



ELSEVIER

Available online at www.sciencedirect.com

 ScienceDirect

APPLIED ANIMAL
BEHAVIOUR
SCIENCE

Applied Animal Behaviour Science 113 (2008) 123–138

www.elsevier.com/locate/applanim

Efficacy of a remote-controlled, positive-reinforcement, dog-training system for modifying problem behaviors exhibited when people arrive at the door

Sophia Yin ^{a,*}, Eduardo J. Fernandez ^b, Sabrina Pagan ^c,
Sarah L. Richardson ^d, Greg Snyder ^e

^a Department of Animal Science, University of California, 1 Shields Avenue, Davis, CA 95616, United States

^b Department of Psychological and Brain Sciences, Center for the Integrative Study of Animal Behavior, Indiana University, 1101 East 10th Street, Bloomington, IN 47403, United States

^c P.O. Box 61, Rancho Mirage, CA 92270, United States

^d Department of Recreation and Parks Management, California State University, Chico, CA 95929-0560, United States

^e The Sharper Image, 350 The Embarcadero, 6th Floor, San Francisco, CA 94105, United States

Accepted 11 November 2007

Available online 31 December 2007

Abstract

This study was conducted to determine the efficacy of a multi-step, positive-reinforcement training protocol, involving a remote-controlled food reward dispenser, for treatment of excessive barking, jumping, and crowding of the door by dogs when people come to the door. In Experiment 1, we tested the multi-step protocol in a laboratory setting to determine whether the protocol is successful in a controlled environment when implemented by dog trainers. Six dogs with a history of problem behaviors at the door were trained to run to a platform with a rug on it, lie down and stay (“down-stay”) for 1 min while common household door distractions such as loud knocking, ringing doorbells, and running people were presented. The dog’s ability to remain in a down-stay for 1 min with such distractions was measured before and after training. During training, the number of training trials required and the numbers of trials performed correctly and incorrectly were recorded for each dog. The results revealed that dogs remained in a down-stay with distractions significantly longer after training (60 ± 0.0 s) than before (5 ± 1.18 s) ($P = 0.016$). Dogs completed the training protocol in 8 d with only 8.4% incorrect trials, and in a similar number of trials with a coefficient of variation of 10.6%. These results indicated that this protocol was a good candidate for testing in a clinical setting, a home situation with owners doing the training. In Experiment 2, 15 dogs were trained by their owners to run to a rug or bed, lie down, and stay for 1 min while their owners answered the door. After

* Corresponding author at: 3215 Trawler Place, Davis, CA 95616, United States. Tel.: +1 530 757 2383; fax: +1 530 757 2383.

E-mail address: sophia@nerdbook.com (S. Yin).

training, barking decreased from 19.3 ± 4.62 barks/min to 2.1 ± 0.79 barks/min ($P < 0.0001$), jumping decreased from 8.2 ± 2.12 jumps/min to 0.02 ± 0.02 jumps/min ($P < 0.0005$) and time spent within 0.3 m of the door when visitors were outside decreased from $84.5\% \pm 4.23\%$ to $0.0\% \pm 0.00\%$ ($P < 0.0001$). Percent time spent in contact with the visitor when the visitor was inside decreased from $69.2\% \pm 4.19\%$ to $0.18\% \pm 0.13\%$ ($P < 0.0001$). Additionally, owner perception of their dog's behavior improved significantly ($P < 0.0001$). Six dogs that were not trained with the protocol showed no significant improvement ($P = 0.344$).

© 2007 Elsevier B.V. All rights reserved.

Keywords: Dog behavior; Operant conditioning; Shaping; Remote-controlled feeder; Positive-reinforcement

1. Introduction

Surveys indicate that 86–90% of all dogs exhibit one or more problem behaviors (Campbell, 1986; Adams and Clark, 1989; Vacalopoulos and Anderson, 1993) and that such behaviors are cited as the most common reasons for shelter relinquishment and euthanasia (Salman et al., 1998; Wells and Hepper, 2000). Jumping on people, barking (Campbell, 1986; Adams and Clark, 1989; Kobelt et al., 2003), and overexcitement (Kobelt et al., 2003) rank among the most commonly cited problems. One common situation that triggers all of these problem behaviors is the arrival of people at the owner's front door.

Many techniques exist for dealing with such problems. Punishment techniques include kneeling the dog in the chest (Koehler, 1996), squirting it in the mouth with water (PETCO, 2004), or pulling sharply on the dog's choke chain (Millan, 2004). To keep the dog away from the door, one recommendation is the use of two trainers, one to answer the door and one to give the sharp choke chain correction as the dog approaches the door (Koehler, 1996). Though punishment techniques are taught in training classes and shown on television, certified applied animal behaviorists and veterinary behaviorists advise the use of counter-conditioning, or positive-reinforcement of appropriate alternative behaviors (Landsberg et al., 1997; Overall, 1997) such as sitting instead of jumping and standing quietly instead of barking (Landsberg et al., 1997; Overall, 1997). For the visitor situation, dogs can be trained to "place" (go to a rug/bed) and remain lying down (in a "down-stay") while the owner answers the door (Miller, 2001; Yin, 2004).

All of these punishment and positive-reinforcement techniques can be challenging to perform successfully and in the standardized manner required for scientific comparison. One challenge is that they require appropriate timing. A punishment or reinforcement should occur immediately after initiation of the target behavior (Lindsay, 2000). Owners are often not prepared to physically punish a dog immediately, when it jumps, barks, or rushes to the door, or to reward it for good behavior. Additionally, in the case where dogs are taught to "place," either two trainers must be involved (one to reward the dog repeatedly while it is lying down, and one to answer the door) or the owner must repeatedly walk back to the dog to reward it.

A second challenge is that when behaviors are unlikely to occur spontaneously, they need to be trained in gradual steps through the shaping process (Lindsay, 2000). All of the door-related techniques require multiple shaping steps. For instance, to train a dog to remain in a down-stay while the owner walks to the door, one must teach the dog to lie down for several seconds to receive a reward and then train longer down-stays. A variation is that the dog receives rewards every several seconds until it can lie down for a specified time period. Then the interval between rewards is gradually increased. In both variations, distractions such as people running, talking,

and knocking on the door provide a greater challenge requiring additional steps. Paradoxically, given the importance of shaping, little research has systematically evaluated the implementation of shaping in an applied setting in animals (Galbicka, 1994; Pear and Legris, 1987). Furthermore, only one published study has systematically evaluated the individual steps in a multi-step shaping protocol in an applied setting (Ferguson and Rosales-Ruiz, 2001). One obstacle to systematically evaluating and implementing a shaping procedure is that training is often performed “by hand” (Peterson, 2004; Skinner, 1972). That is, food rewards are typically delivered by a person rather than by an automated food delivery system as used in laboratory studies. This hand-delivery results in variability in timing, placement, and stimuli that occur with the reward, thus increasing the likelihood of inaccurate measurements (Johnston and Pennypacker, 1993).

