



# The language of less-lethal weapons

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Edited by Thomas Albright, Salk Institute for Biological Studies, La Jolla, CA; received November 17, 2021; accepted March 4, 2022

It has been over 1 year since we observed the policing of the George Floyd protests in the United States [R. R. Hardeman, E. M. Medina, R. W. Boyd, *N. Engl. J. Med.* 383, 197–199 (2020)]. Multiple injury reports emerged in medical journals, and the scientific community called for law enforcement to discontinue the use of less-lethal weapons [E. A. Kaske *et al.*, *N. Engl. J. Med.* 384, 774–775 (2021) and K. A. Olson *et al.*, *N. Engl. J. Med.* 383, 1081–1083 (2020)]. Despite progress in research, policy change has not followed a similar pace. Although the reasoning for this discrepancy is multifactorial, failure to use appropriate language may be one contributing factor to the challenges faced in updating policies and practices. Here, we detail how language has the potential to influence thinking and decision-making, we discuss how the language of less-lethal weapons minimizes harm, and we provide a framework for naming conventions that acknowledges harm.

less lethal | nonlethal | protest | linguistics | health inequities

Formally described by conceptual metaphor theory, words have the potential to influence thought and decision-making (1). Everyday language is filled with metaphors. In the English language, time is often described as a commodity. For instance, one might state that an experience was “time well spent” (2). Time can also be described spatially (e.g., a task taking a “long time”) (3). In many cases, the use of metaphor is innocuous, but in other circumstances, metaphors can have real-world consequences. In one study, car speeds were estimated as higher when they were said to smash into one another than when they were said to hit one another (4). In another study using metaphor to describe crime, variation in a single word led people to reason differently and propose different solutions (5). Moreover, in that same study, the language effect often went unnoticed, with participants citing statistics for their proposed solutions rather than the metaphor. Given these principles, the language used to describe less-lethal weapons has the potential to covertly influence public perception and policy.

Less-lethal weapons are colloquially referred to as nonlethal weapons, tools, or devices. Evidence for the rewording of these weapons from nonlethal to less-lethal comes from systematic reviews published in 2017. Researchers identified 53 deaths from kinetic impact projectile injuries and 2 deaths from chemical irritant injuries (6, 7). A recent case series identified 10 fatal penetrating head injuries from launched chemical irritant canisters in Iraq (8). The terminology in the professional literature and policy is changing to acknowledge the risk of death. We have made progress in our overall description of these weapons; however, the names of specific weapons continue to minimize the effects.

Chemical irritants are more commonly referred to as tear gas, pepper spray, or mace. However, symptoms of

these weapons include much more than tears. Although chemical irritants cause lacrimation, they can also cause respiratory distress, asthma exacerbations, nausea, emesis, skin blistering, or burns as well as tachycardia and transient hypertension (6, 9, 10). Due to dispersal techniques, such as launching gas canisters from a modified firearm, blunt and penetrating trauma has also been reported (6, 8, 11). Language like “irritants” and “tears” inaccurately discounts the severity of symptoms.

Chemical irritants, including tear gas, were banned for warfare under multiple treaties, including the 1993 Chemical Weapons Convention, yet they are rarely referred to as chemical weapons in practice (12, 13). Instead, we use euphemisms for the term “weapon.” We understand that the term “chemical weapons” typically describes compounds with greater lethality (e.g., nerve gas) (14). Nevertheless, the fact that the chemical agents used for crowd control can be the very same chemicals banned as weapons of war supports that the use of the term chemical weapons can be consistently applied for both per se lethal and less-lethal types. To preserve distinctions of lethality, it would be more accurate to describe irritants as “less-lethal chemical weapons” and agents like nerve gas as “lethal chemical weapons.”

Kinetic impact projectiles, an umbrella term for rubber bullets, foam bullets, and beanbags, are another category of less-lethal weapons (15). During the George Floyd protests, these weapons caused significant harm to protesters, media, and emergency medical services (16). While confirmed reports include serious injuries, like traumatic brain injury, subdural hematoma, and permanent visual impairment, the language used to describe munitions does not reflect the same severity. The word “beanbag” is typically used to describe a comfortable chair or a children’s lawn game. Beanbag munitions are rather dissimilar, consisting of sacs filled with lead pellets (17). A report in Austin, Texas, where law enforcement reported only using beanbag munitions, documented 19 injured patients, including 4 with penetrating trauma (18). In Minneapolis,

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Author contributions: E.A.K., J.T.W., R.R.H., D.P.D., and D.J.S. wrote the paper.

