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EDITORIAL

Why electric shock is not behavior modification

In doing the Web research for my earlier survey of nonveterinary programs for those who work with troubled dogs (Editorial: How do we obtain and disseminate accurate information? Vol. 1, Issue 3:89–93), I encountered a number of Web sites that either supported or reviled training using electric shock. This is a perennial issue, and although I loathe starting the new year with yet another revisit, perhaps the time has come to ask—not what people think about shock—but whether it "works," what we mean by "works," and what would be necessary to evaluate this or any other technique using the scientific method. If we can start the new year by promoting a rational, scientific approach to this issue, we will have set a tone for discussion that is much needed.

For the purposes of ensuring that we are all talking about the same thing, I have repeated the Table found in the earlier editorial, "Steps for any scientific effort." For the purposes of this discussion, I limited myself to sites readily found on the internet (with thanks to Donna Dyer, LVT, for locating these sites), to germane discussions in veterinary publications, and to the peer-reviewed literature focusing on pet dogs.

In 1999 I wrote a letter, published in the Australian Veterinary Journal (Overall, 1999), deploring shock and continued the discussion in 2003 (Overall, 2003), when I learned that I had been cited as supporting shock (Perkins, 2003a). In response to my letter stating that I did not and never had supported shock for teaching or helping animals learn, I was labeled a Luddite (Perkins, 2003b). I was also labeled as biased because I recommended that we approach this issue by collecting the data. But what does it mean to collect data?

By definition, when you collect data in a systematic way with a discrete question in mind, you are abandoning the approaches of self-report, personal testimonials, and argumentum ad hominem that are so prevalent in discussions supporting shock, regardless of the source. The scientific method gives us a way to test our beliefs. Unfortunately, studies on the effects of shock are not numerous, despite the claim that "Major veterinary universities have tested E-collars since the mid 60s, when they were invented. No evidence of any such [nerve – sic] damage has ever been found" (Castle, n.d.). The studies that have been published are valid and important to understand. I am going to review some of the ground I covered in previous letters, and add information from data relatively recently published in hopes of allowing anyone who is interested to understand that:

(1) the use of shock is not treatment for pets with behavioral concerns;
(2) the use of shock is not a way forward;
(3) the use of shock does not bring dogs back from the brink of euthanasia; instead, it may send them there; and
(4) such adversarial techniques have negative consequences that those promoting these techniques either dismiss or ignore.

We have known for decades that shock works to teach avoidance and cessation of behavior, which in the extreme form, as often examined in the psychological literature, is called "immobility." It is this criterion of "immobility" by which learned helplessness is accessed (Seligman, 1971). Given this definition, I have been surprised at how often those who support shock ignore the fact that cessation may not be a hallmark of "improved behavior," especially when the welfare of the animal is considered. It is also surprising that no one who is recommending shock for treatment of behavioral problems has evaluated the extent to which they may be inducing learned helplessness in the dogs they seek to treat.

This lack of follow-through is problematic and, of course, violates the tenets of the scientific method (see steps 1–3 in the Table).

Whether the discussion is about electric shock (Castle, n.d.; Perkins, 2005) or low-level electronic stimulation (Courtney, E collar Focus and Control, 2005; Hassen, n.d.), the use of an electric impulse is intended to stop a specific behavior that is deemed undesirable. In none of the sources I read did anyone pause to ask what information the dog was conveying by the behavior that people found worrisome or undesirable. In none of the sources did any of the authors realize that cessation of one behavior did not mean that the dog was normal, or that he or she was rationally complying with a program designed to eliminate the reason for the behavior. In fact, Courtney (2005) states that the client found the dog to have become "obedient." Obedient dogs can be quite distressed and can suffer from profound anxiety

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Table Steps for any scientific effort. These steps form the necessary and sufficient conditions for when an approach is scientific:

1. Ask a question;
2. Make preliminary observations and formulate hypotheses. *Hypotheses* are specific questions—usually these hypotheses are best formulated after an extensive period of observation so that apparent patterns emerge.
3. Make predictions from the hypotheses.
4. Identify which variables need to be measured in order to test these predictions;
5. Choose suitable methods for measuring the variables.
6. Collect sufficient data. Stop collecting the data when, but only when, you have enough to provide clear answers.
7. Use the right statistical tools for testing the hypotheses. These tools will be determined largely by the pattern and type of data that you collected.

Data from Martin and Bateson, 1986.

while complying with a request. These issues were only discussed in papers and on sites whose focus was concern for what the animal experienced during training (Flint, 2005; IPDTA Laurette, n.d.). So, does using shock "work"? If we consider this question, we can now see how important criteria for evaluation have become (steps 4 and 5 in the Table).

If those recommending electric shock do not understand normal canine behavior and signaling and have little respect for the welfare and cognitive needs of dogs, how can they evaluate any "data" they purport to collect in a scientific context? They cannot. They have not complied with step 1 in the Table and cannot comply with step 2 in the Table because they have not made the needed range of observations.

