

A CONSTRUCTIONAL CANINE AGGRESSION TREATMENT: USING A NEGATIVE
REINFORCEMENT SHAPING PROCEDURE WITH DOGS
IN HOME AND COMMUNITY SETTINGS

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Aggression in dogs is a significant public health concern with 7.2 mortality cases per 100 million inhabitants and approximately 4.7 million dog bites annually. Canine aggression is typically viewed as a genetic trait and treated as pathology through the use of medical or respondent behavioral procedures. In this study the effects of the differential negative reinforcement of safe, alternative behaviors to aggression using distancing as the reinforcer were evaluated. The results demonstrated that even when the aggression was in evidence throughout most of the dog's lifetime, it responded quickly to changes in reinforcement contingencies.

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INTRODUCTION

Canine aggression is “a serious public health problem that inflicts considerable physical and emotional damage on victims and incurs immeasurable hidden costs to communities” (Task Force on Canine Aggression and Human-Canine Interactions, 2001). In 1996, the last year in which data were assembled, 4.7 million dog bites were reported (Sacks, 1996). Since then the number of pet dogs in the United States has grown from 52.9 million to 74.8 million (American Pet Products Manufacturer’s Association, 2007). Eight hundred thousand people seek medical care annually for dog bites (Weiss, 1998) with about 368,000 of those reporting to hospital emergency departments (Centers for Disease Control and Prevention, 2003; Gilchrist, J. Gotsch, K. Annest, J.L., & Ryan, G., 2003). Thirty-one deaths from dog attacks on humans occurred in the United States in the year 2006 alone (Delise, 2006).

Canine aggression is thought to be an evolutionarily-selected genetic trait in canines (Cameron, D.B., 1997; Overall, K., 2003 & Reissner, I.R., 1997). As such, aggression is considered pathology in need of diagnosis. The diagnostic labels that identify types of aggression describe the stimulus conditions under which aggression occurs for the dog. The most common aggression labels include intra-specific, that is, aggression toward another dog, either in the family or outside the family; same-sex, that is, aggression toward another dog of the aggressor’s sex (Sherman, Reisner, Taliaferro, & Houpt, 1996), territorial, possessive, fearful, predatory, parental, dominance, hormonal, and stress-induced (Delise, 2004) and pain-elicited aggression (O’Heare, 2007),

Treatment for canine aggression is usually conducted using medication (e.g. anti-anxiety medications) or medical treatment (e.g., spay, neuter or treat for thyroid imbalance; Beaver & Haug, 2003), punishment, desensitization, counterconditioning, management or distraction

procedures, or combinations of these. Veterinary treatment often involves the prescription of anti-anxiety medications and anti-depressants that influence serotonin production and reuptake (U.S. Patent No. 5788986). Most traditional procedures are based, at least in part, on punishment procedures and may include the application of pain using training gear such as shock collars, choke collars or prong collars combined with quick tugs on the leash and verbal corrections aimed at interrupting the aggressive behavior. In a modern punishment procedure called abandonment training the owner or another person favored by the dog presents a word that has been conditioned as a punisher (e.g., “bye,” “uh oh,” or “oops”) and walks or runs away from the tethered dog contingently upon aggressive responses (King, n.d.). Punishment procedures used to treat canine aggression have a high incidence of failure and may result in an increase in the magnitude and frequency of the aggressive responses (Merck, 2006) or the development of additional problematic responses such as positions of the body, tail, and ears that are associated with aggression or stress (Schilder & van der Borg, 2004).

Desensitization and counterconditioning procedures, often combined with punishment or positive reinforcement procedures, can reduce the overall number of aggressive responses, but they are slow and results are inconsistent. When used in the treatment of canine aggression these procedures are reported to take anywhere from a few months to several years to produce a reduction in the number and magnitude of aggressive responses (e.g. Brown, 2004; Parsons, 2004). Kraft and Al-Issa (1965) reported that in a desensitization treatment with a woman, 40 to 50 sessions of 1-hr each were required to achieve desirable outcomes. Because it is not possible to instruct dogs to engage in the types of relaxation procedures that are components of desensitization procedures used with humans, treatments begin with the subject at a sufficient distance from an aversive stimulus that no aggressive responses are performed. Extensive

experience in observing canine behavior and a certain amount of guesswork is necessary to determine what behaviors indicate that the animal is relaxed. Pet owners frequently report that even after successful treatment they must remain constantly vigilant because aggressive responses continue to occur when prompts are not delivered. Thus success is defined as any apparent reduction in aggressive responses.

Distraction and management procedures are often used either alone or in conjunction with any of the above procedures. Several distraction treatments that include the building of alternative repertoires use prompting and arbitrary reinforcers (e.g. clickers and treats) to distract the dog in the presence of stress-producing stimuli rather than shaping alternative behaviors using functional consequences. Management procedures involve preventing the dog from encountering stimuli toward which it is likely to aggress through crating, taking him out only when and where aversive stimuli are unlikely to be encountered, using gear that allows greater control of his movements such as head halters, removing him from the vicinity if aggression occurs, and other techniques.

What all of the above treatments have in common is that in them aggression is treated as respondent behavior. Although punishment implies the use of operant procedures, its use nevertheless assumes that aggression is a genetic trait. Current interventions for canine aggression treat it as pathology and focus on reducing the rate, frequency and intensity of the aggressive behavior rather than on building alternative repertoires. Many trainers and veterinarians tell clients that because aggression is part of the animal's genetic makeup it can, at best, be managed or minimized. Management and restriction procedures also assume that aggression is respondent behavior. They are usually instituted early in the treatment to avoid exposing the dog to situations in which the dog may encounter unconditioned respondent stimuli.

These measures may include removing the dog from the presence of triggering stimuli, placing it in a crate, and teaching it to look to the owner on cue in the presence of aversive stimuli.

Alternatively, aggression can be viewed as operant behavior. There is evidence that aggression can be taught through shaping and maintained by reinforcing consequences, a view which contradicts the current canine aggression treatment ideologies. Skinner (1959) wrote an abstract about an experimental analysis of aggressive behaviors in pigeons. Pigeon A and Pigeon B were placed in a small chamber together and aggressive behaviors toward Pigeon B were shaped in Pigeon A through positive reinforcement that consisted of food delivery contingent upon successive approximations of aggressive behavior. In the abstract describing the presentation, Skinner wrote, “As ‘cold’ fighting gives way to attack in A’s behavior, all the ‘ethological’ signs of aggressive emotion emerge: A struts about the cage, coos in a characteristic fashion, and its feathers, particularly on its neck, become erect. This can hardly be simply a conditioned emotional respondent because it does not occur in B, the aggressed” (pp. 264).

The role of environmental consequences for aggressive behaviors has been widely documented in research with humans. For example, a functional analysis conducted by Lalli and Casey (1996) demonstrated that the aggressive behaviors of a young boy with developmental delays were multiply controlled by attention, toys and escape from tasks. Aggression was reduced to low or zero rates when escape or escape combined with social interaction was provided on an fixed ratio-1 (FR-1) schedule contingent on non-occurrence of aggression. The aggressive, self-injurious and destructive behaviors performed by adults in a residential program were shown in a functional analysis to be maintained by escape from noises in the environment (McCord, Iwata, Galensky, Ellingson and Thomson, 2001).

Positive reinforcement has been used to eliminate problematic emotional behaviors in humans. Approach behaviors were successfully reinforced in a child with autism suffering from phobias of automated toys. Ricciardi, Luiselli and Camari (2006) successfully shaped approach responses in the child who previously screamed, fled or hit people in the presence of such objects. The approach they chose was a gradual exposure to phobic stimuli based on shaping approach behaviors and providing positive reinforcers for achieving steps in the approach hierarchy. The approach is typically paired with escape extinction but these researchers successfully omitted it allowing the child to escape if he chose. The child learned to approach the objects when access to preferred items was provided contingent upon approaches, and the behavior continued beyond the end of the study.

There is also evidence that even when unconditioned stimuli that typically elicit aggression are in place, the environment exerts significant influence over emotional responses. Delgado (1967) conducted research with a female monkey named Lina that was surgically fitted with a device through which electrical stimulation could be applied to the hypothalamus, a procedure that was associated with an increase in violent behavior. The electrical stimulation occurred for 5 s every minute for 1 hr while in each of 3 different colonies consisting of 4 monkeys each. Colony 1 consisted of Bob, Nora, Kali and Lina. Lina aggressed toward none of the other monkeys even when she was attacked by them. Colony 2 consisted of Bob, Nora, Lina and Tula. Lina threatened and attacked Tula but was submissive toward Bob and Nora. Colony 3 consisted of Harry, Lina, Doll and Tula. Lina was quite aggressive toward Doll and Tula but did not behave aggressively toward Harry. In each colony population Lina performed aggressive behaviors only toward certain monkeys and never behaved aggressively toward others. This

indicates that environmental influences superseded the electrical stimulation of the aggression centers of the monkey's brain.

There is no doubt that aversive stimulation can elicit aggression (e.g. Azrin, Hake, & Hutchinson, 1965; Polsky, 2000) but Delgado's experiment suggested that while aggression may originate as respondent behavior, consequential events in the contemporary environment may assume maintenance of it in the organism's repertoire. In his Presidential address at the Association for Applied Behavior Analysis conference Goldiamond (1978) said, "Regardless of the source of the behavior pattern, if the behavior affects the environment around it, once the behavior occurs and recurs, it enters the public domain, that is, the domain of its environment. And once it does so, the source and type of behavior can be swamped by those patterns required by the consequential contingencies." Thus the purpose here is not to deny that aggression may originate as respondent behavior, but to consider what contingencies beyond the initial unconditioned stimulus may affect it.

Furthermore, it is helpful to reconsider exactly what is inherited. Skinner (1969) wrote that "what is inherited is not the behavior but a susceptibility to reinforcement" (p. 187). In this view organisms do not inherit aggressive behaviors, but instead they inherit the susceptibility for reinforcement by outcomes that may be acquired through the production of aggressive behaviors. It follows that if alternative behaviors to aggression produce similar outcomes, particularly if the alternative behaviors require a lower response cost, the alternative behaviors may come to overpower the aggressive responses already extant in the organism's repertoire. The behavior of an organism is not mandated by its genetic heritage but influenced by the organism's susceptibility to reinforcement. This means that behavior can be changed by altering the reinforcement contingencies.

In most cases of canine aggression the outcome for aggressive responses is the creating of distance between the dog and aversive stimuli. When a dog barks, growls or lunges the common result is that other animals or people move away, thus it become a strong part of the dog's repertoire when faced with certain stimulus conditions.

The purpose of this research is to answer the following question. Given that the outcome of aggressive responses is to create distance between a dog and aversive stimuli, can we use distance as a reinforcer to shape desirable alternative behaviors?

METHODS

Subjects

The subjects were six domestic dogs whose owners or caregivers offered them as subjects because of concern about the dogs' histories of aggression.

