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Canine Enrichment

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11.1 Introduction

Despite the public's interest in companion animals, animal shelters in the United States operate under minimal federal or state regulation; consequently, dogs' experiences can vary considerably between facilities (Newbury et al. 2010). A large body of research suggests that dogs encounter a variety of potential stressors within the shelter that could negatively impact their welfare (Taylor and Mills 2007; Hennessy 2013), including but not limited to excessive noise (Sales et al. 1997; Coppola, Enns, et al. 2006; Scheifele et al. 2012; Venn 2013), spatial restriction (Hubrecht 1995; Hubrecht et al. 1995; Beerda et al. 1999), social isolation (Beerda et al. 1999), loss of owner (Hiby et al. 2006), lack of control (Hennessy et al. 1997), and absence of a daily routine (Hennessy et al. 1998).

Four to five-and-a-half million dogs enter animal shelters annually in the United States (Woodruff and Smith 2017; Rowan and Kartal 2018). In recent years considerable efforts have been made to improve outcomes for these dogs (Protopopova and Gunter 2017), resulting in substantial increases in the number of dogs adopted and returned to their owners as well as reductions in euthanasia (ASPCA 2018; Rowan and Kartal 2018). Along with

improving outcomes for animals entering shelters, organizations have increased their focus on improving the welfare of the animals in their care. One component of this approach includes the use of enrichment interventions (Taylor and Mills 2007; Hennessy 2013; Moesta et al. 2015). Yet, many procedures that are routinely used in shelters have not been experimentally tested, nor have many of the ways in which animals are cared for and housed been empirically considered.

11.2 Enrichment Interventions in the Animal Shelter

Shepherdson (1998) described enrichment as a systematic approach that attempts to understand and provide for both the "psychological and behavioral needs of captive animals." For dogs living in shelters, this could be described as their proximate or immediate welfare as they await adoption. Mellen and MacPhee (2001) further identify key additions to Shepherdson's approach that relate well to the provision of canine enrichment in animal shelters.

Enrichment programs should be proactive, taking into consideration species affinities as well as the individual's history while considering shelter resources. This chapter will

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describe how these programs can be assessed and how staff and volunteer efforts can be utilized to carry out programs successfully. Like many captive environments, such as zoos or laboratories, the animal shelter is likely stressful; however, unlike these previously mentioned environments, a stay in the animal shelter is intended to be temporary. Thus, when appropriate, enrichment interventions that affect dogs' distal or ultimate welfare of leaving the shelter and living in a home, such as prolonging or reducing their length of stay, will also be discussed.

Because the focus of this chapter is on canine enrichment in the animal shelter, it does not include studies conducted on other kenneled dogs (e.g., purpose-bred dogs living in laboratories, veterinary colonies, or working dogs), rather the focus is on companion dogs that were likely once owned pets and now living under sheltering conditions. These interventions have been broadly categorized as those that provide social interaction: either with a human or canine; object enrichment; and sensory stimulation (auditory, olfactory, or visual).

11.2.1 Human Social Interaction

Our relationship with dogs is unique. Through a combination of domestication, artificial selection, and socialization, dogs have developed the ability to form bonds with us, and our social influence on them is strong (Morey 1994). When we consider this shared history with dogs, it should not be surprising that in the inherent social isolation of the animal shelter, human-animal interaction has been one of the most studied enrichment interventions (see Gunter et al. 2021 for a review).

The impact of one-time, in-shelter interactions involving 20–30 minutes of petting or play on behavioral measures and cortisol levels has been assessed in a number of studies (Hennessy et al. 1997; Hennessy et al. 1998; Menor-Campos et al. 2011; Shiverdecker et al. 2013; Dudley et al. 2015). In some of these studies, the sex of the human influenced

the impact of the petting, with women having a greater effect on cortisol reduction than men (Hennessy et al. 1997; McGowan et al. 2018). In total, these interventions report reductions in cortisol immediately following the interaction, suggesting that they decrease dogs' stress. Behaviorally, Shiverdecker and colleagues (2013) found that when dogs were left alone in a novel enclosure, they vocalized significantly more than when they were being petted, played with, or left with a passive stranger.

Willen et al. (2017) also examined the effects of 30-minute interactions across two successive days, similar to what staff or volunteers would provide in the shelter, to detect possible cumulative benefits. They found that, as demonstrated in prior studies, dogs' cortisol reduced after interacting with a person, but multiple interactions did not produce additional benefits. While cortisol decreased following 30 minutes of interaction, those reductions did not persist an hour later. Behaviorally, dogs vocalized, panted, and tried to escape the interaction room less and were seen to be wagging their tails more often in these sessions as compared to dogs that were left alone in a novel room or remained in their kennel.

More recently, McGowan et al. (2018) found that just 15 minutes with a person could decrease dogs' heart rate, increase heart rate variability (HRV), and reduce standing by the dog during the interactions. The authors found that the amount of time the dogs interacted with the volunteer was influential, such that when dogs spent less than 50% of their time in contact with the volunteer, they experienced less of a benefit from the intervention. This suggests that physical contact with the enrichment, in this case the human, is important in decreasing biological markers of stress reactivity. Willen et al. (2017) also found evidence that 15 minutes of petting reduced cortisol, but it only occurred for some dogs, notably those brought to the shelter as strays, with reductions comparable to what was found with 30-minute interactions. Dogs that were owner relinquished did not experience this effect.

It seems likely that the activity that a person engages in with the dog during these interactions affects the dogs' in-kennel behavior. Protopopova et al. (2018) examined the effects of two 15-minute-long interventions of reading and exercise that occurred daily for 2 weeks. When dogs received exercise, they moved back and forth in their kennels less often immediately preceding the intervention; but immediately after, dogs' back and forth movement increased but jumping on the kennel door lessened. For dogs that were read to by a volunteer, undesirable behaviors associated with an increased length of stay were reduced prior to the intervention. Immediately after, dogs were also moving back and forth in their kennels more often but barking and jumping on their kennel doors had decreased.

The results of Protopopova et al. (2018) are mixed in that dogs' back and forth motion in the kennel increased after both the exercise and reading interventions, a behavior previously shown to be associated with longer lengths of stay (Protopopova et al. 2014). When parsing out the interventions' positive effects, a greater reduction on door jumping was seen with exercise, but an overall larger decrease in undesired behaviors (including both door jumping and barking) was found when volunteers read to the dogs. As the authors note, more research is needed with longer observations, both before and after the interventions, to better elucidate their effects. In the meantime, shelters may consider individualizing the activity of the interaction based on the behavior of the dog, using calm interactions for dogs that need to reduce their barking, while more active dogs that are jumping on kennel doors and rubbing the walls may experience more benefit from exercise.

Interactions of 15–30 minutes occurring weekly or multiple times a week for several weeks have also been explored, such as those described by Bergamasco et al. (2010), Valsecchi et al. (2007), Normando et al. (2006), and Hennessy et al. (2002). Bergamasco et al. (2010) investigated a 25-minute intervention in

which shelter dogs played with a person and toy, were walked on leash, groomed, trained, and received food, praise, and petting three times a week for eight weeks. Although Bergamasco and colleagues found little effect of the interactions on dogs' cortisol levels or HRV, dogs' sociability over the eight-week intervention improved such that they were more likely to approach the experimenter and initiate interaction in the kennel before leaving on their leashed walk.

Valsecchi et al. (2007) tested an intervention of training, play, and petting every other day for two months and found dogs' obedience, docility, and sociability improved compared to unenriched dogs. Dogs in both the intervention and control groups showed reductions in cortisol; the authors suggested that the regular sampling and, consequently, interaction with humans may have contributed to the overall cortisol decrease. Similarly, Normando et al. (2006) reported that 15-minute, weekly interactions with a volunteer over five weeks led to changes in dogs' social behavior. Dogs receiving the intervention were out of sight less and wagged their tails more often than non-intervention dogs when the experimenter was present, and these effects persisted after the intervention ceased. Thus when considering the impacts of these interventions, it is worth noting that dogs' interest in people increases as they spend more time with us, which may aid in their likelihood of adoption and ultimate welfare of leaving the shelter and living in a home.

