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Technologically facilitated remoteness increases killing behavior

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A B S T R A C T

Technology now enables killing from remote locations. Killing remotely might be psychologically easier than killing face to face, which could promote more killing behavior and incur less severe emotional consequences. The current study manipulated the medium via which participants completed an ostensible ladybug-killing task. Participants who were in the same room as the insects killed fewer of them than participants who killed remotely via videoconference. Remoteness exerted an indirect effect on self-reported emotional consequences of killing. There was no additional effect of varying the ostensible location of the remote targets (same building vs. different state). This research emphasizes the importance of considering the psychological consequences of the remoteness technology affords.

1. Introduction

Although humans have killed at range since the Paleolithic (Churchill & Rhodes, 2009), only recently has technology made it possible to hunt prey and fight enemies from an entirely different place. The proliferation of armed unmanned aerial vehicles ("drones") and debate about the morality of their use (Coeckelbergh, 2013; Sharkey, 2012) have raised the question of whether this technology is a "moral buffer," reducing the impact of killing (Cummings, 2003). However, there is little empirical research on the psychological effects of remoteness on killing. The current paper uses an insect-killing paradigm to provide experimental evidence of the effect of remoteness on killing and its emotional consequences.

Scholars of military psychology have argued that direct, intimate killing is psychologically difficult. For example, soldiers who experience combat (and particularly those who kill) are more likely to experience maladaptive mental health outcomes (Sareen et al., 2007), including post-traumatic stress (Maguen et al., 2010; Van Winkle and Safer, 2011), suicidality (Maguen et al., 2011), and increased risk-taking behavior (Killgore et al., 2008). One prominent perspective holds that training soldiers entails overcoming a natural aversion to life-taking (Grossman, 2009). However, killing from elsewhere may entail fewer such inhibitions. Indeed, although there is no evidence for differences in mental health diagnoses (Otto & Webber, 2013), subclinical symptoms of post-traumatic stress in drone operators are less common than in the general population of soldiers returning from deployment (Chappelle, Goodman, Reardon, & Thompson, 2014).

Other evidence suggests that decreasing intimacy between aggressors and targets can increase aggression. For example, in Milgram's (1974) studies of obedience, when remoteness between the teacher and learner was greater (no audio connection vs. audio connection vs. same room vs. physical contact), the learner inflicted more harm, and indeed this was among the largest observed effects (Haslam, Loughnan, & Perry, 2014). Relatedly, neurological evidence indicates that moral judgments involving personal closeness are processed differently than other judgments. Greene and colleagues (Greene, Sommerville, Nystrom, Darley, and Cohen, 2001) examined a version of the "trolley problem," in which participants decide between allowing a runaway trolley to kill five people and sacrificing one person to prevent the five deaths. Greene, Sommerville, Nystrom, Darley, and Cohen (2001) found that, when people considered "personal" dilemmas (e.g., pushing a man onto the track to stop the trolley), reaction times were slower and different brain regions were activated than when people considered less personal dilemmas (e.g., pulling a switch to divert the trolley).

From a social-cognitive perspective, Construal Level Theory (Trope & Liberman, 2010) suggests that remoteness might reduce inhibitions against killing. This theory posits that distance (whether physical, temporal, or social) causes more abstract processing (i.e., holistic, broad mental representations) and less concrete processing (i.e., subordinate, narrow representations). People who are thinking more abstractly base their judgments and behavior more on moral values (Eyal, Liberman, & Trope, 2008; Giacomantonio, De Dreu, Shalvi, Sligte, & Leder, 2010), placing more weight on broad principles and less

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weight on context and detail. Thus, a cognitive shift toward abstract concepts might induce people to think about the broader purposes of killing, which are often framed positively (e.g., patriotism, justice, victory, security), rather than the concrete (and unpleasant) details of the act of life-taking. Via this mechanism, increasing distance could increase killing.

