FEARFUL TO FRIENDLY (F2F): A CONSTRUCTIONAL FEAR TREATMENT FOR DOMESTIC CATS USING A NEGATIVE REINFORCEMENT SHAPING PROCEDURE IN A HOME SETTING

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Feral and fearful cats and kittens in animal shelters are not likely to be adopted as companion animals because they emit fearful or aggressive behaviors in the presence of humans. The purpose of the fearful to friendly (F2F) research was to investigate a shaping procedure to increase friendly behaviors of feral and fearful domestic cats and kittens with the goal of achieving animal shelters’ adoptability criteria. The results showed the F2F procedure was a safe and very effective procedure to quickly tame feral kittens deemed unadoptable. The day after implementing F2F, three out of four kittens approached me and accepted petting and holding without any additional training.
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INTRODUCTION

The Humane Society of the United States (HSUS) defines a feral cat according to its origin, "feral cats are the offspring of lost or abandoned pet cats or other feral cats who are not spayed or neutered" (2011). Feral cats are often called wild cats because they are born in the wild (not in captivity). HSUS (2011) makes the distinction between feral cats and stray cats by stating that "stray cats are accustomed to contact with people and are tame, but feral cats are not accustomed to contact with people and are typically too fearful and wild to be handled." Whereas stray cats may approach people, allow people to approach them and accept petting, feral cats usually avoid human contact. Thus, "stray cats may be reunited with their families or adopted into new homes, feral cats do not easily adapt or may never adapt to living as pets in close contact with people" (HSUS, 2011). I wrote the following poem, “Feral vs. Stray,” as an example of using behavior to distinguish feral and stray cats.

While walking down the street one-day, I passed two cats, one orange, one gray. As I walked by, the first cat greeted me with head and tail held high. His eyes met mine, and he meowed as if to say, "I am lost and cannot find my way." The second cat’s head and tail were low. His body clearly said, "One step closer and I must go." Such uncertainty in his wide eyes, pupils large, fight or flight, only more distance from me could make things right. With whiskers flared, he hissed and ran away. I quickly knew which was feral and which was stray.

According to the American Society for the Prevention of Cruelty to Animals (ASPCA) (2012a), “if a feral cat survives kittenhood, his average lifespan is less than two years if living on his own.” The ASPCA further states that “the average lifespan of
an indoor cat is 13 to 17 years—and we’ve known lots of kitties who’ve made it to 20-plus!” (2012b). Nearly 100% of feral domestic cats relinquished to animal shelters are euthanized (Alley Cat Allies, 2011a). Feral cats and kittens do not meet adoptability criteria because they emit fearful or aggressive behaviors in the presence of humans. Although these behaviors are useful for their survival in the outdoor environment, these behaviors do not make for good companion animals. Similarly, an indoor cat that is not afraid of people or dogs may be in more danger outdoors since not all people and dogs are nice to cats. People that choose to relocate feral cats or kittens from outdoor life to indoor life are asking a lot of feral cats or kittens by expecting them to automatically adjust to a different and threatening environment. The indoor environment requires friendly behaviors for the cat to be able to survive in this situation. An unfriendly, fearful house cat is likely to be relinquished to an animal shelter. Furthermore, fearful cats typically are not good candidates for adoption in an animal shelter setting because they do not show well to the public.

A search of the scientific literature found no studies that provided a systematic procedure for training fearful or feral cats or kittens to behave friendly toward people. In an effort to locate research of a similar nature to fearful to friendly (F2F), I conducted a literature review. The literature search used three major search engines (JSTOR®, PubMed®, and ScienceDirect®) and used the key terms: cat socialization, kitten socialization, socializing cats, socializing kittens, cat taming, kitten taming, taming cats, taming kittens, and shaping with negative reinforcement. Due to the lack of scholarly articles available on this subject, I investigated the Internet and located a few of the well-known, reputable animal welfare organizations’ advice on taming or socializing
domestic cats or kittens for the purpose of creating companion animals. Also, I relied on my experiences as a volunteer pet foster parent and feral cat trap-neuter-return volunteer to create a list of the most commonly used practices for training adoptable behaviors in felines.

There is a wealth of advice available on the Internet with suggestions for socializing feral kittens. For example, “Alley Cat Allies does not recommend attempting to socialize adult feral cats or kittens older than four months of age” (2011b). In my experience, most animal rescue groups I worked with deemed 13 weeks and older as the cut off age for taming feral kittens because there were limited volunteers available to foster kittens and even fewer that would assume responsibility for taming feral kittens. For this reason, the animal welfare organizations I volunteered with had the goal of helping a larger quantity of kittens meet adoptability criteria by focusing on fostering younger feral kittens that were likely to be tamed faster than older feral kittens. Alley Cat Allies further details the problems people encounter when attempting to socialize older feral cats. For example, Alley Cat Allies says that socializing feral cats is “a time-consuming project with a very low rate of success. And even if a feral cat does ‘tame up’, he bonds only to the caregiver who brought him in—almost never to other humans or homes” (2011c). These are all valid concerns that need to be addressed. First, there needs to be a systematic procedure that its effects can be measured. Current socializing tips suggest walking slowly, talking in a low voice, and turning on the television (Alley Cat Allies, 2011b). However, these tips lack experimental data to validate their effectiveness. In particular the systematic socializing procedure needs to provide more specific behavioral criteria of what is expected from feral and fearful
felines in order to meet adoptability criteria, so that no matter who is using the procedure, everybody is working toward the same achievable goal. Being able to pet a feral kitten does not make it adoptable. Second, since feral and fearful cats/kittens need to be confined in the beginning of the socialization process, the socialization procedure needs to change behavior to meet friendly criteria in a timely manner, so that cats and kittens do not have to be confined for extended periods of time. Third, the procedure needs to be safe for the frightened animal and for the person who is conducting it while minimizing stress on the animal. Fourth, the behavior change procedure should not be age dependent. Addressing the need for a consistent procedure that can be used on fearful or feral cats of any age is of utmost importance. Finally, the procedure needs to address generalization of friendly behaviors from the trainer/caretaker to potential adopters and to new environments, such as a new home.

What are the current solutions to manage feral cats? One solution is prevention. Unaltered cats reproduce at an exponential rate, thus adding to the cat overpopulation problem. There is a movement known as trap-neuter-return that seeks to reduce the cat overpopulation problem through the following methods. In this process, a feral cat is humanely trapped and taken to a veterinarian where it is spayed or neutered. Often times, the cat will receive vaccinations to prevent diseases such as rabies. Upon request, the cat’s ear may be surgically tipped (universal sign of an altered feral cat). Following a recovery period, the cat is returned to the original location where it was trapped. Ideally, caretakers will feed and provide water for the colony of cats and provide shelter and medical care. In some cases, the original location is no longer a safe habitat for the feral cat and he/she must be relocated to a new environment.
There are five common techniques used for socializing feral kittens under 13 weeks old. Preventative strategies advise to take a feral kitten away from its mother cat at a young age or before the kitten is weaned, before it learns to be feral. Another strategy is to put feral kittens in a cage in a room with much human activity in an effort to get kittens to adapt to the new indoor environment. A third strategy is to sit in the room with the kitten for extended periods of time, desensitization. A fourth technique is offering feral kittens food products with a strong odor, such as salmon, either as a lure or as a reinforcer for friendly behavior. A fifth strategy is the use of escape extinction, that is, the restraining of a feral kitten in a towel until it stops struggling to escape.

The benefit to taking a feral kitten away from its mother cat at a young age or before the kitten is weaned is that a young kitten is easy to restrain and socialize since it has a minimal history of fear toward humans. However, deliberately orphaning young kittens may disadvantage kittens by depriving them of essential nutrients acquired from nursing and valuable life skills gained from interactions with their mother and siblings. Kittens that are captured and brought into captivity prior to being weaned by their mother will require bottle feeding, which is time consuming and expensive. These kittens may grow up to be friendly, but other behavioral issues may emerge as a result of being orphaned (e.g., inappropriate suckling, biting, rough play).

Putting a feral kitten in a cage in a room with the most human activity is another common suggestion for socialization. In this scenario, kittens are exposed to lots of new sights, sounds, smells, textures, and tastes. The cage and room conditions can make a big difference in the animal’s behavior. These conditions can be very stressful to a frightened confined animal that has no means of escape. This arrangement sets
the animal up for failure. Stressing an animal does not teach it to be friendly. Animals, like people, learn best when they are not stressed.

Also, some advice suggests desensitization techniques as a means for a person to be able to approach a kitten, such as sitting on the floor or in a chair in the room the kitten is confined in while waiting for the kitten to calm down and then scooting closer to the kitten. This can be a very time consuming process, and since the person is usually in a sitting position it does not provide the appropriate stimulus of a person in a standing position walking toward the kitten. Also, the term “calm down” is not specific, so it does not provide the person with much information about what behaviors they are looking for. In my experience, most frightened kittens will seek a hiding spot and may not come out until the person leaves the room.

Offering a feral kitten smelly foods or attempting to get the kitten to interact with toys is another mainstream idea for turning feral kittens. This involves using respondent or classical conditioning by pairing people with good things that the animal likes. Positive reinforcement is also used in the form of delivering a piece of food, a play toy, or something the animal likes contingent on friendly behavior. Unfortunately, feral or fearful felines do not typically eat in the presence of humans or engage in play behaviors with people, which make using respondent conditioning or positive reinforcement difficult. If a person walks in close proximity to a feral kitten this can put additional stress on the kitten. Under stressful conditions the animal is not likely to eat. Even if the kitten will consume the edible in a timely manner then there is still the drawback that both desirable and undesirable behaviors are being selected when positive reinforcement is used with a frightened animal. All the behaviors the kitten is
emitting (both desirable and undesirable) are followed with consequences the kitten likes, such as food or play, thus increasing the likelihood of maintaining the undesirable behaviors.

Restraining a feral kitten in a towel until it stops struggling to escape is a common suggestion to get a feral kitten accustomed to being held. This advice can result in an increase in undesirable responding because the kitten’s behavior intensifies with the increased stress of being captured and restrained in a towel. The frightened animal may bite, scratch, thrash about, and try any means possible to escape from the person that is holding it. People use a towel so that they are less likely to be injured in this process. In some situations the kitten escapes and then the person is faced with the dilemma of how to recapture the frightened animal. A loose feral kitten is likely to climb walls and accidentally cause damage to the contents of the house and/or injure itself or anyone that gets in its way. Another problem is that escape extinction essentially punishes all escape responses the kitten may emit. This process does not teach the kitten the friendly behaviors that it needs to learn to be adoptable. The kitten may eventually stop struggling to escape, but that does not mean that it is friendly. Most people do not enjoy the process since it can be dangerous and they observe how terrified it makes the animal.

In 2007, Snider published her research with aggressive dogs, constructional aggression treatment (CAT), which sought to answer the question, “given that the outcome of aggressive responses is to create distance between a dog and aversive stimuli, can we use distance as a reinforcer to shape desirable alternative behaviors?” (p. 7). This research described numerous examples of successfully training friendly
behaviors in aggressive canines using shaping with negative reinforcement. “The results demonstrated that even when the aggression was in evidence throughout most of the dog’s lifetime, it responded quickly to changes in reinforcement contingencies” (Snider, 2007). The present research is an extension of the CAT research. I used distance as the reinforcer to shape desirable responding in feral and fearful cats and kittens. Snider’s research made the valuable point that most aggression treatments view this behavior as a respondent behavior, which is true for fear treatments as well. Similar to the CAT research, F2F takes a different approach to treating fear by viewing it as an operant behavior maintained by negative reinforcement (escape or avoid an aversive stimulus).

The purpose of the fearful to friendly research was to develop a safe, fast, systematic procedure to increase desired behaviors that meet animal welfare organizations’ adoptability criteria in feral and fearful domestic cats and kittens while in the presence of humans. This research sought to answer the question, what effect will a treatment package including an errorless shaping with negative and positive reinforcement procedure have on desirable and undesirable responding in feral and fearful domestic cats and kittens?
METHODS

Subjects

The subjects that participated in the fearfully to friendly (F2F) research included three neutered male kittens that were 5 to 6 months of age named Marvin (gray tabby domestic short hair), Wallis (black domestic short hair with a white spot on his chest), and Gromit (black domestic short hair) as well as a spayed 10-week-old female kitten named Alice (pastel calico domestic short hair). All four kittens were feral kittens that were deemed unadoptable.

Marvin, Wallis, and Gromit were all brothers. They were born to a feral mother cat by a pile of logs. A rescue group took these seven kittens from their mother at a young age (approximately 5 weeks old) with the intentions of taming and adopting the kittens. Marvin, Wallis, and Gromit never became tame, so they were deemed unadoptable and lived in a dog crate and watched their tame siblings play in the rest of the house. An animal rescue group volunteer contacted me and requested that Marvin (5 months old) participate in the F2F research in an effort to increase his likelihood of adoption. One month later, the rescue group transferred Wallis and Gromit (6 months old) to me to socialize and adopt out. All three male kittens were neutered and vaccinated before I acquired them.

Alice was found in a drain hole at a local university. An animal control officer rescued her with a catchpole while the kitten and feral mother frantically called to each other. The animal control officer contacted me and requested that Alice be considered as a candidate for the F2F procedure. At animal control, Alice hid in the back of her cage and was not available for adoption to the public since she was feral. She was
scheduled for euthanasia 96 hours following her admittance into the shelter. I took Alice from the animal shelter to a veterinarian to be vaccinated for rabies and spayed per animal shelter requirements. She was too young for a rabies vaccine, so it was administered after the F2F procedure was completed. After her spay surgery, Alice hid in her cat condo at my house.

Setting

The subjects were housed separately in a two-story cat condo in the training room at my house. The cat condo was situated in the corner of the room, so there were two sides of the cage that no one could approach the kitten. This design was intended to reduce the stress on the kitten. The F2F research took place in two different houses. I conducted the F2F treatment with Marvin in Houston, Texas and the other three kittens in Denton, Texas. The training rooms used were quiet locations with minimal human traffic, and the door remained closed. The rest of the house was not altered to accommodate the kittens, but was already animal friendly because I had dogs and cats that lived in the rest of the house. For Wallis, Gromit, and Alice’s generalization training, F2F was repeated as needed in all rooms in my house and my back yard that was equipped with cat safety fencing to prevent elopement. Marvin’s generalization training was limited to the training room and hallway attached to the training room.