While interaction durations of 15 and 30 minutes have received the most attention in the literature, longer one-time interactions have also been explored. Coppola, Grandin, et al. (2006) explored the impact of a 45-minute interaction of petting, play, and grooming on dogs' cortisol levels immediately following the interaction as well as one and two days and one week later. Interestingly, Coppola and colleagues found that dogs in the contact group did not differ two hours following the interaction with the experimenter but did so when

measured the following day, with no other differences observed at later time points. This study's finding of an effect on the day following human interaction remains the only evidence to date of a delayed reduction in stress for shelter dogs, suggesting the need for additional studies to determine if longer in-shelter interactions confer distinctive advantages.

Interventions in which dogs leave the shelter for few days or weeks may provide an increased benefit to dogs when compared to in-shelter interactions (Hennessy et al. 2006; Fehring 2014; and Gunter et al. 2019). This is likely due to the prolonged nature of the interventions as well as the environment that they occur within. Hennessy et al. (2006) studied dogs fostered in a three-week prison program, during which they lived with and received obedience training and social interaction by incarcerated handlers. Post-intervention, the dogs more readily responded to cues such as sit, down, and walk. They also jumped on strangers and barked less, but yawned more, in a novel situation post-intervention than dogs that had remained at the shelter. While cortisol was relatively unaffected for both groups, the effects on behavior are cautiously optimistic evidence for the use of such programs for longer-stay dogs or those needing additional socialization.

Time in a home might confer even greater benefits to dogs awaiting adoption. Fehring (2014) reported that placement in a foster home resulted in lower cortisol compared to in-shelter levels, and that the dogs' cortisol steadily declined over the first three days in foster care. In a recent study by Gunter et al. (2019), dogs that stayed for one or two nights in a volunteer's home were found to have lower cortisol than dogs that remained in the shelter; and while dogs' cortisol increased upon return, it was no higher than baseline levels in the shelter before fostering. Additionally, dogs' longest bouts of uninterrupted rest were highest while in the home but remained longer upon return to the shelter than before fostering. In all, these studies provide compelling

evidence for the use of stays out of the shelter as an important enrichment tool with measurable benefits.

Limiting visitors in kenneling areas may also improve dogs' proximate welfare by reducing the unpredictability of human traffic, improving dogs' ability to control environmental contingencies; however, the impact on their ultimate welfare, such as reduced adoption visibility and potentially longer lengths of stay, should also be considered. Wells and Hepper (2000) found that during days with more visitors to the shelter, dogs spent more time at the front of their kennels, standing and barking. Hewison et al. (2014) prohibited potential adopter access during afternoons when the animal shelter was otherwise open for viewing dogs. They found that noise levels were over 12 dB lower during the intervention as compared to pre-intervention levels with positive changes in behavior as well. Sedentary behavior increased in both the mornings before opening and afternoons during the intervention, locomotor activity also decreased, and the frequency and duration of repetitive behaviors were reduced in the afternoon—suggesting that scheduled breaks during the day from the arousing bustle of people could afford dogs an opportunity to relax and recharge without leaving the shelter.

11.2.1.1 Human Social Interaction through Training

Thorn et al. (2006) demonstrated that dogs living in the shelter learned to sit in less than 10 minutes and performed this behavior with new people in a subsequent training session. Herron et al. (2014) provided in-kennel training for dogs twice a day and afternoon enrichment of a frozen, food-filled toy. During training, dogs were reinforced with food for making eye contact, not barking, sitting or lying down, and being at the front of the kennel. Over the course of the three-day intervention, dogs were sitting, lying down, and quiet more often and jumping less in their kennel when compared to control dogs. Additionally,

control dogs showed a significant increase in barking, whining, and growling.

Training interventions in the shelter have often focused on in-kennel behavior, but changing out-of-kennel behavior can also be enriching and increase welfare, particularly if it reduces aggressive behavior. Orihel and Fraser (2008) tested a 10-day training intervention for dogs that exhibited moderate aggression toward other dogs. The intervention consisted of 30-minute sessions on leash in which a stimulus dog was presented to the dog, at decreasing distances, while the dog was cued to sit or make eye contact with the handler. Dogs were rewarded with praise and food for relaxed behavior, while behaviors such as staring or growling toward the other dog resulted in redirection of the dog's gaze by the handler. Dogs in the control group received time in an outdoor enclosure. While dogs in both groups showed similar levels of aggression pre-intervention, after 10 days of training a majority of intervention dogs showed decreases in aggressive behaviors, while dogs in the control condition showed increases in growling and muzzle licking when presented with another dog. However, when dogs in the intervention were tested one week after training had ceased, their overall aggression scores had returned to pre-intervention levels, suggesting that continued training for dogs with canine aggression is needed to make sustained behavioral change while living in the shelter.

Training in the shelter can be effective, not only with operant techniques but with simpler approaches deploying classical conditioning methods. Protopopova and Wynne (2015) demonstrated that both classical and operant conditioning can reduce undesirable in-kennel behaviors, including dogs being at the back of the kennel, facing backward, rubbing the kennel walls, and barking. The two interventions used in the study were: differential reinforcement of other behavior, whereby dogs were provided a food reward for any behavior other than the undesired ones, and non-contingent delivery of food, wherein

dogs were provided a treat regardless of their behavior. Both interventions reduced unwanted behaviors; however, the time spent training the dogs was considerably lower using classical conditioning (20 seconds per dog) than operant (2 minutes). In a follow-up study, Payne and Assemi (2017) observed that with daily pairings of a door chime with food (three to five times a week) over three weeks, kennel noise decreased by 15 dB, reducing the intensity of an established environmental stressor. In all, these studies suggest that classical conditioning is an effective, time-efficient method of training that can be more easily deployed in the shelter environment and still positively impact welfare.

11.2.1.2 Application of Evidence-Based Shelter Practices for Human Social Interaction

As evidenced by the myriad studies described here, the opportunity for shelter dogs to spend time with people consistently provides stress reduction and is the most impactful type of additive enrichment intervention. Interactions can be as short as 15 minutes, and a dog's comfort level with the person and time spent with them likely makes a difference in the beneficial effects conferred. Activities between dogs and people should be tailored to the preferences and behavior of the individual dog. For dogs to fully benefit from their time with people, it is best that interactions occur out of the kennel away from environmental stressors; and better yet, out of the shelter in foster homes as they await adoption.

Noise levels in the shelter can be extreme, sometimes exceeding 100 dB (Sales et al. 1997; Coppola, Enns, et al. 2006; Scheifele et al. 2012; Venn 2013) and surpassing the 90-dB limit set by the Occupational Safety and Health Administration for human exposure during an eight-hour period (United States Department of Labor, Occupational Health and Safety Administration 1983). This noise can be lessened by reducing in-kennel barking, and simple interventions that involve walking past the dogs' kennels and treating,

regardless of behavior, can quickly accomplish this. Conversely, a scheduled break from human traffic during the day could also improve dogs' welfare, including reductions in noise and improvements in behavior, and provide a more practical option for shelters that cannot remove adopters from kenneling areas altogether. As with any unwanted behaviors, training needs to occur regularly to maintain improvement; but in general, changing behavior and learning new behaviors is possible in the shelter and is one type of human interaction that can help meet dogs' psychological and behavioral needs.

11.2.2 Canine Social Interaction

While not as well-studied as interactions with people, researchers have examined the effects of social contact with other dogs, either through housing manipulations (Mertens and Unshelm 1996; Wells and Hepper 1998; Dalla Villa et al. 2013; Walker et al. 2014) or interactions out of the kennel (Belpedio et al. 2010; Flower 2016; L. Gunter et al., work in preparation).