To date, experiments on the efficacy of training techniques to address the situation where people arrive at the front door have not been performed. A few published studies have explored the use of remote punishment (e.g. the citronella anti-bark collar) to decrease barking in specific situations short-term, (Wells, 2001; Moffat et al., 2003) but none have focused on the use of positive-reinforcement or shaping for jumping, barking or door-crowding problems.

The present study evaluated a multi-step protocol for training dogs to place and remain in a down-stay in the presence of distractions that commonly elicit problem behaviors when visitors come to the door. A remote-controlled food reward dispenser, which allowed trainers to reward the dog from a distance and in a predictable manner, was used. The study was divided into two parts; Experiment 1 occurred in a laboratory setting with dog trainers and Experiment 2 was a clinical trial in which owners performed the training in their homes.

2. Experiment 1: Laboratory setting

2.1. Methods

2.1.1. Location

Dogs were trained in a 9 m × 12 m area of a 500 m² dog training facility in Chico, California, USA over a 9-d period. Dogs were dropped off by their owners daily at 09:00 h and picked up at 16:00 h. They were housed in plastic travel kennels provided by their owners when not being trained and were walked every 2 to 3 h during the day. Owners walked their dogs prior to dropping them off and after picking them up.

2.1.2. Subjects

Six dogs ranging from 8 to 12 months of age were acquired from a local dog training class in Chico, California. The breeds were Australian shepherd, Boxer, Welsh corgi and the following crossbreeds: Labrador, Airedale and McNabb. All were neutered, with three of each sex. The dogs were selected for the study based on the following criteria: (i) a pre-evaluation questionnaire, in which owners rated their dogs as a 4 to 5 on a 5-point scale, with 1 representing “very well-behaved/easy to control,” and 5 representing “very unruly/out of control”; (ii) the dogs showed no signs of stress, such as continuous barking, whining, or panting while kenneled; (iii) the dogs were motivated to eat the available food items; (iv) the dogs had not previously learned the “down-stay” or “place” exercises; and (v) the dogs reacted to common door-related distractions (e.g. door knocking, doorbells, human activity) by moving toward or barking at the distraction.

2.1.3. Equipment

Training involved the use of two types of remote-controlled food reward dispensers (The Sharper Image, San Francisco, CA, USA). One device was a prototype dispenser (Fig. 1). The second dispenser was a modified electronic vitamin and pill dispenser with 28 compartments. For both, dispensing was controlled by a handheld remote control. A tone sounded each time the remote button was pressed, and within 1 s a

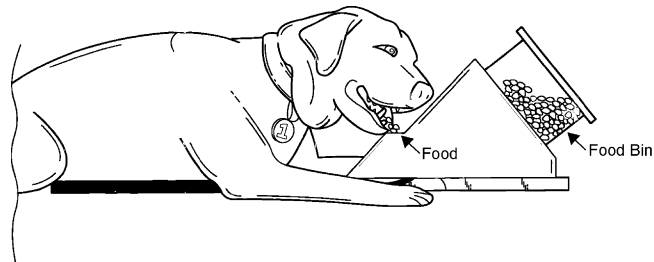


Fig. 1. Remote-controlled food reward dispenser. Dogs ate the food rewards while standing or while lying down, depending on the stage of training.

single kibble or kibble-sized treat (hereafter referred to as a food reward) was dispensed. A stopwatch was used to measure elapsed time during the timed training trials.

2.1.4. Pre-training measures

Dogs were tested to determine the amount of time they would remain in a down-stay. A trainer verbally or visually cued the dog to lie down and then walked 1.5 m from the dog. Timing started when the dog lay down and stopped when the dog spontaneously got up or at 1 min, whichever occurred first. This test was repeated five times in succession, and an average was taken.

2.1.5. General training procedures

The dogs were trained for one to three sessions per day, lasting 10–30 min each, depending on the dog's attention span and motivation to work for the food reward. If there was a sudden trend toward performing the exercise more slowly or taking the food rewards more slowly, the session was ended. Approximately 80% of the training was performed by a primary trainer. To prevent fatigue in this trainer, four secondary trainers performed the remaining training under the direct supervision of the primary trainer stationed just outside the training area. An observer recorded data and was stationed adjacent to the training area. There were three different observers throughout the study.

2.1.6. Preliminary training

Prior to data collection, dogs were taught two preliminary exercises. All dogs had a history of having been trained by their owners to perform similar exercises.

2.1.6.1. Training the conditioned reinforcer (tone = food reward). The dogs were taught to eat food from the food-reward dispenser and to associate the tone emitted by the dispenser with the appearance of the food reward. Trainers started by manually placing the food reward in the bowl (Step 1) and then, once dogs ate without hesitation, dispensing the food reward (Step 2). Next the trainer activated the tone function so that pressing the remote button sounded a tone followed within 1 s by a food reward (Step 3). Once dogs immediately looked for the food reward after hearing the tone, they were required to make eye contact with the trainer to receive the food reward. When the dog could start 1.5 m away from the food reward device (Step 5), make eye contact with the trainer and then immediately respond to the tone by going to get the food reward 9 out of 10 times in succession the dog could move onto the next exercise. At this point, the tone could be used as a conditioned reinforcer to signal the availability of a food reward.

2.1.6.2. Touching a target with the nose. The second preliminary exercise that dogs learned was a "targeting" exercise, in which they walked several steps to touch with their nose a yellow, foam golf ball on the end of a retractable pointer. When dogs touched this target, the trainer pressed the remote, and a tone sounded followed by dispensing of the food reward. This exercise was used in later stages of training to get dogs out of their down-stay so that a new trial could be started and to give the dog practice running back to

Table 1
Eleven shaping steps to train dogs to perform a down-stay for 1 min

| Shaping step | Food reward interval | Distance of trainer from dog (m) |
|--------------|--|----------------------------------|
| 1 | Every 3 s starting at time 0 | 0.3 |
| 2 | Every 3 s starting 3 s after the dog laid down | 0.3 |
| 3 | Every 5 s | 1.0 |
| 4 | Every 7 s up to 56 s, then at 1 min | 1.0 |
| 5 | Every 10 s | 1.0 |
| 6 | Every 15 s | 1.5 |
| 7 | Every 20 s | 1.5 |
| 8 | Every 25 s until 50 s, then at 1 min | 1.5 |
| 9 | Every 30 s | 1.5 |
| 10 | At 45 s and 1 min | 1.5 |
| 11 | At 1 min | 1.5 |

For Step 1, the first food reward was dispensed as soon as the dog laid down on the platform. For Steps 2–11, the first food reward was dispensed at the end of the designated food reward interval.

the food dispenser. Training was divided into five steps. In Step 1, canned dog food was placed on the target to lure the dog, and the target was placed far enough away so the dog had to stretch to touch it. Step 2 was identical to step 1, but there was no food lure. In step 3 the target was presented at a distance so the dog had to take two steps to reach it. In Step 4, the presentation distance was increased to four steps. In step 5, the trainer verbalized the cue word “target” prior to presenting the target.

