THE TRAINING OF NONHUMAN PRIMATES WITH POLE AND COLLAR FOR CHAIR WORK USING POSITIVE REINFORCEMENT

By

EMILY GRACE FRANKLIN

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Approved by:

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Dr. C.J. Doane, DVM, DACLAM
Associate Director & Head, Clinical Services
University Animal Care, The University of Arizona

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For my honors thesis I wanted to do something involving animals and research. I started by talking to Dr. David G. Besselsen, DVM, PhD, Diplomate ACLAM, ACVP, Director, University Animal Care, Attending Veterinarian, University of Arizona. Through Dr. Besselsen I was able to connect with Dr. CJ Doane who agreed to advise me on my honors thesis. We started out doing database research in spring of 2015 thinking we would be studying the Pharmacokinetics of Transdermal Fentanyl in Domestic Farm Pigs (Sus Scrofa Domesticus). This study would involve the application of topical pain medications in order to reduce the stress of the animal. Pain control during lab animal procedures is very important to the animal's wellbeing as well as the ethics and lawfulness of the study. It is the top priority of the biomedical researchers, lab animal veterinarians and IACUCs to reduce or eliminate pain and distress in lab animals in compliance with federal mandates for use of animals in "scientifically, technically, and humanely appropriate" ways (National Research Council). Recently, new analgesics, pain relief drugs, have been created in an attempt to increase the length of relief. If a drug can be administered once and provide relief for many days, it would be considered superior to current methods which involve re-dosing the animal multiple times a day. The administration of drugs can be stressful or painful for the animal, especially invasive injections. Sustained release drugs not only give long term relief, but they maintain levels in the body at a steady state which means unlike re-dosing, there are no peaks and troughs of pain relief, it should be a constant level throughout the treatment. Drugs like sustained release buprenorphine (SRB), transdermal buprenorphine (TDB) and transdermal fentanyl (TDF) have emerged recently.

Our study would have sought to determine the levels of TD fentanyl in domestic farm pigs over the course of a week. We would be performing the study on domestic farm pigs because

they are commonly used for research at the U of A and worldwide and thus if better practices can be found to prevent pain and discomfort during and after procedures these techniques should be studied and pursued.

We planned to use pigs already coming to the lab for another study so that we would not need to purchase specimens exclusively for our study. This made our proposed study less expensive and meant less pigs needed to be euthanized or relocated at the end of the two studies. The existing study brings in 10 swine about 4 times a year to be used for all sorts of invasive surgeries in order to train medical students. The day of surgical procedures ends with euthanasia during anesthesia. We were hoping to swap some of the pain medication the animals already receive before and during surgery with a dose of transdermal fentanyl, an analgesic they were already getting intravenously. Transdermal analgesics are supposed to be better because they last for longer in the blood steam and at more constant levels. Confirming this would require a pharmacokinetic study of multiple blood samples per specimen.

Throughout the fall 2015 semester we made lots of progress towards the study. We created an amendment proposal to the current study involving pigs, we created a time line for the study, we held group meetings, and we did lots of database research leading up to a plan for our procedure. Unfortunately, in early December, a few weeks before the first pig surgeries, we were informed a bit unexpectedly that our amendment could not be approved due to cost of the drug and the pharmacokinetic analysis as well as other complications. We needed to find a new study and quickly so we would have enough time to get data and analyze it.

At a meeting in mid-December we were informed that we could begin to plan a replacement study involving non-human primates. Three new Rhesus Macaques were due to be out of quarantine on January 25th and then they would need to be trained via the pole and collar method

for chairing. The humane and positive reinforcement focused training of these monkeys is what we took on as our study.

Abstract

Nonhuman primates are used in laboratory research to advance our knowledge of behavior, disease, aging, memory, cerebral processes and much more. Research with primates may require physical restraint that allows the animal and handlers to safely perform specific tasks. Often, this means temporary restraint in a primate chair. In order to move a NHP between their home cage and a primate chair the pole and collar method is commonly used. A procedure in which a collar, often aluminum, is placed on the monkey and can be attached to a primate pole grasped by the handler. This allows controlled movement of the animal outside of their home cage. The many tactics for pole and collar training involve a varying mix of positive and negative reinforcement. Higher ratios of negative reinforcement than positive reinforcement can mean more stress for both the trainer and the trainee. Our goal was to show that mostly positive reinforcement, with very little negative reinforcement, is effective and timely for training the monkeys to enter the chair. We have broken down this training into 12 key steps. The three rhesus macaques from this study took an average of 28.7 training sessions to be fully chair trained.