Mertens and Unshelm (1996) measured behavioral differences between individually and group-housed dogs and found that dogs housed together were less noisy and better behaved. In that study, dogs that were singly housed barked, whimpered, and howled more than dogs that were group-housed. The researchers observed that solo dogs were more likely to display aggressive behavior at the kennel front toward other dogs. While conflicts did arise when dogs were housed in groups (which were as large as 30 dogs), of the 211 dogs participating over the three-month study period, only five incidents occurred, resulting in what the researchers called "light wounds." Of particular interest, 10% of dogs that were singly housed during the study displayed stereotypies, while no dogs in the group-housed condition did.

Because of the need for a human presence in the group-housing condition to deescalate

potential conflicts, two staff members monitored the group-housed dogs (with dogs kenneled singly at night and during feeding). Perhaps as a result of this extra human presence, dogs in this condition more often approached an unknown observer than did singly housed dogs during a behavioral test. Follow-up research is needed to address limitations of this study, including potential shelter and population differences (this study took place at two different facilities). These findings suggest that group-housing in which dogs as well as people are present could be helpful in improving sociability.

While group-housing of the size tested by Mertens and Unshelm (1996) may not be feasible for most shelters due to space, canine sociability, or staff resources, pair housing may be a viable alternative. Dalla Villa and colleagues (2013) studied the effects of group (four to five dogs in an enclosure) versus pair housing on long-stay shelter dogs and found that dogs' behavior improved under pair-housing conditions. Dogs' trotting, walking, and standing decreased in pair housing, while more lying down occurred, suggesting that dogs were spending more time resting when living together in pairs. While social behavior occurred rarely in either type of housing, agonistic behavior (i.e., defensive or threatening social behavior) was not observed between paired dogs, while such behavior made up nearly one-fifth of social interactions of group-housed dogs.

Walker et al. (2014) examined the impacts of removing one dog from a co-housed pair after the pair had been living together in the shelter for several weeks. After separation, the remaining dogs' running, changes in posture, and stretching all increased, suggestive of more activity and possible restlessness. Other behaviors that are considered stereotypic in nature and indicative of decreased welfare, such as circling and figures of eight, also increased. Many of these behaviors did begin to decline over the six-day post-separation period, although play (now without a conspecific present) remained reduced. While no changes in

cortisol were found, S-IgA levels were elevated after dogs were separated from each other. Interpreting the impacts of this short-term separation on dogs' S-IgA is based on just a few studies, but the elevated levels do suggest that the acute stress of separation negatively impacted dogs' immune function. Additionally, trends for longer latencies to the middle and near negative positions in a cognitive bias test, though not significant, also support a finding that separation had a negative impact on dogs' underlying affective state. In agreement with observations by Mertens and Unshelm (1996) and Dalla Villa et al. (2013), Walker et al. (2014) found that co-housed dogs spent little time behaving agonistically (0.1%) and instead were much more affiliative (3.2%).

It is difficult to determine whether the simple presence of other dogs is, in fact, canine social interaction or merely visual stimulation, and whether such a presence is enriching to dogs or a detriment to their welfare. Wells and Hepper (1998) tested two housing conditions for dogs: one in which the dogs were able to view other dogs in directly opposing kennels versus dogs that looked out to an empty kennel row. Wells and Hepper found that dogs more often were at the front of their kennels when they were able to see other dogs and more often at the back of the kennel when they could not. No differences were observed in the dogs' behavior (i.e., standing, sitting, resting), including vocalizing.

Certainly, dogs being at the front of their kennels is helpful for adopter viewing and can lead to shorter lengths of stay (Protopopova et al. 2014). However, single housing is sometimes associated with more reactivity at the front of the kennel (Mertens and Unshelm 1996). Thus, housing dogs singly with nearby conspecific visual contact but no social interaction may have more complex effects on welfare than is currently understood, and further empirical exploration of this commonly used shelter housing arrangement is needed to inform best practices.

It is possible that social interactions outside of the kennel may be more enriching than

simple visual contact. Belpedio et al. (2010) examined the effects of 30 minutes of off-leash, canine social interaction as compared to dogs remaining in their kennels. Saliva for cortisol analysis was collected each morning as a baseline as well as 30 minutes and 3 hours post-interaction, and dogs' in-kennel behavior was recorded 1 minute prior to saliva collection. The authors detected no differences in cortisol levels, but, collectively, stress-related behaviors, which included jumping, barking, and whining, occurred more frequently with dogs in the kenneled group during the study. It should be noted, though, that dogs that received social interaction did lick, pant, pace, spin and yawn more than dogs left in their kennels, suggesting a mixed effect, if any, of this particular intervention on dogs' overall welfare.

Flower (2016) investigated the impact of one-time, off-leash canine interactions on dogs' performance on a behavioral assessment with more promising results. When dogs' behavior was assessed with an unfamiliar dog on-leash, dogs that had interacted with other dogs prior to the assessment displayed more playful, submissive behavior toward the unknown dog than dogs that had not had the interaction experience. While these results are preliminary, they suggest that this type of brief social contact for dogs could be beneficial in supporting appropriate on-leash behavior when seeing other dogs in the shelter.

The benefits of canine social interaction may extend beyond positive changes in behavior. The effect of differences in housing and social contact with other dogs on cortisol and S-IgA levels has been examined (L. Gunter et al., work in preparation). Traditional kennel housing was compared to a novel housing design with smaller, glass-fronted enclosures. Two social conditions were compared within each housing type: a condition with no social contact with other dogs and a condition with three 15-minute conspecific sessions a day. Dogs experienced each of the four experimental conditions for three days. (This design

provided a true control for social interaction in a given housing type.)

The authors found that dogs' S-IgA was higher when living in the novel-designed kennels (irrespective of social condition), and lower when receiving daily canine social contact regardless of housing, with no interaction effect between housing and social condition. (It is worth noting that when videos of the social contact sessions were behaviorally coded, dogs spent more time with people than the other dogs or the environment during these sessions.)

While no main effects of housing or social contact were found with dogs' cortisol values, cortisol was highest when dogs were living in novel housing and receiving no social contact and were lowest when living in traditional kennels and receiving no social contact. While these results provide evidence that dogs' contact with other dogs can influence their stress, immune function, and ultimately, welfare, more research is needed to better understand how characteristics of the social contact as well as the level of activity engaged in during these sessions can influence the intervention's impact.

11.2.2.1 Application of Evidence-Based Shelter Practices for Canine Social Interaction

While much less studied than interactions with people, dogs spending time with other dogs is likely beneficial for their welfare while living in the shelter, and efforts should be made to facilitate these interactions, particularly amongst dogs that prefer the company of other dogs. (A two-month-long survey of dogs and their conspecific skills taken at a large, open admission shelter in the Midwest found that when accounting for various medical procedures and shelter processes in which dogs would be unable to partake in off-leash interactions, less than one-third of dogs were suitable and available for interactions with other dogs on a daily basis [unpublished results].) Nevertheless, it is likely that off-leash interactions can

improve dogs' behavior when seeing other dogs on-leash and can promote better welfare; however, much more research is needed to better understand how the duration of these interactions, number of dogs, methods used when managing interactions, and compatibility between the dogs contribute to these potentially positive effects.

Co-housing with another dog can likely stave off the effects of social isolation and possibly buffer the stressors of everyday life in the shelter, yet care should be taken to ensure compatibility, using paired walks and/or off-leash interactions to identify well-matched kennelmates. For dogs that are successfully co-housed with another dog, having new opportunities for social interaction identified should one of the pair be adopted would likely be helpful for the remaining dog's welfare.

11.2.3 Object Enrichment

When considering placing objects within the kennel, it is useful to revisit our definition of enrichment. Beds, chews, balls, ropes, and soft toys have varying functional value to dogs, so we must consider the species as well as the individual's history and preferences in determining how relevant an object will likely be. It is not surprising, then, that investigations into object enrichment for shelter-housed dogs have been met with mixed success (Wells and Hepper 2000; Wells 2004; Pullen et al. 2010; Kiddie et al. 2017).