2.1.7. Training

Once the dogs were able to target, the protocol for training began. It was divided into three stages: (1) down-stay for 1 min, (2) place (i.e. go to the platform and lie down), and (3) down-stay with distractions. A summary of the protocol is described below and a more detailed version has been published elsewhere (Yin, 2005).

2.1.7.1. Stage 1: Down-stay on a platform (see Video 1 in Supplementary Material). Stage 1 involved 11 shaping steps (Table 1) in which dogs were required to lie down and remain (stay) on a wooden platform 0.6 m long \times 0.9 m wide \times 8 cm high with a rug on top. The food-reward dispenser (hereafter referred to as the food dispenser) was located on the floor at the short end of the platform, so that the dog could consume food rewards while lying on the platform. Each trial lasted 1 min and when the dog remained lying down for five successive 1-min trials, the trainer proceeded to the next step. In the early steps, the trainer dispensed the food rewards frequently starting every 3 s for 1 min while the dog was in a down-stay. With each sequential step, the trainer increased the interval between food rewards until, at Step 11, the dog was required to remain in a down-stay for the entire 1-min period with the food reward dispensed at 1 min. Additionally during this process, the trainer’s distance from the dog increased so that by Step 11 the trainer was 1.5 m from the dog. Dogs were targeted off the platform between trials (see Video 1 in Supplementary Material).

An observer recorded the number of seconds the dog remained in its down-stay for each trial and counted each completed 1 min down-stay as a correct trial. If the dog stood before the end of a 1-min trial, the trial was recorded as incorrect, and the trainer gave a verbal cue for the dog to lie down, in which case a new 1-min trial was initiated.

2.1.7.2. Stage 2: Teaching “place” (see Video 2 in Supplementary Material). Stage 2 consisted of five shaping steps (Table 2). The dogs were trained to run 3 m to the platform and lie down. Upon lying down, a food reward was dispensed. In Steps 1–3 dogs ran directly onto the platform to get to the food dispenser. In Steps 4 and 5, the platform was rotated 45° to the left or to the right so that the dog had to orient itself correctly onto the platform prior to lying down (Fig. 2). When the dog was able to perform 9 out of 10 trials

Table 2

Five shaping steps to train a dog to “place” (go to and lie down on a platform)

| Shaping step | Description |
|--------------|--|
| 1 | The dog and trainer stood 3 m behind the platform with the food reward dispenser in front of the platform, such that the dog had to step onto the platform to reach the dispenser. While holding the dog’s collar, the trainer dispensed food into the dispenser. The trainer then verbally cued the dog by saying “place” and immediately released the dog, allowing it to run onto the platform and receive the food reward. Once the dog had consumed the food, the trainer verbally cued the dog to lie down by saying “down.” The trainer was allowed to repeat the cue “down” up to three times. Once the dog lay down, the trainer dispensed two or more food rewards at random intervals to reward the dog for remaining lying down. Rewards were given until the dog remained focused on the food dispenser for at least 2 s. If the dog ate the food reward, then laid down within three verbal cues without stepping off the platform while the trainer was 3 m away, this was recorded as a correct trial. |
| 2 | Step 1 was repeated, but the dog was required to lie down the first time the trainer gave the verbal cue “down.” The trial was marked correct if the dog laid down on the platform within 5 s of the cue being given. |
| 3 | As for Step 2, but the dog was given the verbal cue “place”, the trainer released the dog and once the dog stood on the platform, the trainer said “down.” A food reward was dispensed only after the dog laid down on the platform. |
| 4 | The platform was turned approximately 45° to the left, so that the dog had to reorient to step onto and lie down on the platform to receive its food reward (Fig. 2). The trial was marked correct if the dog ran to the food reward dispenser and laid down on the platform within 3 s after the first “down” cue. If the dog lay down on the floor instead of on the platform, the trial was marked incorrect and the trainer walked to the platform and positioned the dog onto the platform. |
| 5 | Step 4 was repeated, but the platform was angled 45° to the right. |

When the dog correctly performed 9 out of 10 trials in succession, it reached criterion for that step. [see [Video 2 in Supplementary Material](#)].

in succession correctly for each step, the trainer progressed to the next step, or stage of training. Again, an observer recorded each trial of each step as correct or incorrect.

2.1.7.3. Stage 3: Down-stay with distractions (see [Video 3 in Supplementary Material](#)). Stage 3 consisted of 18 shaping steps (Table 3) in which the trainer verbally cued the dog to “place” onto the platform from 3 m away, and then the dog remained in a down-stay with various distractions, including people walking, people talking, doorbell ringing, people knocking on the wall, and toys being bounced or squeaked. Each distraction was introduced in a separate step, and each trial lasted 1 min. When the dog remained in the down-stay during two, 1-min trials in succession, the trainer proceeded to the next step. In the final step of

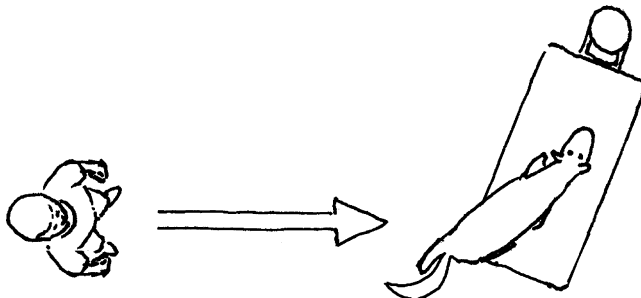


Fig. 2. In steps 4 and 5 of training a dog to go to and lie on a platform, the platform and food-reward dispenser were positioned at a 45° angle, so that dogs had to reorient and lie down on the platform to receive their food reward.

