

Using the Doggy Issues and Guidance (DIG) Assessment Tool for Informing Individualized, Reinforcement-Based Treatment of Canine Behavioral Issues

Uso de la herramienta de evaluación Doggy Issues and Guidance (DIG) para informar el tratamiento individualizado y basado en refuerzo de los problemas de conducta canina

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ABSTRACT

Behavioral issues put dogs at risk of being surrendered to animal shelters and potentially being euthanized. We designed an open-ended interview that has been termed the Doggy Issues and Guidance (DIG) assessment tool to inform the individualized treatment of behavioral issues. Five owners were interviewed using the DIG assessment to identify relevant variables influencing their dog's behavioral issues. Two dogs then participated in a subsequent functional analysis, empirically validating information obtained from the interviews. Finally, we used cooperation skills training to increase appropriate behavior (i.e., sitting and lying) and replace the behavioral issues (i.e., aggression, barking, jumping) in two canines relying solely on reinforcement. Social validity questionnaires were conducted to evaluate (a) the acceptability, understanding, collaboration, and feasibility of the DIG assessment and (b) acceptability and satisfaction with the treatment outcomes. Owners who completed the social validity questionnaires provided positive ratings for the entire assessment and treatment process.

KEYWORDS

Canine, cooperation skills training, behavior issues, functional analysis

RESUMEN

Los problemas de conducta ponen a los perros en riesgo de ser entregados a refugios de animales y potencialmente de ser sacrificados. Diseñamos una entrevista abierta que se ha denominado herramienta de evaluación Doggy Issues and Guidance (DIG) para informar el tratamiento individualizado de los problemas de conducta. Se entrevistó a cinco propietarios utilizando la evaluación DIG para identificar variables relevantes que influyen en los problemas de conducta de sus perros. Luego, dos perros participaron en un análisis funcional posterior, validando empíricamente la información obtenida de las entrevistas. Finalmente, utilizamos el entrenamiento de habilidades de cooperación para aumentar el conducta apropiado (es decir, sentarse y acostarse) y reemplazar los problemas de conducta (es decir, agresión, ladridos, saltos) en dos caninos que dependen únicamente del refuerzo. Se realizaron cuestionarios de validez social para evaluar (a) la aceptabilidad, comprensión, colaboración y viabilidad de la evaluación DIG y (b) la aceptabilidad y satisfacción con los resultados del tratamiento. Los propietarios que completaron los cuestionarios de validez social proporcionaron valoraciones positivas de todo el proceso de evaluación y tratamiento.

PALABRAS CLAVE

Canino, entrenamiento en habilidades de cooperación, problemas de conducta, análisis funcional.

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Approximately 6.5 million cats and dogs are relinquished to shelters every year, and around 1.5 million of these animals are euthanized due to overcrowding and lack of adoptive homes (Protopopova & Wynne, 2015; Winslow et al., 2018). In addition, 26% of those dogs are sent to the shelters due to unmanageable behavioral issues such as destructiveness, disobedience, excessive barking, and stereotypic responses (Dorey et al., 2012; Pfaller-Sadovsky, Arnott, & Hurtado-Parrado, 2019). In fact, surveys indicate that as high as 86 to 90% of all dogs exhibit behavioral issues, which can put them at risk for abandonment, abuse, or neglect. Due to these high statistics, researchers consider behavioral issues amongst dogs to be a “significant animal welfare issue” (Yin et al., 2008).

The most common and severe form of behavioral issues exhibited by dogs is aggression. Canine aggression is a typical adaptive communicative response between dogs. Specifically, dominance-associated aggression, which is the most common aggression form exhibited by dogs, is a natural evolutionarily selected trait passed down genetically in canines (Cameron, 1997). This aggressive behavior poses a great risk of danger for family members in a household setting (Mehrkam et al., 2020). In many states, such as New York, canine aggression can lead to owners being legally mandated to (a) pay for damages if perpetrated against a human or (b) seclude, relinquish, or euthanize their pet if perpetrated against another dog or companion animal (Agriculture and Markets Law, 2020, New York Consolidated Laws, Agriculture and Markets

Law - AGM § 121. Night quarantine, retrieved from <https://codes.findlaw.com/ny/agriculture-and-markets-law/agm-sect-121.html>).

Functional analysis is a common tool used to identify environmental variables contributing to behavioral issues to better inform effective behavioral treatment. However, functional analysis is more commonly associated with the behavioral issues exhibited by humans diagnosed with intellectual and developmental disabilities (see Hanley et al., 2003 for a review).

In a seminal demonstration of the functional analysis, Iwata et al. (1982/1994) described the operant methodology used to assess the causal relations between self-injurious behavior (SIB) and common potential reinforcers (e.g., attention, escape from demands) with nine participants with developmental disabilities. The authors identified that severe problem behavior such as SIB could be influenced by environmental consequences, suggesting that behavioral treatments could be established rearranging those same consequences to instead support some form of alternative appropriate behavior.

