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Does The Manipulation of Tail Position Facilitate Extinction of Canine Phobic Behavior?

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DOES THE MANIPULATION OF TAIL POSITION FACILITATE EXTINCTION OF CANINE PHOBIC BEHAVIOR?

A Thesis

by

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ABSTRACT

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The phobic behavior of interest is tail tucking which is indicative of submission. In this study the tail was physically manipulated by the use of a custom made harness to hold the tail up in a dominant position to ideally extinguish phobic behavior through reciprocal inhibition. The harness did not hold the tail up the entire duration of the interventions, although it still held the base of the tail up. The intervention did not appear to have an affect on the two of the five subjects. The three more phobic canines did display some behavioral changes, although the changes noticed were not expected measures so they were not quantified. The changes observed are based on behavioral observation.

DEDICATION

The desire and motivation to complete my master studies could not have been possible without the love, pestering, and encouragement from my family, friends, and my beloved four legged companions. Thank you Mom, Maggie Zárate, Dad, Miguel Zárate, Adrian S. Perales, and Adrian O. Garza. A very special thank you to my four-legged brother Dwezel and my baby girl Whiskey who inspired me to conduct this research. I could not have done it without you all.

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I am forever in debt to my extraordinary committee chair, Dr. Fredrick Ernst, for believing in my every move. Another huge thank you to my committee member Dr. Robert Dearth for encouraging all of my outlandish ideas and to Dr. Wendy James-Aldridge for your conciseness in reviewing draft after draft. Thank you to the psychology graduate program for helping fund this experiment.

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CHAPTER I

INTRODUCTION

Dogs, through fixed action patters and learned behavioral conditioning, produce a variety of responses in anxiety provoking situation, typically with the overt behavior, phobic behavior, and covert autonomic response, such as the fight or flight response. This is typically an adaptive response that functions to protect the dog. The problem arises when these phobic behaviors and autonomic responses are being elicited inappropriately when stimuli that are threatening are over generalized to stimuli that are not directly threatening. The response can then become maladaptive. Constant fight or flight activation can have a number of negative biological consequences, such as lowered immune system response. Constant phobic behavior can also have negative effects on confidence levels and social relationships with other dogs and humans.

The overt purpose of this study is to learn more about the canine tail and its possible role in directing feelings of anxiety, specifically on a guided walk. The knowledge gained from this study could potentially provide a new therapeutic tool to help an anxious dog become more confident. This could help the dog by reducing the anxiety in general, but it could also help reduce fear induced attacks towards other dogs and humans. Little research has been conducted on the canine tail. The canine tail can send a number of subtle messages to other dogs and to humans, if humans learn to read them. In addition, this research will attempt to answer or at least add more information to

the question, “Does the dog wag the tail or does the tail wag the dog?” The possible application of behavior modification to induce biological change is the underlying premise of this study.

In this experiment, the goal was to extinguish these phobic behaviors by reciprocal inhibition. Ideally, the posture change would reduce anxiety and counter the fight or flight response enough that it cannot continue due to a) a lack of sympathetic arousal and/or b) activation of the parasympathetic nervous system to reduce any anxiety not countered initially by the intervention and aid in a quick return to homeostasis, thus creating a calmer and more confident dog.

CHAPTER II

REVIEW OF THE LITERATURE

Canine Development

For the first two weeks of life puppies rely on their mother for nourishment and care; this is known as the neonatal period. At this stage in life puppies do little more than sleep and eat (Thorne, 1997; Grant, 1987). The next phase of life is known as the transitional phase, and as the name suggests there is a rapid change in development. During this phase, sensory input becomes more refined. A puppy's ears and eyes start to open and they begin to attempt walking as opposed to crawling. Although all phases are necessary and important in development, the socialization period is the pinnacle. In this stage, puppies are now equipped to analyze input from the external world and respond accordingly. Social signals, such as the play bow and tail wag, become evident during this phase which can be observed as early as the third week of life and are usually fully established by the 49th day (Thorne, 1997; Coren, 2004).

At around the third and forth weeks, puppies begin playing with one another and become all around more social creatures. The tail starts to wag and display other messages. For example, two puppies could be playing but one bites the other too hard. The bitten puppy may walk away and end play, a form of negative punishment. The biter may then approach the offended pup in a submissive stance with his tail lowered along

with a lowered body position, as well. This communicates to the other, “I mean no harm.” This socialization is necessary to ensure the dog will be able to read the body language and intentions of fellow canines (Coren, 2004). It is during the socialization period that dogs begin to learn what is and what is not acceptable behavior through social interaction with their mother and siblings. Furthermore, dominant and subordinate behaviors and interactions displayed during this period may facilitate the knowledge and acceptance of social hierarchies among the canine world that will be necessary in maintaining order (Thorne, 1997).

There is a critical period for canines to be socialized with other dogs and humans (Thorn, 1997). It is speculated the period between four and eight weeks of age is the main social relationship forming time. There is a critical period in which a dog has the capacity to create new social attachments with humans and dogs which is around the 6th to 8th week period (Fox, 1978). If dogs are not socialized with other dogs by around the 8th week the dog usually becomes aggressive or fearful towards other dogs. Scott and Fuller (1965) raised puppies with no human interaction between the ages of four and twelve weeks of age. These puppies were consistently fearful of humans and remained virtually untrainable. Studies have also shown, in addition to initial socialization during the 6th to 8th week period, subsequent reinforcement is necessary. If a pup has been socialized with humans but was then isolated at around three to four months of age, the pup would become very leery of strangers (Wooply, 1968) and act inappropriately.

One potential reason these isolated dogs may act inappropriately is because they do not learn the appropriate dominant and submissive roles and signals that govern social interactions (Thorne, 1997). For example, if a dog does not learn that the human is the

dominant leader to whom they should submit, there could be confrontation. In the canine realm, if a dog was hand reared by humans, they display much less tail wagging (Coren, 2004). Humans may not be fazed by this but in the canine world it could be a potential communicative handicap. These handicapped dogs may act inappropriately with other dogs by jumping up and rushing or in some instances growling, barking, and fighting with other dogs. They typically do not know how to behave and in many instances end up causing trouble because of their lack of social skills, such as a disregard for a dog with raised hackles or a vertical tail, which is typically indicative of a threat or they may ignore another dog's submission attempts and provoke a fear induced attack. The opposite could be observed as well. Some dogs learn only to act a certain way. Being submissive also lets other dogs know how to treat the individual (Lindsay, 2000). If the dog is being submissive, the other dog may take the opportunity to be the dominant individual which reinforces the submissiveness in the other dog (Schenkel, 1967).

Dominant & Submissive Behavior

Canines have various methods of communicating and social ordering. "Facial expression along with body posture which includes tail position are considered accurate indicators of a dog's changing moods and intentions" (Lindsay, 2000, pp. 378). Body language which can include ears, hackles, stance, head, body position, and tail position can communicate the degree of dominance or submission toward fellow pack mates, among other things (Mech, 1974). For example, a dominant canine will usually display erect ears, expose the teeth, and stand tall and stiff, with the tail in a vertical position. The main focus of this study is body language and visual cues. The dominate individual can usually be identified by his upright tail carriage (Schenkel, 1967). The subordinate

canines will cower, fold their ears back, and the tail is usually tucked between the legs or down to one side, indicating submission (Schenkel, 1967). Submission functions to reduce aggressive attacks. In essence, the submitter is communicating to a threatening source that the submitter is not a threat and does not want to prompt a fight. Dominance and submission, ideally, function to maintain harmony (Schenkel, 1967; Lorenz 1953).

The positions of the head, ears, and tail will be used as a measure of a dog's level of dominance and submission. In canines, their tail is one of the visual cues that can relay a number of different messages to another canine, such as "Go away," "I'm ready to fight," or "I am happy, let's play!" The message is dependent in part to the position of the tail.

Figure 1 illustrates different tail positions, a) through c), which are all varying levels of tail tuck, are all examples of submission increasing in severity from a) minimal to c) severe. Position d), a relaxed hanging tail, is a calm and relaxed posture. Position e), a straight tail in relation to the horizontal plane, could be indicative of curiosity, a threat, or anxiety. Position f), upright tail position, could mean the dog is confident and dominant. Each position has to some degree a level of variability. To accurately gauge the intentions of a canine, other signals, such as ear and head position, need to be taken into account as well because some signals may not be as strong or accurate in some individuals.

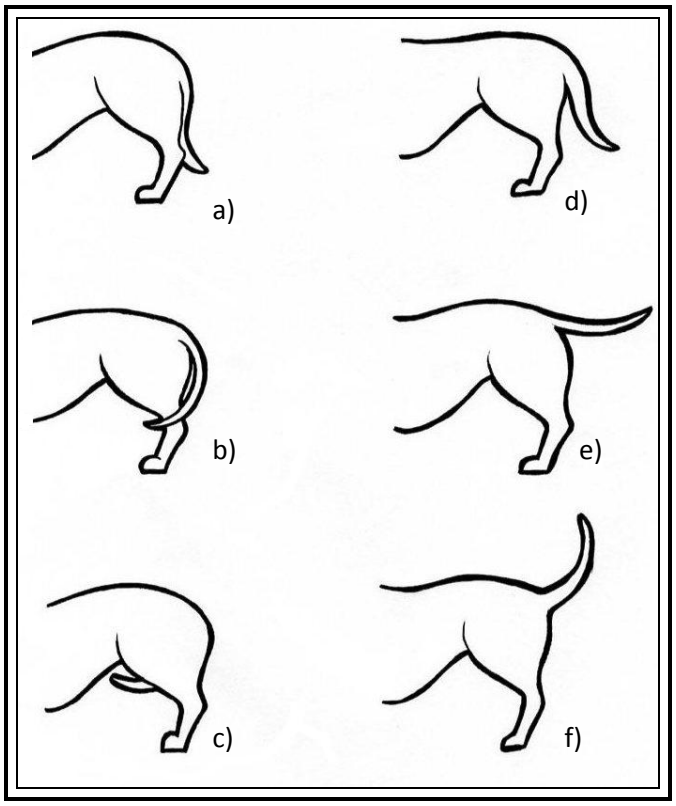


Figure 1. Tail Position, a) slight submission, b) moderate submission, c) strong submission, d) relaxed, e) curiosity, and f) confident or dominant. (Illustrations by R. Zarate, 2010)

Figure 2 shows four of the possible head positions in dogs. Position a) shows a dog with a lowered head (in relation to its horizontal body plane) which could be indicative of submission, avoidance, or how tired the dog it. Position b) is a straight head position which could mean the dog is submitting slightly, tired, or calm. Position c) is a dog turning his head away which could be due to an interesting stimulus or could be another type of avoidance submission. Position d) is a dog with his head up which is usually a confident or dominant position. The head position can also give some indication of the dog's eye gaze. A submissive dog will avert his head and eyes from a threatening individual. The main head position being measured in this study is head turns, specifically nonfunctional, phobic head turns.

