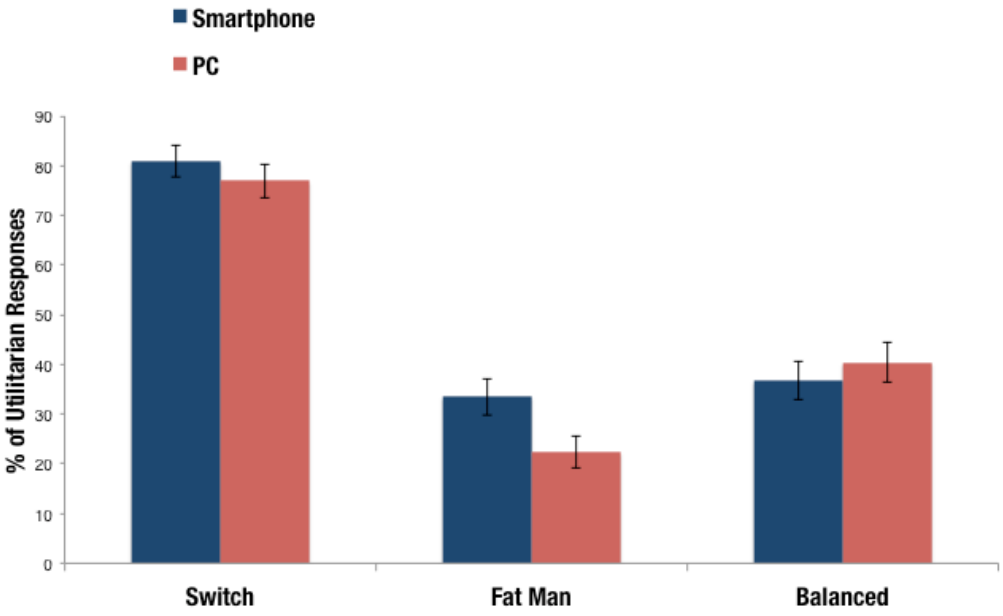

Fig. 2. Percentage of Utilitarian Responses for both Digital Contexts (Smartphone vs. PC) on each of the three versions of the Trolley problem (Switch vs. Fat Man vs. Balanced). Error bars represent standard errors[3].

As expected, in the Fat Man dilemma more participants avoided the act of pushing the heavy man off the footbridge in front of the train, presumably because of the emotional burden of this choice. More importantly, participants were more likely to opt for sacrificing the Fat Man (utilitarian response) to save five men when using a Smartphone (33.5%) than when using a PC (22.3%). A 2x2 chi-square test of independence was performed to examine the frequency of

[2] In the Smartphone condition, 39% of participants used an iPhone during the experiment, 58.5% an Android, 2.2% a Windows Mobile Phone and 0.2% a BlackBerry.

[3] We computed errors bars for binary categorical data in this way: Let's say our estimate for the probability of assignment in a target category is p. Then $SE = \sqrt{\frac{pq}{n}}$, where q = (1-p).

Utilitarian vs. Deontological Responses against Digital Context in the Fat Man condition and this revealed a significant association between the variables, χ^2 (1, N=327) = 5.15, p=.023. This result supports our hypothesis that moral judgments in Smartphones increase utilitarian decision-making, than when using a PC.

We then analyzed the frequency of Utilitarian vs. Deontological Responses, across the two Digital Contexts, in the Switch condition. Slightly more participants decided to sacrifice one man by pulling the switch than to do nothing and let five people die (80.9% for the Smartphone users; 76.9% for the PC users), but there was no evidence for an association between the two variables, χ^2 (1, N=313) = .741, p=.389. This result supports our expectation that in less emotional scenarios, such as the Switch dilemma, there is a reduced effect of Digital Context. That is, there is no difference in participants' moral judgments when using a Smartphone or a PC if the moral scenario is already highly utilitarian.

Finally, we examined the frequency of Utilitarian vs. Deontological Responses in the Balanced condition. Note, this condition was designed so that, in the PC condition at least, there would be fairly equivalent utilitarian and deontological influences, and this was approximately the case. Regarding the manipulation of interest, 40.4% of participants decided to push the heavy man off the footbridge in the PC and 36.7% in the Smartphone conditions. Nevertheless, a chi-square test of independence showed that the relation between these variables was not significant, χ^2 (1, N=314) = .448, p=.503. The (tentative) conclusion from this experiment is that using a Smartphone rather than a PC has a reliable impact on moral judgments only when dilemmas or scenarios have high emotional content.