Table 3

Eighteen shaping steps used to train dogs to ignore distractions and remain in a down-stay for 1 min

| Step | Criteria | Number of successive correct trials needed to advance to next step |
|------|---|--|
| 1 | <i>Walking distraction</i> : Trainers walked within 3 m of the dog (randomly approaching and withdrawing) as the food reward was dispensed every 3 s. High intensity distractions (those causing the dog to orient toward the trainer or away from the food dispenser) were timed to occur while the dog was eating the dispensed food reward. The goal was to keep the intensity low enough so that the dog did not orient but to increase the intensity as rapidly as possible. Once the dog no longer oriented to the trainer, the trainer no longer needed to time them to occur as the dog was eating. | 5 |
| 2 | <i>Running distraction</i> : Same as Step 1, but the trainer ran around the dog as the food reward was dispensed. | 5 |
| 3 | <i>Talking distraction</i> : Same as Step 1, but the trainer talked loudly and occasionally shouted near the dog as the food reward was dispensed. | 5 |
| 4 | <i>Knocking distraction timed with food reward</i> : The trainer knocked on the walls and the door as the dog was eating the food reward and stopped once the dog finished eating the food reward. Food rewards were dispensed every 3 s. | 2 |
| 5 | <i>Knocking distraction (random)</i> : Same as Step 4, but knocking was no longer timed to occur as the dog was eating the food reward; rather, the trainer knocked randomly at least 20 times during each 1 min trial. | 2 |
| 6 | <i>Toy distraction (3 m from dog) timed with food reward</i> : The trainer bounced or squeaked a toy as the dog was eating the food reward and stopped once the dog finished eating the food reward. Food rewards were dispensed every 3 s. | 2 |
| 7 | <i>Toy distraction (3 m from the dog) presented at random</i> : Same as Step 6, but the distraction was no longer timed to occur as the dog was eating; rather, it occurred randomly at least 20 times during the 1-min trial. | 2 |
| 8 | <i>Toy distraction (1.5 m from dog) timed with the food reward</i> : Same as Step 6, but the trainer stood and bounced or squeaked the toy 1.5 m from the dog. | 2 |
| 9 | <i>Toy distraction (1.5 m from dog) presented randomly</i> : Same as Step 7, but the trainer stood and bounced or squeaked the toy 1.5 m from the dog. | 2 |
| 10 | <i>All distractions combined plus doorbell</i> : All of the above distractions were presented as the dog was eating the food reward. Food rewards were dispensed every 3 s. Each of the previously used distractions, plus a new distraction, doorbell ringing, was presented at least once during the session. | 2 |
| 11 | <i>All distractions combined</i> : Same as Step 10, but the interval between food rewards increased to every 5 s. The trainer presented the distractions as the dog was eating the food reward. Each stimulus occurred at least once during the session. | 2 |
| 12 | Step 11 was repeated, but food rewards were dispensed every 7 s, and distractions were no longer timed to occur as the dog was eating the food reward; rather, they were presented randomly. | 2 |
| 13 | Repeated Step 12, but the food reward was dispensed every 10 s. | 2 |
| 14 | Repeated Step 13, but the food reward was dispensed every 15 s. | 2 |
| 15 | Repeated Step 14, but the food reward was dispensed every 20 s. | 2 |
| 16 | Repeated Step 15, but the food reward was dispensed at 30 s and 1 min. | 2 |
| 17 | Repeated Step 16, but the food reward was dispensed at 45 s and 1 min. | 2 |
| 18 | Repeated Step 17, but the food reward was dispensed at 1 min. | 2 |

Dogs were rewarded with food via a remote-controlled food dispenser operated by the trainer if they remained in a down-stay position on the platform. Distractions occurred approximately 3 m from the dog unless otherwise noted.

this stage of training, all distractions were presented, but food rewards were presented only at 1-min. When the dog performed this step correctly on three consecutive trials, training was considered complete.

2.1.7.4. Automatic sit training at home by owners. Starting on Day 3 we required that for the rest of the experiment, owners pet their dogs only when the dogs were sitting or lying down. This exercise was instituted because during routine handling of dogs outside the experimental training sessions, owners were observed to be inadvertently rewarding behaviors that the experimenters were trying to eliminate, such as jumping and running around while greeting people. This reinforcement could have confounded the experimental results, leading to increased training time. Prior to training this exercise, two dogs (the Labrador mix and the Australian shepherd) could only have short training sessions of 1–10 min because they were more interested in soliciting play with the trainers than obtaining a food reward. Afterwards, they were more motivated to work for their food, and their training sessions lasted up to 25 min.

2.1.8. Final testing, measurements and data analysis

Once all dogs had completed training, they were tested on a separate day by a different trainer or the dog's owner, to determine whether the behavior would generalize to a different handler, including to an owner with whom the dog had a history of misbehavior. In cases where a trainer was used, the trainer had not trained the dog previously and had not already trained a dog through both the placing and distractions stages of training. Because changes in phonetics of a verbal command and in features of non-verbal command delivery occur between individual trainers and have been shown to lead to deterioration in performance by dogs (Fukuzawa et al., 2005a,b), trainers and owners practiced with the dogs prior to testing to establish a training relationship with the dog. Practice sessions also allowed trainers and owners to learn to perform the techniques correctly. Final testing was analogous to the pre-training down-stay test, except that all distractions were presented at least one time during each testing trial. Each dog had three testing trials each lasting 1 min, with dogs receiving the food reward at 1 min. An observer recorded the time dogs spent in their down-stay. Results were compared to the pre-training down-stay measurement durations using a Fisher's sign test.

2.2. Results

Comparison of average time spent in a down-stay with distractions over 1 min before and after training revealed significant improvement (sign test; $n = 6$, $X = 0$, $P = 0.016$). Prior to training, dogs remained in a down-stay for 5 ± 1.81 s (mean \pm S.D.). After training, all dogs remained in a down-stay with distractions for the entire 1 min trial (60.0 ± 0.00 s). The dogs completed the protocol stages in a similar number of trials (211.3 ± 22.5) with a coefficient of variation of 10.6%. Analysis of the number of correct and incorrect trials revealed that dogs performed the exercise correctly in $91.6\% \pm 4.35\%$ of trials. The percentage of correct trials improved with each stage of training (down-stay stage: $88.3 \pm 6.68\%$; "place" stage: $89.9\% \pm 5.02\%$; down-stay with distractions stage: $96.5\% \pm 3.13\%$).

2.3. Discussion

These results indicated that dogs could be trained using a remote-controlled food-reward dispenser and a detailed multi-step protocol to "place" and remain lying down in the presence of common distractions associated with visitors arriving at the door and that this training could be generalized to other handlers. The recognition that owners reinforced behaviors that the protocol sought to eliminate suggested that the automatic sit might be an important aspect if the protocol was to be tested in a home situation.