Angel was a 7-year-old female Rhodesian Ridgeback that lived with an adult female owner, her teen-aged son and her male partner in an urban area. The dog was adopted at 8 weeks of age with the owner's goal of engaging in dog sports, hiking and conformation showing. Before Angel was 6 months old the owner took her to training classes that focused on positive reinforcement training methods. Aggressive behaviors were first noticed when Angel was 6 months old at a conformation competition where the subject growled at other dogs. Other Rhodesian Ridgeback show dog owners at the event advised Angel's owner to "correct" the dog by hitting her on the head with a hand or leash and to scold her at each occurrence. The owner did this for 2 days but discontinued the practice because she thought the aggressive behavior was worsening and she did not like hitting her dog. The aggressive behaviors escalated over the next 6 years to include staring at other dogs (a precursor to growling), growling, barking and lunging. Angel had chased other dogs several times and pinned them down by the throat. The owner reported that Angel was aggressive toward all other dogs, particularly those that looked similar to Rhodesian Ridgebacks. The owner reported that it was sometimes possible to successfully introduce her dog to another dog off-lead if they were outside. She reported a strong correlation between her pulling the leash taut and Angel's aggressive responses so she began a practice of intentionally pulling the dog's leash tight and simultaneously providing the dog with treats in an attempt to pair the tightness of the leash with the experience of receiving treats, however she reported minimal success. The owner gave up competitive and social activities with her dog due

to Angel's aggression. The owner's primary training information about training and behavior came from reading. Angel was used in a seminar demonstration prior to this treatment where the owner learned to teach the dog to look at her in the presence of other dogs in exchange for treats. The owner's assessment of the outcome was that the technique was successful in distracting her dog from looking at other dogs, but that it required that she constantly be on guard so that she could cue Angel to look at her before the subject saw any other dogs in the environment.

Mary was a 3-year-old spayed female Pit Bull mix that lived in a no-kill animal shelter housing approximately 28 dogs at any time and this shelter was located side-by-side with two other animal shelters. The shelter was staffed by volunteers who interacted with all of the dogs daily, provided them with play-time in fenced yards with compatible dogs or alone as needed, and took them for daily walks. Mary's history before to coming to the shelter was unknown, but the staff reported no evidence that Mary had received any prior formal training. There were no signs of aggression upon intake. The aggressive behavior was first noticed when a volunteer at the shelter used a gas-powered weed eater in the dog's presence. Mary growled, barked and lunged at the volunteer, and continued to direct aggressive behavior toward this volunteer after the weed eater was put away.

Oliver was a 1-year-old male Australian Shepherd that belonged to a single woman who lived in an urban neighborhood and also had a mixed-breed dog of Oliver's same age. Oliver was adopted when he was 10 weeks old from a breeder. This dog's aggression consisted of growling, barking, lunging and biting unfamiliar humans and dogs. The dog had received training involving desensitization and counterconditioning procedures prior to the current treatment but the trainer who worked with him and who handled him during this procedure reported minimal success in reducing his aggressive behaviors. This dog had been given an antidepressant to treat

obsessive-compulsive disorders and separation anxiety in dogs, and that was replaced with an antidepressant prescribed for the treatment of obsessive-compulsive disorder and aggression in dogs. Both had been ineffective in reducing the aggression and were discontinued prior to the current treatment.

Riley was an 11-year-old neutered male mixed breed dog weighing approximately 60 pounds. He was owned by a family that consisted of a husband, a wife and a teenaged son living in an urban neighborhood. Riley was adopted at approximately 1 year of age after being abandoned in a back yard when his original owners moved away. Aggression toward unfamiliar people was first noticed within a week of adoption and consisted of growling, barking, lunging and biting. Riley had bitten two people, in one case breaking the skin on the arm of an adult guest, and in another case nipping the face of a child guest who was feeding him. Riley had also blocked an adult female guest's exit from the kitchen by standing in the doorway while barking and growling at her 2 weeks prior to the first session of the current treatment. Audible, rapid panting sometimes accompanied, preceded, or followed the aggressive behaviors. The family managed these behaviors by crating him in a different room whenever guests were present. Riley was aggressive toward any human who was not part of the immediate family except for a veterinary technician at the clinic the family used for Riley's veterinary care and boarding and a grandmother who visited every few years. When the veterinarian's office had no space to board Riley the family sometimes took separate vacations or brought the dog along but left him in a crate except to walk him because they could not find a kennel or another veterinarian who would board him. Several years earlier Riley and the female owner worked with a professional dog trainer to treat the aggression. This trainer taught the family about pack leadership. The

experience was reported as a “limited success,” providing some management tools, but no reduction in the aggressive behavior.

Sabrina was a 3-year-old female Bull Terrier that lived in a family consisting of a husband, wife and an 8-month-old male Bull Terrier living in a suburban neighborhood. Sabrina was adopted at 8 weeks of age from a breeder. The aggressive behaviors were first noticed when the dog was 2 years old, and the wife’s sister moved into town where she frequently visited the couple. The aggressive behaviors were directed only at the sister, and only occurred when the husband was not at home. They consisted of growling, barking, lunging at and biting. Sabrina bit the sister at least 10 times, leaving bruises, puncture wounds and scrapes on her arms and legs, and tearing her clothing. On a few occasions the husband was called home from work because the wife could not deter Sabrina once she began attacking her sister. When the husband arrived the dog’s behavior changed so dramatically that he was surprised when I showed him videotape of the baseline procedure. In his presence Sabrina was friendly toward everyone, including the sister, and was easy to handle. The dog was friendly toward everyone else and was friendly toward the sister in the presence of the male owner. Sabrina’s owners took her to positive-reinforcement-based training classes along with their other dog who displayed no aggressive behaviors. The class instructor referred them to participate in this study.

Buddy was a 9-year-old neutered male Red Heeler Australian Cattle dog that lived with his female owner, the owner’s mother, the mother’s three dogs and two caged birds in a suburban neighborhood. Buddy was adopted from a breeder at the age of approximately 6 weeks and had previously lived with the woman and her ex-husband. Buddy had very limited experience with dogs and people outside the family. He received no obedience training. The aggression was first noticed when he was still a puppy. It consisted of growling, audible panting, barking, lunging,

eyes bulging out of the sockets so that the whites were visible all around the iris, and biting. Buddy had bitten several people including friends and repair persons, and his bites sometimes broke the skin. Buddy was aggressive toward any human or animal who was not part of the immediate family. Buddy had not received any form of veterinary care for about 7 years, because the aggressive behaviors made it necessary to anesthetize him in order for the veterinarian to conduct an examination. The transportation and restraint necessary were an ordeal for the owner. The owner was unwilling to muzzle the dog for fear of being bitten, but reported that as long as no strangers were present Buddy was friendly and affectionate toward her and her mother. No training had been conducted to specifically address the aggression prior to this study because the owner did not know that such training was available. Because Buddy attacked the mother's dogs, he could not be loose in the house or yard with them, so the mother and daughter rotated the dog's locations between the living areas, bedrooms and back yard.

Measurement

For each subject measurements were taken on the cumulative number of successful trials and on the cumulative number of behaviors across trials. A successful trial was defined as any trial during which barking, chewing, growling and lunging did not occur either together or separately. A total of 15 behaviors were measured across all 6 subjects with measurements for each subject consisting of some but not all of these behaviors. Only behaviors occurring during trials were counted.

Of these behaviors four were categorized as aggressive and two were associated with aggression. The aggressive behaviors were barking, lunging, chewing and growling. Backing up and panting usually occurred in a class with the aggressive behaviors. For purposes of

measurement they were not counted as aggressive behaviors in calculating successful trials. At the same time they were not counted as acceptable alternative behaviors that would be reinforced during the procedure. Backing up consisted of one backward step taken with either front foot. Each step in the backward direction during a trial was counted as one occurrence of backing up. Backing up was categorized as aggressive because it most often occurred immediately before lunging.

Barking consisted of an abrupt vocalization during which the opening of the dog's mouth widens during the emission of the sound and narrows as the sound ends. An instance of barking began when a single vocalization became audible and ended with a dip in volume. A bark was counted each time the volume peaked. A bark was not counted when no sound was audible even if the dog's mouth widened and narrowed in a manner that looked as if the dog was barking.

Chewing consisted of the subject grasping the leash or harness within the mouth and biting down on it with the teeth. An instance of chewing began when the leash crossed the plane of the dog's mouth and ended when it was no longer within the plane of the mouth.

Growling consisted of a deep guttural vocalization with the mouth either closed or narrowly opened, whether or not the teeth were showing. For measurement purposes, an instance of growling began when the sound became audible to the observer and ended when it was no longer audible regardless of the position of the dog's mouth. If the sound was already audible at the beginning of a trial, the ongoing occurrence was counted as one instance of growling.

Lunging consisted of a sudden forward burst of movement of the dog's body accompanied by looking at the decoy. One instance of lunging consisted of any number of steps toward the decoy, whether or not both front feet left the floor. The position of the subject at the beginning of the behavior was not a defining characteristic of the lunging behavior. An instance

of lunging began when sudden forward movement in the direction of the decoy began and ended when the forward movement of the dog's body ended.

Panting consisted of an abrupt expulsion of air from the mouth that was audible to the observer. An instance of panting began when the sound of a single air expulsion became audible and ended when it was no longer audible.

The remaining nine behaviors were categorized as acceptable alternative behaviors. These were approaching, laying down, head tipping, licking, sniffing, sitting, turning away, walking away and yawning.

Approaching occurred in the absence of aggressive responses and consisted of the slow, gentle movement of the nose and face toward or around the area of the decoy. Approach behaviors included sniffing at the decoy or taking steps toward the decoy with or without touching the decoy. One instance of approach began when the subject moved toward the decoy and ended when the subject moved away from the subject.

Down consisted of the torso touching the floor in the chest area as well as in the hip area, with the dog either laying on the chest or the side. For recording purposes if the subject was already down when the trial began it counted as one instance of down. When the dog lifted either the chest or hips off the floor or both the instance of down ended. A new occurrence of down was counted when both chest and hips touched the ground at the same time.

Head tipping consisted of looking at the decoy and tipping the head toward the horizontal plane without turning face away from decoy. An instance of head tipping began when the head moved to an angle of more than 5 degrees from vertical while looking forward. An instance of head tipping ended when the head returned to the vertical position.

Licking consisted of a quick out and in motion of the tongue during which the tongue was visible to the observer, with or without touching the nose. An instance began when the tongue became visible to the observer and ended when the tongue was no longer visible.

Sniffing consisted of placing the nostril area on or within 1 inch of any surface with the dog's mandible perpendicular to the surface. An instance of sniffing began when the nostrils were within 1 inch of the surface and ended when they moved more than 1 inch from the surface.

Sitting consisted of the dog being positioned in such a way that the back legs were bent and the haunches were touching the floor or resting on the dog's feet with chest held upright by the front legs. For recording purposes, if a dog was already sitting when the trial began it was counted as one sit. Intra-trial instances of sitting began when the haunches touched the floor and ended when the haunches stopped touching the floor.