Although the functional analysis methodology has yet to fully be embraced with other species, there have been some single-case demonstrations with SIB in a captive baboon (Dorey et al., 2009), feces throwing and spitting in a captive chimpanzee (Martin et al. 2011), aggression in a captive lemur (Farmer- Dougan, 2014), and self-injurious feather plucking in a black vulture (Morris & Slocum, 2019). Assessments of behavioral issues in dogs currently consist of mostly closed-ended questionnaires and standardized testing in an attempt to es-

establish the behavioral issues a dog exhibits and classify this behavior (Dorey et al., 2012). These assessments do not include an empirical validation of the environmental variables contributing to behavioral issues and may influence the continued use of punishment techniques such as kneeling the dog in the chest, squirting the dog with water, pulling on the dog's choke chain, and stepping on their leash to keep them down (Yin et al., 2008). By using a function-based assessment to determine the environmental variables sustaining behavioral issues, more reinforcement-based treatments can be developed and used for canines.

In a single-case example, Mehrkam et al. (2020) used functional analysis methodology to assess the environmental variables maintaining human-directed resource guarding behavior exhibited by a dog in a home setting. The functional analysis consisted of three standardized conditions (escape, attention, and tangible) evaluating potential reinforcers, which were presented in a sequential order compared to a single control condition. The functional analysis determined that resource guarding occurred in the presence of a human hand across multiple consequences. Therefore, the experimenters evaluated three treatments specifically matched to each test condition from the functional analysis. The treatments either included (a) providing escape from the hand contingent on the absence of guarding behavior, (b) praise contingent on the absence of guarding behavior, and (c) a preferred tangible item contingent on sitting and attentive behavior. Results of the three treatments demonstrated that operant procedures derived

from the functional analysis were successful in decreasing the resource guarding behavior.

Canine behaviors such as jumping on owners could also be construed as problematic, especially considering if the dogs are exceptionally large (Dorey et al., 2011; Pfaller-Sadovsky et al., 2019). Pfaller-Sadovsky et al. (2019), conducted functional analyses for five dogs who exhibited jumping behaviors. The functional analysis used the same standardized test conditions to inform a treatment of noncontingent reinforcement (NCR). Following the functional analysis, the dog was given reinforcers on a time-based schedule, regardless of whether jumping occurred and the treatment effectively decreased jumping up in three out of four dogs.

The functional analysis methodology was also extended to canine behavioral issues that are more stereotypic in nature such as circling or excessive floor licking (Hall et al., 2015). Hall et al. (2015) began with the implementation of surveys to better understand antecedents and consequences of the behavioral issues as reported by the dog's owners. The authors then conducted the functional analyses using the information suggested to be influencing the stereotypic behavior (e.g., removal of light, access to a walk outside) before implementing treatments developed based on the results of the functional analyses with three dogs. Hall et al. (2015) implemented differential reinforcement of alternative behavior (DRA) and differential reinforcement of other behavior (DRO) based procedures; however, still relied on punishment procedures (i.e., timeout) for two of the three participants.

The literature reviewed above provides a multitude of different functional analysis and treatment procedures that have been implemented across different owners, dogs, and behavioral issues. While effective, the range of procedures limits a therapist's ability to identify a comprehensive treatment package that begins with the initial interviews with family members and ends with a socially acceptable treatment that has produced meaningful change in behavioral issues for any dogs (cf., Hanley et al. 2014). The purpose of this study was to design an open-ended indirect assessment that could be used to inform an individualized functional analysis for each dog and develop a comprehensive behavioral treatment package to reduce any behavioral issues reported by the dog owners. The behavioral treatment focused on using DRA as a form of cooperation skills training to improve the relationship between the owner and dog by focusing on only reinforcement-based strategies. Social validity measures were collected to ensure the assessment and treatment process was found to be acceptable and helpful to the owner's situation.

Method

Subjects, Setting, and Materials

Description of dogs were summarized in Table 1. Toby was a Lhasa Apso that was acquired at 2 months of age from a professional breeder. He was 11 years old at the time of the study. His owners referred him for participation because they reported loud and incessant barking that occurred every time they began to prepare his food. Shayla was a Beagle mix that was ac-

quired at 2 months of age from a family friend and was 9 years old at the time of the study. The owners found it difficult to leave the house because they reported Shayla would immediately begin to whine and jump on them to get them to stop. In addition, Shayla was a large dog, which created a precarious situation for the female owner. Killian was a Rat Terrier mix that was acquired at 1 year of age from an animal shelter. He was 9 years old at the time of the study. Owner's referred Killian for participation in this study because they reported he was afraid of large dogs and would often pull on the leash and bark at them in public. Casey was a Labrador/Pitbull mix that was acquired at 3 months of age from an animal shelter. She was 6 years old at the time of the study and had difficulty with the presence of other dogs when with her owner (i.e., owner's reported Casey was overly protective). Charlie was a Sheepadoodle that was acquired at 2 months of age from a professional breeder and was 1 year old at the time of the study. Similarly, to Casey, Charlie reportedly had difficulty with other dogs being around his owner.