Yet all of the sources supporting electric shock state that the dogs stop the targeted behavior when shocked (Castle, n.d.; Courtney, 2005; Deeley, n.d.; Goldberg, online; Hassen, n.d.; NAIA, n.d., Perkins, 2005; RadioFence, online). In fact, in one of the many "articles" published online (Castle, The Electronic Collar, 2002, online), Castle states that he prevents dogs from leaving their people's sides by proofing. "I have the dog recall to me and then transfer to the owner. This is done quite simply by putting the dog on a Flexi leash and when he gets to the end of it, pressing the button (after first having found his level of stimulation). Dogs are liable to do many things when they first feel the stimulation and I ignore all of them. While still holding the button of the Ecollar unit down I gently guide the dog to come towards me and as soon as he takes a few steps in that direction, I release the button. This is continued until the dog figures out that if he comes towards me, the discomfort stops. I then walk away from the dog and press the button. If he moves to go with me I release the button. . . . I then proof the dog by throwing toys. If the dog leaves the owner's side, I have him say 'here' and stim [sic shock] the dog. This proofing continues until the dog doesn't leave the owner's side no matter what distraction I supply."

There are many things wrong with this approach, and although they have been discussed in texts on veterinary behavioral medicine, I shall quickly review the shortcomings here.

First, Flexi leads are formulae for teaching unschooled or unmannered dogs to fail on a lead. The dogs can only be jerked back when they hit the end of the lead, and because all dogs push against pressure, their response is worse.

Second, the dog is punished for actually doing nothing in the described scenario.

Third, all of the data and observations about canine responses to electric shock are deliberately ignored here. This is a formula for not understanding what you observe.

Fourth, I never throw a toy I don't want a pet dog to chase. Why would I devalue the toy? If you are teaching a working dog to ignore food or toys, there are easier and better ways to do this.

Finally, any dog who stops reacting to any stimuli in such a conditioned situation is experiencing learned helplessness, not obedience.

Somewhere in this discussion, rational thought must suggest that different strengths and durations of shock may cause different experiences, and what the human being experiences may not be what the dog experiences. I've yet to have someone hand me an adjustable-level collar and ask me to prove that it doesn't hurt by shocking them at any level I chose.

That said, carrying out steps 4 and 5 in the Table is difficult. There is little information available, and what there is does not appear to be collected in a consistent manner. Most of these collars have stimulation "levels," and knowing that the author cannot feel anything below a 5 on a particular collar (Courtney, 2005) in no way allows us to perform steps 4 and 5. There are no data to support someone's assertion that a model that "taps" as fast as 1/1000th of a second is over "as quick as the static shock you get from a doorknob. And by the way, the intensities I use are usually quite a bit less than what you typically feel from the doorknob." (Goldberg, 2004). The assertions are that modern E-collars offer up to 50,000 random frequencies and so cannot experience random discharge, or that there are between 6 and 18 levels of "stim" offered without supportive data, but there are long lists of model numbers the author recommends (Castle, n.d.). It is not helpful to note that the collars automatically shut off after 10–12 seconds (Castle, n.d.), without knowing what the dog received and perceived in those 10–12 seconds. RadioFence (online) states that "The brand that has the UL mark of approval on its receiver features a correction that lasts only 1/40th of a second—less time than it takes the average person to snap their fingers." What else does this device feature? Whatever it is, it is not discussed here, but you do get to learn that the training shock is ¼ the level of a cattle fence and 1/20th the level of a stun gun, which delivers a shock of 100 Kv (RadioFence,

online). Unfortunately, the study cited in this discussion is presented without statistical analysis, or any data on the range of voltage found in each situation (I doubt they are all exactly the same). A review of the numbers involved (5 training collars v. 100 stun guns) strongly suggests that steps 5–7 in the Table were violated here. In fact, all of the writing cited in this paragraph is of concern, because it implies a reliability that is simply not proven.

We must ask ourselves 2 questions with respect to cessation of a behavior and the potential for subsequent immobility: (1) is immobility what we want, and is cessation of one behavior about which a client has a complaint sufficient? and (2) what other behaviors or behavioral processes are being affected when one is exposed to shock?

Cessation is insufficient for 2 reasons.

First, if the behavior stops, we must realize that a "stop" here is only a halt in the process or signal and that the dog must then be directed toward and rewarded for an appropriate behavior if we wish for him to be able to make such a decision himself as a result of learning. This subsequent step is not discussed in the literature on shock.

Second, and more important, the canine behavior for which the animal is receiving a shock is not analogous to the lever-pressing behaviors so often cited in the rodent literature for which shock has been used as an assay for "motivation." The behaviors for which people wish to use shock in dogs are those that annoy humans. These behaviors are either signals or nonspecific signs of underlying distress. It is clear from the above example that such distress is neither considered nor addressed.

The question should be, are we doing harm when we use shock to extinguish behaviors, some of which may be normal? If one is considering the mechanism of cellular learning, the answer must be yes.

