

## Short Report

## The Sting of Intentional Pain

Kurt Gray and Daniel M. Wegner

Harvard University

When someone steps on your toe on purpose, it seems to hurt more than when the person does the same thing unintentionally. The physical parameters of the harm may not differ—your toe is flattened in both cases—but the psychological experience of pain is changed nonetheless. Intentional harms are premeditated by another person and have the specific purpose of causing pain. In a sense, intended harms are events initiated by one mind to communicate meaning (malice) to another, and this could shape the recipient's experience. This study examined whether self-reported pain is indeed higher when the events producing the pain are understood as intentionally (as opposed to unintentionally) caused by another person.

Although pain was traditionally conceived to be solely physical in nature (Aydede, 2005), its experience varies substantially with psychological context. The placebo analgesia effect, for example, is the reduction of pain without a change in physical stimulation when context, expectations, or sugar pills challenge the interpretation of a sensation as painful (e.g., Fields, 2008). The nocebo effect, in turn, is the experience of pain without any physical stimulation—as when participants report headaches when told that a (nonexistent) electric current is passing through their heads (Schweiger & Parducci, 1981). These variations in pain experience seem to depend on the meaning of the stimulus: A sugar pill is meant to decrease pain, whereas electric current is meant to increase pain. In an interpersonal context, the meaning of an action is derived from the perceiver's perceptions of the actor's intention (Clark, 1996), which means that intentional harms, unlike accidental harms, are *meant* to cause pain.

The possibility that the malicious intent of other people could be translated into additional physical pain is suggested by studies demonstrating that similar areas of cortex respond to both physical pain and social harms (Eisenberger, Lieberman, & Williams, 2003). Social harms, which are presumably laden with intention, have also been shown to be more painful to relive than simple physical harms (Chen, Williams, Fitness, & Newton, 2008). So, although a broken toe (or electric shock) may hurt, an intentionally broken toe (or electric shock) should hurt more.

## METHOD

Forty-eight participants (68% female, 32% male) participated in a lab study of “psychophysical perception in pairs.” Four participants were excluded for suspicion and one participant was excluded for failing to follow instructions, leaving a total of 43.

On arrival, participants met their study partner—a confederate—and were escorted to an individual room. They were then introduced to the psychophysical tasks of color matching, number estimation, pitch judgment, and discomfort assessment, each of which they completed. Discomfort assessment involved being administered an electric shock and evaluating it on a 7-point scale ranging from *not at all uncomfortable* to *extremely uncomfortable*. Shocks of 1-ms duration were delivered to the wrist of the dominant hand through a stimulator (Biopac Systems, Goleta, CA), with voltage precalibrated for each participant to be “very uncomfortable.” Voltages ranged from 40 to 75 V between subjects. Participants evaluated two blocks of computer-administered electric shocks initially in an individual practice session as a baseline pain measure.

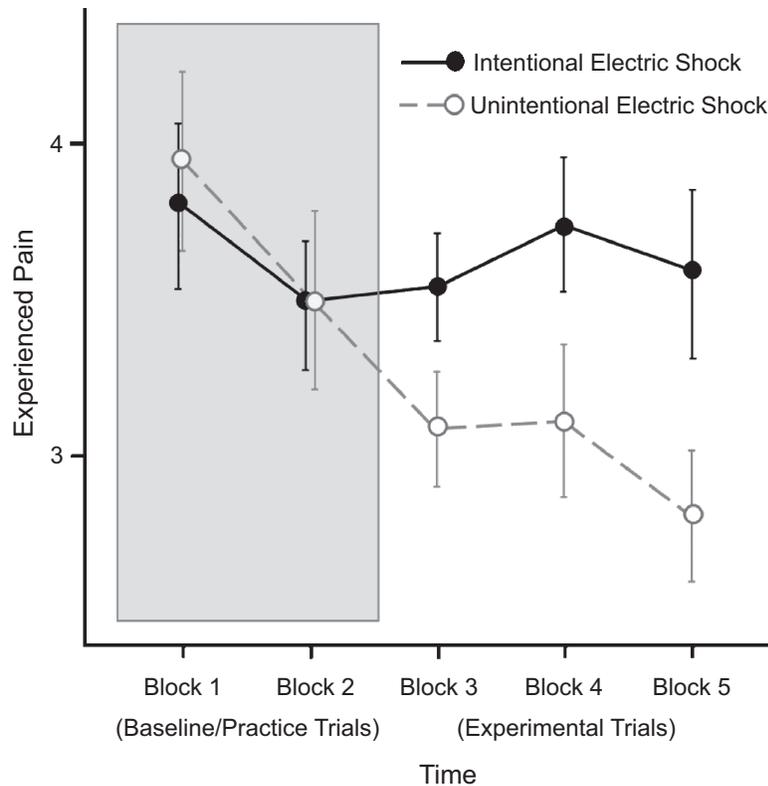
On each experimental trial, participants saw a computer screen with two potential tasks before completing one of them. When discomfort assessment was a potential task, the alternate task was evaluating the relative pitches of tones. On this and other trials, participants were told that the participant in the next room (the confederate) would select which task the participant would complete.

