

A CONSTRUCTIONAL APPROACH TO ESTABLISHING AND
MAINTAINING CALM CANINE BEHAVIOR

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Very few behavior-change programs with canines produce effects that persist beyond the training condition. The present study is an experimental demonstration of a constructional program that established calm patterns of behavior as alternatives to hyperactive ones. Three dogs that exhibited hyperactive patterns were chosen as subjects. Seven conditions common to canine-caretaker relationships were used to determine which factors resulted in the hyperactive patterns. Then, sitting and lying down were taught as beginning points using touch as a reinforcer. The final behavior, maintained by naturally occurring reinforcers, was established errorlessly. The study used a control-analysis strategy of behavior change with a changing-criterion design. The intervention resulted in an immediate reduction in hyperactivity and an increase in sitting and lying down for all dogs.

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INTRODUCTION

To overcome “hyperactive” behavior, like jumping and barking, traditional dog-training approaches have relied heavily on the use of punishment. Popular punishers include the use of either shock collars, leash jerks, squirts of water, or firm touches (Grandin, 2010; McConnell, 2002; Milan, 2007). For example, Linhart, Roberts, Schumake, and Johnson (1976) used a specially designed high-voltage shock collar that would deliver a 7000-volt shock to the coyote’s neck contingent upon approaching black rabbits. The procedure reduced attacks on black rabbits in 3 out of 4 adult captive coyotes; the other avoided both black and white rabbits and needed to be put back on a dry-food diet. Likewise, a study at Cornell’s College of Veterinary Medicine found that wearing a citronella collar, which releases a puff of natural citronella under the dog’s chin, reduces excessive and nuisance barking (Juarbe-Diaz & Houpt, 1996). The same effects have more recently been shown with “scentless” collars (Moffat, Landsberg, & Beaudet, 2003). There is no question that these and other punishment techniques have been effective at reducing the frequency of behavior; however, when these contingencies are removed, the undesired behavior often reappears (see Azrin, 1960; Linhart et al., 1976).

Because of unwanted side effects of punishment and the recurrence of patterns targeted for reduction, dog training is in the process of migrating away from punishment and aversive techniques. Instead, it is moving toward approaches that are constructional, using procedures aimed at increasing desirable behaviors through positive reinforcement. A good example, popular among dog trainers, is clicker training. Clicker training is a process that typically aims to teach new behaviors or increases the frequency of already existing behavior. It uses a “clicker” to make an audible sound, referred to as a “click,” followed by a reinforcer, typically food, to shape behavior (Pryor, 1984). The use of the clicker as a teaching tool in animal training goes back to

the work of Keller Breland, Marion Breland, and Bob Bailey (Bailey & Gillaspy, 2005). Clicker training has proven successful at teaching dolphins to jump through hoops, rabbits to do people's banking (put coins in "the bank"), and chickens to dance, to play tic-tac-toe, and to walk a circle around two blue cones and walk a figure 8 when the cones are yellow (Bailey, 2011; Bailey, 2016).

Although clicker training has proved to be an effective tool for teaching new behaviors across species, difficulties arise when attempting to interpose a new behavior where an occasion-behavior-consequence relationship already exists. A common example is found when attempting to teach dogs that bark and jump when greeting visitors at the door, to sit politely instead. During training, friends or family members knock on the door and enter the house while the caretaker reinforces sitting politely with "clicks and treats." In these cases, when food is present, the dog may stay very close to the caretaker, looking at the food, and sitting rather than jumping on the guest as usual. However, dogs meeting visitors at the front door behave completely different outside these training sessions when their caretaker is opening the door without holding food and a clicker. When food is absent, the target behavior is often absent too, and the caretaker instead may have to intervene with jumping with some form of physical contact or verbal cues to "sit" or "lie down."

While it is generally accepted that superimposing a punishing contingency on the frequency of an already existing pattern of behavior is the reason for the transient effects of punishment, it is often overlooked that the same effect can be seen when superimposing positive reinforcement contingencies (Balsam & Bondy, 1983; Wylie & Grossman, 1988). For example, Hall, Protopopova, & Wynne (2014) found that when a laser was pointed at the ground or wall, chasing the light occurred, and was found to be maintained by moving the light away. To

decrease light chasing, Hall et al. (2014) extinguished light chasing and superimposed a new contingency: providing food for paw waving. (The authors referred to this as DRA. But until paw waving was maintained by the same antecedent and consequential variables, it is best to refer to this behavior as other behavior.) Paw waving was eventually placed on fixed interval (FI) 15s schedule, meaning food was being delivered every 15s as long as paw waving occurred once during the interval. The reduction of light chasing and the occurrence of paw waving was maintained as long as food was being delivered on a set schedule; but as soon as the food delivery was discontinued, the paw waving ceased to occur and light chasing returned. Similarly, Protopopova, Kisten, and Wynne (2016) observed dogs in home settings bark for a variety of reasons. To increase silence, Protopopova et al. superimposed a new contingency: providing food through a remote feeder for periods of time not barking. Time not barking increased for 4 out of the 5 dogs used in the study. But when the procedure was removed, barking returned, for 3 out of the 4 dogs that still remained in the study. (The authors acknowledged the absence in barking for the 4th subject was likely due to factors not influenced by the procedures.)

Without explicit programming to bring the target behavior established during training into contact with natural maintaining contingencies, training reflects that of behavior modification and effects are often short-lived. In these cases, even though maintaining variables are identified, other competing contingencies are often introduced (Protopopova, Kisten, & Wynne, 2016; Stewart, 2012). Or even when relevant reinforcers are manipulated, sometimes alternatives are not specified (Dorey, Tobias, Udell, & Wynne, 2012), which is a defining characteristic of differential reinforcement of other behavior (DRO). DRO operates on the principle that reinforcement is delivered for the absence of behavior after a period of time has elapsed, and thus curtails specifying a response to be reinforced. The main dependent variable

available is the disturbing behavior that is targeted for reduction. It is extremely difficult to draw conclusions regarding what is being reinforced, and without specification of the response to be reinforced, stimulus shaping, or transfer procedures, are without direction, as attempts to determine the extent of maintenance and generalization would be. The critical variable of functional interventions is that they establish functional alternative behaviors – that is, behaviors that occur under the same stimulus conditions with the same consequences.