The authors declare no competing interest.

This article is a PNAS Direct Submission.

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Published April 12, 2022.

**Table 1. Less-lethal weapon naming conventions**

Harm-minimizing terms	Harm-acknowledging terms
Nonlethal weapon	Less-lethal weapon, weapon
Tear gas, chemical irritant	Incapacitating agent, chemical agent, less-lethal chemical weapon*
Beanbag	(12-gauge/shotgun-fired) baton round, impact munition
Rubber/foam/sponge bullet	(40-mm) baton round, impact munition
Projectile	Munitions
Tool/device	Weapon

Listed are commonly used harm-minimizing terms used to describe less-lethal weapons and potential harm-acknowledging terms.

\*To be able to acknowledge differences in morbidity and mortality and to be consistent with prevailing classifications, chemical weapons should be distinguished as either lethal or less lethal.

we identified 57 patients injured by kinetic impact projectiles, including 23 patients with hits to the head (11). These patterns of severe head injuries were identified across the United States (19). Since this time, there have been minimal changes to safety standards and oversight (20, 21).

The scientific community has encouraged evidence-based policy change regarding the use of less-lethal weapons (22–24). As policymakers continue to consider recommendations, stakeholders in medicine and public health should use language that accurately reflects the nature of these weapons and is consistent with other prevailing policies. First, we can characterize these less-lethal weapons primarily as weapons—not as tools, devices, irritants, or projectiles. This small change, particularly in media coverage, would help accurately reflect the impact of less-lethal weapons. Second, we can shift our language from tear gas and chemical irritants to less-lethal chemical weapons. Finally, we can change our description of munitions from harm minimizing to harm acknowledging. Existing terminology is listed in Table 1. Future guidelines should focus on removing delicate descriptors (i.e., foam, rubber, beanbag, irritants).

The language that either portrays these weapons as safe or obfuscates their true danger may contribute to

their continued distribution and inappropriate use without rigorous safety standards or market regulation (20, 21, 24). In the United States, this is something we must consider within the context of the Black Lives Matter movement and an ongoing and continuous struggle for racial equity and justice (25). Less-lethal weapons were used by police throughout the civil rights movement of the 1950s and 1960s (26). Less-lethal weapons were disproportionately used during Black Lives Matter protests (27). People protesting structural racism, largely consisting of Black lives, suffered the harms. Altogether, this reveals how these weapons contribute to health inequities and systemic racism. Language has the power to shift cultural norms; language also has the power to conceal violence and perpetuate injustice. When the public is made aware of the realities of these weapons, opportunities arise more readily for constructive policy change. As policymakers consider the manufacturing and regulation of these weapons, the language of less-lethal weapons should more accurately inform the conversation.