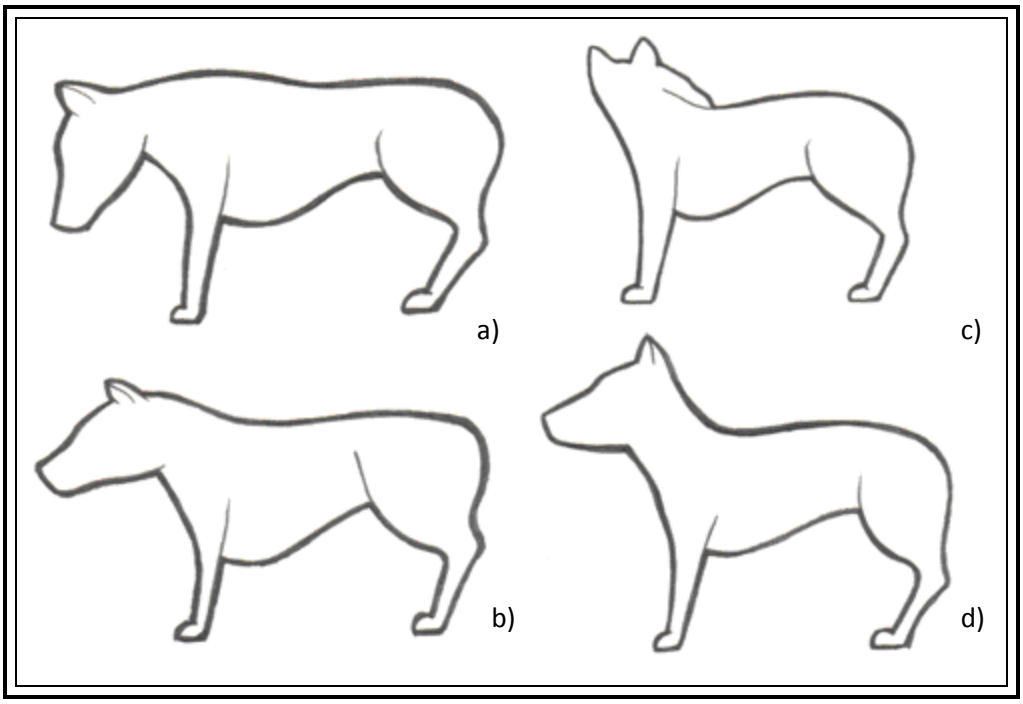


Figure 2. Head Position, a) submission, b) calm, c) interest or avoidance, and d) confident or dominant. (Illustrations by R. Zarate, 2010)

Humans and dogs alike have to deal with social ordering and hierarchies. Humans also display a certain level of dominance and submission in social situations. Dominant humans hold their heads up high, have more direct eye contact, and stand tall and straight in a more confident manner. Submissive humans typically slouch, avert their eye gaze, and hold their heads low (Kunz, 2007). Charles Darwin (1872, pp. 263) even touched on the posture exuded by a dominant. “A proud man exhibits his sense of superiority over other by holding his head and body erect.” These behaviors have been correlated with degrees of pride or confidence and anxiety.

Dominance & Submission: The Association with Confidence, Anxiety, & Posture

Studies have found individuals with lower levels of self-confidence are typically much less likely to display dominance (Geist & Harmick, 1983) and much more likely to display submissive behaviors. Walters and Inderbitzen (1998) conducted a study testing

peer relations and social anxiety. Peers were classified in one of four groups: cooperative, friendly dominant, hostile dominant, and submissive. They found those individuals who were submissive were much more prone to and reported greater levels of social anxiety. The anxious feeling may be what dictates the individual to display submissive behaviors but the submissive behaviors themselves may provoke feelings of anxiety, too. They are more than likely mixed and exert varying levels of control on the other.

Recent speculation suggests modifying posture, in this case the submissive posture, in humans could have anxiety reducing effects. Individuals with a low level of confidence and high levels of anxiety typically display submissive posture (e.g. a slouched, curved spine) as opposed to confident individuals who typically display dominant posture (e.g. standing up tall and straight) (Kunz, 2007). Anxious individuals are instructed to stand up straight to display a higher level of confidence in an attempt to counter the submissive behaviors that are speculated to be correlated with anxiety responses; this is part of the Linden Method.

Posture as affected by anxiety reducing drugs has been tested on mice. Anxious behavior and its relation to a mouse's body posture was studied by Lepicard, Venault, Negroni, Perez-Diaz, Joubertm Bertrand, Berthoz, and Chapouthier (2003). Mice were administered a diazepam which reduced the levels of anxiety in the mouse. This also improved the posture of the subjects. When a subject was experiencing difficulty, such as unusual sensory information, it affected posture in such a way they displayed a low tail angle and low trunk elevation. It is theorized the sensory information absorbed mandates how much or how little body control is maintained as manifested here though balance and body posture.

> "The importance and relevance of each sensory system in the control of posture has been well established through the observation of individuals deprived of sensory inputs… this lack of input, or a lack of accurate input, generally decreases postural control performance," Bolmont, Gangloff, Vouriot, & Perrin (2002, pp. 96).

(In this thesis study, the "inaccurate inputs" are the stimuli that are perceived as threatening when they are not which inappropriately activates the fight or flight response.) Some individuals with depression and/or anxiety have been administered different medications to alleviate their symptoms. One autistic individual, Temple Grandin, comments in her book that once she began taking Tofranil, an antidepressant, to calm her intense anxiety, one of the behavioral changes she noticed was her posture improved from a "hunch to a straight back" (1995). In addition to the medication, Grandin also observed her behavior through videotapes and was able to modify some of her autistic and anxious behaviors from them. Grandin described herself as a prey animal that was plagued fear, one of her primary emotions. Fear is typically associated with a higher rate of fight or flight response activation.

The Fight or Flight Response

In 1929, Walter Cannon first introduced the theory of the fight or flight, FFR, as an adaptive response. The FFR is a primitive survival mechanism. It has a number of different names, such as the "acute stress response" and the more recent "fight-or-flight-or-freeze" response. This response's main purpose is to prepare the animal for a certain course of action, which ideally will keep the animal alive (Harari & Legge, 2001).

The sympathetic nervous system is the autonomic activating system in the body which also controls the FFR, among other things. In this study, the term "fight or flight" is referring to the autonomic response itself as opposed the behavior that ensues. Some of the physiological responses initiated by the FFR are heart rate increases in order to pump blood to the extremities while it pulls away energy from other biological functions that are irrelevant for fight or flight activities such as digestion. Cortisol, a stress hormone, is released to initiate glucose release to support the upcoming action that will need to be taken. There is dilation of blood vessels in the muscles to enable the organism to physically capable of reaction. Shaking reflexes increase and the colon and bladder may be evacuated, perhaps to deter a predator from wanting to eat the individual (Harari & Legge, 2001). The deactivating system is called the parasympathetic system which is responsible for countering the sympathetic systems arousing effects bringing the individual back to homeostasis.

When does fight or flight become maladaptive?

A number of biological responses can become maladaptive when left unchecked or allowed to run out of control for example, anaphylactic shock, a severe allergic reaction that is activated initially to protect the organism but can result in the organism's death. In some individuals the FFR can also become physically and mentally maladaptive (Harari & Legge, 2001). It is when the FFR is activated inappropriately to a stimulus that is not immediately threatening that the adaptive response becomes maladaptive.

For example, in humans a panic attack is in essence a natural physiological fight or flight activation to a presenting threat that began as adaptive (Tubridy, 2003). The problem arises when this physiological response is occurring in excess to a stimulus that

should not be a trigger for the FFR. In many cases, the initiating stimulus is unapparent to the individual. The body is initially responding to some subconscious stimulus that is perceived as threatening. Then an individual may interpret their body's response as something life threatening, as well. Many panic attack sufferers describe the panic attack as terrifying and resembling the feeling of having a heart attack. In this case, it is the fear of the physiological response itself which typically only increases the response's intensity. In essence it is the fear of fear (Tubridy, 2003). This response can the lead to further anxiety and increased levels of stress hormones such as adrenaline and cortisol, which is suspected to play a factor in weight gain and a decrease in immune system response. In addition to the physiological effects, constant sympathetic arousal may hinder psychological characteristics such as self-confidence and assurance as well as having a negative impact on social interactions (Tubridy, 2003). When the FFR response is over stimulated and inappropriately activated, it can become maladaptive. One of the focuses of this study is the autonomic FFR itself and its dual role as a stimulus and response in relation to how it mandates behavior.

The Role of Behavioral Conditioning on Autonomic Responses

Once a threatening stimulus activates the FFR, the FFR itself can function initially as an unconditioned stimulus (US) that provokes the conscious or perceived feelings of anxiety and fear through the release of norepinephrine, epinephrine, and cortisol among other things which is manifested through phobic behavioral displays, the unconditioned response (UR). The FFR can then turn into a conditioned stimulus (CS) for phobic behavior, the conditioned response (CR), after enough pairings. The phobic behavior typically functions to reduce the anxiety, usually through an avoidance or

escape response, which would then through negative reinforcement, reinforce the phobic behaviors (Powell, Symbaluk, and Honey, 2009). Simple extinguishing techniques would be met with great resistant due to the fact the individual has had the phobic behavior reinforced on a variable ratio schedule. For example, a dog may exhibit phobic behavior elicited by some unknown stimulus on a walk. The owner may become frustrated with the uncooperative dog and give up on the walk. This negatively reinforces the phobic behaviors by removing the dog from the situation. The dog then learns phobic behaviors will allow the dog to escape the situation, behaviorally speaking, the “flight” in fight or flight. Thus far, the dog’s only method of coping with the threatening stimulus is to escape the situation. The situation can then produce an avoidance response, making it that much more difficult to extinguish (Powell, et al., 2009).

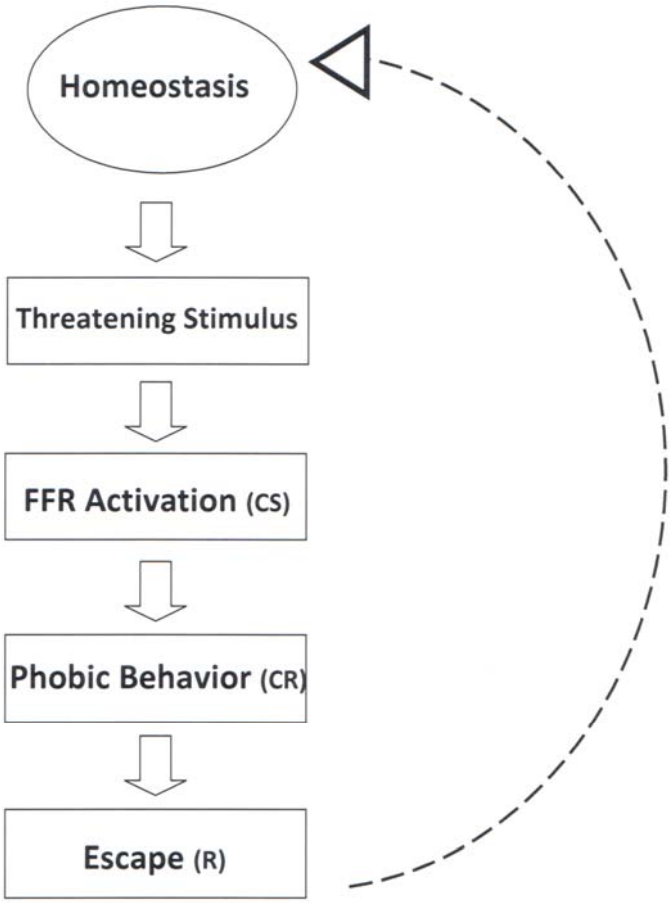


Figure 3. Escape Situation. A threatening stimulus disrupts homeostasis by activating the sympathetic nervous system (FFR) which after a few pairing becomes a CS for phobic behavior such as tail tucking, now a CR. The dog is negatively reinforced when the FFR response is removed and the parasympathetic nervous system is activated to bring the dog back to homeostasis.