There are very few examples of using functional analysis to establish alternatives for disturbing patterns in non-human animals. In only four such studies, a functional analysis was used to identify maintaining variables for disturbing patterns and available alternatives that were later used to establish and maintain a functional alternative (Dorey, Rosales-Ruiz, Smith, & Lovelace, 2009; Katz, 2016; Rentfro, 2009; Snider, 2007). Dorey et al. (2009), using an A-B-A-B reversal design, identified hair-pulling and hand-biting of an olive baboon to be maintained by caregiver attention. Then, by re-allocating caregiver attention to lip-smacking, which was already occurring at low frequencies in the same context, lip-smacking then serviced as an alternative to the self-injurious patterns. Re-allocating reinforcement without the use of shaping, as was the case in the study just mentioned, raises issues surrounding the use of extinction. Snider (2007) and Katz (2016) used an errorless shaping program, which avoided extinction as much as possible, to effectively reinforce friendly, pro-social behaviors as alternatives to aggressive and fearful patterns with dogs.

Accordingly, there are four different criteria for determining success of behavior change programs with dogs: decrease the frequency of disturbing behavior (Dorey et al., 2012; Protopopova, 2016), establish/increase the frequency of target behavior (Hall et al., 2014; Stewart, 2012), establish a target pattern (Dorey et al., 2009), and maintain a target pattern in

natural/test environment without contrived contingencies (Katz, 2016; Rentfro, 2009; Snider, 2007). The purpose of this study was to test whether a constructional program (Goldiamond, 1974; Skinner, 1968) could errorlessly produce calm patterns of behavior (e.g., sitting and lying down) as functional alternatives to hyperactive patterns of behavior (e.g., jumping, barking, nipping, and licking) that maintain.

METHOD

Subjects

Three dogs, each with a varied background, served as subjects (S) in the study. Two of the subjects, Jerry and Rocky, both males, were typical house pets. The third subject, Ranata, a female, was in the care of a local animal shelter, and was at the home of a “foster parent” throughout the length of the study.

Jerry, a German Shepherd, that was 9-years-old at the time of the study, participated in the study due to his mugging and pushiness at mealtimes. When suppertime neared, Jerry would often nudge his owner by pushing his nose against his owner’s leg or arm until he was fed. Additionally, when being fed, Jerry would position himself between the person feeding him and the food bowl, making the feeding routine difficult for the person scooping the food. In general, Jerry was friendly towards people; he would often approach and nudge them until they interacted with him through some form of gentle strokes and scratches.

Rocky, a Labrador Retriever mix, that was also 9-years-old at the time of the study, participated in the study because of barking that occurred every time he and the owner went outside for a jog. The barking would begin exactly when the harness was picked up and continued until it was brought down to be fastened and worn. This happened for as long as the owner could remember. Rocky also enjoyed the interaction of other people; he too, would approach and sit by people for scratches and petting. Whenever his owner stood up straight, Rocky would walk in front of him, sit, and wait to be petted.

Ranata, figured to be a year-and-a-half-old pit-bull mix, was being fostered from the Society for the Prevention of Cruelty to Animals (SPCA) of Texas in Dallas, TX. During her assessment and stay at the SPCA of Texas, Ranata was identified as being hyper-active as a

result of rambunctious activity when in the presence of people. The same behaviors, earning her the label of hyper-active inside the shelter, were immediately seen upon her arrival at the foster house. These patterns included jumping, licking, and mouthing people occurred whenever she was around people, especially when they sat on the couch to watch T.V.

Setting

The experiment was conducted in the subjects' natural environment, where the disturbing patterns were occurring. No rooms were blocked off, and water was always available; subjects were allowed to roam around the house, look out the window, or simply lie down on their doggie beds and rest at any time.

For Jerry, the experiment was conducted in the kitchen where he lived. The experimenter (E) stood with his back facing a food bin, which was against the wall about one foot away, next to the food and water bowl. The food bin always had food. A camera was mounted on a tripod set up in the opposite corner of the kitchen from where the experiment was being conducted and directed towards the food bin.

For Rocky, the experiment was conducted in the front entryway of the place where he lived. The experimenter stood with his back facing the front door, with dog leashes and harnesses hanging from hooks on the wall to the left of the experimenter. A camera was mounted on a tripod, and placed in the living room directed towards the front entryway.

For Ranata, the experiment was conducted in the living room of a foster home where she had a limited reinforcement history. Another dog, which was not a subject in this study, was present at all times, and they were free to interact. The experimenter stood facing the L shaped couch with his back to the T.V., which was mounted on the wall. The T.V. was both, on and off,

during training and testing. A camera on a tripod was located in the kitchen and directed towards the couch.

Measurement

A total of eight behaviors were recorded across all subjects. Only behaviors occurring during trials were counted. The dependent variables for Jerry were the cumulative time interrupting, sitting, and lying down. The dependent variables for Rocky were the cumulative time barking, sitting, and lying down. The dependent variables for Ranata were cumulative time jumping, licking, mouthing, climbing, sitting, and lying down.

Of these eight behaviors, six were categorized as disturbing patterns. Disturbing patterns included jumping, mouthing, licking, barking, interrupting, and climbing on the E.

Jumping on experimenter began when the front two paws simultaneously broke contact with the floor; this continued until the paws made contact with the experimenter, and ended when either one or both of the paws returned to the floor. Jumping on furniture was not recorded. Mouthing experimenter began when an opened mouth oriented towards the E's body until the mouth and teeth or gums made contact with E; mouthing ended when contact was broken and head turned away. Contact with the front of the mouth did not count; to be recorded as an occurrence of mouthing, contact with teeth had to be made.

Licking experimenter began when the dog's mouth oriented towards the E's body, followed by the tongue making contact with the E, and ended when the head oriented somewhere else. Contact from tongue during mouthing was not recorded as a "lick", rather it is just part of the mouthing.

Barking consisted of the mouth opening accompanied by an abrupt audible sound. It began with the mouth opening, followed by an abrupt audible sound, and ended when the mouth

closed and the sound was no longer audible. Prolonged sounds more closely resembling howls or whines were not counted.

Climbing began when paws made contact with the E, followed by standing or walking on the E, and ended when contact from the paws is broken. Contact made while jumping was not recorded as climbing. Climbing on the E only occurred when the E was sitting on the couch.