Experiment 2a

The objective of Experiment 2a was to provide additional evidence for the increased number of utilitarian responses using a Smartphone by manipulating the amount of time available to form a moral judgment. We wanted to test the hypothesis that moral judgments using a Smartphone

increase the number of utilitarian responses in comparison to when using a PC (under Time Constraint). It is possible that the effect of Digital Context is independent from that of Time Constraint, in which case we cannot explain the former in terms of (just) the latter. Alternatively, Time Constraint may provide a bias on moral decision making opposite to the effect of Digital Context (e.g., a *decrease* of utilitarian responses, in the fat man scenario, when participants are using a Smartphone), which will create a complex picture regarding how using Smartphones in everyday moral judgments biases for and against utilitarian responses. We also measured participants' affective reaction with the Self Assessment Manikin test (Bradley and Lang, 1994).

Method

Sample

A total of 250 participants, all of whom were US residents, were recruited on-line and received $0.80 for doing the task (114 women, 136 men; mean age=32.9 years, *SD*=9.1).

Materials and Procedure

The study was designed in Qualtrics, run on Amazon Mechanical Turk and lasted less than 10 minutes. Digital Context (Smartphone vs. PC), Version of the Trolley Problem (Switch vs. Fat Man) and Time Constraint (10 seconds vs. Unlimited Time to respond) were manipulated between participants. There were therefore eight conditions. We used the frequency of Utilitarian vs. Deontological Responses as the dependent measure.

We followed the same procedure (verification and tracking methods) as in Experiment 1 for the Smartphone condition.

All participants followed a similar procedure as in Experiment 1. They first completed a filler task (10 trivia questions) including a catch question, as in Experiment 1. Then, participants were presented with one of the two moral scenarios (Switch or Fat Man). In all cases the dilemma was presented with both text and an illustration. Participants were alerted of the available time for responding depending on their condition (i.e. "You will only have 10 seconds to answer the question in the next screen" vs. "You will have unlimited time to answer the question in the next

screen"). After the presentation of the scenario, in the "10 seconds" condition participants had to choose between Choice A (utilitarian) or Choice B (deontological), while a countdown timer appeared at the top of their screen (both Smartphone and PC). In contrast, in the "Unlimited Time" condition, participants were explicitly told that they had to make their judgment taking as much time as they wanted. Finally, participants were asked to complete the Self Assessment Manikin test (Bradley and Lang, 1994), which is a technique that directly measures the pleasure, arousal and dominance associated with a person's affective reaction.

Results Experiment 2a

We excluded a total of 10 participants out of 250 following the same criteria as in Experiment 1 (participants were rejected if they answered the catch question incorrectly or if English was not their first language).

As a manipulation check, we first examined the amount of time that participants took to finish the experiment. Overall, participants ended up spending more time in the Unlimited Time condition (5min 10s) than in the 10s condition (4min 32s), but this was not significant, $t(238) = -1.916$, $p = .057$. This indicates that even in the time pressure condition participants had ample time to respond to the questions.

We examined the differences in the percentage of Utilitarian Responses for the two Digital Contexts (Smartphone vs. PC) on each of the two versions of the Trolley Problem (Switch vs. Fat Man) and with or without time pressure (10s vs. Unlimited Time; Figure 3).

