

Evaluating the Secure Base Effect in Shelter Dog-Shelter Volunteer, Foster Dog-
Foster Volunteer, and Pet Dog-Owner Pairs

by
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A THESIS

submitted to
Oregon State University
Honors College

in partial fulfillment of
the requirements for the
degree of

Honors Baccalaureate of Science in Biology
(Honors Scholar)

Presented May 25, 2018
Commencement June 2018

AN ABSTRACT OF THE THESIS OF

Mary Hadley Schoderbek for the degree of Honors Baccalaureate of Science in Biology presented May 25, 2018. Title: Evaluating the Secure Base Effect in Shelter Dog-Shelter Volunteer, Foster Dog-Foster Volunteer, and Pet Dog-Owner Pairs.

Abstract approved: _____

Monique A. R. Udell

The aim of this study was to evaluate the different attachment profiles that characterize shelter dog-shelter volunteer and foster dog-foster volunteer relationships and to assess the proportion of insecure and secure attachment styles within foster, shelter, and pet dog populations. Foster dog-foster volunteer, shelter dog-shelter volunteer, and pet dog-owner pairs participated in the Secure Base Test, a short attachment test consisting of three, two-minute phases: (1) Baseline- the dog is placed in an unfamiliar testing room in the presence of their caregiver (2) Alone- the caregiver exits the room, leaving the dog alone (3) Return- the caregiver returns to the room and is reunited with the dog. Based on the response to the caregiver during the Return phase, each dog was categorized into one of four attachment styles: (1) Secure (2) Insecure-Ambivalent (3) Insecure-Avoidant (4) or Insecure-Disorganized. Although proportions of attachment styles were expected to differ among the three populations of dogs, no statistically significant differences were observed in the number of secure and insecure attachments for dogs across pet, foster, or shelter environments.

Key Words: Shelter Dogs, Foster Dogs, Attachment, Ainsworth Strange Situation Test, Secure Base Effect

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presented on May 25, 2018.

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I understand that my project will become part of the permanent collection of Oregon
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Introduction

Dogs, like other social animals, have a predisposition to form and maintain affectional bonds and attachments with other individuals (for review, see (Payne, Bennett, & McGreevy, 2015; Rehn & Keeling, 2016). These are strong emotional and physical bonds connecting two individuals through space and time. An attachment bond is a particular type of affectional bond, most commonly observed between infants and their primary caregivers. Bowlby was the first to describe attachment in an ethological context, speculating that the attachment of an infant to their primary caregiver is an innate, biological behavior (Bowlby, 1969). When the infant is separated from its attachment figure, his or her attachment system is activated, designed to reunite the infant with his caregiver (Bowlby, 1958).

An attachment bond is differentiated from other affectional bonds by several key features: 1) proximity maintenance, or staying in close proximity to and resisting separation from the attachment figure; 2) separation distress, or exhibiting distress, such as crying or searching, upon involuntary separation from the attachment figure; 3) secure-base, or using the attachment figure as a base from which to confidently explore the environment; and 4) safehaven, or using the attachment figure as a source of comfort and assurance during emotional distress (Ainsworth & Bell, 1970).

Although proximity maintenance and separation distress may be observed in other affectional bonds, an attachment relationship includes the added benefit of experiencing security and comfort from the attachment figure (Ainsworth, 1989).

Ainsworth's Strange Situation Procedure (ASSP) was developed to examine this attachment relationship between infants and their primary caregivers (Ainsworth & Bell, 1970). In ASSP, an infant and their caregiver enter an unfamiliar room where they are introduced to an unfamiliar person. The infant stays in the room, and the test then consists of three short periods of separation from and two short periods of reunion with the attachment figure. This mildly stressful setting is designed to characterize the infant's attachment style to the caregiver, by recording exploratory and play behaviors, proximity and contact-seeking behaviors, and vocalizations.

From these results, Ainsworth et al. identified three different types of attachment profiles: 1) secure attachment, 2) insecure-ambivalent/resistant attachment, and 3) insecure-avoidant attachment. In general, securely attached children become distressed upon separation from their caregiver, but calm down quickly upon reunion and divert back to exploratory and play behavior. They use their caregiver as a secure base, and reunion behavior is characterized as smooth and positive. Insecurely-ambivalent/resistant attached children became distressed upon separation from their caregiver, but do not calm down quickly upon reunion. They will usually resist comfort provided by their caregiver, and do not engage in exploratory or play behavior. Insecurely-avoidant attached children typically show no signs of distress upon separation from the caregiver, and will explore and play in their environment regardless of whether the caregiver is present or not. A fourth type of attachment called disorganized attachment was also later identified, although it is rare. (Main & Solomon, 1986). Children with disorganized attachment may show

disoriented or confused behavior upon reunion, with evidence of a strong approach avoidance conflict or fear of the caregiver.