Cat condo. The two-story cat condo contained six or seven plastic shelves specifically designed to fit the cage. Two shelves with padded covers were used as perches on the top of the left and right side of the upper level of the cat condo. The other four shelves were used to divide the upper and lower level of the cat condo. When the kittens were allowed access to the bottom level of the cat condo one shelf on
the far left side was removed and positioned lower, so the kitten could use the shelf as a step to access the bottom level of the cat condo. In some cases, there was an additional shelf that acted as a perch located on the right side on the lower level of the cat condo. There was a carpet scratching post that was connected upside down with its base attached to the top of the cat condo and the pole positioned against the back of the cage. This design was intended to prevent the kittens from knocking the scratcher over or from hiding behind the scratcher. A small clear plastic litter box was used so that the kitten was still visible even when he/she was lying down in the litter box. Non-scoopable litter was used initially until I determined if the kitten was going to knock over the litter box. When scoopable littler comes in contact with water it creates a sticky paste that will adhere to a kitten’s fur and create a difficult to clean mess in the cage. Four plastic green welcome mats were located on the bottom of the upper and lower level of the cat condo. The welcome mats were used to collect any litter the kitten may track from the litter box. The food and water bowls were attached to the cage and two to four clamps were used to secure the food and water bowl to the metal bowl holder that was bolted to the cage. This design was intended to prevent the kitten from knocking over its food and water dish. I placed a heavy removable snack dish that was difficult for the kitten to knock over by the cage door entrance, thus creating easy access to deliver treats during pretreatment. Several feline safe toys were in the cage, such as a ball and squeaking mouse or chirping bird. A large flat cardboard cat scratcher with catnip was located on the right side of the cat condo. The large cat scratcher was used to make it less likely to flip over. There were one or two florescent cabinet lights on top of the cat condo. For Wallis, Gromit, and Alice large mirrors were
located behind the cat condo and on the right side of cage against the wall. Sheets were used to cover the top, sides, and back of the cage during pretreatment (see Appendix A for a photo of the cat condo during pretreatment).

I invented an easily removable hiding spot for the F2F research, so the kitten could have a place to hide during pretreatment, but still allowing me to remove the hiding spot from the outside of the cage with minimal disruption for the kitten. The removable hiding spot was located on the right side of the upper level of the cat condo and consisted of two pillow cases attached to the top of the cat condo using binder rings. The pillowcases were hung perpendicular to each other to create a ‘L’ shape design that resulted in a square formation due to the back and side of the cat condo being pushed against the wall. The sheet on the top of the cat condo created a roof for the hiding spot. The hiding spot enclosed the shelf on the top right side of the cage and the cardboard cat scratcher located underneath the top right shelf. The kitten could easily push through the pillowcases to exit or use the doors that were cut in the bottom of both pillowcases.

One kitten per cage. I housed kittens separately in the cat condo during treatment because an extra kitten in the cage or in the training room would have added an extra variable in the environment that was not necessary and may have complicated the situation. If one kitten was hissing while the other kitten was purring then both behaviors would be reinforced with this procedure.

Kitten safety. I did not use kitten toys with strings or elastic in an effort to prevent the kitten from possibly becoming entangled or strangled. Since the kittens were
confined to a cat condo, it was important for me to monitor the room temperature to keep the kittens comfortable.

Prior to bringing the subjects to my house, I made the training room cat friendly with kitten safe toys and scratchers. Each room in my house was assessed for safety before I allowed the kitten access to the new environment. For example, all windows were closed since cats can push through the screens and end up lost or injured.

Materials

In the approaching condition, I used sheets of paper with numbers placed in sheet protectors on the floor from the training room door to the cat condo. For the brushing condition, I used a boar’s bristle brush connected to a wooden dowel and a boar’s bristle brush without a stick. I used new brushes for each kitten so there was no other kitten’s scent on the brush. I used a baby food spoon alone or a baby food spoon connected to a wooden dowel with meat baby food at the end of the brushing condition. I wore a nail belt full of cat toys while training the kittens to approach me outside of the cat condo.

Video lighting. I used florescent lighting above the cat condo for video purposes because this type of bulb did not create as much heat as other light bulbs. The florescent light bulb also was not as bright as other bulbs, so it did not appear to cause the confined kitten discomfort. I assessed the kitten’s comfort with the light on the observation that none of the kittens squinted their eyes when the video lighting on top of the cage was turned on. The video lights were used during pretreatment for brief periods of time and throughout the training.
Measurement

This experiment measured the desirable (friendly) and undesirable (unfriendly) behaviors in four feral kittens while each was housed in a cat condo and when they were outside of the cage in my home. Each kitten’s location in the condo was also measured. My behavior was measured according to the training step achieved at each trial.

*Desirable and undesirable behaviors.* The desirable and undesirable behaviors were categorized according to what region of the body they occurred in. The body locations included both desirable and undesirable head, body, legs, and tail behaviors. The desirable head category contained the greatest number of behaviors with a total of 15 behaviors, which included biting training objects, blinking, drinking, ear turning, eating, eyes closed, grooming, head down, head shaking, head turning, meowing, pushing against, rubbing, tongue flicking, and yawning. Pushing against and rubbing could potentially be emitted from the head and/or the body, but were recorded under the head category. There were six possible undesirable head behaviors that could be emitted, which included distancing movement, ears down, eyes wide, hissing, meowing repetitively, and whiskers flared. Distancing movement could potentially be emitted from several body locations including head, body, and/or legs, but was recorded under the head category. The body category contained five desirable behaviors: body stretching, deep breath, hip lifting, hip/shoulder shifting, and skin rippling. Piloerection was the only undesirable body behavior. There were 10 desirable behaviors in the legs category, which included back paws away from body, front paws away from body, jumping, leg stretching, marching, paw stretching, pawing, playing, scratching objects,
scratching self. No undesirable leg behaviors were observed other than distancing movements. There were three desirable tail behaviors: tail away from body, tail high, and tail wagging. Tail thumping was the only undesirable tail behavior. There were five lying down behaviors (lying down belly down, lying down belly up, lying down ‘L’ position, lying down on side, and rolling over), three sitting behaviors (sitting high, sitting low, and sitting on back legs), four standing behaviors (crouching, standing high, standing low, and standing on back legs), and three walking behaviors (approaching, walking high, and walking low). Other desirable behaviors that did not occur during the trials were: climbing cage, drooling, licking person, purring, running, and toileting. None of the four kittens emitted the following undesirable behaviors: arching back, biting person, freezing, growling, pupils dilated, scratching person, and spraying. Seven additional desirable behaviors were recorded when the kittens were free roaming in my house. These desirable behaviors included accepting petting, close proximity to other cats, on trainer’s lap, purring, running, trainer approaching kitten, and trainer holding kitten. The kitten’s desirable and undesirable behaviors were graphed cumulatively according to the occurrence of behaviors per trial (see Appendix B for behavioral definitions).

_Kitten’s location in the cat condo._ The kitten’s location in the cat condo was defined as the kitten’s placement of the front and back paws in the cat condo. There were eight possible locations the kitten could be in, which included the left or right upper shelves or lower shelves or left or right on the top or bottom level of the cat condo. The kitten did not have access to the bottom level of the cat condo until it met the brushing condition criterion. If the kitten was located in more than one quadrant on the grid due
to moving around or lying down in the middle of two locations then it was scored as both locations. The kitten’s location in the cage was graphed cumulatively.

*Training steps.* A training step was defined as a change in criteria for reinforcement in the shaping program. In the approaching condition there were 13 steps that covered the distance between the entrance of the training room door and the entrance of the cat condo door. Each step corresponded to a numbered (1-13) sheet of 8.5 X 11 inch paper, in the portrait orientation. In the cage door condition there were five training steps (14-18), which consisted of me reaching toward the cage door until I was able to touch the top of the cage door with both hands then I slid the latch over the cage door, and finally opened the cage door so that it rested on my stomach, thus freeing my hands. All of the approximations within each training step occurred in small increments, such as one-inch at minimum. In the brushing condition there were five training steps (19-23), which began with me holding a brush connected to a wooden dowel outside of the cat condo and moving it toward the inside of the cat condo at the cage door entrance. From there I moved the brush toward the kitten, followed by brushing the sides of the kitten’s mouth, sides of body, back, and finally the top of its head. All of the approximations within each training step occurred in small increments, such as one-inch at minimum. In the training steps, the kitten approaching the trainer and petting condition (KATP) was broken down into two sections (kitten approaching trainer followed by petting). There were five training steps (24-28) to teach the kitten to approach me. I used objects in the cage as landmarks to assess the kitten’s movement while approaching the brush or me. If I needed to teach the kitten to approach me then I used the brush as a target for the kitten to approach. I held the brush approximately
one-inch from the kitten’s nose initially and then gradually increased the distance so that
the kitten would approach the brush on either the left or right side of the cage followed
by approaching the brush at the cage door entrance. There were four training steps
(29-32) to teach the kitten to accept petting. I moved my hand from the bottom of the
wooden dowel to the other side of the wooden dowel that was connected to the boar’s
bristle brush. My objective was to fade out the brush with the wooden dowel and use
the brush by itself. I faded my hand passed the brush to touch the kitten’s fur with my
fingertips. I increased the distance my fingers traveled with each petting stroke. I
began with petting the kitten’s back with my fingertips followed by petting with my entire
hand. Next, I pet the top of the kitten’s head with my fingertips followed by my entire
hand. The final petting stroke was from the top of the kitten’s head along its backbone
to the tip of its tail. All of the approximations within each training step during KATP
occurred in small increments, such as one-inch at minimum. The training steps were
graphed according to the training step number (1-32) recorded per trial. When more
than one training step occurred per trial in the KATP condition, I graphed the highest
step reached per trial (see Appendix C for training steps).

Recording procedures. I collected data during treatment and following treatment
by reviewing videos of the F2F research (see Appendices D, E, and F for data sheets).
A DVD video camera was used to record each trial. The video camera was located on
a tripod at the door entrance to the training room. It was placed in the middle of the
numbered sheets on the floor, which led from the door entrance to the cat condo. The
video camera faced the cat condo. The cat condo was located in the corner of the
training room against the wall furthest from the door. My behavior was not recorded by
the video camera since it was zoomed in on the subject. For Wallis, Gromit, and Alice there were mirrors located behind the cat condo and on the side of the cat condo that was against the wall. The mirrors started at the floor level and exceeded the height of the cat condo. The mirrors were used to view the kitten’s head when he/she was not facing me and they were intended to allow the video camera to record both the kitten’s behavior and my behavior, but that was not possible with only one video camera.

**Reliability observer training.** First, I provided the reliability observer with a packet of written behavioral definitions that included one color photo example of each behavior (see Appendix B for definitions). The reliability observer and I read over the definitions together and discussed examples of the behaviors, and I answered the reliability observer’s questions. I further trained the reliability observer to identify desirable and undesirable behaviors in domestic cats using the behavior identification game (BIG) for cats. I created an approximately 60-minute instructional DVD that included behavioral definitions of each desirable and undesirable behavior in the F2F research. Also, it included videos of multiple exemplars of almost all desirable and undesirable behaviors, data sheets with an answer key, and instructions how to cumulatively graph the data collected. The reliability observer had a practice data sheet that had clusters of approximately five behaviors per section that were divided by desirable and undesirable behaviors and then arranged according to head, body, legs, tail, lying down, sitting, standing, and walking (see Appendix G for BIG data sheets). The reliability observer would watch the videos with multiple examples of the cat emitting one of the five behaviors. Each video was labeled with a trial number. The reliability observer was instructed to put a ‘X’ under the appropriate trial number next to the behavior on the
data sheet that he observed in the video. After each section was complete, the
reliability observer and I referred to the answer key to verify accuracy. This was
repeated multiple times until all the behaviors on the data sheet were completed. If the
reliability observer had any problems identifying the behaviors correctly then the
definitions were discussed and clarified. In the final video (approximately 30 seconds),
the BIG DVD instructed the viewer to say out loud all the behaviors he observed the
F2F kittens emitting when they first were allowed outside in my back yard. The
individual behavior videos were intended to prepare the reliability observer for being
able to identify behaviors that were occurring in all body locations on the kittens.

Then the reliability observer and I looked at multiple examples of difficult to
identify trials or unusual topographies of behaviors. When the reliability observer told
me that he was comfortable with identifying desirable and undesirable behaviors, he
was allowed to begin data collection. His data collection instructions consisted of put a
‘X’ under the appropriate trial number next to all the behaviors that occurred on that trial.
Approximations to behaviors were recorded as well. I showed the reliability observer
how to scroll over each video clip in slow motion to be able to identify even the smallest
of behaviors. The reliability observer and I each had access to the F2F behavioral
definitions for reference throughout data collection.

Cage location data collection training consisted of reading the definitions and
showing the reliability observer video clips of the cat condo that identified each of the
cage locations. After a few practice data collection trials the reliability observer was
ready to begin data collection.
Inter-Observer Agreement (IOA)

IOA was calculated for 30% of the total trials using the formula $A/(A+D)*100$. IOA for the kitten’s location in the cat condo was 100% for Marvin, Wallis, and Alice and 97.14% for Gromit. IOA for the occurrence of behaviors inside the cat condo was 95.93% for Marvin, 90.71% for Wallis, 91.12% for Gromit, and 91.61% for Alice. IOA for the occurrence of behaviors outside of the cage in my home was 92.59% for Marvin, Wallis, Gromit, and Alice.

IOA was not collected for my behavior because there was only one video camera, which recorded the subjects’ behaviors. However, I recorded my training step location throughout the F2F procedure for each subject while in the cat condo.
PROCEDURES

The experiment consisted of eight conditions: pretreatment, baseline, approaching (trainer approaching cat condo), cage door (opening cage door), brushing (brushing kitten), brushing follow-up, kitten approaching trainer and petting (KATP), and generalization training in my house. The fearful to friendly (F2F) procedure was guided by the constructional approach (see Goldiamond, 1974), that is, it focused on increasing the desirable behaviors that would allow friendly interactions between the cat and a person. F2F aimed at being an errorless learning procedure by arranging the environment so the subjects and I would be successful. Throughout treatment, I attempted to stay below the threshold (fear threshold) that evoked undesirable responding. Fading procedures were used to introduce the training room environment during pretreatment and to fade out the stick connected to the brush, and to fade in my hand during the petting condition. Shaping procedures were used by reinforcing approximations to behaving friendly. For example, when working with a “statue” cat that offered minimal movement, I would reinforce for any leg movements (leg stretching) followed by crouching to get the component behaviors of the kitten moving its legs and then putting weight on its legs (crouching), so that I could eventually shape the behavior to the point that the kitten was standing up and finally walking.