Introduction

Research that involves awake, behaving primates often uses chair restraint, so that procedures and tasks can be performed on and by the monkey in a safe and controlled manner. In

the 1960's the stress and safety concerns of capturing a monkey and restraining it were combatted by "keeping the monkeys permanently restrained in primate chairs" (Glassman et al). Fortunately, the housing and restraint of primates has been continuously updated and made more ethical and humane; for example, there are new limits to how long a monkey can be restrained and how they are housed. Today, monkeys are housed in large cages and chaired using the pole and collar method. The pole and collar method used at each facility varies as there is no common procedure published. The chairing can range from mostly negative reinforcement to mostly positive reinforcement. Positive and negative reinforcement fall under the term operant conditioning (see table 1). Operant conditioning is the training of a subject to increase or decrease a specific behavior via the administration of desirable or undesirable stimuli. Negative reinforcement is the removal of an undesirable stimulus when the desired behavior is performed; an example of this is the reduction of squeeze when the animal calms down. Positive reinforcement is the addition of a desirable stimulus when the desired action occurs; for example, giving food treats when the animal performs the desired action.

Operant Conditioning		
	Desirable Stimulus	Undesirable Stimulus
Positive / adding stimulus	Positive Reinforcement	Positive Punishment
Negative / removing stimulus	Negative Punishment	Negative Reinforcement

Table 1

This means that chairing a monkey can involve lots of squeeze application and physical manipulation of the animal or it can involve minimal squeeze and maximized treat training. A mostly negative reinforcement tactic is argued for by saying it is faster to train this way. While potentially true, this method can be physically and mentally stressful for both the technician and the animal and may lead to association of the trainer, the pole, and the chair with stress or

anxiety. Our study sought to show that the animals can be relatively quickly chair trained through mostly positive reinforcement, a potentially more humane tactic with less stress. We hope this study can provide a step by step means for chair training so that the trainer and animal are both more calm during the transfer to and from a chair.

Positive and negative reinforcement are commonly used for all sorts of animal training both inside and outside of the lab. Probably the most documented species trained in these ways is dogs. Operant conditioning is training to increase or decrease certain behaviors by modifying stimuli. Operant conditioning can be divided into two categories, Reinforcement, the increasing of a behavior, and Punishment, the decrease of a behavior. Each of these can be further divided into two categories, positive or negative (see table 1). Positive reinforcement is the addition of a desirable stimulus when a correct behavior occurs, for example giving a dog a treat for sitting. Negative reinforcement is the removal of an undesirable stimuli when the correct behavior occurs, like turning off an obnoxious alarm when the dog sits. Positive Punishment is the addition of an undesirable stimuli when the wrong behavior is performed; if the dog does not sit when told they might be sternly scolded. Lastly, negative punishment is the removal of a desirable stimulus when the wrong behavior is performed, for example, not giving the dog attention when it is misbehaving. All four tactics are known to produce the desired results, an increase or decrease in a specific behavior, but some recent studies indicate that positive reinforcement may be most strongly correlated to obedience (Hiby et. al). In a study comparing positive reinforcement and negative reinforcement or punishment for training canine companions it was found that “the number of [problematic behaviors] reported by the owners correlated with the number of tasks for which their dog was trained using punishment, but not using rewards”

(Hiby et. al). This helps to indicate that reinforcement is more humane than punishment because it causes less additional problematic behaviors.

