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Functional Behavior Assessment with Guide Dogs in Training: A Feasibility Study

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requirements for the degree of Doctor of Philosophy in
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by

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Abstract

Guide dogs are an important resource for the community with visual impairment. Despite the many resources allocated towards preparing the dogs for their guide dog career, guide dog training organizations report over half of dogs in the training program fail to meet behavioral standards required to serve as a guide dog. Guide dogs are trained in a complex system making it difficult to pinpoint the primary contributor or contributors to poor training outcomes. However, the puppy-raising period has been identified in the literature as a period during which puppies begin to engage in behaviors that threaten their suitability as a guide dog. The present research evaluated the treatment utility and feasibility of a descriptive functional behavior assessment for puppy raisers' management of undesired puppy behavior that could threaten the puppy's eligibility to serve as a guide dog. Psychoeducation was provided as a second-tier intervention when implementing the assessment-informed intervention did not result in the desired behavior change. Four participants completed the study. The assessment informed a successful intervention for three of the four participants. Psychoeducation was provided to one participant, though the puppy raiser's poor treatment integrity prevented evaluation of the effects of psychoeducation as a separate intervention. Results suggest utility of functional assessment of puppy behavior and assessing puppy raisers' compliance to organizational training protocols. Implementation of assessment-informed behavioral intervention is an important step towards data-based decisions regarding the puppies' best interest with respect to continuing the career path of a guide dog.

Keywords: functional behavior assessment, guide dog, puppy raising, Functional Assessment for the Behavior of Dogs

Dedication

This work is dedicated to guide dogs, their handlers, those who are waiting to be part of a working guide dog team, and the puppy raisers who greatly contribute to the training and preparation of puppies for their future service provisions as guides.

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Functional Behavior Assessment with Guide Dogs in Training: A Feasibility Study

Meaningful collaborations with behavior analysts have improved the circumstances of many vulnerable populations (Dallery, Raiff, & Grabinski, 2013; Friman, 2010; Maple & Segura, 2014; Poling, 2016). An additional vulnerable population that may be served by behavior analysts is that of the visually-impaired. Many individuals in this population utilize guide dogs to assist them in navigating a world not well designed for the safety and inclusion of individuals who cannot see obstacles in their physical surroundings. Guide dogs are characterized by a remarkable skill set that is established over an extended period of time and within a complex system. Unfortunately, the demand for guide dogs is not currently being met, as evident by waitlists up to a year and a half (“Frequently Asked Questions,” n.d.; “FAQ,” n.d.), thus limiting the extent to which the visually-impaired may engage and interact safely with their communities. A major reason the demand is not being met is that puppies are not meeting behavioral criteria to complete the training program. This research serves to evaluate the treatment utility and feasibility of a descriptive functional behavior assessment and psychoeducation for the management of persistent puppy behavior that threatens the puppy’s eligibility to serve as a guide dog.

Training the Guide Dog

Guide dogs function to replace lost vision and aid in safe travels for their handlers. An estimated 10,000 guide dog teams are currently active in the United States (“FAQs,” n.d.). Successful guide dogs must master an extensive skill set in order to excel in their service provision duties. They must be capable of a vast range of complex behavior in contexts full of novelty, distraction, and even aversive stimuli. Deviations

from these guidelines are unacceptable because the safety of the handler is at stake. Indeed, if the guide dog engages in behaviors that interfere with its task, the safety of both the guide dog and handler can be seriously compromised. Considering medical care, training, and other related expenses, preparing a single guide dog for use by a handler costs the organization approximately \$50,000 (“FAQs,” n.d.). Approximately 14 accredited organizations nationwide work to meet this demand (“Closest Guide Dog Providers,” n.d.). Across guide dog organizations, there is general consistency in behavioral targets, duration of training, and the use of two specific training components within each guide dog’s training career (“Starting a Guide Dog Organisation,” n.d.). The first and most extensive component is the *puppy-raising period* which consists of training provided by non-professional trainers—the puppy raisers—and lasts upwards of two years. The second component is the *formal training period*, which is completed by professional guide dog trainers and concludes the final approximate three months of the puppy's training career.

The Puppy-Raising Period

The puppy-raising period takes place in various communities in which a guide dog organization has established a puppy-raising group. Puppy-raising groups consist of one or multiple volunteer leaders who reside in the community and coordinate group functions. The guide dog organization has employees that teach the puppy-raising group leaders how to implement the organization’s preferred dog training protocols. Leaders then manage the puppy-raising group under the remote supervision of guide dog organization employees. Group leaders are responsible for teaching the puppy raisers

training protocols, coordinating opportunities to socialize the puppies, and consulting with puppy raisers when questions arise.

Puppy raisers are volunteers who offer their time and resources to raising a guide dog puppy within a puppy-raising group. No knowledge about or experience training dogs is required from puppy raisers in order to join the puppy-raising group, though they are required to commit to utilizing the organization's preferred training protocols. Some factors (e.g., other animals in the home with a history of aggressive behavior) can prevent volunteers from meeting puppy-raising eligibility criteria. Otherwise, criteria are not especially difficult to meet by interested volunteers. In fact, one organization even welcomes puppy raisers as young as nine years old with parent approval ("Puppy Raising," n.d.). Puppy raisers are provided educational material on the training protocols, as well as support from the puppy-raising group leaders. Guide dog training organizations do not compensate puppy raisers for their commitment, though the organization covers some costs associated with raising a puppy (e.g., veterinary care).

Puppy raisers are tasked with teaching the bulk of skills crucial to guide dog work. These skills include basic obedience commands like "sit" and "heel," which instruct the dog to maintain specific positions with respect to the handler. More complex skills expected to be mastered during this period include ignoring people other than the handler and remaining calm when exposed to various noises, crowds, and sights. Additionally, puppy raisers are expected to bring relieving the bladder and bowels under stimulus control of a command.

The puppy-raising period is particularly important for two reasons. First, pivotal responses are taught in the puppy-raising period (e.g., attending to the handler). Skill

deficits at this stage can hinder the puppies' mastery of more complex and critical guide dog skills. Skill deficits often present as the puppies learning an incorrect behavior or engaging in the behavior in the presence of inappropriate stimulus conditions. For example, the puppy may meet mastery criteria for the "sit" command but engage in the behavior when a passerby provides the command. The puppies are to follow commands only when provided by the handler.

Second, this period is important because puppy raisers begin to care for the puppies as early as eight weeks old, which falls within the critical period (Scott & Fuller, 1965). While the onset and duration of the critical period may differ within and across breeds, it is said to last from approximately four to fourteen weeks of age (Morrow et al., 2015; Webster, 1997). The critical period is one of the marked canine developmental periods during which socialization and exposure to rich stimulus conditions is particularly important for adaptive puppy psychosocial development. Puppies learn responses important to their future careers as a guide dog during this formative period. For example, exposure to moving vehicles, emergency sirens, people of all appearances, cats and other small animals, slippery floors, and even the sudden opening of an umbrella during the critical period can affect how puppies will respond to such events going forward. Thus, puppy raisers are in a unique position to affect the trajectory of puppies' careers as they attempt to mitigate the potential aversive quality of experiences.

The following description of how puppy raisers are supported is characteristic of the guide dog organization within which the present research was conducted. Other training organizations may vary in their efforts to support puppy raisers. However, it is reasonable to believe that practices across training organizations are fairly consistent

across organizations as The International Guide Dog Federation provides guidance and oversight of accredited guide dog training organizations worldwide (“IGDF Standards,” n.d.).

Puppy raisers are provided educational material on training protocols to use with the puppy. The educational materials are in written form and some are accompanied by videos modeling the particular training protocol. Puppy raisers are expected to review the material prior to receiving a puppy to raise, as well as perform a selection of the protocols in the presence of puppy-raising group leaders for feedback and correction as needed. As previously mentioned, puppy raisers also receive periodic supervision and consultation from the puppy-raising group leaders to further refine their training skills. Training protocols are predominantly behavior-specific descriptions of how to reinforce and punish particular behaviors. Protocols exist for a variety of undesired puppy behaviors, such as jumping on people or mouthing, each of which fail to consider possible functions of the behaviors. Guide dog organizations also provide protocols that address specific behavioral outcomes, such as “sit” or “come.” A description of a shaping procedure for “sit” is provided in written form, and there may be a video of a trainer modeling the shaping procedure for the behavioral outcome “sit.” Although behavioral principles and procedures are utilized, puppy raisers are not provided with an analytical skill set that facilitates training in situations that deviate from the written protocols. That is, puppy raisers are not prepared to troubleshoot when kibble or attention from the handler does not serve as a reinforcer, as the protocols assume these will be sufficient means to shape or otherwise reinforce a given behavior.

Formal Training

Upon completion of the puppy-raising period, the dogs are returned to the training organization campus to conclude their training careers. The formal training requires approximately three months. Despite being a relatively short component of the dogs' training career, it is considerably more expensive than the puppy-raising period (Asher et al., 2013). During formal training, the dogs learn more advanced skills specifically related to guiding a handler with visual impairment. For example, the dogs learn to identify obstacles (e.g., a bicycle lying on the sidewalk, low-hanging tree branch), stop for changes in elevation (e.g., stairs, potholes), and to respond to traffic (e.g., refuse to proceed forward when there is traffic undetected by the handler). This training is completed by professional Guide Dog Mobility Instructors who often obtain degrees in Orientation and Mobility and complete multi-year apprenticeship programs.

The Japan Guide Dog Association reports that 70% of puppies dismissed from their training program are dismissed due to behavior (Arata, Momozawa, Takeuchi, & Mori, 2010). Similarly, the puppies are dismissed from the training program for behaviors that are expected to be addressed in the puppy-raising period (Arata et al., 2010). Exact methods of assessing puppy behavior across guide dog training organizations are unknown, though the research presented in following sections will describe ongoing efforts of organizations to refine their assessments. Important to note is that success in the training program does not necessarily mean the dog will ultimately serve the role of a guide dog. Some dogs, upon success in the training program, will be retired early from their guide career due to medical or behavioral reasons. Some research suggests that the typical method of reporting training success rates is actually inflated, as

they do not account for guide dogs who fail to perform at desired standards within their first year of guide work (Batt, Batt, Baguley, & McGreevy, 2010).

These outcomes are problematic from an organizational standpoint because a great deal of time and fiscal resources are required to train guide dogs. From the consumer's standpoint, these outcomes are problematic because an insufficient supply of guide dogs limits the extent to which the visually-impaired may engage safely and confidently within their communities (Audrestch et al., 2015). Moreover, these outcomes are concerning from a welfare standpoint, as many puppies complete the extensive training, yet are not suited for the career of a guide dog. Thus, the system within which guide dogs are produced warrants further evaluation.

Guide dog training organizations are clearly complex systems. Many resources are required to prepare puppies for a career in supplementing the sight and ensuring safety of their visually impaired handlers. As intimated above, possibly the most critical component of this system is the puppy-raising period. Puppies learn both basic and crucial behaviors expected from a guide dog during this period that also overlaps with the critical period of canine development. The puppy-raising period takes place over the course of nearly two years; while also necessary, the formal training takes a fraction of the time. Given the high impact guide dogs can have on their handlers' lives and the concerns of the current training system, it raises the question of how behavior science might contribute to improving guide dog training outcomes.

The following section aims to highlight research conducted since 2000 that addresses the various behavioral assessments and interventions utilized during the puppy-raising period towards improved training outcomes.

Recent Literature on Assessing the Suitability of the Guide Dog

A variety of questions regarding guide dogs have been investigated over the last few decades, including questions about genetics (Ennik, Liinamo, Leighton, & van Arendonk, 2006; Fallani, Prato Previde, & Valsecchi, 2007; Serpell & Hsu, 2001; Takeuchi et al., 2009), maternal behavior (Bray, Sammel, Cheney, Serpell, & Seyfarth, 2017b, 2017a), and puppy attachment (Valsecchi, Previde, Accorsi, & Fallani, 2010). While this research is informative, a review of these research areas extends beyond the scope of the present study. Instead, this section will highlight research conducted since 2000 that addresses a puppy's learning and behavior during the guide dog puppy-raising period.

Assessment for Predicting a Puppy's Success as a Guide Dog

Research addressing puppy behavior during the puppy-raising period employs a variety of assessments to determine correlations between reported or observed puppy behaviors and success and failure in the guide dog training program (Asher et al., 2013; Gazzano, Mariti, Sighieri, et al., 2008; Harvey, Craigon, Sommerville, et al., 2016; Serpell & Duffy, 2016). The researchers conducting correlative research often discuss the data as being informative as to whether the puppy should continue in the training program. Puppy behavior that is strongly correlated with success in the program is considered at least partial evidence of the puppy's "suitability" for a guide dog career (with health and physical composition also contributing to their determined suitability) (Knol, Roozendaal, van den Bogaard, & Bouw, 1988). Determining behavioral suitability as early in the puppy's training career as possible is appealing to training organizations in the context of resource allocation and puppy welfare (Coppinger, Coppinger, & Skillings,

2010). The cost of supporting puppies through the training program escalates and substantially increases upon entering formal training. Puppies who complete some or all of formal training to ultimately be determined ill-suited for the career are especially costly to organizations (Asher et al., 2013). The sooner that suitability can be determined, the sooner the organization can confirm resources are allocated to puppies likely to successfully complete the training program. In addition, identifying suitability early may contribute to improved puppy welfare. Quick identification of a puppy who is ill-suited for the career of a guide dog will allow for quick rehoming of the puppy—either in an alternative career (e.g., search and rescue) or as a companion animal (i.e., pet)—while avoiding over two years in an extensive guide dog training program. Thus, identifying a method of determining suitability is desired from fiscal and welfare standpoints. Guide dog organizations and researchers have been collaborating to determine a valid and reliable method by which puppies' suitability is determined.