Wells and Hepper (2000) explored the impacts of a bed and a suspended Nylabone® (Nylabone Products, Neptune City, NJ) chew, both placed at the front of the kennel on dogs' behavior. They found that the bed at the front of the kennel caused the dogs to spend more time there, whereas the chew did not; however, dogs' bed usage decreased when the bed was placed in the front as compared to its typical position in the back of the kennel. While dogs initially sniffed the Nylabone, fewer than 20% of the dogs were seen chewing, pawing, or tugging at it. These findings suggest that while

a bed is of interest to shelter dogs, where it resides impacts use.

Subsequently, Wells (2004) provided dogs a variety of objects: squeaky and non-squeaky balls, Nylabone chews, ropes, and Boomer Balls® (Company of Animals, Broomfield, CO). In a design similar to typical shelter practices, objects were provided for longer durations, six days, with dogs' location in the kennel and behavior recorded. Overall, dogs rarely interacted with the objects (<10% of all observations) with a reduction over time, suggesting a possible habituation effect. Dogs did show a preference for the Nylabone over the other toys by spending the most time with it; and dogs moved more and stood less when provided the Nylabone, squeaky ball, and non-squeaky ball. As the author recommends, if object usage is limited and habituation likely, rotation is recommended for the highest probability of engagement.

Pullen et al. (2010) explored two categories of objects: (i) robust toys, including a Boomer Ball, rope, nylon and rubber tug, and rubber toy; and (ii) toys that are more destructible, such as a vinyl bone, soft and plush toys with squeakers, and a non-squeaky tennis ball. Robust toys were concurrently presented in combinations of hanging and on the kennel floor (trial 1), while the destructible toys were only presented alongside the robust toys, all on the floor (trial 2). Only 35% of shelter dogs interacted with the robust toys during the robust-only trial, spending on average just two minutes with them. Dogs that contacted the robust toys, spent more time interacting with them on the floor (vs. hanging) with a shorter latency to interact. When the toys were hanging, however, dogs interacted longest with the rope toy. Conversely, when shelter dogs were given the option of soft, destructible toys in trial 2, more than three-quarters of dogs spent 25% of the 15-minute session interacting with them, mainly ignoring the robust selections. They also interacted longer with the softer toys, spending

the most time with the squeaky bone, soft, and plush toys, and the least time with the tennis ball.

Kiddie et al. (2017) investigated three types of low-cost interventions to improve shelter dog behavior: partitions blocking visual contact of adjacent dogs, whole coconuts (to potentially play with, chew, or break open), or cardboard beds as possible relief from the plastic mesh bottom of a crate. Dogs were observed for two 30-minute sessions on non-consecutive days in the baseline, intervention, and post-intervention periods with each type of enrichment. While no behavioral differences were found between treatments, dogs were observed to lie down, sit, and yawn less with any enrichment (as compared to baseline and post-intervention). Of the 36 dogs in the study, all but 1 dog destroyed the cardboard bed—treating it as a chewable object rather than potential bedding. Kiddie et al. (2017) found that dogs interacted with the coconut and cardboard less over time, which could be related to their eventual deconstructed states. However, it is also probable that, as Wells (2004) found, novelty plays a role in object enrichment.

11.2.3.1 Application of Evidence-Based Shelter Practices for Object Enrichment

One of the most basic forms of enrichment shelter dogs should be provided is a bed and placing it at the back of the kennel will likely encourage its usage. When considering what toys to provide in the shelter, destructibility should be considered with unsupervised dogs, particularly those with a history of ingesting items (either in a previous home, foster care, or the shelter) and especially those that have needed medical intervention. For dogs that can be safely left alone with toys, providing objects that dogs will most likely interact with, taking into consideration species and individual preferences, is the best approach to improving welfare.

Based on the previous studies, softer objects, such as squeaky, rubber bones and plush toys,

will likely be interacted with by the most dogs for longer periods of time as opposed to harder, most robust toys. Providing them on the ground will also increase the likelihood of interaction. However, individual differences exist; and simple assessments can help identify what toys dogs in your shelter prefer (which can easily be conducted during interaction sessions with volunteers or staff out of the kennel) and, along with frequent rotation, will further aid in their toy engagement.

11.2.4 Auditory Enrichment

Several studies have explored the use of auditory enrichment to change dogs' behavior and reduce noise in shelter kennels (Wells et al. 2002; Kogan et al. 2012; Bowman et al. 2015; Brayley and Montrose 2016; Bowman et al. 2017), focusing on certain genres of music or types of sound, often those that are perceived as pleasant and mood-enhancing to humans (Rickard et al. 2005).

Wells et al. (2002) investigated the impacts of classical, heavy metal, and pop music; human conversation on the radio; and a control condition of no auditory enrichment on the dogs' behavior. Each was played for four hours with dogs experiencing all music types. Dogs spent more time resting, less time standing, and more time being quiet in their kennels when classical music was played as compared to other genres of music, human conversation, or no auditory enrichment. Conversely, with heavy metal, dogs were observed barking more frequently compared to any other condition. Similarly, Kogan et al. (2012) exposed dogs to 45 minutes a day of songs from two of the same musical genres: classical and heavy metal along with a track from "Through a Dog's Ear" by Leeds and Wagner (2008), wherein classical piano music is simplified to create a more soothing rendition. Along with a control condition with no added sound, auditory stimulation was provided to the dogs three times a week for four months. As seen by Wells et al. (2002), classical music led to the most time

spent resting. Dogs vocalized more often when no music was provided and were less vocal when classical music was played, but differences were observed between classical selections. Both Wells et al. (2002) and Kogan et al. (2012) observed detrimental behavioral effects with heavy metal music, including increased body shaking, barking, and less time resting.

One consistent limitation of the aforementioned studies is the duration of the auditory intervention. Bowman et al. (2015) addressed this concern when they tested the effects of a classical music compilation compared to a no-additional-sound control. Both conditions lasted for six-and-a-half hours a day over seven days with dogs' in-kennel behavior observed twice daily for one-and-a-half hours, first in the morning and then again in the afternoon.

When classical music was played dogs spent more time sitting and laying down, with less time standing and vocalizing. While no changes in cortisol were found with the addition of music, changes in heart rate and HRV, which indicate stress reduction, were identified. Bowman et al. (2015) also investigated whether dogs habituate to auditory stimulation, another point of interest to shelters. They found that the behavioral and HRV effects of classical music began to diminish as quickly as one day, suggesting that while classical music may be effective in improving welfare, rotating the selections that dogs are exposed to each day is important in maintaining those benefits over their stay.

In a follow-up study, Bowman et al. (2017) investigated four other genres of music in addition to classical music, using compilations of pop, soft rock, reggae, and Motown. Each of the five genres was played once for six hours with a no music (control) condition tested before and after. Regardless of genre, dogs spent more time lying down and less time standing. Barking was not impacted by any genre, but dogs were 142 times more likely to bark after the music stopped, whichever genre it was. The succession of genres in this study more closely resembles a five-day intervention

of mixed genres without the inclusion of any potentially stimulating music (i.e., heavy metal)—and as such, the more meaningful comparison between music and silent control here suggests that varied, auditory enrichment is preferential to shelter noise unabated.

Brayley and Montrose (2016) tested many of the same genres in previous studies, but with the novel addition of an audiobook intervention (a more systematic version of Wells et al.'s [2002] inclusion of conversation on the radio). In two-hour presentations, dogs experienced Beethoven, 80s pop music, “Through a Dog’s Ear,” a reading of the *The Lion, the Witch, and the Wardrobe*, and a control condition of no additional sound. When the audiobook was played, dogs spent more time resting and less time walking, sitting, or standing compared to all other conditions. Barking and other vocalizations, such as howling, growling, and whining, also occurred least often with the audiobook, but some differences between the conditions were observed.