Thus, there is evidence suggesting that remoteness could facilitate the act of killing. However, this hypothesis lacks direct experimental support. There are obvious limits on investigations that directly examine human killing. One approach might be to examine a different behavior between humans, such as aggression (e.g., administering hot sauce to an unwilling recipient; McGregor et al., 1998). However, killing a living being is qualitatively different from other acts of aggression — it is a permanent action that cannot be undone. We therefore studied remote killing using a non-human analog: a remote-controlled machine that (ostensibly) killed ladybugs. Previous research examining killing using an insect paradigm has been informative, showing that the act of killing self-reinforces, leading to more subsequent killing (Martens & Kosloff, 2012; Martens, Kosloff, Greenberg, Landau, & Schmader, 2007; Martens, Kosloff, & Jackson, 2010). This approach, though it uses insect rather than human targets, has the advantage of examining actual killing behavior.

Remoteness was manipulated in the current study: some participants were in the same room as the machine, whereas others interacted with the machine via videoconference. We hypothesized that participants who killed insects in the same room would kill less, and would subsequently be more upset, than those who killed from another place (Hypothesis 1). Secondarily, we hypothesized that the effect of remoteness would be stronger for participants who believed the insects were in another state (vs. another room; Hypothesis 2).

2. Method

2.1. Participant recruitment and assignment

Undergraduates were recruited and compensated with partial fulfillment of a course requirement. At recruitment, they were told that the study ("Machine Usability Study") entailed testing an apparatus; the psychology department at the participants' university historically focused on human factors, and participants were accustomed to engaging in usability tests. Upon arriving, potential participants were informed that the study involved using a machine to kill insects; four declined to participate at this time, yielding 330 participants (71.2% female, M_{age} = 19.3).

Participants were randomly assigned to one of three conditions: Close (n = 132, 40% of sample), Remote-California (n = 99, 30% of sample), and Remote-Virginia (n = 99, 30% of sample). We chose this sample size and assignment weighting to maximize our ability to test Hypothesis 1 (i.e., close vs. remote killing), while still enabling a well-powered test of Hypothesis 2 (the difference between the remote conditions). With at least 99 participants/condition, planned comparisons had a power of at least 0.80 to detect Cohen's d = 0.40, per GPower (Faul, Erdfelder, Lang, & Buchner, 2007).

2.2. Procedure

Participants were reminded that the task involved using a remote-controlled machine to kill insects — specifically, ladybugs (*Hippodamia convergens*). As ladybugs are often viewed as lucky or cute (Jones, 2015; Newman et al., 1938), we reasoned that participants would hold inhibitions against killing them. Participants were given a cover story that reminded them of the "usability test" and explained why the machine could be useful (producing biological samples or dye at industrial scale). They were then shown the machine (a black box on which a conveyor belt was mounted; see Supplementary Material), and the experimenter demonstrated how to use a remote control to operate the conveyor belt and a grinder inside the box.

A second experimenter (the "assistant") then placed one living ladybug, encased in a transparent plastic capsule, on the conveyor belt. The experimenter demonstrated the machine's use by advancing the belt, which dropped the capsule into the machine, and operating the grinder, which ostensibly crushed the capsule (and the ladybug). The assistant then opened the machine, removed a tray containing a shattered capsule and a crushed ladybug, and showed its contents.

Next, participants practiced operating the machine, crushing two capsules containing puffed cereal, and were shown that the tray now also contained crushed cereal. Once participants had practiced, the conveyor belt was loaded with ten capsules containing living ladybugs. Participants were instructed thusly: "Please use the machine to kill as many insects as you'd like. Make sure you kill at least two so that we have a good test." Thus, participants could kill from two to ten insects. Participants then began the task.

Once participants indicated that they had finished the task, they completed a computer-based questionnaire. First, participants answered an open-ended question about their experience using the machine. Next, they reported their mood using two sliding scales, one anchored at 100/pleasant-0/unpleasant and the other at 100/stressed-0/relaxed. Participants then indicated, on 9-point Likert-type scales, the extent to which they thought the machine was difficult to operate, how effective the machine was in grinding ladybugs, how comfortable they felt, how enjoyable and upsetting the task was, and how troubled they were by the task.[1]

Participants were then probed for suspicion using a funnel debriefing procedure, fully debriefed (and told that in actuality, the "grinder" was a noisemaker, and thus that participants and the experimenter did not actually kill ladybugs during the experimental session), and dismissed.

2.3. Manipulation of experimental conditions

Participants in the Close condition completed the study in the same room as the machine, seated two feet from it. Participants in the Remote conditions completed the study in a different room than the machine, and saw and heard the machine using videoconference software; they were seated two feet from the computer screen. In both conditions, the experimenter was in the same room as the participant and the assistant was in the same room as the machine.