Turning away consisted of the subject turning the head and eyes or just the eyes away from the decoy with or without turning the body and without stepping away from the decoy. An instance of turning away began when the dog's eyes or nose were facing the decoy and moved away from the decoy horizontally in either direction.

Walking away consisted of turning the whole body away from the decoy and walking any number of steps away from the decoy. An instance of walking away began when a dog took a step with any foot in a direction that led away from the decoy, includes the turning of the subject's body away from the decoy, and includes a minimum of two steps in a direction away from the decoy. An instance of walking away ended when the dog stopped taking steps away from the decoy for 2s.

Yawning consisted of a single expulsion of air lasting more than 3 seconds with a widely opened mouth. A yawn could be audible or inaudible. An instance of yawning was counted when

the lips began to move farther apart at the beginning of an expulsion of air, and ended with the expulsion of air.

For Angel, data were collected on the frequency of barking, growling, lunging, sniffing, sitting, standing, laying down, and lying down with the head down. For Mary data were collected on the frequency of laying down, barking, turning away, lunging, yawning, licking, and approaching. For Oliver measures were taken on the frequency of barking, growling, lunging, backing up, walking away, laying down, sitting, turning away, and approaching. For Riley the frequency of barking, growling, lunging, panting, turning away, sitting, lying down, approaching, tipping the head and licking were recorded. For Sabrina the frequency of barking, growling, lunging, backing up, chewing on her leash or harness, approaching, sniffing, and turning away were recorded. For Buddy the frequencies of barking, growling, lunging, panting, whining, sitting, licking, laying down, turning away and standing up were recorded.

Recording

All sessions were videotaped using one or two camcorders positioned as described in the settings section. Observations were made from the videotapes. Two cameras were used to record Riley's and Buddy's treatments. One camera was mounted on a tripod and focused on the dog and the other was held by an assistant who kept both the decoy and the subject in view. One camera was used to record the treatments of Angel, Mary, Oliver and Sabrina. It was mounted on a tripod and positioned to show both the decoy and the subject by panning the camera.

Observation began for each trial when the decoy left the safe zone and walked toward the subject. Measurement ended when the decoy went out of view at the end of the trial or when the

dog stopped moving after reaching the farthest point at the end of the trial, depending on which was visible in the videotape, or when the camera shifted away from the subject.

Reliability

The experimental design was a multiple baseline across 6 subjects. A trained observer collected interobserver agreement data (IOA). The behavioral definitions were explained to her and she was provided with a list of the behavioral definitions relevant to the individual subject being observed. She was given an opportunity to ask questions about the definitions or observation requirements prior to beginning data collection, and she was permitted to stop the videotape to ask questions to ensure that data collection was performed consistently. The observer was instructed to not discuss her results during the data collection process or to alter them after the fact, and she was not allowed to see the data measures I collected. Data were collected using a data sheet similar to the one depicted in Appendix A. Hash marks were made next to the label of each behavior on the datasheet as it occurred.

IOA for the occurrence of behaviors and successful trials was calculated using the formula $A/(A+D)*100$. IOA was 89.5% across 50.8% of trials for Angel, 95.47% across 46% of trials for Oliver, 95% across 40% of trials for Sabrina, 95.8% over 100% of trials for Mary, 94.3% over 73.8% of trials for Riley and 94.8% over 51% of trials for Buddy.

PROCEDURES

There were five general procedures. They consisted of a brief constructional questionnaire (see Goldiamond, 1974), safety procedures, baseline, negative reinforcement (S^R) shaping and generalization. Baseline consisted of four parts: safety procedures, participant positioning procedures, instructions to handler, threshold determination and baseline trials. S^R -shaping consisted of four parts: safety procedures, participant-positioning procedures, instructions to handler, threshold adjustment, approach to boundary, boundary procedures and interaction procedures.

Brief Constructional Questionnaire

Prior to baseline the owners or caregivers for the subject dogs completed a written interview containing 20 questions (see Appendix B for complete questionnaire). The responses to the questionnaire provided information the researchers used to arrange relevant treatment conditions, to assess the relevant response topographies, to learn about past treatments that may have influenced current responding, and to give priority to the owner's or caregiver's goals in setting treatment goals.

Question 1 asked the owners some identifying information about their dogs (e.g., dog's name, breed and weight, owner's address and contact information.) Questions 2 and 3 provided information about the dog's current health and any medication that was prescribed for reasons other than the aggressive behavior. These questions were evaluated to determine if the resolution of health concerns could make treatment unnecessary or could enhance the effectiveness of the treatment. Question 4 identified the dog's known aggressive response topographies by asking what the dog does when it is aggressive. Question 5 asked whether the dog had bitten anyone.

This provided information about the intensity of the behavior and to inform researchers whether additional safety precautions should be taken. Questions 6-8 requested information used to identify stimulus conditions under which aggressive behaviors were observed: the objects of the dog's aggression, the environments in which aggression occurred, other conditions in effect during or around the time of aggressive responses. Question 9 asked the owner to describe any situations in which aggression occurred that had not been covered in other questions. Question 10 asked about conditions under which no aggressive responding had been observed or under which the owner or caregiver considered aggressive responses to be unlikely. Question 11 asked what the dog's family or caregivers currently do when the dog behaves aggressively and how the dog responds to that treatment. Question 12 asks about the circumstances surrounding the first observation of the aggressive behavior. Question 13 garners information about the dog's treatment, training history and the owner or caregiver's assessment of the outcome of that treatment. Question 14 asked about veterinary prescriptions or behavioral recommendations related to the aggressive behavior and the owner's evaluation of the outcome of those treatments. Question 15 asked about the handling gear used with the dog and the methods currently employed by the owners and caregivers in response to the dog's aggression. This question was included to help the researchers decide what gear to use during the procedure. Questions 16 and 17 ask whether the dog's living situation has been jeopardized by the aggressive behavior—specifically whether rehoming or euthanasia has been considered. Questions 18 through 20 focus on the owner's goals for living with the dog. Question 18 gathers information about what the owner values about the dog. Question 19 indicates limitations on the owner's life caused by the dog's aggressive behaviors. The purpose of Question 20 is to find out what the owner would like life to be like with the dog if the aggression problem were resolved.

After the owner or caregiver completed the questionnaire and prior to the beginning of baseline, I read the responses and discussed them with the owner or caregiver. Opportunities were given for the owner or caregiver to elaborate, change answers (and/or) provide any information thought to be relevant.

Handling Gear

Before the baseline session began, decisions about handling gear were made for each subject to ensure the safety of all participants and to minimize stimulus conditions that would only be in place only during training so as to prevent the dog's behavior from being discriminated in terms of what gear was used. Information from Question 15 was used in making these decisions. If the gear the owner normally used with the dog was insufficiently safe, other gear was recommended. The dog was placed in this gear several times prior to treatment to avoid presenting two novel conditions simultaneously. In this study no handlers used pain-producing gear (i.e., shock collars, choke chains or prong collars). However, if they had, alternative gear would have been recommended to keep that gear from functioning as a conflicting stimulus.

Angel and Oliver wore the flat collars they normally wore. The collars were made of a thick band of 1 in wide woven nylon material that encircled the neck and connected with a metal slip-through buckle. The collars were equipped with metal loops to which a leash's clamp was clipped. Mary, Riley, Sabrina and Buddy wore body harnesses. The harnesses were made of 1 in wide woven nylon material that had a strap that encircled the neck, a strap that encircled the rib cage, a strap that connected the neck and chest straps together between the shoulder blades and a strap that connected the straps together under the chest. The strap that encircled the chest had a metal slip-through buckle. Each harness was equipped with a metal ring located where the

connecting strap and the chest strap met on the dog's back. The leashes were attached to this ring.

Handlers

Each dog was paired with a handler. The decision about who would handle the dog was guided by the responses to Questions 6 - 10. Question 6 provides information about toward whom that dog's aggression is commonly directed. In treating dogs that are aggressive in the presence of their owners, the owner handles. No dog in this study aggressed toward an owner, but had this been the case the owner would have acted as a participant in the procedure performing as described for the decoy. If a dog did not behave aggressively in the presence of an owner, the owner would be absent during the procedure and someone else would handle the dog.

Angel's owner handled her. Mary was handled by a female volunteer from the animal shelter at which she was housed. Oliver was handled by a male friend of the owner toward whom the dog was friendly and who had worked with the dog as a trainer. Riley was handled by his female owner. Sabrina was handled by the female owner. The male owner was absent during treatment for Sabrina because the dog did not behave aggressively in his presence. Buddy was handled by his female owner.

Decoys

The confederates used to simulate the aversive stimuli in the dog's natural environment were called decoys in this study because that is a term commonly used among dog trainers who work with aggressive dogs. Decoys were selected based on the answers to Question 6, "Who or what is the object of the dog's aggression?"

Angel was aggressive toward all unfamiliar dogs. Two decoys were used in treatment for this subject. They were my 7-year-old Greyhound, and my 3-year-old Chinese Crested mix breed.

Mary was aggressive toward people who had recently used noisy lawn equipment in her presence. The decoy was a female shelter volunteer who turned on and held a weed eater in the presence of the dog several days prior to treatment.

Oliver was aggressive toward unfamiliar people. The decoys used in his procedure were a male volunteer and me.

Riley was aggressive toward dogs and people, but treatment was conducted using only people as decoys. I acted as the first decoy, an 18-year-old male volunteer acted as the second decoy, and a female college student acted as the third decoy.

Sabrina was aggressive only toward her owner's sister, only in the absence of the husband. The sister, a 19-year-old college student, participated in the procedure.

Buddy was aggressive toward all people and dogs except for his owner and her mother with whom they lived. A long baseline was conducted with Buddy. I acted as the decoy.

Settings

Decisions about where to conduct the sessions were based on answers to Questions 7 - 10 on the questionnaire, on discussions with the owner after the completed questionnaire was received, and on whether the treatment would be conducted in a seminar setting. Question 7 asked about environments in which aggressive behaviors occurred. Question 8 asked about activities during which aggression occurred. Question 9 asked about other situations during which aggression occurred, and sometimes produced information that added to the answers to

Questions 7 and 8. Question 10 asked where the dog was not aggressive and provided information about how to arrange the environment to make the approximations sufficiently small for the dog.

Angel's aggressive behaviors occurred in any location where she came into contact with unfamiliar dogs. Treatment was conducted in a conference room measuring 50ft. by 30ft. as part of a dog trainers' seminar. The floor was concrete. There was an audience of approximately 35 people seated on one side of the room. There was a small stage measuring approximately 8ft x 10ft x 1ft on which the dog and owner stood during the procedure. A camera operator was positioned near the audience with a video camera on a tripod.

