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# Evidence That Initial Obedient Killing Fuels Subsequent Volitional Killing Beyond Effects Of Practice

Andy Martens
University of Canterbury

Spee Kosloff
University of Arizona

Lydia Eckstein Jackson
University of Tennessee

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Please address correspondence to Andy Martens, Department of Psychology, University of Canterbury, Private Bag 4800, Christchurch, New Zealand; e-mail: andy.martens@canterbury.ac.nz

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## Abstract

Research using a bug-killing paradigm has suggested that increased initial killing may promote increased subsequent killing (Martens et al., 2007). Here we tested whether this effect is due to killing *per se* or merely due to practice, and whether this initial repeated bug-killing exerts its effect by desensitizing people or by motivating them to kill more. Participants were asked to place bugs into an "extermination grinder" at their own pace after putting either one or five bugs into the grinder initially. Participants either believed they were actually killing the bugs or knew they were not. Results showed that the initial-killing effect occurred only when people thought they were killing, suggesting this is not merely a practice effect. Also, suggesting a motivational component, among participants who killed five bugs initially, those who believed they were killing went on to kill more than those who knew the killing was simulated.

# Evidence That Initial Obedient Killing Fuels Subsequent Volitional Killing Beyond Effects Of Practice

Does engaging in killing make a person more likely to kill subsequently? Observations of various manifestations of killing—from the killing of animals, to war and genocide—suggest that killing initially can be emotionally difficult and traumatic for the perpetrator, and is thus an act that people generally avoid (e.g., Grossman, 2001; McNair, 2002; White, 1998). However, others have suggested that the more a person kills, the more these acts of destruction may gain a momentum of their own, increasing the likelihood of further killing (e.g., Staub, 2002; Charny, 2002; Wright & Hensley, 2003; Zimbardo, 2004).

Experimental work has begun to examine the hypothesis that killing can fuel further killing, using a paradigm in which participants are led to believe (falsely) that they are killing bugs by putting them into an "extermination grinder" (Martens, Kosloff, Greenberg, Landau, & Schmader, 2007). This research showed that inducing the obedient killing of five bugs led to more subsequent volitional killing than inducing the obedient killing of just one bug. Drawing on the work of a number of researchers (Festinger, 1957; Lifton, 1986; Darley, 1992; Baumeister, 1996; Gross, 2006; Tavris & Aronson, 2007), the explanation proposed for this effect is that after killing one bug initially, people inhibit subsequent killing in order to avoid dissonance (e.g., shame, guilt) that would otherwise result from further killing. But after killing five bugs initially, individuals cross a threshold or "point of no return," such that continued/increased killing becomes a means of justifying the prior killing—that is, of convincing oneself (and others) that the killing was warranted and permissible in the first place. Thus, we suggest the effect of dissonance on killing reverses itself depending on the degree of initial killing. With little (1 bug) or no initial killing, dissonance should decrease subsequent killing. But repeated initial bug-killing (e.g., five bugs) should commit people to this line of behavior, making justification of the behavior through increased subsequent killing more likely.

However, alternative, non-motivational explanations for these data remain, which we attempted to address in the present study. Firstly, the effect of killing five bugs observed in the prior research (Martens et al., 2007) may not have been a result of initial killing *per se*, but rather merely the result of practice. It could be that putting five bugs into the grinder initially, as opposed to one, increased the fluidity of people's physical performance during the later killing task and for this reason led to more killing; or perhaps performing any action more frequently simply primes people to perform this action with greater frequency later on (e.g., Bargh & Chartrand, 1999).

Secondly, if the effect is a result of killing *per se*, it may be that the initial killing of five bugs, rather than motivating more killing, desensitizes people to bug-killing more than does killing a single bug; thus subsequent killing is made more likely simply because it becomes *easier* emotionally (e.g., Carnagy, Anderson, & Bushman, 2007; Grossman, 2001). In other words, this passive desensitization account suggests that the prior finding may reflect inhibition of volitional killing after low initial killing (one bug) and relaxation of this inhibition after repeated initial killing (five bugs).

