BENJAMÍN SCHULTZ-FIGUEROA

The Celluloid Specimen

Moving Image Research into Animal Life

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Benjamín Schultz-Figueroa

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Introduction

*The Celluloid Specimen: Moving Image Research
into Animal Life*

Looking through the index cards at the archives of the Yerkes National Primate Research Center, one will find traces of Mona, a chimpanzee who died on September 24, 1942.[1] Like many laboratory animals, Mona continued to produce scientific evidence as a specimen saved within the laboratory's collections long after her death. Her body currently exists as item cards in the lab's filing system: her cadaver, head with brain, placentas and umbilical cords from two births, uterus, fallopian tubes, and ovaries each have different entries. But alongside these anatomical remains, Mona is also present in four cards representing films that document her interactions with her children and her performance during intelligence tests. Within this filing system, and that of many other animal labs across the globe, film reels have been itemized with body parts, experimental observations, lab notes, published findings, and other ephemera, each existing alongside the other as scientific documents of animal life to be preserved and stored for future use.

How should we approach these traces of Mona in the scientific archive? What do they tell us about the history of animal research, the role of animals in society, and their representation on film? Such films certainly stand as a visual record of how science was practiced, as well as providing a testament to the lives of animals like Mona that were dramatically transformed in the name of scientific discovery and progress. To conceptualize these overlapping dynamics, I have taken to calling animal research films *celluloid specimens*. This term evokes the central dynamics that define films like those at the Yerkes National Primate Research Center. Beginning in the mid-eighteenth century, the term *specimen* was used to refer to "a part or portion of some substance or organism, etc., serving as an example of the thing in question for purposes of investigation or scientific study."[2] In specifying

a severed "part or portion," the word points to the violence of Mona's dissection, as well as the act of selection that brackets what is being studied. Specimens are defined by their role as evidence for specific scientific projects, which dictate what is saved and what is not. Like the films of Mona, specimens are items to be categorized, stored, and compared within a filing system and therefore integrated into an epistemic network. As actual corporeal portions of an animal, specimens are also signs of that animal's life, indexes of its ontological existence at some point in the past. And finally, specimens are preservations—usually maintained via formaldehyde—and thus continue to hold meaning long after both the death of the original animals and the completion of the scientific projects that made them. Whether relying on celluloid or formaldehyde, specimens are the end result of chemical processes that transform living, breathing beings into objects of scientific study. In coupling *celluloid* with *specimen*, I mean to refer to how all of these dynamics are present not only in preserved sections of animals' bodies but also in the scientific research films depicting animal experiments.

Celluloid specimens are artifacts from the history of scientific experiments with animals. But they are also films, part of a larger media history and context. The animal researchers studied in this book were important interlocutors with filmmakers working in educational filmmaking, ethnographic filmmaking, and sponsored filmmaking, and the methods and theories used to make their celluloid specimens were created in dialogue with these central forms of nontheatrical cinema. Additionally, celluloid specimens were often created as experiments into *what film could capture through the image of an animal*—proposing variously that films of animals could visualize pure thought, the processes of history and culture, and the influence of environment on an organism. In this capacity, creators of celluloid specimens often proposed their own theories of media and their relationship to living organisms, theories that intersected with and influenced major media studies figures such as Marshall McLuhan and Noam Chomsky. But perhaps more important, the scientists filming celluloid specimens often created new types of aesthetic and technological approaches to representing animals onscreen. These techniques exist alongside more well-known approaches from narrative and wildlife filmmaking. Studying these films therefore reintroduces a major strain of animal representation that has been largely left out of the discussion.

By focusing on the production, distribution, and reception of celluloid specimens, this book contributes to a growing body of scholarship dedicated to the scientific uses of film.[3] *The Celluloid Specimen* expands this field into the animal laboratory, a thriving area of cinematic production where thousands of animal research films were created as laboratory notes, teaching aids, moving illustrations, and archival records. As such, this book also contributes to philosophical and ethical debates about the use of animals in society, as well as scholarly considerations of the aesthetics of animal representations in the moving image.[4] As the first book to focus exclusively on the aesthetic techniques and ethical stakes

of animal representation in American laboratory filmmaking, *The Celluloid Specimen* extends conversations within critical animal studies into new, unsurveyed terrain. I will show that different analytical techniques and approaches are needed for us to understand the political significance of the onscreen animals in scientific films. It is my hope that this book will provide such conceptual tools to a broad community of scholars interested in the representation of animals on film.

Like many so-called useful films, celluloid specimens are interstitial objects that are usually thought of as passive recordings of scientific research with little to no intrinsic interest in and of themselves.[5] Hundreds, if not thousands, of celluloid specimens have been left to languish unseen in the vaults of labs, universities, and archives. But when examined in their own right, animal laboratory films are revealed to be rich historical, political, and aesthetic texts that have played crucial roles in the history of science and cinema, as well as in broader social histories. In many research labs, the moving image has been used as an essential tool for transforming complex, often unpredictable, living things into specimens that can be studied in an orderly fashion. Animal researchers have produced novel ways of representing living animals onscreen in the pursuit of research agendas, presenting them in ways that differ significantly from other cinematic portrayals of nonhuman life, such as nature documentaries, animated features, or other forms of animal narratives. Despite the centrality of animal testing for many scientific disciplines and the abundance of films produced on this subject, film scholars have not yet written the history of this cinematic form. Yet it persists as a hidden material record of experiments with nonhuman life that reaches back to the beginning of the twentieth century.

The films of Mona at the Yerkes National Primate Research Center are good examples of the multifaceted dynamics at play in celluloid specimens. Taken at face value—especially for nonscientific audiences—these films attest to the violence and imprisonment forced on Mona, the ways in which she was restricted in her movement, and how her body was disassembled in the name of science. From this perspective, film was an extension of her violence and capture.[6] And perhaps even beyond simple violence, they also document elements of cruelty, the ways in which Mona and other research animals were often physically or psychologically tortured by their keepers in the name of science. Moments of jarring animal suffering are nearly ubiquitous in the history of celluloid specimens, and I will necessarily return to them throughout this book.

But if these films served solely as accounts of nonhuman pain performed in the name of science, there would be very little reason to examine them. Indeed, there is a long and violent history of animal cruelty in the name of scientific discovery and innovation. But what makes such films important objects of study is their startling effectiveness as tools for shaping scientific discourse and social governance—a function that affects humans and animals alike. These films served as central components within scientific research programs whose findings influenced the

shape of major facets of twentieth-century American society.[7] If we continue looking beyond solely the violence and cruelty contained in these cinematic images, we can focus on their content and purpose. In the case of Mona, she was filmed as part of Robert Yerkes's primatology research. Yerkes, a known eugenicist, produced images of chimpanzee maternal behavior and intelligence as part of his larger political project, where they served as pieces of evidence that were meant to justify particular policies in the scientific management of race, species, gender, and genetics. In his various leadership roles within powerful American scientific and governmental institutions—president of the American Psychological Association, chairman of the Committee on the Psychological Examination of Recruits during World War I, "Expert Eugenic Agent" for the House Committee on Immigration and Naturalization, chairman of the Committee on Inheritance of Mental Traits at the Eugenics Records Office, and chairman of the United States National Research Council's Committee for Research in Problems of Sex—Yerkes contributed to some of the most important political debates of his time. As we will see in the chapters dedicated to him, his rise to positions of power was predicated on his psychological experiments with animals like Mona, and the decisions he made in these positions were directly influenced by the theories of species that he developed while studying Mona and her kindred. Recognizing this role for Yerkes's research is to also recognize that the films of Mona are not only scientific recordings but also political texts.

Thus, to fully address the complexity of celluloid specimens, it is important to recognize that they are simultaneously important pieces of scientific findings and of political rhetoric. Yet they are not entirely defined by their status as "texts." Looking at the Yerkes films, we also see traces of Mona herself—a primate who is estimated to have been born in 1913 in Sierra Leone and subsequently lived with Cuban socialite Madam Rosalia Abreu in her primate colony in Havana before being donated to the Yerkes lab.[8] Mona gave birth to six children in the Yerkes laboratory—Cuba, the twins Tom and Helene, Mon, Ami, and Mu. She died from a bacterial infection at the age of twenty-nine. Celluloid specimens like those at the Yerkes National Primate Research Center contain traces of long-gone life-forms and speak to experiences of confinement and invasive testing. The analysis of animal research films can thus play a recuperative role, one that refuses to allow Mona and her kind to recede quietly into obscurity.

Finally, we might also ask what Mona's images mean for us today. How do the theories, policies, and institutions built on findings extracted from Mona's body and behavior continue to operate in the twenty-first century? In what ways does Mona's life still resonate outside the walls of the laboratory that studied her and the archive that preserves her? Understanding that celluloid specimens have at times played important roles in crafting social policy and creating institutional tools of governance and control, there are good reasons to think that animal research films will continue to be a prevalent force defining our politics going forward.

BEHAVIORIST CELLULOID SPECIMENS:
A CINEMA OF OBSERVATION AND CONTROL

This book specifically analyzes the celluloid specimens created by behaviorists working in the early to mid-twentieth century. It tells the story of how the moving image was adopted by comparative psychologists working in the 1910s, 1920s, and 1930s as a tool to record psychological states, how the medium was then shifted into a means of modeling human behavior with animal subjects during the mid-1930s and 1940s, and finally how it was stripped of its evidentiary status by later "radical behaviorists" who simply saw it as another form of visual stimuli. Each shift is presented through the analysis of a central character: Robert Yerkes stands in for the early period; Neal E. Miller exemplifies the use of film as a form of modeling; and B. F. Skinner represents the later radical behaviorists. These figures were all at the center of their respective movements in comparative psychology. Yerkes's work represents psychology's early attempts to establish itself as a social science with its own empirical practices; Miller was a central member of a movement based out of Yale that was responsible for reviving the behaviorist brand after its decline in the 1920s; and Skinner, one of the most renowned scientists of all time, brought his own version of behaviorism into the public discourse at an unprecedented scale. Skinner's eventual decline in popularity during the late 1970s and 1980s—even as many of his ideas were being adopted and implemented in institutional settings like the classroom, the prison, and the asylum—signaled the eventual fate of behaviorism itself, whose concepts would continue to be practically applied even as they are rarely discussed.

I have chosen to focus on this particular field—as opposed to other forms of animal research—because of behaviorists' aspirations for shaping policy and governance as well as their essential reliance on using nonhuman animals as research subjects. Together, these dynamics make behaviorism a perfect case study for understanding how scientific films of animals have functioned as political texts, allowing us to draw clear connections between filming an animal experiment and shaping social policies. The scientists I study here made such connections themselves. Yerkes described his primate films as evidence of the validity of his eugenicist platforms; Neal E. Miller, alongside his colleagues, created rat films in order to model human behavior in a variety of cultural and institutional settings, such as classrooms, factories, and even lynch mobs; and B. F. Skinner described film as a means of exerting behavioral control over humans and animals on a society-wide scale.

One of the most influential movements in psychology, behaviorism is largely a child of the twentieth century, emerging out of many of the same concerns over empirical observation that led to the creation of film itself.[9] The discipline's origin is usually attributed to a 1913 speech by the psychologist John B. Watson, which was subsequently published as the article "Psychology as the Behaviorist Views

It."[10] Watson asserts that psychology should be an experimental science based on verifiable observations. He argues that rather than attempting to describe the internal thoughts, feelings, and desires of their subjects, behaviorists should study and test how those subjects acted in different controlled settings. This approach contrasted sharply with the symbolic analyses and theoretical frameworks used by other contemporaneous forms of psychology, such as Freudian psychoanalysis or gestalt theory. Drawing from Darwin's theory of evolution, which placed humans within a "continuity of species" that included animals, and building on the earlier work of animal experimentalists like C. Lloyd Morgan, Herbert Spencer Jennings, and William James, Watson developed his argument at a moment when the common lineage of humans and nonhumans was a well-accepted fact in scientific communities.[11] Within this context, his article champions animal experiments as a means of revealing "a unitary scheme of animal response, [which] recognizes no dividing line between man and brute."[12] He reasoned that if human behavior is an extension of animal behavior, experiments with managing animals and their social interactions could lead to similar procedures for human management. This managerial component was essential for how Watson conceived of the field, writing that it was a brand of psychology for "the educator, the physician, the jurist, and the business man," a management tool for use in each of the various arms of society.[13]

Behaviorism went through periods of rapid ascension and decline. After an initial burst of interest and controversy over Watson's work, behaviorism did not truly take off until the 1930s. From then until the 1950s, behaviorism became extremely popular with students of psychology, largely becoming the lingua franca of the discipline. It was then largely superseded by developments in cognitive science and neuropsychology. Despite falling in and out of favor throughout the twentieth century, Watson's approach ultimately did succeed in revolutionizing the field, eventually leading to major developments in human engineering, urban planning, and artificial intelligence, among other disciplines. Indeed, historian of psychology John Mills goes so far as to claim that behaviorism and American psychology generally have become indistinguishable, despite how the movement has fallen out of fashion.[14] When looking at the practice of psychology at the turn of the twenty-first century, Mills saw traces of behaviorism everywhere, from the use of animals to test concepts, to the attempts to predict and manage behavior based on past observations, to the implementation of psychological theories in industrial and commercial spheres. In many ways, these aspects of behaviorism's ongoing influence have heightened exponentially, as increasing computational capacity has been dedicated to the pursuit of behavioral control.

At each step of behaviorism's development, one finds the dual presence of animals and cinema, which operated as fundamental tools for achieving the field's far-reaching sociopolitical goals. Early behaviorists were fascinated by the medium and often drew connections between their laboratory experiments and the experience of watching a film. The latter half of Watson's career, which was dedicated to

the study of human sexual behavior, was itself inspired by his work studying the effects of anti-VD films on soldiers during World War I.[15] In one early publication, Watson presaged his own cruelty toward animals and children by equating scenes of violence in a film to the stimulating effects he observed when administering electric shocks to humans and animals in the lab. He also heartbreakingly describes how the promise of watching a film was the only way to stop an eight-year-old child from crying after receiving such a shock in his lab.[16] Watson later rearticulated these themes when he created his own film, *Studies upon the Behavior of the Human Infant: Experimental Investigation of Babies* (1923). This film claims to depict how a young child, named "little Albert," was conditioned to fear rabbits.[17] Generating lasting controversy, it first shows Watson introducing a variety of animals to the infant Albert, who observes them with neutral interest.[18] The film then cuts to months later, after the child has been supposedly conditioned. Albert is now terrified to touch the rabbits or even any furry rabbit-like object. This film establishes many of the characteristics that will define behaviorist films going forward: shot from a single, stable camera angle, the frame is used to delimit what portions of the laboratory setting are visible to the audience. This tight control over the parameters of the onscreen experiment is also exerted through the film's constant cutting (the standard shot is six seconds long), which renders invisible the actual conditioning of the child. Finally, the presence of the filmmaker/scientist, who is played by Watson himself, has access to all the spaces prohibited to the viewer. Walking in and out of frame to introduce and remove the animals that frighten the child, erasing many of the traces of his own interventions through the editing of the film, Watson's onscreen character deploys and withholds the evidentiary power of the moving image at will. Like Méliès's magician in the theatrical trick films of early cinema, Watson's scientist/filmmaker colluded with the form of the medium itself to display impressive feats of control and power over the children and animals onscreen. In this initial work of behaviorist filmmaking, it is already clear how much cinema has to offer the field in terms of controlling filmed subjects and eliciting them to perform for the camera lens. The film also establishes a direct link between this act of filming and enacting physical or psychological violence, a pattern that, unfortunately, continued. *Studies upon the Behavior of the Human Infant* thus creates a particular gaze—a gaze that refuses sympathy with its human and animal subjects and exerts control over these subjects as part of the act of looking—which will be repeated in many films to come.