Location was not a controlling condition for Mary's aggressive behaviors. Her treatment was conducted in a training area of a pet supply store as part of a seminar for dog owners, trainers and animal shelter workers. There was an audience of approximately 25 people sitting in chairs on one side of the room to the handler's left. Also to her left at the edge of the audience was a camera operator who videotaped the session using a hand-held video camera.

Oliver's aggression was performed in the presence of any unfamiliar human regardless of location. His treatment was conducted in a hotel conference room that measured 75ft. by 50ft as part of a seminar for dog trainers. There was an audience of approximately 50 observers seated along one wall to the handler's right. The flooring was a patterned, multicolored carpet. Two tables measuring 12 ft in length total were aligned end-to-end across the end of the room and the handler stood in front of them with the dog. There were double doors on the opposite end of the room. A video camera mounted on a tripod was positioned inside the doors to the right and was operated by a volunteer.

Riley's aggression was reported to occur in the presence of any unfamiliar human, particularly inside the family's home. Treatment sessions for Riley took place in the family's living room and a front entryway that consisted of a tiled area approximately 20 ft long. One side of the entry opened into a dining area. Part of the other side of the entry opened into a breakfast room, and the other part abutted a wall. At the end of the entry was the living room. Two couches met corner to corner approximately 8 feet beyond the end of the entryway, and were separated by an end table. The entry way flooring was ceramic tile. The living area was carpeted. A video camera was mounted on a tripod in the dining room. Another was handled by an assistant that followed the decoy.

Sabrina's aggression was directed specifically toward the owner's sister only when the owner's husband was not at home. The procedure for Sabrina was conducted in the family's living room and front entryway while the husband was at work. The entryway measured approximately 6' by 8'. and was just inside the front door. Across from the front door was the living room. The living room measured approximately 15' by 20'. On the wall opposite the entry was a set of sliding glass doors that opened onto a screened patio in the back yard. On the left wall was a couch with a coffee table in front of it, and a doorway into the kitchen. Between the couch and the sliding door was a fireplace. I sat on the hearth and operated a video camera.

Buddy's aggression occurred in the presence of any unfamiliar human in any setting, but the family had stopped taking him out of the house and back yard area several years earlier so Buddy's procedure was conducted in the family's living room. The living room measured approximately 12' by 15'. In the corner was a brick fireplace and on the hearth were two bird cages containing small parrots. The wall on the other side of the fireplace was occupied by an entertainment center. On the wall perpendicular to the entertainment center was a chair in which

a flip chart was placed. The flip chart consisted of a 3-ring binder and pages with large numbers so that the current trial number was recorded on the videotape. One video camera was mounted on a tripod inside the entry to the living room.

Positions of Subjects and Handlers

Each dog was restrained by a 6 ft leash made of woven nylon, cloth or leather, with a metal clamp at one end to attach to the dog's harness or collar, and a loop made of the same material as the length of the leash at the other end to serve as a handle. The handlers of all dogs except for Mary wrapped the leash around one arm and held the loop handle in the hand of the same arm, and clasped the length of the 6-foot leash in the other hand. The handle of Mary's leash was attached to a bracket attached to a metal bracket that was drilled into a stud in the wall of the training area in which the treatment was conducted. For those dogs for which treatment did not occur in a seminar setting the dog and handler were positioned in an area determined by Question 7 which asks in what environment the aggression occurs. The dog was positioned to the side or in front of the handler so that its view of the decoy was unobstructed.

Treatments for Angel, Mary and Oliver were part of training seminars. Angel and the owner were positioned on a small stage at one end of a conference room. The owner stood against the wall and held the leash wrapped around her wrist and secured in her hand. Angel was free to move to either side or in front of the handler. Mary was tethered to a wall bracket in a training room. Her handler sat in a chair near her. Mary was able to move freely in any direction in front of the wall. If her leash became tangled the handler adjusted it. Oliver and his handler were positioned near a long table at one end of a conference room. The handler stood and held

the leash wrapped around his arm and secured in his hand. Oliver was free to move to either side, in front or behind the handler.

Treatments for Riley and Sabrina and a baseline for Buddy were conducted in the living rooms of the homes they lived in. Riley and his owner were positioned at the end of an entryway in the living room. The owner leaned against the arm of a couch during the procedure. She wrapped the leash around her arm and held it in her hands during treatment. Riley was free to move to the front, back or left side of the owner during the procedure. Sabrina and her owner were positioned in the entryway of the house. The owner sat in a chair. Sabrina was free to move to the front, back or right side of the owner during the procedure. Buddy and his owner were positioned in front of an entertainment center in the family's living room. The owner stood near the entertainment center. Buddy was free to move in front or to either side of the owner.

Boundary

A boundary was determined for each of the dogs. The boundary indicated how far the dog's head could reach while restrained by his leash and the point beyond which the decoy should not go during the S^R- procedure. For Riley and Sabrina the boundary was indicated by the delineation between carpet and tiling in the living room and entry ways of the houses. For Buddy the boundary was the edge of a chair in the family's living room. For Angel the boundary was the edge of a small stage on which she stood. For Mary the boundary was marked with a dog toy about 18" long and 4" in diameter lain across the boundary.

Instructions to Handlers

Each handler was instructed not to interact with the dog except to untangle its lead or to

prevent him from disengaging from the treatment. Disengaging from treatment consisted of the subject turning away from the decoy so that it could not see approaches, going to sleep, or interacting with objects or individuals in the environment to the exclusion of tending to the decoy. The handler was instructed not to intervene to interrupt or stop activities that did not interfere with the subject's tending to the decoy other than to maintain a firm grip on the leash. The handler was instructed not to distract the dog from the decoy and to provide no verbal cues, commands, reprimands or consequences for any behavior, to inform the decoy or me if the dog performed behaviors that were not responded to by the director or the decoy (barks, growls, staring, visible tightening of facial or body muscles, visible relaxation of the facial or body musculature, sighing, or sniffing toward the decoy, etc.), and to comment upon changes in the dog's behavior that were not behaviorally defined, such as, "She seems to be relaxing," or "He is getting upset." I evaluated any behavioral changes in the subject related to these observations.

Baseline

Before the baseline trials began the decoy's safe zone and the reaction threshold were determined. The safe zone was a position sufficiently distant from the subject that no aggressive responses occurred. In order to determine this distance the decoy entered the training area and walked away from the subject until any aggressive responses that were ongoing ceased.

Baseline threshold. During the first trial the decoy walked from the safe zone toward the dog in a straight line at a normal pace. If the dog was turned away from the decoy upon approach the decoy made a vocal noise such as a clicking sound with the tongue until the subject turned its head toward her. The decoy stopped as soon as an aggressive response occurred. A marker was placed on the floor at this location, and the position was labeled as the initial threshold.

Baseline trials. Baseline trials consisted of the decoy walking from the safe zone to the threshold and back to the safe zone. A baseline trial began with the decoy's first step away from the safe zone. The decoy waited approximately 3s at the threshold before returning to the safe zone. A trial ended as soon as the decoy was within the safe zone again. Walking to the threshold and walking back to the safe zone occurred independently of aggressive behaviors. There was a delay of approximately 15 seconds between trials.

The number of baseline trials for Angel, Oliver and Mary were determined by practical issues related to the seminar setting. The number of trials for Sabrina, Riley and Buddy were decided in advance to provide a multiple baseline.

S^{R-} SHAPING PROCEDURE

Approach from Safe Zone to Boundary

The first trial began when the decoy walked from the safe zone toward the subject. When the dog responded aggressively or exhibited any precursors to aggression the decoy stopped and marked the spot. This location was called the new threshold if it was different from the initial threshold. The decoy waited at the threshold for an acceptable alternative behavior to the aggressive responding (e.g. turning the head, sitting, yawning, etc.). Upon the occurrence of any acceptable alternative behavior or an approximation to acceptable alternative behaviors behavior the decoy turned and walked back to the safe zone. If the subject responded aggressively as the decoy turned or walked away from the near point, the decoy immediately returned to the current threshold. Once back at the threshold she waited for the dog to produce an acceptable alternative behavior before turning and walking away again. This procedure was repeated at the same threshold until the dog performed no aggressive responding as the decoy turned and walked away. If the dog did not react the decoy stayed at the threshold for a few seconds and walked back to the safe zone.

After returning to the safe zone, the decoy waited approximately 15s while facing away from the subject. Trial 2 followed the 15s break and began when the decoy stepped away from the safe zone moving toward the dog but stopped 2ft before the threshold. The decoy returned to the safe zone contingently upon the performance of an acceptable alternative to aggression by the dog. The trial ended when the decoy reached the safe zone. After returning to the safe zone, the decoy again waited approximately 15s. For all future trials in the S^{F-} shaping procedure if the dog responded aggressively in the preceding trial, the current trial consisted of the decoy walking to the same near point. That place remained the near point until the subject performed no

aggressive responses during a trial. If aggressive responses occurred five times at the same near point, the decoy's approach in the subsequent trial would be to a near point approximately two feet farther from the dog than the threshold at which the unsuccessful trials were conducted. If the dog did not respond aggressively in the preceding trial the decoy walked one step closer to the dog in the next trial. Throughout the procedure, after a successful trial at the current near point (i.e. during a trial in which the decoy reached the current threshold with no aggressive responding) the decoy took one step closer to the dog in the subsequent trial and the near point moved one step closer to the dog at the end of the trial.

Boundary procedure. When the decoy reached the dog's boundary the procedure was repeated using the boundary as the threshold until the dog consistently performed no aggressive responses and no behaviors that were possible indicators that an aggressive response might occur. During these trials the decoy's walking away followed desirable alternatives to aggression. Approaches toward the decoy or sniffing in the direction of the decoy without accompanying aggressive responses were also followed with walking away from the decoy. If aggressive responses occurred when the decoy reached the dog's boundary the procedure was to be repeated until no aggressive responses occurred at the boundary for a minimum of 10 trials.

Interactions

Feeding probe. Once the decoy reached the boundary for 10 successive trials with no aggressive or tentative responses from the subject, a feeding probe was conducted. Feeding probes were conducted only when the decoy did not include a dog. If the decoy included a dog the feeding probe section was skipped. A dog treat was tossed on the floor in order to observe the subject's behavior. If the dog found and ate the food without hesitation and turned to look at the

decoy without any signs of aggression, the decoy walked back to the safe zone and waited 15s. This was repeated until several trials had been completed with no signs of aggression. All of the dogs that received food accepted it in this way, but if they had performed aggressive behavior or did not consume the food the procedure would be continued without food until the dog performed only acceptable alternative behaviors.

Approaches to the boundary followed by tossing food on the floor were repeated until it was determined that the subject would safely take food from the decoy's hand. The dog was fed from the hand and after the food was accepted the decoy turned and walked to the safe zone where she waited 15s and repeated for several trials.

When the dog accepted food from the hand with no signs of aggression the decoy determined if the dog could safely be touched. The owner was asked if he or she observed any signs of stress in the subject. If the answer was yes the procedure continued until signs of stress were absent. If the answer was no, the owner was asked if the dog liked to be petted and if there was any way it particularly liked to be petted or any way it did not like to be petted. Using this information the decoy approached to the boundary and petted the dog briefly as instructed by the owner.