The phobic behavior itself may also function as a CS for a secondary FFR if the escape attempt is not successful, thus making the subsequent FFR a secondary CR. So now the phobic behavior itself that was initially a response to the FFR can also function as a stimulus for more FFR activation. The directions of CS and CR are not linear, but more cyclic in that biology can affect behavior but behavior can also affect biology.

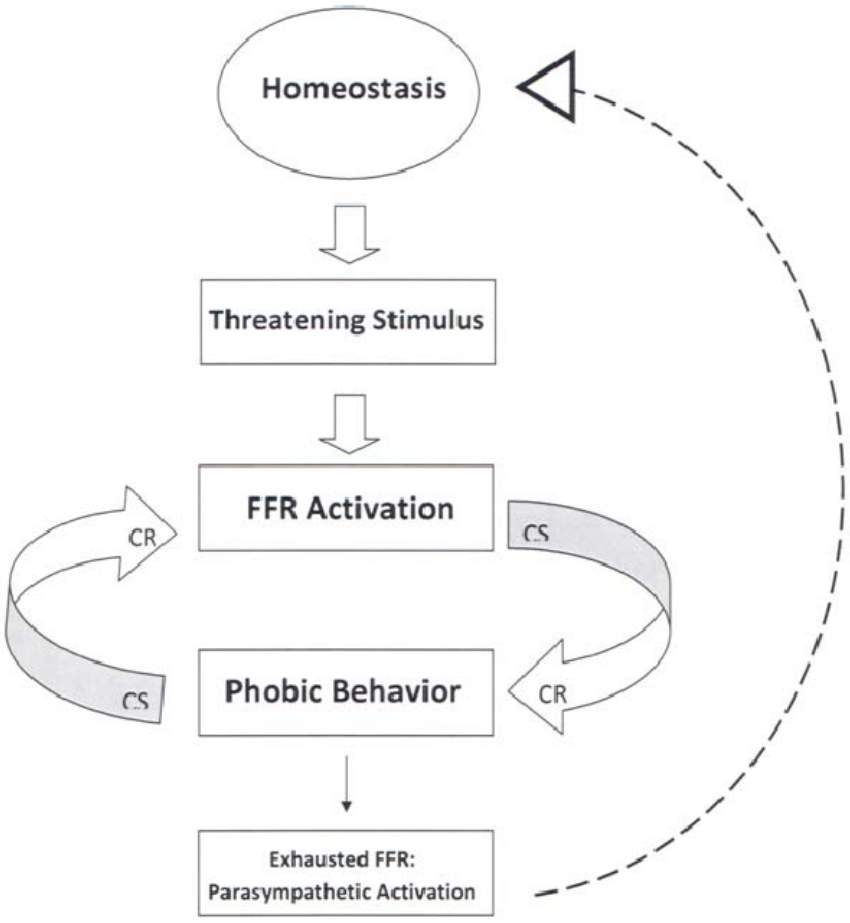


Figure 4. No Escape Possible. A threatening stimulus disrupts homeostasis by activating the sympathetic nervous system (FFR) which after a few pairing, it becomes a CS for phobic behavior such as tail tucking, now a CR. If escape is not possible, more phobic behavior is expressed which is now a CS for more FFR (CR) activation. Once the FFR is exhausted the parasympathetic system is activated, bringing the dog back to homeostasis.

Behavior Modification and Emotional Experience

The James Lange theory of behavior mandating emotion runs parallel with the idea that behavior affects biology. For example, Lange argued we smile and then feel happy. The behavior here is the smile, which after a few pairings the smile can become a CS to the body to release the corresponding “happy” neurotransmitters, CR. The biological response of feeling happy is a response to the behavioral smile. The happy feeling is also the reinforcer because it feels good, positive reinforcement. James D. Laird of Clark

University built on Lange's idea and elaborated on it. His idea is known as the "self-perception theory," (Liard, 1974). Once again the argument is feelings are the consequences of behavior. As a side note, a dog's wagging tail has been compared numerous times to the human smile, (Lindsay, 2000). In addition to the social needs for a tail, it may play a much larger role in the emotional realm. If this theory holds true, the need for a tail in dogs is far more significant than once believed.

In another study interested in the subjective experience of emotions, the facial feedback hypothesis was tested with humans. Subjects viewed films and were themselves filmed, as well. Those with "high levels of facial expressiveness were accompanied by higher levels of autonomic activity and subjective reports of affective experience" (Zuckerman, Klorman, Larrance, & Spiegel, 1981, pp 929). Behaviors, facial expression and tail position, affect to some degree an individual's subjective experience of a situation. A correlation has been established between facial expression and its relation to emotional experience but the extent that bodily sensations correlated with subjective experience is less established. Stepper & Strack (1993, p. 211) tested the "proprioceptive determinants of emotional and nonemotional feelings." Proprioceptions are "the sense of the body's position in space," (Sherwood, 2007, p. 188). The proprioception in their study, as in this study, was posture. Their findings suggested that "emotional and nonemotional feelings are partly determined by proprioceptive cues that operate in a direct fashion" (Stepper & Strack, 1993, p. 218). They concluded that "experiential representations can… be constructed as perceptions that are elicited and upheld by peripheral sensory stimulation." In essence, experiences and how they are internalized are compiled based on a set of sensations that are elicited by either external stimuli or

internal stimuli such as interoceptive and proprioceptive stimuli (Stepper & Strack, 1993). It may then "be possible to influence the experience and judgments that are based on them by manipulating the associated proprioceptive cues" (Stepper & Strack, 1993, p. 219).

The behavior of interest in the present study is posture, specifically tail position in dogs, which is a proprioceptic sense or stimulus. When the tail is held down or between the legs it is thought to be indicative of submissive behavior. Submission has been tied to increased levels of anxiety which is associated with the FFR. Just as discussed above, the submissive posture can develop inappropriately into a CS for anxiety and the FFR. The behavior is now a phobic response because it is now pathological and maladaptive. In essence, the tail tucked between the legs has been associated with being anxious, so now the very act of tucking the tail could provoke the anxiety and FFR.

If the submissive posture is then externally and physically manipulated to an incompatible confident or dominant posture, the incongruent non-anxious behavioral change inhibits the anxiety because they are two incongruent messages. Hence, if the dog is in a confident or dominant posture the parasympathetic response is the counter to the fight or flight, sympathetic response. Wolpe (1958) theorized reciprocal inhibition could be used in humans to reduce and counteract anxiety. He believed responses that were incompatible with anxiety such as confidence, served as a counter conditioning tool.

Posture and Tail Position as Proprioceptions

A proprioception can affect the perception of a given experience which suggests it could affect an autonomic response. Although the level at which the proprioception could activate the response is unknown at this point, it must play some part in the quantitative

stimuli needed to activate the response (i.e. anxiety provoking image, sound, and other external and internal stimuli). Stepper and Strack (1993, p. 219) suggested “a specific experiential representation is elicited if a certain configuration of specific bodily cues and noetic information matches a template.” In other words, for a situation to be experienced or perceived a particular way stimuli X, Y, and Z need to be in place, but if we remove Z, X and Y do not have the same or as strong an effect; the template is not complete. It may initiate a similar experience but to a lesser degree or it may completely suppress it.

The proprioception of interest, tail position, may not be powerful enough on its own to completely inhibit the sympathetic FFR response, but if at least one sensory stimulus is relaying incongruent information, it may facilitate the countering of the sympathetic response by activating the parasympathetic response. In addition, the removal of one of the sensory inputs could weaken the activating power of the situation, thus, aiding a quicker return to homeostasis.

Proprioceptions have also been associated with learning new behaviors and skills. It would be very difficult to teach a dog to consciously modify its posture during the stressful situation, but if external manipulation were implemented, muscle memory could function as the initiator of behavior change. Ideally, the dogs will habituate to the proprioceptic manipulation implemented (a harness) and leave newly established physiological responses (anxiety reduction) and the muscle memory characteristics of a more confident dog (Berent & Lemley, 1994). The intervention in this study was expected to serve as a reciprocal inhibitor to the sympathetic, FFR.

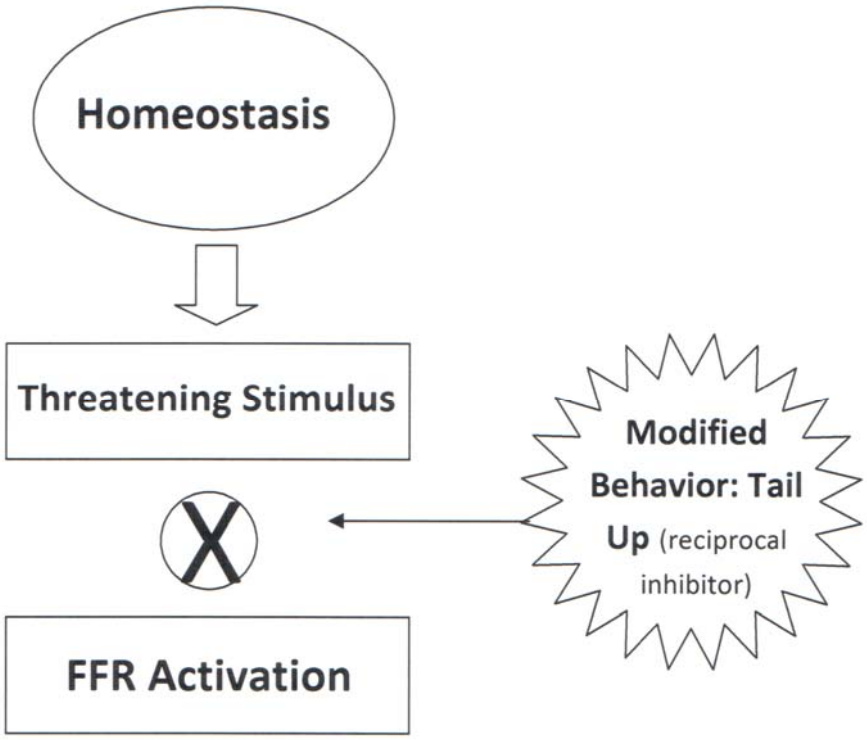


Figure 5. Intervention Pathway. A threatening stimulus disrupts homeostasis but the modified tail position is incongruent with the phobic behaviors that can serve as a CS for FFR activation (CR). The reciprocal inhibitor (tail up position) halts FFR activation.