Interrupting experimenter routine began upon approaching the E, followed by a disruption of the E's momentum or movement through space, and ended upon walking away from the E. Interrupting experimenter routines can occur while the E folds clothes, makes the bed, vacuums, or engages in a variety of other activities. During this study, interrupting experimenter only occurred during feeding routines.

Two of the eight behaviors recorded were categorized as target behaviors. Target behaviors include either sitting or lying down near the E. 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. Sitting began with a variety of topographies. For our purposes, recording began when any part of the S's haunches made contact with the floor and ended when contact was broken.

Lying down consisted of the dog's torso touching the floor in the chest and/or hip area, with the dog either laying on its chest, side, or back. Lying down began with a variety of topographies. For our purposes, recording began when both chest and hips made contact with the ground and ended when the chest, hips, or both broke contact with the floor.

Recording

All trials were videotaped with a camcorder on a tripod. Observations were made from

the recordings. For Jerry, observation began when the E walked toward food bin and ended when the E walked away. For Rocky, observation began when the E walked toward area where harness was located and ended when the E walked away. For Ranata, observation began when the E walked towards the couch and ended when the E walked away.

Reliability

Sessions were videotaped using a video camera positioned as described in the settings section. Data was recorded while reviewing the recorded sessions on a laptop computer. Recording for each trial began when the E entered the frame and ended as E began to walk away from S.

An observer was trained to collect interobserver agreement data (IOA) from video. The observer was provided with a data sheet, a list of behaviors, and their definitions. At the top of the data sheet were instructions to *Record the total amount of time these behaviors take place*. To record occurrences of sitting, lying down, barking, jumping, nipping, licking, or interrupting, the observer used the data sheet shown in the appendix, which restricts observations to the behaviors of interest for each trial. The observer recorded the total number of occurrences of target and disturbing behaviors and their duration. Prior to collecting any data, the observer was given an opportunity to ask any questions pertaining to the behavior definitions or observation requirements. She was also informed that she could stop the data collection process to ask questions that may arise while collecting the data. Instruction was provided not to discuss the data or change them after the fact.

IOA for the occurrence of behaviors was calculated by taking the total number of agreements and dividing them by the total number of agreements + disagreements times 100; this

is represented by the formula $A/(A+D)*100$. For this measure, IOA was 100% for 27% of trials for all subjects. IOA for the duration of behaviors was calculated by dividing the smaller duration by the larger duration and multiplying the number times 100; this is represented by the formula $Smaller\ Duration/Larger\ Duration*100$. For this measure IOA was 98% for Jerry 25% of trials, 99% for Rocky for 27% of trials, and 98% for Ranata for 30% of trials.

General Procedures

There were 3 procedures: baseline, response shaping, and stimulus shaping. Each procedure by itself was a miniature program relevant to the whole.

Preliminary Assessment

A modified questionnaire, as described by Goldiamond (1974), was used to aid in the selection of the target outcomes and change procedures. The first question asked of caretakers was, *assuming a successful solution, what would the outcome be?* Initial answers included that the dog would calm down or that the dog would be good. A follow-up question, *what would they be doing when being good*, was asked to help clear up the fuzzy goals and create observable, measurable objectives. Soon afterwards, it was decided that under certain conditions, ranging from returning home to presenting a leash, that approaching and sitting or lying down for critical consequences was the desired outcome. The third question, *what skills are strengths were currently available that are related to the target pattern*, made obvious what was already “known” that each S had an extensive history of sitting and lying down. This made apparent that the behavior change necessary was not to teach a new response, but to bring a behavior that is already part of the repertoire to occur under the control of conditions that had not affected the

behavior before (Goldiamond & Thompson, 1967/2004, Mager & Pipe 1970/1984).

As suggested by Mager and Pipe (1970/1984), the programming challenge was then to re-allocate reinforcement to favor sitting and lying down; however, as has already been pointed out, using the critical consequences maintaining hyperactive patterns to shape alternatives can present problems, if constraints demand the use of extinction. This is often the reasoning for introducing conditioned reinforcers to aid in the establishment of the response; however, as has already been made apparent, the challenge is not to establish a new behavior, but to get a behavior that has occurred in the past to occur under different conditions that have not controlled it prior. The next question that needed to be answered, but was not asked to caretakers, is what patterns are available as entry repertoire in a behavior-change program that could avoid relying on extinction or hoping for transfer from the controlling conditions in training to the test conditions.

Since sitting and lying down were already in the S's repertoire, conditions that occasioned sitting or lying down were analyzed to discover patterns that could conceptually permit criterion-related changes to the terminal stimulus requirements of the target objective (Ray, 1969). Since occasions that include using food or a play activity as a reinforcer involve additional stimuli in the environmental arrangement that are not specified in the terminal stimulus, their use may increase program complexity; however, each S would approach their caretakers throughout the day to be petted. Both Jerry and Ranata, in various conditions, approach people with all four paws on the ground to be petted. Rocky approaches and sits to be petted in a variety of conditions. Since using affection did not involve additional environmental stimuli that would need to be "faded" out, it was decided that petting was to be used as a reinforcer to shape the terminal outcome. The use of petting as a reinforcer adds another experimental question to the study: whether petting, through gentle strokes and scratches, is

sufficient to be used as a reinforcer in a behavior change program.

Baseline

Over the span of several days, at various times throughout the day, E conducted baseline trials, testing seven conditions that dogs and their owners typically engage in daily. These conditions included: coming-home-to-dog; walking-outside-to-dog; sitting-on-the-couch; and presenting-dog-with-leash, toy, food, or brush. During these trials, Ss were free to come and go as they pleased.

The trials for coming-home-to-dog were set up with the S in the house and the E standing on the front porch; walking-outside-to-dog were arranged with the S in the backyard and the E standing inside the back door. All other trials were arranged with both the S and the E inside the house.