In the Remote-California condition, participants were told that the machine was located in the same building. This was reinforced by the videoconference's username, which corresponded to the participants' California university. In the Remote-Virginia condition, participants were told that the machine was located in another laboratory in Virginia; again, this was reinforced by the videoconference's username ("insect.grinder.Virginia").

All measures, manipulations, and exclusions in the study are disclosed, as well as the method of determining the final sample size.

3. Results

3.1. Believability of the cover story

Examination of open-ended responses (contained in Supplementary Material) and funnel debriefing revealed that fourteen participants (six/4.5% in the Close condition, four/4.0% in the Remote-California condition, and three/3.0% in the Remote-Virginia condition) did not believe that they were actually killing ladybugs; they were excluded. The final sample consisted of 317 participants (126 in the Close condition, 95 in the Remote-California condition, and 96 in the Remote-Virginia

[1] Participants next completed the MFQ-20 (Graham et al., 2011) for exploratory purposes unrelated to this paper.

condition). The believability rate (96.1%) and ratings of the machine's effectiveness in grinding ladybugs (7.72/9) indicate that the cover story was convincing.

3.2. Effects on killing behavior

An analysis of variance revealed a significant effect of remoteness on killing,[2] $F(2, 314) = 5.11$, $p = 0.007$, partial $\eta^2 = 0.032$, 90% CI = 0.005–0.066 (Fig. 1). To test Hypothesis 1, that people would kill more insects in the Remote conditions ($M = 4.63$ insects killed beyond minimum, $SD = 3.27$) than in the Close condition ($M = 3.55$, $SD = 3.29$), we conducted a planned contrast (-1, 0.5, 0.5), which showed that the predicted difference was significant, $t(315) = 2.87$, $p = 0.004$, Cohen's $d = 0.33$, 95% CI = 0.10–0.56.[3] To test Hypothesis 2, that people would kill more insects in the Remote-Virginia ($M = 4.30$, $SD = 3.23$) condition than in the Remote-California ($M = 4.97$, $SD = 3.30$) condition, we conducted a second planned contrast (0, -1, 1).[4] This difference was not significant, $t(156) = -1.317$, $p = 0.190$, Cohen's $d = 0.21$, 95% CI = -0.10–0.52.

3.3. Effects on emotional consequences of killing

Using confirmatory factor analysis (CFA), we first established a negative emotion factor from the five self-report items measuring mood and responses to the killing task. Using structural equation modeling, we found that remoteness did not influence the self-reported emotional consequence of killing ($b_{\text{remote}} = 1.661$, $SE_{\text{remote}} = 5.261$, $p = 0.389$), but that including the number of insects killed as a mediating variable revealed a significant indirect effect (Remote $b_{\text{Sobel}} = -2.478$, SE = 0.997, $p = 0.007$). A full presentation of this model, as well as an alternative mediating model and an analysis of gender effects, is contained in Supplementary Material.

4. Discussion

As hypothesized, participants killed more insects when they were in a different room than their targets (Hypothesis 1). However, the isolated effect of physical distance (i.e., Hypothesis 2, comparing the two Remote conditions) did not influence behavior as expected; there was a trend in the opposite of the hypothesized direction, though the effect was small (and not statistically significant). In interpreting these findings, it is important to note that the Close and Remote conditions differed on several dimensions. In addition to the communication medium (participants in the Remote conditions viewed their targets on a computer screen and heard the grinding through headphones, whereas participants in the Close condition did not have the sights and sounds of the killing process mediated through technology), the conditions differed with respect to the physical distance between participants and targets. That the hypothesized additional effect of ostensibly locating the targets in another state was not observed suggests that physical proximity alone did not drive the observed effects. This is consistent with extant theoretical perspectives, such as Construal Level Theory's holistic conception of "distance" (e.g., Liberman, Sagristano, & Trope, 2002; Stephan, Liberman, & Trope, 2010; Trope & Liberman, 2010). Thus, it is probable that the effect of being in a different place than the targets was driven more by psychological remoteness (i.e., the physical versus mediated presence of the insects) than spatial distance.