In this experiment, the goal was to extinguish phobic behaviors in the dog by reciprocal inhibition. Ideally, the posture change (proprioception) would reduce anxiety and counter the fight or flight response enough that it cannot continue due to a) a lack of sympathetic arousal and/or b) activation of the parasympathetic nervous system to reduce any anxiety not countered initially by the intervention and aid in a quick return to homeostasis.

CHAPTER III

METHODOLOGY & FINDINGS

All subjects were recruited from volunteer dog owners through flyers posted around the University of Texas Pan American campus and at the McAllen Dog Park.

Dog 1 was an enacted male schnauzer, approximately 8 months old with a docked tail approximately two inches long. Dog 2 was a six year old, neutered Chihuahua with an unmodified tail. Dog 3 was an enacted female, breed unknown, approximately three years of age with an enacted tail approximately eight inches in length. Dog 4 was a neutered male Chihuahua approximately five years in age with an unmodified tail. Dog 5 was a spayed, standard poodle approximately three years old with a docked tail approximately five inches in length.

Procedure

Habituation: Before the dogs began the experiment, a habituation phase was implemented. Each dog wore a modified posterior harness for 20 minutes for three days at home. The owner was instructed to do this before the dog was brought into the study. Baseline and intervention sessions: Each dog was walked from the intersection of Cynthia St. and Martin St. in McAllen (Northwest corner) to 2nd St. (Colonel Rowe) and back again while wearing the modified posterior harness. The entire route is approximately 0.25 km. The experimenter walked at a brisk pace. The experimenter did not interact with the do except to prompt when needed. An assistant videotaped the walk

by walking behind the experimenter and dog. Animals were transported by automobile to the start point by two assistants. The harness was attached immediately after the dog exited the vehicle. The walking time did not exceed a 20-minute time limit and lasted 10-minutes on average. The location was a moderately busy street that included but was not limited to the following external stimuli: humans walking, humans riding bikes, other canines, and automobiles. Animals were tested between 4pm-8pm, Monday through Sunday for 10-18 consecutive days. The dogs were returned to owners after each session.

Treatment device: A modified posterior harness held the animal's tail in an upright angle, approximately at a 75 degree angle in relation to the horizontal plane of the animal's body. The tail was secured into a sling with Velcro. The tip of the sling was attached to the posterior harness, dorsally. The angle did not exceed 90 degrees. The angle was not high enough to cause the dog any obvious discomfort.

Apparatus & Methods

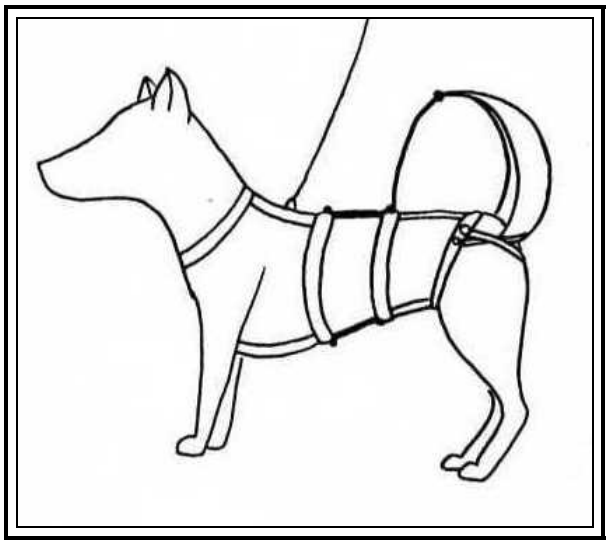


Figure 6. Modified harness design. The apparatus consists of two harnesses, one on the anterior end and one on the posterior end. The posterior harness is held in place by two straps that extend between the legs. A sling holds the tail up.

The posterior harness is a regular harness that has been reversed and attached to the posterior end of the dog. Two straps extend from under the legs to prevent the harness from shifting its position. These straps are tight enough to secure the harness but had enough slack for the dog to have comfortable mobility. The interventive part of the device consists of another leather strap, made comfortable by wrapping denim around it. The denim sling held the dog's tail inside with Velcro. The tip of the sling was attached to the dorsal side of the harness to prevent the tail from tucking between the legs. Three sizes were constructed: small, medium, and large.

Behaviors of interest: The behaviors of interest include head turns, stationary attempts, and lunging. Head turning when displayed phobicly involves rapid, head turning to no obvious stimulus. Stationary attempts were any attempt made by the dog to avoid moving forward. This includes sitting, flailing in collar, lying down, and pulling in any direction that is not in front of the rater. To qualify as a lunge the dog had to pull in the direction in front of the experimenter or the dog's feet had to come off or at least close to coming off the ground in a flee type attempt (Sternburg, 2008). These behaviors were used as components to operationally define phobic behavior. The occurrence of these behaviors was recorded for 10-minutes per session. The tail position before and after the intervention was also observed for any differences, such as the tail being held higher or lower, (Judah, 2008). In addition to these defined behaviors, the experimenter also conducted individual case study observations to observe any change not encompassed in the above behaviors. Subjective observations from owners before and after the experiment were reported, as well.

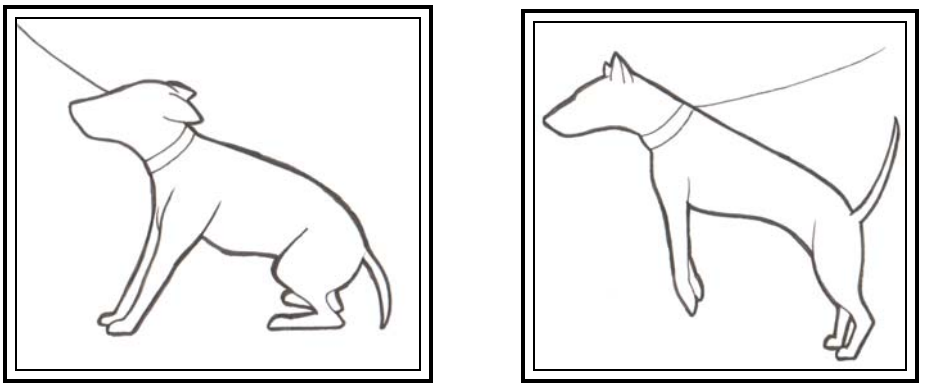


Figure 7. Illustration of stationary attempt and lunge. These are two other behaviors of interest that were used to measure the dog's phobic level.

Research design: The research design was a single-subject design in terms of experimental analysis of behavior (EAB) but could also be construed as a clinical case study. Because the approach in this study employed EAB design features, the terminology of EAB will be used to describe methods and results.

A multiple baseline across subjects with an embedded ABA, also known as reversal design, element was employed. In this design strategy, multiple transitions from a baseline phase to a treatment phase can be evaluated visually within and between subjects. No statistical calculations were necessary. Each subject's behavior is examined for visual evidence of change from baseline to intervention phases and a staggered imitation of baseline lengths across subjects permits evaluation of a second measure of comparison between baseline and intervention phases (multiple base line component).

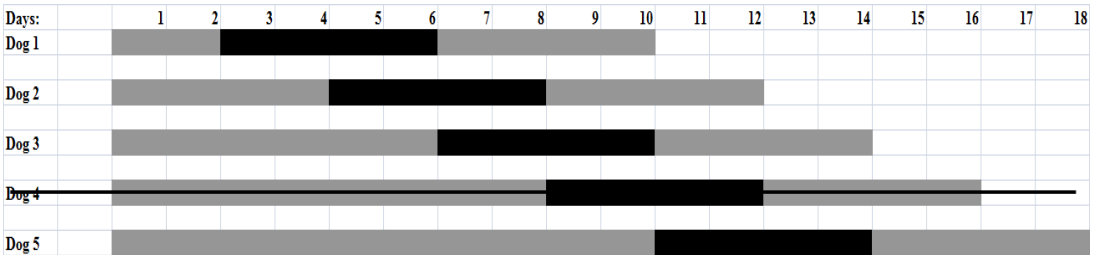


Figure 8. ABA schedule for dogs 1-5. (Dog 4 was removed from the study on the 13th day.)

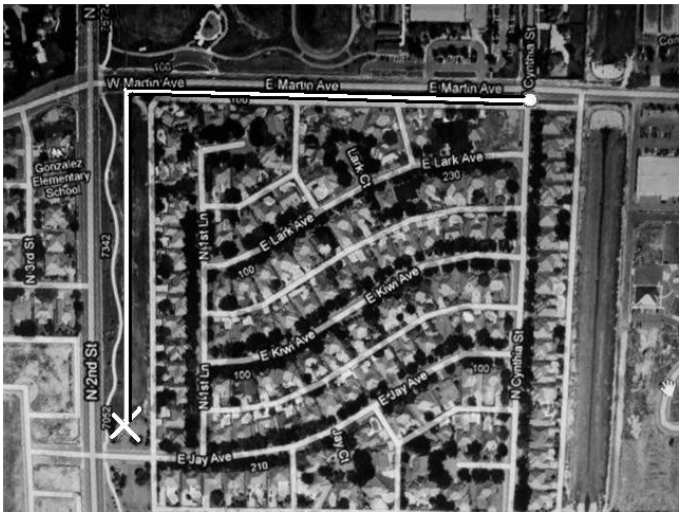


Figure 9. Map of test site. While circle indicates start and end point. White "X" indicates the furthest turn around point. (Google Maps, retrieved March 15, 2010)

Figure 10. Photographs of harness on dog.

Results

The results from the experiment were graphed in such a way that comparisons can be made with and across subjects in a multiple baseline design mixed with an ABA design (see Figure 10). Based on head turns, there appeared to be an affect on at least one of the four dogs that completed the testing sessions. (Dog 4 was removed from the study on day 13.) It appeared Dog 5 had a reduction in head turning once intervention was implemented. This dog then appeared to returning to baseline once the intervention harness was removed. Dog 3 also appeared to reduce in head turns steadily while intervention was implemented then leveled off and remained consistent once the intervention was removed. Dogs 1 and 2 showed some decreases and increases that do not appear to coincide with the intervention. (Lunging was another behavior of interest but the only dog to display this behavior was Dog 5, refer to Figure 15.)

Figure 11 also illustrates a multiple baseline design with an ABA component observing stationary attempts in four dogs. Dog 1, 2, and 3 display a reduction in stationary attempts that appear to be due to time and habituation to the walk itself. Dog 5's stationary attempts fluctuate and range between 0-4 and did not show an obvious pattern.