Considering that regular conversation tested by Wells et al. (2002) demonstrated no impact on dogs’ behavior, the consistent effect of the audiobook in this study is curious. The authors suggest that the professional delivery and tempo of the book’s narration may have led to greater attending by the dogs than just casual conversation.

11.2.4.1 Application of Evidence-Based Shelter Practices for Auditory Enrichment

Multiple studies support classical music as an effective intervention in the shelter, but caveats remain. Repeating the same recording across the entirety of the day, multiple days in succession (which is not uncommon in animal sheltering), has not been tested. When considering Bowman et al.’s findings, it is likely that dogs can quickly habituate to the music, reducing its calming action. At a minimum, multiple, classical music compilations should be rotated daily to potentially reduce this effect. Audiobooks are another promising form of enrichment that may increase auditory variety

while promoting behaviors associated with better welfare and could be included in the shelter’s rotation of recordings.

It is unknown, however, whether dogs perceive music in a manner that is similar to us, and presumptions of a positive affect based on these recordings, such as a calming effect with classical music, may be anthropomorphic (Rickard et al. 2005). An alternate explanation for the results of these studies could be that the music is masking or changing the perception of one sound through the presence of another. In the case of the animal shelter, it’s possible that classical music, more so than other types of music, may act similar to white noise, equally distributing sounds across the frequency band, masking sudden changes in sound (e.g., barking by other dogs, doors opening and closing). This may create a more consistent environment for the dogs, leading to the observed behavioral changes. Future studies exploring sound masking could help us better understand what qualities of auditory enrichment are influential in dogs’ perception and their reactions in the shelter.

11.2.5 Olfactory Enrichment

Many of the reasons to explore auditory enrichment in the shelter, likely apply to olfactory interventions as well. One key feature to these interventions, however, is the species-specific relevance of olfaction in the daily lives of dogs (Nielsen et al. 2015). Over the past decade and a half, researchers have explored the impacts of odors and pheromones on the behavior and physiology of shelter dogs (Graham et al. 2005a; Tod et al. 2005; Binks et al. 2018; Hermiston et al. 2018; Uccheddu et al. 2018; Haverbeke et al. 2019).

Graham et al. (2005a) investigated lavender, chamomile, rosemary, peppermint along with a no-odor control, each diffused in front of and behind the dogs’ kennels for four hours a day over five consecutive days. Exposure to both lavender and chamomile led to increases in dogs’ resting and decreases in movement and

vocalization. Conversely when rosemary and peppermint were diffused, resting decreased while dogs' standing, moving, and vocalizing occurred more often.

Binks et al. (2018) evaluated cloths scented with ginger, coconut, vanilla, and valerian placed in the dogs' kennels along with two control conditions: a non-scented cloth and no cloth present. For each condition, dogs' behavior was recorded for two hours a day over three successive days. With all odors, dogs vocalized and moved less and rested more compared to both controls, demonstrating a positive effect of these olfactory interventions. Moreover, dogs reclined with their eyes closed most often with coconut- and ginger-scented cloths compared to the no-cloth control. However, it is worth noting that the non-scented cloth also reduced dogs' vocalizing and movement and increased resting behavior more so than having no cloth in the kennel, suggesting more investigation may be needed to parse out the novel effect of the cloth and the odors themselves. (Use caution when implementing olfactory interventions in the shelter that involve essential oils; see resources from ASPCA's Animal Poison Control Center at www.ASPCApro.org.)

Pheromones differ from odors in that they are species-specific chemosignals that affect the behavior of conspecifics. Dog-appeasing pheromone (DAP) is a synthetic version of a pheromone produced by lactating female dogs shortly after giving birth and is processed through the canine vomeronasal organ, a specialized organ for detecting non-volatile chemosignals that is part of many species' olfactory systems. Tod et al. (2005) compared the behavioral effects of a seven-day diffuser treatment of DAP versus placebo on dogs living in separate kennel blocks at a shelter. They found that when an unknown person walked past the dogs' kennels on the final day of treatment, the average barking amplitude (loudness) of the DAP group was lower than that of the placebo; however, the peak barking amplitude did not differ, indicating that barking in

both groups had similar peaks in their loudness. Likewise, when Hermiston et al. (2018) sprayed DAP directly in dogs' kennels 30 minutes prior to an unknown dog walking past the dogs' kennels, the kennel block of the DAP-treated group was more than 6 dBs lower than dogs' kennels that were untreated, a more than 30% reduction in volume. However, barking frequency and behavior did not differ between groups.

11.2.5.1 Application of Evidence-Based Shelter Practices for Olfactory Enrichment

Dog-appeasing pheromone is an impactful intervention in reducing the loudness of dog barking in the shelter. Olfactory interventions that use calming odors (i.e., lavender, chamomile, coconut, and ginger) may be a more cost-effective enrichment that affects multiple behavioral measures in addition to barking, such as increased rest and decreased movement. More stimulating odors, such as peppermint, ginger, and valerian, may be better-suited for out-of-kennel interactions where dogs can more actively engage with them. However, if costliness of intervention is not a concern, the nascent literature on DAP in the animal shelter is supportive of its effectiveness. With these types of olfactory enrichment, dispersion (and doing so in a safe manner with essential oils) is a consideration, and logistic questions, such as diffuser placement, coverage plans, and maintenance of therapeutic levels, will need to be addressed. DAP collars, while not used in these studies, have shown promise in reducing behavioral measures associated with fear and anxiety in response to a simulated thunderstorm in laboratory beagles (Landsberg et al. 2015); these may be a more appropriate mode of DAP for the shelter environment.

11.2.6 Visual Stimulation

To our knowledge, only one study has explored the effects of visual sensory stimulation, namely, television monitors, as a form of canine enrichment in the shelter. Graham

et al. (2005b) investigated the impact of monitors placed at the front of dogs' kennels, with video of other dogs, unfamiliar animals, and humans as well as a blank screen, on the dogs' behavior. Each intervention type lasted four hours a day for five days. Regardless of image type, dogs' vocalizing and movement decreased with more time spent at the front of their kennel. Similar to findings on toy engagement (Wells 2004), dogs spent only 10% of their time looking at the monitors as compared to controls, and their interest waned over time, suggesting the more species-specific, interactive enrichment previously described may be preferred by dogs and provide greater welfare benefits.

11.3 Assessing Enrichment

Because enrichment can only possibly be enriching if the animal uses it, assessing enrichment interventions is essential. Not only do such practices ensure that programs are accomplishing their main goal of improving welfare, they allow shelters to make informed decisions about how they allocate their time and resources.

With this in mind, evidence-based decisions about enrichment are often made on the shelter-wide level and then on the individual dog. This helps us decide what primary enrichment programs to enact that are likely to be used by a majority of the dogs (see Section 11.2) before tailoring enrichment for smaller proportions of animals that are not engaging or benefitting from the primary enrichment the shelter provides.

Most specific decisions around efficacy will be at the individual animal level, once the primary enrichment programs have been identified, because shelters should be cognizant of the specific effects of the enrichment on the individual. At the shelter-wide level, however, a shelter could discontinue a certain type of enrichment if it is not bringing about the desired behavioral change or not used by a

large proportion of dogs. They could instead opt for another enrichment type and assess it, with hopes that it will be more effective. Whether at the shelter-wide or individual level, evidence-based decisions allow the shelter to better serve all dogs, preventing shelters from spending resources on interventions that are not beneficial, and instead directing those resources to other, more effective modes of enrichment.

11.3.1 What to Measure

In terms of assessing enrichment in the shelter, there are two main classes of behavior to measure. The first is the dog's direct engagement with the enrichment. A variety of measures can be used to assess direct engagement, each answering different questions about the intervention (see Box 11.1). The other class of behavior is whether the enrichment impacts important behaviors for that individual animal, such as producing more resting behavior or a reduction in barking.

