

Note

Extinguishing a Learned Response in a Free-ranging Gray Wolf (*Canis lupus*)

L. DAVID MECH

United States Geological Survey, Northern Prairie Wildlife Research Center, 8711 — 37th Street SE, Jamestown, North Dakota 58401-7317 USA; email: david_mech@usgs.gov or mechx002@umn.edu

Mech, L. David. 2017. Extinguishing a learned response in a free-ranging Gray Wolf (*Canis lupus*). *Canadian Field-Naturalist* 131(1): 23–25. <https://doi.org/10.22621/cfn.v131i1.1951>

A free-ranging Gray Wolf (*Canis lupus*), habituated to human presence (the author) on Ellesmere Island, Canada, learned to anticipate experimental feeding by a human, became impatient, persistent, and bold and exhibited stalking behaviour toward the food source. Only after the author offered the wolf about 90 clumps of dry soil over a period of 45 minutes in three bouts, did the wolf give up this behaviour. To my knowledge, this is the first example of extinguishing a learned response in a free-ranging wolf and provides new insight into the learning behaviour of such animals.

Key Words: Behaviour; *Canis lupus*; Ellesmere Island; extinguishing learned behaviour; Arctic; Gray Wolf; learned-response; learning

Learning and extinguishing learned behaviour (Thorndike 1911; Skinner 1953) have been well studied in domestic dogs (Miklosi 2015). Some investigations of learning have been conducted with captive Gray Wolves (*Canis lupus*; Packard 2003; Frank 2011), including one study that included extinguishing learned behaviour (Cheney 1982). In addition, considerable research has been done comparing social learning between dogs and captive wolves (Range and Viranyi 2013; Marshall-Pescini *et al.* 2015). However, to my knowledge, only Packard (2012) has studied learning in free-ranging wolves, and no one has investigated extinguishing a learned response in such wolves. The purpose of this study is to provide a detailed account of how I extinguished a learned response in a free-ranging wolf.

During the summers of 1986–2010, I made a series of observations of wolves on the Fosheim Peninsula of Ellesmere Island, Nunavut, Canada (80°N, 86°W; Mech 1987, 1988, 1995; Mech and Cluff 2011). Unlike those anywhere else in the world, the wolves in this remote region are unafraid of humans and can be observed from close range (< 1 m). Over 25 summers, my colleagues and I studied the behaviour of about 35 individual Arctic Grey Wolves (*Canis lupus arctos*). Their degree of tolerance toward us varied, but most would approach to within 5 m, while we were seated on all-terrain vehicles (ATVs). The main prey of these wolves are Muskoxen (*Ovibos moschatus*), Arctic Hares (*Lepus arcticus*), and Peary Caribou (*Rangifer tarandus pearyi*; Mech 1988).

In addition to observing the wolves' behaviour (Mech 1987, 1988, 1995), I also conducted various feeding experiments. In one such test, I threw weighed pieces of prey animals and other potential food items (e.g., Arctic Hare, Seal [*Phoca* spp.] meat, cheese, and dry

dog food) to breeding male members of packs after they had left their den of pups to go foraging. I wanted to determine how much food they would have to obtain to return to the den to feed their offspring. I tested small amounts of foods and found that the wolves would always accept various types of meat or prey parts, sometimes also cheese bits, and less often even dried dog food. Thus, I could gauge the degree of a wolf's hunger by which type of food it would accept (L.D.M., unpublished data).

Usually, I kept the food assortment in a 3–4-L plastic bucket hung from the handle bar of a four-wheeled ATV on which I always sat while observing the wolves. As a side effect of the feeding routine, the wolves learned that when I reached toward or into the bucket, they would get fed. Even on hearing the sound of touching or brushing against the bucket, the wolves would arise and approach me expectantly. Most often I did not feed them. Thus, the reinforcement was the variable-ratio type, in which a reward comes after an unpredictable number of responses. Whenever I did feed the wolves, they would wait around a few minutes after I stopped and resume whatever they had been doing before approaching me, most often sleeping or resting. Until the current observation, the wolves approached to within about 1–5 m, depending on the individual, and waited passively.