The dog-owner relationship is considered to be analogous to the child-parent relationship in many homes. Topál et al. (1998) were the first to categorize the dog-owner relationship as an attachment bond. To do so, they used a modified version of the ASSP, hereby referred to as the Strange Situation Test (SST). Topál et al. (1998) looked primarily at the amount of time spent playing or exploring in the presence of an owner or stranger, the amount of time spent in contact with the human, and the amount of time spent in contact with the door. From these measurements, they were able to categorize dogs' attachment styles based on three factors: the amount of distress exhibited by the dog from being in an unfamiliar environment, the dog's response to being separated from the owner, and how the dog behaved towards the stranger. However, several authors later rejected Topál et al.'s findings, contending that order effects existed, and that they did not collect enough behavioral variables to discern an attachment relationship from a general affectional bond (Palmer & Custance, 2008; Prato-Previde, Custance, Spiezio, & Sabatini, 2003; Rehn, McGowan, & Keeling, 2013). It should also be noted that these findings do not allow for categorization of attachment styles according to the original styles described by Ainsworth.

Likewise, Prato-Previde et al. (2003) used the SST to look for attachment patterns using more secure-base related behavioral variables. Although they did find evidence for proximity seeking and separation distress, as well as more exploration in the presence of their owner, they were still unable to provide clear evidence of a dog-

owner attachment due to order effects (Horn, Huber, & Range, 2013; Mariti, Ricci, Zilocchi, & Gazzano, 2013; Palmer & Custance, 2008; Prato-Previde et al., 2003; & Rehn et al., 2013). Specifically, following the period where the dog was left alone in the room, the stranger returned to the room. The dog was never left alone prior to the owner's return, so the secure base effect could not be accurately assessed.

Despite these initial doubts, additional studies addressed the issue of order effects by using a counterbalanced version of the SST (Mariti et al., 2013; Mongillo et al., 2013; Palmer & Custance, 2008; Rehn et al., 2013). These studies do provide convincing evidence that an attachment bond exists between dog and owner, very similar to the bond between infants and their primary caregivers. To date, few studies have classified attachment styles in dogs according to Ainsworth's original categorizations.

As examined by child-parent and dog-owner attachment testing, the secure-base effect is considered a crucial component of attachment relationships. Harlow (1958) originally designed the open field test to study the secure base effect in infant rhesus macaques (*Macaca mulatta*). When the infants were placed in a novel environment, a cloth "mother" could be used as a secure base. A modified version of Harlow's test, known as the Secure Base Test (SBT), was utilized in our study. The Secure Base Test consists of three, two-minute phases in which dogs are allowed to freely explore an unfamiliar testing room. During the Baseline phase, the dog is placed in an unfamiliar testing room in the presence of their caregiver (the shelter volunteer, foster volunteer, or their owner), and caregivers are instructed to interact with the dog when it comes within a pre-measured semicircle with a 1-meter radius.

During the Alone phase, the caregiver exits the room, leaving the dog alone. During the Return phase, the caregiver returns to the room, and the instructions for the caregiver are identical to those provided in baseline. The secure base effect can be assessed based on the dog's response to the caregiver during the Return phase.

While attachment relationships between pet dogs and their owners have been studied extensively, very little is known about attachment relationships between foster dogs and foster volunteers and shelter dogs and shelter volunteers. Shelter dogs have been observed to develop attachment relationships with unfamiliar handlers relatively rapidly, in just three, 10-minute sessions taking place over three days (Gácsi, Topál, Miklósi, Dóka, & Csányi, 2001), but the quality of those attachment relationships remains unknown. Given that shelter dogs form bonds to new humans very quickly, foster dogs are also likely primed to form attachments to their new caretakers quickly.

The aim of this study was to evaluate the different attachment profiles that characterize shelter dog-shelter volunteer and foster dog-foster volunteer relationships, and to assess the proportion of insecure and secure attachment styles within foster, shelter, and pet dog populations. We predicted that the proportion of attachment styles observed in shelter dogs and foster dogs to their caregivers would differ from the proportions of attachment styles observed in pet dogs to their owners.