## The Present Study

First, the present study examined whether repeated bug-killing in itself begets further volitional bug-killing, or whether this effect is merely a function of practice. To do so, we extended the past experiment (Martens et al., 2007) by adding a control condition that resembled the killing condition in all ways but one: we informed participants at the outset that the killing task would be a simulation, i.e., that the bugs would not be killed. All the physical aspects of the experiment that might elicit non-killing-related practice effects (including the use of real bugs[1]), therefore, were the same for these participants. If the effect of repeated initial bug-killing on subsequent killing emerges because of practice, then the one

vs. five effect on subsequent killing should emerge with the simulated killing. Conversely, if the effect is a consequence of the killing *per se*, then the one vs. five effect should emerge only when participants think they are actually killing.

Second, this paradigm allowed us to examine the competing passive-desensitization and motivational dissonance-reduction accounts—particularly by comparing the effect of actual vs. simulated killing among participants who initially put five bugs into the grinder. If the initial killing of five bugs increases subsequent killing because of passive desensitization—because people adapt to the task through repetition, making subsequent killing *less difficult* emotionally—then subsequent killing among those who initially think they killed five bugs should approximate what we observe in the more emotionally benign (i.e., less emotionally difficult) simulation task. In contrast, if the motivational account is correct, then initially killing five bugs, rather than dampening the emotional response to the killing, should elicit dissonance which individuals seek to reduce through increased killing, to justify the initial five exterminations. Consequently, subsequent killing among those who initially killed five bugs should surpass that observed in the relatively low-dissonance parallel simulation condition. That is, if exterminating five bugs is emotionally burdensome and thus motivates further extermination to justify the initial repeated killing, then individuals who believe they killed five bugs should show an elevated tendency to kill relative to participants in the relatively emotionally benign five-bug/simulation condition.

## *Method*

### *Participants*

One-hundred-and-eleven undergraduates at the University of Canterbury participated and were compensated with a ten-dollar voucher. Five participants discontinued the experiment after reading the consent form. Four participants were excluded from analyses because they expressed strong suspicion that they were not actually killing the bugs. Four participants were excluded due to procedural problems. This left 98 participants (41 male, 57 female).

### *Materials and Procedure*

Participants were run one at a time. They arrived at the laboratory, were greeted by the experimenter and seated at a table in the corner of the room behind cubicle partitions. The participants first received an "overview of the study": the experimenter explained that the study looks at "various types of human-animal interactions" and that in "this particular session we'll look at the role of exterminators who deal with bugs." The experimenter informed participants that "the study does involve engaging in a bug extermination task" and that they would answer questions about this experience after this task. Participants were then provided a consent form to read and sign if they wished to participate.

As participants read the consent form, the experimenter proceeded to a table at the other end of the room, out of sight of the participant, and set up the "extermination machine" with which participants would ostensibly kill bugs. The extermination machine (Figure 1) was a modified coffee grinder, created by attaching a plastic tube and funnel to the side of the grinder. Thus, a bug dropped into the funnel would appear to fall through the tube and into the grinder (though in actuality the tube was blocked did not lead into the grinder). The machine had a grinder-activation button on its side. Its default position was "off" and pressing the button activated the grinder for as long as it was depressed.

After setting up the extermination grinder, the experimenter retrieved the bugs (Figures 1 and 2) from an adjoining room, briefly heating them with a hairdryer for 5-10 seconds; this triggered movement in the bugs, thus ensuring that participants knew the bugs were alive. Next to the extermination machine, the experimenter set up either one or five small translucent cups, each one containing a small bug—a slater, similar to a pillbug. The

slaters measured approximately 1 centimeter in length. Behind either the one or five cup(s), the experimenter set a plastic tray with twenty cups, each containing a single slater.

The experimenter escorted the participant to the table where the extermination task was to take place and showed the participant the plastic cups, pointing out that each contained a bug. The experimenter stated that "to start off, I'm going to have you familiarize yourself with our extermination task." The experimenter indicated the grinder, describing it as "a grinder, our extermination machine." The experimenter added that "generally, exterminators use poison sprays but we can't use those sprays inside the building for health and safety reasons."

*Manipulation of perceived killing.* The experimenter subsequently showed half of the participants, randomly assigned, that "the tube attached to the grinder is blocked off and does not lead into the grinder, so the bugs that you'll put into the funnel won't make it to the actual grinder and won't be killed." Thus, these participants were under the impression that the study was simply examining "human-animal interactions" by way of this simulated extermination. In debriefing, participants in the simulation conditions reported thinking of the study in this way, and were not suspicious about the procedures. All other participants remained under the impression that they were indeed exterminating bugs.