Pretreatment. The objective of pretreatment was to get the kitten acclimated to the new environment, which was achieved when the kitten was eating and moving around the cat condo when people were not present. This was accomplished in three steps: setting up the cage for the subjects, fading in the environment, and kitten maintenance.
**Setting up the cat condo.** I collected all necessary training supplies and had the cat condo and training room completely arranged prior to bringing home the subjects. Also, I never housed more than two feral kittens at one time due to limited resources available to provide separate cat condos for multiple feral kittens. I allowed each kitten two to four days to adjust to the new environment (training room). This also served as a recovery period for Alice following her spay surgery.

I attempted to create a quiet, low stress environment that was very enriching for the kitten. The pretreatment cage set up was designed to create a dark environment where the kitten could hide and may be more likely to move around the cage, interact with its environment (toys or scratchers), and eat. The more behaviors the kitten offered the less shaping I had to do. Also, by allowing the kitten a place to hide it created a visual barrier between the kitten and me, which served as a safety precaution when it came time for me to clean the cage or feed the kitten. My close proximity to the cage was aversive for the cornered kitten, so it was likely to have a fight or flight response. The hiding spot provided the kitten with the opportunity to hide, so it was less likely to try to escape through the cage door opening or respond aggressively toward me during the feeding and cleaning process.

**Fading in the environment.** While the kitten was in the cat condo, the training room was slowly introduced to the kitten using a fading procedure. Before treatment began, the sheets located on the top, back, left and right sides of the cat condo and the removable hiding spot were faded out completely. The sheets were faded out by clamping the sheets higher and higher on the cat condo until they were only on top of the cat condo, and then removed all together. When fading out the hiding spot, I
unlatched the binder rings and pulled each side of the hiding spot up from the top of the cage and clamped the second or third row of binder rings to the bars on the ceiling of the cat condo then it was removed completely. With Marvin, the removable hiding spot was removed all at once since at that point I had not devised a good system to slowly remove the hiding spot.

*Kitten maintenance.* I attempted to minimize time spent in the presence of the subjects during the pretreatment condition. I cleaned the kitten’s litter box at a minimum once a day, and made sure the kitten always had access to fresh dry kitten food and water. I offered each kitten lots of high value foods in the snack dish to encourage eating, such as meat baby food, tuna fish, salmon, and dry cat treats. I removed the kitten’s snack dish before starting F2F. During pretreatment and following the completion of the F2F procedure, my cats were allowed to enter the training room via a cat door installed in the training room door. I observed the subject’s behavior through a round hole about the size of a tennis ball that was cut in the training room door, peephole. The peephole was covered when not in use. If the subject emitted friendly behaviors in the presence of my cats or dogs then my animals were permitted to come and go in the training room as they pleased throughout the pretreatment condition. In this condition, the cats had free access to the training room via their cat door, but I stood behind the door out of the kitten’s view when letting the dogs in and out of the room. Following the initial assessment, I continued to make random observations of the subject’s behavior while my resident cats were in the training room to determine if the subject continued to emit friendly behaviors in the presence of novel pets. My dogs and cats were accustomed to fostering kittens, so they only emitted desirable behaviors in
the presence of the subjects. If the subject emitted any undesirable behaviors, such as hissing then I, while standing out of view of the subject, called my pet(s) out of the room with a verbal recall, closed the training room door, inserted the cat door cover, and then delivered an edible or attention for my cats and dogs approaching me while I was located outside of the training room.

I used the peephole as a tool to observe the kitten’s movement in the cage while the kitten was alone in the training room, and to observe the kitten’s eating behavior after I put food in the snack dish. The shorter the duration between eating following the presentation of the food, served as an indicator that the kitten was becoming more relaxed in the pretreatment environment.

**Baseline.** The purpose of baseline was to determine how close I could approach the kitten to the point that the kitten emitted undesirable responding. Baseline provided me with the information needed to determine what training step number would be the goal for the first treatment trial. I broke down longer baselines into two days (e.g., Alice’s baseline).

During baseline, I entered the training room and pushed the record button on the video camera. The trial started when I began walking toward the cat condo. While I walked to the training step, I positioned myself on either side of the numbers on the floor so as to not block the video camera’s view of the kitten. I approached the cage door until the kitten emitted an undesirable behavior. If the undesirable behavior was minor (e.g., small distancing movement) then I kept moving forward to assess if the kitten’s undesirable responding would escalate. When a more intense undesirable behavior (e.g., hissing) occurred then I stopped approaching, turned around and walked toward
the training room door entrance. When I reached the training room door entrance the trial was deemed complete and I pushed the record button again to cease recording. Then I opened the training room door, exited the room, and closed the training room door behind me. I waited for approximately 15-30 seconds before beginning the next trial. I used this time to record data.

I walked at a typical pace during this procedure. I did not talk during the shaping with negative reinforcement conditions for three reasons. One reason, I was concentrating on the slightest changes in behavior so as to keep the trials brief. Secondly, I did not want to introduce another variable into the procedure. Finally, I was already an aversive stimulus, so I waited to use my voice until I became a positive stimulus that way my voice was only paired with positive experiences for the kitten.

If the kitten was eating, drinking, or toileting at the time I opened the door to begin the trial then I closed the door without conducting the trial until the kitten completed the behavior. In this situation, I used the peephole in the door to determine when to begin the next trial. I recorded the occurrence of these behaviors on the trial that followed the behavior. The purpose was not to cause undue stress on the kitten that may interfere with its consumption or elimination needs. However, during the shaping with positive reinforcement condition, I was no longer an aversive stimulus, so this rule did not apply to eating or drinking in the KATP condition, but remained in effect for toileting. Following baseline, I offered the kitten a longer break of approximately 15 minutes before treatment began with the exception of Alice’s first baseline condition because it occurred the day prior to treatment. This break allowed the kitten time to calm down before starting the procedure.
SHAPING WITH NEGATIVE REINFORCEMENT PROCEDURE

During the approaching, cage door, brushing, brushing follow-up, kitten approaching trainer and petting (KATP), and generalization conditions, negative reinforcement was used to shape friendly behaviors. The negative reinforcer was the removal of low levels of threat (e.g., my proximity to the cage, opening the door cage, etc.). Fearful to friendly (F2F) included two types of shaping: response shaping involved reinforcing friendly behavior and smaller components of friendly behavior. Stimulus shaping involved changing the kitten’s behavior by changing how the stimulus (a person) was introduced.

During response shaping the target behavior (petting kitten) was divided into smaller component behaviors or steps. I progressed forward or regressed backward along the training steps that led to petting the kitten based on how the kitten responded to my presence at each training step (see Appendix C for list of training steps). I focused on increasing the shaping criterion on successful trials where the kitten emitted only desirable behaviors with the understanding that more learning occurs when animals are relaxed. In order to increase the criterion for friendly behaviors, I waited for improvements in behavior or for a new behavior to be emitted. I accepted tiny improvements to keep trials brief. I slowly increased this criterion so that by the end of the F2F procedure the kitten behaved like other friendly kittens. On unsuccessful trials where the kitten emitted an undesirable behavior, I relaxed the shaping criterion for desirable behaviors (did not attempt to train a new behavior or improve upon a behavior) by accepting any desirable behavior the kitten emitted after the undesirable behavior ceased. This was an effort to take the pressure off of the frightened animal by
keeping the trial brief. However, as new behaviors were taught on the successful trials there was an increased likelihood that the subject would emit the newly trained responses on unsuccessful trials in which case the newly trained behaviors were reinforced on unsuccessful trials as well.

To help identify the friendly and unfriendly behaviors, the kitten’s behavior was conceptualized as a behavioral continuum of connected behavior. When one behavior ends another one begins. Since behavior is connected it can be shaped in different directions along the behavioral continuum. For example, if the kitten’s head was low it could be shaped in one direction to hold its head high or shaped in the other direction to put its head down. In my experience, a caged fearful or feral cat or kitten will typically start out in a lying down or crouching position with its head low and its legs and tail close to its body. I worked on shaping the kitten’s behavior to a more relaxed body posture with its head, legs, and tail up or away from its body. I shaped the kitten’s behavior along the behavioral continuum from lying down to crouching to sitting or standing and finally to walking. Paying attention to what direction along the behavioral continuum the kitten’s behavior was traveling helped me determine the progress I was making with each kitten. Even though crouching in itself was not the most desirable body position, if the kitten moved from a lying down position to a crouching position that was considered progress toward the target behavior, sitting or standing. If the kitten moved from a standing high position to a crouching position then that was a regression along the behavioral continuum (see Appendix H for behavioral continuum details).

On each trial, I aimed at stopping at a preplanned destination (training step). When I arrived at the preplanned destination, I observed the kitten for approximately
three seconds. If the kitten met friendly criteria I left the room for 15-30 seconds. The shorter the trial duration the better (3 – 60 seconds) when using negative reinforcement. If the kitten emitted a desirable behavior prior to me reaching the desired training step, I reinforced that behavior by walking out of the room immediately instead of progressing to the training step originally intended. If the kitten emitted an undesirable behavior(s) at or before the target destination I stopped approaching and waited for the undesired behavior to lessen or stop and left the room contingent on the emission of a more desirable behavior.

After a successful trial, I had three options. First, I could return to the last successful training step to work on shaping the kitten’s behavioral approximations into a more desirable target behavior. For example, an eye flutter made me leave last time, but this time the eye needs to close half way, next time the eye needs to close all the way. The second option was to return to the last successful training step to work on expanding the kitten’s desirable behavior repertoire. For example, I already observed the kitten’s blinking behavior now I waited for the kitten to emit novel behaviors, such as head turning. The third option was for me to go to the next training step following a successful trial. I assessed the kitten’s behavior to decide, which option was most appropriate per trial. If the kitten offered minimal movement then I started with option one to shape any approximations to get the kitten moving. If the kitten emitted target behaviors (e.g., leg stretching with a fully extended leg), but I did not observe the kitten emitting very many desirable target behaviors then I would work on expanding the behavioral repertoire (option two) before moving to another training step. After I increased the quantity of desirable behaviors in the kitten’s repertoire then I progressed
to a new training step (option three) whenever the kitten emitted one of the newly trained behaviors or when the kitten emitted a novel behavior.

After an unsuccessful trial, I reduced the training step criterion on the next trial. The training step destination was also adjusted due to changes in the environment when the kitten changed locations in the cat condo. I had two options on an unsuccessful trial. First, I could adjust my behavior and proceed to a lesser training step than was achieved in the kitten’s previous location so as to stay below the fear threshold. My other option was to proceed along the training steps and determine along the way the location of the new fear threshold (the point at which the kitten emitted an undesirable behavior). If the kitten emitted an undesired behavior prior to me reaching the intended training step then I would stop proceeding immediately and proceed to a lesser training step on the following trial. For example, my goal was to walk to training step 10, but the kitten hissed at me on training step eight, so on the next trial I approached to training step seven.

If the kitten hissed or growled after I turned to walk away then I would stop at whatever location I was at when the undesirable behavior was emitted and turn around to face the kitten and wait for the kitten to emit a desirable behavior and then walk away. I did not encounter this problem with any of the subjects.

The shaping program was carried out in six phases: approaching the cat condo, opening cage door, brushing the kitten, brushing follow-up, kitten approaching trainer and trainer petting kitten, and generalization.

Approaching cat condo. This training phase consisted of 13 training steps, which were depicted by 14 sheets of paper in plastic protective sleeves with one number per
the training room door entrance to the cage. The sheet of paper labeled number one was placed by the door entrance and number 14 was placed against the cat condo. Square 14 was not part of the training steps since I needed to stand far enough away from the cage entrance to be able to open the cage door completely in the cage door condition. Criterion was met when I completed three consecutive successful trials on square 13.

*Opening cage door.* This training phase included five training steps. First, I reached toward the cage door followed by touching the cage door (second step). The third step was to slide the latch over the cage door thus freeing the door to be able to open it. The fourth step was to open the cage door in small increments. The criterion was met when the cage door was open completely for three consecutive successful trials.

*Brushing the kitten.* There were five training steps in this condition, which included holding the brush outside of the cage door, holding the brush inside at the cage door entrance, reaching toward the kitten with the brush, touching the kitten with the brush, brushing the kitten (side of mouth, both sides of body, back, and top of head). The criterion was met when I completed 10 consecutive successful trials of brushing the kitten from its head to the base of its tail. I offered each subject meat baby food on a baby spoon at the end of the brushing condition to assess if the subject would eat in my presence before progressing to KATP. Before switching to positive reinforcement, I needed to be confident that the kitten was not likely to emit undesirable behaviors. For this reason, I had a higher successful trial criterion for this condition than previous
conditions and did follow-up brushing sessions to make sure that the kitten was behaving friendly consistently.

*Follow-up brushing condition.* Data was not collected for this condition.

Following treatment, I repeated the F2F procedure as needed to brush the kitten. I observed for several brushing sessions to see if the kitten would offer approaching and allow petting without training for it. If the kitten approached me during the brushing follow-up session then I resumed video recording and labeled the video as KATP.
SHAPING WITH POSITIVE REINFORCEMENT PROCEDURE

If I could reliably complete all of the conditions and the kitten was only emitting desirable behaviors, but was not reliably approaching the front of the cage then I used shaping with positive reinforcement to train the kitten to approach and allow petting. The brush was used as a target for the kitten to approach and brushing was the consequence for approaching. Shaping was used to train the kitten to approach the brush all over the cage. There was not a limit on trial duration when using positive reinforcement. Kitten approaching trainer and petting (KATP) either occurred without training following shaping with negative reinforcement or if needed additional training with positive reinforcement was implemented, but both scenarios were labeled as KATP.

Kitten approaching trainer. The five training steps for this condition began with the kitten looking at the brush, followed by the kitten approaching the brush. In the third and fourth steps, the kitten approached the brush on the left and right side of the cage. Criterion was met when the kitten approached the front of the cage for three consecutive successful trials. When the kitten was emitting only desirable behaviors and approaching the front of the cage, I began slowly fading my hand up the stick to the brush. When I could hold the brush with the stick attached, I faded out the stick altogether. At that point, I used a boar’s bristle brush that was not connected to the wooden dowel to brush the kitten. In the final step, I used my index finger for the kitten to approach instead of the brush.