The DIG assessments were conducted virtually over a video conferencing application. Any treatment services took place at the dog's residences with the trainer present (Shayla) or virtually coaching the owner live via the video conferencing application (Toby). For Shayla the general environment in the home for training was the entrance way. For Toby the general environment in the home for training was a 10 foot by 10 foot dining room/kitchen space. Any potentially distracting items that were not part of the experiment were removed during data

Table 1
Demographic Information and Functional Analysis Variables

Dog	Demographics				Functional Analysis Variables	
	Age		Breed	Location Born	Evocative Events	Preferred Events
	Initial Ownership	Current				
Toby	2 months	11 years	Lhasa Apso	Professional Breeder	Feed Preparation	Food Presentation
Shayla	2 months	9 years	Beagle Mix	Family Friend	Owner Leaving	Owner Returning to Play
Killian	1 year	9 years	Rat Terrier Mix	Animal Shelter	Presence of Large Dog	Removal of Large Dog
Casey	3 months	6 years	Labrador/Pit Bull Mix	Animal Shelter	Presence of Other Dog	Removal of Other Dog
Charlie	2 months	1 year	Sheepadoodle	Professional Breeder	Presence of Other Dog	Removal of Other Dog

collection. Materials available in the room included a smartphone camera, laptop used for video conferencing, related dog toys (ball, chewy toy, stuffed toy) or treats, water bowls, food bowls, collars, harnesses, and leashes. Each trial was a maximum of 5 min. The dogs were trained for 10-15 sessions weekly and the training sessions were dependent on the dog's interest. Motivation to engage in behavioral issues or appropriate alternative behavior may shift during the session (Pfaller-Sadovsky et al., 2019). That is, the dogs could discontinue training at any point by walking away or orienting away from the owner. This was conducted to ensure that the dogs preferred the treatment process.

Measurement

We measured multiple topographies of caregiver-informed behavioral issues. One category of behavior was aggression which was defined as instances of biting, lunging, snapping, including precursors to aggression

(e.g., growling or barking, and baring teeth). Another category of behavior was jumping up on humans which was defined as a dog's front paws leaving the ground with at least one of the paws touching the experimenter. Although not a behavioral issue, we included a measure of distress to indicate the dog's difficulty with the situation. Distress is a mental/emotional state characterized by unpleasant behavior and emotional strain. We defined distress as low/tucked tail, stiff body, ears back, looking away, hiding, whining, hair on neck standing up.

We also measured two forms of appropriate behavior: sitting and lying down. Sitting was operationally defined as the dog's tail end and hind legs being fully on the ground, with the front legs in standing position holding up the dog's upper body. Laying was defined as the dog's whole under belly and chin touching the ground. These behaviors were measured per trial and represented in a cumulative record, in which the number of trials for each response

was added to the total number of responses recorded since data collection began.

Experimental design

Both the functional analysis and treatment evaluation were conducted using single-subject experimental designs (SCEDs). SCEDs maintain a high level of internal validity because the participants experience both the baseline/control and treatment conditions, thus serving as their own control (Perone & Hursh, 2013). The functional analysis was conducted using a multielement design (Johnston & Pennypacker, 2009). During the functional analysis, two conditions (test and control) were rapidly alternated. Experimental control was demonstrated when there were higher levels of behavioral issues during the test condition in comparison to the control condition. The behavioral treatment using cooperation skills training was evaluated using a multiple baseline design across behaviors (Gast & Ledford, 2009). The treatment was introduced in a staggered fashion targeting two different responses (i.e., sitting and lying down). Experimental control was demonstrated when each target behavior increased with the corresponding contingent reinforcement from the treatment.

Interobserver Agreement and Treatment Integrity

Interobserver agreement (IOA) data was calculated during at least 33% during the functional analysis and cooperation skills training. A secondary observer independently collected data either during live sessions or using recordings. The experimenter used the

trial-by-trial method to calculate IOA (Cooper et al., 2020). This method reports the agreement between each discrete trial instead of the total count. Each experimenter separately calculated and reported their counts of each trial (0 or 1). Agreements were counted when both observers scored a matching response for occurrence or nonoccurrence of the behavior during a trial. Disagreements were counted when one observer recorded the occurrence of the behavior and the other observer recorded a nonoccurrence. For Shayla, IOA for problem behavior, sitting, lying down, and distress was 93% (range, 0-100%), 89% (range, 0-100%), 96% (range, 0-100%), and 89% (range, 0-100%), respectively. The IOA for Toby was 96% (range, 0-100%), 92% (0, 100%), 100%, and 84% (range, 0-100%) for problem behavior, sitting, lying down, and distress, respectively. The range of agreement was always 0 and 100% because the two observers could only agree that the event occurred or disagree in a binary manner.