*Manipulation of initial killing.* Next, ostensibly in order to become familiar with the extermination task, participants were randomly assigned either "to dump one bug into the grinder" or "to dump five bugs into the grinder, one at a time." The experimenter continued that "the next step is to turn on the extermination machine by pressing the button for at least three seconds." Once participants complied, the experimenter explained that "the familiarization part of the procedure" was completed and that "a brief extermination experience" would follow.

*Extermination task.* For the extermination task, each participant was instructed "to put bugs into the grinder, one at a time, for a 12-second period"; this was ostensibly to ensure that "everybody in the study has the same length extermination experience." Further, participants were asked "to do this task continuously but at your own pace over the 12-second period." The experimenter then handed the participant a digital timer set to 12 seconds and said: "When I leave the room, hit the start button and put the bugs into the grinder. When the 12 seconds are up, the alarm will go off. At that point, press the stop button on the timer and turn on the grinder for at least three seconds. I'll come back in once you've finished." The number of bugs participants put into the grinder served as the dependent measure.

After the extermination task, the experimenter returned and presented participants with a brief questionnaire. The questionnaire first presented six filler questions, followed by two questions assessing whether putting bugs into the grinder was relatively volitional during the 12-second period compared to the initial familiarization period: "During the 12-second timed extermination task, to what extent did you feel that the number of bugs you put in was your choice?" and "In the first task when you familiarized yourself with the extermination procedure, to what extent did you feel that the number of bugs you put in was your choice?" Participants responded to each item on a scale from 1 (not at all) to 9 (completely). With these two items entered into a repeated measures ANOVA, perceived choice of number of bugs put into the grinder during the 12-second period ($M = 6.46$, $SD = 2.36$) was well above the midline and significantly exceeded the choice perceived during the initial familiarization task ($M = 3.27$, $SD = 2.73$), $F\ (1, 96) = 112.25$, $p < .01$.

Lastly, participants recorded their age ($M = 20.77$, $SD = 5.76$) and gender. When the participants had completed this questionnaire, the experimenter sensitively debriefed them and assessed their level of suspicion.

## *Results*

First, we sought to replicate past work—to observe whether killing five bugs initially led to more relatively volitional bug-killing than killing only one initially—as well as to test whether mere practice could account for this effect. We conducted a 2 (Initial Killing: one vs. five bugs) × 2 (Simulation Knowledge: ostensibly real killing vs. openly simulated killing) × 2 (Gender: male vs. female) ANOVA with the number of bugs participants put into the grinder at their own pace during the 12-second task as the dependent measure. Only the Initial Killing × Simulation Knowledge interaction was significant, $F$ (1, 90) = 7.53, $p < .01$.[2] Replicating past work, pairwise comparisons showed that, among participants who thought they were actually killing bugs, those initially led to kill five bugs went on to kill more during the 12-second task ($M$ = 5.85, $SD$ = 2.20) than those initially led to kill only one bug ($M$ = 4.50, $SD$ = 1.67), $F$ (1, 90) = 7.61, $p < .01$, Cohen's $d$ = .69.[3] Participants who knew the killing was simulated, however, did not differ based on whether they initially put one or five bugs into the grinder ($M$s = 5.28 and 4.82, $SD$s = 1.75 and 1.33, respectively), $p > .20$. Thus, as depicted in Figure 3, the tendency for repeated initial obedient bug-killing to heighten subsequent volitional bug-killing is not merely a product of practice, but rather is a function of repeated killing in itself.

We next examined the previously discussed motivational-dissonance and passive-desensitization accounts for this effect. Both explanations would predict that people who killed one bug initially should show an aversion to or inhibition of subsequent killing in the perceived-killing condition, relative to the emotionally easier simulation condition. Consistent with this prediction, a trend emerged such that among participants who put only one bug into the grinder initially, those who believed they were killing put fewer bugs into the grinder during the self-paced 12-second task than those who knew the killing was simulated, $F$ (1, 90) = 3.39, $p$ =.07, Cohen's $d$ = .46. However, supporting the motivational account, among those who put five bugs into the grinder initially, participants who believed they were actually killing went on to kill *more* during the 12-second task than those in the emotionally easier simulation condition, $F$ (1, 90) = 4.18, $p < .05$, Cohen's $d$ = .57. Thus, initial killing of five bugs did not simply reduce the inhibitory influence of killing observed in the one kill condition, but actually increased killing behavior relative to the five bug/simulation condition. This suggests that the initial believed killing of five bugs did not simply desensitize participants, but rather motivated them to kill more bugs than those in the parallel yet emotionally benign simulation condition. .