Petting. There were four training steps for petting the kitten. Petting began with me petting the kitten with my fingers on its back followed by petting the kitten with a
bare hand along its back. Criterion was met when I faded out the brush completely, and kitten approached the front of the cage and allowed petting from head to tip of tail for three consecutive successful trials. The fourth training step was optional. The kitten accepted petting from the side of the cat condo.

In the petting condition, I had the kitten target to the brush at the front of the cage so that its body was by the cage door entrance and its head was facing the left or right side of the cat condo. Then I began fading my fingers passed the brush so that the kitten was simultaneously brushed and pet with my fingertips. I faded in my hand until I was only petting the kitten with my hand while using brushing as a consequence that followed accepting petting. The next step was to fade out the brush altogether.
GENERALIZATION TRAINING OUTSIDE OF THE CAT CONDO

Data was not collected on the generalization training condition. However, data was recorded from an approximately two-minute video of each kitten following the generalization training condition. Alice’s video was a six-month follow-up showing that her friendly behaviors maintained overtime. When the kitten met criterion for the kitten approaching trainer and petting (KATP) condition then the kitten was released in the training room and given access to the cat condo via the cat condo entrance on the bottom level of the cage. I minimized the number of hiding places in the training room in an effort to make it more likely that the kitten would be visible for me to repeat the F2F procedure with him or her in the training room. Also, I attempted to encourage the kitten to interact with his/her new environment by enriching the training room with cat friendly toys and scratchers. Each kitten was allowed two to four days to adjust to the training room and then the F2F procedure was repeated as needed in the new environment. After I successfully used shaping with positive and negative reinforcement to train the kitten to allow me to approach it, the kitten approached me, the kitten accepted petting, being picked up, and held then I opened the training room door and allowed the kitten access to the room attached to the training room. The F2F procedure was repeated in novel rooms as needed to meet the above mentioned criteria. The kitten was only introduced to one new room at a time via keeping the doors to new rooms closed. However, the kitten always had access to the locations it had previously been in, such as the cat condo or training room. The kitten was never forced to enter a new room. Each subject chose to explore the new location. My pets were temporarily removed from the new rooms while the kitten had time to adjust to the new environment. After
several days, if a kitten had not gone into a new room on its own then I would have put the kitten in the cat condo and wheeled it in the new room and allowed the kitten two to four days to adjust to the new room while confined to the cat condo before opening the cat condo. However, this situation did not arise since all the subjects entered the novel rooms of their own volition. This pattern was repeated for Wallis, Gromit, and Alice in each room in my house and in my back yard equipped with cat safe fencing.

Generalization probes were conducted with Wallis, Gromit, and Alice’s potential adopters in my house and in the adopter’s house to assess how the kittens would behave in the presence of novel people in a familiar environment and in a novel environment if no further training were provided. The F2F procedure was not used for this portion of the research. However, during the adoption interview for Alice, Wallis, and Gromit the adopters were provided with a brief verbal description of how to implement the F2F procedure if needed in the new environment after allowing the kitten several days to acclimate to the new environment. I did not receive feedback as to whether the adopters used the F2F procedure with the kittens in the adopters’ home.

Design

*Experimental design.* A multiple baseline design across 4 kittens was used in this research. Marvin’s baseline was five trials, Wallis eight trials, Gromit 11 trials, and Alice 20 trials.
RESULTS

Figure 1 shows the cumulative occurrence of desirable and undesirable behaviors for all four kittens during all conditions. During baseline, Marvin’s (top left) undesirable behaviors and desirable behaviors occurred equally in each trial. There were no successful trials during the baseline condition. The number of baseline trials was five, and the total duration was 1 min 27 s. During the approaching condition, the undesirable behaviors immediately stopped and the desirable behavior slightly increased in frequency. The number of approaching trials was 13, and the total duration of this condition was 2 min 56 s. During cage door, the undesirable behavior remained near zero and the desirable behavior further increased in frequency. The number of cage door trials was 12, and the total duration was 3 min 3 s. During brushing, the frequency of desirable behaviors maintained and the frequency of undesirable behaviors remained at zero for the first few trials and then increased slightly. The number of brushing trials was 81. The total duration of this condition was 30 min 10 s. During kitten approaching trainer and petting (KATP), the undesirable behavior remained at zero and the desirable behaviors increased in frequency. The number of KATP trials was three, and the total duration of this condition was 3 min 1 s. Marvin completed all five conditions within 114 trials and the total duration of the experiment was 40 min 37 s.

During baseline, Wallis’ (top right) desirable behaviors were greater than undesirable behaviors. There were no successful trials during the baseline condition. The number of baseline trials was eight, and the total duration was 2 min 47 s.
Figure 1. Cumulative graph of desirable and undesirable behaviors in all conditions.
During the approaching condition, the undesirable behaviors immediately stopped and the desirable behavior slightly decreased in frequency. The number of approaching trials was 13, and the total duration of this condition was 3 min 5 s. During cage door, the undesirable behavior remained near zero and the desirable behavior slightly decreased in frequency. The number of cage door trials was 12, and the total duration was 3 min 28 s. During brushing, the frequency of desirable behaviors significantly increased and the frequency of undesirable behaviors remained at zero for the first third of the condition and then increased to baseline levels. The number of brushing trials was 37, and the total duration of this condition was 28 min 2 s. During KATP, the undesirable behavior returned to near zero levels and the desirable behaviors increased in frequency. The number of KATP trials was three, and the total duration of this condition was 4 min 7 s. Wallis completed all five conditions within 73 trials and the total duration of the experiment was 41 min and 29 s.

During baseline, Gromit's (bottom left) desirable behaviors were greater than undesirable behaviors. There were no successful trials during the baseline condition. The number of baseline trials was 11, and the total duration was 3 min 2 s. During the approaching condition, the undesirable behaviors immediately stopped and the desirable behavior slightly decreased in frequency. The number of approaching trials was 25, and the total duration of this condition was 5 min 7 s. During cage door, the undesirable behavior remained near zero levels for the first few trials and then slightly increased, but at a frequency less than baseline levels. Desirable behaviors slightly increased in frequency comparable to baseline levels. The number of cage door trials was 96, and the total duration was 26 min 40 s. During brushing, the frequency of
desirable behaviors increased and the frequency of undesirable behaviors decreased. The number of brushing trials was 29, and the total duration of this condition was 24 min 43 s. During KATP, the undesirable behavior returned to near zero levels and the desirable behaviors increased in frequency. The number of KATP trials was four, and the total duration of this condition was 4 min 43 s. Gromit completed all five conditions within 165 trials and the total duration of the experiment was 1 hr 4 min 16 s.

During baseline, Alice’s (bottom right) undesirable behaviors and desirable behaviors occurred equally in each trial. There were no successful trials during the baseline condition. The number of baseline trials was 20, and the total duration was 5 min 48 s. During the approaching condition, the undesirable behaviors immediately stopped and the desirable behavior slightly increased in frequency. At the midpoint of this condition there was a slight increase in undesirable behaviors. The number of approaching trials was 46, and the total duration of this condition was 9 min 33 s. During cage door, the undesirable behavior returned to near zero levels and the desirable behavior maintained. The number of cage door trials was eight, and the total duration was 2 min 38 s. During brushing, the frequency of desirable behaviors maintained until the last third of the condition where there was a significant increase. The frequency of undesirable behaviors was slightly higher than the frequency that occurred during the approaching condition. The number of brushing trials was 50, and the total duration of this condition was 28 min 28 s. During KATP, the undesirable behavior slightly decreased and the desirable behaviors significantly increased in frequency at the beginning of the condition and then returned to the same high frequency observed at the end of the brushing condition.
Figure 2. My training step location in all conditions.
Alice’s undesirable responding in the approaching, brushing, and KATP conditions was significantly less than what was observed during baseline and the severity of her behaviors had changed from hissing during baseline to mainly whiskers flared during brushing and KATP. The number of KATP trials was 18, and the total duration of this condition was 25 min 46 s. Alice completed all five conditions within 142 trials and the total duration of the experiment was 1 hr 9 min 35 s.

Figure 2 shows my progression through the training steps throughout all the conditions for all four kittens inside of the cat condo. During Marvin’s baseline (top left), I was able to advance to the cage door training steps (15-18). In the approaching condition, I began on step eight and reached the criterion step (13) for this condition in 13 trials. In the cage door condition, the training advanced without setbacks and was finished in 12 trials. It took me 81 trials to complete the brushing condition for Marvin. During the brushing condition, I had a total of eight setbacks where the training steps dropped from brushing training (step 21) to approaching step 3. Afterwards, the training steps fluctuated between steps eight and 21 during trials 41-81. After trial 81, I progressed to criterion (step 23) with minimal setbacks. In the KATP condition, I quickly achieved criterion within 3 trials.

During Wallis’ baseline (top right) condition, I was able to advance to the brushing kitten training steps (14-21). In the approaching condition, I began on step 11 and reached criterion step (13) for this condition in 13 trials. In the cage door condition, the training advanced without setbacks and was finished in 12 trials. It took me 37 trials to complete the brushing condition for Wallis. I had two setbacks where the training
steps dropped from step 23 to brushing training step 21. In the KATP condition, I quickly achieved criterion within three trials.

During Gromit’s baseline (bottom left), I was able to advance to the cage door training steps (6-16). In the approaching condition, I began on step six and reached the criterion step (13) for this condition in 25 trials. It took me 96 trials to complete the cage door condition for Gromit. During this condition, there were a total of 13 setbacks where the training steps dropped from opening the cage door (step 17) to approaching step 10. Afterwards, the training steps fluctuated between steps 16 and 10 during trials 61-118. After trial 118, I progressed to criterion (step 18). In the KATP condition, I quickly achieved criterion within four trials.

During Alice’s baseline (bottom right), I was able to advance to brushing the kitten training steps (9-23). In the approaching condition, I began on step 13. On the second trial, I had a setback to approaching training step five. By trial 48, the training steps progressed with minimal setbacks to step 13 again, which was followed by a setback to training step nine. Trials 49-66, I progressed to criterion (step 13) with minimal setbacks. I reached criterion (step 13) in 46 trials. In the cage door condition, the training advanced without setbacks and was finished in eight trials. It took me 50 trials to complete the brushing condition for Alice. During the brushing condition, I had a total of five setbacks where the training steps dropped from brushing training (step 21) to approaching step 3. By trial 92, I returned to brushing training step 21, which was immediately followed with a setback to approaching training (step 12). After trial 98, I progressed to criterion (step 23) without any setbacks. In the KATP condition, I achieved criterion within 18 trials with minimal setbacks.
Figure 3. Cumulative graph of cage location in all conditions. Numbers on graph represent hidden data.
Figure 3 shows the cumulative location in the cat condo for all four kittens during all conditions. During baseline, approaching, cage door and brushing, Marvin (top left) stayed on the top right shelf. In trial 40, Marvin moved to the top-level right side of the cage for the first time. In the KATP condition, Marvin no longer occupied the top right shelf, and he never returned to the top level right side of the cage. For the first time he moved to the top level left side of the cage, and the cage door on three trials. For one trial, he occupied the bottom left shelf for the first time.

Wallis (top right) stayed on the left and right side of the top level of the cat condo at an almost equal frequency during baseline, approaching, cage door, brushing and KATP conditions. During the brushing condition, Wallis moved to the top left shelf for the first time for 10 trials and for the first time moved to the top right shelf one time on trial 54. In the KATP condition, Wallis continued to occupy the top level left and top level right side of the cage. For the first time, Wallis moved to the bottom shelf left on three trials, the cage door and bottom level left on two trials, and bottom level right on one trial. He returned to the top right shelf for one trial.

During baseline, Gromit (bottom left) occupied the top level right and top level left side at almost equal rates followed by top left shelf and top right shelf. All locations were occupied at high frequencies. In the approaching condition, Gromit immediately stopped traveling to the top level right, top level left, and top right shelf and continued occupying the top left shelf at a higher frequency. In the cage door condition, Gromit continued to occupy only the top left shelf. After approximately 20 trials, he moved to the top level left and top level right side of the cage. Around trial 80, Gromit began to move to the top right shelf at low frequencies. Around trials 90 - 110 Gromit no longer
was on the top level left and top level right. He moved predominantly to the top left shelf and spent a few trials on the top right shelf. By the end of the condition, Gromit was most frequently on the top level right followed by the top level left and no longer occupied the top left shelf or top right shelf. In the brushing condition, the same trend continued. Top level right was the most frequently occurring location followed by top level left. Top left shelf and top right shelf were visited on one trial during this condition. In the KATP condition, Gromit no longer traveled to the top left shelf. He continued to move to the top level right and top level left at high frequencies. For the first time he walked on the cage door, bottom left shelf and bottom right shelf. He returned to the top right shelf as well.

During baseline, approaching, cage door, and brushing, Alice (bottom right) occupied only the top right shelf. During the KATP condition, she continued to occupy the top right shelf at high frequencies. For the first time, she occupied the top level left and top level right side of the cage on every trial of KATP. By the end of the condition, for the first time, she walked on the cage door and bottom left shelf at almost the same low frequency.

Figure 4 shows the cumulative occurrence of lying down, sitting, standing, and walking behaviors for all four kittens during all conditions. During baseline, Marvin (top left) was lying down belly down during most trials except for the last one where he crouched once. During the approaching condition, lying down belly down maintained and crouching occurred once. During cage door, there was a significant decrease in lying down belly down. The novel behavior of lying down ‘L’ position became the most prevalent behavior. Crouching was no longer emitted in this condition.
Figure 4. Cumulative graph of desirable lying down, sitting, standing, and walking behaviors in all conditions. Numbers on graph represent hidden data.
During brushing, lying down belly down increased and returned to being the most prevalent behavior. Lying down on side was a newly emerging behavior that occurred at high frequencies. Lying down ‘L’ position decreased, but was the third most prevalent behavior. Sitting low was a novel behavior that occurred every trial at the beginning of the condition, but leveled out to zero occurrences after one fourth of the condition. Lying down belly up occurred for the first time. Crouching returned in this condition. It still occurred at a low rate, but it occurred more often in the brushing condition than observed in previous conditions. Crouching and lying down belly up occurred at the same rate. There was one occurrence of the novel behaviors sitting high and standing low. During KATP, standing on back legs, standing high, walking high, and approaching occurred for the first time at the same high frequencies and were the four most prevalent behaviors in this condition. Lying down belly down, lying down belly up, lying down ‘L’ position, lying down on side, and sitting low were no longer emitted in this condition. Crouching decreased, standing low increased, and sitting high maintained with one occurrence.