Procedure

DIG Assessment Tool

The DIG assessment tool is an open-ended interview designed by the first and second author. The questions and formatting of the DIG assessment tool were highly informed by the open-ended interview for the problem behavior exhibited by children designed by Hanley (2012, see appendix). Questions were adapted to be more representative of the experiences of the owner and dogs. The DIG assessment was administered by the experimenter with the dog's owner and required 15-30 min to

conduct. The DIG included questions regarding the dog's relevant background information such as the dog's breed, age, history living situation, training, preferred items, level of activity, amount of exercise, and any medications the dog is taking for behavioral issues. This information is important because these factors could all possibly impact the dog's behavior. Additionally, the owner's assessment of the dog's preferred events can be used to determine the reinforcers used for that dog. Other questions are pertinent to antecedents, consequences, and dimensions (topography, duration, intensity, rate) of the behavioral issues. Behavioral antecedents are events that happen directly before and evoke the behavioral issue. Consequences are behavioral events that happen directly after and reinforce behavior issues.

Functional Analysis

During the functional analysis, the experimenter arranged antecedent and consequent variables representative of the dog's natural environment in which behavioral issues occurred as reported by the owners during the DIG assessment. That is, an individualized contingency was systematically arranged for each dog's behavioral issues to determine the influence of environmental variables on their behavioral issues. The goal of the functional analysis was to empirically validate the verbal reports indicating the problematic context experienced by the owners.

During the control condition, no evocative events were presented, and preferred events were non-contingently provided throughout

the 1-min trial. The dog was given continuous access to the potential reinforcers identified from the DIG assessment, regardless of the presence or absence of the behavioral issues. If the dog exhibited the behavioral issues, the behavior was be ignored while the preferred events were continuously provided. For example, regardless of whether Toby barked or growled while accessing the reinforcer (food), continued access was allowed throughout the entire control.

The test condition used the same preferred events from the control condition; however, they were presented contingent on the occurrence of the behavioral issues. During the test condition, purported evocative events for the behavioral issues were presented for 1 min or for long enough to evoke the behavioral issues. If the behavior issue occurred, the possible reinforcer was presented for 30 s. After 30 s the session was discontinued, and the next programmed trial was initiated. For example, an antecedent variable was introduced to the environment, such as the removing Toby's meal from the fridge and beginning to prepare it. Contingent upon the occurrence of the behavioral issues, the individuals gave Toby his bowl of food.

Treatment Evaluation

The baseline condition of the treatment evaluation was obtained during the test condition of the functional analysis. After 30 s the potential reinforcer was removed, and evocative effects were re-presented for a new trial. The purpose of including the baseline was to

evaluate the extent of the behavioral issue before treatment was introduced.

The behavioral treatment for all dogs included cooperation skills training, which involved DRA using the specific reinforcers identified during the functional analysis. That is, the treatment for each dog incorporated individualized reinforcers that were determined to be functionally related to the behavioral issue. DRA consists of reinforcing occurrences of behavior that is a desirable alternative to the behavioral issues. This behavior occupies that time during which behavioral issues typically occurred. The dogs were taught the desirable behavior during pre-treatment training trials (data available upon request). This included least-to-most prompting and prompt fading. The behavioral treatment was initiated after all prompts were entirely removed. After meeting mastery for sitting during the behavioral treatment, the DRA contingency was modified to support lying down. For Shayla, a reinforcement thinning strategy was used to ensure that owner was able to leave the house while she was lying down. This included steps such as slightly opening the door, opening the door halfway, and completely opening and closing the door while leaving the house. Each thinning step was progressively introduced following the success of Shayla lying down without exhibiting behavioral issues.

Social Validity

Two social validity questionnaires were provided to the owners after their participation in this study. The Usage Rating Profile-Assessment (URP-A; Chafouleas et al., 2012)

was modified for dogs and provided to the dog owners that completed the DIG interview. The purpose was to obtain opinions from dog owners regarding the usefulness of the assessment approach. Scoring categories were separated into four factors and the URP-A included a total of 21 questions. Factor I (acceptability) included seven questions regarding the owner's opinions on assessment effectiveness, reasonableness, fairness, manageability, time feasibility, and commitment to training. Factor II (understanding) included three questions regarding the owner's clarity/ understanding of procedures. Factor III (setting-trainer collaboration) included six questions regarding time allocation, a positive home-service relationship, interest in implementation, enthusiasm, and regular home-service communication. Factor IV (feasibility) included five questions about reasonableness of material preparation, assessment complexity, assessment disruptivity, and feasibility of incorporating assessment methods into routine. The Likert scale from the URP-A ranged from 1 to 6 with one representing the lowest score (i.e., strongly disagree) and six representing the highest score (i.e., strongly agree).