### *Discussion*

The results demonstrated that the effect of repeated initial, obedient killing (five bugs) on subsequent self-paced, volitional killing is not simply a result of physical practice, but an effect of actual killing. Repeatedly putting bugs into the grinder in the initial task increased the number of bugs subsequently put into the grinder only when people believed they were actually killing, not when people knew the killing was simulated. This provides compelling evidence that actual killing can have a promulgating effect.

Why does this promulgating effect of repeated bug-killing emerge? The findings suggest that this effect emerged at least in part from a motivation to kill, rather than solely from habituation or desensitization to the act of killing. After repeated initial bug-killing, people went on to put more bugs into the grinder than those in the parallel simulation condition for whom the task was emotionally easier at the outset—thus they appeared to be killing at a rate that exceeded what we could expect from desensitization alone. We theorized that because killing is a morally proscribed behavior, individuals are generally motivated to inhibit the action and thereby avoid dissonance. But *repeated* initial killing, by committing people to this line of behavior, may redirect the strategy for dissonance reduction toward killing *more*, in an effort to justify one's otherwise morally discrepant actions. Given that one

already has repeatedly violated a moral standard, ceasing to do so becomes less viable for reducing dissonance than continuing to do so in an effort to justify the behavior.

This theorizing suggests that the differences between the killing and simulation conditions are mediated by dissonance resulting from the ethically problematic nature of the killing task relative to the simulation task. Initially putting one bug in the grinder presumably led to more dissonance in the killing condition than in the simulation condition, and this elevation in dissonance presumably led to *fewer* bugs put into the grinder during the self-paced 12-second extermination task. Initially putting five bugs into the grinder should have likewise led to more dissonance in the killing condition than in the simulation condition, but in turn led to *more* bugs put into the grinder subsequently.

While the present study provided evidence in favor of the motivational explanation for the effect of repeated killing, we did not directly assess whether the simulation condition was less emotionally and ethically threatening than the condition in which people believed they were actually killing, and whether the emotional and ethical difficulties accompanying the believed killing drove the observed effects. Though it may appear intuitive that engaging in an actual killing behavior is more negatively arousing and personally threatening than merely simulating that behavior, it is certainly preferable to verify theorized processes. However, there is also reason to think that had we asked participants about these feelings and emotions after the initial killing task that their expression of these emotions could have inadvertently dissolved their potency (see work on the effects of emotional expression on diminishing both dissonance and aggression, Pyszczynski, Greenberg, Solomon, Sideris, & Stubing, 1993 and Berkowitz & Troccoli, 1990).

Consequently, we adopted alternative approaches to verifying whether indeed people who believed they were killing experienced more affective/ethical discomfort than those who knew they were not in fact killing. Firstly, we examined our behavioral findings among those who initially put one bug into the grinder. When participants believed they initially killed a bug, they later put fewer bugs into the grinder than in the parallel simulation-control condition. Though marginal, this effect appears difficult to explain without reference to a motivated resistance to killing, and thus strongly suggests that participants found the bug-killing task aversive and more discomforting than the simulation task.

We also collected additional data to bolster the critical assumption that those who believed they were killing experienced more ethical concerns and emotionality than those in the simulation condition. We told 43 people (drawn from the same population used for the present study) that we were planning a new study and wanted feedback about how they thought they would respond to such a procedure if they were participants. They read a very basic description of the initial killing task and we varied whether the study was described as one in which they would be asked to actually kill one bug or to pretend to kill one bug. After this they rated on a 9-point scale how unethical they thought participating in this study would be and how ashamed they would feel as a result of having participated. Higher numbers reflected feeling the task was unethical and feeling more shame, and we averaged these two items to form a composite reflecting ethical difficulty ($a$ = .86). Those participants who rated the task that entailed killing a bug thought the task would be ethically difficult, with ratings above the midpoint, $M$ = 5.60 ($SD$ = 2.16) and significantly higher than those who rated the task of only pretending to kill a bug, $M$ = 2.94 ($SE$ = 1.75), $F$ (1, 41) = 17.90, $p < .01$. Taking these lines of evidence together, it seems very likely that people experienced the killing task as more ethically aversive and dissonance-provoking than the simulation task.