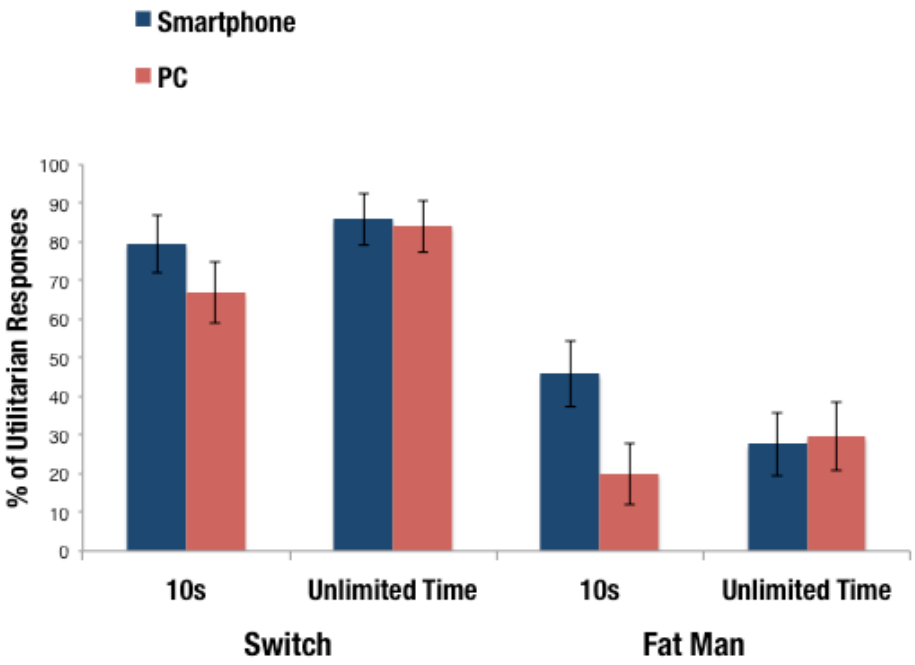

Fig. 3. Percentage of Utilitarian Responses for both Digital Contexts (Smartphone vs. PC) on each of the two versions of the Trolley problem (Switch vs. Fat Man) depending on Time Constraint (10s vs. Unlimited Time). Error bars represent standard errors.

As in Experiment 1, all statistical tests involve the variables frequency of Utilitarian vs. Deontological Responses and Digital Context (Smartphone vs. PC).

In the time pressure (10s), Switch condition, slightly more participants decided to sacrifice one man by pulling the switch than to do nothing and let five people die, when using a Smartphone (79.31%) than when using a PC (66.67%), but this difference was not reliable, χ^2 (1, N=65) = 1.282, p=.257.

Regarding the Unlimited Time condition, in the Switch condition, Digital Context also did not appear to play a role in moral judgments (85.71% and 83.87% for Smartphone and PC, respectively); regardless of Digital Context, we observed highly utilitarian responses. Thus, as before, the results in the Switch dilemma indicate that Digital Context and (as it seems) Time Constraint have a reliable impact on moral judgments only when dilemmas or scenarios have high

emotional content. This result also supports our assumption that in less emotional scenarios, such as the Switch dilemma, any effect of either Digital Context or Time Constraint does not result in a reliable increase in utilitarian responding.

In the time pressure (10s), Fat Man condition, participants were more likely to opt for sacrificing the Fat Man (utilitarian response) to save five when using a Smartphone (45.7%) than when using a PC (20.0%), χ^2 (1, N=60) = 4.239, p=.04. At face value, these results support our hypothesis that, even under conditions of time pressure, some digital contexts (i.e. Smartphones) could trigger utilitarian decision-making.

Finally, we examined participant's responses in the Unlimited Time, Fat Man condition. The results here appear to conflict with our conclusion from Experiment 1, in that there was no difference in Utilitarian vs. Deontological responses, between the Smartphone and PC conditions (27.58% and 29.63%, respectively, χ^2 (1, N=64) = 2.224, p=.136). In other words, when participants were specifically told to spend unlimited time to resolve the dilemma (Unlimited Time condition), the Digital Context effect vanished. We return to this finding in Experiment 2b.

We also considered whether the impact of Digital Content on moral choice could interact with the perceived emotionality of the scenario/context or affective reactions, but the results did not lead us to firm conclusions and therefore will not be reported further (see Supplemental Material).

Experiment 2b

Experiments 1 and 2a left us with a challenge to explain the difference in the Fat Man condition of Experiment 1 and in the Unlimited Time condition in Experiment 2a (where the effect of Digital Context had disappeared). The key difference between these two conditions was that in Experiment 1 participants were not told anything regarding time, while in Experiment 2a, in the equivalent conditions, participants were specifically told they had unlimited time. It is possible that the requirement to keep track of time somehow interacted with other biases in moral decision-making (such as arising from Digital Context). We hypothesized that with unlimited time

instructions, participants were encouraged to take into account the information about the dilemma they have been ignoring so far (which would include emotional cues, on the reasonable assumption that these were originally ignored) and this made the utilitarian bias disappear. In Experiment 2b we address this hypothesis directly by manipulating the Time Instruction to either specify that there was unlimited time available for a moral judgment, or not mentioning time at all (Instructing Unlimited Time vs. No Time Instruction). We only used the Fat Man scenario, as it is for this scenario that the effect of interest was observed. We also measured participants' Response Time (i.e. the time participants took to read the dilemma and make the moral choice) as an additional manipulation check.

