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An Evaluation of Respondent Conditioning Procedures to Decrease Barking in an Animal Shelter

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Abstract

A common problem behavior in animal shelters is excessive noise from barking, which can regularly exceed 100dBs. Noise levels in animal shelters are correlated with increased stress in dogs, which may lead to increased problem behavior and a decrease in adoption. The purpose of the current study was to evaluate the use of respondent conditioning procedures to reduce barking noise level in an animal shelter by pairing a door chime with edible items. Following a baseline and neutral stimulus phase, the door chime was paired with edible items over a period of three weeks. Following this pairing phase, the pairing was stopped to determine if the door chime would act as a conditioned stimulus and reduce barking. These procedures were replicated following an additional baseline phase. Overall, the procedure was effective in reducing the noise level of the kennel area as compared to baseline levels. Implications and future research areas are discussed.

HIGHLIGHTS

- Many animals relinquished to shelters are relinquished due to problem behavior.
- A common problem behavior in dog shelters is barking.
- Researchers tested the effectiveness of a simple respondent conditioning procedure in order to reduce the noise level of barking in a dog shelter.
- The overall noise levels in the shelter decreased as a result of intervention.
- Reduction in noise may increase time adopters spend in dog area and increase adoptions.

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1. INTRODUCTION

Approximately 7.6 million animals are residing in animal shelters in the United States at any given time (American Society for the Protection and Care of Animals, 2016). In addition, approximately 25% of animals relinquished to animal shelters are relinquished due to engaging in some form of problem behavior (Kwan & Bain, 2013; Salman et al., 1998). Lepper, Kass, and Hart (2002) found that dogs relinquished to animal shelters due to behavior problems were less likely to be adopted than animals relinquished for non-behavioral reasons. Therefore, it may be important to reduce the problem behavior of animals in shelters, which could lead to increased adoption rates.

One relatively common problem behavior in animal shelters is excessive barking. Sales et al. (1997) found that the noise level in dog kennels in animal shelters regularly reaches over 100 decibels (dBs), mainly due to excessive barking. Hearing damage in humans can occur at noise levels of 85 dBs or greater, which is well below the levels commonly seen at animal shelters (National Institute on Deafness and Other Communication Disorders, 2016). In addition, excessive noise can cause both psychological and physical stress on subjects in animal shelter. (Coppola, Enns, & Grandin, 2006). Due to this increased stress, it is possible that animals may engage in higher levels of problem behavior (Dreschel & Granger, 2005), which may decrease their chances of adoption.

Despite excessive barking being a relatively common problem at animal shelters, little research has been conducted to attempt to reduce excessive noise in kennel areas. Several studies have shown that playing different genres of music (e.g., classical, reggae, and soft rock) in animal shelters can reduce the amount of barking in the short term (e.g., Bowman Kogan, Schoenfeld-Tacher, & Simon, 2012; Wells, Graham, & Hepper , 2000). However, Bowman et al. (2015) found that habituation to classical music occurred rapidly, and the behavioral effects did not maintain.

Others have suggested redesigning shelters and shelter policies to reduce problem barking. Coppola et al. (2006) suggested redesigning shelter environments, including using soundproofing materials, in order to reduce the overall noise. In addition, Hewison et al. (2014) demonstrated that by restricting access to the dog kennel area to one adopter at a time with staff supervision, noise was substantially reduced. However, it should be noted that many animal shelters depend on public funding or donations, and may not have the financial resources to redesign their kennel areas or the staff necessary to restrict access to the kennel area. Therefore, solutions that require fewer monetary and staff resources may be more beneficial to animal shelters.

Protopopova and Wynne (2015) conducted a study to increase appropriate behavior that was correlated with adoption in the kennel area of an animal shelter. Across two experiments, the authors assessed the effects of a response-dependent reinforcement procedure (Differential Reinforcement of Other Behavior [DRO]) and a response-independent procedure (Noncontingent Reinforcement [NCR]). In the DRO condition, experimenters would stand at the front of the kennel and wait for the dog to stop engaging in problem behavior (including barking). The experimenter would then deliver an edible item to the dog. In the NCR condition, the experimenter would stand at the front of the kennel and deliver an edible item, regardless of the dog's behavior. The authors found that both procedures were equally effective in reducing problem behavior. The authors suggested that NCR might be a good method for decreasing problem behavior, because it requires no special training in behavioral observation. The authors also suggested that the effects of the NCR procedure might be due to respondent conditioning, and that the pairing of the edible item with the approaching experimenter may have elicited responding that was incompatible with problem behavior. It is possible that pairing the edible item with another stimulus, such as a door chime, could alleviate the need for an additional person, especially given the potential staffing issues in animal shelters.