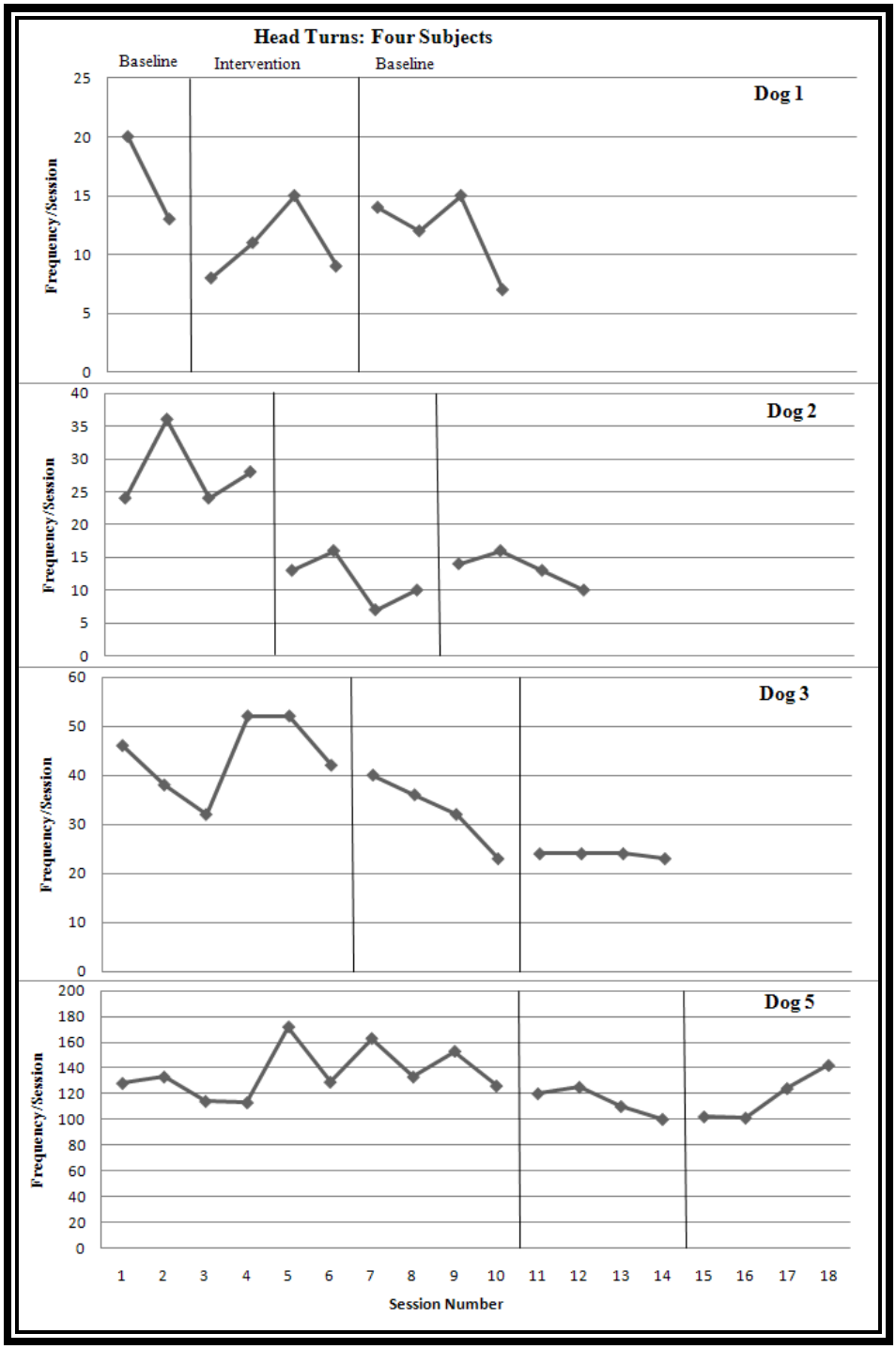


Figure 11. Head Turns for Four Subjects. Head turns for four subjects within a multiple baseline design and embedded ABA reversal design. Dog 1 did not appear to be affected by the intervention device. Dog 2 and Dog 3's behavior began reducing during intervention then leveled off. Dog 5's behavior began reducing then appeared to return to baseline. (Frequency scales were adjusted for each dog.)

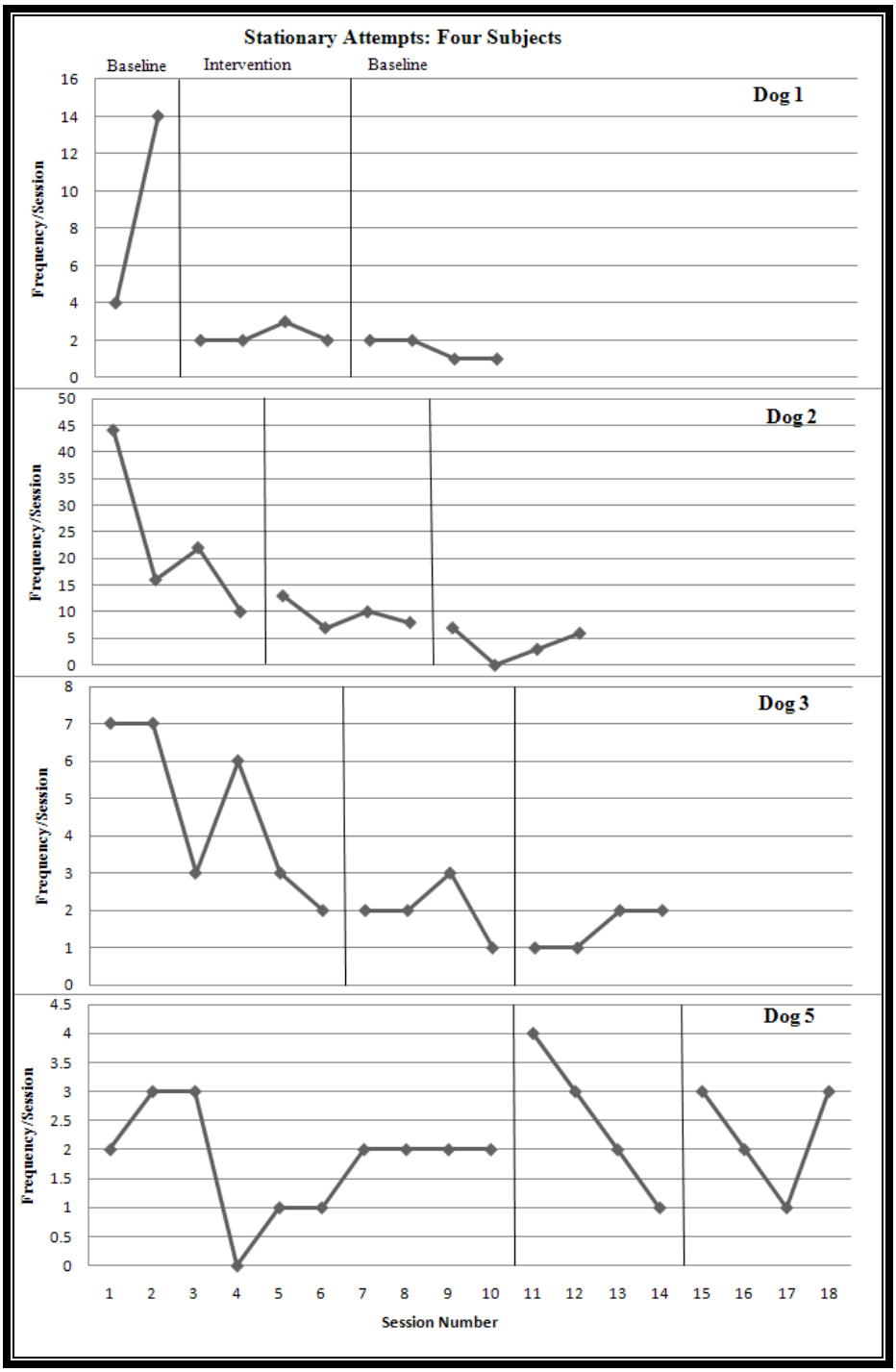
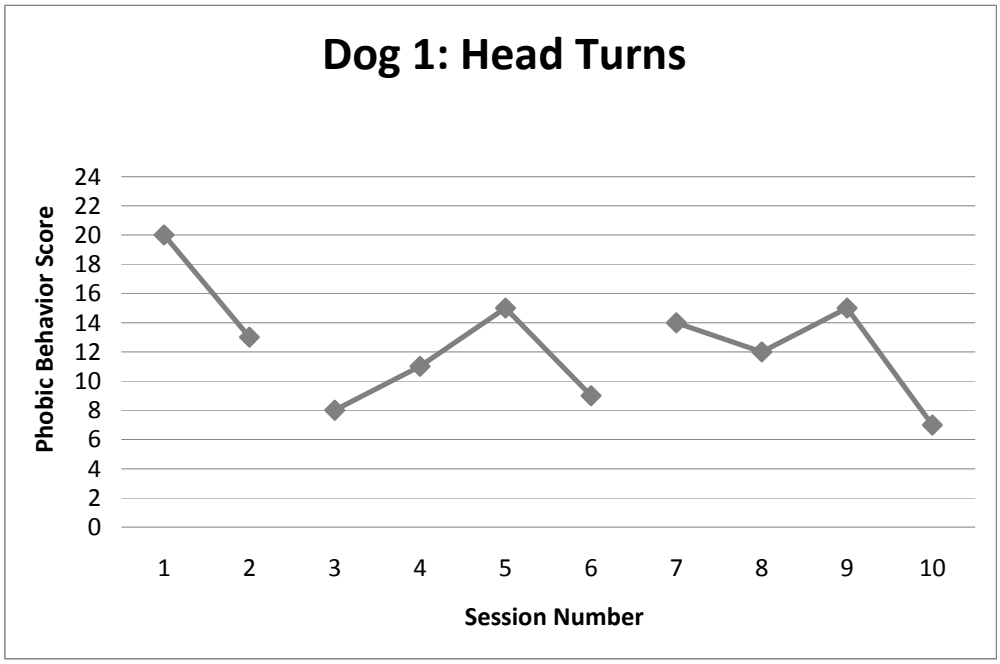


Figure 12. Stationary attempts for Four Subjects. Stationary attempts for four subjects within a multiple baseline design and embedded ABA reversal design. Stationary attempts reduce consistently for dogs 1, 2, and 3. The reduction is most likely due to time. Dog 5's stationary attempts vary between 0-4 and do not display any apparent pattern. (Frequency scales were adjusted for each dog.)

Dog 1



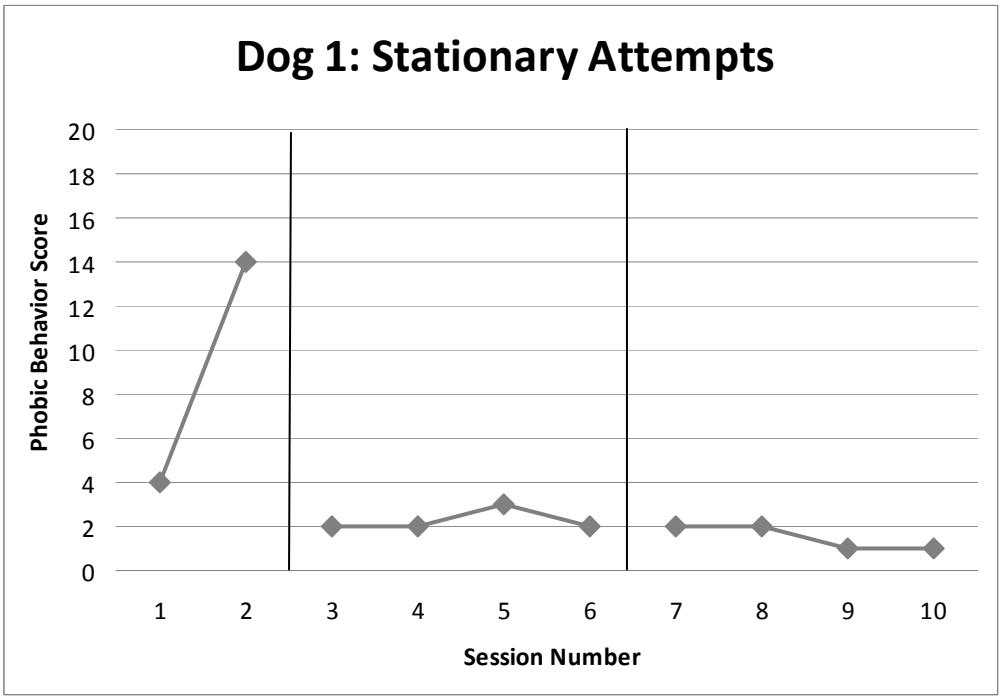


Figure 13. Dog 1: Head Turn and Stationary Attempt Results. Head turning did not appear to be affected by intervention. Although the intervention appears it may have had an affect on stationary attempts, the spike is most likely due to some extraneous factor.