Method

Sample

A total of 300 participants, all of whom were US residents, were recruited on-line and received $0.8 for doing the task (120 women, 180 men; mean age=32.2 years, *SD*=8.9).

Materials and Procedure

The study was designed in Qualtrics, run on Amazon Mechanical Turk and lasted less than 10 minutes. Digital Context (Smartphone vs. PC) and Time Instruction (Instructing Unlimited Time vs. No Time Instruction) were manipulated between participants, using the Fat Man scenario (see Experiment 1 for details). We used the frequency of Utilitarian vs. Deontological Responses as the dependent measure. We also measured participants' Response Time.

Time Instruction was manipulated in the following way. Half the participants were given the instructions (as in the Experiment 2a Unlimited Time condition): "You will have unlimited time to answer the question in the next screen". The other half did not have any indication of the time they had to spend making their judgment (same procedure as in Experiment 1). For the rest of the task, all participants followed a similar procedure as in Experiment 1 and 2a. We also employed the same verification/ tracking methods as in Experiments 1, 2a for the Smartphone condition. Finally, because of the large samples in Experiments 1, 2a, in this experiment we included an additional

question regarding whether participants had taken part ‘in a similar trolley experiment before’. We informed them that there would be no penalty for an affirmative response (i.e., the participant could still do the experiment and get paid normally).

Results across all Experiments 1, 2a and 2b

In this section we report the results of Experiment 2b and then bring together the results from Experiments 1, 2a and 2b, focusing on the Fat Man scenario (Figure 4).

First, we summarize the results from Experiment 2b. In this experiment we excluded a total of 141 participants out of 300 (the total number of participants per condition are reported in the Supplemental Material) following the same criteria as in Experiment 1 and 2a. One participant was rejected because she/he answered incorrectly to the catch question and one because English was not his/her first language. Additionally, 139 participants were eliminated because they said they had come across a moral choice in the context of the Trolley Problem before. The pattern of results does not change qualitatively if these participants are included, but we decided not to do so.

In this experiment we measured Response Time for the particular moral judgment, though we note that, as the experiment was run over the internet, the accuracy of these measurements is lower than in the lab. Did participants in the Instructing Unlimited Time condition take longer to respond than ones in the No Time Instruction one? There was no evidence that this was the case (2x2 ANOVA with Digital Context and Time Instruction, $F<1$ for all effects). We suggest that the effects from Time Constraint and Time Instruction seen in Experiments 2a, 2b could result in a change of the participants’ mind-set and approach to the problems, without corresponding clear differences in Response Time.

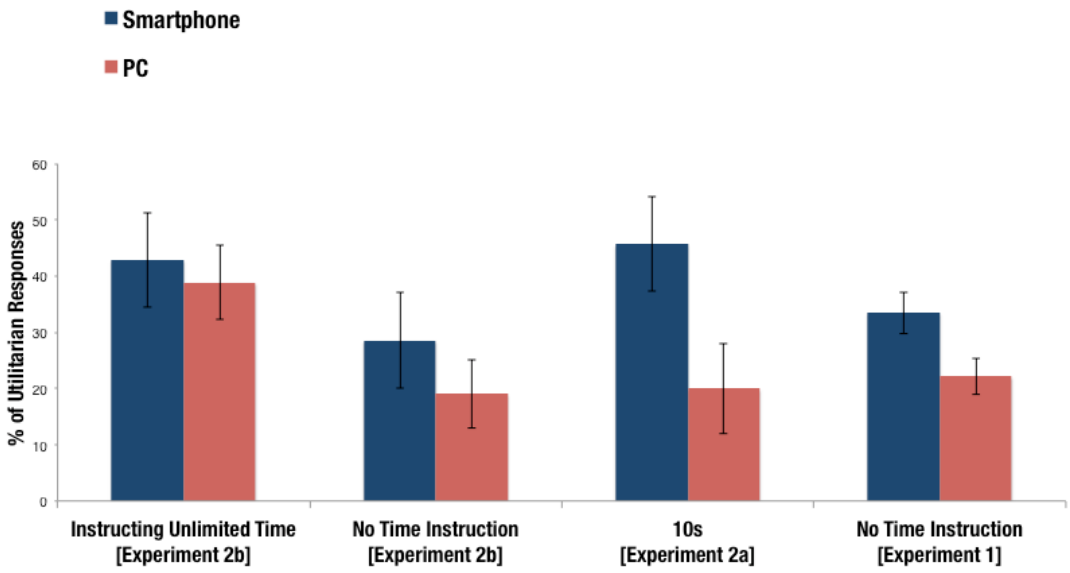

Fig. 4. Summary of the relevant results from Experiments 1, 2a and 2b for the Fat Man problem. The vertical axis shows percentage of utilitarian responses and the horizontal axis the conditions of interest. Error bars represent standard errors.