The purpose of the current study was to extend the results of Protopopova and Wynne (2015) by explicitly conditioning a previously neutral stimulus (a door chime) with the delivery of edible items (unconditioned stimulus) to determine if the door chime would elicit reduced levels of barking in an animal shelter following the conditioning procedure.

2. METHODS

Subjects

Subjects were 50 dogs (*Canis lupus familiaris*) of various breeds and ages (range: 6 months to 12 years), including mixed breeds. The mean length of stay in the shelter for dogs in the study was 6 months (range: 2 weeks to 5 years). All dogs in the shelter were spayed/neutered. Throughout the course of the study, several dogs were adopted and/or introduced to the animal shelter, but the global population remained stable. No steps were taken to control for a stable population throughout the study, as we did not want to prevent the adoption or intake of any shelter dogs.

Additionally, most animal shelters have regular intakes/adoptions, and thus the results of the current study would have more generality to other shelters where this is commonplace.

Setting

All sessions took place in the kennel area of a local no-kill animal shelter in Fresno, California. The kennel area contained 26 1m x 4m kennels with access to an outdoor kennel area of the same size. Dogs could move freely between the outdoor area and indoor area throughout the observation times in the study. The kennels had opaque concrete walls on two sides, and chain-link doors at either end. Dogs were housed between one to four dogs per kennel depending on size and temperament, although a majority of the dogs were housed alone. Kennels were situated in such a way that dogs could see other dogs in the kennel across from them. Kennels contained either raised-platform beds or soft beds. No enrichment items were provided to the dogs per shelter policy. Kennels were cleaned twice daily prior to the shelter opening (8:00AM-10:00AM) and after the shelter closed to the public (6:00PM-8:00PM). Dogs were fed once per day following the closure of the shelter to the public. The kennel area had three doors, one of which could be entered by the general public and two that were restricted to shelter staff and volunteers.

Response Definition and Measurement

The dependent variable in the study was the noise level due to barking. Barking was measured in decibels (dBs) continuously on a second-by-second basis using a Wensn® Digital Sound Level Meter (item number WS1361C; manufactured in the U.S.A.) with a range of 30dB to 130dB. For all sessions, the sound level meter was placed in an unobtrusive location near the center of the kennel area. The sound level meter saved data to a PC based computer program.

Equipment

Throughout the study, a Wensn® Digital Sound Level Meter (described above) was used to record the sound level in the kennel area. Additionally, three SABRE® digital door chimes (Item number HS-DWA2; manufactured in China) were used in the Neutral Stimulus, Pairing Procedure, and Post-Pairing conditions. The door chimes consisted of two parts, a sensor and receiver. The sensor was attached to the door and the receiver was attached to the doorframe on all of the entrances to the kennel area. When the door was opened, the sensor and receiver were separated and the door chime emitted a 120 dB tone for 0.5 s.

Procedures

All sessions began when the sound level meter was activated and lasted for 5 minutes. Following the activation of the sound level meter, the experimenter left the kennel and did not return until the end of the session. Sessions were conducted at varying times per day during the operating hours of the animal shelter when the shelter was open to the public (10:00am-4:30pm), with one to three sessions per day, three to five days per week. Care was taken to ensure that no single time period was favored in the recording. An ABCAC (A: Basline; B: Neutral Stimulus; C: Post-Pairing) reversal design was used for experimental control.

Baseline. During baseline, no programmed stimuli were in place in the kennel area. Sound levels were recorded for the duration of the sessions.

Neutral Stimulus (NS). During the neutral stimulus condition, a digital door chime was placed on all three access points into the kennel area such that the door would chime when any door was opened. There was no programmed pairing of this stimulus with any other stimulus under the control of the experimenter.