One purpose of this study was to establish a protocol that owners could complete in a clinical setting. While shaping and positive-reinforcement procedures have been used in laboratory studies with dogs (Milgram et al., 1999; Mills and Ledger, 2001), typically a high number of trials are needed to reach criterion for each step. For instance, a median of 50 trials were required for a single step in a three-step training procedure (Mills and Ledger, 2001) and up to 400 trials were required to reach criterion in a one-step training procedure (Milgram et al., 1999). In our experiment we chose a high number of steps (34) where each subsequent step was only slightly more difficult than the previous one so that dog would make few mistakes and consequently a relatively low number of trials would be required to complete each step and to complete the overall protocol. As suspected, dogs did make few errors, with over 90% of the trials performed correctly. They also all completed the protocol in a relatively low number of trials and with low variation between dogs in number of trials to reach completion. Studies on learning in humans have shown that when behaviors are reinforced frequently the person being rewarded is more likely to continue engaging in the learning task (Wehby and Hollahan, 2000). Consequently this protocol, with its high rate of correct trials, should result in trainers willing to work through the entire protocol and dogs that are motivated to perform the learning tasks. Overall, though this study involved only six dogs, the success of the dogs as shown by improvement in all dogs and the high rate of correct trials indicates that this protocol is appropriate for use by owners in the home setting.

3. Experiment 2: Clinical trial

3.1. Materials and methods

3.1.1. Overview

Dogs in this study went through a pre-training videotaped evaluation, were trained through the protocol, and then went through a post-training videotaped evaluation. Owners rated their dog's behavior both before and after training.

3.1.2. Criteria for case selection

Dogs for this study were obtained from veterinary students at the University of California, Davis, USA, past participants of local dog-training classes and clients from a behavior consulting practice. All owners were novices at training (i.e. none had successfully trained a dog to reliably or consistently come when called, perform a down-stay, or walk on a loose leash without pulling). Dogs were considered as subjects if their owners met the following criteria: (i) they attended the orientation meeting, (ii) they completed the clinical consent form and pre-study questionnaire, (iii) they agreed to spend 20–40 min/d training their dogs, and (iv) they were willing to follow the protocol, including feeding instructions and ancillary exercises. The pre-study questionnaire asked for information on the number of dogs in the household, the dog's diet and perceived motivation for kibble, and the severity of the dog's problem behaviors at the door. Owners rated their dog's behavior at the door on a scale of 1 to 5, with 1 representing "not annoying" and 5 representing "extremely annoying." Only dogs rated 4 or 5 and that were currently on a dry dog food diet were considered. Final selection into the study was based on evaluation by two observers, of videotape of the dogs' behaviors when visitors came to the door.

3.1.3. Pre-training evaluation and final selection

Each owner videotaped three 1-min guest visits. They set up digital camcorders in their homes, and visitors knocked on the door or rang the doorbell. Owners spoke to the visitor for 30 s while the visitor was outside, then invited the visitor inside the house and continued videotaping for another 30 s. Owners were instructed to avoid speaking to their dog or correcting their dog's behavior.

Table 4

Breed, age, and sex of dogs that underwent the training protocol and number of dogs in the household present during the pre-training and post-training videotaped evaluations of behavior

| ID | Breed | Age (years) | Sex | Number of dogs in household during evaluations ^a |
|----|-------------------------------|-------------|----------------|---|
| 1 | Australian catterdog/terrier | 8 | Female spayed | 2 |
| 2 | Labrador retriever | 9 | Male castrated | 1 |
| 3 | Beagle/Welsh corgi | 6.5 | Female spayed | 2 |
| 4 | Papillon mix | 7 | Male castrated | 1 |
| 5 | Pit bull/mastiff | 2 | Male castrated | 1 |
| 6 | German shepherd mix | 5 | Female spayed | 1 |
| 7 | Labrador/terrier | 3.5 | Female spayed | 1 |
| 8 | Basenji/Rhodesian ridgeback | 3.5 | Female spayed | 1 |
| 9 | Rottweiler | 1.5 | Female spayed | 2 |
| 10 | Great Dane | 1 | Male castrated | 1 |
| 11 | Labrador retriever mix | 7.5 | Female spayed | 1 |
| 12 | Boston terrier/Cocker spaniel | 3.5 | Male castrated | 1 |
| 13 | Sharpei mix | 4.5 | Male castrated | 3 |
| 14 | Labrador mix | 7 | Male castrated | 1 |
| 15 | Chihuahua/terrier | 1.5 | Male castrated | 2 |

^a A total of six households had multiple dogs, but only five elected to evaluate with multiple dogs present.

From these tapes, one observer measured, for each dog, the number of barks per min, the number of times the dog jumped on people per min, the percentage of time the dog was within 0.3 m of the door when the visitor was outside, and the percentage of time the dog spent in physical contact with the visitor when the visitor was inside. A second observer rated the behavior on a 5-point scale, with 1 representing “very well-behaved, calm/in control” and 5 representing “very unruly, excited/out of control.” Only dogs that rated 4 or 5 on this scale and that spent an average of 50% or more of the 1-min period within 0.3 m of the door, or in physical contact with the person were admitted into the study. Fifteen dogs of various breeds, ranging from 1 to 9 years of age, were included in the study (Table 4). Six dogs lived in multi-dog households and five were evaluated with one or more household dogs present during videotaped guest visits, and 10 were tested with no other dogs present.

3.1.4. Equipment/instructional materials

Owners were provided with the prototype remote-controlled food reward dispenser and target that were used in Experiment 1, a hand-held stopwatch for timing down-stay trials and reward intervals, a detailed instruction manual, and a computer disk containing 15 short instructional videos. The primary researcher and a research assistant visited each owner weekly to assess progress, clarify instructions, ensure the protocol was being followed, and correct technique errors.

3.1.5. Overview of the training procedure (see Video 4 in Supplementary Material)

Owners were instructed to train their dogs in multiple sessions totaling 20–40 min/d, preferably around the dog’s normal mealtimes. As with protocols recommended by veterinary behaviorists and applied animal behaviorists (Voith, 1982; Landsberg et al., 1997; Overall, 1997), we instructed owners that their dogs should earn all food through the training process, rather than receiving food in their food bowls. Dogs received primarily kibble as the food reward, but semi-moist or dry dog treats were also used. Owners were instructed to decrease the total daily food allotment if the dog did not appear hungry and to stop sessions if the dog started hesitating taking the dispensed food (indicating satiation) or if the speed at which it performed the behavior being trained was slowing down (indicating fatigue). A more detailed description of this protocol can be found in Yin (2005).