The second social validity questionnaire was provided to dog owners who completed the cooperation skills training and were related to the acceptability of the entire assessment and treatment process. The questions included the rating of the extent to which the owner was satisfied with the dog's improvement in behavioral issues and improvement in listening skills. The owner was also asked to rate the extent to which they would suggest

this treatment to others, the extent to which they find punishment procedures to be acceptable, and the extent to which treatment of their pet's behavioral issues is important. The owner was encouraged to give the researcher's additional commentary/feedback regarding the treatment in the open-ended comments sections. This questionnaire including a Likert scale ranging from one (lowest score) to seven (highest score) with four representing a neutral rating.

Results

The DIG assessment was completed for five dogs (Toby, Shayla, Killian, Casey, and Charlie) and the results are summarized in Table 1. Outcomes of the DIG assessment for Toby suggested that he engaged in aggressive behavior including growling and barking while food was being prepared for him and that this behavior was reinforced following preparation when he was able to eat. Outcomes of the DIG assessment for Shayla suggested that she engaged in aggression including barking, growling, and jumping when family members left the home and that this behavior was reinforced when they returned or did not leave. Outcomes for Killian predicted that his behavioral issues (aggression) were caused by the presence of a large dog and reinforced by the removal of large dogs from the environment. Casey and Charlie's behavioral issues (aggression) were hypothesized to be evoked by the presence of any other dogs, regardless of size, and reinforced by the removal of the other dog. The results of the DIG assessment for Shayla and Toby

were used to conduct a functional analysis to validate the caregiver-informed contingency.

Figure 1 displays the results of the functional analysis for Shayla and Toby. Behavioral issues were observed during every test trial for both dogs when the evocative events were presented. In addition, appropriate behavior (sitting and lying down) was typically not observed; however, there was a consistent level of distress experienced. During the control trials, when preferred events were freely available, behavioral issues were never observed. Appropriate behavior continued to not be emitted and there was no distress during this time. Therefore, we concluded that the environmental contingencies evaluated during the functional analysis influenced behavioral issues and we used this information to inform the subsequent treatment.

Figure 2 depicts the results of the behavioral treatment. During the baseline, behavioral issues and distress were occurring at consistent levels across trials. Once the DRA was introduced for sitting, behavioral issues decreased and sitting began to increase. More consistent decreases in behavioral issues and distress were observed with Shayla. The DRA was then modified to support lying down and behavioral issues and distress remained low during these trials for both participants. Although lying down began to increase, sitting continued to occur on occasion for Shayla and reliably during every trial for Toby. Anecdotally, the dogs would first sit, likely due to the immediately preceding training, before continuing to lie down. That being said, the owner of Shayla was eventually able to leave the house and the