In other ways, though, Watson's film is an outlier in the history of behaviorist filmmaking, particularly in its use of animals as stimuli rather than as subjects of an experiment. Watson's willingness to publicly display his damaging experiments on human children was quickly considered an ethical travesty. Later scientific films were instead made with a vast menagerie of other animals—rats, pigeons, primates, cats, dogs, monkeys, and more—in order to study, monitor, and control a sprawling set of behaviors from mating to working, giving birth to developing an

VIDEO 1. Clip from *Studies upon the Behavior of the Human Infant: Experimental Investigation of Babies* (John B. Watson, 1923). DOI: https://doi.org/10.1525/luminos.145.1

addiction, learning a new skill to participating in mob violence. In each instance, different species were chosen for the behaviors they could perform, as well as their more intangible social and symbolic statuses. The three scientific filmmakers around which this book is organized—Yerkes, Miller, and Skinner—selected their different test animals based on their capacity to illustrate the scientist's research. On the one hand, Yerkes was interested in what he called "ideation," the processes of the intellect, and thus chose to work with high-functioning primates. Miller, on the other hand, was concerned with the ways that different cultures create their own personality types; thus, he chose rats because of their ability to stand in as a standardized form of life that could be repeatedly tested in different conditions. For his part, Skinner found that pigeons were both amenable to being conditioned in the lab and served as powerful rhetorical devices—since viewers were frequently shocked to see what these supposedly stupid birds could be trained to do.

Each section of this book therefore focuses on a specific scientist (Yerkes, Miller, Skinner) *and* a specific set of experimental animal subjects (primates, rats, pigeons). But each section also features a distinct affective relationship to power that was embodied in the research being conducted. I categorize these relationships under the headings of "sympathy," "modeling," and "control." Although only the first of these groupings is recognizably emotional in its content, all three required complex arrangements of scientists, technologies, and animals that demanded

particular affective postures and responses from each. "Modeling" and "control" may sound clinically objective, yet producing such perspectives requires deep conceptual and technological interventions into the sensing bodies of both animals and scientists. As Claude Bernard—one of the founding figures of animal experimentation and vivisection—infamously wrote, the experimenter "no longer hears the cry of animals, he no longer sees the blood that flows, he sees only his idea and perceives only organisms concealing problems which he intends to solve."[19] Here, even the pursuit of an abstract idea is clearly rendered as an embodied experience of sensing organisms who adopt and reject particular affective relationships with one another.[20] Scientific objectivity, modeling, and control are all specific brands of emotional labor, just as much as scientific uses of sympathy.

It is my contention in this book that moving images were central in the creation of all three of these affective relationships. In each instance, film was used for its capacity to perform different scientific functions. The first section of the book is dedicated to the primatologist Robert Yerkes's use of film as a means of creating a sympathetic rapport between scientific audiences and his animal subjects. In this section, I study Yerkes's use of mediated sympathy in three different settings—his planning and implementation of intelligence exams during World War I, his use of film as a means of transforming scientific discourse, and the position of his films within the wider popular culture of primate cinema—each of which is the topic of its own chapter. In each site, we will see how film was used to facilitate emotional projections and sympathy across differences as a means of supposedly accessing hidden truths about the minds of others. This emotional experience was at the heart of Yerkes's scientific work, and he often produced accounts of such experiences as the finished outcome of his research. Moreover, sympathy was essential for how Yerkes articulated his belief in eugenics, which he envisioned as an enlightened form of progress through the management of race and species. Yerkes argued that social hierarchies should be built and maintained through a sensitive deployment of understanding for how different groups of people and animals experienced the world. His sympathy therefore came with an implicit threat: to better know the other was a way to better contain and confine them. Film's use in this process was equally troubling, modeling the subject position of the eugenicist managers who could see into the very minds and hearts of those they control.

The second section of the book is dedicated to the experimental rat films made throughout the mid-twentieth century—focusing primarily on Neal E. Miller's *Motivation and Reward in Learning* (1948), which emerged out of a prevalent critique of Yerkes and his fellow eugenicists. Rather than picture difference as a property inherent to an organism that could be revealed through film, Miller and his colleagues proposed that difference was the end result of an ongoing relationship between organisms and their environment, a development that their films set out to capture. Here, film was considered a type of model, one that was primarily abstract in nature. In the three chapters constituting this section, we observe how

this modeling was produced through the creation of *Motivation and Reward in Learning*, in the broader genre of the lab-rat film, and in the screening of these films in classroom settings. I argue that animal modeling was a particular form of affective labor, one that involved what Donna Haraway describes as "shared suffering" from both the scientists and their lab animals. I expand this idea to show the ways in which shared suffering was not limited to the events of the lab but often extended to the sites where laboratory findings were used to govern or where films of the lab were screened. I conclude that, as a form of abstraction, onscreen animal modeling of human behavior takes on an essentially different set of registers and political stakes from Yerkes's approach. Miller and his peers sought to explain a wide array of disparate social actors and actions with their filmed rodent models, from the racial violence of lynch mobs to the workings of class in American society, from child socialization to the effects of overpopulation in urban centers. In these instances, the trifecta of rat, film, and model became a tool for simplifying and controlling massively complex social issues through manipulations of and interactions with nonhuman animals.

The final section of the book focuses on the use of film as a means of control through the work of B. F. Skinner, who was a persistent critic of the essentialism of Yerkes and his films and of the theoretical modeling deployed by Miller and his peers. Rather than use film to represent a truth about his animal subjects or to simulate scientific principles of behavior, Skinner purposely used film and later television to exert control over viewers. Whether conditioning pigeons to guide missiles, scientists to distrust their own models, or the broader American public to embrace his research—each the topic of a chapter—Skinner consistently framed the moving image as a means of shaping the behavior of spectators, both human and nonhuman. The public fallout from his theories—especially when he proposed their use to abolish prisons and private property—led to his becoming a deeply contested figure throughout the 1960s and 1970s, a time when comparative psychology's political stakes were hotly debated. Even as Skinner's techniques of control were consistently integrated into prisons, classrooms, and asylums, his detractors argued that Skinner was stripping the human of all that was exceptional to it. The onscreen image of the pigeon became a potent symbol for the posthuman politics of control, one that simultaneously evoked visions of dystopia and utopian societies to come.

Portions of the lives of Skinner's pigeons, Miller's rats, and Yerkes's primates remain preserved in the films that feature them. As the category of "celluloid specimens" suggests, these films are in some ways morbid objects, containing the remains of long-dead animals, yet the debate over their meaning is still very much alive, continuing to be contested, as science, culture, technology, and ecology shift around them. Ultimately, I ask not only what these films *have* meant for animals, scientists, and viewers at large but also what else it is *possible* for them to mean, either for us today or at some point in the future. Sympathy across species boundaries,

political modeling with human and nonhuman organisms, and interspecies networks of control are all part of our current field of contested politics, picked up by different actors and used for different purposes. I turn to these contemporary extensions in the book's conclusion, where I consider the status of celluloid specimens today. Arguing for a unique form of historiography based on the nonhuman listening and maneuvering practice of echolocation, I emphasize the ways in which animal research films made by midcentury behaviorists continue to resonate with ongoing issues surrounding the use of standardized tests, drone warfare, and educational media, while also considering their relationship to new moving image representations of animal experiments coming out of cognitive psychology, genomics, and zoology. In this context, films like those of Mona—hidden deep in the storage racks of the Yerkes laboratory archives—can speak volumes about many of our most pressing contemporary issues if only we care to listen to them.

BEYOND ENCOUNTER: APPROACHING ANIMAL IMAGES AS INFRASTRUCTURE

As a scholar working within the conceptual frameworks of critical animal studies and film studies, I found myself unexpectedly confounded by many of the films that I watched while researching this book. What should I take from Yerkes's simultaneous love of his primates, his claim that film could undo the boundaries between human and animal, and his deeply racist worldview? How could I make sense of abstract images of rodent behavior that were being used as explanations for the horrors of a lynching? How should I reconcile Skinner's apparent use of film to transform animals into killing machines *as well as* utopian critiques of capitalism? The theories from critical animal studies and film studies that I had on hand for analyzing such animal images were not up to the task of reckoning with these contradictions.

Ultimately, I drew from fields like nontheatrical film studies and the history of science in order to understand how these films functioned as political texts within their various institutional settings. But in doing so, I ended up developing different ways of approaching onscreen animals that largely diverge from how such discussions have evolved in film studies over the last two decades. As I demonstrate below, film scholars have focused primarily on framing animal films *as encounters*, debating whether the animals in them have agency over how they are presented onscreen and the effects that such images might have on human viewers. Yet this framework does not approach the primary political significance of films like those studied here. Therefore, instead of an analysis of film-as-encounter, I propose an infrastructural approach to animals on film, one that positions their meaning within their historical and institutional contexts. Doing so will allow me to radically destabilize the stakes of debates over animal agency and cross-species contact from how they have been treated up to this point.

The film scholar Anat Pick's *Creaturely Poetics: Animality and Vulnerability in Literature and Film* represents some of the best writing of the prevailing film-as-multispecies-encounter discourse.[21] Pick studies the poetics of watching animals onscreen, exploring how such experiences of spectatorship can dramatically, even spiritually, transform viewers. In the first pages of the book, she defines her ontological approach in contrast to historical studies of humans and animals. Citing the philosopher Matthew Calarco's *Zoographies: The Question of the Animal from Heidegger to Derrida*, she writes: "animal studies entails more than 'a historical and genealogical analysis of the constitution of the human-animal distinction and how this distinction has functioned across a number of institutions, practices, and discourses.' It should aim for an 'alternative ontology of animal life, an ontology in which the human-animal distinction is called radically into question.'"[22]

In Pick's view, historical circumstances are mere distractions from the more important work of undoing human-animal divisions. Finding common cause with André Bazin's realism and Roland Barthes's notion of the *punctum*, Pick focuses on the ontology of the cinematic image, which she argues creates an "encounter with wounding finitudes" between humans and animals.[23] In other words, she claims that viewing indexical images of other species can create a recognition of shared mortality and singularity across the human-animal divide.

Pick's approach is representative of the one adopted broadly in film studies, where transformative encounters and moments of contact with onscreen animals are prioritized over the institutional or historical contexts that define how human-animal distinctions are made. In the work done by Pick and others working with a similar approach, the central questions are how and whether animal alterity can be represented onscreen, which formal practices enforce or undo anthropocentrism and anthropomorphism, and how indexical images of animals might transform human spectators. These works focus closely on the aesthetics of individual films, asking how they might create new experiences of spectatorship "in which the human-animal distinction is called radically into question."[24] Cumulatively, these scholars argue that animal images are forms of encounter and engagement with their profilmic subjects—experiences that have the potential to generate new ethical, political, or philosophical formations.

Analyzing film as a form of encounter has its limits, though, especially when one is dealing with nontheatrical films like celluloid specimens. Interspecies encounters are primarily interpersonal phenomena, resting on individual experiences between humans and animals. As such, focusing exclusively on the moment of encounter erases the dispersed rationales and institutions that surround the production and distribution of animal films, factors that are especially important for understanding how nontheatrical films create meaning. Pick argues that this erasure is a necessary move in order to understand animal films' transformative potential, especially in the context of scientific research. Discussing Frederick Wiseman's *Primate*, the 1974 exposé of the Yerkes National Primate Research

Center, Pick argues that only by "muting" or "dumbing down" the scientific reasons for animal experiments can we face animals as they truly are: living, vulnerable beings like ourselves.[25] No longer caught up in the dense technical language of scientific research, she claims that Wiseman's film and others like it allow us to question the fundamental ethics of our relationship with animals—a relationship that she sees as superseding and escaping rationales given for conducting the experiments in the first place.

Pick may certainly be right that animal test subjects must be removed from their scientific context to be fully seen, but there are also significant downsides to the elisions she advocates. The first of these downsides is the flattening out of all scientific reasoning as basically equivalent, with no distinction between, say, animal testing to develop new pharmaceutical drugs versus developing a vaccine. Pick argues that considering such differences lessens the impact of the onscreen traumatic cruelty that audiences witness, distracting them from the main ethical challenge of acknowledging animals as living, sentient beings who deserve recognition as such. But this position leads to a second, more serious, downside: scientific politics manifest precisely in these details that are being erased in order to more fully see the animal. How scientists intend to use the findings they produce through animal research is crucial for understanding the ways in which this research will intervene in society at large. By focusing on only the experimental scene of the laboratory, and consciously eliminating the broader discourses and applications of the research developed there, we lose touch with the differing political and historical stakes of each experiment. Only by widening our scope to include such social phenomena can we begin to truly think through the imbrications of human and nonhuman politics writ large.

The pitfalls of a constricted approach to animal studies—which exists as solely an ontological-philosophical critique of the status of animals under humanism, to the exclusion of broader sociohistorical constructs—are doubly insidious when considering the intersections of "the animal question" and other forms of oppression. Frequently, these discussions have led to the so-called dreaded comparison between animals and Black enslaved peoples, exemplified in PETA's racist caricature of Marjorie Spiegel's original claim in their "Are Animals the New Slaves?" ad campaign from 2005.[26] As Bénédicte Boisseron argues in *Afro-Dog: Blackness and the Animal Question*, even more benign versions of this comparison—in which groups of people are described as being treated "as animals" or animals are described as being treated "as slaves"—ultimately hollow out and instrumentalize the politics of both race and animals.[27] Without historical specificity, such comparisons reveal little about how the complex systems oppressing animals and groups of people intersect. These arguments also propagate the misleading idea that a single political spectrum exists in which speciesism and racism are simply variations of the same phenomenon. Such a worldview cannot account for, say, the loving relationship between humans and animals in many police K9 units,

where mutual, interspecies bonds are weaponized against a broad range of marginalized groups (criminal suspects, protesters, the unhoused, drug users, etc.). As the chapters in this book will demonstrate time and again, there is no smooth continuity between racism and speciesism but rather a dense network of power relations that are determined by historical and cultural contexts and that can only be fully understood within those contexts. If we wish, as I do in this book, to critically deconstruct how categories of race and species are mobilized by forces such as capitalism, colonialism, humanism, nationalism, scientism, and any number of other social constructs, our approach must be steeped in historical and genealogical detail. Ultimately, the blanket comparison of confining, killing, or mistreating animals to performing similar actions on racialized groups of humans obfuscates far more than it reveals.

This book thus proposes an alternative approach to animal images on film. Indeed, I argue that any "ontology in which the human-animal distinction is called radically into question" does not need to *move beyond* historical and genealogical analysis, as Pick claims, but rather must be *predicated on* exactly this type of analysis.[28] As we will see throughout this book, the terms *human* and *animal* are essentially meaningless without a historical, contextual frame. To avoid the reifying effects of such concepts, I have chosen not to use *anthropocentrism* (the centering of human over animal) or *anthropomorphism* (the transformation of animals into humanlike subjects) as key terms for my own argument except in reference to the language used by my subjects of study or the theorists who discuss them. As the historians of science Lorraine Daston and Gregg Mitman argue, terms like *anthropomorphism* are entirely plastic—as what constitutes the "Anthropos" in each historical instance can be radically different, a point that many contemporary authors working on animals and film gesture toward but do not fully incorporate into their analyses.[29]

I also focus on how hegemonic structures of power can exist outside humanism. The exclusive analyses of multispecies encounters, and their potential to undo the pernicious effects of anthropocentrism, do not acknowledge important changes in how humans and animals are enlisted into social hierarchies. All too often the assumption seems to be that humanism continues to operate as it did during the Enlightenment, as if it was still assumed that humans are fully Cartesian subjects while animals are unfeeling automata. But, of course, much has changed since the eighteenth century, to the point that this version of humanism is diminishingly important for the organization of society, even as it remains the main target for much critical animal studies scholarship. The behaviorists studied in this book actively described themselves as opposing what they saw as Descartes's anthropocentrism, yet this did not necessarily lead them to an egalitarian treatment of their animal subjects. Behaviorism itself was an essential participant in a broader shift throughout the twentieth century toward more dispersed notions of intelligence and agency that were no longer exclusively human in nature. Crucially,

this shift did not lead to any programmatic improvement in the lives of animals. As Haraway and, more recently, the animal studies scholar Nicole Shukin have argued, one of the strongest catalysts for a posthuman worldview has been global capitalism, which often actively encourages the blurring of boundaries between human and animal.[30] Yet animals are still cruelly tortured, killed, and driven to extinction at rates far exceeding any previous historical period. More than the centuries-old philosophies of Cartesian dualism, this late twentieth-century social formation remains far-and-away the largest threat to both animal and human life in our current milieu.