Indirect Assessments

Indirect assessments have a long-standing history in the field of Applied Behavior Analysis as a method of assessing human behavior (Iwata, Kahng, Wallace, & Lindberg, 2000). This type of assessment does not involve direct observation of behavior. Rather, it relies on informants' description of past events and can take the form as interviews and questionnaires. Much of the research on guide dog puppy behavior utilizes data from indirect assessments to determine correlations of ultimate success in the training program (i.e., suitability) (Gazzano, Mariti, Sighieri, et al., 2008; Harvey, Craigon, Sommerville, et al., 2016; Serpell & Duffy, 2016). Of note, the correlational analyses are a deviation from the field of Applied Behavior Analysis. The need for individual analysis will be

discussed in following narrative. This section provides an overview of the research involving indirect assessment of puppy behavior.

Serpell and Hsu (2001) explored the possibility of mediating some of the costs of direct assessment with utilization of indirect assessment of puppy behavior. They developed one of the most well-known and widely-utilized indirect measure of dog behavior called the Canine Behavioral Assessment and Research Questionnaire (C-BARQ©). The C-BARQ© is an instrument that has been used to assess the frequency and intensity of various behaviors during and beyond puppyhood. Guide dog organizations have participated in the validation of the instrument, and the data gathered from this assessment have been used for correlational analyses with respect to ultimate success or failure in the guide training programs. For example, predictive validity of the C-BARQ© was reported as early as six-months-old at the group level of data analysis (Duffy & Serpell, 2012). This line of research has led to the findings reported by Serpell and Duffy (2016), who administered the C-BARQ© to 978 puppy raisers within a single guide dog organization when the individual puppies were six and twelve months old. Their findings suggested that specific environmental variables correlated with greater success in the program. Specifically, success in the guide dog programs was positively correlated with the increasing number of puppies the raiser has raised and the puppy being raised in a home with at least one additional dog. They also found that the puppy experiencing a frightening situation (e.g., being attacked by another dog) early in life was predictive of failure in the program (Serpell & Duffy, 2016).

Serpell's line of research is not the only one reporting data suggestive of the importance of environmental variables affecting guide dog success (Duffy & Serpell,

2012; Serpell & Duffy, 2016; Serpell & Hsu, 2001). Utilizing the Puppy Walker Questionnaire (PWQ) and a series of other modified questionnaires periodically throughout the puppy raising period, it was concluded that the home environment in which the guide dog puppy was raised was correlated with later success in the training program. Puppies who were found to engage in behaviors suitable for a guide dog career had greater opportunity to socialize with other dogs and were raised by experienced puppy raisers. Those found to engage in behavior unsuitable for a guide dog career (e.g., excitability, distractibility) were positively correlated with households also rearing children (Harvey, Craigon, Blythe, England, & Asher, 2016). These researchers later adapted the PWQ in an attempt to identify the level of risk of individual puppies for failing the training program. Levels of risk were identified by asking puppy raisers to score the puppies in the domains of Adaptability, Body Sensitivity, Distractibility, Excitability, General Anxiety, Trainability, and Stair Anxiety. High scores at twelve months old in the Trainability and Adaptability domains were associated with success in the training program, while high scores in the General Anxiety, Excitability, Distractibility, Stair Anxiety and Body Sensitivity domains were associated with failing the training program (Harvey, Craigon, Blythe, England, & Asher, 2017). The PWQ was determined relatively economical and feasible compared to other assessments used to determine suitability. Furthermore, the PWQ may prove useful in flagging puppies engaging in behaviors characteristic of the various domains and facilitating earlier intervention or dismissal from the guide dog training program (Harvey et al., 2017).

Puppy raisers have also provided data regarding their account of undesired behavior in which their puppy has engaged. Gazzano et al. (2008) sought to categorize

types of undesirable behaviors during the puppy raising period and to use these observations to improve the management of the dog. An 80-item questionnaire was used to collect puppy raisers' account of the puppy-raising period, including the puppy's undesirable behaviors and social behavior towards other dogs and the puppy raiser (Gazzano, Mariti, Sighieri, et al., 2008). Three categories of behavior were derived from the data.

The first category included behaviors that were relevant to the ultimate success of a guide dog. Specific behaviors noted in this category included showing interest in being on furniture, begging for food, eating their own feces, and digging in the garden. The second category included behaviors that could be problematic for a guide dog career but were amenable to correction. Behaviors in this category included jumping, pulling on the leash, poor recall, barking at other dogs, and soiling in the home. Finally, the third category included behaviors that put the puppy at risk for failing the training program. Examples of these behaviors included growling, biting, aggressive barking, and scavenging.

Indirect assessments may have utility as initial assessments or for learning general information about puppy-raiser practices. However, correlational data yielded from these indirect assessments do not necessarily increase our understanding of the specific behavior-environment interactions which contribute to success or failures in the training program. For example, indirect assessments do not distinguish between learned behavior, such as pulling on the leash, that is a function of puppy raiser behavior management strategies, and phenotypical behavior, such as tracking scents.

To supplement indirect assessments, researchers have also evaluated methods of direct assessment that may inform determination of guide dog suitability. The following section provides an overview of direct measures of guide dog puppy behavior and what researchers have concluded regarding the utility of these assessments.

Direct Assessments

Direct measures of behavior involve collecting behavior data while the behavior occurs. Assessments that involve direct measures, even in the absence of experimental manipulation of contingencies, can provide a degree of information about potential maintaining variables of the behavior of interest (Sloman, 2010). Important to note, however, is that while puppy behaviors were directly observed, they were subject to statistical analyses. Thus, still little is known about individual puppy responses with respect to the various stimuli. This section will provide an account of the two empirical accounts of assessments that utilized direct measures of guide dog puppy behavior.

Asher et al. (2013) observed six- to eight-week old guide dog puppies' responses in various stimulus conditions. The assessment consisted of instructing a puppy to follow the assessor and to retrieve a toy, gently restraining the puppy, stroking the puppy, and exposing the puppy to a recording of the sound of an aircraft and an artificial squirrel in motion, as well as asking the puppy to move through a tunnel and walking across a ramp. Puppy responses were rated from least- to over-responsive and least- to most-confident and analyzed following chi-squared tests. Of the stimulus conditions presented to the puppies, responses with respect to 1) being stroked by the assessor, 2) exposure to an artificial squirrel, and 3) walking across a ramp were predictive of success in the guide dog training program. That is, puppies who were scored as confident and responsive to

the handler during these conditions were more likely to qualify as a guide dog. The authors suggest that the predictive stimuli-response relations reflect a history with humans that facilitates the puppy following commands of its handler (Asher et al., 2013).

Direct observation of puppy behavior was also utilized in Harvey et al. (2016). These researchers designed a battery of behavioral tests to assess possible use for determining a puppy's suitability. In part, they were evaluating the reliability of the behavioral tests by taking measurements when the puppies were five and eight months of age. A second question in this research was whether the behavioral tests would predict individual puppies' suitability for a guide dog career. Subsets of the battery involved the puppy meeting a stranger, obedience, walking on a raised path, components of a physical exam, tolerance of a head collar, tolerance of a towel placed on the puppy's back, exposure to off-limits food, exposure to artificial birds, and human distractions. The behavioral tests were designed to resemble naturalistic, regular experiences of both the puppies in-training and working guide dogs.

The test-retest reliability of several measures taken at five and eight months of age demonstrated good to high correlations (i.e., $>.03$ to $>.06$). At five months old, behavioral predictors of suitability included: requiring no additional prompts to correctly respond to a "down" command delivered by the puppy raiser; requiring fewer than four prompts to correctly respond to a "down" command delivered by a novel person; and a lack engagement in anxiety-related responses (i.e., barking, lip-licking, shaking). Further results demonstrated that eight-month-old puppies who did not have low posture (considered indicative of chronic and acute stress) and scored low on tests of distraction, fear, anxiety, and reactivity were considered suitable for guide dog careers. The authors

suggest guide dog training programs utilize the instrument to assess puppies who engage in questionable behavior and expedite a career change if necessary (Harvey, Craigon, Sommerville, et al., 2016).

Again, there may be implications of these data regarding raiser experience and the puppy-rearing environment. Opportunity for socialization may be an important contributor to puppy success. Number of trials required for acquisition of behaviors indicative of proper socialization has not been analyzed, and puppies may not be receiving sufficient opportunity to learn responses required of guide dogs. The research suggests utility in selecting targets such as strength and generalization of responding at an early age.

The use of direct observations to measure guide dog puppy behavior have been noted by researchers studying guide dogs as a pragmatic alternative to indirect assessments (Harvey, Craigon, Sommerville, et al., 2016). Treatment utility, e.g. the extent to which they contribute to favorable treatment outcomes (see Hayes, Nelson, & Jarrett, 1987), of any aforementioned assessments has yet to be evaluated. Indeed, the assessment research is in an early stage as it concerns identifying behaviors associated with success and failure in guide dog training programs.

Undesirable Puppy Behavior and Interventions

While researchers have sought to identify behaviors that are incompatible with a career as a guide dog (e.g., Gazzano, Mariti, Sighieri, et al., 2008), few have addressed interventions aimed at preventing or decreasing prevalence of undesired behavior. This section reviews the research on interactions between the puppy raiser and puppy in the puppy-raising period.

Koda (2001) observed the interactions between puppy raisers and puppies to examine how the puppy raiser responded to undesired puppy behaviors (i.e., biting, damaging objects, jumping on a person) and if there were specific puppy raiser responses that reliably suppressed the undesired puppy behavior. Puppy raiser behaviors included responses such as providing attention or toys, employing aversives, and ignoring the puppy. Eleven puppy raiser-puppy dyads were observed to provide 2250 isolated interactions during which undesired puppy behavior occurred. A chi-squared test was conducted on raiser responses and puppy behaviors. Residual analysis determined that ignoring was effective in decreasing undesired puppy vocalizations, and forcibly stopping the puppy (i.e., directly opening the puppy's mouth or pushing the puppy aside) was effective in decreasing behavior resulting in damage to objects. This analysis did not involve an account of individual puppy behavior, which may lead to a puppy raiser providing a functionally irrelevant consequence for an undesired puppy behavior. On the other hand, the data provide an account of typical interventions used in attempt to address undesired puppy behavior.

Batt, Batt, Baguley, and McGreevy (2008) examined the effects of two training interventions in a group comparison. First, some puppy raisers were provided an additional six-and-a-half hours of training on "learning theory (with an emphasis on positive reinforcement) and clicker training" (Batt et al., 2008, p. 203), discrete responses (e.g., "sit" and "leave it"), and loose-leash walking. The second treatment group of puppy raisers were provided an additional five hours of socialization of their puppies with other puppies, people, and otherwise novel stimuli. During the additional hours of socialization, research assistants coached raisers in situ on how to facilitate appropriate

puppy socialization. No difference in success rates of puppies was observed across either of the treatment groups, nor when compared to the control group.

The authors, however, noted a host of possible confounds. For instance, the authors took no account of puppy raisers' compliance to the methods introduced in the group which received supplemental education (e.g., desensitization methods). Puppy raisers' extramural activities (e.g., puppy-related activities not required by the training organization) were not controlled for, and the authors noted high variability across raisers. This would be problematic if, for example, raisers in the control group attended local dog training classes or already had established routines for socializing the puppies. Furthermore, puppies in this research were between 12 and 16 weeks of age, which is nearing the end or even beyond the critical period (four to 14 weeks) at the onset of treatment (Scott & Fuller, 1965; Webster, 1997). Different results may have been observed had the socialization and training sessions been conducted earlier in the puppies' development.

In summary, research to-date has provided guide dog training organizations with some information regarding specific puppy behaviors and rearing environments that may predict an early retirement from the guide dog career path (Asher et al., 2013; Gazzano, Mariti, Alvares, et al., 2008; Harvey, Craigon, Blythe, et al., 2016; Serpell & Duffy, 2016). The research also suggests that responsiveness to handlers, as well as the presence of stress indicators, are predictors of whether the puppy will complete the guide dog training program (Asher et al., 2013; Harvey, Craigon, Sommerville, et al., 2016). Investigation of raisers' behavior management efforts has brought light to the common raiser responses in the management of undesired puppy behavior (Koda, 2001). Finally,

some attention has also been paid to the education provided to puppy raisers, as well as the opportunity for puppies to socialize early in their career (Batt, Batt, Baguley, & McGreevy, 2008). While not always interpreted in such a manner by the researchers or guide dog training organizations, the research does point to the importance of the individual puppy's learning environment, including the role and efficacy of the puppy raiser.