A trial for coming-home-to-dog began when the E opened the front door, walked through the opening, shut the door, and stood in the front entryway. Trials for walking-outside-to-dog began when the E opened the back door, walked through the opening, shut the door, and stood on the back porch. Trials for sitting-on-the couch began when the E walked to the couch and sat down to watch TV. During each of these conditions, the contingencies were similar. If the S approached within arm's reach, the E touched the S face, neck, back, and legs with gentle but firm strokes or scratches, referred to by most dog owners in the United States as petting. Petting was delivered cyclically independent of disturbing or target behaviors; it was provided for anywhere between 3 and 5s, withdrawn for between 3 and 5s, then again provided, and again withdrawn. The E basically ignored licking and barking. If jumping occurred, the E tried to stand firm and follow the procedure. But for nipping, the E moved away and ended trial if it became

painful for the E to endure. A trial was discontinued after 25s elapsed. If the S walked away before 25s elapsed, petting was discontinued; if the S walked away and did not return within 10s, the trial was discontinued; if the S returned before 10s elapsed, cyclic petting was again provided. If an approach did not occur within 10s of walking-through-the-door or sitting-on-the-couch, the trial was discontinued.

For the leash, toy, food, and brush baseline, a trial began when the E walked to where these items were kept, picked the item up, and held it briefly. The contingencies were again similar to the other baseline conditions, except the consequences changed. If the S approached to within arm's reach from where the trial-specific item was picked up, the E provided the consequence typical to that particular environmental situation. For example, when an approach occurred during the leash condition, the leash was fastened, marking the end of the trial, followed by a walk outside. The length and time of walks varied. When an approach occurred during the toy condition, the E threw a ball the S would run after, or dangled a rope the S would tug. And when an approach occurred during the food baseline trials, food was provided. When an approach occurred during the brush condition, the E brushed cyclically for anywhere between 3 and 5s, withdrew brushing for between 3 and 5s, then again brushed, and again withdrew brushing. A trial was discontinued after 25s elapsed. If the S walked away before 25s elapsed, brushing was discontinued; if the S walked away and did not return within 10s, the trial was discontinued. Also, if an approach did not occur within 10s, the trial was discontinued. For each of these conditions, the trial-specific consequences were delivered independent of target and disturbing patterns being recorded.

Shaping Overview

The necessary entry repertoire for the shaping program was approaching people. Shaping consisted of three steps. The goal for the first step was to go from approaching and jumping and barking at the E to approaching and sitting or lying down in front of the E. The goal for the second step was to increase the duration of sitting or lying down in front of the E. And the goal for the final step was to expand the controlling conditions of sitting and lying down to resemble the environmental arrangement that occurred during baseline.

Shaping Step 1: From approaching and jumping to approaching and sitting. A trial began when the E walked to the same area that occasioned the disturbing pattern in baseline, and then stood still rather than carrying out the chain that occasioned the disturbing pattern. For example, Jerry would interrupt the feeding routine at the exact moment the E touched for the food container. So here, the E walked to the same spot he would when reaching for the food container, but instead of reaching out and touching the lid, the E stood up straight and looked at the S. Since Rocky's barking was occasioned by reaching out and touching of the leash, the E walked to the exact spot he would have to be at to reach out and touch the leash; but instead of doing so, he stood up straight right next to them. And for Ranata, whose disturbing patterns were occasioned by sitting on the couch, the E walked right in front of the couch, turned around with his back to the seat, and continued standing upright.

When an approach occurred to within arm's reach, petting, in the form of gentle strokes and scratches, to the head and back, was provided with one hand. Petting continued as long as the S remained within arm's reach without any disturbing patterns occurring. If the S walked away, began to jump, or any disturbing pattern occurred, petting was discontinued. Petting resumed when either another approach occurred, all four feet returned to the ground, or the

disturbing pattern was no longer occurring. When sitting or lying down occurred, petting was provided continuously with two hands, still gentle, but more firm (like that of a light massage). In this way, target patterns were met with steady states of petting. If the S stood up or began to engage in disturbing patterns, petting was discontinued, and only resumed when target patterns occurred without any disturbing pattern occurring simultaneously. Target objective for this was an approach followed by either sitting or lying down near the E for petting to occur when the E walks to a specified location and stands still. The objective for this step was to establish sitting and staying for 30 consecutive seconds of petting without standing up or any occurrence of disturbing patterns being recorded; mastery criterion required success across 5 consecutive trials.

Shaping Step 2: From approaching and sitting to extended sitting and staying. A trial began when the E walked to and stood still in the same area as in Shaping Step 1. Once an approach occurred, the E waited up to 5s for sitting or lying down to occur. And when sitting or lying down occurred, the E bent down and petted S with two hands for a duration ranging from 3 to 10s, then removed his hand briefly, maybe half a second, and then, as long as sitting or lying down was still occurring, resumed petting. The time in between petting began with very short intervals, and was gradually increased to a duration of 10s. Once the time of this “petting loop” afforded, the E stood up straight, with the same posture as when the trial began. If at any time during the trial the S stood up, walked away, or engaged in any disturbing patterns, the E just continued to stand there and wait for sitting or lying down to resume. If at any time during this procedure, sitting or lying down did not occur, but the S was within arm’s reach for longer than 5s, the E reached out and petted with one hand just as in Shaping Step 1. The objective for this step was to increase sitting and/or lying in front of the E to a duration of 10s across 5 consecutive “petting loops” without the occurrence of any disturbing patterns; mastery criterion required

success across 5 consecutive trials.

Shaping Step 3: from extended sitting and staying to sitting under the test conditions.

During this shaping step, a trial began when the E walked to and stood still in the same area as in Shaping Steps 1 and 2. Once an approach occurred, the E waited up to 5s for sitting or lying down to occur. When sitting or lying down occurred, the E bent down and pet the S with two hands for a duration ranging from 3 to 10s, removed his hands, stood up straight, changed the environmental arrangement to resemble the initial link of the chain that occasioned the disturbing pattern in baseline. For Jerry, this included reaching towards the food bin; for Rocky, this included reaching towards the leash; and for Ranata, this included squatting over the couch cushions. As long as sitting or lying down continued throughout the change, the E returned to pet the S. For the first trial, the objective was to maintain sitting or lying down across 5 consecutive petting loops that included the initiating link of the chain that occasioned the disturbing behavior. If sitting or lying down maintained over consecutive loops at one criterion, the changes that occurred during the loop progressed gradually until the changes included the “almost terminal links” of the chain that occurred, or could potentially occur, just prior to the terminal link, the presentation of the trial-specific consequence. If at any time the subject walked away or engaged in disturbing behaviors, the E stood up straight. When sitting or lying down resumed, the E petted the S with two hands for a time ranging from 3 to 10s, stopped petting, stood up straight, and changed the environment to resemble the link that occurred during the last successful loop.