How do historical and genealogical approaches to understanding animal films correct for this oversight? If we are not focusing on questions of nonhuman onscreen agency or the generation of a posthuman aesthetics, what alternative approaches should we adopt? A key to answering these questions comes from the recognition that the historical construction of the human-animal divide is an essential part of what cultural studies scholar Raymond Williams calls the "structure of feeling" at any given moment.[31] For Williams, such structures manifest in our emotions, sensations, and experiences but also are immanent to the objects in our daily life, including media like cinema. Crucially, these structures operate beyond any individual framework and are part of an ongoing, ever-changing process of *social* experience, in which broad ideological formations—such as distinctions between human and animal—are navigated over time. Media theorist Rebecca Coleman highlights the dispersed nature of such structures when she tweaks Williams's term as "infra-structures of feeling," arguing that we must analyze how affective textures are woven through the distribution of feelings across institutions, platforms, and media. As Coleman observes, the term "*infra*-structure" highlights the "*expanded architecture* of texts through which a structure of feeling might be produced and organized."[32] Here, films depicting animals would be considered as *infrastructural tools* through which different affective relationships to animals are distributed, propagated, or dispelled. When considered using this approach, the questions of where a film is watched, who is watching it, and for what purpose become just as important for defining the significance of the onscreen animal as the aesthetics of the film itself.

Within academic film history, this methodology is analogous to theories developed to study cinema "beyond the screen," an approach largely spearheaded by research into nontheatrical film and media. Whether discussing educational, sponsored, military, industrial, or scientific filmmaking, this method uses the context and intended purpose of each film to understand the meaning of its images.[33] The study of nontheatrical film brings with it a set of techniques for considering film as a component or outgrowth of infrastructure, using archival records to reconstruct distribution networks, locating statements to funders that identify film's role in procuring sponsorship, identifying the technical specifications for modifying cameras and film stocks, scouring trade journals for references to film's

differing use in individual institutional contexts, and so on. These approaches are especially important in the history of science, which James A. Secord claims is increasingly understood as essentially "a form of communication" through which knowledge is circulated and distributed.[34]

In this book, I therefore ask questions about cinematic images of animals that differ markedly from those asked by theorists viewing animal cinema as primarily an experience of cross-species encounter. These new questions focus on how animal images function within broader media infrastructures, how cinematic encounters with nonhuman animals—which theorists such as Pick do such an excellent job of analyzing—are subsequently connected to scientific, industrial, or political projects outside the screening itself. And they ask how different social groups and organizations have been positioned in relation to onscreen animals and what such positioning was meant to achieve. These questions complement and complicate those asked by Pick and others, placing the transformative effects of onscreen multispecies encounters within particular infrastructures of feeling that could mobilize such encounters for their own purposes. Here, definitions of *human* and *animal* are created and recreated again and again, woven into structures of feeling differently each time.

Adopting an infrastructural approach to animal images has allowed me to reconcile what at first seemed irreconcilable in celluloid specimens like those of Mona. It provides me with the tools to understand how these films simultaneously exist as remains of living individuals, results of scientific experiments, leftover pieces of political rhetoric, and artifacts of past practices that continue to resonate in the present. Within his particular historical and institutional context, Yerkes could coherently proclaim his love for his apes and hail film's capacity to pull viewers outside of anthropocentrism, all while conducting constraining and invasive testing on his primate subjects. Yerkes's love for Mona was not an extraneous by-product of his eugenicist beliefs but rather a central practice—one in which Mona was enlisted into a racist political project that was inscribed on her body and behavior, even as film was supposedly being used to sympathize with her and her actions. Such practices of control exist outside the edges of the frame—in the organization of the archive, in the offscreen laboratory setting, in rationales published in scientific journals, and in distribution circuits for scientific films—potent spaces of power where what it means to be an animal, as well as what it means to be a human, are defined and redefined over and over again.

A Science of Sympathy

The Films of Robert Mearns Yerkes

ROBERT MEARNS YERKES (1876–1956) concludes a 1905 article on animal psychology for the *Journal of Philosophy* by stating, "Perhaps when we rid ourselves of certain prejudices that physical science fosters we shall agree with those who know the ant and the bee most intimately."[1] By the "prejudices that physical science fosters" Yerkes meant the study of nonhuman animals as machines, without any recourse to interiority. Instead, he pursued an "intimate" knowledge of the minds of animals at a time when the nascent field of behaviorism's technique of mechanized measurements was on the rise. Deeply aware of the social, cultural, and political transformations being enacted by visualizing technologies such as chronophotography, Yerkes articulated an alternative approach to laboratory moving images that emphasized their capacity to capture and frame cross-species emotional relationships. Whether studying the alien bodies and behaviors of insects or the far more familiar activities of primates, he remained convinced that pairing scientifically mediated observations with intuitive interpretations would yield fundamental truths about animal feelings, minds, and personalities. Within this book's genealogy of celluloid specimens, his films are uniquely focused on producing complex representations of animal behavior that were meant to engage audiences in an affective experience of sympathy that combined cross-species identification with a clinical form of surveillance.

Since Yerkes's time, sympathy has become a central concern within the academic field of critical animal studies, especially in relation to their onscreen images. As seen in my introduction, theorists like Anat Pick argue that film can produce an essentially sympathetic rapport between audiences and animals in films.[2] Many have argued that the creation of such moments has a moral imperative, promising

to undo many of the cultural and political divides between human and animal. One scholar of cognitive film theory, Alexa Weik von Mossner, argues that the production of sympathy through film takes on an "ethical dimension" when viewer experiences enhance their "understanding of what it is like to experience the world through a different set of senses," which she claims can lead them "to conclude that conscious, thinking, and feeling beings deserve to be treated with more respect."[3] In these and other accounts, film's capacity to confront viewers with the fact of animal sentience fosters a more ethical relationship with animals in their lives outside the theater. But the political functions of sympathy in Yerkes's films are very different from those described by Pick and von Mossner, leading me to conclude that their approach fails to take into account the ways that empathy for animals can be woven into a *variety* of political projects. In this section, I argue that the "ethical dimensions" of sympathy should not be limited to the question of how an abstract "human" might understand an equally abstract "animal" but must also include the question of which groups of humans are sympathizing with whom and for what purpose? As we will see in the following three chapters, Yerkes's strategic use of film to produce sympathy fueled a racist political project that often mobilized these feelings as a rationale for enacting racist policies.

Yerkes was singularly aware of the emotional effects created by the moving image, which he attempted to use as a tool within his scientific practice. The founder of primatology and a central champion of organized standardized testing, Yerkes is an exceptional, if unexamined, figure in the history of scientific filmmaking. He established and ran massive behavioral testing institutions that were designed for the measurement and categorization of individual identity. These institutions included the American Psychology Association—which Yerkes presided over as president for the pivotal year of 1917—and his primate research centers—including the Primate Laboratory of the Yale Institute of Psychology, established in 1925, and the Anthropoid Experimental Station in Orange Park, Florida, established in 1930. These organizations dramatically shaped empirical studies of behavior in the United States during the early decades of the twentieth century. Yerkes's primate labs deployed the moving image on a grand scale, producing more than forty films during the 1930s and 1940s. Stored within their laboratory files are many canisters of celluloid specimens, which were used internally as notes, as illustrations of findings, and as visual aids for conference presentations. These labs also had a contract with Educational Films Incorporated to distribute eight edited films to high schools and colleges across the country.[4]

This section of the book contains three chapters. The first centers on Yerkes's work with IQ testing during the 1910s. I argue that his use of the intelligence test, and its mass application to incoming World War I recruits, relied on a theory of the gaze that linked a subject's identity to their behavior during spectatorship, which he saw as an expression of one's innate intelligence. Heredity, ideation, and temperament were all supposedly relayed through this engagement with visual

media, creating a hierarchy of ways of looking that could be ranked and organized according to the colonial imaginary of social Darwinism. Yerkes's approach to visual culture in these tests also became a structural principle in his primate films, the topic of the second chapter. There, we explore Yerkes's theories of documentary cinema, which he claimed could capture the internal truths of primate cognition by cinematographically indexing their movements. He believed scientific audiences could then infer these truths through an act of affectively engaged film spectatorship. Film was therefore meant to induce a process of empathy in which elite audiences of psychologists could correctly identify the true motivations of onscreen apes that would otherwise elude less specialized observers.

Yerkes deployed film to insert this act of evidence-based empathy into a discourse that was becoming increasingly hostile to any such speculation. In so doing, he greatly expanded the scope of his psychobiological experiments. Rather than being restrained to directly visible physiological and behavioral responses, the lab, for Yerkes, became a space for testing, transforming, and optimizing his laboratory subjects' temperaments, identities, and lived experiences. The final chapter of this section analyzes these ambitious goals within the context of Yerkes's work with eugenics, where film was meant to register the effects of interventions into social structure and personality. I argue that Yerkes used film to depict what he saw as the accelerations of species and racial evolution through management, which one day might be broadly enacted through his political project.

In these various interventions and settings, Yerkes consistently sought to know and sympathize actively with the mind of his subjects, whether apes or humans, for the purposes of ranking, studying, and transforming them. Film was a privileged medium in this procedure. Using the moving image, he defined both the mental processes of his experimental specimens and the experience of scientific observation for his audiences. Perhaps more than any other scientific filmmaker working at this time, Yerkes was aware of the animal research film as an affectively charged technology, a tool for tying together the bodies on- and offscreen through the relays of image and affect. Throughout his scientific career, Yerkes attempted to lay a path for his own particular vision of scientific progress by operationalizing this visual culture, what Hugo Münsterberg titles the "psychotechnology" of screen and audience. The racist underpinnings of his vision of progress, with its past imagined as a racialized "savagery" and its future as an enlightened industrialism, were deeply inscribed into the very form and function of his celluloid specimens.

Stimulating Intelligence

IQ Exams and the Cinema

Imagine for a moment that you are an army recruit drafted for military service during World War I. You are stationed at one of the many camps dedicated to transforming draftees into battle-ready soldiers—say, Camp Bowie in Texas, Camp Dix in New Jersey, or Camp Dodge in Iowa—and you are awaiting your assignment.[1] You are also "illiterate," or at least you have been labeled as such. Perhaps you never attended school or are a recent immigrant who does not read or write English. Or, perhaps, you are simply entering one of the all-Black battalions, and the junior psychology student who is charged with assessing your reading comprehension simply categorized your entire cohort as illiterate *en masse*.[2] Whatever the reason, you have been assigned to the "beta" group of illiterate recruits (fig. 1), who are separated off from the "alpha" group of English-language readers and writers. You and somewhere between twenty-five and one hundred men and boys are ushered into a large room.[3] Rows of chairs are set up facing the front, like a classroom, an auditorium, or a movie theater. Or perhaps you are directed to sit on the floor. An unusual blackboard has been placed in a central location, draped with a curtain, as if part of a stage set for a play. Two young men, dressed in military uniforms, sit at front, waiting until everyone is seated before handing out pencils and examination booklets. Once finished, they stand on either side of the blackboard. One man begins to speak loudly, slowly, and with emphasis: "Attention. Watch *this* man. . . . *He* is going to do *here* (tapping the blackboard), what *you* (pointing to different members of the group) are to do on your papers. . . . Ask *no questions*. *Wait* till I say 'Go ahead!'"[4] With that, a man at the front announces that they are going to begin, and he raises the curtain covering the blackboard to reveal an image. It displays a grid with rows of pictures. One row includes a four-fingered hand, a fish with no eye, and a man whose pipe is floating in the air in

FIGURE 1. Photograph titled "Group Examination Beta with Negro Recruits" from Robert M. Yerkes, *Psychological Examining in the United States Army* (Washington, DC: US Government Printing Office, 1921).
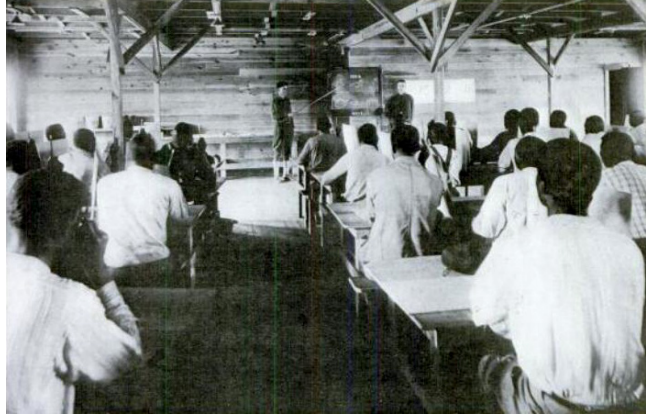
front of him.[5] "Look!" says the demonstrator as he points at each image. "Fix it; fix it," he says.[6] The demonstrator then completes each of the pictures. He finally tells you to open your book, which contains a similar set of images, and instructs you to start. After a few minutes, you are told to stop, and a crank is turned on the blackboard that rotates the screen to bring a new image into view.[7] Image after disconnected image—mazes, portraits of faces, abstract geometric shapes, dismembered stick figures—replace one another on the blackboard. You are told to engage with each image in a particular way, and to record your engagement by drawing on a copy of the picture in your test booklet. At the end of the testing session, your booklet is collected and sent off to a centralized facility where it will be graded against the "correct" ways of seeing these images. Your gaze has been both directed and documented.

The above scenario is generated from Robert Yerkes's 1921 report *Psychological Examining in the United States Army*, which he developed in tandem with his initial studies into primate cognition. These psychological tests determined the careers of many soldiers during World War I. In 1917, Yerkes, who had long worked on testing in American schools, capitalized on his role as head of the American Psychological Association to successfully lobby the army into using intelligence testing for the placement of incoming recruits.[8] The influx of new soldiers during the war had generated a massive personnel problem for the military, which was ill-equipped to accurately process and assign ranks for them all. But what army generals considered a logistical nightmare, Yerkes envisioned as a unique opportunity to put his theories into practice. In the controlled infrastructure of the military and the vast number of test subjects, Yerkes saw a lab-like setting for testing his psychological theories. By the end of 1917, he had overseen the administration of intelligence exams to 1.75 million people, a data set whose scope and diversity was unprecedented.[9] In doing so, Yerkes effectively shifted the discourse around IQ measurements from a local and anecdotal level to a national one.

Much has been written about these tests, including their role in beginning military psychology, establishing psychology as a stand-alone discipline, institutionalizing standardized testing, expanding the pernicious influence of eugenicist theories of race, and fueling anti-immigrant legislation in the 1920s.[10] But none of these analyses address the central role that theories of spectatorship played in the creation and implementation of the exams. The following chapter uses the lens of film studies to correct for this, reexamining the tests *as media objects* that existed within a broader media ecosystem that included film.

Doing so allows us to clearly see the importance of early cinema discourse for Yerkes's theories of race and intelligence, a discourse that Yerkes both responded to and interwove into his practice of applied psychology. Unlike Laura Mulvey's famous articulation of the male gaze in classical cinema, which denotes a position of objectifying power and authority, the act of looking in Yerkes's iteration was an act of profound vulnerability.[11] To him, viewers unwittingly expressed and revealed essential parts of themselves in the ways that they gaze. As we will see, Yerkes reimagined racial categories *as distinct forms of spectatorship*, which could be monitored during a screening and then operationalized by governing bodies such as schools and the military. This basic assertion, a shift away from the anatomical theories of race from the nineteenth century, had massive effects outside the testing space itself, such as when the nearly two million army test-takers were segregated based on their results or when the tests were lauded as essential tools for social management or when the test findings were used as evidence of the threat of immigration in congressional debates. In each of these instances, scientific theories of race were translated into practices of institutional governance through Yerkes's use of media.

Yerkes's theories have long since been debunked as inherently biased and racist, most famously by his contemporary Franz Boas and later by Stephen Jay Gould.[12] Yet they continued to shape Yerkes's approach to visual media long after he stopped working in intelligence testing and moved his focus to his primate labs, which we will examine in the next two chapters. Within the context of Yerkes's scientific practice, the structures of the IQ exams serve as implicit examples of his broader media theory, which would later be put into practice with his animal subjects. Yerkes's military exams also represent a dark potential for theories of media as a material manifestation of thought, cognition, and emotion. As we will see, Yerkes yoked such theories to his own racist political project. What Yerkes described as "psychotechnology" became a powerful institutional tool for naturalizing and institutionalizing racist hierarchies and was, in fact, an essential component in eugenicist conceptualizations of race. The fact that these theories and uses of media were demonstrably wrong made them no less effective as means of exerting control.