If shock and pain are profound, it is possible to induce almost immediate long-term potentiation (LTP), the molecular changes associated with hippocampal memory that will lead to a strong aversion or phobia. The hippocampus is the primary region where fears and anxieties associated with fearful stimuli are thought to originate, so a logical sequela to a stressful, painful stimulus may be fear, phobia, or withdrawal. At the cellular level, any kind of repeated reinforcement ensures better, more numerous, and more efficient connections between neurons (Wittenberg and Tsien, 2002). When stimulation continues, we know that activity-dependent plasticity at synapses (e.g., learning) occurs in the lateral amygdala. This is one modality postulated to be involved in learning of contextual fear (Schafe et al., 2001).

Another issue to consider is that we may also be changing other behaviors or processes when we expose an animal to shock.

It is important to realize that the discussions of LTP above are based on rodent models of learning that often involve knock-out genes. One of the criteria for evaluating the validity of these mouse models includes a demonstration that other normal behaviors have not been changed. This is a clear application of validation involved in the scientific method, and it has actually been used in dogs subjected to shock collars.

In a landmark paper published in 2004, Schilder and van der Borg demonstrated, using guard dog-trained German shepherd dogs, that there were untoward, negative, long-term effects of training with shock. Dogs that were shocked in training, but not when the evaluations were made, showed a lower ear posture in free-walking, and more stress-related behaviors than did dogs who had not been shocked in training. These differences were also found when these dogs participated in obedience training and manwork. In addition to the noted behavioral responses associated with stress and distress found in dogs that had been trained with shock, the researchers also found behavioral differences that were most profound when the person associated with the shock (the owner or handler) was present. These data supported those from a previous study (Beerda et al., 1997), which also documented alterations in the HPA axis in dogs that were shocked when compared with dogs experiencing no shock. Their conclusions were that: (1) this type of training, in general, is stressful; (2) receiving shocks is painful for the dogs; and (3) the dogs learn a context-dependent concern—the presence of the handler and his or her commands announces the reception of shocks. It is important to note that despite these differences, these dogs all continued to work. Because handler capabilities are a confounding variable when evaluating working dogs, collecting the data about whether aversive training actually affects abilities of successful dogs to work is likely to be difficult. This does not mean that such data should not be collected.

These conclusions give lie to the assertions that "taps" are "imperceptible" and "tickle" human beings (Goldberg, online), and that when fitted with electronic collars people are surprised that they feel so little. In short, if the 1/1000 of a second "tap" (no information on how such data were acquired or validated) only generates a reaction so subtle that a dog might only look at you or flick his ear (Goldberg, online), why are we not using a clicker or a voice to get that response? If the "stimulus" is just to get attention (Courtney, 2005; , 2004, online; Hassen, n.d.), this becomes all about timing and getting the dog's attention. Do we really need an electric collar or shock to do that? If so, we have likely overridden many of the dog's normal responses. In such cases the obvious conclusion is that these dogs would have responded and will respond to clear signaling and humane training designed to provide them with a clear, contextual set of instructions.

Polsky (2000), following up on numerous citations suggesting links between shock and a change in behavior from nonaggressive to aggressive, has published data supporting an undesirable change in overall behavior in dogs subjected to electronic fences, where previously unaggressive dogs became aggressive when the dog was wearing the receiver

collar, the system was working, and the dog was in or near the signal field. In each of these cases, the shock delivery was completely out of context to the behavior the dog was performing, usually greeting someone, and in each of these cases these previously nonaggressive dogs delivered multiple bites, doing serious damage to the victims, 2 of whom were children. Although the cases cited are few (5), the pattern of the behaviors is important, worrisome, and deserves to be further pursued.

Shock collars have also been asserted to have utility as a failsafe method for stopping trained patrol dogs from overly enthusiastic biting, yet there are no published data on this issue that we could discover. In an article from the *Los Angeles Times* (latimes.com) newspaper on 26 August 2006, there is a report of a dog who, in the course of searching a garage for a burglar, repeatedly bit his handler, ignoring shocks from the collar he was wearing (Lin, 2006). Many police dogs wear shock collars in the absence of any clear data that shock will inhibit a dog who is trained to react aggressively in controlled situations. In fact, once they are fully behaviorally and physiologically engaged in attack behaviors, these dogs are likely to be further stimulated by pain, if they don't already override such outside sensations.

Many advocates of humane approaches have asked whether we would treat a child with a behavioral problem this way, and if not, why should we treat a dog this way? The flippant and unfortunately painfully accurate answer may be, "Because we can," a response that is never adequate. Researching this editorial made me viscerally ill, but the materials available clearly make the case that the claims citing efficacy of shock are not based in science or in the scientific method. If we can encourage our clients to participate in the discussion about how we know something, they can begin to evaluate the incredible effluence of argumentum, ad hominem, themselves. Only if clients have the critical skills that allow them to read and evaluate the information available to them can they ask for humane help. It is only in this way that we can interrupt the cycle of violence so many have perpetuated.

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