Angel and Buddy did not reach the interaction condition. Riley was fed from the hand without first tossing food onto the floor.

Walking Procedures

Human decoys. After the decoy petted the dog for several trials, she returned to the safe zone, waited for 15 seconds then walked to the boundary again. For Mary, the decoy then walked beside the subject as the caregiver held the leash and they walked across the room and back with

Mary between them. For Mary and for Riley the decoy walked the dog across the room and back holding the leash with the owner or caregiver staying behind. At no time during the walking procedure did any of the subjects behave aggressively toward the decoy. If they had behaved aggressively when the decoy was holding the leash it would have been given to the handler and if safe to do so, the decoy would wait for alternative behaviors, contingently upon which she would walk away. If they had behaved aggressively while the owner was holding the leash and if it were safe to do so the decoy would have waited for an acceptable alternative behavior and walked away. The procedure would have been repeated until success was achieved.

Canine decoys. This procedure is provided here for information only as no dog-aggressive dog included in the study was obtained for the study long enough to reach this stage. The handler held the subject's leash with the dog to her side in preparation for walking. The decoy's handler held the decoy's leash with the decoy on her opposite side. The two handlers were positioned between the dogs. They walked across the training area and back. This was repeated several times while observing the subject's behavior. After this procedure the decoy dog was positioned between the two handlers and the walking procedure was repeated.

Next the decoy and handler were positioned in front of the subject and handler and several circuits around the training area were conducted. If this was successful the decoy and handler were positioned behind the subject and handler and several circuits of the training area were walked this way. Finally the decoy and subject dogs were walked past each other on a common path.

If aggressive responses occurred during the walking phase with the canine decoy, the handlers of the decoy and the subject stopped moving and looked for an acceptable alternative

behavior from the subject. When such a behavior was performed, the decoy walked the dog away from the subject and waited approximately 15s before resuming the walking procedure.

GENERALIZATION TRAINING

Generalization procedures were programmed into the constructional aggression treatment. After the initial treatment was completed, the treatment was repeated using different decoys in different locations until the proximity of the decoys and the various locations were not associated with inappropriate aggressive responding.

Riley's treatment generalized to the camera operator during the first session and he was able to feed and pet the dog without working through the procedure. Three weeks later I returned to the home with a different assistant. The subject responded in a friendly manner to me, but responded aggressively to the new assistant. The S^{R-} shaping procedure was repeated using the assistance as the decoy.

RESULTS

Each subject's results were graphed cumulatively (see Appendix D). On all graphs the scale for successful trials (trials during which no aggressive responses occurred) is shown on a right-side y-axis and the scale for the occurrences of aggressive and alternative behaviors is shown on the left-side y-axis.

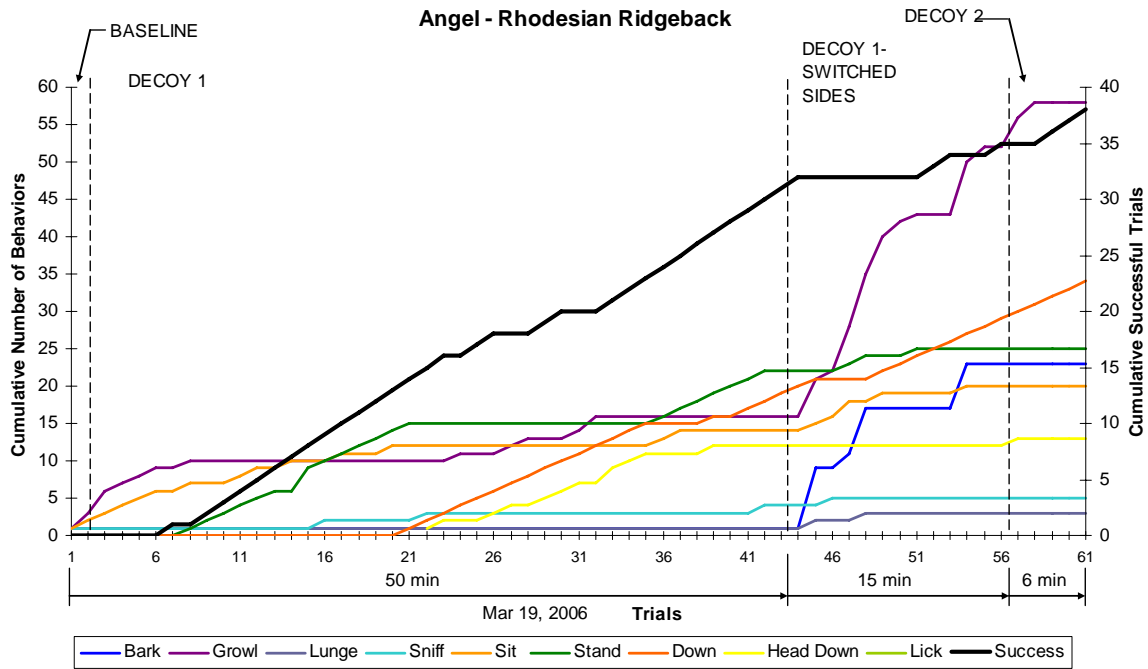


Figure 1. Cumulative graph of Angel's aggressive and alternative behaviors (left-hand y-axis) and successful trials (right-hand y-axis).

Figure 1 shows the cumulative number of aggressive behaviors, alternative behaviors and successful trials for Angel during baseline, Decoy-1, Side 1 and 2, and Decoy-2. Angel's aggressive behaviors were growling, barking and lunging. During baseline (Trials 1 & 2) barking and lunging occurred once, growling occurred five times, and sitting occurred twice. During the Decoy-1 condition the rates of aggressive responding diminished as the numbers of successful trials increased. The first successful trial was on Trial 6. Continuous successful trials occurred

from Trial 8 through Trial 23 and from Trials 33 through 43. During these trials Angel sniffed and sat instead of displaying aggressive behaviors. Lying down and lying down with the head down began to replace sitting and sniffing at Trial 21 and continued to the end of this condition. Growling occurred once during Trials 24, 27, 28, 31 and twice on Trial 32.

The Decoy-1 switched sides at Trial 44. This was the point at which the decoy’s handler moved to the other side of the decoy dog so when they turned to walk away there was no one between the decoy and the subject. Trials 44, 52, 53, and 56 were successful. During most of these trials Angel remained lying down with her head up. Trials 45-51, 54 and 56 were unsuccessful. During these trials growling occurred at high rates in all the trials and barking occurred during Trials 45, 47, 48 and 54. During the Decoy-2 condition, when a second dog was introduced as the decoy, all trials were successful (58 through 61) and the alternative behavior displayed was sitting down.

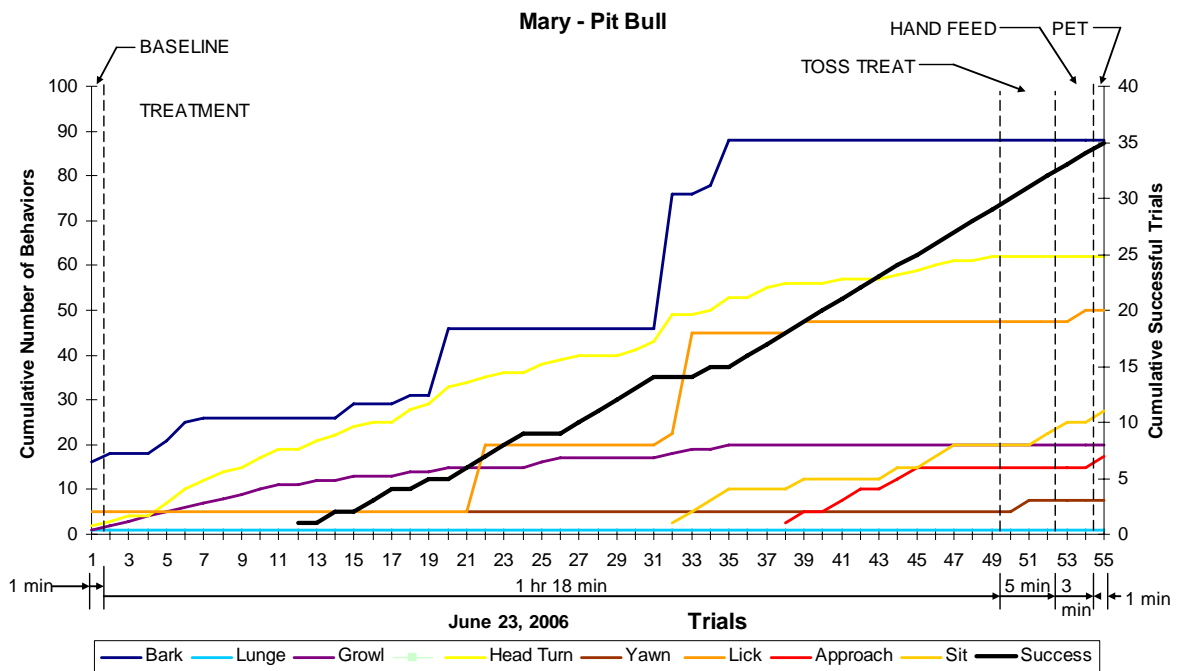


Figure 2. Cumulative graph of Mary’s aggressive and alternative behaviors (left-hand y-axis) and successful trials (right-hand y-axis).

Figure 2 shows the cumulative number of aggressive behaviors, alternative behaviors and successful trials for Mary during baseline, treatment, hand feed and feed & pet conditions. During baseline (Trial 1) Mary barked 16 times, licked two times, lunged once and turned her head three times. During the treatment condition, Trial 12 was the first successful trial. Intermittent successful trials occurred between Trials 12-19, and there were successful trials from Trial 20-24, 27-31 and 33-34. During successful trials when there were no aggressive responses, lying down, turning the head and licking began to replace the aggressive behaviors. The remaining trials from Trial 35 to the end of the treatment condition were all successful. Sitting first occurred at Trial 31 and approach began at Trial 37 and both continued through the remainder of the treatment condition. Lying down, turning the head, licking, sitting and approaching completely replaced growling and barking by the end of the condition.

All of the remaining trials were successful throughout the toss treat, hand feed and feed and pet conditions. Head turning did not occur after the beginning of the toss treat condition as sitting and lying down occurred more often. One instance of approach occurred in the feed and pet condition. During Mary's walking interaction phase, Mary was walked across the room and back with the handler holding her leash and the decoy at her other side. As they walked Mary repeatedly jumped up on the decoy in a friendly manner. Next the decoy walked the dog across the room and back holding the leash and without the handler. Finally the decoy walked toward the dog and handler and sat on the floor with the dog. The dog jumped into her lap and licked her.