The basic structure of such theories continues to haunt our media ecosystem, in which algorithmic marketing based on race and the gaze has become widespread.[13]

Like in Yerkes's tests, contemporary mass media is intent on dividing its viewers into demographic groups that can be optimized rather than addressing an imagined universal spectator. The assumption that racial identity defines what one will see when interacting with media, and that this dynamic can be controlled and operationalized, persists even though Yerkes's eugenicist theories have long since been rejected.

CONTROLLING DIFFERENCE: IDENTITY AS SPECTATORSHIP

In 1913, Robert Yerkes began searching for what he described as a "universal point scale," a single system for accurately evaluating the intelligence of any test subject. He and a series of collaborators began administering intelligence tests in Boston schools, where they struggled to devise a test model that could be applied across very different students in very different classrooms. Confronted with the melting pot of the public-school system, Yerkes and his colleagues quickly ran into the challenge of evaluating diverse populations, a central concern of the Progressive Era. Describing this work for a 1915 monograph outlining their new method for evaluating student IQ scores, Yerkes and coauthors Rose Hardwick and James Winfred Bridges wrote: "Our city schools as well as our institutions for the criminalistics and the mentally defective or diseased contain individuals of all races and of the most varied heredity and sociological status. It becomes perfectly clear to one in such an institution . . . that only through familiarity with the nature and degree of mental ability which is characteristic of the sexes of various ages, races, inheritances, environments, and so on, can the examiner understand and fairly evaluate an individual's performance in a mental examination."[14] Here, Yerkes and his coauthors found themselves adopting a complex position, arguing that the only way to achieve an accurate form of measurement was through an increasingly refined attention to the specifics of an individual test-taker's identity. Universality could only be achieved through difference.

Between 1880 and the First World War, approximately twenty-five million people immigrated to the United States.[15] Rapid urbanization and a constant flow of immigrants from southern and eastern Europe dramatically reshaped the American landscape, stoking anxieties over cultural difference.[16] This unprecedented diversity fed into an enduring obsession over American identity and the best methods for either rejecting or integrating incoming groups of people into a coherent national whole.[17] During this period, both standardized tests and the cinema were seen as methods for addressing the large heterogeneous crowds that characterized a rapidly industrializing urban America. As technologies, both the moving image and standardized testing were designed as mass media, each functioning as a systematic, reliable, and repeatable means of communication with large groups of people. In each instance, diverse audiences entered

a space in which their attention was stimulated and directed by images, often placed centrally at the front of the room. The success of such events was premised on developing a method for engaging all the varying spectators and synthesizing them into a singular audience. In this way, both were engaged in what Jonathan Kahana calls "intelligence work," creating an imagined public through their means of address and producing a form of citizenship in the act of viewing.[18]

Thanks to the work of contemporary film historians, we have a good sense of the multifaceted ways in which film conducted such intelligence work in the Progressive Era.[19] Many Progressive Era reformers saw cinema as a tool for generating national cohesion as the nation's most successful commercial entertainment during these years.[20] As Miriam Hansen has shown, the belief in film's status as a "universal language" by the likes of early film theorist Vachel Lindsay and director D. W. Griffith made it an ideal medium for communicating American identity to the multilingual, multicultural masses.[21] Deployed by public health departments, factory employers, civic groups, congregations, and others, cinema was believed to be an ideal means of indoctrinating newcomers into American social norms.[22] Hansen argues that industrial capitalism and a burgeoning consumer culture fueled the development of cinematic narrative structures that sought to "build an ostensibly classless mass audience," who could all understand and enjoy the cinema despite their diverse backgrounds.[23] Theoretically, the goal was for all Americans, regardless of their spoken language or cultural upbringing, to participate in these onscreen American dreams, even if such participation was largely curtailed outside the theater by the realities of an industrial economy predicated on white supremacy and patriarchy.[24]

Like cinema, the intelligence test was a tool for managing and ordering the body politic, arranging its various parts for the purposes of cohesion. Whether used for communication, assimilation, or evaluation, both the rise of cinema, as the century's first popular mass medium, and the development of testing procedures were premised on circumventing the divisions caused by language—facilitating an exchange of information that operated on what was considered a precultural, primarily visual, level. At the level of design and function, Yerkes's World War I tests mirrored those of the feature film, including a rapt and silent audience staring at images in the front of a large room. Indeed, at Camp Cody, New Mexico, testers used a nearby vaudeville and film theater, the Liberty Theater, as an examination space, since it met the requirements for displaying the test's images to large groups better than any building on the military base.[25] And film itself was sometimes used as part of these tests. One of the smaller initiatives being run by army psychologists at the time was to observe and monitor Black recruits while watching the sex hygiene film *Damaged Goods* (Tom Ricketts, 1914) and monitoring their responses.[26]

Nonetheless, the goals of intelligence testers were also fundamentally different from those of filmmakers. Rather than creating a shared singular experience

for a heterogeneous audience, Yerkes and his cohort of intelligence-testing psychologists were concerned with sorting audience members into a stable hierarchy that could be put to use outside the screening/testing space. His commitment to biologically determined theories of race led Yerkes to seek out differences among spectators around which he planned to build a social structure.[27] By focusing on the precedent-setting example of Yerkes's World War I exams, I offer an alternative version of Progressive Era spectatorship and its social function, one less connected to the egalitarian principles often associated with the period than to nineteenth-century scientific theories of racial hierarchy and the planned application of these theories through a eugenicist political platform.

Yerkes developed his tests at a time when psychologists sought an individual test and scoring mechanism that could be universally applied to different groups. By the 1910s, various attempts to implement such tests had consistently produced wildly disparate results that could not be synthesized under a single coherent grading rubric.[28] Working to design more effective tests led Yerkes to generate his own unique conceptions of spectatorship, identity, and assimilation. He theorized an *expressive* spectatorship through his IQ tests, which supposedly relayed internal truths about viewers' heredity, mentality, and behavior. He believed that how one viewed visual materials, like film, was an expression of otherwise invisible internal states of mind, which in turn could be traced back to one's genetic makeup. This act of expressive viewing became a central structural component of Yerkes's subsequent primate films, as we will explore in later chapters. His goal with the IQ test was to monitor and record the gazes of his audience and operationalize this information outside the screening/testing space. With this new approach, he grouped and ranked individual viewers into discrete categories of race, ethnicity, and gender, each of whom supposedly experienced the world in a different manner, an approach that was diametrically opposed to cinema's supposed universal spectatorship. Through this process, the unruly mass became a clearly defined assembly of quantifiably different identity groups, each of which expressed themselves in their reactions to the world around them. Thus, this project was part of a larger shift to psychologically define and regulate racial categories, which would contribute to the xenophobic backlash of the 1920s and play a crucial role in the subsequent passage of stringent immigration restrictions.[29]

Yerkes's approach to race was driven by a belief in what Richard T. von Mayrhauser calls his "unified concept of social Darwinian hierarchy," which itself was the product of generations of scientific racism.[30] Emerging alongside Darwin's theory of evolution, social Darwinism merged cutting-edge ideas from scientific naturalism with preexisting frameworks of white supremacy. Social Darwinists universalized white culture as the model of humanity, positing it as the forefront of evolutionary progress.[31] Well before Darwin, as Warren Montag demonstrates, Enlightenment philosophers generated notions of progress and "universal humanity" that were largely synonymous with European whiteness.[32] This brand

of humanism instituted a studied white gaze that conceptualized archetypical humanity against perceived differences between races, a gaze that envisioned non-white bodies as a border or intermediate step between the categories of human and animal.

Nineteenth-century social Darwinists developed their own scientific visual culture to legitimize this hierarchy. Naturalists, missionaries, and early anthropologists inspected racialized bodies for "abnormalities" that marked them as different from, and allegedly less evolved than, their own white bodies, which were coded as the human norm.[33] David Green writes that "within this biologisation of history the perception of a natural order of social structure and stratification was thought to be readily available in the evidence of the human body."[34] As we will see in the third chapter, this colonial fantasy of racialized "development" was a central theme in Yerkes's embrace of eugenics.

By the 1910s, however, theories of heredity and race had raised fundamental questions about locating racial differences in visible features of the body. Yerkes was operating at a time when Mendelian genetic theory—prominently espoused by Charles Davenport, one of Yerkes's teachers—had radically destabilized racial categories. Within this context, "racial types" gave way to "populations" in which each individual was, according to Nancy D. Fortney, "a unique carrier of diverse genotypes or heritable components of heredity, observable by the outward manifestations (phenotypes) of inherited characteristics."[35] Race here was defined by "norms" within populations—an accumulation of shared, yet distinct, traits that were demarcated by their visible phenotype. Previous attempts at visualizing and defining race had worked to create a single, visible racial "type,"[36] but, within the newer framework of Mendelian genetics, the focus on genotypes rather than phenotypes defined race as a diverse amalgam of genes within a population rather than as observable traits or a lone ideal.[37] The practice of visualizing racialized bodies gave way to statistical tallies of behavior within racially defined groups.

Deeply embedded in these shifts, Yerkes's post-Mendel approach to race and its role in society led him to develop his own methods of observation and visualization. His form of social Darwinism did not primarily tell the story of evolution through differences in anatomy but rather in personality and identity; thus, approaches toward measurement and visualization had to be reconsidered. Population norms and mental functions were difficult phenomena to capture systematically through sight. The psychologist could not identify and quantify these differences simply through the act of looking at bodies, ruling out the anatomical photographs and skull measurements that had defined previous generations of social Darwinian science.[38] Within Yerkes's approach, the gaze was not used by scientists to evaluate race but rather was monitored in test subjects as an expression of racialized interiority.

Yerkes defined racial groups by their capacity for particular types of behavior, which he saw as empirically testable phenomena that were ontologically separate

from the organisms and individuals who exhibited them. Individuals may display more or less empathy or thought, but the categories of "empathy" and "thought" remained the same in each instance, allowing the same questions to be used when testing them. For Yerkes, the role of the IQ tester was comparable to Daston and Galison's description of botanists in the sixteenth century or Foucault's description of doctors practicing nosology in the eighteenth century.[39] All of these scientific practitioners created their findings through a process that Daston and Galison call "truth-to-nature," wherein underlying types, general forms, and categories are abstracted from the massive fluctuation of details in any given scientific subject. Within the schema of "truth-to-nature," scientists order facts according to metaphysical principles or ideals, whether they be the shape of a disease, the type of a leaf, or the function of a behavior. Such an approach requires what Foucault describes as a look that sees past the body that is actually present, to the broader, more essentially true, concept or organization that it conveys.[40] For Yerkes, these concepts were particular forms of ideation.

According to Yerkes, the evaluation of racial differences was predicated on identifying and measuring certain distinct types of mental activity—categories such as receptivity, imagination, empathy, and thought—each of which expressed themselves in individuals according to evolutionary biology and age.[41] Yerkes theorized that these "types or classes of behavior" were always present in the human mind, though to differing degrees, and therefore could provide an underlying unity for comparing and evaluating different ages, races, and ethnicities. In the Yerkes-Bridges test, developed in 1913, Yerkes claimed to take account of different behavioral types by producing a four-part evaluation of mental functions, each of which had an equal role in determining the final score of any test, no matter who took it.[42] As he wrote of this test: "it is extremely improbable that serious injustice should be done any individual by the neglect of racial characteristics, for one of the great and obvious advantages of the [Yerkes-Bridges test] is that many aspects of mental ability, or, more properly, mental functions, are measured, and the total score, therefore, represents a varied group of mental measurements."[43] Yerkes asserted that he had created a comprehensive picture of intelligence due to the diversity of behaviors being evaluated, while also claiming that the consistency of the behavioral types provided a unity through which different racial groups could be compared. Implicit in this claim was the assertion that racial difference manifests in different kinds of thinking—that is, that the proportions of each "mental function" were racially determined. Such claims were made explicit in his later summary of the World War I exams, where Yerkes suggested that there are dramatic differences in the intelligence "types" of Scandinavian recruits versus those of Slavic or Latin descent, and where he proposes that the lower scores of Black recruits resulted from "qualitative differences" in their thought process.[44]

The result was a statistical approach that employed an ever more detailed attention to racial and ethnic differences but always in the service of producing a more accurate singular appraisal of general human intelligence.[45] Individual intelligence was broken down into a series of diverse "functions" or "types," but these functions ultimately were combined to yield a single number designating a subject's particular position in the hierarchy of ability. Similarly, divisions were drawn within populations along gender, racial, and ethnic lines but only toward the creation of separate norms for each group, norms that were meant to more fully integrate different backgrounds under a single testing regime.[46] Throughout his scientific and political writing, Yerkes emphasized the synthesis and integration of difference into a totalizing whole, therefore positioning difference as something to which an incorporating system (a nation-state, a military chain of command, a classroom, a mental institution, etc.) must be calibrated in order to direct all its heterogeneous parts effectively. As Yerkes entered into the development of his army IQ tests, he did not seek to create a universal spectator who could be inhabited by many different individuals, as did so many of the Progressive Era reformers; rather, he worked to define and differentiate audience members so that their differences could be controlled and managed. As we will see in the next section, his tests were meant to elicit and document these differences by creating a scene for spectatorship, transforming the diverse mass into a collection of differing groups waiting to be categorized. No longer focusing solely on observing the racialized body, Yerkes believed that repeated visual experiences, like film, operate like a microscope for behavior, revealing the otherwise hidden genetic predispositions in the reactions of those who watch.

MEASURING AUDIENCES: PSYCHOTECHNOLOGY, EVOLUTION, AND EVALUATION

In 1928, the neuropsychiatrist Louis E. Bisch received a surprise visit from James R. Quick, the editor of the film magazine *Photoplay*. Quick asked Bisch to pen an article for the magazine answering the question of whether the widespread popularity of movies meant that the American public were "morons."[47] In his response, Bisch returns to his experience as a young psychologist administering Yerkes's intelligence exams during World War I as director of the Psychiatric Division of the Fifth Naval District. Proclaiming himself a skeptic of the tests, he argued that recruits often engaged in ways that fundamentally eluded the exam's rubrics, leading test administrators to miss many signs of individual comprehension by simply grading answers as correct or incorrect. Bisch then connected the unique responses of the test-takers to the many possible responses different audience members have while watching a film: "Pleasure, animation, excitement, sympathy, amusement, enthralled interest—the entire gamut of emotions have been

experienced by my movie neighbors while I remained as unmoved as a stone."[48] He suggested that the claim that audiences are morons for such aberrant responses reproduces the problems of Yerkes's exam in that both mistake the sensibilities of the examiner for the truth.

Yet the same year that Bisch disputed the claim that intelligence could be evaluated by the response of spectators, the behaviorist Orlando O. Norris proclaimed that "perception is an exhibition of intelligence."[49] Indeed, the evaluative significance of spectatorship remained an ongoing debate within various fields of applied science, and moving images continued to be used for training and testing purposes throughout the century.[50] Bisch's warning against interpreting audience responses as signs of intelligence and ability was apparently not widely heard, at least not by Yerkes. During his long career, Yerkes unceasingly championed his World War I exams as a prime example of the benefits of using media to study the minds of spectators. He called such media "psychotechnology," a borrowed term from his longtime friend and mentor Hugo Münsterberg.