The sequence of stimulus changes for Jerry consisted of reaching toward the food bin, touching the lid briefly, touching it for durations up to 5s, lifting the lid, reaching inside for durations up to 5s, and a shuffling sound created by stirring the food with a measuring cup. The almost terminal links consisted of scooping out food with a measuring cup, and holding it out for

up to 10s, and high above the S's head, moving it around in front of the E, holding it next to the food bowl, and tapping it against the food bowl. The terminal link was dumping the food into the bowl. The sequence of stimulus changes for Rocky included reaching for the harness, touching it, moving it, lifting it off the hook up briefly, and holding it out for up to 10s. The almost terminal links included holding the harness next to the S, spinning it around, unfastening and fastening the clasp, and therefore creating a clinking sound. The terminal link was putting on the harness. The stimulus changes for Ranata consisted of walking around in front of the couch, touching the couch in different spots, squatting over the couch cushions, and briefly sitting on the couch. Almost terminal links consisted of approximations to the E sitting on the couch. The terminal links were E sitting on the edge of the couch with their elbows on their knees, lying back with arms on the back support, and sitting and pointing a remote control at the television.

The objective of this step was to maintain sitting or lying down across 5 consecutive petting loops that consisted of at least one of the almost terminal links without any disturbing behaviors occurring; and the mastery criterion required success across 5 consecutive trials.

Return to Baseline

The return to baseline was an exact replication of baseline procedures. If target patterns present and disturbing patterns are absent, a few more trials were conducted to test for maintenance. If sitting or lying down did not occur in the first trial, a stimulus control procedure was used to transfer the sitting from the training conditions to the test conditions.

The objective of this condition was to expand sitting or lying down from the E standing still to include the original conditions present during baseline trials. A trial for this condition began when the E went through the chain that occurred during baseline; but this time, it stopped at the initial link that occasioned the disturbing behavior in baseline, and waited 5s for sitting or

lying down to occur. When sitting or lying down occurred, the E presented the critical consequence provided in baseline: Going for a walk was the critical consequence in the presenting-dog-with-leash condition; playing fetch or tug-of-war was the critical consequence for the toy condition; petting was the critical consequence for the coming-home-to-your-dog, walking-outside-to-dog, and sitting on the couch conditions. If sitting did not occur within the 5s window, the E returned to standing still, and waited for sitting or lying down to occur. This continued until the latency for the occasion-behavior relation matched the latency of the disturbing pattern during baseline. This step was only necessary for Jerry.

For Jerry, a trial began when the E walked into the kitchen and touched the lid of the food bin, which was followed by standing up straight in the same spot. When Jerry sat or lied down after the occurrence of the E standing up, the E petted S for 30s, and then ended the trial. The time between the preceding change of touching the food bin, and the subsequent change of standing up, was gradually increased across trials. When sitting or lying down occurred while the E was touching the food bin, the E then opened the food bin, scooped out food, and poured it into the bowl. These trials continued until sitting or lying down occurred without the E pausing.

RESULTS

Each subject's results were graphed cumulatively. Cumulative duration is shown on the y-axis across trials, which is shown on the x-axis. Cumulative duration represented the change better than cumulative frequency.

Figure 1 shows the cumulative duration for sitting and lying down in seconds for Jerry during food baseline, shaping, and return to baseline. Figure 2 shows the cumulative duration for interrupting in seconds for Jerry during food baseline, shaping, and return to baseline.

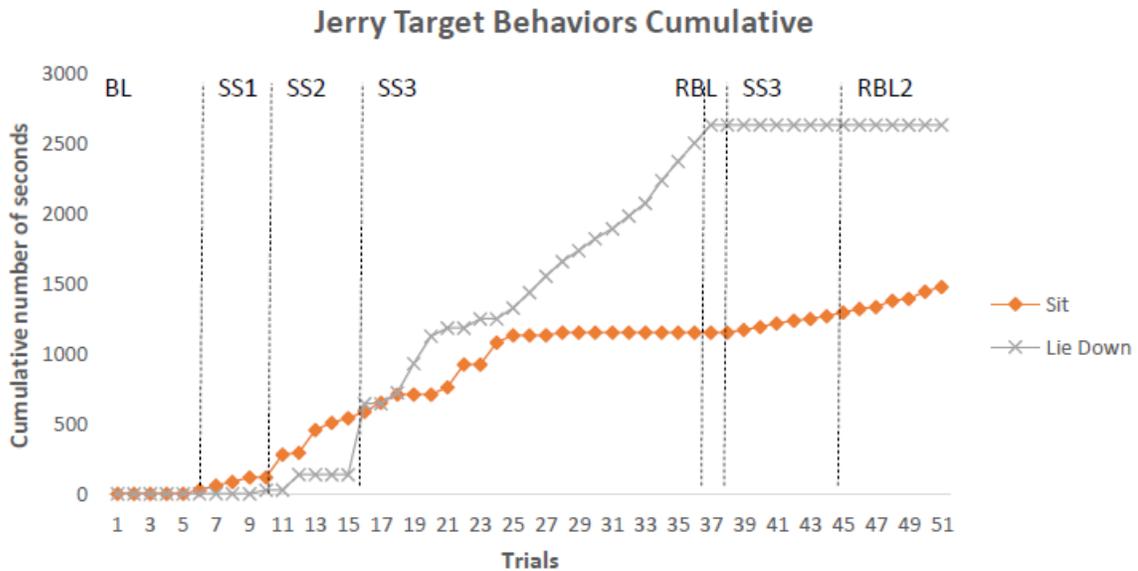


Figure 1. Cumulative graph of Jerry's sitting and lying down (y-axis) across trials (x-axis).