In the intentional condition, the confederate chose the discomfort-assessment task when it was an option, and participants received an electric shock. In the unintentional condition, the confederate selected the pitch-judgment task when discomfort assessment was an option. In this condition, however, participants were told that the mapping between the selection and administration of tasks was switched, unbeknownst to the confederate, so they would always receive the task opposite to the one selected by the confederate. Thus, when pitch judgment was selected for them, they completed discomfort assessment and received an electric shock.

On their computer screen, participants saw both the confederate choice and the actual task to be administered (in advance), which ensured that participants were not surprised when they received an electric shock and also reinforced the intentional or unintentional nature of the shock. Pilot testing confirmed that

---

Address correspondence to Kurt Gray, Department of Psychology, William James Hall, 33 Kirkland St., Cambridge, MA 02138, e-mail: kurtgray@fas.harvard.edu.



**Fig. 1.** Experienced pain as a function of whether electric shocks were perceived as intentional or unintentional.

shocks were perceived (on a 7-point scale) as more intentional in the intentional condition ( $M = 5.64$ ,  $SD = 1.49$ ) than in the unintentional condition ( $M = 2.17$ ,  $SD = 0.83$ ),  $t(24) = 7.13$ ,  $p < .01$ ,  $p_{\text{rep}} = .99$ , and that the confederate was seen as more blameworthy (on a 5-point scale) in the intentional condition ( $M = 2.43$ ,  $SD = 1.40$ ) than in the unintentional condition ( $M = 1.41$ ,  $SD = 0.67$ ),  $t(24) = 2.29$ ,  $p < .03$ ,  $p_{\text{rep}} = .91$ . In both conditions, participants completed three blocks of experimental trials after the two practice/baseline trials.

## RESULTS AND DISCUSSION

Mean pain ratings from shocks in each of the five blocks (see Fig. 1) were submitted to a 2 (condition: intentional, unintentional)  $\times$  5 (time: block number) between-within analysis of variance, which revealed the predicted interaction,  $F(4, 164) = 3.09$ ,  $p = .02$ ,  $p_{\text{rep}} = .93$ ,  $\eta^2 = .07$ . A composite of the two practice blocks revealed no significant difference in experienced pain between conditions ( $t < 1$ ); however, an average of experienced pain in the three experimental blocks revealed that intended pain ( $M = 3.62$ ,  $SD = 0.99$ ) was experienced as more painful than unintended pain ( $M = 3.00$ ,  $SD = 0.78$ ),  $t(41) = 2.21$ ,  $p = .03$ ,  $p_{\text{rep}} = .91$ .

Additionally, there was a significant decreasing linear trend of experienced pain in the unintentional condition,  $F(1, 17) = 20.18$ ,  $p = .001$ ,  $p_{\text{rep}} = .99$ , suggesting that participants in this

condition exhibited the standard pattern of habituation to repeated painful stimulation (Geffrath, Baumgartner, & Treede, 2007). In contrast, there was no linear trend in the intentional condition,  $F = 0.08$ , suggesting that participants in this condition continued to feel the fresh pain of an intentional harm as time went on.

This study provides evidence that the experience of pain changes depending upon the psychological context in which people are harmed. Specifically, the meaning of a harm—whether it was intended—influences the amount of pain it causes. Although people can become accustomed to the pain of an unintentional harm, the malice behind an intentional pain keeps it stinging.

**Acknowledgments**—We thank assistants Tiffany Niver, Jane Fang, Daniel Liss, and Dean Scaduto. This work was supported by the Social Science and Humanities Research Council of Canada, the Institute for Humane Studies, and National Institute of Mental Health Grant MH 49127.

## REFERENCES

- Aydede, M. (2005). Introduction: A critical and quasi-historical essay on theories of pain. In M. Aydede (Ed.), *Pain: New essays on its nature and the methodology of its study* (pp. 1–58). Cambridge, MA: MIT Press.

- Chen, Z., Williams, K.D., Fitness, J., & Newton, N. (2008). When hurt will not heal: Exploring the capacity to relive social and physical pain. *Psychological Science, 19*, 789–795.
- Clark, H.H. (1996). *Using language*. New York: Cambridge University Press.
- Eisenberger, N.I., Lieberman, M.D., & Williams, K.D. (2003). Does rejection hurt? An fMRI study of social exclusion. *Science, 302*, 290–292.
- Fields, H.S. (2008). *Pain: Mechanisms and management* (2nd ed.). New York: McGraw-Hill.
- Geffrath, W., Baumgartner, U., & Treede, R.-D. (2007). Peripheral and central components of habituation to heat pain perception and evoked potentials in humans. *Pain, 132*, 301–311.
- Schweiger, A., & Parducci, A. (1981). Nocebo: The psychologic induction of pain. *Pavlovian Journal of Biological Science, 16*, 140–143.

(RECEIVED 5/28/08; REVISION ACCEPTED 7/7/08)