A close analysis of Münsterberg's theories, and the ways that they were taken up by Yerkes, reveals the ways that Yerkes situated his use of media. Through his work with Münsterberg, Yerkes was steeped in the theories of psychology and the moving image. Münsterberg and Yerkes cotaught a course on laboratory psychology at Yale from 1902 to 1917, and each was deeply acquainted with the other's theories and procedures.[51] Yerkes was well aware of Münsterberg's research at Harvard's laboratory of experimental science, where Münsterberg and his students used a variety of moving image devices to test perception—including the antirrheoscope, which created simple optical illusions through zigzag patterns when cranked in front of a participant's eyes, and the "wave writer," which registered physiological changes in participants' bodies.[52] By asking test subjects to report on how they felt during these experiences, and pairing these descriptions with recordings of response times, heart rates, and other physiological indicators, Münsterberg envisioned individual psychological states as a kind of mental technology that could be induced, manufactured, and designed through media.[53]

Yerkes also knew of Münsterberg's extensive writing on applied psychology, including its use in industrial, marketing, medical, pedagogical, and juridical spheres.[54] Part of this work involved a series of films Münsterberg developed for Paramount in 1916, which were formatted as IQ tests and functioned similarly to Yerkes's beta exams, which were conducted a year later.[55] Yet the differences between Münsterberg's films and Yerkes's tests are telling. In a speech given at a Paramount reception party, Münsterberg linked his films with his claims about applied psychology.[56] He described both his pedagogical and industrial goals for the medium. On the one hand, he claimed that film should act as a textbook that could teach spectators to recognize their own mental strengths and weaknesses in what they saw onscreen. On the other hand, he argued that the ultimate purpose for these films was not simply individual self-realization or introspection but

also the "vast and far-reaching influence" of psychology as a field. Inspired in part by a nostalgia for German social structures and German idealism, Münsterberg conceived of psychotechnology as a form of national propaganda, claiming that advertisers, artists, and filmmakers could all use psychological principles to design symbols that would lead to greater national cohesion, just as religious iconography had in the past.[57]

Yerkes adopted a similar set of pursuits—using media technology to generate social harmony and duty—but his psychotechnology was adapted to meet the purposes of American eugenics rather than German idealism. Like others, Yerkes defined eugenics as the art of applying theoretical science toward "the control of human nature." This control was premised on the psychologist's role as a manager, which ultimately differentiated his approach from Münsterberg's. As Jeremy Blatter emphasizes, Münsterberg's configuration of the screening/testing space placed the power of the test in the hands of the audience, who were meant to be informed about their own capacities through the process.[58] In contrast, Yerkes adopted the methods of the eugenics survey when creating his tests, methods that he had learned under the tutelage of the infamous eugenicist Charles Davenport, where the goal was population management—controlling the vocation, reproduction, and health of different racial and ethnic demographics.[59] Davenport's surveys were part of a widespread effort to gather data, producing the kinds of numbers that could statistically define large, heterogeneous groups of people. Similarly, the results of Yerkes's World War I exams were also viewed by an outside board of psychologists who were in charge of assigning positions to each recruit based on the recruit's score. In Yerkes's arrangement, millions of cadets' experiences of spectatorship were broken down into statistical data, which was then compiled and analyzed by the Army's Statistical Unit in a central repository.[60] Here, applied psychotechnology and eugenics theories of race were paired with military infrastructure to direct and categorize soldiers within the hierarchy of the army.[61]

Unlike Münsterberg's films, the test images in Yerkes's WWI exams had dramatic effects on life outside the testing space itself. As historians such as Daniel J. Kevles, Stephen Jay Gould, and others have discussed, supporters of both segregation and immigration restrictions used Yerkes's test results to legitimize their arguments.[62] Carl Campbell Brigham, an adviser for the army field testing who was brought in by Yerkes, wrote an influential analysis of the army tests titled *A Study of American Intelligence*, in which he argued for massive disparities in the supposed inborn intelligence between racial groups. In Yerkes's introduction to the book, he infamously wrote that "no one of us as a citizen can afford to ignore the menace of racial deterioration or the evident relations of immigration to national progress and welfare."[63] Yerkes also pushed the publishers of Brigham's manuscript to release it before the House Committee on Immigration and Naturalization began debating a bill to restrict immigration in 1923, so that its claims could be included as part of the public discourse.[64] And, indeed, the language

of Brigham's analysis made its way into debates on the floor of the US House of Representatives, where the all-male and all-white members openly worried about the racial "purity" of the United States. When the Immigration Act subsequently passed by a landslide in 1924, it dramatically restricted the number of immigrants from select countries who were granted citizenship to the US.[65]

These rippling effects were all premised on Yerkes's notion that genetic differences expressed themselves primarily in a person's perception of the world around them. Test questions were therefore developed to bring forth different displays of inherited identity through the use of visual prompts, asking test-takers to demonstrate different mental capacities through the performance of different types of spectatorship. The beta exams tested everything from the ability to locate patterns and complete mazes to "accurately" ranking drawings of women according to beauty. In these tests, how one visually perceived and processed the world was the primary subject rather than any particular form of knowledge.

Take, for instance, the beta exam's "fix-it" and "aesthetic judgment" problems. The fix-it problems picture incomplete or jumbled images that test-takers were asked to "fix," including a missing rabbit's ear, the pin on a record player, the firing mechanism on a pistol, and the smoke from a chimney.[66] These images tested one's knowledge of the ideal form of the represented object, to which the flawed image was meant to be compared. The fix-it category also included "jumbled image" questions. Here, test-takers were asked to correctly reassemble a set of narrative comic strips that were placed out of order. Often the stories depicted were short morality tales (fig. 2)—a criminal commits a crime, is caught, tried, and imprisoned; a boy breaks a window, is found by his mother, and spanked.[67] Yerkes meant these questions to evaluate one's knowledge of moral cause and effect, supposedly demonstrating the ability to see the proper story of parenting or justice that structured the image frames. Inherent within this structure was the belief that one's values, thought process, and identity were wrapped up in the act of viewing media materials and that there was one singular "correct" type of gaze that could be defined by the test's designer, which would then be used to grade responses.

The test booklet was essential in Yerkes's psychotechnology because it recorded the test-taker's experience. These booklets were subsequently used to place each individual viewer within the institutional structure of the army. By combining the test booklet and the screening/testing space, Yerkes precisely exploited the distance between the image's ideal viewer—one who met the test-maker's definition of intelligence—and experiences of local audiences. Intelligent test-takers would have the same aesthetic ideals and definitions of beauty, symmetry, and justice as the test-makers. Those who did not share these ideals would reveal their aberrant spectatorship through their answers in the test booklet. Yerkes thereby fundamentally relied on the fracturing of audiences before reconstituting them in the space outside the theater.

Parts of this approach mirror the role of cinema for many Progressive Era reformers, who, as we have seen, sought to use the medium to produce identity
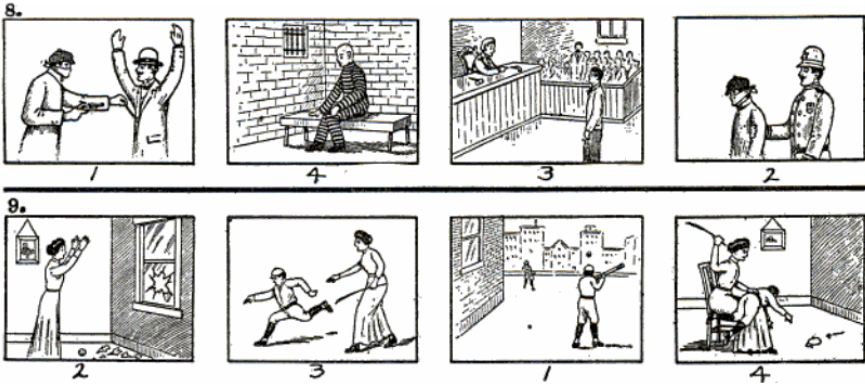
FIGURE 2. A "Jumbled Image" from Robert M. Yerkes, *Psychological Examining in the United States Army* (Washington, DC: US Government Printing Office, 1921).

and citizenship in their audiences. In their eyes, the act of watching a film could transform a spectator into the ideal student, worker, or citizen. Yet, at the same time, scholars such as Judith Mayne have argued that diverse immigrant audiences of early nickelodeons brought their own perspectives to bare in their spectatorship, interpreting cinematic images rather than being interpellated by them.[68] One could therefore read the Yerkes tests operationalizing these different relationships to the image as a means of measuring identity, deploying Yerkes's own theory of spectatorship for the purposes of control.

Yerkes was mostly blind to his own position as the definer of the image's "true" meaning; thus, he failed to see that he was testing for confirmation of his worldview.[69] As many commentators have noted—perhaps most important among them the anthropologist Franz Boas, a contemporary critic of the tests—arriving at the correct test answers often required a knowledge of American culture and ideological norms, specifically those of a white, native-born, and educated northeasterner like Yerkes.[70] In the World War I exams, one's ability to see as this subset did, to conform one's gaze to particular values, became synonymous with one's general intellect. Yerkes's gaze was elevated to the universal definition of "intelligence" against which any deviation was marked as a failure to properly see. Despite changes in technique, whiteness remained "the principle of perfection" that Montag identified in earlier forms of enlightenment racism.[71]

Throughout the 1920s and 1930s, Yerkes largely replaced his intelligence-testing work with primate experiments. This shift included a change in media technology. In the lab, Yerkes retained some of the devices he had used to test human intelligence, such as his "multiple choice apparatus," which was adapted to test nonhumans on the same ideational functions as the exam he had developed in the Boston public schools by adapting its design to the particularities of each species.[72] But film also became an increasingly central instrument for recording and measuring the minds of his nonhuman subjects. The framework of Münsterberg's

psychotechnology, as well as his social Darwinian and eugenicist theories of evolution, continued to guide Yerkes in the design and presentation of his films. Spectatorship and cognition remained deeply intertwined as he attempted to define scientific observation in the context of nonhuman behavior, as we will see in the next chapter.

"Getting a Feeling for the Animal"

Ape Affects Onscreen

When viewing the Robert Yerkes collection at the Emory University library, I was unexpectedly struck by a moment in his 1935 film *Maternal Behavior in Chimpanzee*. Cuba—an eight-year-old primate who had just given birth to Peter, the first chimpanzee to be born in a laboratory setting—paused while consuming her placenta and umbilical cord to look directly at the camera.[1] This look seemed to pierce the screen. The moment was brief—a cut in the film and her image skips off to a new activity. But for a few seconds, the filmmaker, the camera, and I all collapsed into a single entity caught by Cuba's baleful stare. Was Yerkes also startled by this gaze? Was he briefly captured by Cuba's look as he repeatedly watched, edited, and presented his film to colleagues? Did he ask himself—as Derrida later did when confronted by the returned look of his cat—"What does this bottomless gaze offer my sight?"[2] There is of course no way to tell for sure. But Yerkes was the kind of scientist who would at times ask such questions, reflecting publicly on his own position in relation to his primate subjects, often plumbing the depths of their complex interactions with a frank openness to animal emotions. As we will see, this openness to animal emotions was a key component for his scientific research project, as well as for his political worldview.

Derrida's encounter with his cat was a thread that, once pulled, began to unravel a massive tangle of philosophical thought separating humans from animals. In Derrida's telling, his cat's look demanded he acknowledge the life before him, a life that could never be fully reduced to a complex machine (as Descartes claimed) or an impoverished assemblage of disconnected experiences (as Heidegger claimed). Instead, the animal's gaze (fig. 3), which addressed him despite its muteness, required Derrida recognize worlds beyond human language and reason, spaces of relation and response that were not defined by philosophical discourse or rational deduction. The film scholar Akira Mizuta Lippit extends the transformative power of animal

FIGURE 3. Photograph titled "40–2." Robert Mearns Yerkes Papers (MS 569), box 131, folder 2237, Manuscripts and Archives, Yale University Library.

looks to cinema's indexical images of them. Like the returned gaze of Derrida's cat, he argues that film has the potential to disturb language's coherence and meaning making. Lippit writes that this "anxiety" is caused by film's "uncanny materiality that drives the spectator outside of language toward an experience of ecstasy, of standing outside, of brief psychosis."[3] Film thus pulls against signification through its photographic properties, which refuse any single meaning in the face of many possible readings. Its mechanical reproduction of a wealth of material detail alludes to a world outside language's one-to-one correspondence between sign and referent. It is therefore uniquely suited for, and especially vulnerable to, the powers of the animal gaze, generating moments like the one I experienced while watching Yerkes's film of Cuba. The indexical images of her stare reproduced the punctum of the animal's look, initiating an unwieldy process of identification and alienation among spectator, animal, and film, creating a type of image that Lippit calls an "animetaphor."[4]

Most laboratory scientists engage in forms of knowledge production that diverge dramatically from such cinematic and zoonotic breaks in language. Under the circumstances described by Derrida and Lippit, the distances between observer and observed, human and animal, both collapse. Especially during this early period of comparative psychology, the recognition of animal emotions was largely frowned on. In this chapter, however, we will examine Yerkes's unique use of film as a tool for animal research, which did not deny the medium's unsettling potential to generate intense affective relationships between viewers and onscreen subjects. Indeed, Yerkes sought to create this very experience.

A useful lens through which to understand how Yerkes's research used sympathy is Sara Ahmed's term *affective economy*, which describes how "the accumulation of affective value" ties together communities through the production of shared

emotional states.[5] As we will see, films and animals were both essential to how Yerkes envisioned the affective economy of animal research, which he believed should be built around a common "feeling for the animal" that would be shared by an elite set of scientific observers. Unlike the white supremacy groups that Ahmed analyzes, early primatologists did not share the common emotion of fear but rather of *sympathy*, which determined who was inside and outside this community based on their access to an understanding of animal emotion. Additionally, though less clearly malignant than fear, sympathy functioned *within* this scientific community in many of the same ways—establishing essential differences between the subject experiencing sympathy and the object of that sympathy, differences expressed in the expansion of one (the sympathizer, who becomes capable of explaining and describing the sympathized) and the restriction of the other (the sympathized, who becomes defined by its status as an object of sympathy).[6] As we will see, this process was made material through the production, distribution, and reception of films that were meant to build a common emotional experience of sympathy with primates. This experience then became the bedrock emotional formation for Yerkes's eugenics, which sought to apply such sympathy to a broad array of geopolitical differences and conflicts. Despite the fact that sympathy is ostensibly a way of losing oneself through an acknowledgment of others, in this context it actually functioned as a means of defining and empowering privileged groups of people.

I will argue that Yerkes sought to activate, manage, and systematize precisely film's powerful ability to create sympathy by superseding symbolic language. In the first section of this chapter, I contextualize Yerkes's films within his approach to laboratory research, which focused directly on the emotional bonds between researchers and primates. I argue that he used film to empirically introduce emotional descriptions into scientific discussions, where this content would otherwise be inadmissible. In the second section, I examine the politics of this pursuit within the platform of Yerkes's eugenicist beliefs (described extensively in the previous chapter). In this portion of the chapter, I reframe his production of sympathy through the mechanism of film as an exertion of power, one that sought to define the experiences of others and thereby place them within an organizational hierarchy. Ultimately, I conclude that Yerkes's strategic production of cross-species cinematic sympathy offers a troubling counterexample to the use of film to "decenter the human," which is so often lionized within critical animal studies.

"AS CLEAR AS WORDS": CAPTURING ANIMAL EMOTIONS ON FILM

Yerkes developed a practice of animal research paralleling his work in intelligence testing. His initial examinations of animals began with comparative analyses of sensitivity in a wide variety of species, including invertebrates, earthworms, mice, and frogs.[7] He started studying great apes during a 1915 trip to Santa Barbara, California, where a small independent lab for primatology had been established.[8] In

1923, Yerkes began constructing a primatology laboratory on the Yale campus in New Haven, Connecticut, and in 1930, he established a second colony in Orange Park, Florida.[9] Throughout this period, Yerkes systematically deployed Bell and Howell's portable Filmo and Eyemo cameras to shoot 16 mm and 35 mm footage of his primate subjects.[10] During his tenure as director of the laboratories (a position from which he stepped down in 1941) more than ninety chimpanzees would live, be experimented on, and be filmed at these facilities. Of the films that exist from Yerkes's tenure as director, only four are currently accessible: *Maternal Behavior in Chimpanzee* (Yerkes, 1935), *Some Aspects of Social Behavior in Chimpanzee* (Nissen & Crawford, 1936), *The Use of Tools by the Chimpanzee in Problem Solutions* (Jackson, 1934), and a portion of *Stylus Maze Experiments with Chimpanzee* (Spragg, 1935). This chapter focuses primarily on the first of these, which Yerkes shot himself. The rest of the films made at the center, which include titles such as *From Infancy to Maturity in Chimpanzee Life* (1932) and *Behavioral Experiments with Congo, a Young Mountain Gorilla* (1933), among nearly forty others, remain, as I stated in the intro to the Yerkes section of the book, unavailable for now. These films were essential tools in Yerkes's research into primate emotions and cognition, as well as in the dissemination of this research.