During baseline, Wallis’ (top right) desirable behaviors that occurred on almost every trial were sitting high, sitting on back legs, lying down belly down, standing high, and walking high. Standing low, sitting low, lying down on side, lying down belly up, and lying down ‘L’ position all occurred at lower frequencies. During the approaching condition, sitting high, sitting on back legs, lying down belly down, standing high, walking high, standing low, sitting low, and lying down belly up no longer were emitted in this condition. There was a significant increase in lying down on side at the beginning of the condition, but it leveled off to zero. Lying down ‘L’ position increased significantly
and became the most prevalent behavior. During cage door, lying down ‘L’ position was not present and lying down belly down returned at a high frequency for the first half of the condition, but was replaced with lying down on side. During brushing, lying down ‘L’ position returned and became the most prevalent behavior. Lying down on side slightly decreased, but continued to be the second most prevalent behavior. Lying down belly up returned for the first time since baseline. It occurred at high frequencies comparable to lying down on side. Lying down belly down decreased. Sitting high returned for the first time since baseline, but at a much lower rate. Sitting on back legs, sitting low, crouching, standing low, standing high, and walking high all returned at low frequencies for the first time since baseline. Approaching, standing on back legs, and walking low were all novel behaviors that occurred at low frequencies in this condition. During KATP, crouching, lying down belly down, lying down ‘L’ position, lying down on side, and walking low were no longer emitted in this condition. Approaching, sitting high, standing high, standing on back legs, and walking high increased and became the most prevalent behaviors. Lying down belly up decreased; meanwhile, sitting low, sitting on back legs, and standing low maintained at low frequencies.

During baseline, Gromit’s (bottom left) desirable behaviors from highest to lowest occurrence were sitting low, lying down belly down, sitting high, crouching, approaching, standing on back legs, walking high, lying down ‘L’ position, standing high, and walking low. During the approaching condition, crouching, approaching, standing high, standing on back legs, walking high, and walking low were no longer emitted in this condition. Lying down ‘L’ position increased significantly and became the most prevalent behavior in this condition. Lying down belly down, sitting high, and sitting low decreased
significantly. During cage door, lying down ‘L’ position maintained its high occurrence and continued to be the most prevalent behavior. Lying down belly down, sitting high, and sitting low increased to similar frequencies as observed in baseline. All three behaviors occurred at almost equal rates by the end of the condition. Lying down on side and standing low were novel behaviors that occurred often. Standing on back legs, approaching, and walking low all returned from baseline and occurred at almost equal low rates by the end of the condition. These behaviors were followed by crouching, standing high, and walking high, which also returned from baseline and occurred at almost equal low rates by the end of the condition. Lying down belly up and sitting on back legs were novel behaviors that occurred twice. During the brushing condition, approaching, sitting low, sitting on back legs, standing high, and walking high were no longer emitted in this condition. Lying down ‘L’ position maintained its frequency and continued to be the most prevalent behavior. Lying down on side increased significantly and became the second most prevalent behavior. Lying down belly up increased significantly; meanwhile, lying down belly down decreased. Standing on back legs, standing low, and walking low were emitted at the end of the condition and continued to occur at low frequencies. Rolling over was a novel behavior that occurred twice. Sitting low decreased to only two occurrences. During KATP, lying down belly down, lying down belly up, lying down ‘L’ position, and standing low were no longer present. Walking high and standing on back legs increased significantly and both were the most prevalent behaviors in this condition. Approaching and standing high returned from the cage door condition and significantly increased to the most prevalent behaviors. The following behaviors all increased except lying down on side maintained its high rate,
walking low and sitting high occurred three times, and lying down on side occurred twice. Crouching and rolling over decreased to one occurrence.

During baseline, Alice’s (bottom right) lying down belly down occurred in every trial and crouching occurred three times. During the approaching condition, lying down ‘L’ position was a novel behavior that occurred in almost every trial and became the most prevalent behavior in this condition. Lying down belly down decreased, but still occurred at high rates. Lying down on side was a novel behavior that occurred a few times in the middle of the condition. During cage door, lying down on side was not present in this condition. Lying down ‘L’ position maintained its high frequency and continued to be the most prevalent behavior. Lying down belly down decreased significantly to near zero levels. During brushing, lying down belly down increased and became the most prevalent behavior in this condition. Lying down on side occurred at almost equal rates to lying down ‘L’ position by the end of the condition. Lying down ‘L’ position decreased, but continued to occur at a high rate. At the end of the condition, the following novel behaviors were emitted, crouching, sitting high, and sitting low. Crouching occurred at a high rate and sitting high and sitting low were at lower frequencies. Standing low and rolling over were both novel behaviors that occurred once on the last two trials. During KATP, approaching and standing high were both novel behaviors and occurred on almost every trial. Standing low and sitting high increased significantly and occurred at high frequencies. Walking high was a novel behavior that occurred at similar rates to standing low and sitting high. Walking low was a novel behavior and occurred at similar high frequencies to sitting low. Crouching, lying down belly down, and lying down ‘L’ position decreased. Sitting on back legs and
standing on back legs were novel behaviors that by the end of the condition occurred at a similar rate to crouching, lying down belly down, and lying down 'L' position. Lying down on side decreased significantly to near zero levels. Lying down belly up was a novel behavior that occurred one time.

Figure 5 shows the cumulative occurrence of desirable head behaviors for all four kittens during all conditions. During baseline, Marvin’s (top left) desirable behaviors consisted of head turning at first, followed by tongue flicking. During the approaching condition, there was a slight increase in head turning behaviors, tongue flicking disappeared, and blinking followed by head down were emitted for the first time at low frequencies. During cage door, head turning and head down maintained and there was a slight increase in blinking. Ear turning was emitted for the first time as the second most frequent behavior after head turning. At the end of the condition, eyes closed emerged. During brushing, there was a minimal decrease in head turning, but it continued to be the most prevalent behavior. There was a slight decrease in blinking, but it was still the second most frequent behavior by the end of the condition. There was a significant increase in head down and eyes closed. Ear turning maintained in frequency. Tongue flicking returned after being absent following baseline and at one point made its way to the second most frequent behavior before leveling off to zero by the last third of the condition. Grooming was emitted for the first time for the second quarter of the brushing condition and then leveled off to zero levels. Pushing against appeared for the first time at the end of this condition for one trial. During KATP, head turning and pushing against were the only two desirable head behaviors emitted and they both occurred at the same high frequency, one per trial.
Figure 5. Cumulative graph of desirable head behaviors in all conditions. Numbers on graph represent hidden data.
During baseline, Wallis’ (top right) desirable behaviors from highest to lowest frequency were head turning followed by tongue flicking, blinking, and head down. During the approaching condition, head turning maintained until the midpoint of the condition and leveled off to near zero levels. Tongue flicking disappeared. Blinking decreased to near zero levels. Head down significantly increased to become the most frequently occurring behavior by the end of this condition. Ear turning occurred for the first time and occurred at an almost equal rate to head down. Eyes closed occurred for the first time near the midpoint of this condition and was emitted at a high frequency. During cage door, head turning, head down, ears turning, and eyes closed maintained and blinking increased. Eyes closed, which occurred at an almost equal rate to head down, became the most frequently occurring behavior in this condition. During brushing, head turning increased and became the most frequently occurring behavior again. Head down decreased, but remained in the second most frequently occurring behavior for the majority of the condition. Tongue flicking was absent following baseline, but returned in this condition at high frequencies becoming the second most frequent behavior by the end of the condition. Ear turning and blinking noticeably decreased. Eyes closed decreased significantly to near zero levels. Biting training objects and grooming were both novel behaviors and occurred at almost equal moderate frequencies by the end of the condition. Rubbing and head shaking were both novel behaviors and occurred at almost equal low frequencies by the end of the condition. Eating was a novel behavior that occurred on one trial in this condition. In the KATP condition, meowing and pushing against were all novel behaviors that occurred at the same high frequency as head turning, one behavior per trial. Rubbing
and tongue flicking maintained, and biting training objects, blinking, eating, ear turning, eyes closed, grooming, head down, and head shaking were no longer emitted.

During baseline, Gromit’s (bottom left) desirable behaviors from highest to lowest frequency were head turning followed by ear turning, tongue flicking, meowing, and blinking. In the approaching condition, head turning and ear turning slightly decreased, but continued to be the most frequently occurring behaviors. Tongue flicking, meowing, and blinking decreased to near zero levels. Head down and eyes closed were newly emerging behaviors that occurred at low frequencies by the end of the condition. In the cage door condition, there was a minimal increase in head turning, which continued to be the most prevalent behavior. There was a significant increase in tongue flicking, and it became the second most frequently occurring behavior. Ear turning decreased and occurred at almost equal rates to the novel behavior grooming. Head down, eyes closed, blinking, and meowing all increased. Head shaking and yawning were both novel behaviors that occurred on one and two trials respectively. In the brushing condition, head turning maintained and continued to be the most frequently occurring behavior. Head down and eyes closed significantly increased to the second and third most frequently occurring behaviors respectively. Tongue flicking increased and blinking, grooming, and yawning maintained. Biting training objects was a novel behavior that occurred at almost the same moderate frequency as blinking and grooming. Rubbing was a novel behavior that was emitted twice toward the end of the condition. Head shaking maintained at one occurrence and meowing was no longer emitted. In the KATP condition, head turning maintained and continued to be the most frequently occurring behavior followed by rubbing, which increased. Pushing against
was a novel behavior that occurred at moderate frequencies. Eyes closed, head down, and tongue flicking decreased. Eyes closed and head down occurred at identical frequencies. Biting training objects, blinking, ear turning, grooming, head shaking, and yawning were no longer emitted. Eating was a novel behavior that occurred one time. 

During baseline, Alice’s (bottom right) desirable behaviors from highest to lowest frequency were meowing, tongue flicking, head turning, head down, blinking, and ear turning. In the approaching condition, head down and eyes closed were novel behaviors that occurred at similar rates and were the most frequently occurring behaviors. Head turning and blinking maintained. Ear turning increased and meowing decreased. Tongue flicking disappeared. In the cage door condition, head down continued to be the most dominant behavior. Blinking increased, but eyes closed, head turning, and ear turning decreased and meowing disappeared. In the brushing condition, head turning increased and became the most frequently occurring behavior. Head down slightly decreased, but occurred as the second most frequent behavior. Eyes closed and blinking decreased, but still occurred at high rates. Ear turning increased to a similar frequency that occurred in the approaching condition. Meowing returned in this condition at the same frequency that occurred in the approaching condition. Tongue flicking returned for the first time since baseline and occurred at a similar frequency to meowing. Pushing against and head shaking were both novel behaviors emitted toward the end of the condition. Pushing against occurred at a high frequency. In the KATP condition, head turning slightly increased and continued to be the most prevalent behavior. Pushing against continued to occur at high frequencies and became the second most frequent behavior. Biting training objects was a novel
behavior that made its way to the third most frequently occurring behavior by the end of the KATP condition. Tongue flicking and meowing maintained. Eating and grooming were novel behaviors that occurred at moderate frequencies (four times), and head shaking increased slightly. Drinking was a novel behavior that occurred at a low frequency, twice. Head down, ear turning, and blinking decreased significantly to low frequency behaviors. Eyes closed disappeared.

Figure 6 shows the cumulative occurrence of undesirable head behaviors for all four kittens during all conditions. During baseline, Marvin’s (top left) undesirable head behaviors consisted of ears down followed by hissing, both occurred in almost all trials. During the approaching condition, ears down and hissing were absent and distancing movement emerged for the first time, but only occurred once. During cage door, distancing movement maintained at near zero levels. Hissing returned, but occurred at the same low rate as distancing movement. During brushing, there was a significant increase in distancing movement, which was the most prevalent behavior in this condition. Hissing returned for the first time since baseline and occurred at almost equal low rates to ears down. Ears down increased from the previous condition. Eyes wide occurred for the first time in this condition. It was the least frequently occurring behavior, but it occurred at a similar low frequency to ears down and hissing. During KATP, eyes wide and hissing were no longer present; meanwhile, distancing movement and ears down occurred one time.

During baseline, Wallis’ (top right) undesirable head behaviors from highest to lowest frequency were hissing, ears down, and distancing movement. Hissing and distancing movement occurred at equally high frequencies.
Figure 6. Cumulative graph of undesirable head behaviors in all conditions. Numbers on graph represent hidden data.
During the approaching condition, hissing and distancing movement no longer occurred. Ears down significantly decreased to near zero levels. During cage door, the ears down behavior was no longer emitted and eyes wide occurred once for the first time. During brushing, eyes wide disappeared, but distancing movement and ears down returned. The frequency of distancing movement increased from baseline levels, and it became the most prevalent behavior in this condition. Ears down significantly increased from the approaching condition, but occurred less frequently than in the baseline condition. During KATP, distancing movement and ears down decreased significantly to only one occurrence. Meowing repetitively occurred for the first time, but only one time.

During baseline, Gromit’s (bottom left) undesirable head behaviors from highest to lowest frequency were hissing, distancing movement, ears down, meowing repetitively, and eyes wide. Hissing and distancing movement both occurred at almost equally high rates; meanwhile, all the other behaviors occurred at low frequencies. During the approaching condition, meowing repetitively and eyes wide were no longer present. There was a significant decrease in hissing and distancing movement, which both occurred only once in this condition. Ears down decreased to near zero levels as well. During cage door, there was a significant increase in distancing movement and hissing, both being the most frequently occurring behaviors in this condition. However, neither returned to baseline levels. Ears down increased to baseline levels, but still occurred at a low rate. Meowing repetitively and eyes wide returned at similar low frequencies as occurred during baseline. During the brushing condition, hissing, meowing repetitively, and eyes wide were no longer present. Distancing movement and
ears down maintained. During KATP, distancing movement no longer occurred and there was only one occurrence of ears down.