The guide dog training system lends itself well to a long line of behavioral research that could approach the important questions addressed in the research reviewed here, particularly the remaining questions regarding the role of the puppy raiser and intervening upon the identified problematic puppy behaviors. Of the medically-eligible puppies in the training program, over half fail to meet behavioral criteria. The majority of behaviors for which puppies are dismissed from the training program are expected to be addressed in the puppy-raising period. Thus, the method of behavior assessment and treatment during the puppy-raising period warrants further evaluation. Volunteer puppy raisers may benefit from some form of supplemental education and tools that facilitate the functional assessment and treatment of undesired puppy behavior.

Functional Assessment of Human Behavior

Skinner (1953) described a functional analysis of behavior as analysis which “specifies behavior as a dependent variable and proposes to account for it in terms of observable and manipulable physical conditions” (p. 41). Functional analyses of behavior have a long-standing history in the field of Applied Behavior Analysis (Dixon, Tarbox, & Vogel, 2012). Determining the variables that maintain undesired behavior is a major component of best-practice standards of behavior analysts in the treatment of undesired

behaviors (Heyvaert, Saenen, Campbell, Maes, & Onghena, 2014; Miller & Lee, 2013). Functional assessment of behavior can be characterized by three approaches that vary in the degree of observation of the behavior and whether variables in the environment are manipulated.

The experimental Functional Analysis (FA) is an assessment that entails direct observation and manipulation of environmental variables hypothesized to be important to the maintenance of the behavior. This assessment methodology was developed in 1982 by Iwata, Dorsey, Slifter, Bauman, & Richman (1982/1994). Standard FA methodology systematically manipulates environmental circumstances—both social and physical—that might differentially affect the individual's responding. Functional analyses can inform effective treatment by identifying relevant antecedent conditions, the source of reinforcement, as well as what variables are irrelevant to the behavior of interest (Iwata, Kahng, Wallace, & Lindberg, 2000). Thus, an intervention may be designed that involves only environmental changes that are relevant to the behavior of interest. Several modifications to methodology have been suggested over time, though it remains an effective method of identifying maintaining variables when required resources are available (Beavers, Iwata, & Lerman, 2013; Hagopian, Rooker, Jessel, & DeLeon, 2013; Hanley, Jin, Vanselow, & Hanratty, 2014; Jessel, Hanley, Ghaemmaghami, & Metras, 2019).

In order to mediate some of the resources required to conduct FAs (Hanley, Iwata, & McCord, 2003), researchers have developed alternatives and supplements to the standard experimental FA. Descriptive assessments have been utilized in attempt to mediate resources required to perform the experimental FA (Anderson & Long, 2002;

Lloyd, Kennedy, & Yoder, 2013). The techniques consist of direct observation of the behavior in the absence of additional programmed contingencies (i.e., beyond what is naturally occurring). In contrast to an experimental FA, descriptive assessments do not involve manipulating suspected maintaining variables. However, because behavioral events are observed and recorded as they occur, conditional probabilities between environmental and behavioral events may be calculated, which can suggest a functional relation. Commonly-used examples of descriptive assessments include continuous observation recording (e.g., frequency and interval), Antecedent-Behavior-Consequence (ABC) recording, and scatter plot recording. Some notable advantages of descriptive assessments are that direct observation facilitates recording of baseline rates of the behavior, facilitates development of an operational definition, can inform design of experimental FA conditions if needed, and can provide meaningful information regarding existing contingencies when an experimental FA is unfeasible (Sloman, 2010).

Indirect assessments were also developed to assist in the identification of relevant variables maintaining behavior (e.g., Duker & Sigafos, 1998; Durand & Crimmins, 1988). Indirect assessments do not involve direct observation of behavior or manipulation of suspected maintaining variables. Rather, they rely on informants' description of past events and can take the form of interviews and questionnaires. The retrospective accounts are used to inform hypotheses about the undesired behavior(s) of interest. A main feature of indirect assessments is that they are quick to complete, do not require extensive training to be able to administer, and may provide structure to initial interviews with caretakers. However, reliability and variability has not been demonstrated in the use of indirect assessments to identify behavioral function (Iwata et al., 2000).

Despite the treatment utility of conducting experimental FAs, there are circumstances under which clinicians are unable to conduct or will otherwise decide against the use of the experimental FA (Roscoe, Phillips, Kelly, Farber, & Dube, 2015; Sasso, Conroy, Peck Stichter, & Fox, 2001). Coupled with the lack of reliability and validity of indirect assessments in the identification of functional relations, descriptive functional assessments have been evaluated as the next-best option towards identifying functional behavior-environment relations.

Such research has evaluated agreement between results of descriptive functional assessments and experimental FAs. Agreement between experimental FAs and descriptive functional assessments have demonstrated mixed results (Martens, Gertz, de Lacy Werder, & Rymanowski, 2010; Pence, Roscoe, Bourret, & Ahearn, 2009; Thompson & Iwata, 2007; Walker, Chung, & Bonnet, 2018). Most recently, structured descriptive assessment methodology has identified escape and tangible functions of behavior, however still fails to accurately identify the role of attention (Martens et al., 2019). To date, there is a lacking of strong evidence of convergent validity of descriptive functional assessments and experimental FAs.

A related, but separate, area of research regarding descriptive functional assessment is an evaluation of treatment utility, or the extent to which the assessments inform a successful intervention (Hayes et al., 1987). Descriptive assessments have been found to inform effective interventions for students with disabilities in inclusive school settings (Walker et al., 2018), children with developmental delays in a clinical laboratory setting (English & Anderson, 2006), and in neurotypical children (Anderson, English, & Hedrick, 2006). Further research in this area is warranted as a recent survey of practicing

behavior analysts indicated descriptive functional assessments as being their most frequently utilized assessment of behavioral function (Oliver, Pratt, & Normand, 2015).

The functional assessment of human behavior has been of great interest to researchers and practitioners for decades. Only recently has there been a focus on the functional assessment of dog behavior.

Functional Assessment of Dog Behavior

Compared to the body of literature on the functional assessment of human behavior, the body of literature on the functional assessment of dog behavior is quite young. Given the demonstrated utility of functional behavior assessments in the human population, there is good reason to further evaluate the utility of these assessment methods for dog behavior.

The FA methodology used in the body of literature on assessment of human behavior has only relatively recently been applied to the assessment of dog behavior. The first published account of using FA methodology to assess dog behavior was in 2012 and sought to assess and treat dogs' behavior of jumping on humans (Dorey, Tobias, Udell, & Wynne, 2012). A modified version of an indirect assessment, the Motivation Assessment Scale (Durand & Crimmins, 1988), was used to inform the arrangement of experimental sessions of an FA. Dorey and colleagues identified the function of the dogs' jumping behavior and successfully intervened with a function-based treatment plan. Stereotypic behavior, separation-related behavior, and undesired behavior of dogs residing in a shelter have also been assessed with the FA methodology (Feuerbacher & Wynne, 2016; Hall, Protopopova, & Wynne, 2015; Winslow, Payne, & Massoudi, 2018). Each of these

demonstrations were considered successful in informing function-based interventions of dog behavior.

Susan D. Kapla's (2005) unpublished dissertation utilized indirect, descriptive, and experimental assessments to identify environment-behavior relations important for the treatment of undesired dog behavior. Assessments were conducted in order of intrusiveness, specifically conducting indirect assessments first, descriptive assessments second, and experimental assessments last. The indirect and descriptive assessment data were used to develop hypotheses regarding the function of behavior. Hypotheses were then tested by contingency manipulations for evaluation as a function-based intervention.

The conclusions of this study were that owners were capable of identifying some relevant conditions under which the undesired behavior occurred via indirect assessments. A few conditions were unidentified or inaccurately assumed to be relevant, thus supporting the procedure of using descriptive assessments in conjunction with indirect assessments. Indeed, the assessments did inform function-based interventions which produced meaningful behavior change (Kapla, 2005).

Terri Bright's (2013) unpublished dissertation investigated the utility of the Functional Assessment for the Behavior of Dogs (FABD) in the assessment and treatment of undesired dog behavior. The FABD is a structured Antecedent-Behavior-Consequence (ABC) form adapted for pet owners to use for the assessment of the dog's behavior. Bright (2013) instructed pet owners how to use the FABD. Owners collected data over approximately ten isolated instances of the target behavior. Data were then scored by the researcher and used to inform the development of a hypothesis regarding the maintaining consequences of the undesired behavior. The hypotheses that resulted from the FABD

data were tested in an experimental FA. Maintaining variables of behavior identified in the FA matched those identified in the FABD. Function-based interventions were then implemented and considered successful in the decrease of the undesired dog behavior.

The FABD has potential benefits of facilitating greater contact of the owner with the environment-behavior relations, an ease of administration, and identifying testable hypotheses regarding function of behavior without performing an experimental FA. An additional feature of the FABD is that dog owners, and presumably volunteers in a guide dog training system, can participate in the assessment process.

The Current Study

The guide dog training system lends itself well to a long line of research addressing questions about pre- and neo-natal care of dogs in the program, puppy-raiser fidelity of current procedures, education and training provided to puppy raisers, efficacy of current puppy training protocols, and variables that directly influence the success and failure of puppies in the training program. To date, researchers have addressed some of these questions, though there has yet to be a thorough investigation of *individual* puppy raiser-puppy interactions that affect puppy performance in the training program.

Investigation of puppy raiser-puppy interactions is one of many appropriate steps for a guide dog training organization to take before relying on correlational data from large-scale studies addressing success and failure rates of guide dog training programs. The present study was designed with great consideration of the barriers that have likely prevented the lines of research previously discussed (e.g., limited financial resources, reliance on volunteers, organizational assumptions).

Secondary to the lack of behavior assessment following the identification and treatment of an undesired puppy behavior in both research and practice, we were interested in the introduction to a functional behavior assessment within the standard process of addressing puppy behavior. Bright (2013) demonstrated that the FABD would be a useful assessment for the development of function-based interventions for undesired dog behavior. Thus, the proposed research sought to address the following questions:

- 1) Is there treatment utility of the FABD for the management of undesired guide dog puppy behavior?
- 2) Do puppy raisers implement procedures with fidelity?
- 3) Do puppy raisers consider the FABD a feasible assessment to use when needing to address undesired puppy behavior?

Study Implications

The most important implication of the present research is its potential to improve the experience of the puppy and puppy raiser. Puppy raisers are tasked with teaching puppies behavior that is critical to their future service provisions to the visually-impaired community. Furthermore, they are responsible for the puppies during a hugely important developmental period that also happens to be characteristic of the emergence of undesired behaviors. At no fault of their own, puppy raisers are generally not educated or experienced in assessing the reasons why undesired behaviors occur. Rather, they are instructed to use training protocols standard of the guide dog training program that fail to account for individual puppy differences or conditions under which the behaviors occur. When a puppy raiser is faced with needing to managing an undesired behavior, such as

rolling over on the floor while on leash, the puppy raiser may be instructed to ignore the behavior when in actuality, the behavior is escape maintained.

When the standard organizational training protocols fail to result in the desired behavior change, puppy raisers may, understandably, resort to traditional, unscientific rules about behavior or create their own rules about why behavior occurs, all in the absence of contextual factors that contribute to individual puppy behavior. Examples of such rules might include “puppies need to be taught who is dominate” or “the puppy defecates on the floor as an act of defiance,” both of which are likely to result in punitive and aversive measures of addressing the behavior. Rules like these are low-hanging fruit for people trying to understand why a puppy engages in undesired behavior. As we know, aversive consequences may be at least temporarily effective in punishing undesired behavior, but they risk the failure to identify important individual and contextual variables contributing to the puppy’s behavior. Indeed, the puppy could be defecating on the floor because the “fun” family children are regularly tasked with keeping the puppy occupied while the puppy raiser cleans the mess or secondary to a medical condition.

The present research is also a starting point to addressing organizational needs. Considering the duration, expected outcomes, and the increasing cost as puppies remain in the training program, it should serve training programs well to thoroughly evaluate the puppy-raising period. This research serves to inform the need for and efficacy of a specific intervention at a specific point in the guide dog training process. Specific questions it may provide data towards answering include: To what degree are puppy raisers adhering to training protocols? Do puppy raisers’ behavior management efforts benefit from a functional behavior assessment? Are puppy raisers able to properly

conduct the functional behavior assessment and do they report it as a feasible tool to use on an as-needed basis? Does a 30-minute educational video about reinforcement improve puppy raisers' use of positive reinforcement procedures? Are puppy behavior outcomes meaningful in relation to how many resources are required to adopt any of the evaluated interventions? While there are several ways that behavior scientists can offer their expertise to the system that trains guide dogs (see Funk & Williams, 2020), what is clear is that intervening at the level of puppy raising is needed to identify what interventions should be considered for adoption within training organizations.

Finally, the visually-impaired community is waiting a year or longer for guide dogs. No one should be denied their preferred supportive means to engage with their community. A balance must be met between a reasonable time to wait for a guide dog and the amount of time it takes to train competent guide dogs and create an available supply. The present research offers insight into what may be done within the puppy-raising period that produces meaningful effects on training outcomes and therefore the availability of competent guide dogs for the visually-impaired community.