The two leftmost bar clusters in Figure 4 show the results of Experiment 2b. Interestingly, using the data from Experiment 2b, we replicated the finding from Experiment 2a, that the mere fact of "nudging" participants to use unlimited time resulted in utilitarian responses that were not influenced by Digital Context. A 2x2 chi-square test with frequency of Utilitarian vs. Deontological Responses against Time Instruction (Instructing Unlimited Time vs. No Time Instruction) confirmed this conclusion, χ^2 (1) = 5.509, p = .018.

We next considered whether the results from Experiments 2b replicated the effect from Experiments 1 and 2a regarding Digital Context. The pattern of results from the No Time Instruction condition in Experiment 2b closely matched the corresponding results in Experiment 1. In Experiment 2b, as expected, participants were more likely to opt for sacrificing the Fat Man (utilitarian response) to save five when using a Smartphone (28.6%) than when using a PC (19%). Even though the trend was as expected, a 2x2 chi-square test with frequency of Utilitarian vs.

Deontological Responses against Digital Context (Smartphone vs. PC) was not significant, χ^2 (1, N=70) = 0.864, p=.35. However, after collapsing the data (for the *identical* Fat Man, No Time Instruction conditions) from Experiments 1 and 2b, we obtained a significant association between frequency of Utilitarian vs. Deontological Responses and Digital Context (Smartphone vs. PC), χ^2 (1, N=397) = 6.27, p=.012. This result supports our hypothesis that moral judgments in Smartphones increase utilitarian decision-making, compared to when using a PC, when no information about time is provided.

Importantly, the results from Experiments 1, 2a and 2b put together indicate that under conditions of no time information and time pressure there is indeed a utilitarian bias. The only Time Instruction in which the utilitarian bias was eliminated was the Unlimited Time condition, in which participants were specifically told to take as long as they needed to respond. This finding has a plausible interpretation that, in the Unlimited Time condition, participants took into account the information they have been ignoring so far (which would include emotional cues) and this made the utilitarian bias disappear. Thus, the results so far support the hypothesis that, under most conditions, smartphones (vs. PC) are associated with more utilitarian decision-making (vs. deontological). An additional interesting finding is that utilitarian judgments emerge in both the No Time Instruction condition and the Time Pressure condition. This latter finding presents a route for extending the dual route model of moral decision-making (Greene et al., 2001), which currently incorporates an assumption that more hurried judgments are more likely to lead to deontological judgments (though we stress that even in the Time Pressure condition participants would have had ample time to respond).

Experiment 3

A reasonable interpretation of the results in Experiments 1, 2a and 2b is that the increase in utilitarian judgments is due to an induction of high construal, increasing psychological distance and giving rise to an abstract representation of actions. This interpretation is supported by the idea of

'narrowing focus', which has been put forward regarding the use of smartphones (Ariely, 2016). In Experiment 3 we attempt to provide a preliminary investigation to further support this interpretation, by measuring psychological distance and by overall more complete manipulation of Time (No Time Instruction vs. Unlimited Time vs. Time Pressure). We only used the Fat Man scenario, as it is for this scenario that the effect of interest was observed. We also measured participants' response time.

Method

Sample

A total of 1211 participants, all of whom were US residents, were recruited on-line and received $0.8 for doing the task (587 women, 624 men; mean age=31.82 years, *SD*=9.43).

Materials and Procedure

The study was designed in Qualtrics, run on Amazon Mechanical Turk and lasted less than 10 minutes. Digital Context (Smartphone vs. PC) and Time (No Time Instruction vs. Unlimited Time vs. Time Pressure) were manipulated between participants, using the Fat Man scenario (see Experiment 1 for details). We used the frequency of Utilitarian vs. Deontological Responses as the dependent measure. We also measured psychological distance and participants' response time.