A 2003 article titled "The Use of Positive Reinforcement Training Techniques to Enhance the Care, Management, and Welfare of Primates in the Laboratory" discusses the various advantages that arise from using positive reinforcement in training and handling of primates. Positive reinforcement can lead to many benefits for the primates and the personnel, such as improved ability to care for the animal, improved trainer safety, reduced aggression, improved socialization, and improved relationship between handler and animal (Laule et. al). A recent paper published in the Journal of the American Association for Laboratory Animal Science (JAALAS) is titled, "Refining the Pole-and-Collar Method of Restraint: Emphasizing the Use of Positive Training Techniques with Rhesus Macaques (*Macaca mulatta*)." This team used almost exclusively positive reinforcement, giving treats when appropriate behavior was performed, to train their primates. This study trained their 8 monkeys in a mean of 85 days, 1085 minutes, or 17 weeks. Given the choice between over 4 months of training before a study can begin or just using faster, negative reinforcement tactics, chances are the lab will pick the quicker, cheaper methods. Another 4 plus months means 17 more weeks of feeding and caring for the primates before the study can begin. Our primate expert / lead trainer, Prisca Zimmerman, said that it should take "about 5 weeks" to chair train a monkey using positive reinforcement. Prisca has trained many monkeys using a positive reinforcement tactic, but up to now, no comprehensive data had been taken concerning how long the monkeys take to train this way. Our study goals were to chair train three newly acquired male Rhesus Macaques using Prisca's positive reinforcement focused tactics while recording notes about what each of the training steps were and how long each animal spent on them.

The JAALAS paper mentioned above described using the cage squeeze as "Negative reinforcement training" and said that it should be avoided. These researchers defined Negative reinforcement training as "the removal of an unpleasant action or aversive stimulus immediately after the desired behavior occurs, whose purpose is to increase the frequency of the behavior over time." The way in which our team uses the squeeze is different; we use it to restrict the space the animal can inhabit but we move the squeeze gently and calmly to move the animal to the front for sitting. The squeeze is not released immediately after they sit at the front, we first attach the hook or the pole, or give treats depending on what step is being practiced. We made an effort to train using treats and praise before having to use the squeeze for recalcitrant monkeys.

The article titled "Behavioral and physiological adaptation to repeated chair restraint in rhesus macaques" published in *Physiology & Behavior* by Ruys et al. discusses the effects of stress on chairing primates. Their study sought to examine the idea that after repeated training days the procedures are no longer as stressful and the animal can relax, habituation occurs. Their study found that even though behaviorally the animal appears to be less agitated, their brain chemicals indicate that they have not fully habituated to the task, there is still underlying stress. This makes our study all the more important because if the base level of stress is lower than the habituated level should be much lower.

Materials and Methods

We used three male rhesus macaques (*Macaca mulatta*) obtained from the California National Primate Research Center in Davis, CA. Ham was 6 years and 5 months old when acquired, Delta was 4 years and 5 months, and Eggo was 4 years and 7 months. The monkeys were housed in accordance with the Animal Welfare Act and PHS policy. The animals were put

in quarantine for the appropriate time consistent with CDC recommendations for domestic quarantine and were ready to begin training on January 25th. All work and training procedures were reviewed and approved by the IACUC as safe and humane for the animals and trainers. Starting with step one on the 25th our team went into the animal room on weekdays for training. The subjects were housed in a room together with just the three of them. Delta and Eggo's cages were attached, but they were not pair housed until 2-4-16, Day 6 of training. They are housed in specialized primate cages designed for the comfort and safety of the animals. They each have an aluminum Primate Products collar to which primate poles can be attached. Our training team included three key members; Prisca served as the lead trainer, Lierin Cox, a CVT in the animal care department, was the assistant trainer, and I recorded the notes, data and videos. We were overseen by Dr. C.J. Doane, DVM, DACLAM, and Associate Director & Head of Clinical Services at University Animal Care.

The following is a breakdown of the 12 steps Prisca used to humanely train these monkeys. Each step has basic details of the procedure as well as a "ready to move on" to the next step objective. It was important to keep in mind that each subject is unique in personality and eagerness to learn, so the animals will not all be on the same step during the same training day.

Steps for NHP Chair Training

1. Adjust animal to presence of training team in room. Give treats when they are calm and team is seated.
    a. Have team enter room in appropriate PPE and find the stools they will be sitting on during the sessions; being low to the ground is important so that the animals do not feel challenged by your presence.
    b. Once team is seated, have the main trainer give treats one at a time to the animals if they approach the front of the cage and take them calmly.
    c. Use phrases like "good boy," "good monkey," etc. So that they associate these verbal cues with treats
    d. Ready to move on when animals take treats calmly and do not run away after receiving them.