Still, more work examining the mediating aspects of the effect of repeated killing seems warranted. Future work, for example, might examine dissonance covertly, perhaps physiologically, as well as measure perceptions of commitment to the killing task (which we have theorized shifts the path adopted to reduce dissonance, from that of going on to kill less

to that of going on to kill more). Future work might also examine mediating factors by combining an individual difference approach used in prior similar research (Martens et al., 2007) with the "simulation" methodology used in the present research. This prior work found that initial perceived similarity to bugs moderated the one vs. five effect, presumably because this individual difference predicts who will feel uneasy and dissonant about the bug-killing. In the present research we would expect, therefore, that similarity should again moderate the one vs. five effect—that this one vs. five effect would emerge particularly for those higher in similarity—but only in the "killing" condition. In the simulation conditions we would expect no such effect, or a less pronounced effect, given the more ethically benign nature of the simulation task.

### *Conclusion*

The current data are importantly limited by the targets of killing used: bugs. Work may attempt to examine with archival data whether similar patterns of behavior exist with other animals and with human beings as targets of killing. The current data present compelling evidence that the promulgating effect of the repeated killing of bugs does have to do with killing itself, not with other physical aspects of the experimental procedure. Thus the present findings suggest the importance of considering that similar patterns may play out in other forms of killing too.

These data and our accompanying theorizing may also have additional implications for non-lethal harmful behaviors that violate moral standards, though killing has properties that surely also render its behavioral consequences unique. For example, killing cannot be undone, and is the ultimate form of violence. If, as theorized, commitment to the unethical act plays a critical role in triggering the continuation of this behavior, then the irreversible nature of killing may mean it has the potential to spiral out of control even more quickly than other forms of violence or unethical behaviour. Consequently, application of this theorizing to the stemming of human conflicts suggests particularly careful monitoring of situations with an enhanced potential for people to kill repeatedly.

Our theorizing and data also may have implications for aftermath in human conflicts, and specifically for dealing with individual perpetrators of killing. Psychological insights into the processes that contribute to the successful reintegration of former combatants and child soldiers into civilian life are crucial, and psychological "retraining" is being discussed in the context of post-conflict disarmament, demobilization, and reintegration (DDR) programs (e.g., Humphreys & Weinstein, 2007; Wessels, 2004). If desensitization alone explains the promulgating effect of killing, then efforts should focus on re-sensitizing people to the negative consequences of violence. However, the motivational theorizing that explained the current data—that repeated killing can drive people to kill again in an effort to justify their prior actions and in turn keep dissonance at bay—suggests that these efforts should also somehow entail addressing people's shame/guilt or their potential for shame/guilt associated with their actions. For example, perhaps avenues can be provided that allow for constructive coping with these emotions. One possibility is suggested by an Iraq War Veteran, that a particularly direct and powerful way to atone for the taking of life may be to work to literally give or save it in some way. Having saved each rifle cartridge he used lethally in Iraq, he explains: "Too much life was taken by these magazines; too much for one person to bear. When I look at these it just reminds me I gotta give a life back" (Shapiro, 2005).

Mass killing of human beings, and more generally the maintenance of unethical behavior, are complex phenomena that cannot be reduced to one or two causes. However, despite these limitations, we hope the present experimental investigation and future extensions will provide contributions that can, together with other forms of study, converge on a more complete understanding of the perpetuation of these behaviors.

References

Bargh, J.A., & Chartrand, T.L. (1999). The unbearable automaticity of being. *American Psychologist, 54*, 462-479.

Baumeister, R. F. (1996). *Evil: Inside human cruelty and violence.* New York: W H Freeman/Times Books/Henry Holt & Co.

Berkowitz, L., & Troccoli, B.T. (1990). Feelings, direction of attention, expressed evaluations of others. *Cognition & Emotion, 4*, 305-325.

Carnagey, N.L., Anderson, C.A., & Bushman, B.J. (2007). The effect of video game violence on physiological desensitization to real-life violence. *Journal of Experimental Social Psychology, 43*, 489-496.

Charny, I.W. (2002). Leo Kuper: A giant pioneer. In S. Totten and S.L. Jacobs (Eds.), *Pioneers of Genocide Studies* (pp. 267-294). New Brunswick, NJ: Transaction Publishers.