Determining if, how long, and in what way dogs engage with the enrichment is essential for determining, at a preliminary level, if that enrichment should be continued or not: is the dog engaging and in a desirable fashion? Or is the dog not engaging? If engagement is confirmed but the enrichment does not bring about the desired behavior change, one can assess if the lack of effect was due to it not impacting the behavior at all or just not to the degree desired.

Of course, one of the main goals in providing enrichment is to improve the animals' welfare and assessing the impact on dogs' behavior is critical. For example, consider a 15-minute front-of-kennel treating program, where volunteers toss hot dogs when passing by the dogs' kennels to create a positive association with visitors. To assess intervention efficacy, the shelter could measure the frequency or duration of dogs lunging or barking at the front of their kennels. A shelter that has many shy, fearful dogs might

Box 11.1 Key Enrichment Engagement Questions*Population Level*

- 1) What percentage of dogs engage with a certain type of enrichment, such as a rope toy in the kennel?

Assessment utility: Provides a shelter-wide determination of whether the item is deliverable to most dogs with a high likelihood of engagement.

Individual Level

- 1) Does an individual dog engage with the enrichment?

Assessment utility: Lets a shelter tailor the individual dog's experience and ensure it includes enrichment that the dog actually uses.

- 2) How long did the dog engage with the enrichment?

Assessment utility: Allows for determination of whether the intervention is sufficiently enriching or if a higher level of engagement is desired. For example, deciding to freeze a dog's stuffed KONG to increase the amount of time the dog spends interacting with it.

- 3) How did the dog engage with it (e.g., biting or shredding it)?

Assessment utility: Helps determine whether enrichment is individually appropriate. For example, the dog might engage regularly with an enrichment item, but it results in bleeding gums. If that's the case, a different item may be better. This measure can also help inform decisions about objects that are often considered to be obstruction risks. If one dog is observed to shred and consume a soft toy, then the item is poorly suited for that dog; but soft toys can still be highly enriching for other dogs.

implement a similar program but measure behavior change differently. In this case, staff could measure dogs' frequency of approach behavior when they pass by kennels during morning rounds.

To evaluate intervention efficacy, shelters can measure behaviors before enrichment is provided and then compare those same measures afterward. This can be done on a shelter-wide level (e.g., measuring noise level in the kennels) or per individual dog (e.g., measuring the frequency or duration of barking by one dog). Tracking an individual dog's behavior daily allows us to identify changes in a dog's behavior early, which is vital in the shelter. With more knowledge sooner, more individualized interventions can be implemented sooner, such as providing an office foster for a dog that is showing initial signs of kennel reactivity. Ideally, data collection starts as soon as a dog enters the shelter. Tracking the dog's behavior can allow

detection of non-engagement with the enrichment and/or behavioral deterioration, either of which would warrant action.

Given the multifactorial nature of behavior, it is difficult to predict how quickly enrichment might affect behaviors of interest. An intervention may be effective but only after the animal has encountered the enrichment for several days or weeks. Given the time-sensitive nature of shelter work, such long observation periods are not recommended. If an intervention was implemented to counter a problematic behavior but does not produce positive behavioral change within one week at most, modifying the enrichment strategy is advised. Additionally, if no engagement is observed after even two days, changing enrichment types would be appropriate.

Ideally, shelters would assess both the engagement and the effect on behaviors of interest as they provide different information. However, engagement with some forms of

enrichment can be hard to measure. For example, how would a dog's interaction with music or odors be measured? In these cases, measuring the effects of the intervention on other behavior, such as resting and activity-based behaviors, may be the only metric.

After the measurable behaviors have been selected, objective definitions are needed. Behavioral definitions should be clear and simple. They should indicate what does and does not count as a response; this is particularly important when many people are measuring. Even something as straightforward as "engaging with object" needs a definition: does chewing on it count? How about licking? Sleeping on it? An objective definition should describe what the behavior looks like and should not include subjective terms. For example, "jumping and barking with the intention of getting the person's attention" is an unsuitable definition for kennel reactivity as what the dog *meant* to do is unknown. A better definition might be: "jumping on any part of the kennel with the front two paws while simultaneously barking when a person or animal walks past." After deciding on what to measure and how to define it, the next step is deciding how to measure it.

11.3.2 How to Measure

While recording an animal and coding their behavior later is a common research practice, it is impractical for a shelter. Instead, live coding is the most feasible way to make observations. This allows staff or volunteers to integrate observations into their daily routine.

Of course, this can present challenges. It is possible that human presence alone can change the dog's behavior (known as the "observer effect"). If the behavior of interest occurs in response to a person (e.g., kennel reactivity), this might not be an issue. If the behavior is engagement with an object, though, the observer might disrupt the dog. If this is the case, clever observational skills are needed, such as observing from a greater distance or having a staff member to whom the

dog is habituated (and less likely to influence the dog) record the behavior. If the shelter has the wherewithal to install cameras, remote observation reduces these observer issues significantly.

With live coding, the materials needed to record the observations can vary in their simplicity. Observations can be recorded on paper, either placed directly on the dog's kennel or in a log that the observer carries. While both are simple to implement and allow for real-time assessments of behavioral trends and enrichment decisions, observations also need to be transferred to the animal's database record, making this method more time-intensive than it may initially appear. With the ubiquity of smartphones, however, observations can be recorded directly into a shared file, eliminating the extra transfer step. Observations can be completed by staff during daily rounds or activities, or assigned to volunteers and entered in real time. Data compilation and transfer can be done on a weekly basis, if necessary, to reduce workload, as long as the data are assessed daily to allow for timely, informed decisions. For some behaviors, it is important for observations to be made when the behavior is likely to occur (e.g., measuring food guarding without food present would not be helpful).

11.3.3 Measurement Methods

There is a wide range of measurement techniques in animal behavior. The most detailed and time-intensive measurement approach is continuous measurement, in which all instances of the behavior(s) and their duration are recorded. This, however, is unreasonable for shelters. Other measurement systems that are more feasible but still provide useable data about the enrichment program should be considered. These methods include focal animal sampling, instantaneous scan sampling (ISS), interval recording (IR), momentary time sampling (MTS), and permanent products. For the purposes of our discussion, ISS, MTS, and permanent products are described in more detail in Box 11.2. For a more extensive discussion of

Box 11.2 Types of Behavioral Sampling Most Useful in the Animal Shelter

Instantaneous scan sampling. Instantaneous scan sampling (ISS) is used to quickly assess the behavior of multiple individuals, making this method very useful in sheltering. In ISS, the observer focuses on one individual and records what the dog is doing in that instant, before shifting focus to the next dog. For example, an observer might walk down a kennel aisle and mark down whether each dog is engaging with a plush toy as the observer passes the dog's kennel. Additionally, observers can record the presence or absence of a behavior. ISS can also be used to measure how frequently (percentage of observations) one dog or all dogs in a kennel row display the behavior.

Momentary time sampling. Momentary time sampling (MTS) is a blend of ISS and interval recording. In MTS, an individual animal is observed for an instant, as in ISS, but in MTS the same animal will be observed again, after a specified interval (e.g., every 20 seconds or every 10 minutes). For example, a volunteer might walk through kennels and record whether each dog was engaged with a recently delivered, peanut-butter-covered disc. Then five minutes later, the volunteer could walk through again and conduct a second observation for each dog. This observation pattern provides an estimate of behavior duration. In the example, observing the dog engaged during sample 1 and again in sample 2, with five minutes elapsing between the two, provides a six- to seven-minute estimate of engagement with the disc.