Method

Participants and Setting

Seven adult puppy raisers were recruited from a guide dog training organization with chapters across the West Coast and other southern states. Participants' research activities took place in their homes secondary to Covid-19 community and organizational safety precautions. Participants were required to have a device capable of recording videos, send video recordings to the researcher, and have the capabilities to meet virtually (e.g., Skype, Zoom). In the event any of these requirements were not met or the

participant failed to follow other instructions related to research activities (e.g., complete the assessment), the participants were dismissed from the study.

Puppies who participated in the study ranged from two months old to upwards of one year old at the onset of baseline data collection. Each puppy had one primary raiser responsible for their training. The puppies were cleared of medical conditions. With respect to behavioral inclusion criteria, the puppies were required to engage in an undesired behavior on a daily basis. Puppies who engaged in elimination-related behaviors were not admitted into the study. In the event the undesired puppy behavior decreased to zero or near-zero levels, the participant was dismissed from the study. Characteristics are summarized below in Table 1.

Table 1

Characteristics of participating puppies.

Puppy Name	Age (months)	Sex	Breed
Mayfield	11.5	female	Labrador retriever
Scott	6.5	male	Labrador/golden retriever
Leigh	6.5	male	Labrador/golden retriever
Ruby	11.5	female	Labrador retriever
Mac	2	female	Labrador/golden retriever
Hodges	4.5	male	Labrador/golden retriever
Asher	9.5	female	Labrador retriever

Mayfield was a female Labrador retriever who was 11.5 months old at the time of baseline data collection. Her raiser worked in the medical field and had no prior exposure to Applied Behavior Analysis. Mayfield's raiser previously raised 14 dogs, including six

who were career-changed. Of the career-changed dogs, one was changed for medical reasons, one was transferred to a different service dog organization, and four were for behavioral reasons. The raiser's prior experience with non-guide dogs was as an owner of companion dogs.

Scott was a male Labrador retriever and golden retriever cross (17/20 Labrador, 3/20 golden) who was six-and-a-half months old at the time of baseline data collection. His raiser worked in the medical field and had no prior exposure to Applied Behavior Analysis. Scott's raiser previously raised five dogs, including two who were career-changed. One was transferred to a different service dog organization while the other was career-changed for an unknown reason. The raiser's experience with non-guide dogs was with companion dogs.

Lee was a male Labrador retriever and golden retriever cross (proportions unspecified) who was six-and-a-half months old at the time of baseline data collection. His raiser worked in finance and had no prior exposure to Applied Behavior Analysis. The puppy raiser previously raised three dogs, including two that were career changed for behavior. The raiser's experience with non-guide dogs was taking basic obedience puppy classes with companion dogs.

Ruby was a female Labrador retriever that was 11.5 months old at the time of baseline data collection. Her raiser worked in sales and had no prior exposure to Applied Behavior Analysis. Ruby's raiser raised four dogs for the training organization, including one that was career changed for a medical reason. The raiser had prior experience with non-guide dogs as an owner of a companion dog.

Mac was a female Labrador golden retriever cross (7/8 Labrador, 1/8 golden). She was two months old at the onset of baseline data collection. Mac's raiser had a career in the medical field with no prior exposure to Applied Behavior Analysis. The raiser had previously raised two dogs for the training organization. Both dogs were career-changed: one for medical reasons and the other for behavior. Prior experience with non-guide dogs included training their personal companion dogs for agility skills, Canine Good Citizen certification, and to be a therapy dog.

Hodges was a male Labrador retriever and golden retriever cross (7/8 Labrador, 1/8 golden). He was 4.5 months old at the onset of baseline data collection. Hodges' raiser had a career in education administration. His raiser had prior exposure to Applied Behavior Analysis including higher education course content, Positive Behavior Support at district levels, and while working in Special Education. The raiser had no prior puppy raising experience but had owned companion dogs.

Asher was a female Labrador retriever who was nine-and-a-half months old at the time of baseline data collection. Her raiser worked part time in an unspecified field and had no prior exposure to Applied Behavior Analysis. The raiser previously raised two puppies for the training organization both of which became guide dogs. Asher's raiser had prior experience with non-guide dogs as an owner of a companion dog.

Design

The design was a nonconcurrent AB design. A second intervention was introduced as a C condition if puppy behavior persisted at a level of concern through the B condition. All but one participant experienced an AB design; one experienced an ABC design.

The A condition was characteristic of participants managing the undesired puppy behavior as instructed by the training organization and completing the FABD for the target behavior.

The B condition consisted of implementation of a FABD-informed intervention.

The C condition consisted of participants viewing a 30-minute educational video that addressed how and when to use reinforcement procedures with guide dog puppies.

During the A condition and B conditions, participants provided a video recording of a brief discrete-trial training session during which they instructed the puppies to “sit” and “down” five times each using whatever prompting level necessary.

Procedures

Recruitment, Informed Consent, and Enrollment

The guide dog training organization forwarded recruitment messages through their listserv used to communicate with puppy raisers. Puppy raisers contacted the researcher if they were interested in participating. All correspondence between the researcher and participants took place over email, phone, and video conferencing (i.e., Zoom). Email correspondence and video conferencing was used to facilitate confirmation of raisers’ and their puppies’ eligibility to participate. A thorough description of the research and participant obligations was provided to raisers, as well as the opportunity to ask questions about the research. Upon granting informed consent, participants were then provided a questionnaire to collect puppy raiser and puppy information (see Appendix A).

Following the enrollment meeting, participants provided five video examples of the puppy engaging in the identified target behavior, during which participants were

instructed to interact with the puppy as they typically would. The researcher reviewed the videos and developed an operational definition of the puppy target behavior. An appropriate measurement of the behavior was determined and a daily data sheet was designed for use by the participant. Information gathered during the enrollment meeting and from observing the video examples of the target behavior also informed the researcher's customization of the FABD data sheet to include specific consequences the individual puppy was likely to contact following the behavior (e.g., "attention" edited to read "physical contact"). Individualized FABD data sheets can be found in Appendices B through H.

In addition to videos of the target behavior, participants provided a video of a brief training session with the puppy. Participants were asked to record five instances of giving the puppy both the "sit" and "down" commands in an area of the living space that was free of any perceived distractions (e.g., other animals, people, toys). The participant was instructed to use any type of prompting determined necessary for completing the response.

A Condition - Baseline and FABD

Upon the materials being provided to the researcher, the researcher and participants then met for a training on the target behavior definition and daily data collection. This session included providing the participants with a description of examples and nonexamples of the target behavior. When the video examples included recordings of nonexamples of the behavior, those were also reviewed and discussed with the participants. Then, the researcher provided at least one hypothetical example of both a target behavior occurrence and nonoccurrence and how the data should be collected in

each example. Via screen sharing, the data sheet was displayed so the participant could see how the data should be entered on the data sheet. Participants were then asked to provide hypothetical examples of a target behavior occurrence and nonoccurrence and describe if and how the data would be collected for each. Feedback was provided to the participants. The training occurred until the participants' verbal performance of how they planned to monitor and collect daily data was 100% accurate. Participants were instructed not to change how they were managing the puppy behavior until given further notice and to video record as many instances of the target behavior as possible. Puppy behavior data and video recordings of the target behavior were provided to the researcher on a daily or every-other-day basis from thereon out.

Within the week and at the earliest convenience of the participant and researcher, a training on how to use the FABD was conducted by the researcher. This session included providing the participants with a thorough explanation of how to use the FABD with their puppy's target behavior. The researcher provided at least two hypothetical examples of the occurrence of the target behavior and the following consequence(s) and explained how the data should be recorded on the FABD data sheet for each example. Via screen sharing, the FABD data sheet was displayed so the participant could see how the data would be entered. Participants were then asked to provide hypothetical examples of a target behavior occurrence and describe how the data would be collected for each. Feedback was provided to the participants. The training occurred until the participants' verbal performance of how they planned to use the FABD was 100% accurate. Participants were then asked to review the video examples of the target behavior they had previously provided to the researcher and complete the FABD for each example. The

completed FABD data sheet was emailed to the researcher upon completion for review and to inform the development of a new intervention.

Upon receiving the completed FABD data sheet and observation of a stable or upwards trend of the most recent three data points, a meeting was scheduled to review the FABD-informed intervention. For one participant, the meeting was scheduled without the stated data trends secondary to an availability issue.

B Condition - FABD-informed Intervention

First, the researcher provided the participants with a thorough explanation of the FABD results and how the results related to the guide dog training organization's standard protocol of "remove the reinforcer for the undesired behavior." Then, the researcher reviewed the FABD-informed protocol with the participants. Protocols consisted of extinction plus a differential reinforcement procedure.

The researcher provided at least two hypothetical examples of the occurrence of the target behavior and how the new, FABD-informed protocol would be implemented. Participants were then asked to provide hypothetical examples of a target behavior occurrence and describe how they would implement the new, FABD-informed protocol. Feedback was provided to the participants. The training occurred until the participants' verbal performance of how they planned to use the FABD was 100% accurate. Written protocols were provided to participants for reference following the training.

Participants also provided a second video recording of a brief training session with their puppy (e.g., training "stay" or "down").

The researcher graphed and monitored puppy behavior data. Upon reaching levels of behavior that were reasonable for the age of the given guide dog puppy and/or were no

longer threatening the puppy's suitability as a guide dog (i.e., zero or near-zero levels), the participant was notified that their research obligations were complete. If behavior levels were observed as still concerning for a guide dog puppy, the participant was provided a link to the educational video with instructions to view it at their earliest convenience.

C Condition - Psychoeducation

Participants viewed a 30-minute educational video about how to train guide dog puppies with positive reinforcement procedures. Specific topics included contingencies, what constitutes as reinforcement, how and when to use reinforcers, and how to differentially reinforce behavior. The researcher graphed and monitored behavior data. Upon reaching levels of behavior that were reasonable for the age of the given guide dog puppy and/or were no longer threatening the puppy's suitability as a guide dog (i.e., zero or near-zero levels), the participant was notified that their research obligations were complete. If behavior levels were observed as still concerning for a guide dog puppy, the participant was notified that their research obligations were complete. They were also encouraged to discuss the persistent puppy behavior with their assigned contact in the guide dog training organization.

All participants were invited to participate in a survey following their time in the study. The survey posed questions regarding their experience using the FABD and their perceived feasibility and utility of administering the assessment for the management of guide dog puppy behavior. Responses were anonymous and collected through Qualtrics®.

Response Measurement

The present study evaluated three questions, each of which is presented below with a description of the relevant measurement.

Question 1: Is there treatment utility of the FABD for the management of undesired guide dog puppy behavior?

The independent variable was the use of the FABD and the dependent variable was puppy behavior, though they varied for each puppy. Target behaviors and measurements for each puppy are summarized in Table 2.

Table 2

Puppy target behaviors.

Puppy Name	Target Behavior	Measurement(s)
Mayfield	Inappropriate Greeting Behavior	frequency
Scott	Vocalizing on Tie-Down	duration
Lee	Vocalizing in the Crate	duration
Ruby	Jumping on People	frequency
Mac	Vocalizing in the Exercise Pen	duration
Hodges	Scrounging	frequency
Asher	Inappropriate Greeting Behavior	frequency

Mayfield's target behavior was Inappropriate Greeting Behavior, which occurred when she was off-leash inside the home. Inappropriate Greeting Behavior was defined as Mayfield bringing her front two and/or all four feet off the floor. The frequency of behavior was recorded in episodes that began as soon as Mayfield brought her feet off the floor and ended with a five-minute offset. Guide dogs must refrain from jumping on

people to maintain safety with visually-impaired people, thus this behavior was threatening Mayfield's suitability as a guide dog.

Scott's target behavior was Vocalizing on Tie-Down, which occurred when Scott was on tie-down. A dog on tie-down refers to when their collar is connected to a short cable that is connected to an immovable object, such as a wall or heavy piece of furniture. Vocalizing on Tie-Down was considered as barking at any detectable volume while on tie-down while the puppy raiser was ten feet away from Scott. Video recordings of the target behavior facilitated duration measurement. Guide dogs must be able to quietly rest and not disturb anyone in the surroundings while on tie-down with or without the handler present, thus this behavior was threatening Scott's suitability as a guide dog.

Lee's target behavior was Vocalizing in the Crate, which included vocalization at any detectable volume while he was in the crate outside of his typical crate routine (i.e., overnight, after exercise) with the puppy raiser in a separate room. Video and audio recordings of the target behavior facilitated duration measurement. Guide dogs must be able to quietly rest in crates without the handler present, thus this behavior was threatening Lee's suitability as a guide dog.