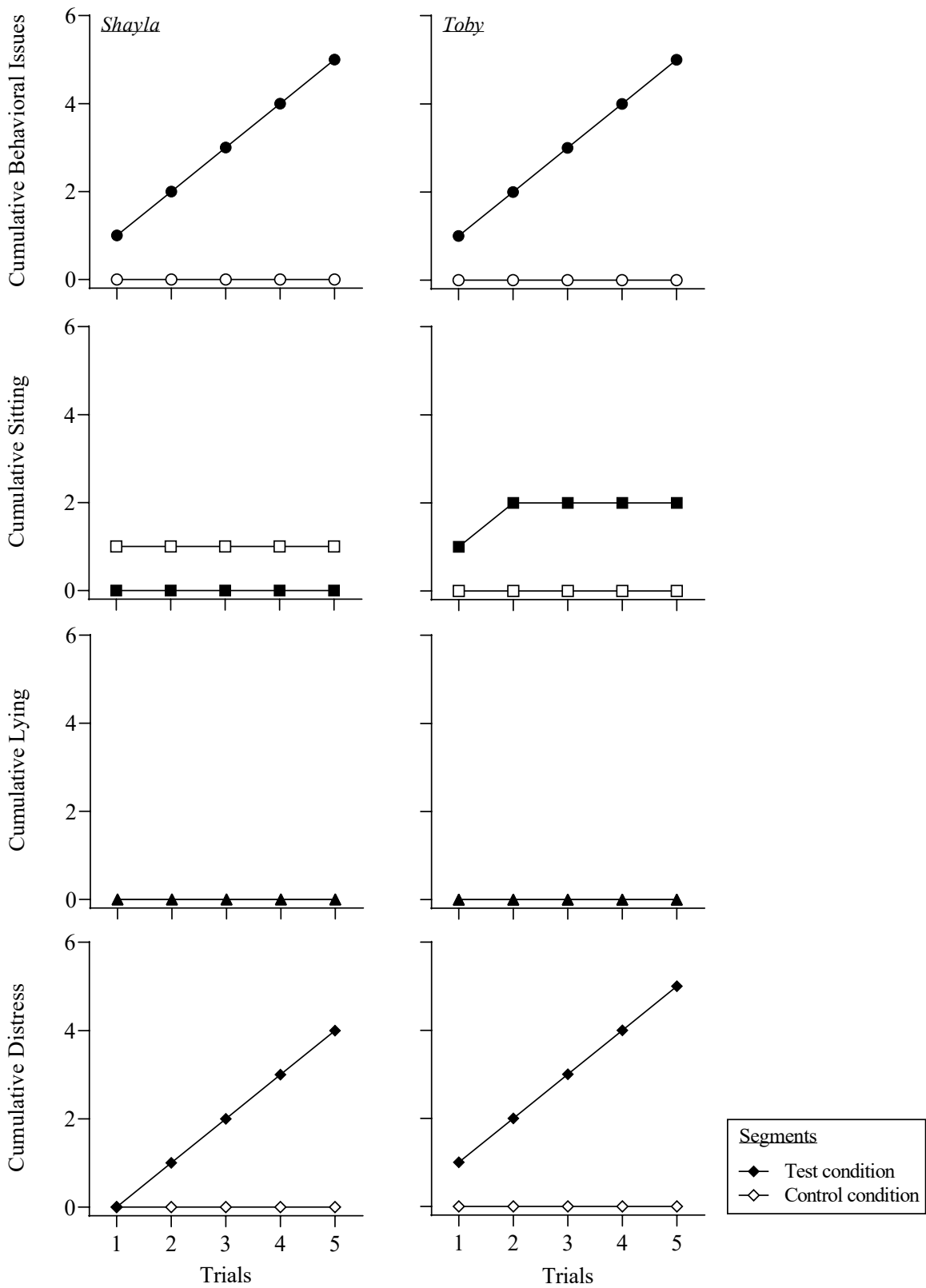


Figure 1. Results of the functional analyses

owner of Toby was able to prepare food without behavioral issues by the end of their participation.

Social validity measures were collected for the DIG assessment from the owners of five dogs (Toby, Shayla, Killian, Casey, and Charlie) using the URP-A (modified for dogs). Results

are summarized in Table 2. Overall, the owners rated the DIG assessment as acceptable (Factor I: $M = 5.8$; $SD = 0.2$) and had a very good understanding of the purpose of the assessment (Factor II: $M = 6$; $SD = 0$). In addition, the owners agreed with the level of collaboration (Factor III: $M = 5.4$; $SD = 0.2$) and found the DIG