Permanent product. A permanent product is the tangible result or outcome of a behavior that can be used as a proxy for that behavior. Examples of permanent products are feces or urine in the kennel (behavior: elimination) or number of KONGs with food eaten from

them (behavior: eating from stuffed KONG). We are not directly observing the behavior; we are recording the product of the behavior. Recording permanent products is often more practical because the observer does not have to be present when the behavior is occurring and can record those permanent products at the person's convenience. Instead of walking through and observing if a dog is working on a stuffed KONG, shelter staff can just note which and how many KONGs have at least some food missing when they are removed from the kennels.

Permanent products measurement for object enrichment can be easily incorporated into other daily activities. For non-consumable enrichment, being creative with what is considered a permanent product increases this technique's utility. For example, if rope toys were provided, chew marks or strings pulled from the toy could indicate interaction. For non-chewers or even rubber objects that may not show evidence of use, objects could be placed in the same location in the kennel; and if the object has moved, it is assumed the animal has touched it. This, of course, is an imperfect measure if it is accidentally moved or left in the same position after play; however, this can still provide relatively useful data with relatively low recording effort.

Permanent product measurement only works when the behavior of interest, whether interaction with an item or an undesired behavior (e.g., a furrow in the dirt from a dog that has been fence running), leaves a tangible result. Additionally, we need to be able to clearly attribute that product to an individual or group of individuals. If we are measuring whether a dog is eating its food, but the dog is co-housed and not separated when fed, we cannot necessarily attribute an empty bowl to our dog of interest.

observation and measurement techniques, see *Measuring Behavior: An Introductory Guide* (Martin and Bateson 2007) and *Applied Behavior Analysis* (Cooper et al. 2019). Appendix 11.A offers an example data sheet for monitoring engagement with enrichment.

11.4 Implementing and Maintaining an Enrichment Program

While shelters have ample enrichment options to choose from, not all programs will be appropriate, depending on the shelter's mission, population, resources, housing practices, behavioral goals, and staff and volunteer skills. As noted above, animals need to engage with the enrichment and show behavioral or psychological benefits. For this to have a chance to occur, it needs to be delivered to them, which requires consideration of human behavior and asking: (i) how are staff, volunteers, and the public engaged in preparing, delivering, and assessing enrichment? and (ii) how can enrichment be effectively and efficiently integrated into daily operations?

Obtaining the desired behavior from staff, volunteers, and the public is no different than obtaining desired behavior from our animals. There are three dimensions to pursue in this regard: (i) training, (ii) arranging the environment, and (iii) arranging consequences. When considering enrichment, shelters need to ensure that they have addressed all three of these components for their program to be successful and sustainable.

11.4.1 Training

It is essential that the personnel implementing or assessing the enrichment program have the ability to complete the tasks required of them. Just as an owner cannot expect their dog-reactive dog to be calm when another dog passes by if they have not taught an appropriate alternative response, we cannot expect our

staff or volunteers to know how to implement enrichment if we have not taught them the required skills. What, then, should training entail to maximize success?

The training required will depend on the complexity of the behavior being taught. If the behavior is stuffing KONGs® (KONG Company, Golden, CO), a simple written task list, ideally with some visual aids, or a short video is likely sufficient. If the behavior is complex, such as learning to take a dog out of the kennel for a walk, then more training is required. Determining the requisite components can be determined by assessing your training: if few people are mastering the skills after training, more steps, such as modeling the behavior or breaking the behavior into smaller steps, may be needed.

Human behavioral literature indicates there are typically three components needed to produce satisfactory performances of complex behavior. First, create a task analysis of what the learner needs to do, including all necessary steps correctly ordered. A task analysis ensures that all the relevant skills are being taught and helps the mentor identify if steps are being omitted or completed incorrectly. At each step, the mentor is teaching the learner and assessing performance. By making this task analysis available to staff and volunteers (e.g., a document posted in a relevant location), it can be used for future reference. See Box 11.3.

Second, the mentor should model the behavior so that the learner can see what the full behavioral sequence looks like. Finally, the learner should perform the behavior with the mentor providing both positive feedback and negative corrective feedback. Shelters often use this type of process in new volunteer mentoring sessions or buddy dates for new dog walkers.

Howard and DiGennaro Reed (2015) examined how one shelter trained volunteers to safely take dogs from their kennels, practice polite leash skills, and work on obedience in a play yard. They found that when volunteers were trained as usual—attending a staff member's live lecture with verbal instructions and a

Box 11.3 Task Analysis for Harnessing a Dog

- Locate the correct kennel
- Read the information on the kennel to ensure the dog can go on a walk
- Retrieve a harness that will fit the dog, a leash, and treats
- Return to the kennel
- Throw treats to the back of the kennel to move dog away from the gate
- Open the gate the minimum amount for the dog walker to enter
- Enter the kennel
- Close the gate
- Identify the correct opening on the harness for the dog's head to go through
- Use treats to lure the dog into the harness
- Clip harness under the chest
- Assess harness and adjust so that it is not too snug or too loose
- Clip the leash to the front clip on the harness and onto the dog's collar

demonstration on how to do these tasks—volunteers only completed ~60% of the tasks correctly. When volunteers attended video-based training (with modules that included on-screen written instructions and images, verbal instructions corresponding to on-screen material, and a study guide), scores improved but participants failed to meet the criteria for mastery (85% of tasks completed correctly without any safety errors). Mastery was only achieved after volunteers saw the behavior modeled and received corrective feedback while they performed the tasks. Behavior modeling and feedback were also critical features of a program that trained volunteers to teach obedience behaviors to shelter dogs (Howard and DiGennaro Reed 2014).

11.4.2 Arranging the Environment

To engage staff, volunteers, and the public to successfully participate in an enrichment program, we need to arrange the environment so

that it supports the desired behavior. Here is an example of insufficient environmental arrangement: a large municipal shelter had their kennel staff walk to the front office for computer data entry whenever they moved a dog to a new kennel (or keep track mentally and make notes for later). Often, this would lead to multiple staff spending at least 20 minutes each day gathered around the computer attempting to locate dogs who were not in their assigned kennels. Instead, the shelter could put a computer in the kennel area or installing a dry erase board in the kennel area where changes could be written until they were later entered into the computer to solve this problem. Whatever the resources or desired action, it is helpful to ask: how can we arrange the workplace so that it is easy for staff and volunteers to do the right thing?

When planning an enrichment program, consider what needs to be changed in the shelter environment to facilitate correct implementation. If the program is sending dogs on field trips, have pre-packed backpacks full of treats, toys, water, and emergency numbers for the volunteer to use. If the program is using novel odors in daily olfactory enrichment, have odors pre-arranged by day in a cabinet rather than asking volunteers to search for them and figure out what was sprayed yesterday and the day before to ensure novelty.

How enrichment is scheduled during the day will also impact whether delivery actually occurs. While enrichment programs were historically viewed as optional activities when time allowed, they are now understood to be essential components of providing appropriate care to and maintaining the welfare of the animals in our custody. Though personnel time needs to be considered, many enrichment programs can add very little work and, in some cases, even reduce labor. If the enrichment program makes care easier and improves animals' lives through reducing behavioral issues, it can be sustained with little external input (i.e., providing praise, gift cards, or other additional reinforcers).

Mapping out the typical day of personnel involved in implementing enrichment programs can identify potential opportunities and challenges. For example, sending dogs on sleepovers when staff are cleaning kennels might be difficult if those staff are also responsible for bringing dogs out for these getaways. A better option may be sending dogs beforehand, so that the dogs are out of their kennels when cleaning occurs. Similarly, putting dogs' rations in buckets on their kennels for the public and volunteers to dispense throughout the day can provide many occasions for enrichment while not adding to staff duties as it actually eliminates the need to distribute and retrieve bowls from inside kennels.