2. Partially open the door and have the animal reach outside of the cage for treats
    a. Have team seated in places
    b. Lock cage doors open about 1-3 inches wide, big enough for a hand but not the whole monkey
    c. Have the animal come sit at the cage door, use a gesture and a verbal cue. We used "come sit" and one hand pointing down at the floor by the door of the cage.
    d. Hold treats outside of cage, not up against the door like before, and have the animals reach out for them.
    e. Bananas or raisins are ideal for this because you can squish them in your hand and have the animal work harder to take them and thus have their hand outside the cage for longer.
    f. Continue to use the positive phrases when the animal calmly takes the treats by reaching outside the cage
    g. Ready to move on when animals take treats without snatching and extend arm outside of cage

3. Give treats with divider present in room and visible to them.
    a. Bring the divider into the room, prop them somewhere visible to the animals.
    b. Give treats when animals take treats by reaching outside of the cage calmly.
    c. Ready to move on when animals take treats calmly.

4. Place divider in the cage and have the animal go to the bottom, lock divider in place and give treats only at bottom.
    a. Open the middle section and put the divider about ¼ of the way in to ½ way in. Gesture and use a verbal cue to ask the monkey to go down, i.e. "go down"
    b. Early on in this step it will likely take holding treats at the top and then slowly moving them down to the bottom and placing on the door at the bottom for the monkey. Bribe them to go down.
    c. Once the animal is fully down, slowly close the divider the rest of the way such that the animal is locked in the bottom
    d. Give lots of treats when they come sit at door at bottom
    e. If an animal refuses to go down, the squeeze may be used, at the top apply about 3/4^{ths} of the squeeze such that the animal is up at the front of the cage, then apply a bit more such that the animal can be touched through the bars without it running away. This touching and squeeze will not hurt them if done appropriately, don't squeeze as far as you can, just enough to hold the monkey at the front. Rub the monkey's fur and let them know that the top is now a no fun place and that treats only come from the bottom.
    f. If after more than 6 days of training the animal refuses to go down and be locked under the divider, time wise it will be more efficient to train this animal to chair from the top. Keep in mind that this will make chairing harder overall for the

monkey and the trainer, but hopefully less stressful in the end than continuing to fight about going down.

g. Ready to move on when animal goes down for hand signals and vocal cues in about a minute or less without panicking and trying to go back up.

5. Introduce the hook tool. Have it nearby when giving treats. Then have them take treats from the hook. And eventually have them allow touching of their body and collar with the hook while giving treats.
    a. Bring the hook tool into the room and have it in the main trainer's hand when having the monkeys come sit in a divided cage.
    b. After they calmly take treats in the presence of the hook start by putting pieces of treats, i.e. banana or marshmallow, on the hook and let the animal take the treats from there
    c. Then once they calmly take treats from the hook, began to reach the hook into the cage to touch the animal and their collar.
    d. This may require about ¾ squeeze and lots of treats.
    e. Get them used to the slight banging sound of the hook on the collar but do not slip the hook through the collar loops in this step
    f. If the animal gabs the hook at all scold them, "no," and take the hook and treats away for a moment then begin again
    g. Ready to move on when the animal stays at the front of the cage, seated in the appropriate spot by the door and remains calm while the collar is touched with the hook and treats are given.
        i. At first treats will need to be given at the same time the collar is touched to keep the monkey in place, but it should get to a point where the collar can be touched repeatedly while verbal praise is given and then treats can be given.

6. Introduce the Pole tool. Touch their body and collar with the pole and have them sit calmly at the door of the cage.
    a. This will be similar to step 5.
    b. Bring the pole tool into the room and have the main trainer hold it in one hand and give treats with the other while the monkey is sitting in a divided cage at the door
    c. Once they are calm about this, begin to move the pole towards the animal while offering treats
    d. In this step the goal is just to touch the collar/animal, not actually attach the pole to the collar.
    e. For touching the collar, one might need to apply about ¾ squeeze to begin with to keep the animal at the front of the cage
    f. Ready to move on when the animal stays at the front of the cage, seated in the appropriate spot by the door and remains calm while the collar is touched with the pole

i. At first treats will need to be given at the same time the collar is touched to keep the monkey in place, but it should get to a point where the collar can be touched repeatedly while verbal praise is given and then treats can be provided