Ruby's target behavior was Jumping on People which occurred when Ruby was on leash or drag line. A dog on drag line refers to them being connected to a leash that drags behind the dog instead of being held by a person (for quick access to redirecting the dog as needed). Jumping on People consisted of Ruby facing a person, bringing her front two and/or all four feet off the floor or ground, and jumping on or towards the person. The behavior was recorded in episodes with an immediate onset and a one-minute offset. Data were depicted as a daily frequency. Guide dogs must refrain from jumping on

people to maintain safety with visually-impaired people. In addition, guide dogs cannot jump on people in the community because while visually-impaired people legally have the right to access their community with guide dogs, establishments are reserve the right to ask anyone with an “out of control” guide dog to leave. The behavior was threatening Ruby’s suitability as a guide dog.

Mac’s target behavior was Vocalizing in the Exercise Pen. The behavior consisted of vocalizations at any detectable volume while Mac was in the exercise pen and the puppy raiser in a separate room. An exercise pen refers to a crate-like enclosure except it does not have a ceiling and is more spacious than a crate. Video recordings of the target behavior facilitated duration measurement. Guide dogs must be able to quietly rest or otherwise entertain themselves in exercise pens without the handler present, thus this behavior was threatening Mac’s suitability as a guide dog.

Hodges’ target behavior was Scrounging, which occurred while he was on leash and entering or exiting the home during relieving (i.e., elimination) routines. Scrounging consisted of Hodges lunging, tugging, or nose-diving towards a detectable item on the ground. Frequency measures were collected for the target behavior. Incidents were counted upon the movement towards the object on the ground and ended once Hodges’ nose was no longer moving towards the ground. Hodges typically engaged in the behavior in the presence of lawn debris, which was a safety issue regarding ingestion as well as for the handler as he aggressively pulled on the leash towards the debris. Guide dogs cannot have a tendency to ingest foreign items or pull on the leash in a way to compromise stability and safety of the handler.

Asher's target behavior was Inappropriate Greeting Behavior, which occurred when Asher was on leash and while a family member was approaching. Inappropriate Greeting Behavior consisted of bowing, laying down, rolling over on the floor, jumping, mouthing, pulling on the least, lunging towards, or otherwise approaching the family member without permission. Not all, but at least one, of the behaviors had to occur in order to be considered Inappropriate Greeting Behavior. Frequency measures were taken for the target behavior. Incidents began as soon as any of the listed behaviors occurred and ended once Asher was successfully redirected back to the puppy raiser's side. Guide dogs need to maintain a proper heel position when on leash to facilitate safety and appropriate social behavior while on-the-job, thus Inappropriate Greeting Behavior was threatening Asher's suitability as a guide dog.

Question 2: Do puppy raisers implement procedures with fidelity?

Puppy raisers' adherence to the guide dog training organization protocol to "reinforce desired behavior" was measured during the brief training sessions that consisted of puppy raisers instructing puppies to "sit" and "down." Measurement consisted of the percentage of trials that puppy raisers delivered an assumed reinforcer contingent upon correct puppy responses within two seconds of the correct puppy response.

Question 3: Do puppy raisers consider the FABD a feasible assessment to use when needing to address undesired puppy behavior?

A social validity survey was provided to participants at the outset of their time in the study. The participants answered questions on a five-point Likert-type scale indicating the degree to which they disagreed or agreed with statements about feasibility

and helpfulness of the FABD in the context of addressing undesired puppy behavior. The mean and range of responses were calculated.

Results

Question 1: Is there treatment utility of the FABD for the management of undesired guide dog puppy behavior?

Results of the FABD for each puppy and corresponding interventions are presented in Table 3. Interventions for Mayfield and Scott are not presented secondary to being dismissed from the study prior to intervention.

Table 3

FABD results and corresponding interventions.

Puppy Name	FABD Results	Intervention
Mayfield	attention (physical, verbal)	n/a
Scott	attention (verbal, physical); edible (kibble)	n/a
Lee	attention (verbal); released from crate	Ext + FI DRO
Ruby	attention (physical, verbal)	Ext + FM DRO
Mac	attention (verbal); edible (kibble)	Ext + VI DRO
Hodges	edible (lawn debris); attention (verbal)	Ext + VM DRO
Asher	attention (physical, verbal)	Ext + FM DRO

Note. FABD results are presented as the suggested maintaining consequences of the behavior.

Mayfield and her puppy raiser completed the FABD and four days of baseline. Results of the FABD suggested Mayfield's Inappropriate Greeting Behavior was maintained by physical and verbal attention. Her and her puppy raiser were dismissed from the study because the puppy raiser stopped addressing the selected target behavior and started taking data and intervening upon other behaviors on multiple occasions.

Scott's FABD results suggested that his Vocalizing on Tie-Down was maintained by verbal and physical attention, as well as kibble (i.e., dog food used as a reward). Following the completion of the FABD, Scott's target behavior decreased to near-zero levels. Completing the FABD involved viewing video recordings of the raiser-puppy interactions and recording those occurrences. Self-monitoring activities and related reactivity may have accounted for the decrease of target behavior, however that was not evaluated (Nelson & Hayes, 1981). The puppy raiser related that there were no other environmental or puppy health changes that may have been contributed to the decrease in target behavior.

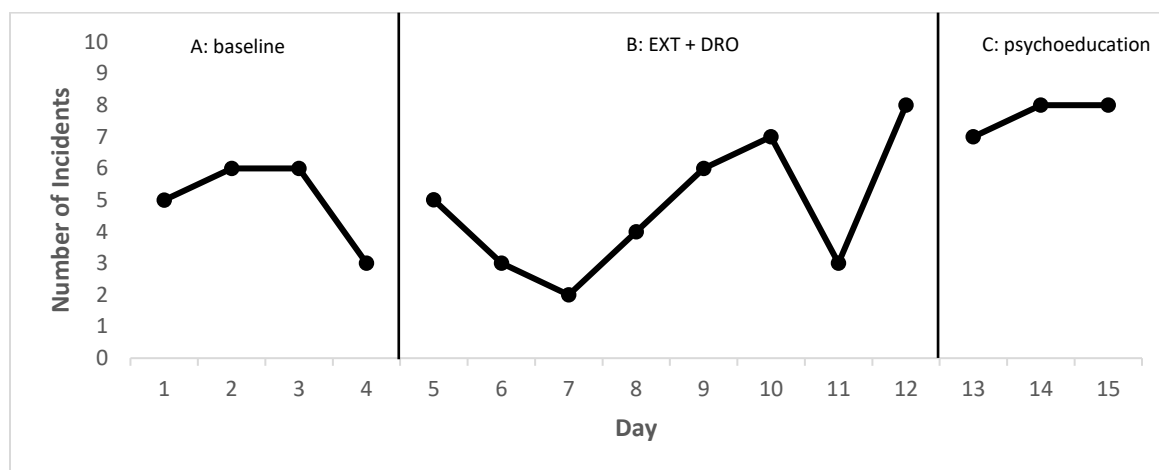
Lee's FABD results suggested that his Vocalizing in the Crate was maintained by his raiser's verbal attention and escape from the crate. The FABD-informed intervention consisted of extinction and differential reinforcement of other behavior on a five-minute fixed-interval schedule. Attention and being released from the crate were withheld contingent on vocalizing in the crate and provided to Lee contingent on five minutes without Vocalizing in the Crate. Five minutes was determined as an achievable reinforcement criterion based on his inter-response time during baseline. Within seven sessions of implementing the intervention, the target behavior reached zero levels. The behavior then re-emerged and the puppy raiser related they were choosing to resort to previous behavior management strategies of providing Lee with attention and letting him out of the crate contingent on him engaging in the target behavior instead of using the FABD-informed intervention. Secondary to their communication of choosing not to utilize the FABD-informed assessment, the puppy raiser and Lee were dismissed from the study.

Mayfield, Scott, and Lee's raisers were provided a debriefing session at the outset of their participation that included recommendations for managing the puppies' target behaviors, as well as to contact their guide dog training organization contact person for further advice.

Ruby's FABD results suggested her Jumping on People was maintained by physical and verbal attention. The FABD-informed intervention consisted of extinction and differential reinforcement of other behavior on a fixed momentary schedule. Verbal and physical attention was withheld contingent on Jumping on People and provided to Ruby contingent on her approaching people without jumping. During baseline, Ruby was observed to engage in episodes of the target behavior three to six times daily.

Following eight days of variable data during intervention, the puppy raiser was provided the psychoeducation. Viewer data indicated that Ruby's raiser viewed 100% of the content and answered 87% (13/15) of the embedded quiz questions correctly. Jumping on People was then observed at a stable daily frequency above desired levels for three consecutive days. This concluded the study for Ruby and her puppy raiser. The participant was provided a debriefing session that covered recommendations for managing Ruby's target behavior, as well as the recommendation to contact their guide dog organization contact person for further advice. Figure 1 depicts Ruby's target behavior data throughout her time in the study.

Figure 1. *Ruby's Daily Frequency of Jumping on People*

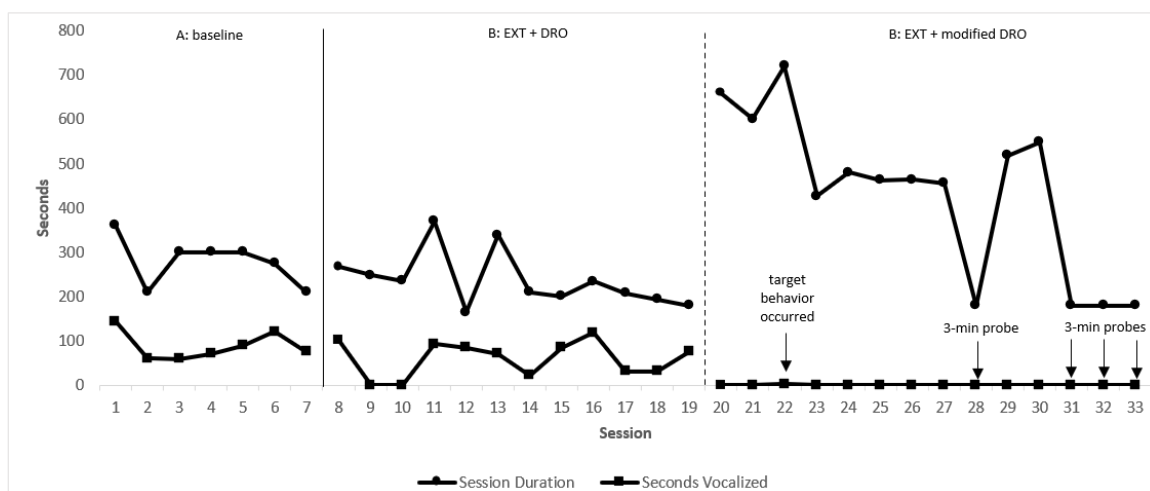


Mac's FABD results suggested her Vocalizing in the Exercise Pen was maintained by verbal attention and kibble. The FABD-informed intervention consisted of extinction and differential reinforcement of other behavior. Verbal attention and kibble were withheld contingent on Vocalizing in the Exercise Pen and provided to Mac contingent on her being in the exercise pen without vocalizing. The DRO procedure was implemented on a three-minute fixed-interval schedule. Sessions were held two to three times daily. Mac engaged in the target behavior between one and two minutes each baseline session.

During sessions eight through 19, reinforcement criteria was three minutes without vocalizing. Throughout the 12 sessions, Mac began to exhibit behavioral indicators of stress (i.e., panting, licking herself). The DRO was then modified to a variable-interval schedule. This change is indicated by the dashed phase-change line in Figure 2. Beginning during Session 20, Mac contacted reinforcers on average every 40 seconds. Access to reinforcers lasted, on average, five seconds. During this condition, the behavior was observed at zero levels with one exception. Mac did engage in the target

behavior during Session 22 and therefore contacted the extinction component of the intervention. Sessions 28, 31, 32, and 33 were probes of three-minute sessions in the exercise pen without any interaction with the puppy raiser. No indicators of stress were observed following the modification of reinforcement criteria, including during the three-minute probes.