During baseline, Alice’s (bottom right) undesirable head behaviors from highest to lowest frequency were whiskers flared, hissing, eyes wide, distancing movement, meowing repetitively, and ears down. Whiskers flared, hissing, and eyes wide were all occurring at similar high frequencies; meanwhile, the other behaviors were less frequent. During the approaching condition, for the first third of this condition there were no undesirable behaviors. Hissing and meowing repetitively no longer occurred for the duration of the fearful to friendly (F2F) treatment. The eyes wide behavior was not present in this condition. Whiskers flared decreased, but continued to be the most prevalent behavior. Distancing movement maintained at its original low frequency, but was the second most frequently occurring behavior in this condition. Ears down increased, but was the least frequently occurring behavior in this condition. During cage door, distancing movement was no longer present, ears down, and whiskers flared decreased to near zero levels. Eyes wide returned, but only occurred one time. During brushing, whiskers flared and eyes wide both significantly increased and were the top two most prevalent behaviors in this condition. Whiskers flared occurred at a similar rate as in the approaching condition, and eyes wide occurred almost at baseline levels. Ears down increased and distancing movement returned in this condition and both achieved the same frequency as occurred in the approaching condition. During KATP, the eyes wide behavior was no longer present. There was a decrease in whiskers flared, ears down increased, and distancing movement maintained. All three behaviors occurred at similar frequencies in this condition.
Figure 7. Cumulative graph of desirable and undesirable body behaviors in all conditions.
Figure 7 shows the cumulative occurrence of both desirable and undesirable body behaviors for all four kittens during all conditions. During baseline, Marvin’s (top left) desirable behaviors consisted of hip/shoulder shifting. During the approaching condition, hip/shoulder shifting decreased. During cage door, hip/shoulder shifting increased comparable to baseline level. During brushing, hip/shoulder shifting maintained. Near the end of the condition, skin rippling emerged as a novel behavior and occurred at a high frequency before leveling off to zero occurrences. During KATP, hip/shoulder shifting and skin rippling were no longer emitted.

During baseline, approaching, and cage door conditions, Wallis (top right) did not emit any body behaviors. During brushing, hip/shoulder shifting emerged as the most prevalent behavior followed by the novel behavior body stretching. Both occurred at low frequencies. During KATP, hip/shoulder shifting was absent in this condition and body stretching increased.

During baseline, Gromit (bottom left) did not emit any body behaviors. During the approaching condition, hip/shoulder shifting emerged as a novel behavior, but leveled off to zero by the midpoint of this condition. During cage door, from trial 50-96 hip/shoulder shifting occurred at a similar rate to the previous condition. During brushing, hip or shoulder shifting decreased. During KATP, hip/shoulder shifting was no longer present.

During baseline, Alice’s (bottom right) hip/shoulder shifting occurred in most trials and hip lifting and skin rippling both occurred one time. During the approaching condition, hip lifting no longer occurred. Hip/shoulder shifting maintained during the first quarter of the condition, but then leveled off to near zero levels for the remainder.
Figure 8. Cumulative graph of desirable leg behaviors in all conditions. Numbers on graph represent hidden data.
Skin rippling maintained with one occurrence. During cage door, Alice did not emit any body behaviors. During brushing, hip lifting and hip/shoulder shifting returned. Hip lifting increased significantly from baseline levels. Hip/shoulder shifting occurred at similar frequencies to the approaching condition. Both behaviors occurred at similar rates, but hip lifting was the most prevalent. Deep breath was a novel behavior that occurred once. During KATP, deep breath was no longer present in this condition. Hip lifting decreased, but continued to be the most prevalent behavior. Piloerection emerged as a novel undesirable behavior. Body stretching emerged as a novel desirable behavior at almost the same rate as piloerection. Skin rippling returned at the same level it stopped at during the approaching condition, one occurrence. Hip/shoulder shifting decreased to one occurrence.

Figure 8 shows the cumulative occurrence of leg behaviors for all four kittens during all conditions. During baseline, Marvin (top left) did not emit any desirable leg behaviors. During the approaching condition, front paws away from body emerged at the end of the condition on every trial. During cage door, front paws away from body maintained. Leg stretching and paw stretching were novel behaviors that occurred at low frequencies. During brushing, there was a slight decrease in front paws away from body, but it continued to be the most prevalent behavior. Leg stretching and the new behavior back paws away from body occurred at similar high rates and were the second and third most prevalent behaviors. Midway through this condition, pawing was a newly emerging behavior that occurred frequently. During KATP, back and front paws away from body were no longer present in this condition. Jumping was a novel behavior. Leg stretching decreased; meanwhile, paw stretching maintained and pawing increased.
During baseline, Wallis’ (top right) most frequently occurring desirable behavior was playing. Jumping, scratching objects, paw stretching, marching, front and back paws away from body, leg stretching, and pawing all occurred three or less times. During the approaching condition, pawing, marching, and jumping were absent from this condition. Front and back paws away from body both significantly increased and they became the most prevalent behaviors in this condition. Jumping, scratching objects, paw stretching, marching, leg stretching, and pawing all maintained at near zero levels. Playing significantly decreased to only one occurrence. During cage door, back paws away from body, playing, and scratching objects were no longer present in this condition. Front paws away did not occur until the middle of this condition, but when it began it maintained a similar frequency to the previous condition and continued to be the most prevalent behavior. Leg stretching and paw stretching continued to occur at near zero levels. During brushing, front paws away from body continued to occur at a high frequency and was the most prevalent behavior in this condition. Leg stretching significantly increased and occurred at almost the same frequency as front paws away. Back paws away from body and pawing returned at similar high frequencies. Paw stretching increased to a commonly occurring behavior. Playing returned, but at a lower frequency than seen in baseline. Jumping returned to the same low frequency observed in baseline. During KATP, playing and back paws away from body were no longer present. Marching returned for the first time since baseline. Jumping increased and pawing maintained. Jumping, marching, and pawing all occurred at the same rate and were the most prevalent behaviors in this condition. Paw stretching maintained
while leg stretching and scratching objects decreased. Front paws away from body significantly decreased to only one occurrence.

During baseline, Gromit’s (bottom left) jumping behavior occurred in most of the trials and leg stretching occurred once. During the approaching condition, playing and paw stretching emerged as novel behaviors and both occurred at low frequencies. The back paws away from body behavior occurred for the first time and was the most prevalent behavior, followed by leg stretching, which maintained its low frequency from baseline. Jumping decreased to near zero levels. During cage door, back paws away from body slightly decreased, but continued to be the most prevalent behavior. Leg stretching increased and continued to be the second most prevalent behavior. The front paws away from body behavior was a novel behavior that occurred as the third most prevalent behavior. Jumping increased, but not to the rate observed during baseline. Playing increased and paw stretching maintained. Pawing and scratching objects were both novel behaviors that occurred at near zero levels. During brushing, jumping was absent from this condition. Paw stretching increased significantly and became the most prevalent behavior. Leg stretching increased, front paws away from body and pawing increased significantly. Paw stretching, leg stretching, front paws away, and pawing all occurred at similar frequencies by the end of this condition. Back paws away slightly increased and playing maintained. Scratching self was a novel behavior that occurred one time. Scratching objects maintained with one occurrence. During KATP, back paws away from body, leg stretching, playing, scratching objects, and scratching self no longer occurred. Jumping returned in this condition and was the most prevalent
behavior. Front paws away maintained; meanwhile, paw stretching and pawing decreased.

During baseline, Alice (bottom right) did not emit any desirable leg behaviors. During the approaching condition, desirable behaviors from highest to lowest occurrence were front paws away from body, leg stretching, paw stretching, and back paws away from body. For approximately the last 15 trials, all four behaviors were no longer emitted, except back paws away from body occurred in the last trial. During cage door, leg stretching and front paws away from body were no longer emitted. Back paws away from body and paw stretching maintained at near zero levels. During brushing, front paws away returned in this condition and became the most prevalent behavior again. Paw stretching and leg stretching appeared near the end of the condition and increased significantly. Back paws away increased and occurred at a similar frequency to paw stretching and leg stretching. Pawing was a novel behavior that began toward the end of the condition at a high frequency. During KATP, pawing increased and became the most prevalent behavior. Jumping was a novel behavior that occurred at equal rates to pawing. Leg stretching and paw stretching decreased. Scratching self and playing were both novel behaviors that occurred at the same low rate. Front paws away from body decreased significantly from the most prevalent behavior in the previous condition to the least prevalent behavior in this condition.

Figure 9 shows the cumulative occurrence of tail away from body, tail high, tail wagging (desirable behaviors), and tail thumping (undesirable behavior) for all four kittens during all conditions. During baseline and approaching conditions, Marvin (top left) did not emit any tail behaviors.
Figure 9. Cumulative graph of desirable and undesirable tail behaviors in all conditions. Numbers on graph represent hidden data.
During cage door, tail away emerged in the middle of the condition as a novel behavior and occurred in every trial. During brushing, tail away continued to be present on every trial for the first few trials, but leveled off to zero occurrences for 43 trials. During KATP, tail away decreased to near zero levels and was replaced by the novel behavior tail high, which occurred on every trial.

During baseline, Wallis (top right) emitted tail away from body on four of eight trials and tail high occurred twice. During the approaching and cage door conditions, there were no tail behaviors emitted. During brushing, tail away returned after 10 trials and then occurred on most of the trials. Tail away occurred on 14 of 37 trials and tail high occurred eight times. Tail away and tail high were emitted in a similar pattern to baseline. During KATP, tail high and tail away increased and tail high became the most prevalent behavior. Tail high occurred on every trial and tail away occurred on almost all trials.

During baseline, Gromit (bottom left) emitted tail away on six of 11 trials and tail high occurred one time. During the approaching condition, there were no tail behaviors emitted. After 40 trials during the cage door condition, tail away appeared and occurred 12 out of 96 trials. After 20 trials, tail high appeared and maintained its low rate with three occurrences. The undesirable behavior tail thumping emerged for the first time and only occurred once. During brushing, tail thumping was no longer present. Tail away appeared at the end of the condition and decreased significantly to only two occurrences. During KATP, tail wagging was a novel behavior that became one of the most prevalent behaviors. Tail high significantly increased and was the other most prevalent behavior. Tail wagging and tail high occurred on every trial. Tail away
increased and occurred at almost the same rate as tail wagging and tail high.

During baseline, approaching, cage door, and brushing, Alice (bottom right) did not emit any tail behaviors. During KATP, tail high emerged as the most prevalent behavior, which occurred on every trial. Tail away emerged as a novel behavior and occurred at similar high rates, 11 of 18 trials. Tail wagging occurred for the first time, but only occurred once.

Figure 10 shows the desirable and undesirable behaviors for all four kittens outside of the cat condo. Data was collected from approximately two-minute videos for Marvin, Wallis, Gromit, and Alice after they completed the generalization training condition in all rooms of my house (Marvin training room only). I restricted data collection to the 24 most desirable behaviors emitted by friendly cats. These friendly behaviors included accepting petting, close proximity to other cats, grooming, jumping, kitten approaching trainer, lying down belly up, lying down on side, marching, meowing, on trainer’s lap, paw stretching, playing, purring, pushing against, rubbing, running, scratching objects, sitting high, standing on back legs, tail away from body, tail high, trainer approaching kitten, trainer holding kitten, and walking high. I looked for all eight undesirable behaviors originally recorded in the cat condo, but only observed three (distancing movement, ears down, and whiskers flared). Wallis offered the most desirable behaviors of all four kittens at 19 behaviors. Alice was a close second with 17 desirable behaviors. Marvin had 15 desirable behaviors and Gromit had the least with 14. Marvin and Alice both emitted two undesirable behaviors while outside of the cat condo. Alice’s video was a six-month follow-up video showing that her friendly behaviors were maintained overtime.
Figure 10. Desirable and undesirable behaviors following generalization training. All four kittens met adoptability criteria in a home setting.
DISCUSSION

Fearful to friendly (F2F) was very successful socializing feral kittens in a timely manner. By the end of the treatment, the desirable friendly behaviors far exceeded the undesirable unfriendly behaviors. It took 71 – 162 trials to complete the procedure while the kittens were in the cat condo. This translated into 40 minutes to 64 minutes working with the kittens inside of the cat condo not including the break times I spent outside of the training room or the brushing follow-up sessions. The total procedure duration from baseline through kitten approaching trainer and petting (KATP) was 40 minutes 37 seconds for Marvin, 41 minutes 29 seconds for Wallis, 1 hour 4 minutes and 16 seconds for Gromit, and 1 hour 9 minutes and 35 seconds for Alice. Overall, the total occurrence of behaviors while each kitten was in the cat condo was 615 desirable and 56 undesirable behaviors for Marvin, 608 desirable and 48 undesirable behaviors for Wallis, 1,065 desirable and 74 undesirable behaviors for Gromit, and 945 desirable and 153 undesirable behaviors for Alice. The maximum desirable behaviors per trial were 14 (Marvin), 18 (Wallis), 19 (Gromit), and 26 (Alice). The undesirable behaviors per trial ranged from zero to three for Marvin, Wallis, and Gromit. Alice’s behavior was the most extreme from one desirable behavior during baseline to 26 desirable behaviors by the end of F2F. These results showed that shaping with negative reinforcement was effective in reducing fearful and aggressive behavior to give way to friendly behavior maintained by positive reinforcement. The results extend the generality of the CAT procedure from aggressive dogs to fearful and feral cats.

In the process of change from fearful/feral behavior to friendly behavior there were some behavior changes worth discussing. During baseline, Marvin and Alice
emitted undesirable behaviors and desirable behaviors at equal rates and Wallis and Gromit emitted more desirable behaviors than undesirable behaviors. Wallis and Gromit moved around the cage during baseline and were emitting lots of desirable behaviors, such as playing. They appeared to be friendly kittens until I reached some distance then they responded with hissing and other undesirable behaviors.

When the negative reinforcement contingency was introduced in the approaching condition, the undesirable behaviors immediately decreased for all four kittens. Some desirable behaviors decreased as well. For example, the highly desirable target behaviors sitting high, standing high, and walking high, were no longer emitting by Wallis and Gromit. Also, Wallis stopped playing with toys, and Wallis and Gromit lost the highly desirable target behaviors of tail away and tail high. The reduction of undesirable behavior was in part due to the errorless nature of the procedure. Errors (or unsuccessful trials) were minimized by advancing to a distance that did not evoke undesirable behavior. The reduction of some desirable behavior was in part due to the presence of an aversive stimulus. For example, Gromit’s movement to different locations in the cat condo was reduced from four locations to one during the first part of the procedure. Since the other cats either stayed in one location or two, there was very little room to see further decreases.

The initial reduction of the friendly repertoire of the cats highlighted one important difference between shaping with negative reinforcement and shaping with positive reinforcement. Shaping with positive reinforcement usually begins with some variability in responding related to a target behavior. The variability is narrowed to meet the requirements of positive reinforcement of a target behavior. Shaping with negative
reinforcement usually begins with a narrow repertoire that needs to be expanded. For a graphic, picture an equilateral triangle. The training would begin at the base of the triangle, which represents the large array of behaviors being emitted by the friendly animal. The objective would be to use positive reinforcement to narrow the behaviors down to the apex of the triangle to pinpoint the one behavior of interest. Whereas with negative reinforcement, it would be the opposite. I began with a subject with a small repertoire, mainly aggressive behaviors, and then I have to work to expand the friendly behaviors (see Appendix I for a graphic of expanding repertoires using negative reinforcement). For example, in the beginning of the F2F treatment, Alice and Marvin were best described as “statue” cats that offered minimal movement for me to shape. For this reason, there were some trials where I used microshaping to reinforce for small changes in the muscles, such as the kitten moving the muscle above its eye.