7. Attach hook and then pole to collar and have animal remain calm at the front of the cage.
    a. This step will likely be a challenging one that takes much of the time.
    b. When the animal feels the restriction of their movement from the hook (and then the pole) they tend to panic about this new sensation.
    c. First, divide the cage then use about ¾ squeeze. Hold treats at the door and once the animal is calm and sitting attempt to attach the hook through the collar loop
        i. This is when they generally run away with the hook attached.
        ii. Additional squeeze may be needed on the side of the cage opposite the door to limit the animal from running, remember not to crush the animal, just limit the movement
    d. Once the hook is attached, quickly but calmly attach the pole and release the hook
    e. Release the squeeze slowly and keep the animal at the front of the cage
    f. Give treats once the animal calmly sits at the front door of the cage with the pole on and squeeze off
    g. Ready to move on when animal takes treats and releases some of the tension on the pole by relaxing.
        i. Not ready to move on if the animal ragdolls, flails, tries to hide, or will not take treats.

8. With the pole on, have the animal move back and forth from the front of the cage to the back calmly and in smooth movements.
    a. Attach the pole and have the animal sit at the front of the cage for treats
    b. Then with a verbal cue, i.e. “Go away,” move them to the back of the cage
    c. Make them wait in the back until you say “okay, come back” or whatever verbal cue your team will use
    d. When they come to the front give treats.
    e. It is important that they get to the point where they move back and forth without crashing around or flailing
    f. Try to use the pole to keep them from speeding back and forth, make it smoother movements
    g. Use a hand gesture for stay and a verbal cue
    h. They tend to switch between going back nicely but not wanting to come forward and the opposite, coming forward nicely and not wanting to go back
    i. Ready to move on when animal calmly moves to the back without lunging, stays there as long as asked to and then calmly moves back to the front of the cage when requested.

9. Back and forth on pole with chair in room, to adjust to its presence.

   a. Bring the chair you will be using for your animal into the room and continue with the process of step 8
   b. Point to and interact with the chair at some points during the back and forth so they know it is coming next.
   c. This may only be a necessary step for the first animal in the room ready to chair, the rest will have seen the other animal chaired and thus will be familiar with the chair.
   d. Ready to move on as long as the animal continues to be calm during the back and forth.

10. Open the door of the cage while animal is on pole and have them move back and forth calmly without exiting the cage.
   a. Just like step 8 but now the door is open
   b. The animal should not be exiting the cage, or trying to
   c. Ready to move on when animal consistently moves back without lunging, stays put and then calmly comes to front for treats without trying to exit cage.

11. Chair the animal. Put on two poles. Have them stay while cage door is opened. Put chair in position and open it then have the animal exit cage and enter the chair.
   a. Place 2 poles on the animal, this may require ¾ squeeze to keep the animal far enough forward for attachment
   b. Then remove the squeeze and have the animal stay at the front of the cage
   c. Prep the chair, open its door and loosen any screws that need it
   d. Open the bottom half of the cage if chairing from the top so that if something goes wrong the monkey can be put away quickly.
   e. Open the cage door and have the monkey continue to sit.
   f. When both trainers, one per pole, are ready, ask the monkey to enter the chair with a verbal cue and tapping the chair and a slight tug to exit the cage
   g. The first few times the animal is double poled, exits the cage, and /or interacts with the chair, they will flail a bit
   h. Once the animal enters the chair, the trainers will likely need to back them out slowly to line up the collar
   i. Affix collar to chair and remove poles.
   j. Give lots of treats, rotate monkey so others can see him get all the rewards
   k. After a few times, roll the chaired animal around the room a bit and give treats.
   l. Once animal is calm try touching the head gently/petting them and then give treats, seeing as chair procedures usually call for head fixation/interaction it is important to get them used to this
   m. When letting the animal out of the chair use one pole and try to limit the speed of the animal so they do not just lunge back home.
   n. Ready to move on when the animal calmly and consistently can exit the cage and enter the chair without panic or chaos. Once in the chair the animal must be calm

to get treats and must return to the cage when prompted calmly, without rocketing back in.

12. Chair the animal using only one pole
    a. Once the animal consistently moves from the cage to the chair calmly on two poles you can move on to this step
    b. Follow the same process as 11 except only use one pole
    c. When the animal consistently does this properly and calmly, they are officially chair trained.