Dog 1 was an intact male schnauzer, approximately eight months old with a docked tail approximately two inches long. Dog 1's owners describe there dog as a "scardy cat". This dog was not leash trained. The owners did not observe any obvious change in behavior after the experiment. Dog 1 appeared to be the least phobic of the five dogs and was put on a ten day ABA schedule, two days on baseline, four days on intervention, and four days baseline.

During first session, Dog 1 held his tail low for less than a minute. Dog 1 then kept his tail up for the majority of time during the ten sessions at approximately 45-65 degrees in relation to the horizontal plane of the dog's back. On the second day of intervention, Dog 1 began barking at two individuals dressed in black walking across the street. This was the first time and only time this dog barked. There were no complications with the intervention and the dog's tail never slipped out or fell down. On intervention day three, dog 1 began pulling on the leash and attempting to explore more. This dog typically marked 1-6 times and would usually defecate 1-2 times each walk. Dog 1's marking increased slightly as the sessions progressed.

Dog 2

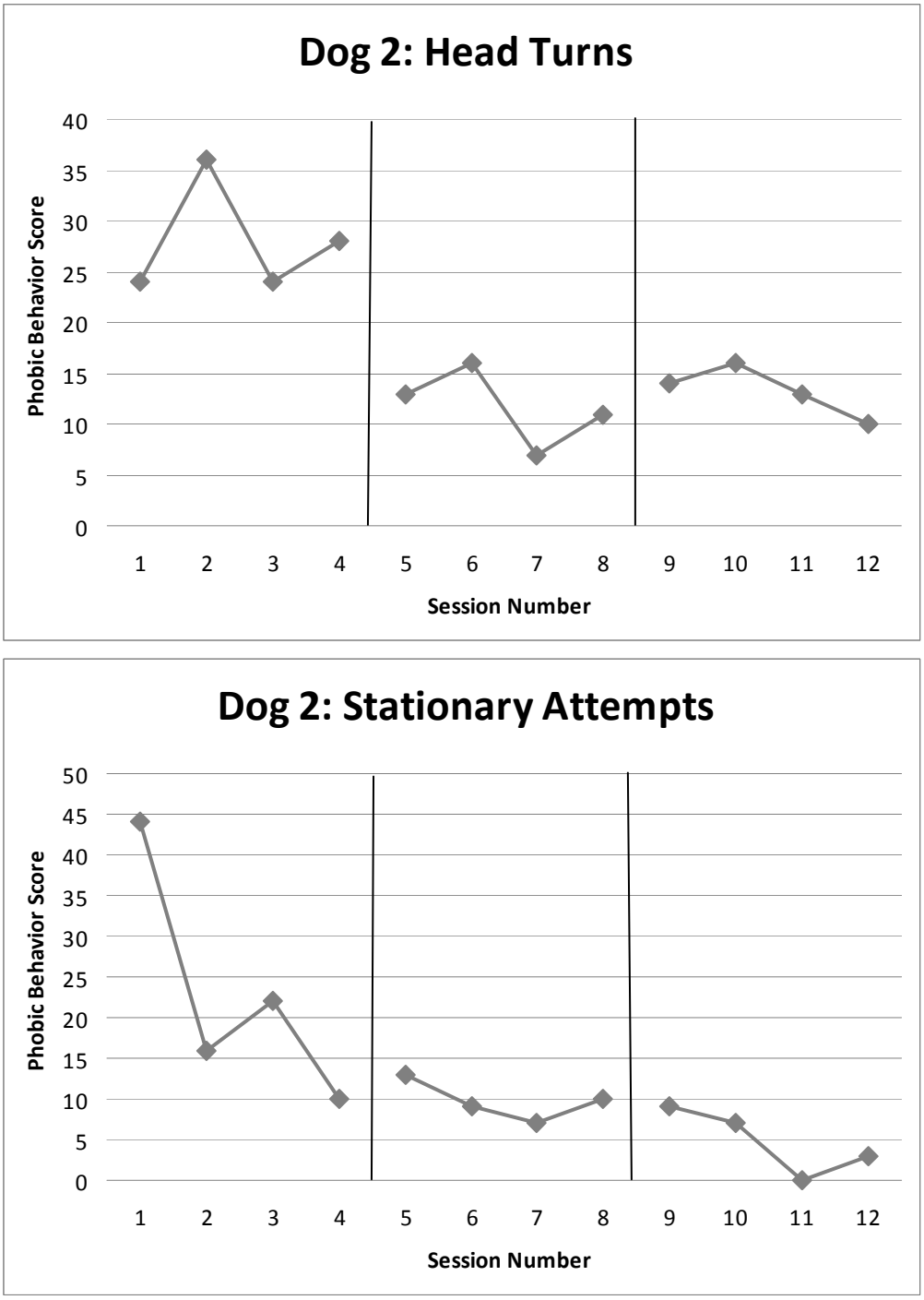


Figure 14. Dog 2: Head Turn and Stationary Attempt Results. Head turns appear to reduce during intervention and increase slightly when returned to baseline conditions. Stationary attempts reduce but this is most likely due to time and habituation to the sessions.

Dog 2 was a six year old, neutered Chihuahua with an unmodified tail. According to reports from his owner, the dog was very nervous and uncooperative. The owners reported the dog appeared more playful and confident after the experiment. This dog was not leash trained. Dog two displayed a moderate amount of phobic behavior. This dog was on a 12 day schedule, four days baseline, four days intervention, and four days at baseline.

Dog 2's tail was typically up during the baseline sessions at approximately 50-75 degrees. This dog tucked his tail on occasion for seconds at a time and would then hold his tail horizontal before it went back up to a more vertical position. This occurred most at beginning of sessions and when the dog had to walk across a grassy area. The dog's tail had a sickle shape which made it curl over itself slightly to the right. The tail appeared to be moving left and right from the sagittal plane, "wagging". The videotape was slowed down to observe this further. In actuality, the tail would swing from the sagittal plane to the right, but never to the left. There appeared to be no obvious change in tail position at end of experiment. At the beginning of most sessions, this dog would display stationary attempts which would require some prompting from walker to get dog to move forward. Prompting included phrases such as, "Come on, lets go." This dog also made stationary attempts when approaching large puddles and when crossing from a paved road to a grassy area. The intervention harness held the tail up the majority of the intervention phase but the tail did fall over slightly a few times. The base of the tail was still held up though, which is the most important area to be elevated rather than the tip of the tail.

Dog 3

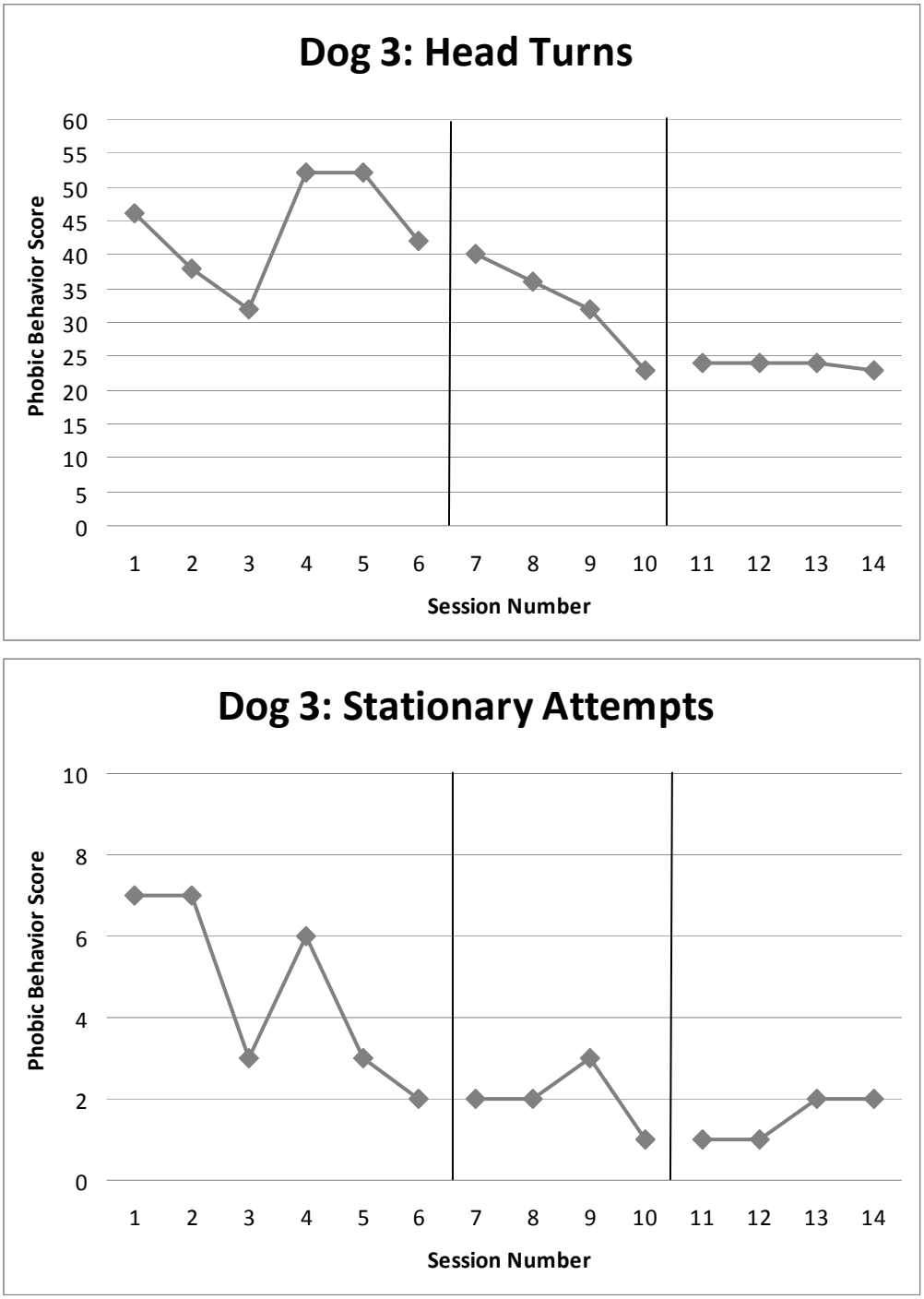


Figure 15. Dog 3: Head Turn and Stationary Attempt Results. Head turns reduced steadily during intervention then leveled off when returned to baseline conditions. Stationary attempts reduced but this was most likely due to time and habituating to the sessions.