In the cage door condition, some of the friendly repertoire reappeared. For example, Gromit’s movement to new locations in the cage and sitting, standing, leg stretching, and walking behaviors returned. The undesirable behaviors were minimal to nonexistent for Marvin, Wallis, and Alice. However, there was a resurgence of undesirable responding for Gromit.

In the brushing condition, the most desirable head behavior, pushing against, emerged for Marvin and Alice. Wallis’ playing behavior returned; meanwhile, playing continued to be prevalent for Gromit. Pawing and paw stretching were prevalent for all four kittens in this condition. Marvin and Alice’s lying down behaviors expanded to more relaxed lying down positions, such as lying down on side and lying down in a ‘L’ position, and even lying down belly up for Marvin. Marvin and Alice began to emit
minimal crouching or sitting behaviors toward the end of the brushing condition. Wallis’ sitting, standing, and walking behaviors returned at the end of the condition. Gromit began to emit more novel highly desirable behaviors, such lying down belly up, rolling over, and standing on back legs. Interestingly, Marvin, Wallis, and Alice all showed an increase in undesirable behaviors compared to the cage door condition. Similar to Gromit in the cage door condition, when these three kittens’ behavioral repertoires started noticeably expanding there was a resurgence of undesirable behaviors. However in this condition, all four kittens’ undesirable behaviors had decreased in intensity or topography. Hissing was no longer emitted by any of the kittens except Marvin. Hissing was replaced with the lesser behavior of distancing movement for Wallis and Gromit. Distancing movement occurred four times as often as hissing for Marvin. Alice’s undesirable behaviors had changed from hissing in previous conditions to mainly whiskers flared.

After the kittens were accepting of me approaching them, opening the cage door, and reaching toward them with a brush, they were able to come into contact with the tactile stimulation the soft brush bristles provided. Toward the end of the brushing condition, all of the kittens were behaving friendly toward me and showing signs that they were enjoying being brushed, such as exposing their bellies by either rolling over or lying down belly up, pushing against the brush with their heads or bodies, and stretching their legs and paws in response to being brushed. At this point, the trial duration increased significantly since the kittens were no longer showing signs of stress when I was in close proximity. When I would attempt to end some of the brushing trials some of the kittens would paw at the brush and capture it with their claws and pull it in
their direction. At this point, a change in contingencies also occurred: friendly behavior was no longer emitted to make me go away, but to seek contact with me.

The most significant increases in moving to multiple locations throughout the cage occurred in the KATP condition for all four kittens. Of the nine possible locations available during KATP, at least one time during this condition Marvin occupied three locations, Wallis seven, Gromit six, and Alice five. Wallis’ marching behavior returned, and all four kittens were walking around the cage and jumping on the top shelves. All four kittens met adoptability criteria because they were pushing against the brush or my hand when being pet, sitting high, standing high, walking high, and approaching me with tail held high. The tail high and tail away behaviors served as a good indicator of how relaxed the kitten was. Tail away behaviors emerged before tail high since tail away was observed when the kittens were in a lying down or sitting position, which typically occurred before the kitten began standing or walking. Since tail high was only possible while the kittens were in an upright position (standing or walking) it was common to see the tail high behavior emerge at the end of the F2F procedure. In the KATP condition, most of the undesirable responding for all of the kittens had decreased in magnitude to the point that I did not observe these behaviors during the training procedure. The undesirable responses were detected while viewing the videos repeatedly in slow motion. Alice continued to emit whiskers flared during KATP, but that was of little concern to me. In the beginning of the F2F treatment, I labeled whiskers flared as undesirable so that I could change my behavior when I observed whiskers flared in an attempt to circumvent more intense undesirable responding, such as hissing. However,
when the kitten started behaving friendly then whiskers flared changed function and undesirable responding no longer followed it.

In addition to conducting the F2F procedure to shape friendly behaviors with the kitten housed in a cat condo, I used shaping with negative reinforcement to train each subject to accept my approaching behavior while loose in the training room or other rooms of my house and in my back yard (three of the four kittens), but no data was taken for this part of the procedure. The procedure to train the kitten to approach me was the same as the F2F procedure where I left the room contingent on desirable behaviors. However, when I would attempt to deliver the reinforcer, distance, I often observed that the kitten would run toward me when I would walk away to leave the room. Once I could approach the kitten, positive reinforcement was used to teach the kitten to approach me. I tossed toys for the kitten to chase as a consequence for approaching me.

When the kitten was outside of the cat condo, a negative reinforcement procedure was used for picking the kitten up and holding the kitten. The first part of the training focused on being able to bend down, squat down, brush the kitten, pet the kitten, and apply gentle pressure to the sides of the kitten’s belly with one hand and then two hands, and return to a standing position. Next, I began to train the kitten to accept being picked up using shaping with negative and positive reinforcement. The negative reinforcer I delivered was releasing the kitten from being held after approximately one second at the approximation and petting was the positive reinforcer I delivered following the successful completion of each approximation. The holding condition began when I was able to pick the kitten up and hold it against my chest. I
used shaping with positive reinforcement and negative reinforcement to increase the duration of being held. The kitten was pet when held (positive reinforcer) and released (negative reinforcer) when the duration was met. The duration of trials increased with each successful trial.

All four kittens met adoptability criteria after generalization training in my home. The kittens approached me in different rooms of the house, allowed me to approach and pet them in different rooms, sat in my lap, and purred. Alice did not sit in my lap during the video clip selected for data collection, but she did offer that friendly behavior at other times, and Marvin’s purring was not captured on the brief generalization video. In the generalization probes with the new adopters, I observed some fearful responding, such as eyes wide. The kittens did not consistently approach the new adopters or accept petting without emitting some undesirable behavior, such as standing low and/or distancing movement. However, the undesirable behaviors they emitted did not prevent them from being adopted, but it would have been ideal if the kittens only emitted desirable behaviors in the presence of new people and in novel environments. This suggests that generalization training should be conducted with a variety of novel people and have criteria met for all generalization conditions before approving the kitten as adoption eligible. It would be helpful if the F2F procedure could be conducted in more than one environment (e.g., different houses) to help prepare the kitten for moving to a new home with new people upon adoption. Stimulus control and generalization techniques, such as train loosely wearing different costumes may be another option if a variety of novel people are not available. Future generalization research should look at the generalization technique of training with common stimuli, such as using the cat
condo to increase successful transfers to new environments and target training with the brush and giving the new person the brush. Also, more emphasis on training adopters to implement the F2F procedure might help the generalization of friendly behaviors in novel situations.

The F2F procedure is not limited to fearful and feral kittens. Although the subjects of the F2F research were under a year of age, the same procedure is applicable to adult cats as well. Also, the F2F procedure can be modified so that it can be used with any animal that is behaving fearfully or aggressively and thus avoids or escapes an aversive stimulus, such as people, other animals, or other stimuli the animal perceives as unpleasant. A modified version of F2F can be used with rabbits, dogs, birds, horses, goats, exotic animals, and more. The modifications would consist of creating a list of desirable and undesirable behaviors that are specific to the species of interest. Other research projects evaluating F2F include cats that are aggressive or fearful toward other cats and/or dogs and separation anxiety.
APPENDIX A

CAT CONDO DURING PRETREATMENT
During treatment, the sheets covering the outside of the cage and the hiding spot were removed. During kitten approaching trainer and petting (KATP), the kittens were allowed access to the bottom level of the cat condo.
APPENDIX B

BEHAVIORAL DEFINITIONS FOR DOMESTIC CATS
F2F Behavioral Definitions for Domestic Cats

Cat’s location in the cat condo
- Left and right side of cage is based on the perspective of the viewer looking at the cage (ala my right or my left).
- When the cat is on the top shelf on the left side of cage score as left under the top level shelves section. The same is true for the top right shelf.
- If any part of the cat’s body is in front of, behind, under or touching the yellow ball connected to the carpet scraper then the cat is considered in the middle of the cage on the top level. Score as both left and right side of the cage.
- If the cat is located completely to the left of the yellow ball score as left side of cage.
- If the cat is completely to the right side of the yellow ball score as...

Cat’s location in the cat condo during KATP condition
- In KATP condition you can see the shelves that make up the top level of the condo. If any part of the cat’s body touches the two shelves to the right then score as right side of cage. If any part of the cat’s body touches the one shelf closest the left side of cage then score as top level left.
- In KATP condition the shelf on the bottom left side of cage that gives the cat access between the top and bottom level is considered the bottom level shelf on the left side. There may or may not be an additional shelf on the bottom level right side.
- On the bottom level, locate the plastic white daisy located in the middle of the cage. Anything to the right of the daisy denotes the right side of the cage and anything to the left of the daisy denotes the left side of the cage.

Desirable behaviors - Head
- Biting training objects
- Blinking
- Drinking
- Ear turning
- Eating
- Eyes closed
- Grooming
- Head down

Biting training objects
- When the cat’s teeth are touching the brush or other training tools. This may be difficult to see since the cat’s mouth is usually blocked by the brush. Cats tend to tug on the training objects with their mouths while they are biting them. The trainer may not see the cat’s mouth, but can feel the cat biting the training object.

Blinking
- When the cat’s eyes are open and then one or both eye lids close together partially or completely and then open again.
- Exclude when cat’s eye get smaller while hissing.
Drinking
When the cat puts its chin past the top rim of the bowl of water or sticks its paw in the bowl of water and then licks its paw.

Ear turning
When ONE of the cat’s ears changes direction. Exclude when one ear turns due to making contact with the cage, brush, shelf. Include when ear is turned back even if you didn’t observe it changing directions.

Eating
When the cat is observed putting food in its mouth or the cat puts its chin past the top rim of the bowl of food. Count as eating even if you can’t see the cat’s mouth, but its head is in the food bowl and it bobs its head up and down.

Eyes closed
When the cat’s top and bottom eye lids on both eyes are touching or almost touching for 2 or more seconds.

Grooming
When the cat is licking or biting at its fur or skin.

Head down
When the cat’s head (top, side, or chin) is touching the ground, litter box, bedding material, or legs/paws. Exclude when cat’s head is touching the cage. Note: If cat moves its head from one position to another then record the beginning and ending position of the movement cycle. For example, when the cat has its head down and then moves its head high you would record head down and head high. There is no need to record head low since the cat did not maintain that position.
**Tongue flicking**

When the tip of the cat’s tongue is extended beyond the cat’s bottom lip. 
Note: Unlike grooming the cat’s tongue does not make contact with any part of its body other than its face. This behavior often occurs immediately following the completion of grooming.

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**Yawning**

When the cat opens its mouth wide, reveals its teeth without making a noise, and then closes its mouth.

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**Desirable behaviors - Body**

- Body stretching
- Deep breath
- Hip lifting
- Hip/shoulder shifting
- Skin rippling

**Body stretching**

When the cat is standing up and arches its back while only emitting desirable behaviors.

Exclude: Leg stretching

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**Deep breath**

There is a change in the cat’s breathing pattern. Instead of lots of small breaths the cat inhales deeply causing the sides of the cat’s body to expand.

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**Hip lifting**

When the cat is in a lying down belly down position and its hips move upward without standing up.
**Hip/shoulder shifting**

When the cat is in a lying down belly down, "L" position, or crouching and it moves one or both hips/shoulders up or down. Include when cat shifts hips up or down while moving into a new body position (e.g. sitting or lying down). Record new body position and hip/shoulder movement is part of the movement cycle of the new body position. Do not score as distancing movement if cat moves its front legs back to shift shoulders.

**Skin rippling**

When the cat's fur along its backbone moves in a wave like motion toward the tail area.

Note: This behavior often occurs in response to the first few trials of brushing along the backbone.

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**Desirable behaviors - Legs**

- Back paws away from body
- Front paws away from body
- Jumping
- Leg stretching
- Marching
- Paw stretching
- Pawing
- Playing
- Scratching objects
- Scratching self

**Back paws away from body**

When the cat is in a lying down position and one or both of the cat's knees and back paws are not touching the cat's stomach or sides of body.

Note: Only score paw positions when cat is in one of the four lying down positions. If objects in the cage obstruct view of legs then do not record leg position. Score as back paws away from body when one or both of the cat's back paws are extended past the side of the shelf.

Legs should appear more straight than bent.

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**Front paws away from body**

When the cat is in a lying down position and one or both of the cat's front paws and elbows are not touching the cat's chest or sides of body.

Note: Only score paw positions when cat is in one of the four lying down positions. If objects in the cage obstruct view of legs then do not record leg position.

Note: Both of the cat's front paws away from body is an incompatible behavior with crouching.

Legs should appear more straight than bent.

**Jumping**

When the cat's front paws followed by the back paws leave the ground while the cat is moving in an upward or downward direction.

Include when cat changes location from a shelf to the top or bottom level or vice versa even if the video didn't record the actual jumping

Exclude when cat puts front paws on a shelf, but doesn't bring back paws to shelf. That would be considered standing or sitting on back legs.
**Leg stretching**

When the cat moves one or both of its front legs and/or one or both of its back legs away from its body.

Score as leg stretching when cat pulls leg away and then moves it forward.

Exclude when cat's legs move away from the cat's body in the process of changing body positions.

Exclude when cat stretches leg and makes contact with an object (brush) or cage or is reaching in the direction of the brush. That would be considered pawing.

Do not score playing or walking as leg stretching.

**Marching**

When the cat is in a sitting or standing position and it lifts one of its paws and then puts it down and lifts another of its paws and then puts it down.

This pattern may be repeated several times. The cat is paw stretching while it is marching.

Record paw stretching separately when marching behavior is observed.

**Paw stretching**

When one or both of the cat's front paws and/or back paws spreads out (usually revealing individual toes and/or claws).

Include when cat curls paw like it is making a fist.

Look for wrist movement up or down.

Exclude when cat spreads paws while grabbing an object (brush, toy, cat scratcher) since that would be scored as pawing, playing, or scratching.

**Pawing**

When the cat moves its front paws to touch an object (brush, cage, shelf) or a person.

Note: If you do not observe the motion of the leg stretching to touch the cage then do not record.