Regarding the time manipulation, one third of participants were not provided with any indication of time for making their judgment (No Time). Participants in the Unlimited Time condition were instructed as follows: "You will have unlimited time to answer the question in the next page. Think carefully about your judgment before responding". Participants in the Time Pressure condition were presented with the following instructions: "The question in the next page should be answered as fast as possible. Use your first impression/ gut feeling in order to respond"; these participants had to make their moral choice while a timer (at the top of their screen) kept track of elapsed time. For the rest of the task, all participants followed a similar procedure as in Experiment 1, 2a and 2b. We also employed the same verification/ tracking methods as in the previous experiments for the Smartphone condition. Then, participants had to respond a measure of

psychological distance (Trope & Liberman, 2010) (e.g., “How distant do you feel yourself from the scenario when making your decision?”) moving a slider that went from 0 (really close) to 7 (far away). Finally, as in Experiment 2b, because of the large samples in the previous experiments, we included an additional question regarding whether participants had taken part ‘in a similar trolley experiment before’.

Results Experiment 3

We excluded a total of 546 participants out of 1211 because they said they had come across a moral choice in the context of the Trolley Problem before. (Note, it may appear wasteful not including such a proportion of the recruited participants, nevertheless we were surprised by the number of participants who had come across the Trolley Problem)

As a manipulation check regarding time, we examined the amount of time that participants took to make their judgments. Participants spent more time responding in the Unlimited Time condition (14.28s) than in the No Time condition (12.53s) and than in the Time Pressure condition (7.5s). A one-way between subjects ANOVA for these means was significant ($F(2, 662) = 6.505$, $p = .002$). A Tukey post-hoc test revealed that all pairwise comparisons between groups were significant ($p = .023$) but the No Time and Unlimited Time comparison was not ($p = .648$).

It is questionable as to whether the measure of distance we employed was sensitive enough, even though it is a standard way of measuring distance in related research (Trope & Liberman, 2010). It is primarily for this reason that the results of this experiment ought to be considered preliminary, though one also needs to point to the depletion of participants in answering the Trolley Problem (approximately 50% of the sample was not naïve). Notwithstanding these qualifications, we examined whether different levels of psychological distance reflected the expected differences regarding moral changes (Figure 5). We selected participants who reported Low vs. High levels of distance (i.e. ≤ 2 points and ≥ 4 points in the 7 Likert scale, respectively).

As expected, participants who reported high levels of distance under time pressure were more likely to opt for the utilitarian response (40.22%) than the ones who reported low ones (26.61%). A 2x2 chi-square test of independence was performed to examine the frequency of Utilitarian vs. Deontological Responses against Low vs. High levels of distance in the Time Pressure condition and this revealed a significant association between the variables, χ^2 (1, N=201) = 4.19, p=.04.

Interestingly, utilitarian responses were also more likely for participants who reported low levels of distance under No Time Instruction (33% vs. 24.24%), indicating utilitarian responses can follow this alternative route (low distance, No Time Instruction). A 2x2 chi-square test of independence was performed to examine the frequency of Utilitarian vs. Deontological Responses against Low vs. High levels of distance in the No Time condition but it was not significant, F<1.

Finally, we suggest, as in Experiment 2b, that the Unlimited Time condition produces conflicting results due to the fact that participants are encouraged to take into account information that they may otherwise have ignored, including emotional valence information for the High Distance participants.