Remoteness influenced emotional responses indirectly (to the extent

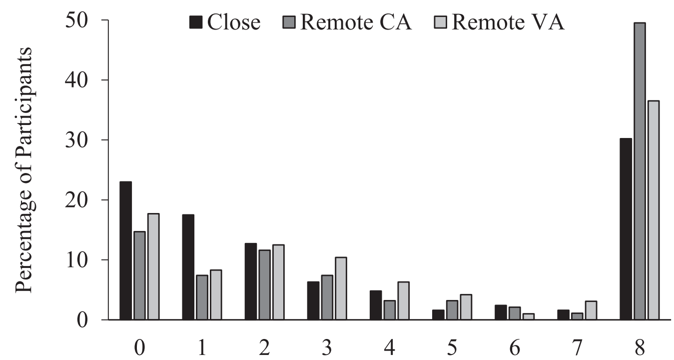

Fig. 1. Number of insects killed beyond minimum by condition.

that participants killed more insects), but not directly. It is possible that participants experienced subtle emotional consequences that another measurement approach (e.g., psychophysiological data) might have detected, or that social desirability played a role. The presence of an indirect effect, however, suggests another possibility. As noted, extant research suggests that killing initiates cognitive and motivational processes that reduce guilt and dissonance, increasing subsequent killing behavior (Martens et al., 2010). In the current study, participants who killed more (and were thus engaged in the killing task for longer) reported experiencing less negative emotion. Conceivably, over the course of the task, participants engaged in dissonance reduction or desensitization processes that attenuated effects on self-reported emotion, and future research directly examining such processes in this context could provide useful insight.

The current research has several important limitations. First, its reliance on student participants raises issues of generalizability. Students might be particularly comfortable with technology, and thus the effect might manifest differently in other populations. Second, the study assessed participants' mood and how they felt about completing the killing task; these reports of emotion are not equivalent to the psychological distress that might be engendered by killing in a non-laboratory context. Third, although the study examines "killing" in general, it is important to consider whether and how it could pertain to killing among people. Clearly, there are vast differences between killing insects and killing human beings. These differences may be both quantitative (more or less intense) and qualitative (engaging different psychological processes). Thus, applying the current findings to contexts involving human lives should be done cautiously.

The current findings do not address the processes underlying the effect of remoteness. One potential explanation, derived from Construal Level Theory, is that remoteness induced a more abstract construal of the killing task. Abstract processing is associated with more heavily weighting moral principles (Eyal et al., 2008). In the current study, the stated reason for killing was to provide scientific and industrial value; if participants believed that killing more insects would be more valuable, remoteness may have increased participants' weighting of those values, leading to more killing. Alternatively (or concurrently), remoteness may have decreased the relative importance of the concrete details of the act, thus blunting the emotionally-driven inhibitions against killing. Yet another possibility is that remoteness alone (i.e., directly) reduced the impact of killing; recent research suggests that both distance and construal level independently attenuate the impact of negative experiences (Williams, Stein, & Galguera, 2014). The current study cannot disentangle these factors; future research should directly examine these underlying mechanisms.

The current study constitutes the first experimental evidence that remoteness can increase killing behavior. It powerfully demonstrates the impact of psychological distance, going beyond its well-documented effects on cognition and judgment to influence a behavior of fundamental human importance. These findings also have implications for moral psychology, suggesting that the differences in judgment observed

[2] As noted, this was *ostensible* killing; we simplify "behavior that participants believed was killing" to "killing" in presenting results.

[3] The distribution of killing behavior was non-normal; a non-parametric Kruskal-Wallis test yielded similar results, $\chi^2(2) = 11.387$, $p = 0.003$.

[4] For this comparison, 33 participants who incorrectly recalled the machine's location were excluded; retaining them did not meaningfully change the results, $t(189) = -1.41$, $p = 0.160$.

between more and less intimate moral dilemmas may also manifest in behavior. Pragmatically, despite its limitations, this research is potentially relevant to the practice of war and to decision-making about lifetaking more generally. Given the appeal of putting fewer soldiers in harm's way, the trend toward lethal technology is likely inexorable. The current research emphasizes the importance of considering the psychological consequences of the remoteness that this technology affords.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.jesp.2017.07.001.

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