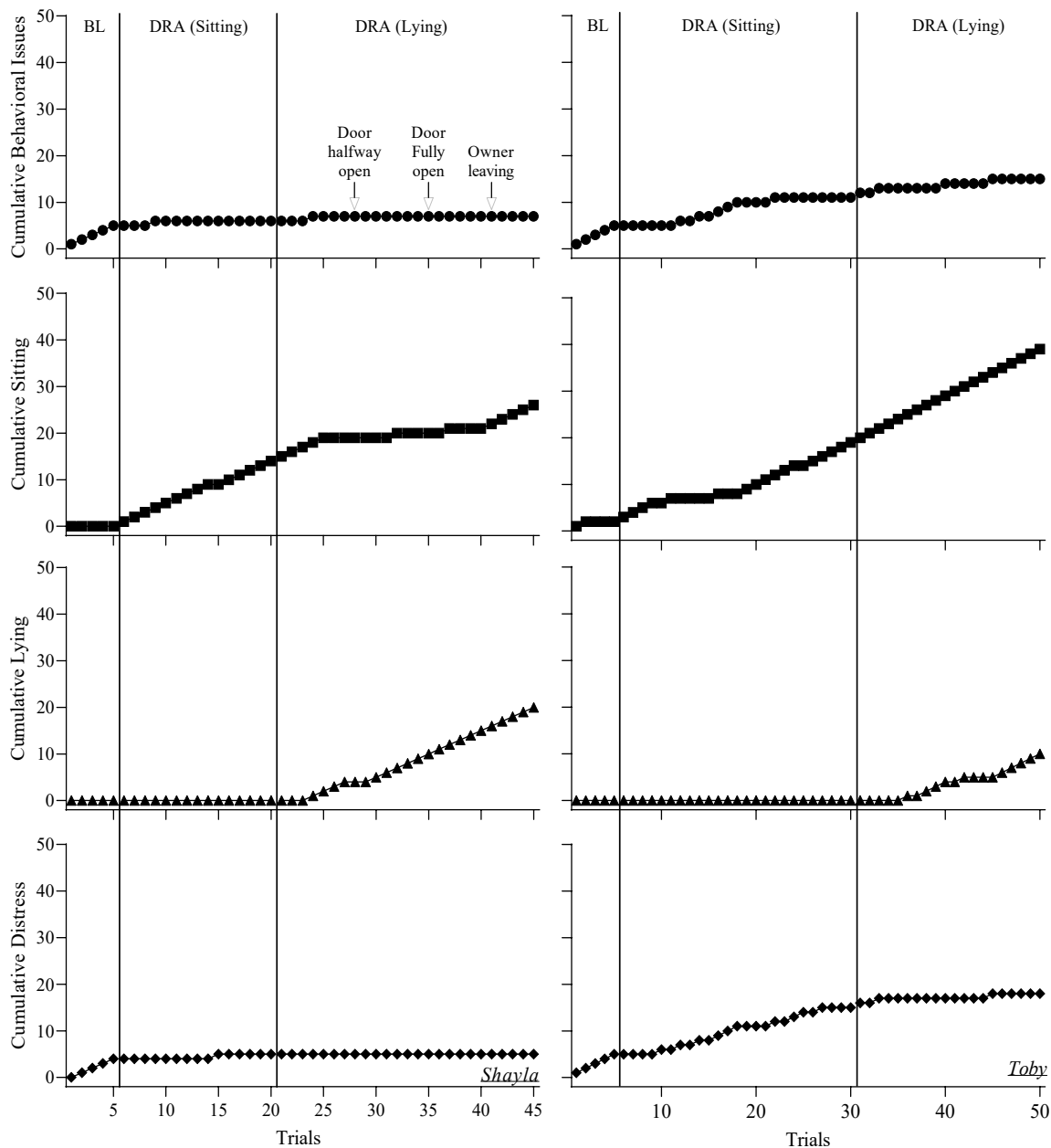


Figure 2. Results of Treatment for Shayla and Toby

Table 2
Results of the URP-A (Modified for Dogs)

Factors & Questions	Owner 1	Owner 2	Owner 3	Owner 4
Factor I: Acceptability				
1	6	5	6	6
6	6	6	6	5
7	6	6	6	5
9	6	6	6	6
10	6	6	6	6
17	6	6	6	6
21	6	5	6	5
Factor II: Understanding				
3	6	6	6	6
5	6	6	6	6
19	6	6	6	6
Factor III: Setting Trainer Collaboration				
2	6	6	6	6
4	6	6	6	6
8	4	4	4	6
12	6	6	6	5
14	6	6	6	6
20	5	4	6	4
Factor IV: Feasibility				
11	5	6	6	5
13	5	6	6	6
15	6	6	5	6
16	6	5	6	6
18	5	6	6	6

assessment to be very feasible (Factor IV: $M = 5.8$; $SD = 0.2$).

The owners of Toby and Shayla completed a second social validity questionnaire following their participation in the entire assessment and treatment process (see Table 3). Shayla and Toby's owners indicated that their dog's behavioral issues were very important to them (7 of 7). Shayla's (1 of 7) and Toby's (2 of 7) owner's rated the use of punishment procedures as not acceptable. Both owners were highly satisfied (7 of 7) with the amount of improvement seen in their dogs' behavioral issues and obedience. Both owners believed the treatment

was highly acceptable (7 of 7). The owners reported that their dogs were highly likely to exhibit behavioral issues before the behavioral treatment (7 of 7) and, after the introduction of the behavioral treatment, Shayla's reported behavioral issues to be less of a concern (2 of 7) while Toby's owner provided a more neutral rating (4 of 7). Both owners rated it highly likely (7 of 7) that they would suggest this behavioral treatment to others with similar issues.

Discussion

These results provide evidence to support the use of the DIG assessment as a tool for

Table 3
Results of the Social Validity Questionnaire

Questions	Shayla	Toby
Importance for Treating Behavioral Issues	7	7
Acceptability of Punishment	1	2
Satisfied with Improvement in Behavioral Issues	7	7
Satisfied with Improvement in obedience	7	7
Acceptability of DIG assessment and Cooperation Skills Training	7	7
Exhibited Behavioral Issues Before Cooperation Skills Training	7	7
Exhibited Behavioral Issues After Cooperation Skills Training	2	4
Refer DIG assessment and Cooperation Skills Training to Others	7	7

identifying ecologically relevant, problematic contexts that could potentially be contributing to behavioral issues. The functional analysis for two dogs validated the owner-informed environmental contingencies consisting of antecedent variables that evoke behavioral issues and preferred events that reinforce those issues. The behavioral issues were then reduced for the two dogs who experienced the functional analysis using a cooperation skills training approach that taught appropriate replacement behavior including sitting and lying down.