Dog 3 was approximately three years of age. Dog 3's breed was unknown. This dog had an enacted tail approximately eight inches in length. Owners reported this dog was scared of new people and typically was not interested in others. Owners reported she would tuck her tail quite often to varying stimuli. This dog was on a 14 day schedule, six days on baseline, four on intervention, and four on baseline.

Initially, this dog displayed strong tail tucking behavior where the tip of the tail was also curved under the dog's body. This behavior became less severe and the dog began holding her tail more out bit still in what would be considered a submissive posture. On day six of baseline, owners reported the dog was misbehaving by urinating inside which according to the owners is not her typically behavior. This behavior continued and appeared to occur most often when the experimenter or assistants would pick up the dog for session. For example, the owner would open the dog and when the dog saw the assistants she appeared very excited and would then urinate, slightly. Owners also reported the dog began hiding in small places such as under their bed. She also began growling and barking more when someone would come to the door, even barking at owner a couple of times as he entered the apartment. The experimenter reminded owners they could withdraw their dog at any time and would understand if they chose to do so. This dog's owners decided to continue with the study. Owners reported the behavior subsided either with time or after the owners allowed the dog in their bed. (These owners do not allow their dog on furniture.) The intervention harness held this dog's tail up the majority of the first and last day of intervention. During the second and third day of intervention there were complications with the harness and the dog's tail

began falling over to one side. The base of the tail was still held up though, which is the most important area to be elevated rather than the tip of the tail.

For the first two days of experiment, Dog 3 displayed strong tail tucking that would relax slightly but was still considered tail tucking. On day 3, this dog wagged her tail then proceeded to roll in some grass. By day five and six she began trotting, holding her tail either horizontally or only slightly submissive, and wagging it slightly. During the intervention her tail was visibly wagging. On intervention day 4 (day 10), there were two instances that the sling which holds the tail had slack, indicating the dog began holding her tail up herself. This dog also appeared more explorative (e.g. more sniffing). On the last day of this dog's schedule, she was displaying a tail that was held either horizontally or up while wagging.

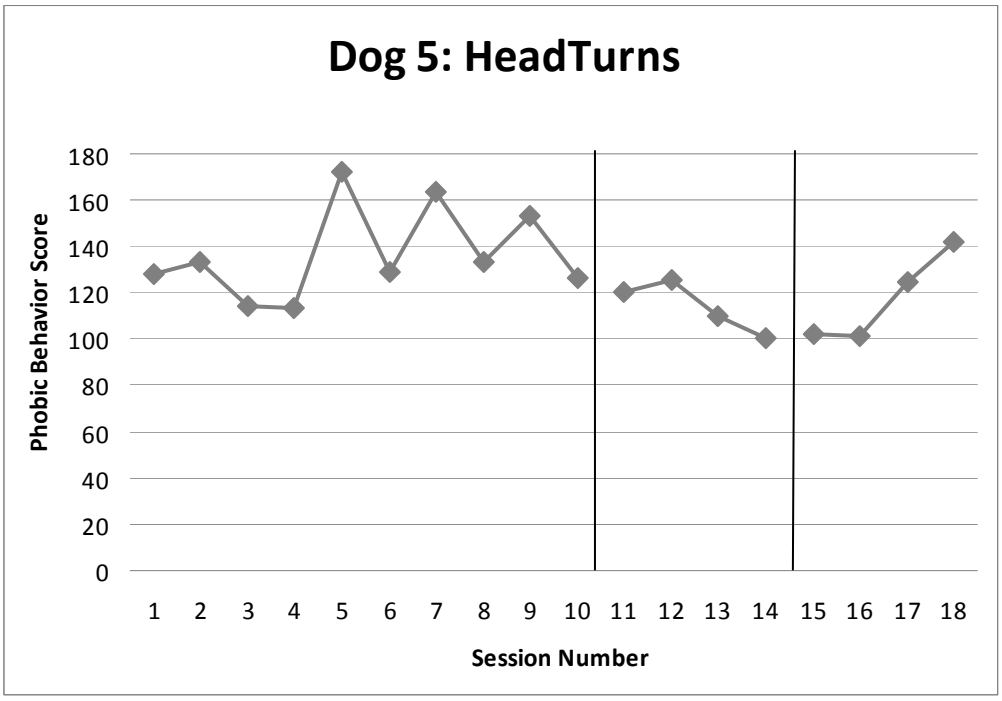
Dog 4

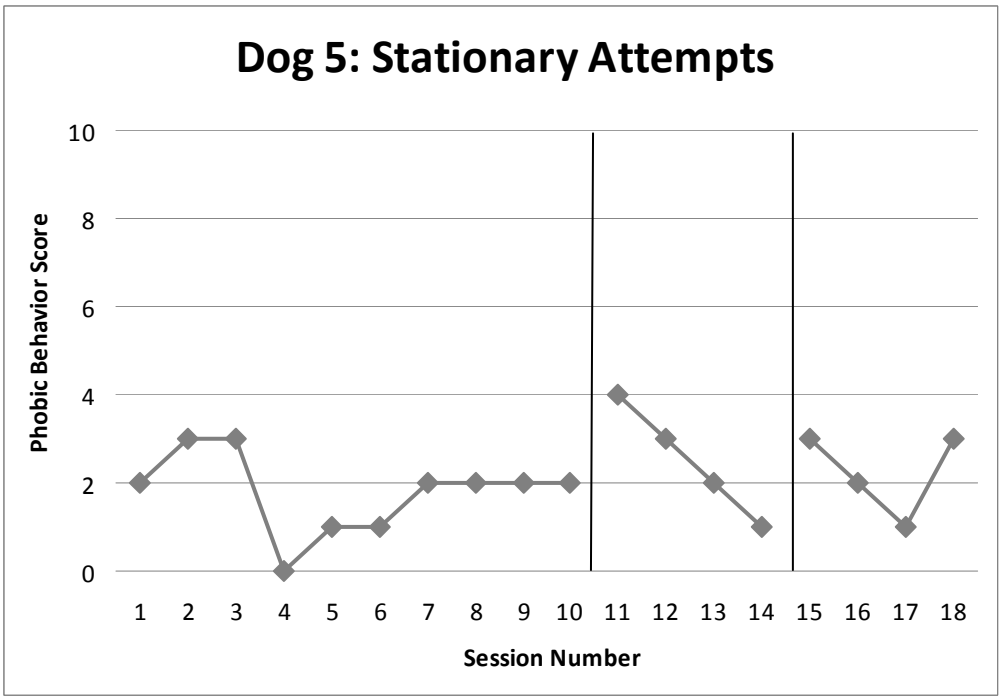
Dog 4 was another neutered male Chihuahua approximately five years of age with an unmodified tail. His owners described him as stubborn and warned he does not like to walk and prefers to be carried. The owners did not observe any change in behavior. This dog was on a 16 day schedule, eight days baseline, four days intervention, and four day baseline.

This dog was removed on the 13th day of the study because he refused to walk through all 13 sessions. Walker attempted to prompt dog with no change. The dog would take a few very forced steps then roll over onto his back where he would typically stay for the 10 minute session. The dog would only walk when it was back in the direction of the start point. Dog 4, with few exceptions, held his tail tucked throughout session. This dog was also aggressive. This dog bit one of the assistants on the face the first day and

snapped multiple times at assistants and experimenter throughout sessions. The intervention harness held the tail up the majority of the intervention phase but on one occasion the tail fell of the there harness.

Dog 5





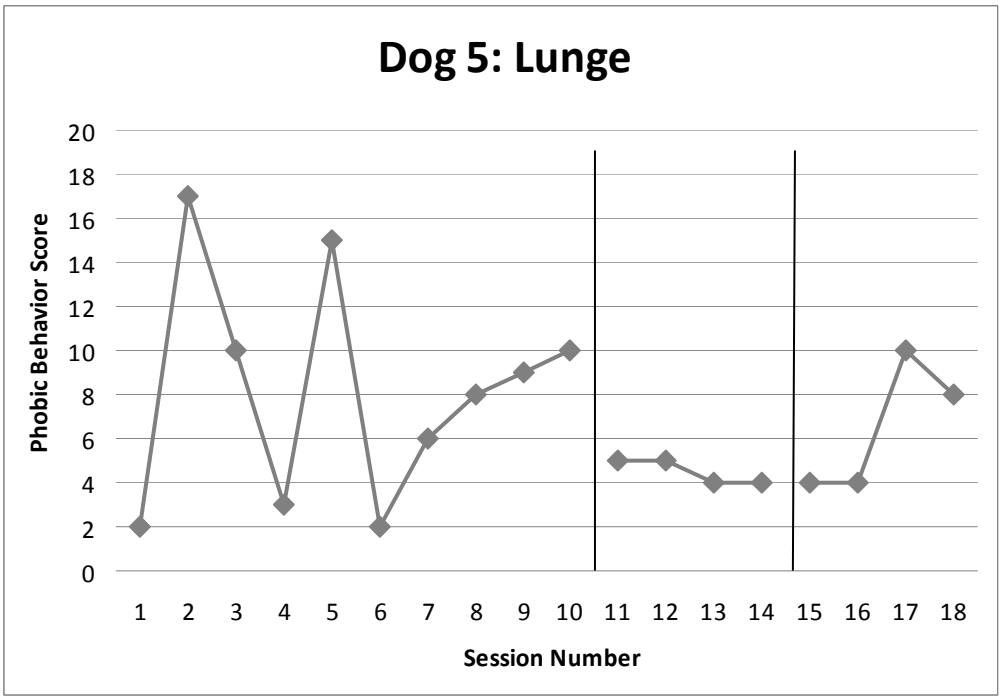


Figure 16. Dog 5: Head Turn, Stationary Attempt and Lunge Results. Head turning followed a classic ABA pattern by reducing during intervention then increased, returning almost completely to baseline. Stationary attempts did not appear to show any obvious pattern. Lunging was erratic but appeared to stabilize once intervention was implemented then appeared to be increase again when returned to baseline conditions.

Dog 5 was a spayed, standard poodle approximately three years old with a docked tail approximately six inches in length. Owners describe this dog as intensely neurotic and unmanageable when taken for walks. This dog was on an 18 day ABA, ten days baseline, four days intervention, and four days baseline.

Dog 5 held her tail between her legs the entire experiment (except during intervention). This dog displayed the highest level of head turning. Lunging was one of the behaviors of interest for all dogs but only Dog 5 exhibited the behavior. During baseline this dog was pulling on the leash and lunging forward. The leash was taut through most of the sessions. During intervention and slightly after the intervention this dog had moments where there was slack on the leash and she would walk along side

walker rather than ahead. This dog appeared phobic to most stimuli such as traffic, which owners say she is very afraid of, bicycles, people, other dogs, and skateboards. This dog would lunge most when the walker would reach the turn around point and begin walking back towards the start. Head turning and lunging appeared to level out slightly when intervention was implemented.