Yerkes saw nonhuman sensoriums as places where strange alternative modes of cognition existed, which he attempted to describe, quantify, and manage, even as he posited their alterity. In an essay on animal cognition, he asks: "For may we not reasonably believe . . . that the ant with its complex organization, however different from ours, its highly developed and complexly differentiated nervous system, its manifold forms of sensory discrimination, its docility, and its extremely varied social life, possesses a form of consciousness which is comparable in complexity of aspect and change with the human?"[11] For Yerkes, the complex anatomy, reactions, adaptations, and interactions of the ant all point to some form of consciousness, even if this consciousness is unrecognizable in human terms. Throughout his career, he argued that ongoing debates over the existence of consciousness in animals were far too restrictive, criticizing his old teacher Münsterberg for using a system based on "acknowledgment," which limited conscious beings to the organisms that humans recognized as such.[12] Yerkes's own experience, and his reviews of the scientific literature, led him to believe that even the most basic organisms (including single-cell animalcules) had the ability to respond to their environment, to learn, and to change, which were his only criteria for possessing consciousness in some form or another. He contended that research into the varied *types* of consciousness possessed by different animals would be more fruitful than research into whether or not these animals possessed consciousness at all.

His study of animal psychology required new objective techniques that could approach such alien forms of consciousness. As it was generally practiced, psychology had developed a whole language and system of introspection, which Yerkes was loath to reject completely as had many behaviorists.[13] Behaviorism's

reduction of animals to their responses seemed to him to ignore adaptation as a sign of lived experience. Like the prominent ethologist Jakob von Uexküll, whom he read and admired, Yerkes insisted that animals experienced the world around them as subjects do, even if their subjectivities differed radically from those experienced by humans.[14] At the same time, the science of introspection relied on an assumption of shared experiences between individual humans, which could be accessed through verbal descriptions. No such common ground could be assumed with animals, nor was there a shared language for bridging these disparate perspectives. Yerkes settled on "inference" as a technique that combined behaviorism's direct observation and testing with an acknowledgment of the "subjective, individual fact" of consciousness that psychology generally approached through introspection.[15] According to Yerkes, comparative psychology should develop a synthesis of empirical testing and informed sympathy to generate reason-based speculations about the subjective mental states behind individual behaviors—whether human or nonhuman.

Yerkes's use of inference operated through a type of palpitation, never directly accessing the mental states he sought to study but rather deducing them from their external manifestations in animal behavior. He described this process as predicated on a "serviceable" set of assumptions that were borne out through everyday interactions and relationships between animals and scientists in the lab.[16] Unlike behaviorism's movement toward a more and more specialized language of stimulus response, behavioral research at Harvard, where Yerkes worked, often used a language of emotion as shorthand to describe animal behavior.[17] His broad use of emotional descriptors was as much a practical concern as a scientific claim. As a practical matter, caring for animals often requires a frank acknowledgment of animal emotional states.[18] Although most scientists only began systematically studying the complex emotional relationships between lab animals and researchers much later, within these early testing animal communities there was an ongoing internal conversation about the management of animal feelings and well-being.[19] Written guidelines, informal advice, and training all directly discussed animal feelings even while most behavioral psychologists patently ignored, downplayed, or erased such feelings in their published papers.[20]

So Yerkes was relatively unique in his inclusion of these behind-the-scenes emotional relationships as central parts of his published work. As the historian Anne C. Rose observes, Yerkes consistently inserted incidental and anecdotal evidence of his primate emotions into his publications.[21] Rather than a theoretical principle or datasheet, he often presents precise descriptions of affectively dense circumstances as his final experimental results. Even when representing his work through statistical tabulation, he is circumspect about the ability for such numbers to reveal the true content of his laboratory experiments.[22] Quantitative tabulation, he argues, simply does not work for behavioral phenomena with these many variables. For him, scientific thinking should rather take the form of intuitive leaps or

insights into animal behavior, which have less to do with deduction than empathy. He writes: "To learn truly about the behavior of an animal one must be able to observe accurately, inclusively, relatedly, and to understand it one must be capable of establishing a sympathetic rapport which assures mutual naturalness of attitude and action. The student of animal behavior who is unsympathetic with his subject, like the artist who lacks feeling for his, is cut off from invaluable aids to insight and creative effort."[23]

Here we have the experimentalist as artist, one who feels for, rather than simply observes, his animal subject. Insight and sympathy, the openness to being changed by the other, the development of trust between human scientists and animal subjects, are all viable tools within Yerkes's conception of experimental practice. Psychobiology, as he describes it, requires establishing contact and maintaining relationships. His laboratory was therefore a site of engaged sympathy, of establishing relationships across species lines, where the functions of the mind in their many possible permutations could be revealed through contact and interaction between animal subjects and human scientists.

Yerkes's approach was dictated by his research topics, including birth and maternity, sexual relationships, and hierarchy and dominance—all of which resisted available forms of reductive experimentation. Behaviorists working in the shadow of Pavlov and his theory of conditioned reflexes were concerned with animal behavior as a set of stimulus responses that could be altered through reinforcement and aversion enforced over many trials.[24] Yerkes was interested in such experiments—indeed, he coauthored the first translation of Pavlov into English and kept up a long running correspondence with him as well—but he also aspired to explain behaviors that were impossible to repeat or easily induce.[25] Take for instance his brief 1915 article, "Maternal Instinct in a Monkey," in the *Journal of Animal Behavior*, which details the actions of a chimpanzee mother named Gertie after a still-birth pregnancy.[26] Yerkes precisely describes Gertie's behavior with her deceased child, how she guarded its body for five weeks before he was able to take it from her, her extreme interest in the dead infant's eyes and eyelids, and her ongoing attention to and physical contact with the body. He provides these detailed descriptions but makes no attempt to theorize or identify causes for these actions other than positing the "persistence of maternal behavior."[27] Births and parental relationships are not reproducible in the same way that stimulus-response tests are and therefore troubled the regime of data collection built on repeating experiments. Scientists like Yerkes, who would study such a phenomenon, ultimately relied on descriptions of unique circumstances rather than the observation of many repeat performances.

One possible method of repeating such singular occurrences is, of course, film. As Scott Curtis has shown, many scientific fields mobilized the moving image as a replacement for repeat experiments in the early decades of the twentieth century: "The motion picture was the best kind of repeatable experiment: if the record

could function as a substitute, it could be endlessly repeated without the work involved in setting up the actual experiment again and again."[28] Film can be used to verify one's observations, or share those observations with other scientists, and thereby reduces the necessity for repeat experiments for the purposes of confirming results or convincing colleagues. This can save scientists labor and cost, but it also fundamentally transformed which experiments are repeatable. With complex and subtle animals like chimpanzees, who each have different personalities and memories, reliable repetition in behavior is hard to come by. Certainly, the impetus for Yerkes to film Cuba's interactions with Peter in *Maternal Behavior in Chimpanzee* must have been the capacity to reexperience an occurrence that up to that point was completely unique. No chimpanzee had ever given birth in a laboratory colony before, and it was uncertain when this would happen again.[29] Filming Cuba's behavior moments after this birth offered an opportunity to assess and study a phenomenon that would otherwise have been lost in its fleeting singularity. If film could truly stand as a substitute for the experiment, individual and unique events could take on the properties of replay and reproduction that were necessary within experimental psychology.

But for Yerkes, film reproduced not only the physical details of the experiment but also the affective relationships of his laboratory research at the time the film was created. Moments of sympathy like these could otherwise only be given through subjective descriptions of one's own feelings. In his written work, Yerkes consistently bemoaned the "crudeness," "incompleteness," and "inadequacy" of his own prose and its unacceptable status as scientific findings despite being the most revealing takeaways from his experimental activity.[30] But while written interpretations of animal feelings and motivations were subject to accusations of inaccuracy and sentimentality, film was not. Yerkes believed that cinema could be used to circumnavigate the limits of language to reproduce emotional interactions for scientific spectators. Describing the social interactions and emotions of his primates, Yerkes wrote: "Were motion-picture records of the behavior . . . available, there would be slight need of verbal description or comment."[31] Yerkes again expresses his frustration with the limits of prose. Film can communicate what language can only approximate. By reproducing all the subtle, indescribable, or unintelligible movements that circulate outside language's grasp, he argues that social behaviors, conscious states, and primate customs can all be reproduced as clear cinematic facts that observers will glean from the moving image, producing what he describes as a "feeling for the animal" that eludes written and spoken language.[32]

For Yerkes, the psychotechnology of cinema induces an emotional analysis of its content, objectively reproducing not only behaviors but also their interpretations in the minds of viewers. This process necessarily requires an act of reading on the part of spectators, which Yerkes recognizes might be a difficult process to control. He writes that when one watched films of primates' emotional relationships, "the facts would be clear to every intelligent observer," but he also acknowledged

that "interpretations differing with the mental background of the observer would be inevitable."[33] As with his work in IQ testing discussed in the previous chapter, Yerkes attributed different readings of his visual material to differing capacities for scientific sight on the part of the spectator. For him, the truth of the primate's emotional state was contained within the film, but it required an act of "intelligent observation" based on informed empathy to uncover. The instability of differing responses could thus be explained by Yerkes's hierarchy of vision: intelligent observers would arrive at the correct reading of a chimp's mental states, and those who did not come to these same conclusions simply showed the deficiency of their own thinking. Here, film's multivalence spoke to differences in the audience rather than pointing to a flaw in the medium's capacity to objectively capture fleeting emotional phenomena.

Maternal Behavior in Chimpanzee's final structure actively encourages exactly the sympathetic rapport and speculation that Yerkes advocated for generally. Yerkes composed the film like one of his laboratory experiments—setting up a moment of complex contact with animals where viewers can engage in speculative sympathy. Beginning with footage of Cuba and her new infant, Peter, approximately forty minutes after birth, the film then moves on to an open-ended experiment where another chimpanzee mother, Dita, has been separated from her infant daughter Rosy for a month and a half and is subsequently presented with an infant who was not her own (Don). The film concludes with a striking sequence that illustrates precisely how Yerkes meant for the medium to generate cross-species sympathy. In it, Dita is finally presented with her daughter Rosy at the end of the six-week separation. Rosy is held just outside of Dita's cage, where Dita can see but not touch her infant. Title cards ask the audience to "Observe Dita's facial and gestural expressions as she sees her baby before her just out of reach. As clearly as with words she begs for the youngster." A long, uninterrupted shot subsequently presents Dita's response from inside the enclosure. She swings from the ceiling, gesticulates repeatedly with her palms up and fingers curled as if taking an object to her chest; she grasps the fencing of her cage and rocks back and forth violently; she bares her teeth and seems to howl (the film is silent); she hops in place rhythmically flipping her hands to face inwards and then outwards. In one startling performance, she grasps a tire hanging in the middle of the cage and reaches out to the infant as though the tire and not the fencing was what was separating her from Rosy. In another instance, she pauses in her rocking back and forth to inspect a faucet just below the fence separating her from Rosy and then, grasping it, she momentarily incorporates the faucet as an object in her behavior titled "begging." In the final shot of the scene, which is also the final shot of the film, Dita seems confused, staring down at the faucet again and then up to the offscreen space where the infant Rosy is being held. The sequence abruptly ends here.

This scene functions as a tempered animetaphor, an attempt to harness the instability of both film and animals as a method for generating scientific meaning.

At the profilmic stage, the experiment was already radically open-ended. There was no prescribed action that Dita was being asked to perform, no clear parameters for when the studied behavior began or ended, no apparatus defining or focusing her actions. Indeed, the camera itself can barely keep her in frame, and there is no coherent reason why the shot ends when it does. The uninterrupted length of the shot, and the many divergent behaviors it presents, allows space for a variety of overlapping readings and meanings to be taken from these images. But despite this deep ambivalence, the title cards graft language onto the ambiguous images, producing a general descriptive heading for their multifaceted content. Gestural and facial expression become "as clear as words," held together under the umbrella of "begging." Viewers are thus induced into an act of translation—the incoherence of Dita's behavior and the film itself becomes coherent through viewer participation, through the act of observing, synthesizing, and empathizing with Dita's motivations as a singular emotional expression. The film is thus meant to document "maternity," and in this final sequence "begging," by creating a recognition of these mental states in audiences and not by explaining or illustrating the cause and effect dictating Dita's movements.

Unlike in Lippit's theorization of the animetaphor, Yerkes did not see the instability of cinematic images as calling into question film's ability to communicate single truths but rather as simply demanding a more discriminating spectator—an "intelligent observer—who could properly define the emotional category or social context within the image's chaotic multivalence. Yerkes thereby took into account the moments after the animetaphor creates its disruptive empathy, when a spectator returns to language and reason, having gleaned new truths that were previously inaccessible. In the end, he saw this experience not as a rebuke of language but a process of expanding it into new territory. Yerkes thus adapts the written and spoken word to encapsulate animal behavior by pairing title cards with cinematic images of this behavior. On its own, *begging* was an inadequate scientific descriptor of Dita, but when presented as synonymous with the detailed filmic image, the term took on the indexical properties of the camera. "Begging" could therefore become an admissible topic of objective analysis through this use of documentary film.

By showing *Maternal Behavior in Chimpanzee* to his colleagues, Yerkes attempted to distribute inference as an appropriate research modality, pulling the discourse of animal testing towards his particular concerns with mental states. He showed his films in classrooms and conferences, often as an accompaniment to his own lectures, where he would further elaborate how viewers should experience their content.[34] For instance, he concludes a speech on the mind and personality of the chimpanzee given to the American Society of Naturalists: "It is not by oversight that I have neglected to use observations and contented myself with description in general terms, for I count upon the cinema record which you are about to see to lend reality to my subject."[35] Here, the mind of the primate, its personality

and individuality, which he had spent the entirety of the lecture generally describing, was to become real and concrete for his audience through cinema. Within these spaces the moving image could advocate powerfully for experimentation based on empathy in ways that his written treatises and spoken lectures could not. Filming singular, emotionally complex occurrences allowed him to introduce different social behaviors into comparative psychology's testing regime. Additionally, through the screening of his films, Yerkes sought to create a "feeling for the animal" in other scientists, validating his suppositions about primate cognition and affect and thereby introducing nonhuman subjectivity into the increasingly empirical sphere of experimental psychology.

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SAVAGE SYMPATHY: A EUGENICIST
STRUCTURE OF FEELING

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Near the conclusion of Ada and Robert Yerkes's 652-page tome *The Great Apes: A Study of Anthropoid Life*, the authors ask: "Why study anthropoid apes or any other infrahuman primate when so many idle and apparently nearly useless human subjects are at hand?"[36] The phrasing of this question is obviously troubling, promoting as it does the idea of "useless humans" and suggesting that, if only for certain legal protections, scientists might experiment on these idle masses. Instead, the authors go on to argue, psychobiologists must settle for apes, who have similar emotional responses to that of humans and thus are suitable stand-ins. They position primates as an essential tool in the pressing study of human minds, actions, and society. Here, Yerkes's dual commitments to psychobiology's study of animal emotions and to eugenics' categorization of humanity come into contact with one another. But this was not the only such contact; indeed, these two pursuits were intimately linked.

Yerkes consistently prefaced his primatology research as having applications for explaining human emotional behavior. In his appeals for funding and in attempts to elicit a broader interest from the psychologist community, he specifically emphasized the affective similarities between primates and humans.[37] While their ideational behavior—their ability to think—was "inferior in type" to that of humans, Yerkes claimed that their emotions clearly held a (distorted, but nonetheless functional) mirror up to humanity's own affective life.[38] Describing the qualities of "the ape," Yerkes wrote: "That it feels as we do may not be asserted with assurance, but it is clear that under conditions which affect us emotionally it manifests similar expressions."[39] Within Yerkes's comparative framework, primates may lack the complexity in structure that allows humans to reason, but their affective relations provide the raw materials out of which such complex thinking emerges, making them revealing test subjects with broad implications. Primates, like film, brought affect into the precise scientific discourse of the laboratory in ways that the florid language and assumptions of introspective psychology could

not. Their presumed capacity to stand in for human emotions and their status outside the legal protections of human citizens meant that they could introduce complex humanlike emotional behaviors into the experimental setting of the lab, where they could be empirically tracked, tested, and quantified in ways that were prohibited with humans.

Yerkes saw his work with primate affects as a crucial component of his broader political project of eugenics. In a 1915 manifesto titled "Progress and Peace," he argues that studies of feeling produce a different form of knowledge and political power than the traditional hard sciences of physics and chemistry, drawing a sharp distinction between the impact of the physical and the biological sciences on human progress.[40] For him, this division has global significance. Both strains of research promised pathways to peaceful futures, but the character of these futures varies dramatically. The physical sciences, he writes, are tied to a war machine that envisions the route toward peace as one of increasing control through fear—a fear produced by technological and military might. In the shadow of World War I, he imagines a future society that discovers "some diabolically horrible means of destroying human life," writing that "the whole world might suddenly be made to bow in terror before the will of the all-powerful nation."[41] The peace offered in this prognosticated world would be one born out of the direct repression of difference and opposition. Physics offers the national war machine the ability to grip the entire planet under a single nation's will.