3.1.5.1. Stage 1: Training the conditioned reinforcer (tone = food reward). This stage of training was identical to Section 2.1.6.1 in Experiment 1. Dogs learned to associate the tone emitted by the dispenser with dispensing of the food reward. Throughout the rest of the study, the tone was used as a conditioned reinforcer to alert the dog when a correct behavior had been performed and that a food reward would be dispensed.

3.1.5.2. Stage 2: Touching a target with the nose. This Stage was identical to Section 2.1.6.2 in Experiment 1. Dogs learned to walk 4 steps to touch a target with their nose. The criterion for advancement for each step was that the dog responded correctly within 2 s of visual presentation of the target (or verbal cue in Step 5) 9 out of 10 times in succession.

3.1.5.3. Stage 3: Down-stay on a rug. Stage 3 was identical to the down-stay portion of training from Experiment 1 (Table 1), with the exception that the dog should lie on a rug or dog bed, as most owners were unlikely to have a platform. The rug or dog bed could be located anywhere in the house.

3.1.5.4. Stage 4: Teaching “place”. In this five-step stage, the owner placed the rug in its final location near the front door, with the food reward dispenser at the end of the rug/bed such that the dog could lie down and eat out of the dispenser while facing the door. This Stage was modified from the “placing” portion of Experiment 1. In Step 1, the owner targeted the dog one or more times in succession and then walked to the rug/bed with the dog and verbally cued the dog to lie down by saying “down.” Once the dog lay down on the rug/bed, the owner dispensed two or more food rewards at random intervals to reward the dog for remaining lying down. Rewards were given until the dog remained focused on the food dispenser for at least 2 s. Step 2 was the same as Step 1, but dogs were required to lie down the first time the owner gave the verbal cue “down.” In Step 3, the dog and owner stood 3 m from the rug and food reward dispenser. A reward was dispensed to attract the dog’s attention while the owner restrained the dog by holding the collar. The owner verbally cued the dog by saying “place” and immediately released the dog’s collar. Once the dog reached the rug/bed and ate the dispensed reward, the owner verbally cued the dog up to three times to lie down by saying “down.” Once the dog lay down, the owner dispensed two or more food rewards at random intervals until the dog remained focused on the food dispenser for at least 2 s. Step 4 was similar to Step 3, but the food reward was not dispensed prior to releasing the dog to allow it to “place.” Instead, the dog was given the verbal cue “place,” and a food reward dispensed only after it lay on the rug. Step 5 was a repeat of Step 4, with the exception that the dog and owner started from different locations relative to the rug/bed. When the dogs correctly completed each trial of each step 9 out of 10 times in succession, they proceeded to Stage 5 of the training program.

3.1.5.5. Stage 5: Down-stay with distractions. This stage of training was identical to the “down-stay with distractions” stage of Experiment 1 (Table 3), with the exception that the dogs lay down on a rug/bed near the door. Additionally, during this stage and stage 6, other household pets could be in the same room while the dog was being trained.

3.1.5.6. Stage 6: Down-stay with visitors coming to the door and entering the house. In this stage, owners enlisted help from their neighbors or from a pool of 18 volunteers and were encouraged to practice with three or more visitors per day. When visitors arrived, the owner “placed” the dog and began providing food rewards from the food dispenser every 3 s. After 30 s, the visitor came inside the house for 30 s. The visitor then left but could revisit and repeat the trial some minutes later. During visits, owners kept their dogs on this high rate of reinforcement until the dogs remained relaxed and focused on the food dispenser and remained in a down-stay. The owners gradually decreased the reinforcement rate with each visit whilst maintaining the down-stay. Owners were encouraged to decrease the reinforcement rate to one food reward/min; however, owners were not professional trainers and could only reasonably be expected to train to the level they considered adequate, as judged from their dog’s behavior. We allowed owners to perform post-training videotaping of guest visits when they felt their dog was adequately trained.

3.1.5.7. Automatic sit for non-food rewards. Because we found that owners in the laboratory study rewarded behaviors that the protocol sought to eliminate, we felt that the automatic sit (Section 2.1.7.4) might be important for dogs in this experiment. All dogs were required to automatically sit to go outside, play fetch, be petted, or receive other attention from humans if they were inconsistently motivated to focus on training exercises, were sometimes more motivated by toys, praise or petting than by food from the dispenser, or if they sometimes got up during Stage 6 when the visitor came to the door. This exercise was derived from the *Nothing in Life is Free/Learn to Earn* protocol (Voith, 1982; Landsberg et al., 1997; Overall, 1997; Yin, 2004). The purpose was to teach the dogs that they were rewarded for sitting and maintaining eye contact with the owner. Sitting before going out the door was particularly important. If the dog stood before the owner gave the verbal cue to go out the door, the owner applied negative punishment (removal of something desired to decrease the undesirable behavior) by closing the door or physically blocking the dog from going out the door. Once the dog sat, the owner immediately unblocked access to the door. Once the dog had learned to sit before the owner would allow it to go through the doorway, this exercise could be applied to Stage 6 of training; if the dog got off of its rug/bed prematurely to go to the door, owners blocked access to the door or visitor until the dog returned to a down-stay on its rug. After the dog returned to the rug, the owner could dispense food rewards to reinforce staying on the rug in the presence of the visitor.

3.1.6. Post-training measurements and data analysis

Once owners completed the protocol, they videotaped three successive visitor visits within 1 to 7 d. Dogs from multi-dog households that had performed the pre-training videos in the presence of the other household dog also performed the post-training test with the other dog present. Measurements and procedures were the same as those used in pre-testing (see Section 3.1.3). Measurements began when the dog was given the cue to place. We also measured the latency to place after the command was given, the percentage of time dogs remained on their rug/bed once they had placed, and the percentage of time they remained in a down-stay on the rug/bed once they were placed. We used these additional data as measures of the strength and consistency of the trained behavior. Because the results did not follow a normal distribution, pre- and post-training measurements were compared using the Wilcoxon signed-rank test.

In addition to videotaping, we followed the testing with an e-mail questionnaire that asked the owners to rate their dog's behavior at the door as they had in the pre-study questionnaire. Owners rated their dog's behavior on a scale of 1 to 5, with 1 representing "not annoying" and 5 representing "extremely annoying." The post-training and pre-training owner evaluations were compared using the Wilcoxon signed-rank test. Owners of multiple dogs also rated the behavior of dogs that did not receive training. A Wilcoxon signed-rank test was used to compare the perceived improvement of the trained dogs with that of dogs in the same household that were not trained through the protocol.