Pairing Procedure. Following the NS condition, the pairing procedure began. During this procedure, the experimenter walked to the front of each kennel. The experimenter activated the digital door chime and provided an edible treat (which varied based on the treats available from donations to the shelter; e.g., Milk-Bone® Soft and ChewyTM, Bil-Jac® Original Recipe, Pup-Peroni®) to each dog in the kennel. Following the delivery of the edible treat, the door chime was sounded two additional times during consumption to provide additional pairings of the chime with the treats. Each dog throughout the study accepted all

treats. This procedure was conducted once per day, three-to-five days per week for three weeks (for a total of 45 pairings). During the replication of this phase, the procedure was conducted once per day, three-to-five days per week for one week. During this condition, the dogs consumed the treats throughout the time of the two additional chimes.

Post-Pairing (CS). The procedures of the CS condition were identical to the NS condition, with the exception that the pairing procedure was conducted prior to the CS condition.

Data Analysis

Data were analyzed throughout the course of the study using visual analysis of the graphical depiction of the data. Data were also summarized using means, Tukey's tri-mean, and ranges for each phase.

Statement of Approval

The procedures described in this manuscript were approved by the Institutional Animal Care and Use Committee (IACUC) at California State University, Fresno.

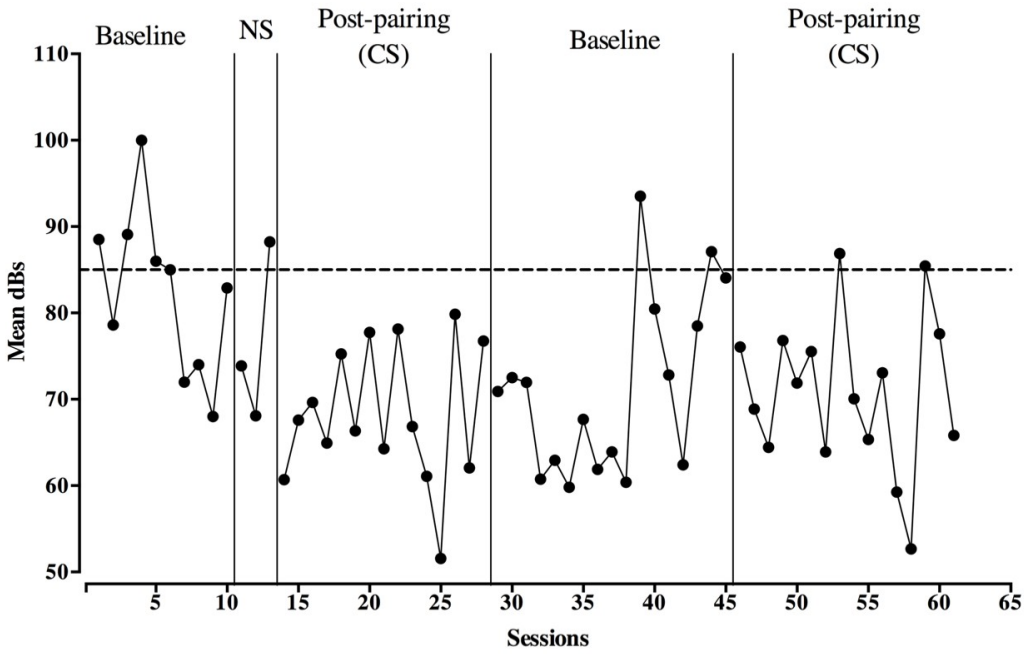
Figure 1. The mean dBs of noise per session in the kennel area across conditions. The dotted line represents the threshold at which hearing damage in humans can occur following prolonged exposure.

Conflict of Interests Statement

No conflicts of interest were present in the conducting of this study.

3. RESULTS and DISCUSSION

The results of the study suggest that the respondent conditioning procedure was effective in decreasing the noise intensity of the kennel area (see Figures 1 and 2). During baseline and the NS condition, the noise of the kennel area was variable across sessions, but maintained at relatively high levels (X = 85.1 dBs; TM= 82.6 dBs; range= 55.3 dBs-111.4 dBs), often above the threshold for damage to hearing in humans (85 dBs). Following the pairing procedure, the noise level reduced to relatively low levels in the CS condition (X = 68.1 dBs; TM= 67.8 dBs; range= 36.1 dBs-106.1 dBs), with noise levels comparable to normal speech level. We next returned to baseline and sound levels initially remained at relatively low levels, possibly due to carryover from the previous condition (i.e., stimulus control), but gradually increased to levels similar to the initial baseline (X = 71.3 dBs; TM= 70.9 dBs; range = 46.4 dBs- 106.3 dBs). Finally, we conducted the pairing procedure for one week, and in the subsequent CS condition, we saw the noise levels decrease to levels similar to the initial CS condition (X = 70.1 dBs; TM= 70.8 dBs; range= 48.4 dBs-102.5 dBs).