Instead of this approach, Yerkes advocates for an alternate route to peace through the biological sciences. The war machine is premised on a fear of difference—the domination, conversion, and eradication of diversity. Against this, Yerkes positions a science of sympathetic psychobiology, which would operate through "understanding, insight, appreciation."[42] In an incredible leap, he describes his practice of the life sciences as a model of patronizing empathy that can lead to world peace through scientific management, where the "dignity and worth" granted experimental animals in the psychobiologist's lab would be similarly granted to other people and countries.[43] He claims that "superior" nations, races, and individuals have been unnecessarily cruel to their "inferiors" owing to a lack of sympathy but that scientific empathy can reorient power away from repression and toward a form of benign management: "To see a savage is to despise or fear him, to know him intimately is to love him. The same law holds of social groups, be they families, tribes, nations or races."[44] Here, Yerkes extrapolates the empathetic work of the lab to a global scale. In his view, observing scientists do not simply "see" their subjects; rather, they "intimately know" them. He thus theorizes that international relations can replicate the techniques of comparative psychology, including personality evaluations, sensory experiments, behavioral adjustments, and, most crucial, the affective bonds. Empathy in these instances is not meant to erase the power differentials existing in the lab, the experiment, or the national stage. Rather, like intelligence tests, empathy is offered as an organizational tool, one that can transform

fear into love, cruelty into paternalism, enemy into ally. Yerkes articulates the life science lab as an ideal, stable hierarchy, in which differences are managed by an enlightened sympathy and fellow feeling.

As Donna Haraway details in *Primate Visions*, Yerkes's vision of power enacted through judicious management rather than violent oppression was predicated on defining personality types for different demographic groups.[45] Temperamental differences, once identified, were to be capitalized on to best organize society. Yerkes saw the heteronormative family unit as an ideal example of such an organization, in which the division of labor was naturalized according to supposedly biologically determined gender identities.[46] With a variety of experiments—most prominently the food-chute competitions, in which male and female primates competed for a limited supply of food—Yerkes and his researchers described gender as differing emotional and mental capacities.[47] Here, operationalized empathy allowed him to make broader claims than he could have otherwise, attributing to gender not only certain behaviors but also forms of consciousness. Yerkes's interpretations of his findings often fit preconceived notions of female passivity and male dominance, a point Ruth Herschberger made at the time in her 1948 critique of sexism in the natural sciences.[48] Despite his commitment to "intelligent observation," Yerkes's access to primate mental states, motivations, and personalities was hardly incontestable and often led him to make claims that broadly conformed to preexisting social beliefs. As with the IQ tests, the "truths" that Yerkes used to evaluate the world ended up being less universal than situated, less absolute than ideological.

Again, we can see these same dynamics play out in *Maternal Behavior in Chimpanzee*. Yerkes structures the film to produce insights into primate maternity, but further consideration of these insights suggests that they reproduce essentialized ideological conceptions of motherhood from the mid-1930s rather than being bedrock truths. Operating at the height of what E. Ann Kaplan calls the period of the "high modernist mother," which lasted throughout the interwar years, Yerkes's film emerged at a time when considerations of maternity were governed by the major narratives of biology, psychology, and the family.[49] These narratives broadly shaped conceptions of motherhood in the United States, operating within both the specialized scientific fields of psychology and medicine, as well as within popular entertainment such as melodrama. In both settings, pathology, biology, morality, and society mixed together to create archetypal characters that defined motherhood. *Maternal Behavior in Chimpanzee* reproduces the common melodrama figures of the "bad mother"—who earns her title through displays of indifference to her child—and the "suffering mother"—who demonstrates her love for her children by evermore demanding and humiliating sacrifices on their behalf.[50] The image of Dita's suffering, her "begging" for her baby, Rosy, seems to offer scientific verification of popular notions of maternal behavior. As in countless melodramas of the time—*Stella Dallas* (Vidor, 1937), *Imitation of Life* (Stahl, 1934), etc.—Yerkes uses the separation of Dita and her child to make the "maternal instinct" most

powerfully visible, intervening through the experiment to construct motherhood as a self-evident "biological fact" available onscreen.[51] In its role as a source of scientific corroboration for such "biological facts," *Maternal Behavior in Chimpanzee* can be read as a unique addition to the discourse of high modernist motherhood, a discourse that spanned the divisions between nontheatrical and popular film.

Alternative to Dita's "suffering mother" is Cuba, the first mother shown in the film and the chimpanzee whose stare struck me so powerfully at Emory. She is described by the title cards as an example of dysfunctional maternity, rejecting and neglecting her child, Peter. Contemporaneous popular science accounts of Cuba emphasize her awkward alienation from her child, the way she treated Peter "much as she might any strange object which interested, puzzled and annoyed her."[52] Onscreen, Cuba is presented through a quick succession of jerky, almost impressionistic, shots as she eats her placenta and part of the umbilical cord, cradles the child, and wanders around the pen. These shots are all medium to close-up, often sacrificing any schematic sense of Cuba's movements for greater detail in her face and gestures. The handheld camera shakes and stutters as it tries to keep her in frame. A persistent curiosity seems to motivate these movements, as the camera peers evermore intently at Cuba, who often is pictured with her back turned, facing a wall as if attempting to escape the gaze of the lens. Her indifference and even resistance to the camera mirrors the charge of indifference to her child, embodying her refusal to *perform* maternity as a naturalized phenomenon of study and of vision. Cuba's supposed pathological form of maternity is displayed by its absence, by her withdrawal from the governing conceptions of emotion and display defining motherhood in the experiment.

There are many possible explanations for Cuba's indifference to her child other than those presented by Yerkes. Cuba had a long and difficult history of maternity in the Yerkes laboratories.[53] She was born in 1926 in Havana, the pet of an aristocratic family who donated her to Yerkes after the death of the family's matriarch, Madame Abreu, in 1931. Cuba gave birth to three children on the laboratory premises: Peter, Cub, and Kola. Peter, who is presented in the film, died two years later when he was given morphine and left unattended for hours in the hot sun. Cub died of a gastrointestinal infection weeks after birth, and Kola was killed during an experiment at the age of one. Cuba herself died during an experimental laparotomy in 1943. Though none of Cuba's children survived, the birth of Peter was the beginning of primate laboratory colonies, a legacy that led to many generations of captive apes living their entire lives under the eyes and lenses of researchers. How Cuba approached maternity in this context can hardly be laid entirely at the feet of her inborn nature. None of this history is acknowledged in the film.

Within the broader context of Yerkes's political aspirations, these films take on new stakes. Film, like the walls and cages of the lab, draws a line between viewer and subject, creating a distinction between observer and observed. But it also invites the viewer to forget this barrier, to walk past it or through it—identifying

with the behavior onscreen. Films like *Maternal Behavior in Chimpanzee* offer up moments in the lives of Mona and Cuba as characters with whom scientific audiences were meant to identify. As discussed earlier, Yerkes intended for his films to produce a seemingly objective language of operationalized empathy, which could be repeated and deployed at will—a scientifically verifiable emotion that he believed should be deployed at all levels of governance, from the management of individual households to the running of nations.

Yerkes's use of film to generate and distribute sympathy for his animal subjects should give pause to animal studies scholars generally. As we have already seen in the work of Akira Lippit, experiences of cross-species empathy, fellow-feeling, and even love are often described as pulling against signification and hierarchies of meaning. Furthermore, many animal studies scholars broadly characterize such experiences as nascent political critiques, claiming that by undoing the primary hierarchy between human and animal one will also undo internal hierarchies between groups of humans, thus unraveling divisions of disability, race, class, and gender.[54] But Yerkes's use of film shows that interspecies sympathy does not necessarily lead to the collapse of political hierarchies; in fact, it is a perfectly functional principle for organizing and structuring such hierarchies. Sympathy was a dominant affect in the structure of feeling of eugenics, a prime motivator for Yerkes in the creation of his intelligence tests and his primatology. This sympathy did not prevent him from building large edifices of essentialized differences between groups of people; rather, it was an integral component in making such claims. Yerkes's work thus calls into question the pursuit of "decentering the human" through the simulation of animal experiences onscreen. In and of itself, such a pursuit does not have a single political purpose but rather can be used for many political means depending on the context.

In the end, it is impossible to tell whether Yerkes lingered over the gaze of Cuba with which I began this chapter, let alone to know what his response to such a gaze may have been. It seems possible that he was caught, as I was, by her look, left wondering what might have motivated it, feeling uncertain about the distance stretching out between onscreen primate and human observer. Whether such feelings might have caused him to question the precepts of social Darwinism around which he organized his research and advocacy is also unknown. But his written work shows little signs of such uncertainty, of succumbing to the destructive possibilities of the animetaphoric functions of film. Instead, he seems to have acknowledged film's power, the power to speak of things beyond language, and used it to bring new terrains of thought, behavior, and motivation under the management of psychobiology. Like intelligence testing, film brought the elusive functions of the mind into the hands of the scientists who participated in Yerkes's empathetic framework. Developing a "feeling for the animal" ultimately facilitated these scientists in categorizing, studying, and controlling animals, but it did not lead them to unlock their cages.

3

Primate Figures

Social Darwinism, Anthropology, and Ingagi

In the Robert Yerkes holdings at the Manuscripts and Archives section of Yale's Sterling Memorial Library, there is a folder titled "Fake Film," which contains several correspondences between Yerkes and Will Hays, the head of the Motion Picture Producers and Distributors Association in Hollywood.[1] The "fake film" in question is the 1930 William Campbell film *Ingagi*, an ostensible travelogue featuring "authentic" and "exotic" sights of far-off Belgian Congo. Among the film's fakeries are men in gorilla suits, trained animal actors, white actors in blackface playing "natives," footage stolen from other films, and a supposedly new species of animal that is in fact an armadillo with prosthetic wings attached to its back.[2] In his letters, Yerkes requests that Hays take direct action against this film for being "grossly misleading and misinformative" and a lie "too gross to be tolerated." If Hays does not act, Yerkes threatens to go to the press and "expose what is evidently a brazen fraud and inform properly a credulous public, which in this instance is wholly at the mercy of obviously unscrupulous exploiters." Complaints like his contributed to a Better Business Bureau investigation of the film, done at the behest of the Hays Office, which catalogued *Ingagi*'s many inaccuracies and fabrications, resulting in a series of lawsuits and countersuits that concluded with the film's drastic reediting.[3]

Ingagi was a central flashpoint in the debate over fabrication, or "nature faking," in early wildlife films and has historically been contrasted with the work of actual scientists. This topic is addressed by several important historical studies of the genre. Film historians argue that nature faking was produced by a structural tension between the filmmakers' commercial and economic aims and the films' supposed scientific and educational purposes. Cynthia Chris writes: "If wildlife filmmakers seeking popular distribution dabbled with authenticity . . . commercial success in animal films would depend on the degree to which they

embraced sensationalism."[4] In this rendering, truthful representations of nature are contrasted with the excesses of sensationalism, excesses that often took the form of extreme sexism and racism. This was especially the case with *Ingagi*. Chris describes the film as "the most controversial of the era," describing it as "conflating a set of racist and misogynistic fantasies about the Others who might be objects of the colonial gaze."[5] Derek Bousé argues that *Ingagi* is representative of the general period of "decadence" that wildlife films entered into in the 1930s, being, as he describes it, "the worst of the lot."[6] Analyzing the pushback to the film by scientists like Yerkes, Gregg Mitman writes that "naturalists feared *Ingagi* might do serious harm by offering moral grounds for the gorilla's extermination precisely at a time when conservation efforts to save the species from extinction were imperative."[7] Mitman also points to the fears of scientists and other nature filmmakers that *Ingagi*'s faked scenes might sully the public's belief in all nature documentary films. In all of these accounts, scientific voracity is contrasted with the film's exploitative sensationalism, providing a check on the "degeneracy" of the film's excesses.

In this chapter, I call this opposition into question. Reconsidering some of the terrain covered by these scholars, I position *Ingagi* and the other nature documentaries of its ilk alongside the politics, history, and aesthetics of laboratory filmmaking. We will see that despite the protestations of Yerkes and his fellow scientists, there were many ways in which the wildlife genre and laboratory filmmaking fed off of each other, playing into the same narratives of resource and knowledge extraction born out of colonialism. The first section of this chapter covers the overlap between Yerkes's milieu and those of the wildlife filmmakers, detailing the intersecting institutions, theories, and trade routes that produced both scientific specimens and adventure nature films. Despite their extreme spectacle, wildlife films played an important role in supporting and popularizing Yerkes's scientific program of eugenics, which Chris describes as having "pervaded scientific and political thought and institutions, and crept into the common sense of dominant classes generally."[8] The second section turns specifically to the films produced in Yerkes's laboratories, arguing that the aesthetics, context, and reception of these works framed their primate subjects as images of accelerated evolution as the ape went from a monster in the jungle to a specimen in the lab. Here, the authenticity of the wildlife film matters less than its role of propping up and mutually justifying the laboratory space as a place where humans and animals can be rationally observed and managed. Monstrosity, excess, and exploitation ultimately provided a necessary foil for scientific measurement, assent, and progress.

Analyzing the "nature faking" debates leads to larger methodological questions about the role of fabrication and ideology in the representation of nonhuman subjects. Take for instance Bousé's use of Baudrillard's concept of the "simulacrum" as a categorical rubric. Bousé writes that an image of nature does "one of four

things: (1) reflects a basic reality, (2) masks and perverts a basic reality, (3) masks the *absence* of a basic reality, and finally (4) bears no relation to any reality whatever (and is thus pure simulacrum)."[9] Here, the status of "pure simulacrum" is bestowed on the most clearly formalist of filmmaking, he cites the examples of avant-garde films and music videos, which make no claims to an "external reality." In establishing this schema, Bousé works to dispel the common perception of wildlife films as apolitical and ahistorical, emphasizing their construction and fabrication of images of nature. But this relies on a fundamental misreading of Baudrillard's claims. In fact, the inverse is true. In their very fabrication, nature-faking wildlife films fundamentally preserve the difference between real and false precisely because they are knowingly faked and therefore are *not* simulacra.

To make a forgery, or to consciously lie, as many of these filmmakers did, ultimately means reinscribing and recognizing the difference between natural truths and fabricated constructions. Filmmakers like those behind *Ingagi* were hucksters, duping their audiences into believing that the false was true. Baudrillard is quite clear when he writes of such fabrication that it "leaves the principle of reality intact: the difference is always clear, it is simply masked, whereas simulation threatens the difference between the 'true' and the 'false', the 'real' and the 'imaginary.'"[10] Simulation, as Baudrillard describes it here, undermines the *possibility* of making a distinction between real and false and therefore does not imply a critical project of sorting out and cataloguing "perversions" of the truth, nor does it imply that a "faked" nature film is a suitable example of simulacra. Instead, the topic of this book, laboratory films of experimental animals, fits the term much more aptly. Celluloid specimens are neither pristine reflections of nature nor cultural illusions but rather are the product of both ideological desires and material bodies. Such cinematic images make the distinction between cultural fictions and natural truths nearly impossible to discern, as they are clearly mediated and constructed, while also fulfilling even the most rigorous definitions of documentary veracity. As we have already seen, the primate films made at the Yerkes labs did not exist outside of politics, ideology, and desire. Instead, their experimental subjects were forced to embody these structures in their behavior, their anatomy, and their social interactions, as they performed test after test for scientists and their cameras.

Ultimately, it is crucial to make the point that images of animals do not need to be faked in order to be historical or political tools. Science and entertainment may have been seen as essentially different enterprises, pitting contrasting animal images against each other, but neither side's claims of simply relaying a preexisting reality should be taken at face value. Rather than posit scientific objectivity as antithetical to being a political, social, or emotional actor, it is better to understand how each instance of objectivity was defined and used by its practitioners. To my knowledge, Yerkes never knowingly fabricated any of his findings, nor did he purposely misconstrue facts to fit his political aspirations. Instead, these aspirations

explicitly shaped and inspired his definition of objectivity, to which he faithfully adhered. Analyzing his films therefore cannot be limited to separating fact from fiction but rather must focus on how Yerkes generated his facts and to what ends they were used.