Methods

Participants

Twenty shelter volunteers who regularly interacted with shelter dogs in a training, walking, playgroup or socialization capacity were recruited through Willamette Humane Society (WHS) in Salem, Oregon. In order to assess attachment bond formation and the bond's influence on humans and dogs under normal conditions, shelter dogs interacted with shelter volunteers based on normal WHS practices. Shelter volunteers selected shelter dogs that had become available for adoption, and with whom they had interacted for at least three separate 10-minute sessions prior to the test. No dog was tested more than once.

Twenty foster volunteers and their foster dogs were recruited from two separate populations. Thirteen of the dogs were from Willamette Humane Society and other local shelters. Seven of the dogs were pooled from a study conducted by researchers at Carroll College. In order to assess attachment bond formation and the bond's influence on humans and dogs under normal conditions, foster dogs were assigned to foster volunteers based on normal WHS or affiliated program practices. Foster dogs were only tested after they had been living in the foster home for at least seven days.

Twenty dog owners and their pet dogs were recruited from the local Corvallis, Oregon area.

Dogs ranged in age from 5-weeks old to approximately 12-years old. As breed was not a variable under evaluation, a variety of breeds and mixes were enrolled in the study. The Secure Base Test was conducted with all participants in an unfamiliar room as described below, although the specific testing room varied across individuals.

Secure Base Test (SBT):

SBT sessions were conducted and videotaped in an unfamiliar room roughly 2.5 meters x 2.5 meters in size. A chair was placed against the wall in the room, and a semi-circle 1-meter in radius was taped on the floor around the chair. Three toys of different types were placed on the floor (outside of the 1-meter radius circle) before volunteers and dogs entered the testing room. Toys included a tennis ball with a squeaker, a rope toy, and a stuffed toy with a squeaker.

Phase one (Baseline, two minutes): The human caregiver (a familiar shelter volunteer, foster volunteer, or owner) was instructed to sit neutrally in the chair while the dog was able to freely explore the room. Each time the dog placed at least two paws or half a body length in the circle, the caregiver could interact (petting, talking, etc.) with the dog (without restraining it). Anytime the dog exited the circle, the caregiver was instructed to go back to sitting neutrally. The caregiver could play with toys with the dog if the dog brought them to the caregiver inside the circle.

Phase two (Alone, two minutes): The human caregiver exited the testing room so that the dog could be left alone.

Phase three (Return, two minutes): The human caregiver re-entered the testing room and the instructions were identical to phase 1 (baseline).

Data collection and analysis

Using the definitions in Table 1, two independent expert observers watched the return phase video recordings and categorized each dog into an attachment style. Following this initial coding process, the independent coders compared their categorizations. For all attachment style categorizations in which the independent coders disagreed, they re-watched the videos to see if an agreement could be reached. Inter-rater reliability was assessed by determining the percentage of classifications for which the expert coders were in agreement.

A Fisher's exact test was used to compare the number of dogs with secure and insecure attachment styles for the pet, foster, and shelter conditions.

Table 1

Attachment Style Classifications (adapted from (Schöberl et al., 2016))

Attachment Style	Description
Secure	Little or no resistance to contact or interaction. Greeting behavior is active, open and positive. Seeks proximity and is comforted upon reunion, returning to exploration or play.
Insecure-Ambivalent	Shows exaggerated proximity-seeking and clinging behavior, but may struggle if held by owner. Mixed persistent distress with efforts to maintain physical contact and/or physically intrusive behavior directed toward the owner. (Dogs who the judges agreed seemed essentially secure but with ambivalent tendencies, were included in the secure group).
Insecure-Avoidant	May show little/no distress on departure. Little/no visible response to return, ignores/turns away but may not resist