Results

Our animals were each successfully chair trained. Ham took 26 training sessions to complete all 12 steps. Delta took 33 training sessions, with 3 of those not counted towards his total, so 30 days. Eggo took 33 training sessions, with 3 of those not counted towards his total, so 30 days. Eggo and Delta have three days that are not counted because as of day 21 they were ready to begin step 11, but their collars did not fit the primate chair. Since Delta and Eggo were younger and smaller than Ham, they had blue collars on, which are 3" inside diameter with a 4" base. Unfortunately, the chair can only lock onto collars with a 5" base, like Ham's gold collar, which has a 3.5" inside diameter and 5" base. We ordered custom collars for Eggo and Delta that retained the 3" inside but had a 5" outer width. The custom collars arrived and were affixed just before training day 25.

Table 2 shows the time and days each animal spent on each step. Step 6 and 9 were skipped for Delta and Step 9 for Eggo (blue cells) because the animals were progressing so well. We felt they got plenty of pre-exposure to the chair while Ham was being trained, so step 9 was not necessary. The red cells indicate data lacking for time spent on the step; the camera would not allow for viewing or downloading of the videos recorded from these days, so the times on each animal could not be recorded. The total days per task per animal are still accurate as are the average days to train overall.

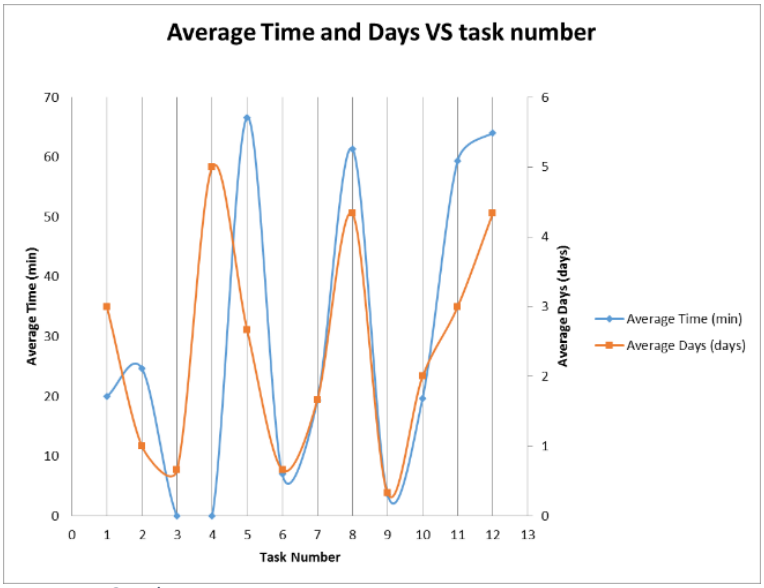
HAM			DELTA			EGGO		
Step number	Total Time on Step with animal (min)	Days on step	Step number	Total Time on Step with animal (min)	Days on step	Step number	Total Time on Step with animal (min)	Days on step
1	20	3	1	20	3	1	20	3
2	14.1	1	2	29.87	1	2	29.87	1
3	0	0	3	0	1	3	0	1
4	0	7	4	0	4	4	0	4
5	14	1	5	101.25	4	5	84.42	3
6	15	1	6	0	0	6	6	1
7	6	1	7	20	2	7	32	2
8	22	1	8	90	9	8	116	9
9	11	1	9	0	0	9	0	0
10	17	2	10	15	2	10	27	2
11	131	6	11	14	1	11	33	2
12	19	2	12	119	6	12	54	5

Table 2

Table 3 shows the average time and days spent on each task, this was calculated by averaging the values from Table 1. Graph 1 shows the average time and days spent for each task.

AVERAGES		
Step number	time on step (min)	days on step (days)
1	20	3
2	24.61333333	1
3	0	0.666666667
4	0	5
5	66.55666667	2.666666667
6	7	0.666666667
7	19.33333333	1.666666667
8	61.33333333	4.333333333
9	3.666666667	0.333333333
10	19.66666667	2
11	59.33333333	3
12	64	4.333333333

Table 3



Graph 1

Table 4 depicts the overall total days, minutes and weeks spent from start to beginning for each animal as well as the averages. (Table 1, Table 2, Table 3 and Graph 1 show the data with days 21-24 excluded for Delta and Eggo as explained above.)