The intervention harness held the tail up the majority of the intervention phase but the tail did fall below the ideal angle on at least four separate occasions. The base of the tail was still held up though, which is the most important area to be elevated rather than the tip of the tail.

Weather conditions were variable. The first four days of experiment had mild to heavy rain hours, as close as one hour before the sessions. The next three days were cloudy with some heavy rain. On one occasion it began to rain heavy during the last dog's session. This session was ended early. After the first week it was mostly sunny and hot with some puddles still present.

CHAPTER IV

SUMMARY

There appeared to be no significant change in Dog 1. This could be due to the low level of phobic behavior. Of the five dogs, Dog 1 acted most confident at the beginning of the experiment. His tail appeared to be either up or horizontal most of the sessions there was one occurrence of unusual behavior, though. On the second day of intervention, Dog 1 barked for approximately 15 seconds. It appeared he was barking at two people walking across the street. This was odd because he had never and did not do this again. It could be possible that if a dog is already confident and the intervention is implemented it could create an overly confident and possibly aggressive dog. This dog initially would pull in front of the walker which kept the least taut much of the sessions. Though the ten day schedule, the dog appeared to be calmer and allowed for some slack on the leash. This is most likely due to habituation to the walk itself. The harness did not appear to affect Dog 1.

Dog 2 had a change in his head turning behavior. During the first four days of baseline, Dog 2 had an average of 28 head turns in ten minutes. His average during intervention was 11 head turns per ten minutes. When this dog was returned to baseline he averaged 13.25 head turns. The reduction could be due to the intervention or habituating to the walk. This dog's owners said he was not leash trained. This could have a lot to do with the reduction in behavior. On the first day, this dog showed a great deal

of resistance by flailing in his collar and refusing to walk forward which appeared to be related to the leash walking. Dog 2's stationary attempts showed a steady decline. This reduction is most likely due to the dog habituating to the walks. Dog 2's tail appeared as though it was wagging through most of the sessions, even when the dog was showing resistance. This wagging appeared erratic at first glance. The tape was slowed down and reviewed to study the tail movements. This dog's tail only wagged from the center to the right. The movement appeared to be due to gravity and momentum more so than conscious tail wagging. This somewhat pseudo wag may be due to the anatomy and genetics of this dog, as well. His tail was typically held up even when the dog showed other signs of nervousness (e.g. folded ears and low head position) although he was able to and did tuck his tail on occasion. Some canine's tails have been manipulated through selective breeding. For example a pug's tail is curled tightly and can't express as much as a dog with a full length straight or sickle shaped tail. In Dog 2's case he may not be consciously holding his tail up but more just allowing it be held it the most comfortable position (Lindsay, 2000). This dog's owners reported he appeared more confident and playful after the experiment which is most likely due to the novelty of the walks themselves. The data suggests the intervention may have had an affect on Dog 2.

Dog 3's behavioral change was more obvious to the experimenter and the dog's owners. Dog 3 displayed a number of anxious behaviors the first few days of experiment (e.g. tucked tail, low head position, and lip licking). This dog's tail started the experiment mostly tucked ranging from moderate to severe tucking. By the third day there was some slight wagging although the tail was still held quite low. In the days preceding intervention Dog 3 held her tail out more but never to the degree the tail harness held it.

For the four days of intervention, Dog 3's tail was visibly wagging in the harness. The walker noticed that while the dog's tail was in the harness and typically was being held taut by supporting straps there were two occasions where the there was slack. This indicating the dog was holding her tail up on her own beyond the degree of the harness. As the sessions went on this dog appeared to be more exploratory and began sniffing more. By the last day of this dog's schedule, she was holding her tail either horizontally or up in a more confident posture.

Dog 3's owners reported on the sixth day of the schedule (still on baseline) that their dog was beginning to act out. For example, this dog began urinating in the house, which according to the owners she has never done before. This dog also began growling and barking at strangers more. On a few occasions the owners reported she barked at them as they entered their apartment. Another odd behavior they reported she had never exhibited before was hiding in odd places. On one occasion, one of the owners found Dog 3 hidden under their bed which she described as very low and a tight squeeze for their dog. The owners also reported she typically is excited and ready to greet her owners upon their arrival home, but some of this behavior was reduced. They stated they would have to call her for her to come out of whatever area she may have been hiding. This dog also began getting onto the furniture, which she was not allowed to do. These odd behaviors continued through intervention stage and some of baseline. The owners reported the behaviors started to reduce by the end of the experiment.

The reports from the owners and the behavior observations of the walk appear to concur. Initially, she walked close to the walker and exhibited head turning, low head position, and other submissive type behaviors. Before or around the time of intervention,

this dog started behaving in what appeared to be a more confident manner. There appear to be a number of factors to explain this. One could be the behaviors were occur due to time and habituation and the expectation of the daily walks. The urination the owners reported was reevaluated and occurred most frequently when one of the assistants would pick the dog up for the sessions. This dog urinated slightly a couple of times when the experimenter picked up the dog from owners apartment to be transported to session. The dog would also stand up on experimenter and on occasion bring the experimenter a rope toy the dog enjoyed. The urination may then be either excitement or submissive urination, although it appears more excitement. This dog is typically walked around the area the owners live and on occasion at the college campus. The dog may have come to expect the novel walks which might have then led the dog to act out. The reverse could be true as well and the dog may have begun to fear the walks, although to the laymen the dog appeared to enjoy the sessions. The dog may have also become accustom to and learned to enjoy the additional attention and exercise. The owners later reported her behavior had subsided, specifically the hiding under the bed behavior, after they let for the first time the dog sleep in the bed with them one night. The extent of the harness' role is difficult to assess. Many of the behaviors could have easily occurred due to the reason given above and a number of other unseen, covert reasons.

Dog 3's head turning behavior showed an interesting pattern. The head turning had a drop then increased on day four and five. The behavior decreased slightly on day six then steadily decreased though out intervention, days seven through ten. The behavior then stayed very steady when she was returned to baseline. The dog may have bottomed out and reached the lowest level of head turning she would exhibit in ten minutes. But,

the dog may have also reached a level of confidence the harness was able introduce to the dog. The position the tail was held in may have only relayed a certain degree of confidence through proprioceptive signals. If the tail was held higher or lower the results may have been different.

Dog 4 was removed from the study on day 13, the day after the last day of intervention. This dog was removed from the study because his behaviors could quantified due to the fact the dog refused to walk and would lay on his back through out most of the sessions. This dog's owners warned that this dog did not enjoy being walked and would typically stand up on owners and the assistants legs in what appeared to be an attempt to have someone pick him up. His tail strongly tucked on multiple occasions. After a few moments on his back on the floor his head would come up and look around. The dog appeared to be relaxing more than submitting. This dog was kept till after intervention to observe any changes in his behavior. No obvious change was observed. It is very possible this dog had learned in the past and during the study to lie down because after ten minutes, no matter what his behavior was, he would get to return back to the vehicle. (It should also be noted, this dog refused to walk for the sessions but would walk back to the vehicle with much less resistance.) Through negative reinforcement the dog most likely learned if he waited long enough he would be rewarded and be allowed to return to the vehicle. The owners did not report any change in his behavior.

Dog 5 was the dog this experiment was modeled for. Her phobic behavior was ideal and appeared to have an observable change. Dog 5's tail was tucked 100% during the study. The dog appeared more phobic as the route met with the busier street, 2nd St. Her lunging behavior occurred most when the walker reached the turn around point and

the walk proceeded back to the vehicle. This dog's behavior was quite erratic in that some days she appeared more phobic than others. The lunging behavior varied between two and 17 pre-intervention. When the intervention was introduced the lunging ranged from four to five per session. The lunging remained here for two days after intervention then spiked again to 11. A longer post intervention would have been beneficial. This dog's head turning behavior also had erratic spikes in pre intervention. In both the lunging and head turning there was not a large reduction in behavior but the behavior did become more consistent and less variable.

The walker observed a large difference in leash tautness. This was not quantified but was visible in the videotapes. During most of baseline this dog was pulling in front of the experimenter. The experimenter typically had her arm raised and extended out because this dog would be pulling with a considerable amount of energy on the leash. The owners confirmed this as her typical behavior on walks which is why they have for the most part given up on trying to walk her because she becomes unmanageable. Once the intervention was implemented Dog 5 began walking closer to walker and allowed for slack on the leash which was not typical. In addition, this dog still displayed a high degree of head turning but the turning itself was less quick and jerky. The dog also had longer periods of no head turning in which the dog appeared calm but then something, possibly a noise, would set her off and she would begin the head turning once again.

Another interesting observation was this dog's behavior to passing cars. Initially this dog would exhibit a strong lunge or attempt to hide when a car would drive by. On days 13, 14 and 16 a car was within ten feet of the dog. She did not lunge or attempt to flee. The owners confirmed her strong phobic behavior to cars and were surprised to be

informed she had calmed down when a car was that close to her. On the 17th day, three days after intervention, the dog exhibited a strong lunge to a car that was further than ten feet. The lunge was strong enough to spin the experimenter almost completely around.

Some of the limitations of this study were the subjects and the degree of phobic behaviors of interest they exhibited. The behaviors of interest themselves were also limited and should be expanded in future research. The harness itself should also be evaluated. The angle at which to hold the tail was and is variable. In the study, the angles were variable because of general movement and adjustment. The exact angle at which to hold the tail at is also unknown at this point. There are varying angles that seem to correlate with certain behaviors but these angles are very discrete to the human eye. In addition, depending on the dog's phobic level the tail should be held at a reciprocally corresponding angle. For example, for a dog that is intensely phobic who always holds her tail between her legs may benefit from a higher tail angle to compensate for the very low level of confidence as opposed to those dogs who are only slightly phobic may only need to be at a horizontal level to calm them.

Another study is recommended to be conducted on Dog 5 with a longer intervention and post intervention period. This dog appeared to respond to the harness but in ways the experimenter had not prepared to measure. In the future, other behaviors should be observed such as the time the leash is held taut or with slack. In addition to this, responding to vehicles, bicycles, skateboards, and other novel objects should be evaluated. Another possible measure could be heart rate and other autonomic responses. A reverse of this experiment where the tails of overly excited or aggressive dogs is held down could shed more light on the potential effects of tail proprioceptions.

CHAPTER V

CONCLUSIONS

Three of the five subjects, Dogs 2, 3, and 5 appear to have been favorably affected by the modified harness. These three dogs appeared to have reductions in the phobic behaviors of interest. Unfortunately some observable behaviors that could have been additional indicators of change were not behaviors the experimenter was quantifiably measuring, such as leash tautness. The harness on did not appear to have a significant effect on phobic behavior for subjects 1 and 4. The harness did not hold the tail up the entire length of all the sessions. This was the pilot study for this topic of research and much more work is needed in this area. It still appears possible manipulating something physical could affect biological processes that then affect perceptions. For future research, a classic ABA, within subjects design should be implemented on Dog 5 over a period no shorter than one month.

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