Figure 2. *Duration of Mac's Sessions and Vocalizations*

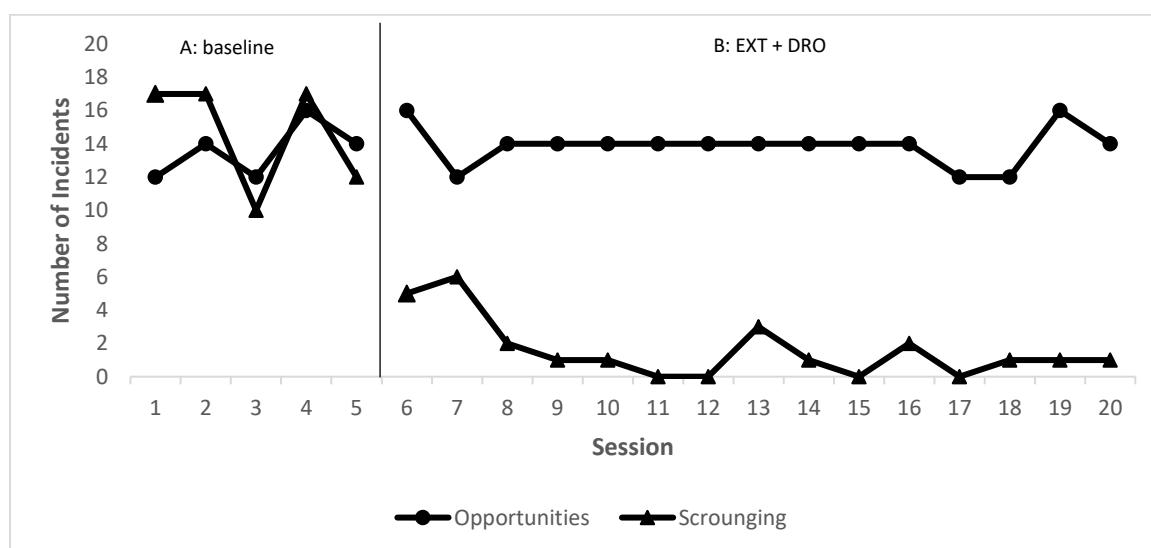


Hodges' FABD results suggested his Scrounging was maintained by access to and consumption of lawn debris and verbal attention. The FABD-informed intervention consisted of extinction (attention) and differential reinforcement of other behavior on a variable-interval schedule. Verbal attention was withheld contingent on Scrounging and provided to Hodges along with kibble contingent on him walking to and from the relieving area without Scrounging. Since lawn debris was not a viable option to use as a reinforcer, multiple pieces of kibble were used as an alternative reinforcer. Typically, puppy raisers reward desired puppy behavior with a single piece of kibble. Towards attempting to better compete with lawn debris, the puppy raiser delivered multiple pieces to Hodges contingent on desired behavior. Important to note is that puppy raisers were

not permitted to utilize other edibles, such as pieces of meat or flavored training treats, without special approval by the guide dog training organization.

As indicated in Figure 3, Hodges had a regular relieving routine of six to eight times per day throughout the entire study. Each relieving routine consisted of a trip outside to the relieving area and a trip back inside from the relieving area. Frequency of Scrounging during baseline ranged from ten to 17 times per day. Following intervention, Hodges engaged in the target behavior from six times to once daily.

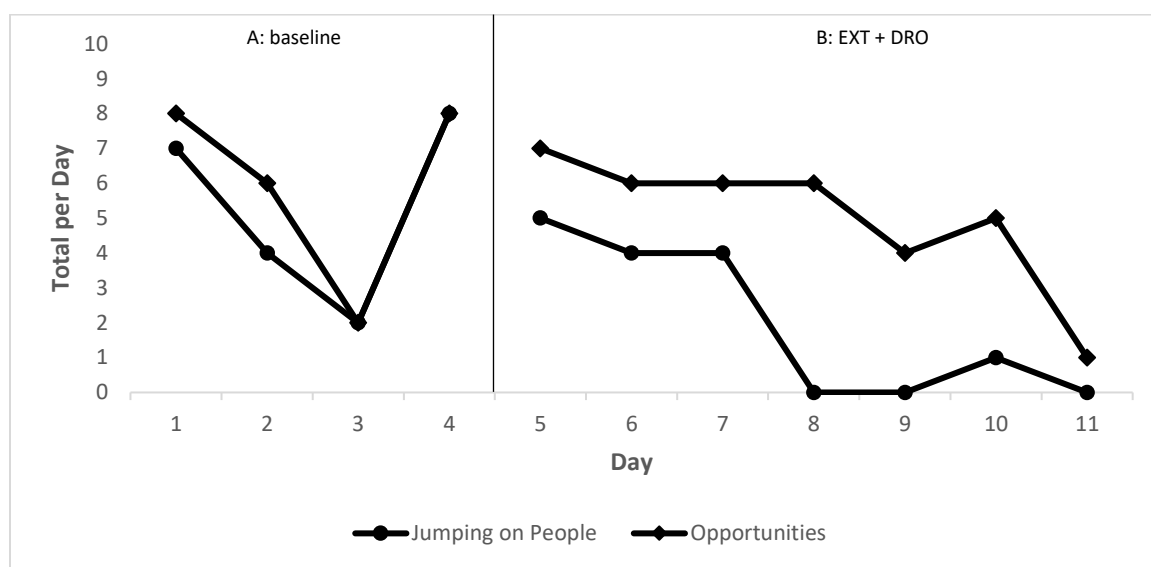
Figure 3. Hodges' Daily Opportunities and Frequency of Scrounging



Asher's FABD results suggested her Inappropriate Greeting Behavior was maintained by physical and verbal attention. The FABD-informed intervention consisted of extinction and differential reinforcement of other behavior on a fixed-interval schedule. Verbal and physical attention was withheld contingent on Inappropriate Greeting Behavior and provided to Asher contingent on the absence of Inappropriate Greeting Behavior as family members approached her. During baseline, Asher engaged in Inappropriate Greeting Behavior from two-thirds to 100% of sessions.

Following intervention, Inappropriate Greeting Behavior decreased to zero levels with one exception. As indicated in Figure 4, the exception consisted of a single instance of Inappropriate Greeting Behavior. While an anecdote not captured by the data collection, the single incident consisted of just a very slight and momentary movement towards the approaching person compared to the target behavior observed during baseline that included lunging towards and mouthing the approaching person, rolling onto her back, jumping, and total disregard of the handler.

Figure 4. *Asher's Daily Greetings and Frequency of Inappropriate Greeting Behavior*



Question 2: Do puppy raisers implement procedures with fidelity?

Puppy raisers' implementation was evaluated for accurate use of the FABD, implementation of the FABD-informed intervention, and delivery of reinforcers during training sessions.

Functional Assessment for the Behavior of Dogs

Procedural fidelity checks for using the FABD were conducted to evaluate adherence to main procedural components of conducting the FABD (i.e., using

appropriate materials, selecting the relevant consequences). All four participants filled out the FABD, indicated the consequences of the behavior, and scored the FABD results with 100% accuracy.

Implementation of Intervention

Treatment integrity checks were conducted to evaluate adherence to the FABD-informed intervention. With respect to addressing target behavior, puppy raiser responses were recorded as correct when the reinforcers were withheld or withdrawn within one second following the target behavior. Responses were recorded as incorrect if the reinforcers were withheld from the puppy in the absence of the target behavior or if they were withdrawn after one second of the target behavior occurring.

For Ruby, Hodges, and Asher's raisers, correct responses with respect to addressing behavior other than the target behavior consisted of providing the reinforcers within one second following the occurrence of the behavior. Incorrect responses were recorded if the reinforcers were withheld from the puppy for more than one second following the occurrence of the behavior. Mac's raiser's criteria were different because of the time-based Differential Reinforcement of Other Behavior procedure. For Mac's raiser, correct responses with respect to addressing behavior other than the target behavior consisted to adhering to the time-based reinforcement criteria. Incorrect responses consisted of providing the reinforcers five seconds before or after Mac met the reinforcement criteria.

The analyses are limited to the number of videos participants were able to record and send to the researcher. Ruby's raiser provided video recordings for 52% of the reported behaviors. Mac's raiser provided video recordings for 100% of the reported

behaviors. Hodges' raiser provided video recordings for 21% of the reported behaviors. Asher's raiser provided video recordings of 77% of the reported behaviors. Treatment integrity for each participant is displayed in Table 4. Puppy names are displayed in Table 4; however, it is important to note that it is their raisers' responses that were calculated and displayed in the table.

Table 4

<i>Summary of treatment integrity for intervening upon target and other behaviors.</i>			
Puppy	Target Behavior (EXT)	Other Behavior (DRO)	Average
Ruby	21%	40%	31%
Mac	100%	100%	100%
Hodges	100%	100%	100%
Asher	100%	100%	100%

Training Sessions

Puppy raisers recorded videos of multiple brief training sessions throughout their time in the study. Training sessions consisted of the puppy raiser instructing the puppy to “sit” and “down” five times each. Their delivery of an assumed reinforcer within two seconds following the puppy's correct responses was considered correct. Delivery of reinforcers for desired guide dog puppy behavior is a guide dog training organization protocol and the occurrence of which was recorded for each puppy raiser's training sessions to give a glimpse of their adherence to training procedures.

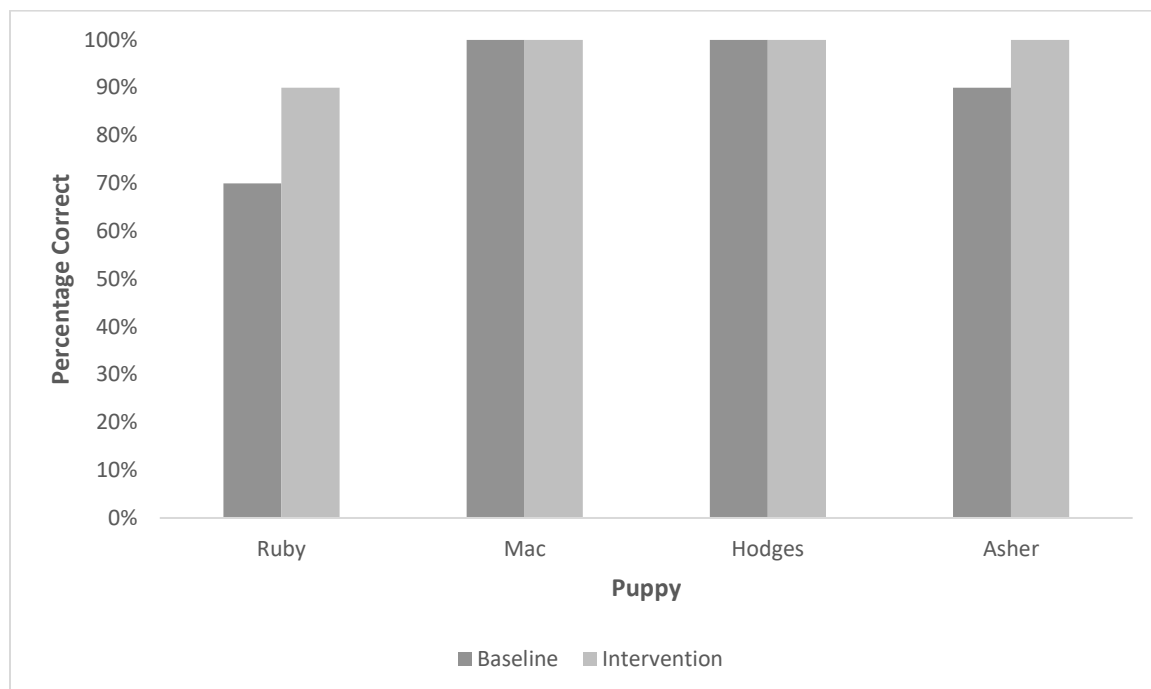
Responses were recorded as correct if the reinforcer was delivered within two seconds of the puppy engaging in the behavior which was requested of them. For example, if the puppy raiser instructed the puppy to “sit,” the puppy sat, and the

reinforcer was delivered within two seconds of the puppy sitting, then the response would be scored as correct. In the same example, if the puppy stood up instead of sat and the puppy raiser delivered a reinforcer for the incorrect puppy response, then the puppy raiser response would be scored as incorrect. Puppy names are displayed in Figure 5; however, it is important to note that it is their raisers' responses that were measured and are depicted in the graph.

Ruby's raiser delivered a reinforcer within two seconds of Ruby engaging in the requested behavior 70% of the trials of the training session that occurred during baseline and 90% of the training session that occurred during the intervention phase.

Mac and Hodges' raisers both delivered a reinforcer within two seconds of the puppies engaging in the requested behavior 100% of the trials of the training sessions that occurred during baseline and intervention phases.

Asher's raiser demonstrated improvement from baseline to intervention phase. The puppy raiser delivered a reinforcer within two seconds of Asher engaging in the requested behavior 90% of the trials of the training session that occurred during baseline and 100% of those that occurred during the intervention phase.

Figure 5. *Puppy Raisers' Correct Delivery of Reinforcers*

Question 3: Do volunteers in a guide dog training system consider the FABD a feasible assessment to use when needing to address undesired puppy behavior?

Each of the four participants completed the survey and responses were anonymous. Questions were presented in a five-point Likert-type scale. Results are displayed in Table 5.

Table 5

Social validity survey results.

Item	Question	Mean	Range
1	It was easy to understand how to use the assessment.	4.75	1.0
2	I would like to use this assessment with guide dog puppies in the future.	4.50	2.0
3	I recommend other puppy raisers have access to this assessment.	5.0	0.0
4	Learning how to use the assessment online was convenient.	5.0	0.0
5	The assessment was easy to use.	5.0	0.0
6	The assessment was a useful tool that helped identify what a guide dog puppy “gets” or “avoids” with their behavior.	4.75	1.0

7	I am more confident in my ability to identify what a guide dog puppy “gets” or “avoids” with their behaviors because I know how to use this assessment.	4.75	1.0
8	I am more confident in my ability to stop unwanted puppy behavior because I know how to use this assessment.	4.50	1.0
9	Most puppy raisers could learn how to use this assessment.	5.0	0.0
10	I enjoyed assessing the guide dog puppy’s behavior.	5.0	0.0

Note. All items scored 1 (*strongly disagree*) to 5 (*strongly agree*).