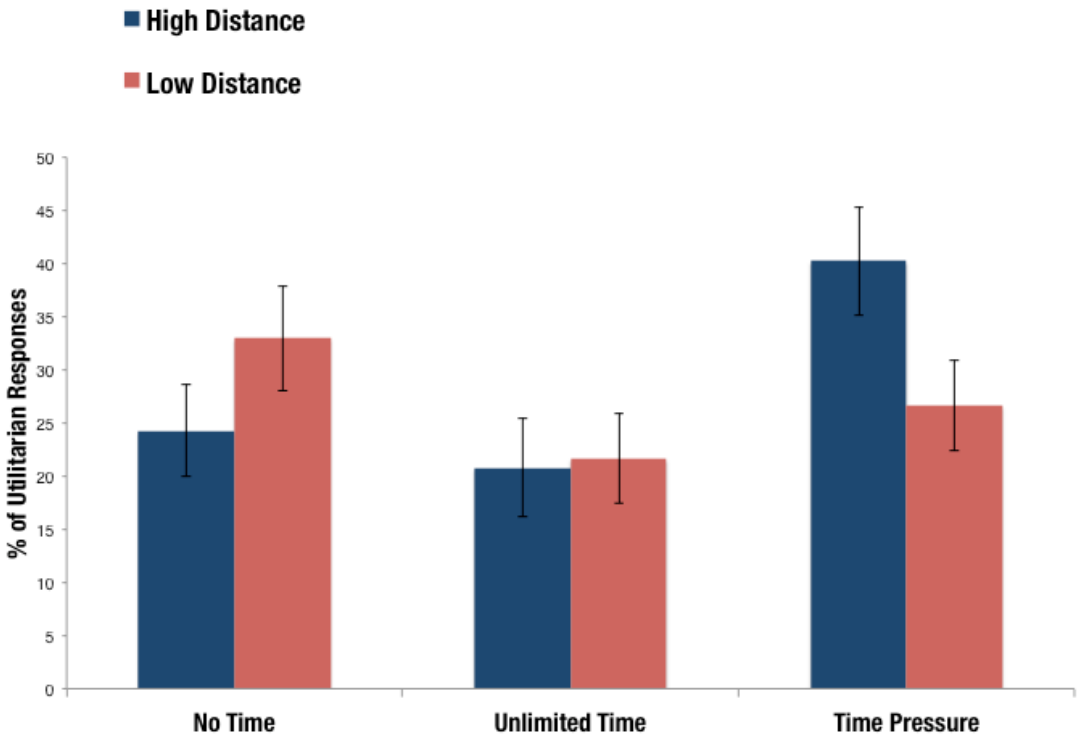

Fig. 5. Percentage of Utilitarian Responses for both low and high levels of distance depending on Time (No Time vs. Unlimited Time vs. Time Pressure). Error bars represent standard errors.

General Discussion

This is one of the first studies to look at the impact of digital context in moral judgments. We considered whether the increasing tendency for our judgments to be mediated through the use of technological gadgets might be changing our approach to moral dilemmas. We have shown that people's moral judgments become more utilitarian (vs. deontological) when using Smartphones as opposed to PCs, under a variety of time-related manipulations (but not all). The present work was motivated by the idea that Smartphones (vs. PCs) channel or tunnel the focus toward a main task and ignore or filter out certain cues (Ariely, 2016). This would induce high construal, increase psychological distance and give rise to an abstract representation of actions, which is aligned with more utilitarian judgments (Trope & Liberman, 2010; Gong, Iliev, & Sachdeva, 2012; Aguilar, Brussino, & Fernández-Dols, 2013). In other words, Digital Context might impact the relation

between different levels of construal (psychological distance) thus affecting utilitarian vs. deontological judgments. While our results are consistent with such a view, clearly further research is needed.

We first consider the implications of these results for the Dual-Process Models of Moral Judgment (Greene et al., 2001; Greene & Haidt, 2002; Greene et al., 2004; Koenigs et al., 2007). A standard assumption is that moral dilemmas resolved in fast, gut-feeling conditions engage a deontological mode of responding, while utilitarian responses are typically the result of longer consideration and involve cognitive control. Instead, we showed that participants under time pressure were more likely to opt for sacrificing the “fat man” to “save five” (utilitarian response) when using a Smartphone than when using a PC. That is, some digital contexts (i.e. Smartphones) can trigger utilitarian decision-making under time pressure, even though time pressure has traditionally been associated with deontological responding in moral choice. Dual route models have received extensive support and no doubt they are valid under most circumstances. Our results indicate a need to perhaps augment the available routes for utilitarian biases in such models.

Other research has provided a more complex picture regarding the impact of time on deontological vs. utilitarian judgments (Greene et al., 2001, 2007, 2009). Specifically, Suter and Hertwig (2011) showed that participants in a time-pressure condition (associated with fast, gut-feeling conditions), relative to a no-time-pressure condition (associated with longer consideration and higher cognitive control), were more likely to give deontological responses only in high-conflict dilemmas. By contrast, in low-conflict and in impersonal dilemmas, the proportion of deontological responses did not differ between conditions. The results from the present experiments partly support these differences between high-low conflict dilemmas. In less emotional scenarios (Switch), neither Digital Context nor Time Constraint resulted in a reliable increase in utilitarian responding. By contrast, in more emotional scenarios (Fat Man), our results question the well-established assumption (from Suter & Hertwig, 2011, amongst others) that hurried decisions enhance deontology, since we showed that moral judgments under a time constraint and in a context

promoting a narrowing effect (Smartphones) seem to make utilitarian judgments more common. More importantly, the recent studies from Kusev et al. (2016), suggesting that any emotional interference, with rational choices taking more time to make, is an artifact of presenting partial information and does not happen when full information is presented, with rational choices taking less time. Could it be the case that Digital Context might influence the variation in accessibility to utilitarian information, as they suggest? We consider this is a potential hypothesis for further research.