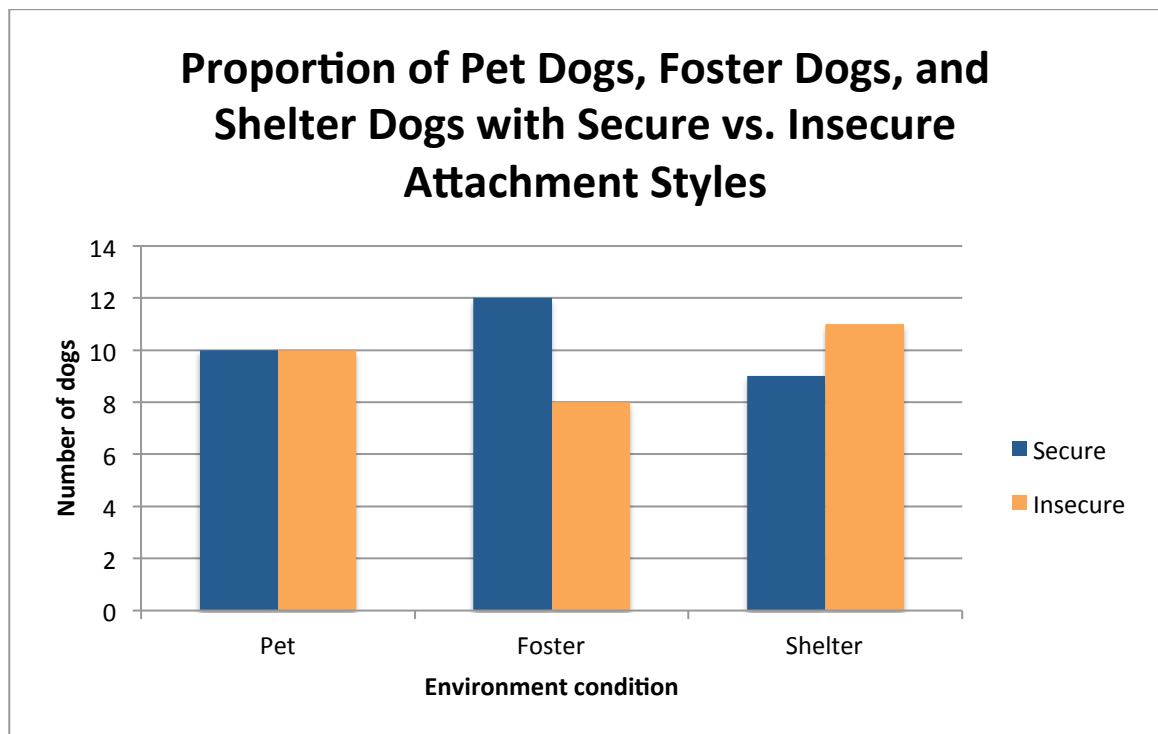
	interaction altogether (e.g. rests or stands without bodily contact, out of reach or at a distance).
Disorganized	Evidence of strong approach avoidance conflict or fear on reunion, for example, circling owner, hiding from sight, rapidly dashing away on reunion, “aimless” wandering around the room. May show stereotypies on return (e.g. freezing or compulsive grooming). Lack of coherent strategy shown by contradictory behavior. “Dissociation” may be observed, that is, staring into space without apparent cause; still or frozen posture for at least 20 seconds (in the nonresting, nonsleeping dog).
Unclassifiable	Classifiers were unable to reach consensus on group placement for dogs from this classification category. Unclassifiable dogs were excluded from further analysis on dog attachment.

Results

Based on the independent expert observers’ interpretation of the return phase, each pet dog, foster dog, and shelter dog was sorted into one of the attachment style classifications from Table 1. For the pet dogs, ten dogs were scored as secure, nine dogs were scored as insecure-ambivalent, and one dog was scored as insecure-avoidant. For the foster dogs, 12 dogs were scored as secure, seven dogs were scored as insecure-ambivalent, and one dog was scored as insecure-disorganized. For the shelter dogs, nine dogs were scored as secure and 11 dogs were scored as insecure-ambivalent. There were not any dogs for which coders did not reach agreement, so no dogs were rated as Unclassifiable.

Since the secure base effect is the distinguishing factor between a secure attachment style and all categories of insecure attachment, the insecure-ambivalent, insecure-avoidant and insecure-disorganized dogs were combined into one group: Insecure (see Figure 1). Thus, ten pet dogs were categorized with secure attachment and ten pet dogs were categorized with insecure attachment; 12 foster dogs were categorized with secure attachment and eight foster dogs were categorized with insecure attachment; and nine shelter dogs were categorized with secure attachment and 11 shelter dogs were categorized with insecure attachment.

Figure 1



Inter-rater reliability for holistic coding, when two independent coders categorized dogs according to the definitions outlined in Table 1, was 70%.

The Fisher's exact test comparing the number of dogs with secure and insecure attachments for pet, foster, and shelter conditions was not significant ($p = 0.6281$), indicating that the foster and shelter environments did not impact the attachment styles of dogs in the present study.