Total Time training animal- until fullychair trained			
Here is the total time spent training the animal excluding days 21 - 24 to show our data more accurately.			
	days/sessions	minutes	weeks
Ham	26	249.1	5.2
Delta	30	367.12	6
Eggo	30	360.29	6
AVERAGES	28.66666667	325.5033333	5.733333333

Table 4

Discussion

Overall, it took Ham 26 days, and Delta and Eggo each 30 days to be fully chair trained. That gives an average of 28.67 days. This is significantly lower than the mean of 85 days that the McMillan team experienced. Our data indicates that using a positive reinforcement intense method the primates can be chair trained in a relatively short period. Previous studies indicate that positive reinforcement can lead to less stress during training than negative reinforcement or punishment. Many studies have found that stress leads to serious negative effects on the wellbeing of the animal and thus the quality of the research obtained from that subject. Stress can cause many varied problems in primates, from deficits and impairment of cognitive function (Arnsten et al.) to dysfunction of blood vessel linings (Strawn et al.). Behavioral studies with awake monkeys require the animals to perform tasks often while the brain and eye activity are closely monitored, if the animal is extremely stressed by the chair, its movements and brain chemistry will be varied from that of a calm monkey performing the task. Our tactics and steps could be used in all research involving monkeys and would likely lead to less stress for the animals as well as the trainers. This change for less stressful primate use methods not only will provide better data, but also is more ethical.

Current societal opinion seems to be geared towards moving away from primates in research. In December, 2011 The National Institutes of Health ceased funding for research involving the use of Chimpanzees. “Dr. Francis S. Collins, the director of the N.I.H., said that chimps, as the closest human relatives, deserve “special consideration and respect” and that the agency was accepting the recommendations released earlier in the day by an expert committee of the Institute of Medicine, which concluded that most research on chimpanzees was unnecessary” (Gorman). This 2011 restriction on chimp use has been furthered over the years and as of 2013

the NIH had retired all but 50 of their chimps to research free sanctuaries (NIH). At the time of the 2013 chimp use reduction NIH Director Francis S. Collins, M.D., Ph.D. said:

> "Americans have benefitted greatly from the chimpanzees' service to biomedical research, but new scientific methods and technologies have rendered their use in research largely unnecessary. Their likeness to humans has made them uniquely valuable for certain types of research, but also demands greater justification for their use. After extensive consideration with the expert guidance of many, I am confident that greatly reducing their use in biomedical research is scientifically sound and the right thing to do." (NIH)

In 2015 the NIH took the last step and retired the remaining 50 chimps with Collins saying "I have reassessed the need to maintain chimpanzees for biomedical research and decided that effective immediately, NIH will no longer maintain a colony of 50 chimpanzees for future research," (Watry). Different groups are responding to these changes in varied ways; to take two opposing beliefs let us look at how PETA and Speaking of Research responded to the cessation of NIH chimp use. PETA called for the cease of all animal testing and compared Collins to a sexual predator for his work with animals (Watry). Speaking of Research spoke about how the decision was unfortunate for scientific advancement (Watry).

The NIH will be convening this summer "in response to a congressional mandate… to review the ethical policies and procedures surrounding work on monkeys, baboons, and related animals" (Grimm). There are many varied opinions on these topics, but animal research is always moving towards more humane and ethical practices. The complete cessation of animal use in research would mean that no new vaccines or drugs or biomedical products could be made and used for improving human lives. Nonhuman Primates are used for studies involving AIDS, behavior, neuroscience, Ebola, immunology and much more. Without the use of NHPs in research the growth of our scientific knowledge and advancement of our treatment of human

diseases would greatly decrease. Primates are mankind's closet living relatives and thus are vital in studies involving viruses and ailments we have in common, like HIV and Alzheimer's disease. Our study follows this trend of improving conditions for NHPs used in research. By using our time efficient and potentially less-stressful, positive-reinforcement chair training procedure, the primates and the technician may both be calmer and safer during interactions. This method definitely should be researched further; our study confirms that a mainly positive reinforcement method can be used to train monkeys for chairing in 5-6 weeks, but we did not take data on the stress levels of our animals. Further studies would need to be conducted to confirm that not only is the method time efficient but that it truly is less stressful on the animals. Many studies have linked positive reinforcement with reduced stress, but none directly in terms of chairing primates using the pole and collar method.

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