**Data Availability.** There are no data underlying this work.

- G. Lakoff, M. Johnson, *Metaphors We Live By* (University of Chicago Press, 2008).
- V. Evans, "How we conceptualise time: Language, meaning and temporal cognition" in *The Cognitive Linguistics Reader*, V. Evans, B. K. Bergen, J. Zinken, Eds. (Equinox Publishing, 2007), pp. 733–764.
- E. Bylund, P. Athanasopoulos, The Whorfian time warp: Representing duration through the language hourglass. *J. Exp. Psychol. Gen.* **146**, 911–916 (2017).
- E. F. Loftus, J. C. Palmer, Reconstruction of automobile destruction: An example of the interaction between language and memory. *J. Verbal Learn. Verbal Behav.* **13**, 585–589 (1974).
- P. H. Thibodeau, L. Boroditsky, Metaphors we think with: The role of metaphor in reasoning. *PLoS One* **6**, e16782 (2011).
- R. J. Haar, V. Iacopino, N. Ranadive, S. D. Weiser, M. Dandu, Health impacts of chemical irritants used for crowd control: A systematic review of the injuries and deaths caused by tear gas and pepper spray. *BMC Public Health* **17**, 831 (2017).
- R. J. Haar, V. Iacopino, N. Ranadive, M. Dandu, S. D. Weiser, Death, injury and disability from kinetic impact projectiles in crowd-control settings: A systematic review. *BMJ Open* **7**, e018154 (2017).
- S. S. Hoz *et al.*, Fatal penetrating head injuries caused by projectile tear gas canisters. *World Neurosurg.* **138**, e119–e123 (2020).
- A. M. Zekri, W. W. King, R. Yeung, W. R. Taylor, Acute mass burns caused by o-chlorobenzylidene malononitrile (CS) tear gas. *Burns* **21**, 586–589 (1995).
- O. Vandenplas *et al.*; European Academy of Allergy and Clinical Immunology, EAACI position paper: Irritant-induced asthma. *Allergy* **69**, 1141–1153 (2014).
- E. A. Kaske *et al.*, Injuries from less-lethal weapons during the George Floyd protests in Minneapolis. *N. Engl. J. Med.* **384**, 774–775 (2021).
- United Nations, *Treaties, States Parties, and Commentaries—Geneva Protocol on Asphyxiating or Poisonous Gases, and of Bacteriological Methods* (United Nations, 1925).
- United Nations, *Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and Their Destruction* (United Nations, 1993).
- B. A. Golomb, Acetylcholinesterase inhibitors and Gulf War illnesses. *Proc. Natl. Acad. Sci. U.S.A.* **105**, 4295–4300 (2008).
- United Nations for Human Rights Office of the High Commissioner, *United Nations Human Rights Guidance on Less-Lethal Weapons in Law Enforcement* (United Nations, 2020).
- M. Heisler, K. Hampton, D. McKay, Dangerous use of crowd-control weapons against medics and protesters in Portland, OR. *Lancet* **396**, e59–e60 (2020).
- D. de Brito, K. R. Challoner, A. Sehgal, W. Mallon, The injury pattern of a new law enforcement weapon: The police bean bag. *Ann. Emerg. Med.* **38**, 383–390 (2001).
- K. A. Olson *et al.*, Penetrating injuries from "less lethal" beanbag munitions. *N. Engl. J. Med.* **383**, 1081–1083 (2020).
- S. Reynhout, Shot in the head. *PHR*, 14 September 2020. <https://phr.org/our-work/resources/shot-in-the-head/>. Accessed 1 November 2021.
- D. Wagner, Minneapolis police injured protesters with rubber bullets. The city has taken little action. *Kaiser Health News*, 26 May 2021. <https://khn.org/news/article/george-floyd-protests-what-happened-police-who-shot-rubber-bullets/>. Accessed 1 November 2021.
- House Committee on Oversight and Reform, Subcommittees Release Memo Detailing Health Risks from Tear Gas and Lack of Federal Regulation (14 October 2021). <https://oversight.house.gov/news/press-releases/subcommittees-release-memo-detailing-health-risks-from-tear-gas-and-lack-of-federal-regulation/>. Accessed 1 November 2021.
- American Academy of Ophthalmology, Statement on Rubber Bullets for Crowd Dispersion. *AAO*, 4 June 2020. <https://www.aao.org/newsroom/news-releases/detail/statement-on-rubber-bullets-crowd-dispersion>. Accessed 1 November 2021.
- American Thoracic Society, Tear Gas Use During COVID-19 Pandemic Irresponsible; Moratorium Needed, Says American Thoracic Society. *NewsWire*, 11 June 2020. [https://www.newswise.com/coronavirus/tear-gas-use-during-covid-19-pandemic-irresponsible-moratorium-needed-says-american-thoracic-society?article\\_id=733044](https://www.newswise.com/coronavirus/tear-gas-use-during-covid-19-pandemic-irresponsible-moratorium-needed-says-american-thoracic-society?article_id=733044). Accessed 1 November 2021.
- L. Wagner, Z. Guttman, Y. Hebner, C. S. Philson, A proposal for FDA oversight of tear gas. *J. Sci. Policy Govern.*, 10.38126/JSPG180115 (2021).
- R. R. Hardeman, E. M. Medina, R. W. Boyd, Stolen breaths. *N. Engl. J. Med.* **383**, 197–199 (2020).
- A. Feigenbaum, *Tear Gas: From the Battlefields of World War I to the Streets of Today* (Verso Books, 2017).
- ACLED, Demonstrations & Political Violence in America: New Data for Summer 2020 (2020). <https://acleddata.com/2020/09/03/demonstrations-political-violence-in-america-new-data-for-summer-2020/>. Accessed 1 November 2021.