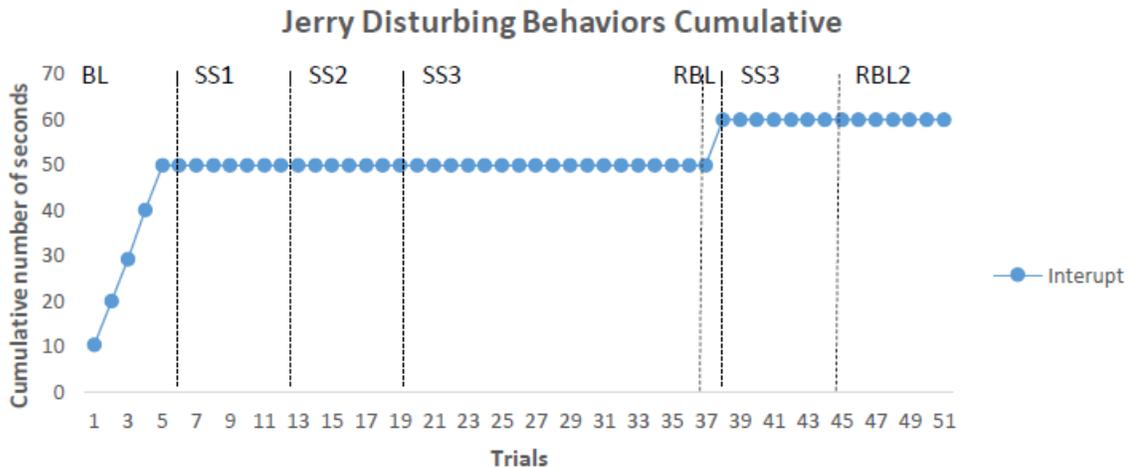


Figure 2. Cumulative graph of Jerry's interrupting (y-axis) across trials (x-axis).

During baseline trials, Jerry interrupted the E's routine by hovering over the food bowl and eating food out of the scoop during the food condition on every trial. Jerry positioned himself between the bowl and the food bin right when the E touched the lid of the food container until food came out, at which point Jerry then reached for the scoop with his mouth while it was moving towards the food bowl. During shaping trials, the frequency of interrupting disappeared; and the frequencies of sitting and lying down, which were absent prior, made an immediate jump, followed by stable frequencies. The target pattern did not occur during the return to baseline, so the cumulative seconds for an additional stimulus control procedure are also shown. After 8 trials of this delayed cue procedure (Touchette, 1971), the latency between touching the food bin and sitting was the same latency as the disturbing pattern during baseline. The target pattern occurred consistently without any interruption across subsequent return to baseline trials. Establishment of the target outcome required 41 trials, spanning 2hr over 14 days.

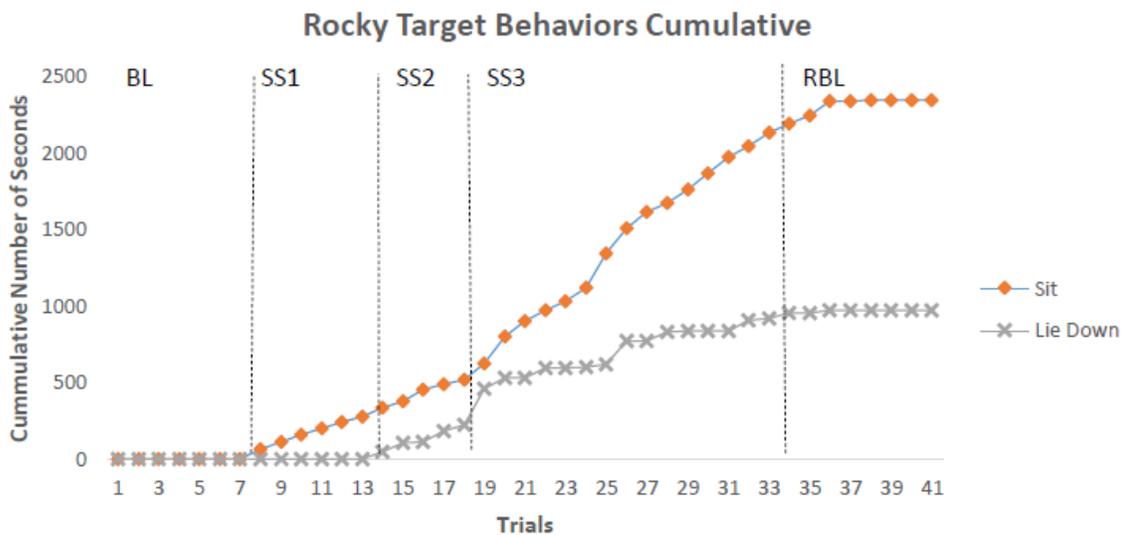


Figure 3. Cumulative graph of Rocky's sitting and lying down (y-axis) across trials (x-axis).

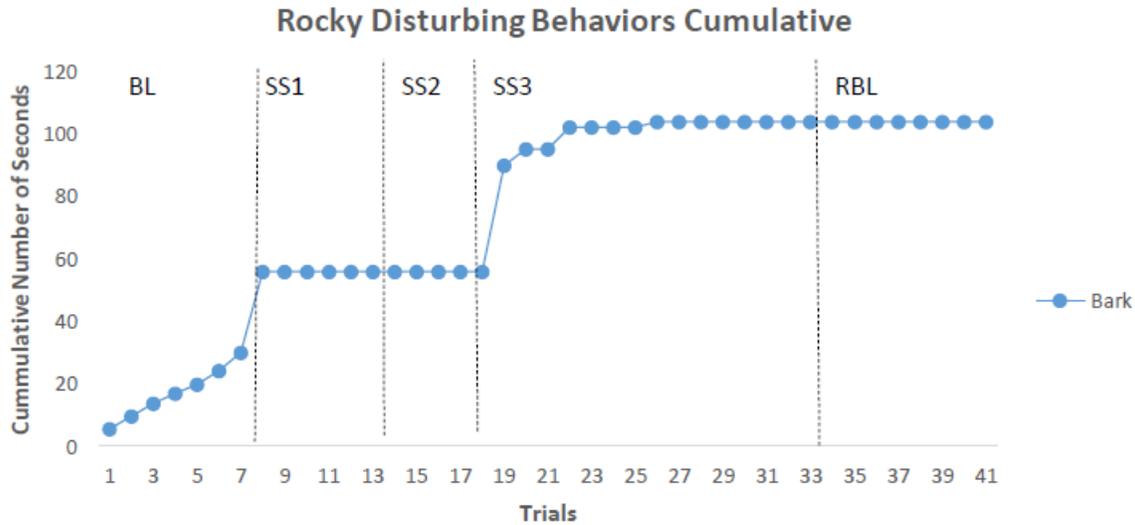


Figure 4. Cumulative graph of Jerry’s barking (y-axis) across trials (x-axis).