Do not score as leg stretching since leg stretching is part of the movement cycle of pawing.

Include when the cat extends its leg to touch cage or moves paw through the cage.

Include when cat stretches back leg to touch cage.

Include when cat moves one or both front or back legs in the direction of the brush.

Record paw stretching as well when appropriate.

Exclude when cat touches paw to carpet sandpaper that is considered scratching.

Exclude when cat extends its leg to touch a toy. That is considered playing.

**Playing**

When the cat uses one or more paws or its mouth to move a toy or item from beddings.

Include when cat accidentally touches toys and makes them move while walking or pawing at brush.

Do not score as leg stretching since that is part of the movement cycle of playing.

**Scratching objects**

When one or both of the cat's front and/or back paws are touching any part of any of the cat scratchers and the cat's paws are move in any direction.

This pattern is usually repeated.

Sometimes you can see the cat's claws.

Sometimes you can hear the noise that scratching objects makes.

Include when the cat has one or both front or back paws on the cat scratcher.
Scratching self
When the tip of the cat's front or back paw is touching the cat's body and then is moved in a downward or sideways motion. This pattern is usually repeated a few times. Sometimes you can see the cat's claws.

Desirable behaviors - Tail
- Tail away from body
- Tail high
- Tail wagging

Tail away from body
When the cat is in a sitting, lying down, or standing on back legs position and the half of the cat's tail that is closest to the base of the tail is not touching the cat's legs or body.
Include when the cat's tail is hanging off the shelf.
Note: If objects in the cage obstruct view of tail then do not record tail position.

Tail high
When the cat is standing or walking and the half of the cat's tail that is closest to the base of the tail is raised above the level of the cat's back.
Include when the base of the cat's tail is even with the cat's back, but the tip of tail curves above the back line.
Include when cat is lying down and tail is not touching the ground and is raised vertically.

Tail wagging
When the cat rapidly moves its entire tail in a side to side motion. For example the cat's tail moves to the left and then back to the right again or vice versa. This pattern may be repeated several times.
The cat's tail may be high or low. Note: Cat is highly aroused when this behavior is emitted. This behavior may occur before or undesirable behavior, but in the case of it is: only desirable behaviors followed tail wagging.

Desirable behaviors – lying down, sitting, standing, walking
- Approaching
- Crouching
- Lying down belly down
- Lying down belly up
- Lying down "L" position
- Lying down on side
- Rolling over
Approaching

When the cat is in a standing position and one or both of the front legs and one or both of the back legs are simultaneously moved in the direction of a person.

Exclude:
- Paw stretching, leg stretching, and pushing against

Crouching

When the cat is in a lying down belly down position with its weight on its front legs. One or both of the cat’s front paws and elbows are close to its body. One or both of the cat’s elbows are bent and not touching the ground.

Exclude when crouching occurs during the movement cycle from one body position to another e.g., lying down “L” position to lying down belly down. However, if cat is in one body position then crouches and returns to the same body position count as crouching.

Note: Cats typically crouch while eating.
Note: Do not count crouching as lying down belly down.
Note: Do not score leg position.
Note: Score tail as away from body when appropriate.

Lying down belly down

When the cat is lying down with its belly facing the ground and its hips and shoulders are up.

Note: Cat can stand up immediately from this position. The cat’s weight is on both the front and back legs.
Note: Record cat paws away from body when appropriate.
Note: Lying down and sitting positions score tail as away from body when appropriate. Read tail high notes for exception to rule.

Lying down belly up

When the cat is lying down on its back with its belly exposed facing upward.

Include when cat is in a lying down on side position and starts to move legs off of ground which exposes belly.

Note: Record cat paws away from body when appropriate.
Note: Lying down and sitting positions score tail as away from body when appropriate. Read tail high notes for exception to rule.
Count as both lying down belly up (LDBU) and lying down on side (LDOE) when cat’s shoulders are turned to the side and its back is on the ground with belly up.

Lying down “L” position

When the cat is lying down belly down with shoulders facing up and hips turned sideways. Right or left hip is touching the ground.

Note: Cat must roll its hips and put weight on back legs before being able to stand up from this position.
Note: Record cat paws away from body when appropriate.
Note: Lying down and sitting positions score tail as away from body when appropriate.
Note: Cat’s back is more of a straight line. It looks more flattened out as compared to the curved back posture when lying down belly down.

Lying down on side

When the cat is lying down on either side of its body with its right shoulder and hip touching the ground or left shoulder and hip touching the ground.

Note: Record cat paws away from body when appropriate.
Note: Lying down and sitting positions score tail as away from body when appropriate. Read tail high notes for exception to rule. Count as both LDBU and LDOE when cat’s shoulders are turned to the side and its back is on the ground with belly up.
Rolling Over

When the cat is lying down on its back, rolls to the other side of its body.

Desirable behaviors – lying down, sitting, standing, walking

- Sitting high
- Sitting low
- Sitting on back legs
- Standing high
- Standing low
- Standing on back legs
- Walking high
- Walking low

Sitting high

When the cat’s back legs are bent and its knees are touching the ground. Its front legs are fully extended and the bottom of the front paws are touching the ground.

Note: Do not score leg position.
Note: Lying down and sitting positions score tail as away from body when appropriate.
Note: Head is typically held high.

Sitting low

When the cat’s back legs are bent and its knees are touching the ground. Its front legs are bent and the bottom of the front paws are touching the ground.

Note: Head is typically held low.
Note: If Marvin, Waltis, or Gromit are sitting on the top shelves score as sitting low since they are too tall to fully extend their front legs. However, Alice is capable of sitting high on the shelves.
Note: Do not score leg position.
Note: Lying down and sitting positions score tail as away from body when appropriate.

Sitting on back legs

When the cat’s back legs are bent and its knees are touching the ground. The cat’s front paws are not touching the ground.

Note: Do not score leg position.
Note: Score tail as away from body when appropriate.

Standing high

When the cat is standing and its front and back legs are fully extended and its paws are in a fixed location.

Note: Do not score leg position.
Standing low

When the cat is standing and its front and back legs are bent and its paws are in a fixed location.

Note: Do not score leg position.
Note: Score tail as high when appropriate.

Standing on back legs

When the cat’s back legs are extended and its knees are not touching the ground. The cat’s front paws are not touching the ground.

Note: Do not score leg position.
Note: Score tail as high when appropriate.

Walking high

When the cat’s front and back legs are fully extended and one or both of the front legs and one or both back legs are simultaneously moved forward or backward.

Note: If cat's front legs are extended and back legs are bent or vice versa then score as both walking high and walking low.
Note: Do not score leg position.
Note: Score tail as high when appropriate.

Walking low

When the cat’s front and back legs are bent and one or both of the front legs and one or both of the back legs are simultaneously moved forward or backward.

Note: If cat's front legs are extended and back legs are bent or vice versa then score as both walking high and walking low.
Note: Do not score leg position.
Note: Score tail as high when appropriate.

Desirable behaviors – Not observed in F2F research

- Climbing cage
- Drooling
- Licking person
- Purring
- Running
- Toileting

Climbing cage

When the cat has 3 or 4 paws holding on to the side of the cage.
Drooling
When the cat’s saliva (liquid in the mouth) is visible on the cat’s lips or lower jaw.
The cat drips saliva from its mouth or the cat’s saliva leaves an observable wet mark on an object.

Licking person
When the cat touches the top part of its tongue to a person’s skin.

Purring
When the cat vocalizes with its mouth closed with a repetitive noise that is sometimes almost inaudible by humans.
When touching a purring cat, a person may feel a vibrating sensation.

Running
When one or both of the front legs and one or both of the back legs push off the ground and simultaneously move forward. This propels the body in a fast forward motion.

Toileting
When the cat is urinating, defecating, squatting, or digging in the litter box.

Undesirable behaviors - Head
• Distancing movement
• Ears down
• Eyes wide
• Hissing
• Moaning repetitively
• Whiskers flared (unwary)
Distancing movement

When the cat moves its head, body, paws, or legs away from a person. This is usually a fast motion.
When the cat jumps from one shelf to the other shelf in response to an approaching person or object.
Note: Record as jumping as well as distancing movement if these behaviors are emitted.
Exclude: playing and grooming
Cat may pull its legs away and then groom a part of its body.
Exclude when cat pulls away as part of a movement cycle e.g. pulls legs away and then does a leg stretch or is changing body position (falling to crouching)
Exclude when cat extends leg and then pulls it back as part of the leg stretching movement cycle.
Exclude head turning and ear turning.
Do not score as distancing movement if cat moves its front legs back to shift shoulders.

Ears down

When the tips of BOTH of the cat’s ears are moved downward and to the side in opposite directions.
The ears start out in a triangular shape and then they flatten out where the inside of the ear is less visible.
Include when only one ear is visible and is moved down.
Exclude ear turning when the cat moves one ear.
Exclude when cat paws ears down in response to coming in contact with an object such as the cage or shelf.

Eyes wide

When the part of the eye above the top of the pupil is visible.

Hissing

When the cat exhales loudly with its mouth open. The cat may or may not be showing its teeth.

Meowing repetitively

When the cat meows three or more times in one minute.
Score as meowing as well.

Whiskers flared

When the distance between the cat’s whiskers increases. The whiskers appear fanned out.
This behavior is typically followed by an undesirable behavior (hissing) during the negative reinforcement condition and by a desirable behavior during the positive reinforcement condition.
Note: Whiskers flared changes function after the switch over from shaping with negative reinforcement to shaping with positive reinforcement.
(Whiskers flared was omitted due to poor quality videos. Only Alice’s whisker flared were scored.)
Undesirable behaviors - Body

- Piloerection

When the cat’s hair on its back, tail, or sides of body are raised away from the cat’s body.

Undesirable behaviors - Tail

- Tail thumping

When the tip or the entire tail is lifted up and then forcefully hits the ground or an object. This pattern is usually repeated.

Undesirable behaviors - Body

- Piloerection

Undesirable behaviors – Not observed in F2F research

- Arching back
- Biting person
- Freezing
- Growling
- Pupils dilated
- Scratching person
- Spraying
Training Steps

**Approaching Cage:**
1-13. square numbers on floor 1-13

**Cage Door:**
14. reaching toward cage door
15. touching cage door
16. sliding latch over cage door
17. cage door open
18. cage door completely open

**Brushing Kitten:**
19. brush outside of cage door
20. brush inside at cage door entrance
21. brush reaching toward kitten
22. brush touching kitten
23. brushing kitten (side of mouth, sides of body, back, and top of head)

**Kitten Approaching Trainer:**
24. looks at brush
25. approaches brush
26. approaches left side of cage
27. approaches right side of cage
28. approaches front of cage

**Petting:**
29. pet with fingers on back
30. pet with hand on back
31. pet with hand from head to tip of tail
32. pet kitten from side of cage (optional)
APPENDIX D

TRAINING DATA SHEET
The training data sheet was used during fearful to friendly (F2F) treatment to record successful and unsuccessful trials.
APPENDIX E

CAGE LOCATION, HEAD, BODY, LEGS, TAIL, AND LYING DOWN, SITTING,
STANDING, WALKING DATA SHEETS
<table>
<thead>
<tr>
<th>Date</th>
<th>Behavior category: Head</th>
<th>Cond.</th>
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<tbody>
<tr>
<td></td>
<td>Head turning</td>
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<tr>
<td></td>
<td>Head down</td>
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<tr>
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<td>Head shaking</td>
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<td>Head facing</td>
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<td></td>
<td>Deep breath</td>
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<td></td>
<td>Balancing movement*</td>
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<tr>
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<td>Pacing</td>
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<tr>
<td></td>
<td>Tail</td>
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</tr>
<tr>
<td></td>
<td>Tail high</td>
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APPENDIX F

OUTSIDE OF CAGE DATA SHEET
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<th>Gromit</th>
<th>Alice</th>
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<thead>
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<th>Gromit</th>
<th>Alice</th>
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<td>eyes wide</td>
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<tr>
<td>ears down</td>
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<tr>
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<td>piloerection</td>
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<td>tail thumping</td>
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APPENDIX G

BEHAVIOR IDENTIFICATION GAME (BIG) FOR CATS DATA SHEETS
# Behavior Identification Game for Cats

(B.I.G.)

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<td>Grooming</td>
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<td>Tongue flicking</td>
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<td>6 7 8 9 10</td>
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<tr>
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<tr>
<td>Head high</td>
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</tr>
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<td>Head low</td>
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<td>Head shaking</td>
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<td>Head turning</td>
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<tr>
<td>Growling</td>
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<td>Hissing</td>
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<tr>
<td>Meowing repetitively</td>
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<tr>
<td>Eyes wide</td>
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<td>5 6 7 8</td>
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<tr>
<td>Pupils dilated</td>
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<tr>
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<td>Body stretching</td>
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<td>Freezing</td>
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<td>Skin rippling</td>
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<td>Hip shifting - down</td>
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<td>Pushing against</td>
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<td>Lying down - &quot;L&quot; position</td>
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<tr>
<td>Back paws away from body</td>
<td>Crouching</td>
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<tr>
<td>Back paws close body</td>
<td>Jumping</td>
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<td>Leg stretching</td>
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<td>Standing on back legs</td>
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<td>Marching</td>
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<td>Behavior category: Tail</td>
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APPENDIX H

BEHAVIORAL CONTINUUM
Friendly Body Postures

The goal of F2F is to shape behaviors along the behavioral continuum from least relaxed to most relaxed.

Friendly body postures include standing high, sitting high, walking high, head high, and tail high.

Head

Most relaxed ↔ Least relaxed ↔ Most relaxed

Head down high  Head low  Head
Legs

Least relaxed ➔ Most relaxed

Front paws close to body

Front paws away from body

Legs

Least relaxed ➔ Most relaxed

Back paws close to body

Back paws away from body
Lying Down

Relaxed ↔ More relaxed ↔ Very relaxed ↔ Extremely relaxed

Lying down
Belly down "L" position On side Belly up

Sitting

Least relaxed ↔ More relaxed ↔ Very relaxed ↔ Extremely relaxed

Crouching Sitting low Sitting high Sitting on back legs
Standing

Least relaxed ↔ More relaxed ↔ Very relaxed ↔ Extremely relaxed

Crouching  Standing low  Standing high  Standing on back legs

Walking

Least relaxed ↔ Most relaxed

Walking low  Walking high
APPENDIX I

EXPANDING BEHAVIORAL REPERTOIRES USING NEGATIVE REINFORCEMENT
REFERENCES