Darley, J.M. (1992). Social organization for the production of evil. *Psychological Inquiry, 3*, 199-218.

Festinger, L. (1957). *A theory of cognitive dissonance*. Evanston, IL: Row, Peterson.

Gross, J.T. (2006). *Fear: Anti-Semitism in Poland after Auschwitz*. New York: Random House.

Grossman, D. (2001). Trained to kill. *Professorenforum-Journal, 2*, 3-10.

Humphreys, M. & Weinstein, J.M. (2007). Demobilization and reintegration. *Journal of Conflict Resolution, 51*, 531-567.

Lifton, R.J. (1986). *The Nazi doctors: Medical killing and the psychology of genocide*. New York: Basic Books.

MacNair, R.M. (2002). Perpetration-induced traumatic stress in combat veterans. *Peace and Conflict: Journal of Peace Psychology*, 8, 63-72.

Martens, A., Kosloff, S., Greenberg, J., Landau, M.J., & Schmader, T. (2007). Killing begets killing: Evidence from a bug-killing paradigm that initial killing fuels subsequent killing. *Personality and Social Psychology Bulletin, 33,* 1251-1264.

Pyszczynski, T., Greenberg, J., Solomon, S., Sideris, J., & Stubing, M.J. (1993). Emotional expression and the reduction of motivated cognitive bias: Evidence from cognitive dissonance and distancing from victims paradigms. *Journal of Personality and Social Psychology, 64*, 177-186.

Shapiro, J. (reporter). (2005, July 8). Returning soldier finds role as advocate [Radio broadcast episode]. *Morning Edition*. Washington DC: National Public Radio.

Staub, E. (2002). The psychology of bystanders, perpetrators, and heroic helpers. In L.S. Newman and R. Erber (Eds.), *Understanding genocide: The social psychology of the Holocaust* (pp.11-42). New York: Oxford University Press.

Tavris, C., & Aronson, E. (2007). *Mistakes were made (but not by me): Why we justify foolish beliefs, bad decisions, and hurtful acts*. New York: Harcourt.

White, D. (1998). It's a dog's life. *Psychology Today, November/December*, 10.

Wessells, M. (2004). Psychosocial issues in reintegrating child soldiers. *Cornell International Law Journal, 37,* 513-525.

Wright, J., & Hensley, C. (2003). From animal cruelty to serial murder: Applying the graduation hypothesis. *International Journal of Offender Therapy and Comparative Criminology, 47*, 71-88.

Zimbardo, P.G. (2004). A situationist perspective on the psychology of evil: Understanding how good people are transformed into perpetrators. In A. Miller (Ed.), *The social psychology of good and evil* (pp.21-50). New York: Guilford Press.

Notes

1. We thought that using living bugs in this condition provided a better control than alternative possibilities, such as using non-living, similarly-sized targets (e.g., coffee beans) because we kept constant variables such as the target's movement that could distract or otherwise affect participants' performance.
2. The only other effect to approach significance was a trend for men to put more bugs into the grinder, $p = .09$; $ps \geq .30$ for all other main effects and interactions.
3. Though we found that initially killing five bugs led to more subsequent killing than initially killing one bug, we did not test the effect of killing five bugs against a control condition in which participants killed no bugs initially. A supplemental study addressed this possibility. Forty-three participants (22 male, 21 female) either engaged in no initial killing at all prior to a 20-second self-paced killing task (the experimenter just showed them the apparatus and explained the procedure to them) or engaged in the initial killing of five bugs before the 20-second self-paced killing task. Those led to kill five bugs went on to kill more ($M = 8.63$, $SD = 2.96$) than those who did not kill initially ($M = 6.79$, $SD = 2.12$), $F(1, 41) = 5.18$, $p < .05$, Cohen's $d = .71$ (note that these means cannot be easily compared with those in the main study because the length of the timed extermination tasks differed—12 seconds in the main study vs. 20 seconds in this supplemental study). Thus, the initial killing of five bugs produces more subsequent killing than both the initial killing of one bug and than no initial killing.

*Figure 1.* The bug-killing machine and tray containing 20 slaters.

*Figure 2.* A slater, measuring approximately 1 cm in length.

*Figure 3.* Bugs killed during the 12-second task as a function of Initial Killing and Simulation Knowledge.