We next consider the results regarding the time instructions in Experiments 2a, 2b and 3. We suggest that the instructions regarding timing (i.e. "You will only have 10 seconds…" or "You will have unlimited time…") induce different mind-sets for making the moral judgments, for example, one of 'pressure' (regardless of whether in actual fact the time is sufficient or not) vs. one of a requirement to consider the issue carefully and take into account as much information as possible (again, regardless of how much time is actually spent on the problem). Clearly, more work is required to disentangle possible explanations for the exact effect of the different instructions concerning timing, especially regarding the possibility that keeping track of time may result in reduced cognitive resources. But the crucial point regarding the present study is that our conclusion considering Digital Context and moral judgments appears mostly independent of such considerations.

Our hypotheses regarding Digital Context and moral decision-making was largely motivated from the narrowing effect and the implications from Construal Level Theory. There is an impressive body of evidence showing that psychological distance affects judgments and decisions in a wide range of psychological domains. According to CLT, psychological distance can vary on at least four dimensions: temporal, spatial, social and hypotheticality (i.e. probability for a scenario to become reality; Trope & Liberman, 2010). Can we localize the particular effect of distance in considering responding using a smartphone vs. a PC? In Experiment 3, we attempted to measure psychological distance directly, though there is a question regarding the validity of the

corresponding measure. Our results indicate that participants who reported high levels of distance under time pressure were more likely to opt for utilitarian responses than the ones who reported low ones. Interestingly, utilitarian responses were also more likely for participants who reported low levels of distance under no time information, thus replicating the results from Korner and Volk (2014) and *another paper from the authors of this manuscript* (under review). Korner and Volk (2014) showed that cognitive capacity moderates construal level effects on moral dilemma judgments. Participants made more deontological judgments under concrete-low (vs. abstract-high) construal when they were under time pressure. This pattern reversed when participants had sufficient time, resulting in more deontological judgments under abstract-high (vs. concrete-low) construal. In contrast to prior work on moral judgments, which mostly links deontology to intuitive processing and utilitarianism to deliberation, their findings suggest that deontological judgments can result from at least two different mechanisms, a conclusion which is broadly consistent with the present findings from Experiment 3 and from *a paper of the authors of this manuscript* (under review; though clearly this is an issue that cannot be resolved easily).

More generally, our results were inconclusive regarding the idea that the psychological distance elicited by a smartphone decreased the intensity of people's affective reactions. It is possible that smartphones induce a greater distance in other respects or that an alternative procedure regarding the measurement of affective reaction may be more effective. For example, it might be the case that the use of digital devices interacts with/mediates the hypotheticality dimension. Therefore, we suggest that the standard dimensions for psychological distance and CLT need be further studied using alternative methods too.

We note that insights from contemporary morality research have mostly been acquired through moral vignettes, questionnaire data and thought experiments such as trolley problems. As important as these approaches are, they are all limited by the artificial nature of the stimuli used and the non-natural settings in which they are embedded. Using Ecological Momentary Assessment (Hoffman et al., 2014) would perhaps be a better way to capture moral events, experiences, and

dynamics as they unfold in people's natural environments.

Overall, as noted, Kiesler et al. (1984) and Walther (1996) started the debate on how social psychological research might contribute to a deeper understanding of the effects of technological change in society on behavior. They argued that perhaps the medium itself has no consistent effects but that different conditions surrounding computer-mediated communication (i.e. Digital Context) can lead to interesting and contrasting behavioural outcomes. For example, in recent years, there have been some concerns that the increasing use of technology in (moral) decision-making and/ or communication may have an overall adverse effect (e.g. regarding the proportionate influence of personal/impersonal information on perceptions of emotionality, the role of social context information on empathy, the emergence of new shared norms governing its use, etc.). It seems reasonable to think that new information and communication technologies may influence human behaviour but, on the other hand, people may learn how to use these technologies and adapt to them (i.e. they develop media literacy), which might continuously lead to changes and variations to any currently established effects. The present work reveals a need for the further systematic study of how Digital Context affects moral choice, all the more so given that, increasingly, governments, charities and other institutions engage in intense campaigns over digital media to encourage moral choices for important aspects of our way of life. We hope this work motivates further studies to shed some light in the ethical dimensions of Human-Machine Interaction and Artificial Intelligence fields.

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