Figure 3 shows the cumulative duration of sitting and lying down in seconds for Rocky during leash baseline, shaping, and return to baseline trials. Figure 4 shows the cumulative duration of barking in seconds for Rocky during leash baseline, shaping, and return to baseline trials. These include a six-month and two-year follow up.

During baseline trials, it was determined that when E touched the leash, Rocky barked until the E bent down to put the leash on. At the first trial of Shaping Step 1, Rocky barked when E stood still next to the leashes. This did not occur prior to baseline testing, and may have been influenced by the routine of using a camera to film baseline and shaping trials. After a few seconds though, barking ceased and sitting then occurred, which was then provided with 30s of petting. Over the next 5 trials, sitting occurred without any barking, then maintained across the following shaping steps.

Barking occurred for short durations during stimulus shaping of Shaping Step 3. During the second and third trials of this step, barking was occasioned by E’s use of two hands to pick up leash, instead of reaching out and touching it with one, as on earlier successful trials. On the fourth trial of Shaping Step 3, barking was occasioned when the E moved the leash down to his

side, next to Rocky’s face. Barking was also later occasioned when the E shook the leash back-and-forth. Each of these events that occasioned barking were included in the final trials, which counted towards mastery criterion. The target pattern occurred on the first return to baseline trial and maintained during a 6-month and 2-year follow up. Establishment of the target outcome required 29 trials, and the total amount of time involved was just over 1hr spanned across 13 days.

Figure 5 shows the cumulative duration of sitting and lying down in seconds for Ranata during sitting-on-the-couch baseline, shaping, and return to baseline trials. Figure 6 shows the cumulative duration of jumping, climbing, licking, and mouthing in seconds for Ranata during sitting-on-the-couch baseline, shaping, and return to baseline trials.

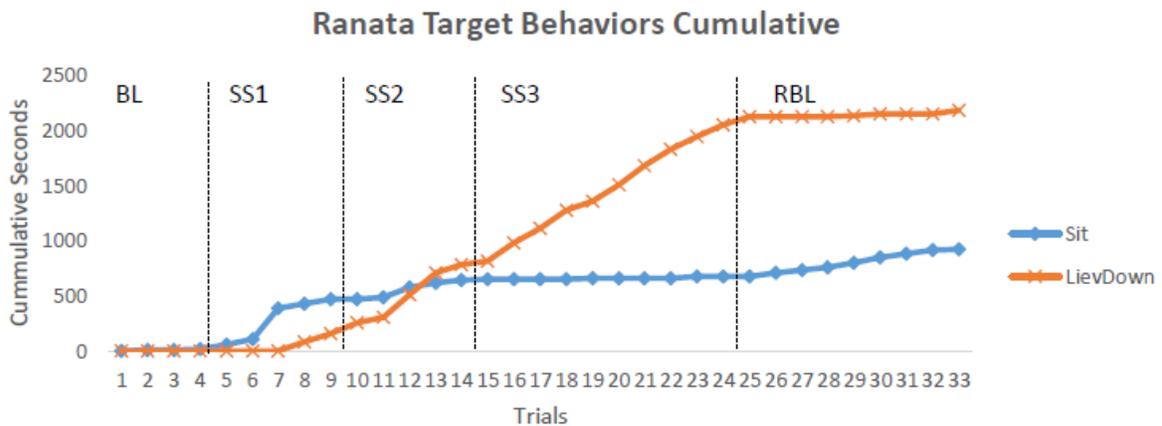


Figure 5. Cumulative graph of Ranata’s sitting (y-axis) across trials (x-axis).

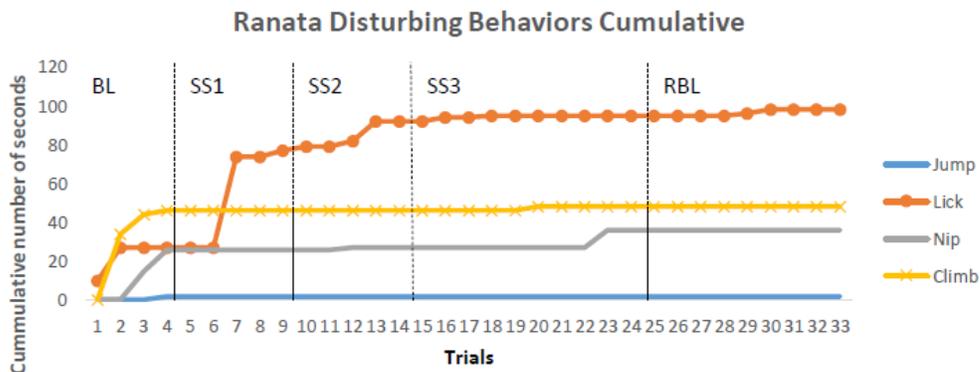


Figure 6. Cumulative graph of Ranata’s jumping, licking, nipping, and climbing (y-axis) across trials (x-axis).

During baseline trials, whenever the E sat on the couch, climbing, mouthing, or licking occurred throughout the entire trial. For two baseline trials, sitting was occurring when the trial began, yet only remained for a brief duration. Two baseline trials were ended before 30s passed due to mouthing that was too painful for the E to endure. Once Shaping Step 1 began, sitting and lying occurred and were maintained throughout the shaping procedures while the disturbing patterns were virtually nonexistent. Licking occurred for a total of 1 minute and 18 seconds in 14 of 21 trials, whereas sitting or lying down occurred for a total of 45 minutes. When the E sat-on-couch in return to baseline trials, sitting occurred immediately for a duration of 4 minutes, whereas licking, the only disturbing behavior to occur, did so for only a duration of 2 seconds. On the fourth and fifth return to baseline trial, the E sat down with a remote control and turned the T.V. on; and on the seventh trial, the E sat down with a laptop. For Ranata, the target outcome required only 21 trials, taking 1hr and 15m spanning over 12 days.