Along with making implementation easy to do correctly, indicating that the enrichment has been delivered needs to be straightforward. Checking a box on a small dry erase board on the kennel could indicate the dog received a chewable item or recently spent time with a person. Additionally, tracking enrichment usage should be quick and simple; this is why using permanent products works well (see Box 11.2). Solutions will vary by shelter; however, talking to impacted staff and volunteers about what would make delivering and tracking the enrichment easiest will likely yield some creative solutions from the people who have probably been thinking about these issues. Finally, the enrichment and behavioral records need to be evaluated by a team member who is tasked with making data-based enrichment decisions, and the records should be entered into the dog's record, so that its preferences for enrichment and its behavior changes can be used by all personnel.

11.4.3 Arranging Consequences

The final piece of successfully managing human behavior is arranging reinforcement contingencies that support the desirable behavior. As much as it would be wonderful if everyone just “did the right thing,” that is, unfortunately, not how behavior works,

especially if we are asking staff or volunteers to do extra work or change their procedures to implement an enrichment program. A brief overview of tactics that can be employed to help maintain enrichment delivery and assessment is presented below. For more in-depth discussions on behavior-based ways to bring about top performances from people, we refer readers to *Performance Management* (Daniels and Bailey 2014) and *Human Competence: Engineering Worthy Performance* (Gilbert 2007).

This first tactic requires a quick definition: a reinforcer is *by definition* a stimulus, which, when delivered following a behavior, increases the future likelihood of that behavior (see Chapter 3 for more information on learning theory). Positive reinforcers, such as money or praise, may be effective. While money is a powerful reinforcer, its accessibility in the limited-resource environment of most animal shelters makes it an unlikely option. However, shelters do have other valuable reinforcers at their disposal such as praise, which is free to give and is one of the most underused positive reinforcers (Flora 2000). Simply recognizing when someone has done well (even if it is their job to do that task) can be highly effective. Praise should be made publicly and should explicitly indicate the behavior for which it is being given. With the advent of social media, praising staff, volunteers, and members of the public is even easier, although delivering the praise in person is still important.

The social stimulation that staff and volunteers receive from interacting with each other can also be reinforcing. Volunteer satisfaction can be significantly enhanced by connectedness to other volunteers, especially to more experienced volunteers or volunteers from whom they can learn new skills (Zappa and Zavarrone 2010). In the authors' experience, very active volunteers often create their own social networks in the shelter, both with staff and other volunteers. Rather than waiting for this to occur organically, shelters can foster these types of interactions by having new volunteers shadow kennel

staff and work collaboratively with them to reduce their workload. Enrichment programs can be designed with a team component where volunteers or a staff member and a volunteer work together to deliver and assess the enrichment.

Another category of potential reinforcers is professional development, which can advance staff and volunteer skills, knowledge, and responsibility. These opportunities can be contingent on completing certain desirable activities, such as delivering enrichment for a certain number of days. In fact, providing staff with increased responsibility within their organization can reduce absenteeism (Fried et al. 1972; Hammer et al. 1981). Setting up these opportunities not only provides the occasion to reinforce desirable performances, it allows shelters to develop the skilled staff and volunteers they need.

Reinforcement contingencies can be set in place to maintain all parts of an enrichment program. For example, volunteers could earn a \$2 voucher to the shelter store after preparing 50 toilet rolls filled with kibble. Staff could earn extra time on the following day's lunch break after all dogs receive three types of enrichment the day before. Members of the public could earn shelter t-shirts after taking 10 dogs on field trips or 5 dogs on sleepovers. Staff could receive raffle tickets for a weekly drawing, if they record the enrichment usage of all the dogs in the shelter one day during their workweek.

11.4.4 Using Staff for Effective Enrichment Programs

While enrichment programs should be developed by staff that are skilled in behavioral principles, the management and delivery of the program does not need to be restricted. Even for shelters that have behavior teams, these teams likely do not have the human resources to carry out daily interventions. Instead, having animal care staff (or as we prefer it more holistically described: animal experience staff) manage these programs, with

enrichment delivery by staff and volunteers, can be particularly impactful as these staff usually spend the most time with the dogs.

Animal care staff can use their many observations throughout the day to identify dogs that are showing concerning behaviors (e.g., kennel reactivity or catatonia) and need additional support, and provide enrichment if they have responsibility for delivery decisions, or relay the information to the person(s) in the shelter that does. This allows dogs to benefit from interventions sooner and empowers all staff to make decisions about how they can improve dogs' lives. The opportunity for animal care staff to engage with the animals beyond daily maintenance (i.e., cleaning and feeding) can be used as a reinforcer for their more mundane tasks. Furthermore, being part of the enrichment program's design, such as when dogs are enrolled or objects are delivered, can improve the success of organizational programs (Lawler and Hackman 1969), such as increasing the likelihood that the enrichment will be carried out correctly and regularly.

For administrative staff without regular interaction with dogs, participating in interventions that directly affect the dogs can be reinforcing. One particular program that can be a great collaboration is an office foster program. The behavior team can work together with medical and operational staff to curate the list of dogs, and animal care staff or morning volunteers can deliver the dogs to the offices. Administrative staff can provide their availability via shared calendar or respond to a daily sign-up email. Many shelters have informal office fostering, but formalizing the program allows dogs to reap the benefits of consistent human interaction, and staff with less daily dog contact can participate in their care.

11.4.5 Engaging the Public for Effective Enrichment Programs

The public can be employed in various capacities depending on the enrichment program. Visiting groups (4-H, Girl Scouts, or corporate teams) can participate in one-time volunteering

opportunities preparing object enrichment, such as stuffed KONGs or toys (e.g., braided ropes). Placing an enrichment preparation station in the shelter lobby captures an audience that may not have considered volunteering when they walked through your doors. To do this successfully, have the necessary materials ready for assembly and make a photo guidebook (task analysis) about the enrichment's preparation, such as how to braid a rope toy or create a snuffle mat.

Delivery of enrichment can also be accomplished through public engagement. Visitors can easily deliver food or toy enrichment as long as the instructions are simple and explicit. For example, dogs' daily rations of food can be placed in a bucket on the dog's kennel. Kibble can then be dropped into a delivery tube or directly into the kennel throughout the day, allowing potential adopters to interact in desirable ways with the dogs. This can create positive associations with new people and reduce barking in the kennels (Protopopova and Wynne 2015; Payne and Assemi 2017).

Typically, shelters implement walking programs, shelter dog training classes, and in-kennel reading programs to provide human interaction to the dogs. More recently, shelters have created field trip (Gunter et al. 2021) and sleepover programs (Gunter et al. 2019) with public options for community participation. Shelters can tailor dogs' eligibility based on behavior, allowing both the dog and person to enjoy the interaction while reducing risk and increasing the likelihood of continued participation in the program. Finding

ways to reduce barriers for the public to interact with the shelter and improve the welfare of the dogs can be an excellent tool in recruiting new volunteers and increasing the overall reach of the organization in the community.

11.5 Conclusions

While the provision of enrichment is necessary for dogs living in animal shelters, so is the assessment of engagement and determination of benefits, namely, creating the desired change we want to see in the dogs' behavior. There are a wide range of sampling and measurement techniques for monitoring enrichment usage and its behavioral effects. Choosing the right one for your shelter will rely on which behaviors are being measured and the resources available to record those measures. Both enrichment delivery and enrichment tracking must be easy and straightforward to do for those who are doing it, but such efforts are only worthwhile if the data being collected are used. Once enrichment programs are in place, data-informed decisions about which enrichment types are provided, on both the shelter-wide and individual dog levels, must be consistently re-evaluated based on the current population of dogs. In total, this will allow shelters to most usefully employ their resources and best serve the dogs in their care.

Please visit the companion website for video clips and downloadable resources associated with this chapter.

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Appendix 11.A Data Sheet

Time Sampling

Put an “x” in the box if the dog was engaging with the enrichment item as you passed the kennel. Alternatively, put an S for sniffing, C for chewing, E for eating, L for licking, or N for not engaging with the enrichment item

KENNEL	MON Item:	TUES Item:	WED Item:	THURS Item:	FRI Item:	SAT Item:	SUN Item:
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
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