Overall, the results were similar to those of Protopopova and Wynne (2015). The non-contingent delivery of edible items paired with the door chime reduced barking behavior in the animal shelter when only the door chime was present. In addition, mean noise levels were reduced below the threshold of hearing damage in humans. The decrease in noise in the kennel area of the animal shelter may reduce physiological stress on the animals and humans in the kennel area. It is also possible that potential adopters may spend more time in the kennel area and be more likely to adopt an animal.

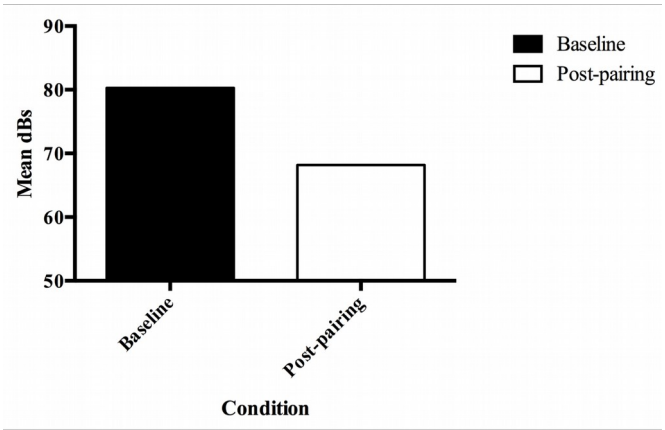


Figure 2. The mean dBs of noise in the kennel area between the baseline and post-pairing conditions.

There are several possible mechanisms by which barking was reduced. First, following the pairing of the door chime and the edible items, it is possible that the door chime became a conditioned stimulus that elicited responding that was incompatible with barking (such as salivation). Second, the door chime, through its pairing with the edible item, may have become a conditioned reinforcer. It is possible that humans entering the kennel area were previously aversive to the dogs, and barking may have been maintained by negative reinforcement in the form of escape from humans. Following the pairing of the door chime with the edible item, it is possible that the door chime served as an abolishing operation for the escape-maintained behavior and reduced the aversiveness of humans entering the kennel area and the kennel area in general (similar to enrichment). Future researchers should evaluate these specific mechanisms to determine the mechanism by which the pairing reduced barking.

There are a few limitations to the current study. First, our data collection mechanism did not discriminate between barking and other sounds in the kennel area. Anecdotally, almost all of the sound in the kennel area was from barking, and thus it is unlikely that other extraneous noise influenced the results in a meaningful way. Second, dogs were adopted and introduced throughout the course of the study. Although not documented, it is possible that dogs were introduced following the pairing procedures, and thus the dogs had never come into contact with the edible item paired with the door chime. Third, the housing of other dogs was not controlled. While this may have increased the ecological validity of the current study, it is also possible that the presence of other dogs in the same kennel may have influenced levels of barking during the study. Fourth, the respondent conditioning procedure used in this study did not specifically target an unconditioned response, so it was unclear by what mechanism the barking decreased.

Future researchers should continue to evaluate respondent conditioning procedures to reduce problem behavior and increase appropriate behavior in shelter animals. Protopopova and Wynne (2015) found that the response-independent delivery of edible items was effective at reducing many different problem behaviors. It is possible that other problem behaviors were reduced in the current study, but due to the nature of measurement we did not obtain this information. Therefore, additional measures including observational measures should be used to determine if respondent conditioning procedures have effects on other potentially problematic behaviors in addition to barking in animal shelters. Additionally, future researchers should train animal shelter staff and volunteers to use these procedures. It is possible that pairing procedure could be conducted within the normal feeding routines of the shelter and may help maintain the effects of the respondent conditioning procedure. Future researchers should also conduct social validity measures to determine if the procedures decrease problem behavior and increased the "perceived adoptability" of the animals in a socially significant way. Finally, future researchers should determine the effects of various procedures to reduce problem behavior on the overall adoption rates of animals in animal shelters.

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