Figure 3 shows cumulative measures of aggressive behaviors, alternative behaviors and successful trials for Oliver during baseline, Decoy 1, Decoy 2 and feed conditions. Oliver's aggressive behaviors were barking, growling and lunging. During baseline Oliver turned away

once in Trial 1 and during Trial 2 Oliver barked 33 times, growled 23 times, lunged 6 times, backed up 20 times, sat twice and turned away 15 times. During the Decoy-1 condition Trials 3-9 were successful. During these trials turning away increased. There was only one successful trial from 10-20. During the unsuccessful trials barking, backing up, growling, lunging and turning away increased but the occurrences diminished as they approached Trial 20. Trials 21 through 27 were successful. During these trials there were no aggressive responses and turning away and down increased.

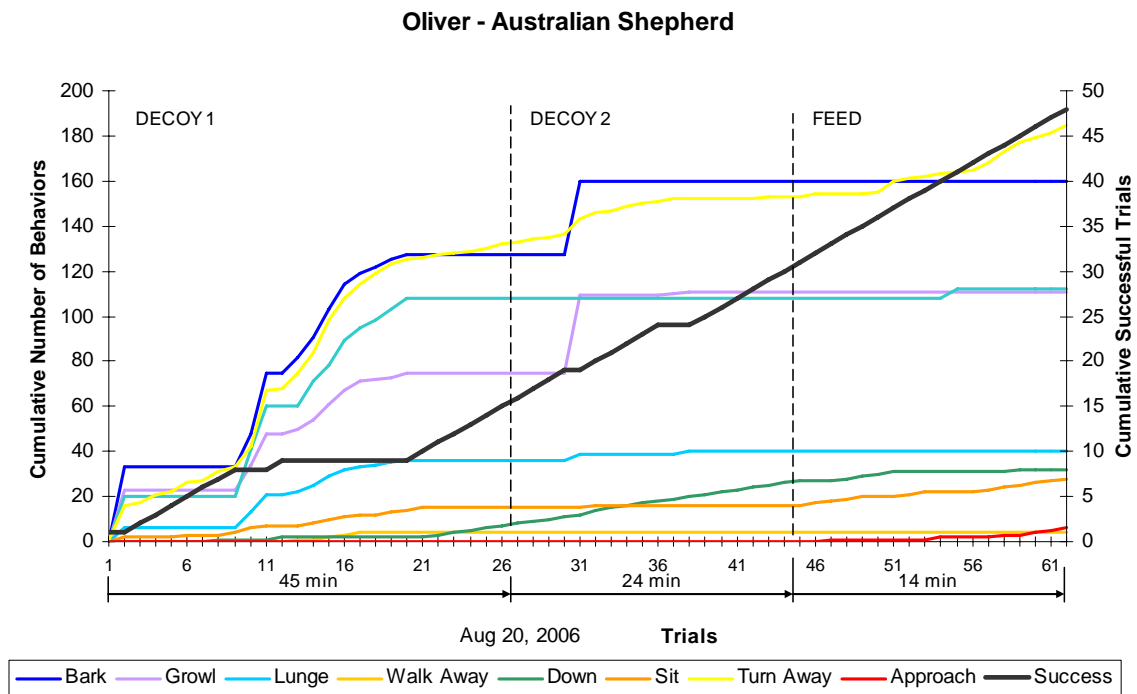


Figure 3. Cumulative graph of Oliver's aggressive and alternative behaviors (left-hand y-axis) and successful trials (right-hand y-axis).

The Decoy-2 condition began at Trial 28. Trials 28-30, 32-36, and 39-45 were successful. As the condition continued there was less of an increase in head turns, but head turns and lying down replaced aggressive behaviors. During Trial 31 there were 33 barks, 34 growls and 3

lunges during. During this trial turning away continued to increase. During Trial 37 Oliver growled and lunged in Trial 38.

During the feed condition Trials 45-59 all trials were successful. Turning away tapered off temporarily but began to increase as the condition progressed. Lying down and sitting increased slightly across the condition, and the first occurrences of approach occurred at Trial 47. Approach occurred in Trials 47, 54 and 58. The hand feed condition began at Trial 60 and all trials were successful. During this condition sitting and approaching occurred one time in each trial. Turning away occurred twice each in Trials 60 and 61, and four times in Trial 62.

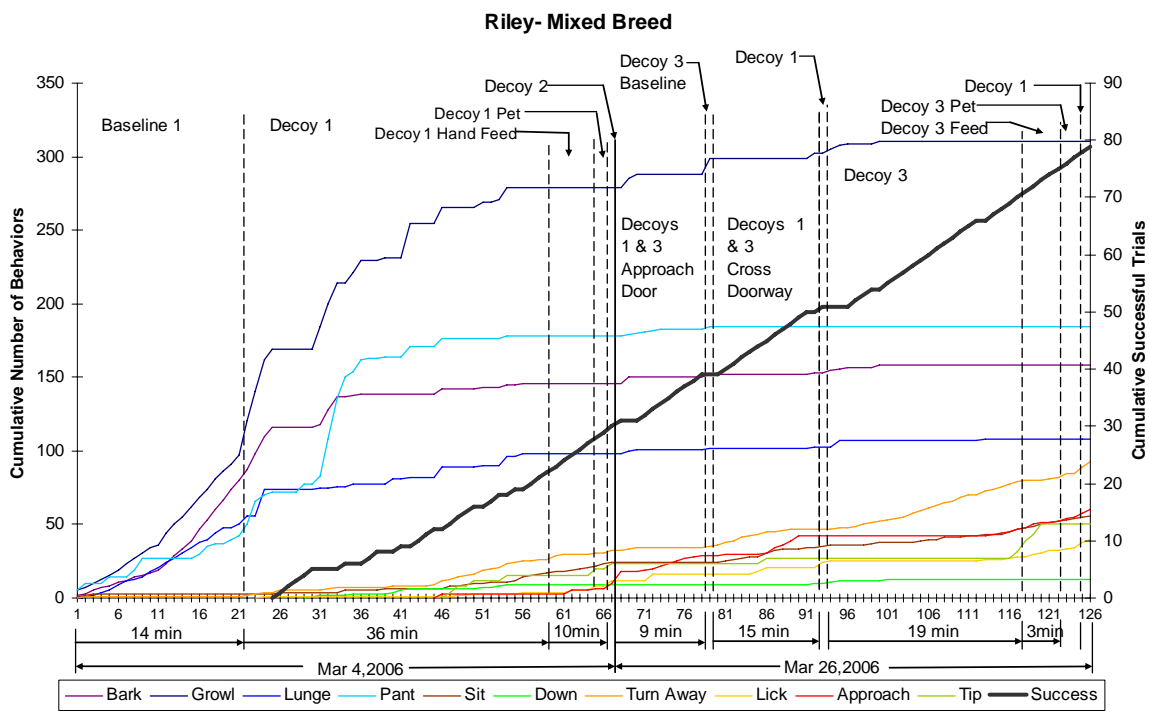


Figure 4. Cumulative graph of Riley’s aggressive and alternative behaviors (left-hand y-axis) and successful trials (right-hand y-axis).

Figure 4 shows cumulative measures of aggressive behaviors, alternative behaviors and successful trials for Riley during Decoy 1 Baseline, Decoy 1, Decoy 1-Hand Feed, Decoy 1-

Hand Feed & Pet, Decoy 2-Feed & Pet, Decoys 1 & 3, Decoy 3 Baseline, Decoy 3, Decoy 3 Hand Feed, and Decoy 3 Hand Feed & Pet conditions. Riley's aggressive behaviors were barking, growling and lunging. During baseline barking and growling occurred in every trial. Occurrences of barking ranged from two to seven per trial, and occurrences of growling ranged from two to eight per trial. Panting occurred from zero to eight times per trial, and lunging occurred from zero to four times per trial.

The Decoy 1 condition began with Trial 22. Successful trials generally increased through this condition and occurred in Trials 26-30, 34, 37 and 38, 41, 43-45, 47-50, 52 and 53, 55, and 57-59. During unsuccessful trials increases in growling, barking, panting and lunging occurred. During Trials 22-25 occurrences of aggressive behaviors ranged from 6 to 12 barks, 7 to 24 growls, 6 to 18 lunges and 8 to 16 instances of panting. During Trials 31-33 occurrences of aggressive behaviors ranged from 2 to 10 barks, 14 to 16 growls, 6 to 28 instances of panting with only one lunge. Turning away, sitting and licking began to occur early in the Decoy 1 condition and gradually increased as the condition progressed. Approach was first recorded at Trial 46 and increased and head tipping began at Trial 47.

The Decoy-1 hand feed condition began at Trial 60 and ran through Trial 64. All trials were successful and no aggressive behaviors occurred. They were replaced with sitting, turning away, licking and approaching. The Decoy 1-pet condition included Trials 65 and 66. Both were successful with sitting, turning away, licking, approaching and tipping the head occurring in place of aggressive behaviors. The Decoy 2 condition occurred in trials 67 and 68. It was successful. No aggressive behaviors occurred and sitting, turning away and tipping the head occurred one time each and licking approaching occurred four times each during Trial 67. Approach occurred 8 times in Trial 68.

After the Decoy-2 condition Decoy-1 walked Riley across the room and back on leash. Then the leash was dropped and Riley was allowed to move freely through the room. He came when called by both Decoy-1 and Decoy-2. He solicited petting, leaned on Decoy-1 and accepted scratching and petting from both Decoy-1 and 2.

The remaining conditions were conducted three weeks after the preceding trials. The Decoys-1 & 3 condition began at Trial 69. Trials 69 and 70 were unsuccessful. In Trial 69 Riley barked 4 times, growled six times, lunged two times and panted once. Trials 71 through 78 were successful. During these trials turn away, approach and sit replaced aggressive behaviors. A Decoy-3 baseline was conducted at Trial 79. This trial was unsuccessful. Riley barked twice, growled 11 times, lunged once and panted once. He also turned away once.

The Decoy-3 condition began at Trial 80. Trials 80-91 were successful with sitting and turning away occurring in almost every trial, and approach increasing across the second half of the condition. Trial 92 was unsuccessful with one bark, three growls and one lunge. Another Decoy 1 condition was run next, and it was successful. Sitting occurred once and licking occurred 3 times.

The last Decoy-3 condition began at Trial 94. The condition was generally successful with the aggressive behaviors occurring at extremely low rates, and turning away, approaching, sitting head tipping and licking increasing as the condition progressed. Trials 97-99 comprised another Decoy-1 condition, and it was successful. Turning away, approaching, sitting and licking occurred.

Following the last Decoy-1 condition, Decoy-1 walked Riley across the room and back with Decoy 3 on the other side of Riley. Afterwards Riley's leash was released and he was allowed to move freely through the room. He came when called by both Decoys, and approached

both decoys voluntarily for petting. He leaned against Decoy 3 while she petted him and scratched his ears.