Previous research on functional analyses for behavioral issues of dogs tended to use three conditions (escape, attention, and tangible) testing for sensitivity to general classes of reinforcement (e.g., Dorey et al., 2012; Mehrkam et al., 2020). These functional analyses required an extended number of sessions, which could potentially delay introduction of an effective treatment. The functional analysis used in the current study evaluated a single test condition incorporating an individualized contingency informed by an open-ended interview and was conducted in a total of five trials. Thus, the use of this specific preparation could improve

overall efficiency during the assessment period and reduce exposure to behavioral issues that could cause a safety concern.

Efficiency is often a concern among those who conduct functional analyses and different formats have been found to impact efficiency differently (Jessel et al., 2021). Interestingly, Jessel et al. found that trial-based formats are not necessarily that efficient and required a range between 92 min and 158 min to conduct. However, it is important to note that trial-based formats often relied on conducting either 20 or 40 trials before completing the assessment. We only conducted five trials during the functional analysis in the current study because of concerns among owners and the safety of their dogs. In addition, there is some evidence to suggest that functional analyses incorporating five trials can successfully identify functional relations (Dowdy et al., 2021). Future researchers may want to consider reducing the number of trials to determine if a five-trial analysis is feasible and would improve overall measures of efficiency.

It is important to point out that the cooperation skills training utilized reinforcement for teaching skills and was meant to consider

the needs of both owners and dogs. Greenbaum (2010) discusses the traditional dominance-based training model vs reinforcement-based modification training. The traditional dominance-based training method uses a human-centric approach in which dogs play a secondary role to humans. This includes alpha-dog training styles, physical/ psychological intimidation, obedience/ dominance training (choke collars, prongs, e-collars). Acceptability of these methods has decreased as the social construct of pets change dynamically. As a result, reinforcement-based modification approaches that are dog centric have emerged. These methods focus on developing a relationship between pet and owner in which the needs of both are considered. The DIG assessment tool, functional analysis, and cooperation skills training developed in this study use a reinforcement-based approach to decrease behavioral issues that is becoming more socially acceptable. In addition, we attempted to arrange the context in a way in which the dog could "choose" to participate, discontinuing any treatment when signs of disinterest began to occur. This takes into consideration the needs of both the pet and owner, as the dog's treatment is created based on the needs, they are expressing by engaging in behavioral issues.

A limitation of this study is the distress measure. The accuracy of this measure is a limitation because signs of distress/ happiness are difficult to identify in non-human participants. In fact, we originally included measures of happiness, but differentiating between happiness and distress became problematic

to operationally define when some behaviors indicative of either tend to overlap. Some researchers have attempted to develop indexes of happiness and unhappiness in humans (Dillon & Carr, 2007; Parsons et al., 2012) as a measure of affect during treatment implementation. Parsons et al. (2012) used an alternating treatments design to identify indexes of happiness and unhappiness in non-vocal people with autism. First, a survey was used to collect data from at least three caregivers regarding situations in which the participant displayed happiness/unhappiness. This information was used to create operational definitions for happiness and unhappiness. Afterwards, two conditions were presented- one during which had been described as a happiness and another as an unhappiness situation. Results support this process for identifying individualized indices of happiness and unhappiness in nonvocal people with autism. When using human participants, it is easier to determine the emotions they are feeling. More research is necessary to identify emotions in pets and determine measures of distress.

Another limitation of this study is that only 2 out of the 5 participants completed the functional analysis and treatment. The other three participants only completed the interview portion. Although owners may approve of the interview process, it is important to ensure that the interview serves a particular purpose for informing effective treatment. This concept has been defined as treatment validity or utility (Hayes et al., 1987). Treatment validity describes the degree to which an assessment contributes to a beneficial treatment outcome.

In other words, if the use of an assessment positively impacts a treatment outcome, then it has utility. More conclusions could be drawn from the data regarding treatment validity if all participants had completed all parts of the study (DIG assessment, functional analysis, and treatment). In addition, the treatment informed by the DIG assessment can be compared to those using arbitrary treatment strategies to improve behavioral issues. Beyond treatment efficacy, it is quite possible that the owners will likely prefer completing the DIG assessment because it shows an attempt to collaborate with them rather than dictate how to treat their dog. However, future research including comparative measures of social validity are required to support such claims.

Finally, it is important to point out that this study was a direct evaluation of the efficacy of the DIG assessment for informing individualized treatments reducing behavioral issues in dog. The SCEDs served this purpose well, identifying causal relations and supporting the notion that the DIG assessment *can* work as intended. However, we are limited in what we can interpret regarding the external validity of the findings without a larger sample size. That is, we are unable to determine under what conditions and with what dogs or owners the DIG assessment *will* work as intended. To address this limitation, future researchers may want to consider larger scale, between-group designs to answer experimental questions regarding the generality of the methods we introduced.

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