DISCUSSION

Disturbing hyperactive patterns of behavior persisted for all subjects throughout various baseline conditions. Jerry persistently interrupted the feeding routine; Rocky barked incessantly when a harness was picked up; and Ranatta jumped, nipped, barked, and crawled all over people to interact with them. When the program was introduced, these disturbing patterns virtually disappeared, and were replaced with the target patterns almost without the occurrence of the disturbing behavior. For Jerry and Rocky, where eating and going for a walk were the critical consequences maintaining the disturbing pattern, the program began with alternative available patterns where petting was a reinforcer; target control was shaped from there. For Ranatta, where interaction was the critical consequence maintaining the disturbing pattern, the current relevant repertoire used was approaching to be pet in contexts that did not occasion the disturbing patterns. Each change in the contingencies was criterion related and control was maintained through the program. When disturbing behavior occurred, the E regained control by backtracking to previous control in the program and proceeded by reducing the step-size to avoid failure. In return to baseline conditions, the target pattern occurred immediately for Rocky and Ranatta. For Jerry, an extra stimulus-control procedure was used to shape sitting when the food bin was touched.

The results show that for all of the subjects the constructional approach to human-animal interaction issues was successful at interposing a desired behavior within a contingency with a long history maintaining hyperactive behavior. This approach viewed hyperactive patterns of behavior not as maladaptive, or a problem in of itself, but as rational patterns of behavior governed by critical consequences. Contrary to other approaches to dealing with hyperactive patterns of behavior that failed to specify the objective in positive terms (Dorey et al., 2012; Hall

et al., 2014; Protopopova et al., 2016), the constructional approach used here specified the target behaviors and the conditions under which their occurrence would be reinforced. Contrary to approaches that only superimpose arbitrary contingencies over hyperactive patterns, which result in these critical consequences being foregone (Hall et al., 2014; Protopopova et al., 2016), the constructional approach ensured the target patterns produced these reinforcers for the Ss just as effectively, if not more so. Furthermore, the constructional approach used contrasted from the pathological approaches in that it identified alternative available patterns and current-relevant repertoires that were used in an errorless behavior change program. Finally, perhaps most importantly, where prior approaches produced effects that were merely transient, lasting only as long as the procedures were in effect, the constructional approach used here was effective at establishing the outcomes specified prior to treatment, and maintaining them years after the procedures were removed.

Affection as a Reinforcer

Prior to this study, Patricia McConnell (2002) expressed caution, asserting that approaching a dog and reaching your hand out can serve as a warning stimulus to the dog, releasing fear or aggressive patterns. There is no evidence for this universally; but under certain conditions, reaching towards a dog could potentially result in aggressive or fearful distancing behavior from the dog (Snider, 2007). Alternatively, it has also been suggested that under certain conditions affection would be a particularly potent reinforcer for dogs as well as other animals (Feuerbacher & Wynne, 2012; Feuerbacher & Wynne, 2014; Feuerbacher & Wynne, 2014; Pryor, 1984; Schneider, 2014). Pryor (1984) found that when dolphins, horses, and several species of zoo animals were clicker-trained, they would later become docile and approach people

to be petted. Experimental evidence also exists suggesting that affection from people, in the form of petting, would be a potent consequence with domestic dogs (Feuerbacher & Wynne, 2012; Feuerbacher & Wynne, 2014). That affection is a reinforcer for domestic dogs, and probably other animals too, is not really disputed as there is considerable anecdotal evidence to suggest so (see Schneider, 2012). Our procedures showed unequivocally that affection was a potent reinforcer for the participant dogs. And not only was it a potent reinforcer, the Es were able to harness it and use it in a program.

Conclusion

During initial baseline conditions, hyperactive patterns persisted among all the Ss; however, after shaping, the Ss were calmly and politely sitting and lying down for a variety of critical consequences. The constructional approach, which utilized the control-analysis strategy, to teaching functional alternatives to hyperactive patterns of behavior with dogs, was successful. The explicit goal, determined prior to training, was arrived at for each S. In all cases, current assets (e.g. affection as a reinforcer) and current relevant repertoires already occurring (approaching, sitting, lying down) were utilized. The procedures used were errorless, meaning we started with old controlling relations and gradually shaped this into new control. When control was disrupted, that criterion for petting was relaxed and then increased across proceeding opportunities. Also, when the target pattern did not occur upon the first return to baseline trial for Jerry, another stimulus-shaping procedure was used. And finally, the identification of maintaining variables, and the explicit change in program steps to bring trained behaviors into contact with these variables, proved sufficient to maintain the target patterns when the procedure was eventually removed. The caretaker wanted the dogs to “sit and be calm.” The dogs wanted

certain critical consequences. By aligning these consequential contingencies (cf., Gilbert, 1978/1996), not only was a systemic solution produced, but the foundations for a relationship were put into place.

APPENDIX A
MODIFIED CONSTRUCTIONAL QUESTIONNAIRE

1. Assuming a successful outcome, what would the outcome be?
2. What would that look like?
3. What skills or strengths are currently available that are related to the target pattern?

APPENDIX B
DATA SHEETS

Data Sheet

Subject: Ranata

Observer name: _____

Record the total amount of time these behaviors take place.

Jumping on experimenter began when the front two paws simultaneously broke contact with the floor, this continued until the paws made contact with the experimenter, and ended when either one or both of the paws returned to the floor. Jumping on furniture was not recorded.

Mouthing experimenter began when an opened mouth oriented towards the E body until the mouth and teeth or gums made contact with E; mouthing ended when contact was broken and head turned away. Contact with the front of the mouth did not count; contact with teeth had to be made to be recorded as an occurrence of mouthing.

Licking experimenter began when the dog's mouth oriented towards the E body, followed by the tongue making contact with the E, and ended when the head oriented somewhere else. Contact from tongue during mouthing is not recorded as a "lick", rather it is just part of the mouthing.

Climbing began when paws made contact with E, followed by standing or walking on E, and ended when contact from the paws is broken. Contact made while jumping was not recorded as climbing. Climbing on experimenter only occurred when E was sitting on the couch.

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. Sitting began with a variety of topographies. For our purposes, recording began when any part of S butt made contact with the floor and ended when contact was broken.

Lying down consisted of the torso touching the floor in the chest and/or hip area, with the dog either laying on the chest, side, or back. Lying down began with a variety of topographies. For our purposes, recording began when both chest and hips made contact with the ground and ended when the chest, hips, or both broke contact with the floor.

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