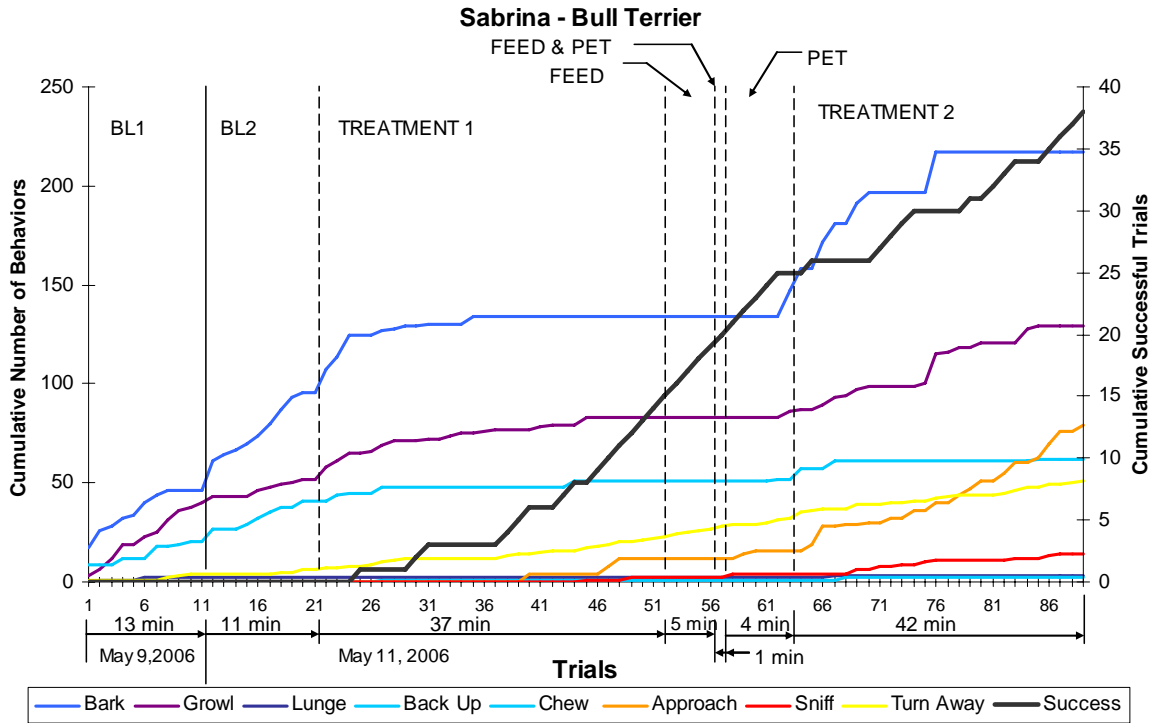


Figure 5. Cumulative graph of Sabrina’s aggressive and alternative behaviors (left-hand y-axis) and successful trials (right-hand y-axis).

Figure 5 shows cumulative measures of aggressive behaviors, alternative behaviors and successful trials for Sabrina across baseline 1, baseline 2, treatment 1, feed, feed & pet, pet and treatment 2 conditions. Sabrina’s aggressive behaviors were barking, growling, lunging and chewing her leash. Baseline 1 was conducted on an evening when the male owner had been home but left the house for a little while so that the baseline could be conducted because the dog was not aggressive in his presence. There were 11 baseline-1 trials. Aggressive responses occurred during all of them, although in the last trial there were only two growls. Numbers of barks ranged from 0 to 17 per trial, rates of growls ranged from 0 to 7 per trial, and lunging occurred in Trials 2 and 6. Baseline 2 was conducted the next night when the male owner was at

work. The results were similar to the first baseline. Rates of barking ranged from 0 to 15 occurrences per trial and rates of growling ranged from 0 to 7 per trial. Treatment 1 condition began at Trial 22. Trial 25 was the first successful trial. As successive trials increased across the condition, aggressive behaviors decreased. From Trial 25 through 45 successful trials occurred intermittently with successes at Trials 25, 30, 33, 38-40, 43, 44, then successive successes from Trial 46 through 52. Turning away increased across the entire condition. Approach behaviors were first seen in Trial 40 and occurred again in Trials 47 and 48, there were four occurrences in each of those trials.

The feed condition ran from Trial 53-57. All trials were successful. Turning away occurred once in each of the feed condition trials. Trial 58 was a feed and pet condition. There were two approaches and one instance of turning away. Trials 59-62 were trials in which Sabrina was petted without being fed. All trials were counted as successful, but there were subjective concerns about the dog's behavior. Although there were approaches during Trials 59 and 60 and turned away in Trials 60 and 61, Sabrina also backed up during Trial 62. Backing up generally occurred in a class with aggressive behaviors for Sabrina. In addition her body posture grew more rigid as the trials progressed. To test her behavior and ensure the safety of all participants another treatment condition was conducted.

Treatment 2 began at Trial 63. All trials between 63 and 70 except for 65 were unsuccessful. Aggressive behaviors returned to high rates with 13 barks and 3 growls in Trial 63, with aggressive responses continuing through Trial 70. Approaches and turning away also occurred during these trials. Trials 71 - 74 were successful. There were approach and turning away behaviors in each of the four trials. Trails 76 -78 were unsuccessful but while there were 20 barks in Trial 76, there were none in Trials 77-78. There were 15 growls in Trial 76 but only one

in Trial 77 and two in Trial 78. Trials 79, 81-83, and 86-89 were successful. Approaches, turning away and sniffing increased across the last condition as aggressive behaviors decreased. After the session Sabrina was petted and hugged by the sister who engaged in the experiment and no aggressive responses occurred.

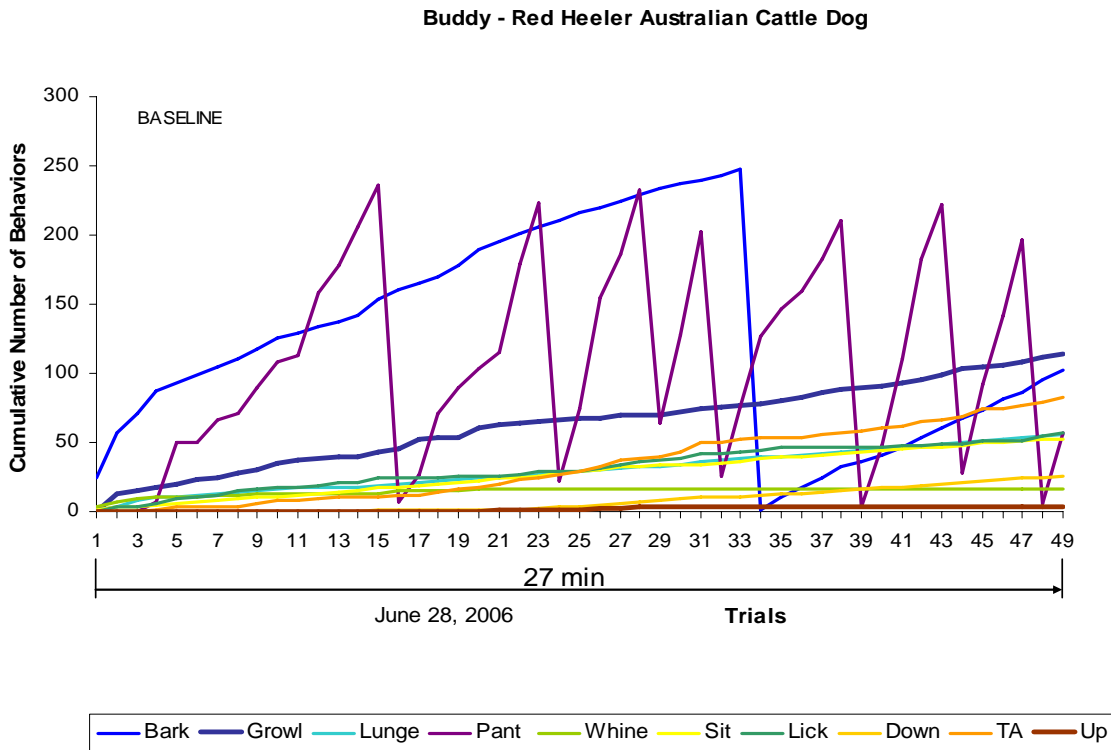


Figure 6. Cumulative graph of Buddy’s aggressive and alternative behaviors.

Figure 6 shows the results of a 50 trial baseline for Buddy. The occurrences of responding across all behaviors remained consistent throughout all 50 trials, with aggressive responses occurring at high rates throughout. Whining ceased after 18 trials. Treatment was not conducted with Buddy due to changes in the family’s living situation.

DISCUSSION

The results show that the procedures used in this experiment effectively replaced aggression with friendly behavior for three dogs (Mary, Sabrina, and Riley) and with sitting, lying-down or turning away for two dogs (Angel and Oliver). Buddy, the only dog that did not receive treatment, continued to display aggressive behavior in spite of 50 trials of baseline. In contrast to current canine aggression treatment procedures the experimental procedures used here worked extremely fast. The Decoy-1 condition of Riley's treatment went from aggression to friendliness in 36 minutes and he was friendly toward a second person within ten more minutes. The introduction to Decoy 3 only took 22 minutes. The treatments for the other dogs that underwent treatment took from 1 to 2 hrs.

An important aspect of this procedure is the use of negative reinforcement to shape alternative behaviors to aggression. In the early trials of a treatment session any alternative behaviors that spontaneously occurred were reinforced. A variety of alternative behaviors were selected from each dog's existing repertoire in order to provide a broad repertoire with which to replace the aggressive responses previously maintained by aggression. When acceptable alternative behaviors were not offered, approximations were reinforced with changing criterion that called for increasingly affiliative behavior. For example, Riley did not approach the decoy in early parts of the treatment sessions, but as trials progressed facing the decoy and moving toward her without performing any aggressive behaviors were selected for reinforcement. At first these behaviors were as small as glancing at the decoy. Longer looks and forward movements were successively reinforced. By the end of the treatment Riley was friendly toward all of the decoys and the friendliness persisted after a 3-week period with Decoy 1. Similarly, Mary and Sabrina were friendly toward the decoys at the end of the procedures. Oliver accepted treats from the

hand of the decoy and it is possible that friendliness would have been achieved with longer treatment. The increase of captured and shaped alternative behaviors suggests that distancing was a negative reinforcer. As distance was repeatedly provided contingently upon alternative behaviors across treatment conditions the occurrences of alternative behaviors increased and the performances of aggressive behaviors decreased.

The constructional approach developed by Goldiamond (1974) was used as a guide in developing this experiment. This procedure is referred to as constructional because of the emphasis on building specific desirable repertoires rather than eliminating aggression and leaving the alternative behavior to chance. The constructional aggression procedure sets specific treatment goals that include the performance of friendly behaviors in conditions under which they do not currently occur and that are of importance to the dogs' owners. Working with the owners to set and meet specific goals for the dog's behavior and to decide upon the environments in which it will occur is essential to the procedure. Owners often report that they appreciate being included in the design of the treatment program for the dog, particularly the decisions about the target behaviors and locations. Other treatment procedures for canine aggression do not work toward specific criterion, but instead work toward the vague goals of "less aggression" or "no aggression."