Discussion

No statistically significant differences were observed in the number of secure and insecure attachments for dogs across pet, foster, or shelter environments. This was unexpected, as we predicted that the proportion of attachment styles observed in shelter dogs and foster dogs to their caregivers would differ from the proportions of attachment styles observed in pet dogs to their owners. These findings may suggest that shelter and foster dogs form attachments with familiar caregivers that are similar in form and proportion to the attachment styles observed in the pet dog population.

However, one observation made by the independent expert observers was that the shelter dog attachment style classifications were less discernable than the pet dog or foster dog attachment style classifications. This could suggest that shelter dogs do not fit as clearly within the specified categories as well as pet dogs or foster dogs. One possible explanation for this result may be that three, 10-minute sessions with a shelter volunteer is an insufficient amount of time for a robust attachment style to develop. It was observed by Gácsi et al. (2001) that dogs exhibit signs of attachment to an unfamiliar handler in this short amount of time. However, the quality of those attachment relationships was not examined because researchers used duration-based measures instead of the holistic coding method used in the present study. To date,

very few studies have looked at categorizing dogs into attachment styles, even though this is an important component in human attachment literature.

The shelter dogs from Gácsi et al. (2001) were also housed in a different environment than the shelter dogs from Willamette Humane Society (WHS). Dogs from Gácsi et al. (2001) were kept in large yards with many other dogs and had no contact with people, other than their caretaker. The WHS dogs were housed in separate cages and likely had interaction with caregivers, volunteers, and, members from the public on a daily basis. Dogs coming from poor social conditions may be more responsive to people and more likely to readily form attachment relationships with new people. Thus, it is possible that the dogs in the present study did not form the same kind of attachment relationships with familiar volunteers due to the fact that they are regularly exposed to a variety of unfamiliar humans.

Anecdotally, shelter dogs also appeared to frequently engage in repetitive toy chewing in the presence of their caregiver, a behavior not commonly observed in the pet dog or foster dog groups. This might suggest that the presence of a caregiver, even for dogs classified as secure, may have had less of a secure base effect in terms of stress reduction. This would be worth evaluating further in future studies.

The foster dogs in our study tended to be more fearful and skittish than dogs pooled from the pet or shelter populations, a factor that could have influenced the results. WHS and affiliated programs utilize foster homes primarily for dogs that are too young for adoption, are recovering from injury or illness, or that may need behavioral training prior to being put up for adoption. These tend to be dogs that are not well suited for a shelter environment, and that may require unique handling and

training. Therefore, the foster dogs from our study may form attachment styles in different proportions than foster dogs coming from an entirely foster-based organization. However, it is interesting to note that despite these perceived differences in the shelter and foster populations tested, we did not observe significant differences in relative proportions of attachment style classification across the populations tested.

Further research should assess whether a dog's attachment profile can be used to predict attachment style towards their adopter, as well as measures such as dog behavior, welfare, and cognition. In human children, development of secure attachment relationships has been associated with a myriad of positive social, emotional, behavioral, and cognitive outcomes (Bernier, Beauchamp, Carlson, & Lalonde, 2015a; Salari, Bohlin, Rydell, & Thorell, 2016; Smyke, Zeanah, Fox, Nelson, & Guthrie, 2010). Children categorized as securely attached to their mothers as toddlers performed better on executive functioning tasks, such as impulse control and working memory (Bernier, Beauchamp, Carlson, & Lalonde, 2015b). Meanwhile, disorganized attachments can be predictive of aggression in children (Lyons-Ruth, 1996; Lyons-Ruth, Alpern, & Repacholi, 1993). Attachment relationships between parent and child may also have long term effects that last into adulthood, as evidenced by Salari et al (2017), who found a link between disorganized attachments in 8-year old children and ADHD symptoms at age 18. Similar trends have been observed with children in foster care, where children who form secure attachments with a foster parent are more likely to thrive and develop secure social bonds later in life (Smyke et al., 2010).

Paired Attachment Tests, in which dogs are allowed to freely explore a testing room in which their familiar caregiver and an unfamiliar person are present, should also be analyzed, to further assess whether the foster dogs and shelter dogs show a preference for their caregiver.

Understanding how attachment relationships impact animal welfare will be beneficial for optimizing foster and shelter programs and improving the success and wellbeing of dogs in these environments.

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