The observation that is the subject of this article was made in 1992, when the wolf pack consisted of an adult male wolf with his mate and three pups. Although the adult male bore no definitive identification marks, his behaviour toward me and toward the plastic bucket indicated that he was probably the same breeding male wolf (“Left Shoulder”) that I had been observing each summer since 1986 (Mech 1995). During summer 1992, he was already showing the above-described,

conditioned response to the plastic bucket when I first approached him on 3 July 1992, and that continued throughout July.

The incident in which I extinguished an unusual response to my accessing the bait bucket occurred on 31 July 1992 at about 0920. The unusual aspects of the response to my feeding on this occasion were the wolf's impatience, persistence, stalking, and bold attempt to access the food source itself. During 25 summers of spending 2–4 weeks each year interacting with the wolves in this area, this was the only time I saw this aggressively bold behaviour. The following description is paraphrased from my field notes:

The male wolf arrived, and not wanting to let him nose around camp, I, on my ATV, lured him away. He acted very hungry and eagerly ate even dry dog food, but he soon started into his predation mode, running after the ATV with tail up and looking at the bait bucket. The minute I stopped, he came to within 1 m of the bucket and seemed to try to grab it. Each time, I'd throw some food to him, but, each time, he would immediately return and act the same way in a very alert mode, ears forward, very anticipatory. I gunned the engine, and the wolf pulled back 30–60 cm but he quickly habituated to that. Thus I was forced to throw him food even though I knew this just rewarded his behaviour. The instant I tried to move, he started his stalking behaviour. I gradually moved ~150 m, but he remained in the stalking mode, and I only warded him off by feeding him some 10–20 times. This continued for ~20 more minutes.

I tried various means to change the wolf's behaviour without just throwing him the food bucket, which held the seal meat. I switched the bucket from the left side of the ATV where the wolf was to the right side, but he just switched his stalk to the right side. I held the bucket on my lap, but he still seemed about to grab it. Once I took a handkerchief out of my coat pocket, and the wolf started eying my pocket.

The way I finally broke the wolf of his stalking was to put dirt clumps into the bucket, breaking small pieces off like food bits and showing each to him like food and then tossing it to him. He went after the piece each time, and a few times he grabbed and bit them and spit them out. I tried this about 50 times, and each time he would go after the clump. After 5–10 minutes of this, the wolf started to leave. When about 4 m away he stopped and resumed his stalk. I resumed throwing him only dirt clumps. After ~20 more, he started away again but returned once more. I threw more clumps, and he checked each.

Finally, the wolf trotted off ~200 m. As I drove off, he came running back and continued the same stalking behaviour. I continued throwing him dirt clumps, and he went after about 20 more. After ~5 minutes, he left, and I let him get ~200 m more away. I then left in the opposite direction at about 1030, and the wolf did not follow.

The adult male wolf's unusual behaviour toward the food bucket probably resulted from the combination of his being especially hungry and me feeding him to ward him off, which only rewarded him and encour-

aged his behaviour in a rapidly escalating learning situation.

It took approximately 90 offerings of dry soil clumps over about 45 minutes to extinguish the wolf's impatience, persistence, stalking behaviour, and bold response in trying to access food. These unrewarded feedings (negative punishment), some of which the wolf grabbed and bit (positive punishment), did not extinguish the animal's basic response to my accessing the bait bucket, as evidenced by his standard response the next day and following days. They only extinguished his more complex and extreme behaviour exhibited on 31 July. The wolf showed classic spontaneous recovery (Pavlov 1927) each time I began driving away, an indication that he was also conditioned to the ATV's sound or movement.

I had learned this approach to extinguishing an animal's response to artificial feeding by using it previously on a Long-Tailed Jaeger (*Stercorarius longicaudus*). I had been feeding this bird around our field camp until it became a nuisance. By feeding it an unrecorded, but high, number of soil clumps, I extinguished the bird's "begging" behaviour.