3.2. Results (see Video 5 in Supplementary Material)

All 15 dogs completed the training protocol within 2 weeks to 4 months. This time period included breaks for owner personal reasons, such as vacations, work or school schedules. Three owners completed training in less than 3 weeks. The remaining 12 took between 4 and 16 weeks. Thirteen of 15 owners had to institute the "automatic sit" exercise to complete the experiment.

The Wilcoxon signed-rank test revealed that, compared to pre-training, the test dogs barked significantly less ($n = 15$, $W = 0$, $P = 0.0005$), jumped significantly less ($n = 15$, $W = 0$, $P = 0.0001$), crowded the door significantly less when visitors were outside ($n = 15$, $W = 0$, $P < 0.0001$), and spent significantly less time in contact with visitors once the guests entered the house ($n = 15$, $W = 0$, $P < 0.0001$) (Table 5). All averages for these behaviors went from a high level before training to a near zero level after. The decline in inappropriate behavior was attributable to dogs performing the alternative behavior of placing. Once given the cue to place,

Table 5
Measurements of dogs' behaviors during visits to the house before and after training ($n = 15$)

| Parameter | Mean (\pm standard error) | | Range | |
|---|------------------------------|------------------------------|-----------------|----------------|
| | Before Training | After Training | Before Training | After Training |
| Barks/min | 19.3 \pm 4.62 | 2.10 \pm 0.79 ^a | 0–51.3 | 0–8.4 |
| Jumps/min | 8.2 \pm 2.12 | 0.02 \pm 0.02 ^b | 0–27.5 | 0–0.3 |
| % Time within 0.3 m of the door when visitor was outside | 84.5 \pm 4.23 | 0.0 \pm 0.00 ^c | 35.9–100 | 0 |
| % Time in contact with the visitor when visitor was inside | 69.2 \pm 4.19 | 0.18 \pm 0.13 ^c | 35.2–91.8 | 0–1.7 |
| Latency to arrive on rug after "place" cue given (s) | N.A. | 2.1 \pm 0.62 | N.A. | 0–8.1 |
| Latency to lie down on rug after "place" cue given (s) | N.A. | 3.3 \pm 0.59 | N.A. | 0–7.9 |
| % Time on the rug/bed | N.A. | 99.7 \pm 0.15 | N.A. | 98.3–100 |
| % Time lying down on the rug/bed | N.A. | 99.0 \pm 0.49 | N.A. | 94.8–100 |
| Number of food rewards given during the 1 min posttraining test | N.A. | 7.8 \pm 1.70 | N.A. | 1.3–24.3 |

N.A., not applicable.

^a $P < 0.005$.

^b $P = 0.0001$.

^c $P < 0.0001$.

dogs took, on average, 2.1 ± 0.62 s to place, and once placed, they spent, on average, 99.8% of their time on their rug during a 1-min guest visit. When on the rug, dogs spent most of their time lying down, with only three dogs moving into a sit position on the rug/bed one time each (defined as both front elbows raised off the floor). In all cases where the dogs sat up, they lay down within 3 s. Three dogs stepped off the rug one time each. Their owners blocked their access to the door by standing between the door and the visitor, and the dogs immediately returned to their rugs and lay down. During the post-training videotaping, owners gave an average of 7.8 food rewards/min.

All owners rated their dogs' behaviors at the door to be significantly better than before training (Wilcoxon signed-rank test: $n = 15$, $W = 0$, $P < 0.0001$); on average, 4.53 ± 0.52 before training and 1.4 ± 0.5 after training on a 5-point scale. For the six owners with other household dogs that showed problem behaviors at the door, but were not trained, two rated their dogs as somewhat improved, and four as showing no improvement (4.21 ± 0.57 before training and 3.93 ± 0.73 after training; Wilcoxon signed-rank; $n = 6$, $W = 0$, $P = 0.344$). All owners rated the trained dogs to be more improved than the non-trained dogs in their household (Wilcoxon signed-rank; $n = 6$, $W = 0$, $P = 0.031$). Trained dogs improved by 3.17 ± 0.76 rating point; untrained dogs improved by only 0.33 ± 0.52 rating points.

3.3. Discussion

This is the first scientific study to test the use of a remote-controlled, positive-reinforcement, dog-training system in a clinical setting and the first to evaluate a standardized counter-conditioning regimen for modifying problem behaviors exhibited by dogs when visitors arrive at the house. Results indicate that owners can carry out a detailed multi-step protocol and successfully decrease their dog's jumping, barking, and crowding of the door when visitors come. Not only did all dogs complete the training protocol, but each dog improved significantly in all

categories measured, including those in multi-dog households where the other dogs also exhibited problem behaviors at the door.

The process of training in the home took much longer to complete than the 8-d training time achieved in the laboratory setting (Experiment 1). One likely reason was that the laboratory-based study was carried out by dog trainers, whereas owners in the clinical trial were novices at training. Owners also took multiple days off from training for personal reasons, and owners sometimes failed to follow instructions carefully and consequently had to repeat steps.

Weekly home visits by trainers significantly improved training performance and led to the discovery of two key factors that contributed to owner compliance in following instructions. First, owners failed to follow instructions if they did not understand the importance of the instructions. Once the owner learned the importance of a step and the consequences of skipping a step, they followed the instructions. Second, owners failed to follow instructions if they did not recognize that they were performing the techniques incorrectly. Once they saw a visual demonstration of the errors they were making and the proper technique, they were better able to perform the technique and the dog was able to perform the behavior correctly.

Another major reason for delay of protocol completion in Experiment 2 was that the automatic sit exercise was essential for 13 of 15 dogs to finish training and owners did not institute this protocol until late in training. These dogs could perform the down-stay with distractions, but would not always remain placed and in a down-stay when a visitor came to the door. These dogs had to learn that their access to the door would be blocked if they got up. Thus, positive-reinforcement alone was not sufficient for the training; removal of the reward for the incorrect behavior was also important. Though food is a strong reinforcer for dogs, they are also motivated to obtain other types of reinforcers, and the intensity of these reinforcers can change based on context (Domjan, 2003). These 13 dogs had to be trained that the competing reward (i.e. access to attention from people at the door) would be removed if they got up from their rug spontaneously. Despite owner errors such as skipping steps, performing the techniques incorrectly, or failing to institute the automatic sit at the door, correction of these errors led to immediate improvement in the dog's performance. These incidental findings indicated that instructional materials should show owners the consequences of skipping training steps or performing them incorrectly.