Interobserver Agreement

Occurrence of Puppy Target Behavior

Interobserver agreement (IOA) for puppy target behavior was computed by watching video recordings of the behaviors. The analyses for IOA of puppy target behavior occurrences were limited to the number of videos participants were able to record and send to the researcher. Ruby’s raiser provided video recordings for 52% of the reported behaviors. Mac’s raiser provided video recordings for 100% of the reported behaviors. Hodges’ raiser provided video recordings for 21% of the reported behaviors. Asher’s raiser provided video recordings of 77% of the reported behaviors. Each video recording provided by each raiser was included in the IOA calculations for a combined total of 62% of reported instances of behavior.

Total count IOA was calculated for Ruby, Hodges, and Asher’s target behaviors. Two independent observers recorded the number of responses that occurred during the observation period. The smaller of the two counts was divided by the larger and multiplied by 100 for a percentage. The mean total count IOA for Ruby, Hodges, and Asher’s sessions were 99%, 95%, and 96%, respectively. Similar calculations were made for interobserver agreement for Mac’s duration of responses. Independent observers recorded the total duration of Vocalizing in the Exercise Pen that occurred during the observation period. The smaller of the two totals was divided by the larger and multiplied

by 100 for a percentage. The mean total duration IOA for Mac's target behavior was 92%.

Treatment Integrity Measures

Exact count-per-trial IOA was calculated for treatment integrity measures. The exact count-per-trial IOA was calculated by taking the total number of intervals that two independent observers were in 100% agreement upon divided by the total number of trials multiplied by 100 for a percentage. Exact count-per-trial IOA for Ruby, Mac, and Asher was 100% and 95% for Hodges.

Reinforcer Delivery During Training Sessions

Interobserver agreement was also calculated for puppy raisers' percentage of correct responses during puppy training sessions. The trial-by-trial IOA for these measures was calculated by taking the number of trials that two independent observers agreed upon divided by the total number of trials multiplied by 100 for a percentage. Trial-by-trial IOA for each puppy raiser's correct delivery of reinforcers during the training sessions was 100%.

Discussion

The purpose of the present research was to evaluate the treatment utility and feasibility of the FABD for puppy raisers' management of undesired puppy behavior. Psychoeducation was provided as a second-tier intervention contingent on persistence of the undesired puppy behavior following the FABD-informed intervention. Puppy raisers' adherence to a variety of procedures was also evaluated as supplemental insight into the efficacy of interventions.

Seven puppy raisers participated in the present research. Three of the seven participants did not complete the study. Reasons for attrition included a sudden decrease of target puppy behavior to near-zero levels for Scott and research protocol noncompliance for Mayfield and Lee's raisers. While the three participants failed to complete the study, each offer data for consideration by guide dog training organizations.

Mayfield's raiser stopped addressing the selected target behavior and started taking data and intervening upon other behaviors on multiple occasions. Remedial training on identifying the target behavior was provided. However, the raiser may have required in-person and more intensive support in order to implement procedures with good fidelity, which was beyond the scope of the present study but could be feasible in the current infrastructure of the training organization.

Lee's raiser implemented the FABD-informed intervention for seven sessions before the target behavior decreased to zero levels. When the behavior re-emerged, the puppy raiser related they were utilizing previous behavior management strategies of providing Lee with attention and releasing him from the crate contingent on target behavior. Reasons for deviating from the intervention that had demonstrated success in decreasing target behavior was communicated to the researcher as a preference. Some behavioral explanations may include a learning history that included negative reinforcement for attending to Lee's vocalizations, countercontrol, or lack of motivation for following research protocols. Any of those are of interest to guide dog training organizations as they pose a threat to the both the training outcome and welfare of the puppy.

Scott's target behavior decreased to zero levels following the completion of the FABD and in the absence of any notable changes in environment or puppy health. Use of the FABD involved the puppy raiser watching videos of their behavior with respect to the puppy target behavior. Self-monitoring may be a viable, minimally intrusive option for changing some puppy raisers' and puppies' behavior that also requires few resources.

With respect to the four participants who completed the study, the FABD informed a successful function-based intervention for all but one participant. Neither the FABD-informed intervention or psychoeducation resulted in decreased levels of behavior for Ruby, though treatment integrity for both extinction and differential components of the intervention was poor. Overwhelmingly, participants reported that the FABD was feasible, useful, and enjoyable to use with their puppies. They also recommended other puppy raisers have access to the assessment. Guide dog training organizations should consider further investigation of incorporating the FABD in the bank of resources available to puppy raisers.

One measure of Question 2 was the extent to which intervention procedures were carried out with fidelity. High treatment integrity was observed for the three participants for which successful FABD-informed intervention was noted. Very poor treatment integrity was observed for Ruby's raiser's implementation of the intervention. While treatment integrity was very poor, Ruby's raiser's procedural fidelity for using the FABD was verified to have been used and completed with accuracy. As with Mayfield's raiser, more in-person or higher intensity of support may have been necessary to facilitate meaningful raiser and puppy behavior change for Ruby and her raiser.

A second measure of Question 2 was the accuracy with which delivery of a reinforcer was observed. Little variability of accuracy across raisers was noted, but even the puppy raisers who performed with the highest accuracy required support to successfully address the target behavior. These data speak to the need for further evaluation of the utility of additional psychoeducation, specifically as it relates to the use of reinforcement for training guide dog puppies. Puppy raisers may have sufficient knowledge of reinforcement procedures but lack the analytical skills required to assess puppy behavior that presents as less-straightforward. Indeed, it may be a case of knowing that but not knowing how (Ryle, 1945).

Overall, results suggest utility of functional assessment of puppy behavior and assessing puppy raisers' compliance to organizational training protocols. This research serves as the first to assess and evaluate puppy and puppy raiser behavior at the individual level. While previous research had investigated important questions about the puppy-raising period, results were all aggregated, making it difficult to make any meaningful conclusions about puppy raiser-puppy interactions. Results of this study offer several jumping points for behavioral lines of research that address guide dog puppy behavior and welfare, puppy raiser behavior, and other questions regarding the organizational processes related to the degree of support provided to puppy raisers and assessing puppy behavior.

Following analysis of individual puppy and raiser behavior, attention could be allocated toward large-scale studies investigating the puppy behavior patterns and factors of rearing environment that are indicative of success and failure in the training program. These data could further inform important behavioral targets during the puppy-raising

period and corresponding interventions. Rather than quickly determining that a puppy should be dismissed from the training program because they engage in behavior indicative of failure in the program, there may be a discussion regarding whether these behaviors may be addressed with a more intensive level of intervention than is standard in the puppy-raising period. This discussion should address whether a more intrusive level of intervention would be ethical and feasible for long-term maintenance of the desired behavioral outcome. Guide dog training organizations may establish a type of remediation program for puppies who require a slightly more sophisticated intervention than what typical puppy raisers are able to provide. In some cases, the moderate-level intervention may not be appropriate for the puppy. For example, an intervention necessary to maintain desired levels of behavior can require more supervision or behavioral expertise than will be available in the home with the guide dog's handler and may also not be the most ethical decision regarding the puppy's well-being.

Upon early observation of behaviors that are identified as requiring excessive resources or not best for the puppy to manage long term, organizations can make data-informed decisions regarding the puppy's career. It is likely that in some cases, the most ethical decision would be to discontinue the puppies' guide dog training careers and transition them into a more suitable life course (e.g., that of a family companion). This would also allow guide dog training organizations to allocate resources toward puppies more compatible with the objectives of a guide dog career.

Towards any and all of these objectives, the behavioral researcher will require the collaboration with guide dog training organization. Important to note is that behavior scientists are not the single missing variable in the guide dog production system or the

critical factor in filling the gaps in the current literature. Indeed, it can be said with confidence that the systematic consideration of behavioral principles and utilization of the many technologies derived from the science of behavior would have meaningful impact on the guide dog training organizations, their guide dogs, and handlers. However, behavior analysts would be joining an established multidisciplinary team and must appreciate that the multiple programs in guide dog training systems (e.g., breeding, veterinary, etc.) serve critical functions. That said, this research suggests behavior scientists may be most helpful in offering our assessment and intervention expertise toward ultimate enhancement of guide dog training programs.

Limitations and Future Directions

The most notable limitation of the current study is the level of support provided by the researcher to the participants in the development of an assessment-informed intervention. If the research procedures were adopted as-is by the guide dog training organization, it would arguably require additional resources than are currently utilized in supporting puppy raisers. A Master's level, experienced clinician fleshed out the training organization's "remove the reinforcer for the undesired behavior" protocol. Participants' skills of applying functional behavior assessment results to the current behavioral concern was not addressed in the present study. The level of support required for participants to construct an assessment-informed intervention meeting the needs of the puppy *and* that is feasible for the puppy raiser to carry out with high treatment integrity is certainly a consideration for future research and practice.

An important observation was noted during Mac's experience in the research. The emergence of behavioral indicators of stress demonstrated the need for puppy raisers to

be skilled in identifying if the puppy is experiencing aversive conditions. Identification of stress indicators during Mac's first iteration of the intervention informed substantial modifications towards mitigation of the apparent aversive qualities of being in the exercise pen. Supporting puppy raisers to be able to reliably identify indicators of stress may be a challenge for the guide dog training organization given the large body of puppy raisers involved in the organization and the various forms of behavioral indicators of stress. An alternative may be to support the puppy club group leaders—those who supervise puppy raisers at the local level—to identify stress indicators as an alternative to the body of puppy raisers. Furthermore, upon noticing indicators of stress, there is an analytical component to modifying interventions accordingly. Guide dog training organizations would do well to have support available to puppy club group leaders and puppy raisers for when this occurs.

An additional limitation of the research was the difficulty with which participants experienced video recording the puppy target behavior on an ongoing basis throughout the study. Depending on the target behavior, managing to video record and attend to the behavior simultaneously could present great challenges if even possible. A good case in point is Hodges' target behavior that occurred while the puppy and raiser were in motion. The puppy raiser had a leash in one hand and was to deliver the kibble reinforcer with the other hand. Video recording the behavior was not possible without a second person available to video record from a distance. Even so, only 21% of Hodges' behaviors were captured on video. Such an arrangement is not especially pragmatic in practice nor does it provide ample opportunity for interobserver agreement in the context of research, at least in the case Hodges' behavior. On the other hand, puppies with vocalization-related target

behaviors were more easily recorded without any assistance. Replicating the current methods of the study in person as opposed to remotely could provide better opportunity for interobserver agreement and relieve the puppy raisers of facilitating a second person to assist with providing video recordings. In practice, assessment may be best conducted by another observer, such as the puppy club group leader. When video recording isn't especially feasible, group leaders' periodic observation of the behavior may also be arranged.

While the FABD informed successful interventions, the objective of descriptive functional behavior assessments is not to confirm the reinforcer(s) maintaining undesired behavior. Rather, a descriptive functional behavior assessment is utilized to identify *possible* maintaining consequences. At no point during the present study was a reinforcer assessment conducted, and this should be noted when evaluating situations in which the FABD or other descriptive functional behavior assessment does not inform a successful intervention. In the case of Ruby, behavioral outcomes may have been due to the inaccurate identification of consequences suspected to maintain the jumping behavior. The treatment integrity data suggest otherwise, but the possibility is a consideration for future research or use for guide dog training organizations that intend to use this method of behavior assessment.

Finally, the current study was limited in its puppy-specific measures. Undesired puppy behavior was measured during the study, however there was no measurement of other indicators of puppy well-being, generalization, or maintenance. While two of the four puppy raisers informally related their observations of generalization and maintenance to the researcher, these were not incorporated as formal measure secondary

to perceived intrusiveness upon puppy raisers. Follow-up research should consider additional measures of generalization and maintenance probes to further speak to the social significance of the behavior assessment and interventions.

Conclusion

Despite these limitations, the current study initiated an important line of behavioral research towards the improved guide dog training outcomes and improved behavioral health of guide dog puppies. Functional behavior assessment of puppy behavior was completed with procedural fidelity by all participants. The FABD led to the successful intervention for each participant who implemented the intervention with high treatment integrity. Puppy raisers related the FABD was easy to use, useful towards the management of undesired puppy behavior, and recommended it be available to other puppy raisers to assist with managing undesired puppy behavior.

Data were suggestive of the importance of assessing puppy raisers' adherence to organizational training protocols. This was partially evaluated by the training sessions during which puppy raisers were to provide presumed reinforcers to the puppies contingent upon correct puppy responses. Participants demonstrated fairly high procedural fidelity. The results raise the question of whether puppy raisers have a sufficient knowledge base but require more or different forms of training in order to effectively implement what they know about training guide dog puppies. Furthermore, the analytic element of troubleshooting interventions not producing desired behavioral outcomes is advanced—how would this be taught to volunteer puppy raisers? Guide dog training organizations need to address the process by which puppy raisers access assistance in such circumstances.

Further pursuit of these investigations are steps toward improving guide dog training outcomes. The independence of many individuals with visual impairment depends upon sufficiently-trained guide dogs. Most importantly, the refinement of guide dog training programs will subsequently improve the quality of life for the visually impaired and their guide dogs.

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Appendix A: Enrollment Questionnaire & Interview Guide

Puppy Raiser/Group Information

Name:

Address:

Phone number:

Email address:

Occupation:

Puppy-Raising Club name and location:

How many puppies have you raised?