My observation has little relevance to the extinguishing of a captive wolf's response to the discrete-trial-probability learning experiments that Cheney (1982) conducted and, as it involved only a single wolf, it cannot necessarily be generalized. However, it does generally accord with the findings of Bentosela *et al.* (2008) about extinguishing learned responses and spontaneous recovery in domestic dogs, although those animals were on a fixed-ratio reinforcement regime. To my knowledge, this observation is the first example of extinguishing a learned response in a free-ranging wolf, and it provides new insight into the learning behaviour of such animals.

Acknowledgements

This study was funded by the United States Department of the Interior and the National Geographic Society. I also thank Environment Canada and the Polar Continental Shelf Project for logistical support. D. Cluff, H. Frank, T. S. Jung, J. M. Packard, Z. Viranyi, and J. Way provided helpful suggestions for improvement of an earlier draft of this article.

Literature Cited

- Bentosela, M., G. Barrera, A. Jakovcevic, A. M. Elgier, and A. E. Mustaca.** 2008. Effect of reinforcement, reinforcer omission and extinction on a communicative response in domestic dogs (*Canis familiaris*). *Behavioural Processes* 78: 464–469. <https://doi.org/10.1016/j.beproc.2008.03.004>
- Cheney, C. D.** 1982. Probability learning in captive wolves. Pages 272–281 in *Wolves of the World: Perspectives of Behavior, Ecology, and Conservation*. Edited by F. H. Harrington and P. C. Paquet. Noyes Publications, Park Ridge, New Jersey, USA. [https://doi.org/10.1016/0376-6357\(84\)90073-1](https://doi.org/10.1016/0376-6357(84)90073-1)
- Frank, H.** 2011. Wolves, dogs, rearing and reinforcement: complex interactions underlying species differences in

- training and problem-solving performance. *Behavioural Genetics* 41: 830–839. <https://doi.org/10.1007/s10519-011-9454-5>
- Marshall-Pescini, S., Z. Viranyi, and F. Range.** 2015. The effect of domestication on inhibitory control: wolves and dogs compared. *PLoS ONE* 10:e0118469. <https://doi.org/10.1371/journal.pone.0118469>
- Mech, L. D.** 1987. At home with the Arctic Wolf. *National Geographic* 177: 562–593.
- Mech, L. D.** 1988. *The Arctic Wolf: Living with the Pack*. Voyageur Press, Stillwater, Minnesota, USA.
- Mech, L. D.** 1995. A ten-year history of the demography and productivity of an arctic wolf pack. *Arctic* 48: 329–332. <https://doi.org/10.14430/arctic1255>
- Mech, L. D., and H. D. Cluff.** 2011. Movements of wolves at the northern extreme of the species' range including during four months of darkness. *PLoS ONE* 6: e25328. <https://doi.org/10.1371/journal.pone.0025328>
- Miklosi, A.** 2015. *Dog Behaviour, Evolution, and Cognition*. Second edition. Oxford University Press, Oxford, United Kingdom. <https://doi.org/10.1093/acprof:oso/9780199295852.001.0001>
- Packard, J. M.** 2003. Wolf behavior: reproductive, social and intelligent. Pages 35–65 in *Wolves: Behavior, Ecology and Conservation*. Edited by L. D. Mech and L. Boitani. University of Chicago Press, Chicago, Illinois, USA.
- Packard, J. M.** 2012. Wolf social intelligence. Pages 1–48 in *Wolves: Biology, Behavior and Conservation*. Edited by A. P. Maia and H. F. Crussi. Nova Science Publishers, Hauppauge, New York, USA.
- Pavlov, I. P.** 1927. *Conditioned Reflexes*. Dover, New York, New York, USA. <https://doi.org/10.5214/ans.0972-7531.1017309>
- Range, F., and Z. Viranyi.** 2013. Social learning from humans or conspecifics: differences and similarities between wolves and dogs. *Frontiers in Psychology* 4: 868. <https://doi.org/10.3389/fpsyg.2013.00868>
- Skinner, B. F.** 1953. *Science and Human Behavior*. MacMillan, New York, New York, USA.
- Thorndike, E. L.** 1911. Animal intelligence. *American Psychology* 53: 1125–1127.

Received 22 June 2016

Accepted 1 March 2017