4. Conclusion

The training protocol utilized in the present studies can be successfully employed by both trainers in a controlled laboratory setting and owners in a home setting to train dogs with problem behaviors, such as barking, jumping, or crowding the door when visitors arrive. When used appropriately, the protocol teaches the dog the more acceptable behavior of calmly lying down on a rug or bed away from the door when visitors arrive. Instructional materials need to be designed to ensure that owners can perform each of the steps correctly and are motivated to perform all steps in succession without skipping steps.

Acknowledgements

We would like to thank Danny Mills, Ed Price, and Katherine Houpt for their invaluable help. We are also grateful to the dog owners and volunteers who participated in this study and to The Sharper Image for providing the research grant.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at [doi:10.1016/j.applanim.2007.11.001](https://doi.org/10.1016/j.applanim.2007.11.001).

References

- Adams, G.J., Clark, W.T., 1989. The prevalence of behavioural problems in domestic dogs; a survey of 105 dog owners. *Aust. Vet. Pract.* 19, 135–137.
- Campbell, W.E., 1986. The prevalence of behavioral problems in American dogs. *Mod. Vet. Pract.* 67, 28–31.
- Domjan, M., 2003. *The Principles of Learning and Behavior*, fifth ed. Thomson/Wadsworth, Belmont, CA, pp. 98–100, 305.
- Ferguson, D.L., Rosales-Ruiz, J., 2001. Loading the problem loader: the effects of target training and shaping on trailer-loading behavior in horses. *J. Appl. Behav. Anal.* 34, 409–423.
- Fukuzawa, M., Mills, D.S., Cooper, J.J., 2005a. The effect of human command phonetic characteristics on auditory cognition in dogs (*Canis familiaris*). *J. Comp. Psychol.* 119, 117–120.
- Fukuzawa, M., Mills, D.S., Cooper, J.J., 2005b. More than just a word: non-semantic command variables affect obedience in the domestic dog (*Canis familiaris*). *Appl. Anim. Behav. Sci.* 91, 129–141.
- Galbicka, G., 1994. Shaping in the 21st century: moving percentile schedules into applied settings. *J. Appl. Behav. Anal.* 27, 739–760.
- Johnston, J.M., Pennypacker, H.S., 1993. *Strategies and Tactics of Behavioral Research*. Lawrence Erlbaum, Hillsdale, NJ, p. 112.
- Kobelt, A.J., Hemsworth, P.H., Barnett, J.L., Coleman, G.J., 2003. A survey of dog ownership in suburban Australia: conditions and behaviour problems. *Appl. Anim. Behav. Sci.* 82, 137–148.
- Koehler, W.R., 1996. *The Koehler Method of Dog Training*. Howell Book House, New York, pp. 167–178.
- Landsberg, G.M., Hunthausen, W.L., Ackerman, L.J., 1997. *Handbook of Behaviour Problems of the Dog and Cat*. Butterworth-Heinemann, Oxford, pp. 34–35, 40.
- Lindsay, S.R., 2000. *Handbook of Applied Dog Behavior and Training*, vol. 1. Iowa State University Press, Ames, IA, pp. 201–287.
- Milgram, N.W., Adams, B., Callahan, H., Head, E., MacKay, B., Thirlwell, C., Cotman, C.W., 1999. Landmark discrimination learning in the dog. *Learn. Mem.* 6, 54–61.
- Millan, C., 2004. Sueki and Coach. *The Dog Whisperer*, vol. 1(6) [DVD]. National Geographic.
- Miller, P., 2001. *The Power of Positive Dog Training*. Howell Book House, New York, pp. 104–105.
- Mills, D., Ledger, R., 2001. The effects of oral selegiline hydrochloride on learning and training in the dog: a psychobiological interpretation. *Prog. Neuropsychopharmacol. Biol. Psychiatry* 25, 1597–1613.
- Moffat, K.S., Landsberg, G.M., Beaudet, R., 2003. Effectiveness and comparison of citronella and scentless spray bark collars for the control of barking in a veterinary hospital setting. *J. Am. Anim. Hosp. Assoc.* 39, 343–348.
- Overall, K.L., 1997. *Clinical Behavioral Medicine for Small Animals*. Mosby, St. Louis, pp. 277, 410–412.
- Pear, J.J., Legris, J.A., 1987. Shaping by automated tracking of an arbitrary operant response. *J. Exp. Anal. Behav.* 47, 241–247.
- PETCO, 2004. *Basic Canine Education Care Sheet: Jumping and Barking* (pamphlet). PETCO Animal Supplies, Inc., San Diego.
- Peterson, G.B., 2004. A day of great illumination: B.F. Skinner's discovery of shaping. *J. Exp. Anal. Behav.* 82, 317–328.
- Salman, M.D., New Jr., J.G., Scarlett, J.M., Kass, P.H., Ruch-Gallie, R., Hetts, S., 1998. Human and animal factors related to the relinquishment of dogs and cats in 12 selected animal shelters in the United States. *J. Appl. Anim. Welfare Sci.* 1, 207–226.
- Skinner, B.F., 1972. Some relations between behavior modification and basic research. In: Bijou, S.W., Ribes-Inesta, E. (Eds.), *Behavior Modification: Issues and Extensions*. Academic Press, New York, pp. 1–6.
- Vacalopoulos, A., Anderson, R.K., 1993. Canine behavior problems reported by clients in a study of veterinary hospitals. *Appl. Anim. Behav. Sci.* 37, 84 (Abstract).
- Voith, V.L., 1982. Treatment of dominance aggression of dogs towards people. *Mod. Vet. Pract.* 63, 149–152.
- Wehby, J.H., Hollahan, M.S., 2000. Effects of high probability requests on the latency to initiate academic tasks. *J. Appl. Behav. Anal.* 33, 259–262.

- Wells, D.L., 2001. The effectiveness of a citronella spray collar in reducing certain forms of barking in dogs. *Appl. Anim. Behav. Sci.* 73, 299–309.
- Wells, D.L., Hepper, P.G., 2000. Prevalence of behaviour problems reported by owners of dogs purchased from an animal rescue shelter. *Appl. Anim. Behav. Sci.* 69, 55–65.
- Yin, S.A., 2004. *How to Behave So Your Dog Behaves*. TFH Publications, Neptune City, NJ, pp. 57–60, 101–103, 161–163.
- Yin, S., 2005. *The Treat and Train Professional Dog Training System* [instruction manual]. The Sharper Image, San Francisco, CA, <http://www.behavior4veterinarians.com/pdf/SI398Manual.pdf> (accessed on June 25, 2007).