How many were career-changed, and for what reason(s)?

Other experience with dogs:

Previous Experience/Exposure to Applied Behavior Analysis (e.g., Positive Behavior Supports, Early Intervention for Autism):

Other Household Members Who Interact with the Puppy (please list if applicable)

Name:

Occupation:

Experience with dogs:

Previous Experience/Exposure to Applied Behavior Analysis (e.g., Positive Behavior Supports, Early Intervention for Autism):

Puppy Information

Name:

Date of Birth:

Breed:

Has the puppy ever been transferred to another Puppy Raiser? If so, when?

Last Vet Appt:

Previous or ongoing medical concerns:

Medication currently taking and reason:

When you have the information above, please return to the researcher.

Interview Guide

Puppy:

Raisers:

Puppy Behavior Information

Behavior of concern:

When do you think this behavior started?

What triggers this behavior?

What stops the behavior?

Where does this behavior occur?

How often does this behavior occur?

Have you been given instructions on how to address the behavior?

Describe the instructions:

Who gave you the instructions?

Were these strategies ever effective in stopping the behavior?

What else is important to know about this behavior?

Appendix B: Mayfield's FABD Form

Functional Assessment for the Behavior of Dogs (FABD)

Target Behavior: "Inappropriate Greeting Behavior"	
Steps to using the assessment	
1	Complete a segment of the assessment below for each video segment. There are 5 of each.
2	In the spaces below, enter tally marks next to <i>ALL</i> of the events that happened during and closely after the behavior incident.
3	After you have completed 5 segments, return the data sheet.

If you have any questions, please reach out.

date	GETS	eye contact	scolded	physical redirection	
		given command(s)	praise	cont'd close proximity w/person	
	AVOIDS	a person	puppy handling	something frightening	
		crate, tie down, xpen	an animal	following command(s)	
	GETS other:			AVOIDS other:	

date	GETS	eye contact	scolded	physical redirection	
		given command(s)	praise	cont'd close proximity w/person	
	AVOIDS	a person	puppy handling	something frightening	
		crate, tie down, xpen	an animal	following command(s)	
	GETS other:			AVOIDS other:	

date	GETS	eye contact	scolded	physical redirection	
		given command(s)	praise	cont'd close proximity w/person	
	AVOIDS	a person	puppy handling	something frightening	
		crate, tie down, xpen	an animal	following command(s)	
	GETS other:			AVOIDS other:	

date	GETS	eye contact	scolded	physical redirection	
		given command(s)	praise	cont'd close proximity w/person	
	AVOIDS	a person	puppy handling	something frightening	
		crate, tie down, xpen	an animal	following command(s)	
	GETS other:			AVOIDS other:	

date	GETS	eye contact	scolded	physical redirection	
		given command(s)	praise	cont'd close proximity w/person	
	AVOIDS	a person	puppy handling	something frightening	
		crate, tie down, xpen	an animal	following command(s)	
	GETS other:			AVOIDS other:	

GETS TOTALS AVOIDS TOTALS

Appendix C: Scott's FABD Form

Functional Assessment for the Behavior of Dogs (FABD)

Target Behavior: "Vocalizing on Tie-Down"	
Steps to using the assessment	
1	Complete a segment of the assessment below for each video segment. There are 5 of each.
2	In the spaces below, enter tally marks next to <i>ALL</i> of the events that happened during and closely after the behavior incident.
3	After you have completed 5 segments, return the data sheet.

If you have any questions, please reach out.

video #	GETS	scolding	kibble	closer proximity to Raiser
		general verbal interaction	praise	commands
	AVOIDS	a person	puppy handling	something frightening
		crate, tie down, xpen	an animal	following command(s)
	GETS other:			AVOIDS other:

video #	GETS	scolding	kibble	closer proximity to Raiser
		general verbal interaction	praise	commands
	AVOIDS	a person	puppy handling	something frightening
		crate, tie down, xpen	an animal	following command(s)
	GETS other:			AVOIDS other:

video #	GETS	scolding	kibble	closer proximity to Raiser
		general verbal interaction	praise	commands
	AVOIDS	a person	puppy handling	something frightening
		crate, tie down, xpen	an animal	following command(s)
	GETS other:			AVOIDS other:

video #	GETS	scolding	kibble	closer proximity to Raiser
		general verbal interaction	praise	commands
	AVOIDS	a person	puppy handling	something frightening
		crate, tie down, xpen	an animal	following command(s)
	GETS other:			AVOIDS other:

video #	GETS	scolding	kibble	closer proximity to Raiser
		general verbal interaction	praise	commands
	AVOIDS	a person	puppy handling	something frightening
		crate, tie down, xpen	an animal	following command(s)
	GETS other:			AVOIDS other:

GETS TOTALS

AVOIDS TOTALS

Appendix D: Lee's FABD Form

Functional Assessment for the Behavior of Dogs (FABD)

Target Behavior: "Vocalizing in the Crate"	
Steps to using the assessment	
1	Complete a segment of the assessment below for each video segment. There are 5 of each.
2	In the spaces below, enter tally marks next to ALL of the events that happened during and closely after the behavior incident.
3	After you have completed 5 segments, return the data sheet.

If you have any questions, please reach out.

date	GETS	collar correction(s)	kibble	visual access to someone	
		given command(s)	praise	let out of crate	
	AVOIDS	a person	puppy handling	something frightening	
		crate, tie down, xpen	an animal	following command(s)	
GETS other:		AVOIDS other:			

date	GETS	collar correction(s)	kibble	visual access to someone	
		given command(s)	praise	let out of crate	
	AVOIDS	a person	puppy handling	something frightening	
		crate, tie down, xpen	an animal	following command(s)	
GETS other:		AVOIDS other:			

date	GETS	collar correction(s)	kibble	visual access to someone	
		given command(s)	praise	let out of crate	
	AVOIDS	a person	puppy handling	something frightening	
		crate, tie down, xpen	an animal	following command(s)	
GETS other:		AVOIDS other:			

date	GETS	collar correction(s)	kibble	visual access to someone	
		given command(s)	praise	let out of crate	
	AVOIDS	a person	puppy handling	something frightening	
		crate, tie down, xpen	an animal	following command(s)	
GETS other:		AVOIDS other:			

date	GETS	praise	kibble	visual access to someone	
		given command(s)	toys	increased proximity to dog or person	
	AVOIDS	a person	puppy handling	something frightening	
		crate, tie down, xpen	a dog	following command(s)	
GETS other:		AVOIDS other:			

GETS TOTALS

AVOIDS TOTALS

Appendix E: Ruby's FABD Form

Functional Assessment for the Behavior of Dogs (FABD)

Target Behavior: "Jumping on People"	
Steps to using the assessment	
1	Complete a segment of the assessment below for each video segment. There are 5 of each.
2	In the spaces below, enter tally marks next to <i>ALL</i> of the events that happened during and closely after the behavior incident.
3	After you have completed 5 segments, return the data sheet

If you have any questions, please reach out.

date	GETS	excited person	scolded	physical redirection	
		given command(s)	praise/kibble	cont'd close proximity w/person	
	AVOIDS	a person	puppy handling	something frightening	
		crate, tie down, xpen	an animal	following command(s)	
GETS other:			AVOIDS other:		

date	GETS	excited person	scolded	physical redirection	
		given command(s)	praise/kibble	cont'd close proximity w/person	
	AVOIDS	a person	puppy handling	something frightening	
		crate, tie down, xpen	an animal	following command(s)	
GETS other:			AVOIDS other:		

date	GETS	excited person	scolded	physical redirection	
		given command(s)	praise/kibble	cont'd close proximity w/person	
	AVOIDS	a person	puppy handling	something frightening	
		crate, tie down, xpen	an animal	following command(s)	
GETS other:			AVOIDS other:		

date	GETS	excited person	scolded	physical redirection	
		given command(s)	praise/kibble	cont'd close proximity w/person	
	AVOIDS	a person	puppy handling	something frightening	
		crate, tie down, xpen	an animal	following command(s)	
GETS other:			AVOIDS other:		

date	GETS	excited person	scolded	physical redirection	
		given command(s)	praise/kibble	cont'd close proximity w/person	
	AVOIDS	a person	puppy handling	something frightening	
		crate, tie down, xpen	an animal	following command(s)	
GETS other:			AVOIDS other:		

GETS TOTALS AVOIDS TOTALS

Appendix F: Mac's FABD Form

Functional Assessment for the Behavior of Dogs (FABD)

Target Behavior: "Vocalizing in the Exercise Pen"	
Steps to using the assessment	
1	Complete a segment of the assessment below for each video segment. There are 5 of each.
2	In the spaces below, enter tally marks next to ALL of the events that happened during and closely after the behavior incident.
3	After you have completed 5 segments, return the data sheet

If you have any questions, please reach out.

video #	GETS	scolding/commands	kibble	closer proximity to Raiser
		general verbal interaction	praise	released from tie-down
	AVOIDS	a person	puppy handling	something frightening
		crate, tie down, xpen	an animal	following command(s)
	GETS other:			AVOIDS other:

video #	GETS	scolding/commands	kibble	closer proximity to Raiser
		general verbal interaction	praise	released from tie-down
	AVOIDS	a person	puppy handling	something frightening
		crate, tie down, xpen	an animal	following command(s)
	GETS other:			AVOIDS other:

video #	GETS	scolding/commands	kibble	closer proximity to Raiser
		general verbal interaction	praise	released from tie-down
	AVOIDS	a person	puppy handling	something frightening
		crate, tie down, xpen	an animal	following command(s)
	GETS other:			AVOIDS other:

video #	GETS	scolding/commands	kibble	closer proximity to Raiser
		general verbal interaction	praise	released from tie-down
	AVOIDS	a person	puppy handling	something frightening
		crate, tie down, xpen	an animal	following command(s)
	GETS other:			AVOIDS other:

video #	GETS	scolding/commands	kibble	closer proximity to Raiser
		general verbal interaction	praise	released from tie-down
	AVOIDS	a person	puppy handling	something frightening
		crate, tie down, xpen	an animal	following command(s)
	GETS other:			AVOIDS other:

GETS TOTALS

AVOIDS TOTALS

Appendix G: Hodges' FABD Form

Functional Assessment for the Behavior of Dogs (FABD)

Target Behavior: "Scrounging"	
Steps to using the assessment	
1	Complete a segment of the assessment below for each video clip. There are 5 of each.
2	In the spaces below, enter tally marks next to <i>ALL</i> of the events that happened during and closely after the behavior incident.
3	After you have completed 5 segments, return the data sheet

If you have any questions, please reach out.

video #	GETS	scolding/commands	kibble	object in mouth
		general verbal interaction	praise	collar correction
	AVOIDS	a person	puppy handling	something frightening
		crate, tie down, xpen	an animal	following command(s)
	GETS other:			AVOIDS other:

video #	GETS	scolding/commands	kibble	object in mouth
		general verbal interaction	praise	collar correction
	AVOIDS	a person	puppy handling	something frightening
		crate, tie down, xpen	an animal	following command(s)
	GETS other:			AVOIDS other:

video #	GETS	scolding/commands	kibble	object in mouth
		general verbal interaction	praise	collar correction
	AVOIDS	a person	puppy handling	something frightening
		crate, tie down, xpen	an animal	following command(s)
	GETS other:			AVOIDS other:

video #	GETS	scolding/commands	kibble	object in mouth
		general verbal interaction	praise	collar correction
	AVOIDS	a person	puppy handling	something frightening
		crate, tie down, xpen	an animal	following command(s)
	GETS other:			AVOIDS other:

video #	GETS	scolding/commands	kibble	object in mouth
		general verbal interaction	praise	collar correction
	AVOIDS	a person	puppy handling	something frightening
		crate, tie down, xpen	an animal	following command(s)
	GETS other:			AVOIDS other:

GETS TOTALS AVOIDS TOTALS

Appendix H: Asher's FABD Form

Functional Assessment for the Behavior of Dogs (FABD)

Target Behavior: "Inappropriate Greeting Behavior"	
Steps to using the assessment	
1	Complete a segment of the assessment below for each video segment. There are 5 of each.
2	In the spaces below, enter tally marks next to <i>ALL</i> of the events that happened during and closely after the behavior incident.
3	After you have completed 5 segments, return the data sheet.

If you have any questions, please reach out.

date	GETS	eye contact	scolded	physical redirection	
		given command(s)	praise	increased proximity w/person	
	AVOIDS	a person	puppy handling	something frightening	
		crate, tie down, xpen	an animal	following command(s)	
	GETS other:			AVOIDS other:	

date	GETS	eye contact	scolded	physical redirection	
		given command(s)	praise	increased proximity w/person	
	AVOIDS	a person	puppy handling	something frightening	
		crate, tie down, xpen	an animal	following command(s)	
	GETS other:			AVOIDS other:	

date	GETS	eye contact	scolded	physical redirection	
		given command(s)	praise	increased proximity w/person	
	AVOIDS	a person	puppy handling	something frightening	
		crate, tie down, xpen	an animal	following command(s)	
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GETS TOTALS

AVOIDS TOTALS