While systematic desensitization, counterconditioning, punishment and distraction procedures have the goal of reducing aggressive responses, or even of simply making them more manageable, they do not make friendliness a treatment goal. Most of the current popular approaches to the treatment of canine aggression seek to teach the dog to relax or to remain calm in the presence of aversive stimuli. Unfortunately, "relaxed" and "calm" are difficult to quantify and require subjective interpretations of some inner state of the dog. In contrast, in the present

experiment active behaviors rather than the subjective values of calmness and relaxation were reinforced with the result that by the end of the procedure the dogs were offering a variety of safe, desirable, and often friendly alternative behaviors to aggression.

In spite of differences in goals the constructional aggression treatment may be confused with systematic desensitization because both involve the gradual introduction of levels of intensity of the aversive stimuli. However, the logic and procedures of introduction are importantly different. First, in the present procedure the aversive stimuli are introduced gradually to avoid the dog's freezing and extinction bursts that would compete with the occurrence of the desirable alternatives to be reinforced. The purpose here is not adaptation or habituation as it is in desensitization procedures. Second, during a successful trial with no aggressive responding, in the present procedure the decoy walks away. In desensitization procedures the decoy uses calmness as an indication that it is time to move closer to the subject. Third, in the current procedure if an aggressive response occurs during a trial the decoy waits for an alternative response to occur and immediately walks away. In desensitization the decoy walks away if there is an aggressive response because it indicates they have gone beyond the dog's threshold. More generally, the main difference is that systematic desensitization focuses on following decreased levels of emotional responding with an increase in the intensity of the aversive stimulus. The constructional aggression treatment follows desirable alternative behaviors to aggression with the contingent withdrawal of the aversive stimulus. This distinction is important because the treatment discussed here purposefully shapes alternative behavioral repertoires with which to replace aggression rather than simply minimizing the emotional responses to aversive stimuli.

Desensitization and counterconditioning procedures often take months or years to produce improvements that do not include friendly behaviors. The experiment with Buddy

indicates that repeated presentations of aversive stimuli will either take an extremely long time or may not result in the desired outcomes at all. The aggressive responses of the other dogs in the study had already been significantly reduced by the fiftieth trial, so the persistence of Buddy's aggressive responses indicates that for this dog habituation did not occur even with the stimulus remaining at a constant intensity. While it is possible that the effectiveness of the procedure described in this thesis involves habituation to some degree, it is clear from the results of the baselines for Sabrina, Riley and Buddy that habituation alone was not responsible for the changes.

A goal of the constructional aggression procedure was to train the alternative repertoires in such a way that after treatment the natural environment could assume maintenance of them. During treatment the aversive stimulus approaches and walks away. In the natural environment this happens also, but on an intermittent schedule. For this reason we determined that the delivery of food as described earlier would present an unnecessary complication. The use of food as a reinforcer would require either a transfer of control to the environment, which may prove difficult, or a perpetual program of food delivery in the presence of aversive stimuli.

Interestingly the aggression was under very specific stimulus control. All six dogs behaved aggressively under some conditions but not others, such as toward unfamiliar dogs or toward unfamiliar people. The conditions under which some of the dogs behaved aggressively were extremely specific. Mary was only aggressive toward people who had used noisy lawn equipment in her presence. Prior to conducting Riley's treatment, tests were done in the back yard, on the sidewalk in front of the home, and at the front door. During none of these tests did Riley behave aggressively. In the back yard this dog behaved in a very relaxed manner, even yawning and attempting to approach the decoy. Aggressive behaviors were not observed until the

owner and Riley were in the living room and the decoy, who was outside, rang the door bell. Sabrina's aggression was extremely specific and was directed only at her owner's sister, and only when the owner's husband was not present.

Changes in stimulus control conditions were responsible for aggressive behaviors occurring after a series of successful trials during the procedure. Understanding how integral stimulus control is in the dogs' aggression is important for trainers to understand, but it is common to assume a treatment failure or a defect in the dog when aggressive behavior recurs during or after treatment. Angel's treatment proceeded smoothly through the Decoy-1 condition, but when the handler was no longer positioned between the decoy and subject aggressive behaviors increased. Switching to another dog in the Decoy-2 condition was followed by an immediate decrease in aggressive responses. For Sabrina the delivery of food followed by the non-delivery of food was followed by an increase in aggressive responding.

For all of the dogs there were trials with aggressive responses following series of successful trials. For example, although Mary had not responded aggressively for several trials, beginning at Trial 19 and again at Trial 31 aggressive behaviors increased. Similar events occurred with all of the five dogs that entered treatment conditions. For all of these dogs the increase in closeness of the decoy to the subject appeared to influence the increased aggression. As the decoy moved closer to the subject after achieving one or more successful trials, the stimulus conditions seemed to change just enough to cause the subject to resume aggressive responding. For all dogs the aggressive behaviors ceased to occur as the treatment progressed.

Generalization training is a necessary part of the success of this procedure. Stokes and Baer (1977) wrote, "it is not always realized that generalization does not automatically occur simply because a behavior change is accomplished." Many trainers, behaviorists and

veterinarians assume that when an aggressive response occurs after treatment that a defect in the animal (e.g. a genetic trait) is responsible, but this assumption is usually made without considering the controlling variables. Stokes and Baer (1977) continue, “the need actively to *program* generalization, rather than passively to expect it as an outcome of certain training procedures, is a point requiring both emphasis and effective techniques.” The discriminated conditions under which aggression occurs must be systematically generalized until aggression no longer occurs in problematic situations (Stokes and Baer, 1977). Trainers and owners who do not expect and plan for generalization often think the treatment has been unsuccessful or that the dog has “regressed,” when in fact insufficient exemplars have been presented as part of their training to achieve generalization. In studies with humans training as few as 3 exemplars has been shown to result in generalization (Griffiths and Craighead, 1972). It is possible that the greater the number of stimulus conditions under which a problem behavior is maintained at the start of treatment the greater the number of training exemplars will be necessary to achieve generalization.

For two of the dogs long-lasting successes were reported occurred. Mary was successfully adopted after the treatment. Riley’s owner reported to the me that his behavior was better a year after treatment. Follow-up data on the other dogs was unavailable.

Suggestions for further study include 1) an examination of the change from distancing to friendly approach behaviors in the dogs, 2) evaluating how much generalization training can be expected for a dog to cease discriminating between antecedent conditions for aggression and those for non-aggression, and 3) whether the application of a conditioned reinforcer such as a click followed by food would result in quicker acquisition of alternative repertoires under specific stimulus conditions, and 3) whether the click and treat training would be difficult to

replace with maintenance of the repertoire by the natural environment. This research should be replicated with different species in different types of settings as well.

The current research adds to existing literature by demonstrating that a reinforcer, in this case, distancing, that is currently reinforcing a problem behavior may be used to successfully reinforce preferred behaviors. It also shows that repeated exposure to aversive stimuli may not result in diminishment of aggressive behaviors, and if it does it may take a long time to achieve. Importantly, this research sets the stage for the natural environment to attain maintenance of the safer repertoires that have been entered into situations in which they previously did not occur. This research clearly demonstrates that the treatment of canine aggression need be neither slow nor tentative.

APPENDIX
DATA SHEET AND QUESTIONNAIRE

Data Sheet

Subject: _____ **Observer:** _____

Date: _____ **Session:** _____

Trial _____

Bark	
Growl	
Lunge	
Sniff	
Sit	
Stand	
Down	
Head Down	

Trial _____

Bark	
Growl	
Lunge	
Sniff	
Sit	
Stand	
Down	
Head Down	

Trial _____

Bark	
Growl	
Lunge	
Sniff	
Sit	
Stand	
Down	
Head Down	

Brief Constructional Questionnaire

1) Describe your dog.

Name: _____ Age: _____

Sex: _____ Spayed/Neutered? _____

Breed: _____ Color: _____

Size (Weight or height—Approx okay): _____

Other physical characteristics: _____

2) Does your dog have any health concerns? Yes No

If yes, what are they?

3) Is your dog on medications for any condition not believed to be related to the aggression? Yes No

What is the medication and its purpose? _____

4) Describe what the behaviors dog does when he is aggressive. (Barking, growling, lunging, etc.)

5) Has your dog bitten anyone? Yes / No

a. How much damage did the bite cause?

b. What circumstances surrounded the bite?

6) Who is the object of your dog's aggression? (Adults, teenagers, children, dogs, specific individual, object, other)

7) In what environments does this behavior occur? (Home, agility class, park, neighborhood sidewalk, back yard, etc.)

8) What concurrent activities are taking place when the aggressive behavior happens? (Dinner time, owner arrives at home, someone answers the door, etc.)

9) Can you think of anything else related to when he is aggressive? (e.g. While he's wearing a leash but not when he is not wearing one? When a certain person is around even though the aggression is not directed at him/her? Other?)

10) Are there any situations where and when the dog is not aggressive? What are they?

11) What do you or other family members do when your dog performs aggressive behaviors?

a. How does the dog respond when this happens?

12) How long as the behavior been going on?

a. How and when did it start?

13) Treatment history:

- a. How many trainers, if any, have you worked with for the aggression?
 - i. What was the professional title of the trainer, if any and if known? (Behavior consultant, trainer, etc.)
 - 1. Are you aware of any education or certifications this person held related to training dogs or working with aggressive animals? What were they?
 - ii. When did you work with [him/her/them]?
 - iii. What did they do or recommend that you do with your dog?
 - iv. What is your evaluation of the outcome?
- 14) Has your dog been under a veterinarian's care or treatment for aggression? Yes / No
- a. Has the dog been on medication for aggression? Yes / No
 - i. What medication?
 - ii. When and for how long was s/he on it?
 - iii. What is your evaluation of the outcome?
 - b. Did the veterinarian prescribe non-medical treatment for aggression? Yes / No
 - i. Did you follow the recommendation?
 - ii. What did it involve?
 - iii. What is your evaluation of the outcome?
- 15) What kind(s) of handling gear do you use with your dog? (Leashes, flat collar, slip or choke collar or chain, electronic collar, body harness, head halter, other)
- 16) Has anyone recommended euthanasia for your dog because of his/her aggression, or have you considered it on your own? Yes / No
- a. Was that person a family member, friend, veterinarian, trainer, yourself or other?
 - b. If they provided a reason for the recommendation, what was it?
 - c. Why didn't you do it?
- 17) Has anyone recommended rehoming your dog because of his/her aggression, or have you considered it on your own? Yes No
- a. Was that person a family member, friend, veterinarian, trainer, yourself or other?
 - b. If they provided a reason for the recommendation, what was it?
 - c. Why didn't you do it?
- 18) What does your dog do that you value? (Tricks, canine sports, companion, etc.) Why do you value him?
- 19) Do you feel that your dog's aggression limits your life? How?
- 20) List all the things you would do with your dog if he didn't have aggression.

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