Rather than read *Ingagi* and the research films produced in the Yerkes laboratories as having opposite relationships to reality, as Bousé does, I see them as two sides of the same coin, both being products of a form of colonial logic manifested in eugenicist theories of race and evolution. Achille Mbembe describes this colonial logic as a discourse on the animal, which shapes the ways that power is exerted in colonized spaces. Mbembe identifies two traditions in this discourse: those of the strange animal and those of the intimate animal. The strange animal is a beast, a "body-thing," whose monstrosity justifies any acts of violence to control or contain. Many wildlife films cohere to this image in their exotic depictions of otherness, where people, continents, and animals are all imagined as unwaveringly "savage." But a second tradition of the colonial animal discourse also holds true, in which the animal becomes a member of the family as a pet. Mbembe writes: "one could, as with an animal, *sympathize* with the colonized, even 'love' him or her."[11] This sympathy is based on a specific brand of transformation and performance, "familiarity and domestication," in which the animal enters rational modernity through servitude and work. Forced labor here becomes a sign of arriving into modern systems of production through a process that collapses the concepts of "ruling," "taming," and "civilizing." In the use of these figures, colonial logic constructs a shroud of reason, what Mbembe calls "the tawdry cloak of humanism,"[12] to mask the underlying arbitrariness of its violence, its foundational sadism and barbarism. Horror and sympathy are both necessary for this logic to function.

While *Ingagi* clearly presents a vision of nature based on the notion of animal savagery, it is out of the latter tradition that the cinematic work of Yerkes emerges. Just as Mbembe describes, his work was hailed as a civilizing process that was produced through a mixture of sympathy and forced labor. Unlike naturalist documentaries, whose "authenticity" was premised on providing untarnished glimpses of animals in a pristine and hostile nature, Yerkes's cinematic experiments depicted the transformation of his primate subjects into willing specimens. These films derived their scientific authenticity from the technical accouterments of the laboratory setting, which denotes the scientist's capacity to transform animal behavior, yet they also managed to capture a public fantasy of apes as sympathetic lower lifeforms that could be civilized and put to work. By bringing humanity's past into the lab through the figure of the anthropoid ape, the "civilizing" power of rational management could be confirmed. These films were not affectless documents of truth or simple recordings of events in the lab but powerful political symbols that evoked widespread colonial desires.

TRUTH "TREMBLING IN THE BALANCE":
COLONIAL ANTHROPOLOGY, WILDLIFE FILMS,
AND EVOLUTIONARY RHETORIC

An early reviewer of *Ingagi* succinctly described the public's fundamental uncertainty about the film's truthfulness: "there are moments when the authenticity of the film seems to tremble in the balance."[13] Indeed, as Will Hays began his campaign to censor *Ingagi* in 1930, the Hollywood reporter Mollie Merrick scoffed at the notion that the public had gullibly accepted the film as factual: "When 'Ingagi' was first shown it didn't seem possible to me that the civilians who argued so frothily really believed that it was the whole truth and nothing but the truth."[14] And yet, she marveled, here was Hays recalling it on the grounds that "the public swallowed it, lock, stock, and barrel." Indeed, one paper claimed it was the Hays Office itself, rather than the public, that was "duped" into believing that anyone had actually taken the film seriously.[15] But while Merrick and others were not fooled by the film, there is reason to think many were. One reviewer wrote of being "swamped" with questions about whether the ape in the film was real or not.[16] The press surrounding *Ingagi*'s release spoke of it as a scientific upset. One reviewer claimed that the film "seems to have proved" the evolutionary link between gorillas and humans.[17] An Indianapolis newspaper portrayed *Ingagi* as a suitable follow-up for interested attendees to a recent talk by the lawyer Clarence Darrow, who defended John T. Scopes in the 1925 Scopes "Monkey" Trial, describing it as "the motion picture record of what is said to be new discoveries of interest in the origin of man."[18] As another paper summarized, the film was "astounding, sensational, and authentic."[19]

The relationship between sensationalism and authenticity shaped the wildlife genre from its very beginnings, existing at the border of science and popular culture. Throughout the 1910s, 1920s, and 1930s, while Yerkes was shooting and editing his own primate footage, these films proliferated, rising and falling in popularity. Film historians have written extensively about this period, during which wildlife filmmakers were often funded by major scientific organizations who sought, as Cynthia Chris describes, "to raise public interest and funds for research, conservation, and museum projects."[20] Yet this relationship largely collapsed as the films were increasingly recognized as unscientific, staged, or otherwise falsified. An example of such entanglements can be seen in the relationship between famed taxidermist Carl Akeley and the married travelogue filmmakers Osa and Martin Johnson. Akeley was instrumental in the production of many wildlife films in the 1920s. The Akeley motion picture camera—which he invented in 1917 to address the unique demands of naturalist filmmakers in the field—was an industry standard, used by the likes of Robert Flaherty for *Nanook of the North* (1922) and *Moana* (1926) and by the Johnsons for *Simba: King of the Beasts* (1928) and *Congorilla* (1932).[21] Akeley used his position at the American Museum of Natural History, where he oversaw

taxidermy in the Hall of Africa exhibit, to procure funding and sponsorship for the Johnsons.[22] Akeley's support for the Johnsons was the product of a shared belief in the logic of conservation and taxidermy, which tied together the deaths of animals and the preservation of their visage. Both parties argued that killing individual animals, whether for an onscreen hunting sequence or for a museum display, was an acceptable sacrifice for a species' image to be saved for posterity, envisioning a time when these animals would be nothing more than ghosts from the past. Taxidermy, photography, and film offered insurance against this seemingly inevitable disappearance in the future.

The support of the American Museum of Natural History lent the Johnsons a new scientific authority, elevating the reputation of Martin Johnson from "vaudeville performer to gentleman naturalist."[23] Indeed, this was just one of many ways that the scientific and wildlife film communities overlapped. From funding institutions, to ideological projects, to actual individual apes, scientists like Yerkes operated largely in the same settings as prominent wildlife filmmakers, even as they produced research for very different audiences and pursued very different goals. Especially throughout the 1910s and 1920s—before Yerkes successfully bred populations of experimental apes in his laboratory colonies—it was extremely difficult to gain access to chimpanzees and gorillas, requiring a catch-as-catch-can approach that included visiting circuses, private collections, zoos, and watching wildlife films. Early on, Yerkes bemoaned the haphazard nature of his dependence on external sources and chance encounters, writing that "knowledge of anthropoid life has grown haltingly, irregularly, uncertainly because of fragmentary, unverified, and often unverifiable observations."[24] In an attempt to further his research, he dealt directly with many of the primary players in the wildlife filmmaking world. Beginning in 1922, he exchanged letters with Akeley, inaugurating a correspondence that lasted until Akeley's death in 1926.[25] In these letters, Yerkes requested photographs of gorilla family groups in their natural habitat of the then Belgium Congo (now the Democratic Republic of Congo), coordinated preservation efforts for primates in the wild, and exchanged findings about gorilla anatomy. Yerkes also corresponded with Martin Johnson from 1929 to 1931, sending similar requests to those he sent to Akeley, asking to procure specimens and for footage of gorilla social groups.[26] In fact, the final breaking point between the Johnsons and the American Museum of Natural History came over Martin Johnson's false claim of working for the museum when attempting to procure a permit for capturing and shipping gorillas, a claim he made while negotiating with Yerkes.

Yerkes's relationship with these filmmakers is indicative not only of their shared institutions and resources but also of their mutual reliance on the colonial ideology of evolutionary progress and its infrastructure of resource extraction. Donna Haraway argues that the American Museum of Natural History's board members largely agreed to fund the Johnsons out of the desire to promote eugenics.[27] Akeley's

theory of conservation dovetailed with the eugenicist theories of outspoken white supremacists on the museum's board—such as Madison Grant, author of *The Passing of the Great Race*, a racist manifesto of scientific theories of racial "purity" and "hygiene." Such figures believed that conservationist narratives confirmed the social Darwinism underlying eugenics by imagining colonized countries and their human and animal inhabitants as part of a past giving way to European civilization.[28] The transcontinental transport of films, scientific specimens, and animals existed within colonialism's global market for material products and exotic fantasies. The Johnsons are a prime example: filming their own exploits capturing wild apes in the Congo region, animals that would then be sold to circuses, zoos, and scientists like Yerkes in the US.[29] This trade in animal bodies and images was built on long-standing structures of resource removal and human slavery. Indeed, up until the early 1930s, humans as well as nonhumans were transported, sold, and traded through these same circuits of commerce.[30] This colonial context ultimately determined how the films functioned as visual spectacles. As Derrida argues in *The Beast and the Sovereign*, presentations of exotic animals, from menageries to zoos, have long been used to demonstrate imperial sovereignty's strength abroad for the locals back home.[31] According to him, these spaces congregate populations around the image of their nation's power through the display of animals (and often humans) from far-flung countries. Movie theaters and animal laboratories add a modern twist to the operations of the royal or the municipal gardens—testifying to the scope and reach of the industrial and scientific production of images to a broad public at home.

Scientific theories are used within both the wildlife films and the ethnographic films from this time to confirm and authenticate colonial ideologies. As Fatimah Tobing Rony shows, contemporaneous anthropological filmmaking—created for both research and popular science purposes—was motivated by what she describes as a taxidermic impulse toward preservation and display, which was not reserved for animals in the early decades of the twentieth century but also aimed its lens toward allegedly "vanishing" Indigenous groups as well.[32] This strain of cinematic visual culture dramatized a theory of geography, civilization, and progress in which racial categories were constructed as evolutionary stages in the movement from animal to human, what Mitman calls a "taxonomic hierarchy of human races."[33] Drawing from the nineteenth century theories of anatomy discussed in chapter 1, racial differences were tied to supposed structural differences in the body, which were claimed to be self-evidently captured by the film.

In these films, onscreen bodies took on an evidentiary status, but this status also had a grotesque aspect, in which ethnographic subjects were pictured as frighteningly absurd or repellent because of their supposed proximity to animality.[34] Animal bodies, specifically primates, played a key role in this noxious fascination. Within what Bousé describes as the "symbolic Darwinism" of the wildlife

film, individual figures were made to stand in for broad biological concepts, illus-
trating abstract notions of heredity, fitness, and descent in their singular actions
and bodies.[35] Oliver Gaycken elaborates: "Given how centrally primate images fig-
ured in the reception of Darwin's ideas, practically any image of, say, an orangutan
produced after 1859 could not help but contain a message about evolution."[36] The
speechless ape, with its hairy form and hulking figure, was continuously brought
into proximity with a broad array of colonized people as a point of comparison.
Films such as *Congorilla* were marketed heavily on catching a glimpse of this brute
body. The film's promotional material featured giant novelty theater fronts of goril-
las locked in heated battle.[37] Its iconic posters feature a giant gorilla face, nostrils
flared, mouth open, eyes bulging, which seems to scream out at the spectator.

Despite all its gruesome exaggerations and fabrications, *Ingagi* was ultimately
more of a caricature than a break from ethnographic filmmaking practices at this
time—pushing the genre's dynamics to a farcical extreme. Released three years
prior to *King Kong*, the film was an important tipping point for the ethnographic
monster movie as it shifted from supposedly educational material to openly fic-
tional horror. It marketed itself by tapping into the widespread popularity of the
wildlife film's most sensationalist narratives. *Ingagi*'s posters promise a sensational
experience of interspecies sex and hybrid lifeforms, what they called "half-ape half-
human creatures," and "queer half breed children." One of the film's most notori-
ous scenes depicts evolution's missing link as a gorilla (actually a man in a gorilla
suit) glimpsed stealing away with a topless "native" woman (actually a hired actor
in blackface).[38] One reviewer wrote of this sequence as "a pictorial revelation" that
had "the power, seemingly, of electrifying its audience—which . . . appeared more
dead than alive by the time it was over."[39] In scenes like these, *Ingagi* functioned
as a soft-core fantasy of the colonial imaginary, a pornographic remake of social
Darwinist anthropology's defining moment of human separation from animal.

Similar examples of *Ingagi*'s many outright falsehoods—its staged scenes and
lurid exploitation of its subjects—can be found piecemeal in other more repu-
table examples from the genre. But by brazenly bringing these fabrications into
one film, *Ingagi* threatened to expose the artifice of the other, supposedly more
authentic, entries. As a reviewer of the 1930 travelogue *Africa Speaks!* admitted: "It
looks like the real article. I have no way of actually knowing after seeing 'Ingagi.'"[40]
It was precisely this danger of undermining the scientific nature of film that drove
the American Society of Mammalogists, of which Yerkes was a member, to unani-
mously pass a resolution condemning the film for its misrepresentation of nature.[41]
In Yerkes's complaint to Hays, he protests that *Ingagi* attempts to "convince the
observer that objects are presented with photographic accuracy," which he worries
will mislead what he calls a "credulous" public. Ultimately Yerkes and his peers
were concerned about science's status within popular culture and film's capacity to
relay scientific authority rather than with *Ingagi*'s racism or exploitation.

VIDEO 2. Clip from *Ingagi* (William Campbell, 1930). Courtesy of Kino Lorber Inc.
DOI: https://doi.org/10.1525/luminos.145.2

Mitman and others have shown that the pushback to *Ingagi* indicated a larger split developing between scientific institutions and the ethnographic filmmakers they had sponsored.[42] This split contributed to the wildlife film falling into decline throughout the early 1930s. The scientists lodging criticisms of the genre largely saw themselves as pursuing disciplinary defenses of scientific fact, motivated by a desire to protect the truth from charlatans like the *Ingagi* filmmakers. As we have seen, this was undoubtedly how Yerkes understood his own criticisms of the film. But if we simply stop there, we ignore the model of filmmaking practiced by the complainants themselves, which had its own political and disciplinary goals that often were just as invested in realizing racist narratives of human evolution. Wholeheartedly accepting the scientists' position threatens to reconfirm scientists' claims that laboratory filmmaking presented unmediated transparency and access to the truth, thereby erasing the similar assumptions that operated in both instances. Yes, as we saw in the previous chapter, and will see in the next section of this chapter, Yerkes's films look nothing like the exploitative schlock of *Ingagi*. But still, just as Yerkes relied on the same colonial expeditions for procuring his specimens as filmmakers like the Johnsons did for producing their films, so, too, did his laboratory films ultimately complement the degraded images of extreme alterity in the wildlife film.

ENTERING THE LAB: PRIMATE SPECIMENS
AND EUGENICIST FUTURISM

In 1916, as Yerkes was instituting the army IQ tests covered in chapter 1, the *Richmond Times-Dispatch* ran a two-page article on his work and that of his fellow primatologists titled "If Science Should Develop Apes into Useful Workers."[43] The article asks: "Would a race of highly intelligent ape-laborers have souls, and so be entitled to religious instruction and protection from the degradation of slavery?" In 1919, another article on Yerkes from the *Richmond Times Dispatch* proposes: "If the ape can be taught to THINK he can be taught to WORK. And if he can be made to work he can do the drudgery of the world."[44] Such comments followed Yerkes throughout his long career, as his research continued to be greeted in the popular press with similar fantasies. In 1934, for instance, the *Evening Star* newspaper published an article on Yerkes titled "Teaching Apes the Value of Money," which asked: "Will accumulated 'money' come to represent power or prestige in the ape community? Will apes learn to hoard, or will they keep their money in circulation?"[45] For years, coverage of Yerkes speculated that apes were just a few scientific experiments away from being integrated into society as useful subjects, working and participating in capitalist enterprise (fig. 4).

The fact that these fantasies take the form of an imagined enslavement of primates demonstrates their intimate relationship with colonialist history and social Darwinist theories of ascension. Most recent scholarship focuses on Yerkes's representation of apes as part of humanity's evolutionary past. Megan H. Glick argues that his photographs of primates grew out of a commitment to multiorigin evolutionary theory, which spuriously claimed that white people descended from chimpanzees, while Black people descended from gorillas.[46] While recognizing the possible validity of Glick's argument, it is also important to acknowledge that Yerkes was not a prominent figure in evolutionary debates, which he saw as primarily settled fact.[47] The vast majority of his writing makes no reference to these debates. Therefore, a broader analysis of his theories of race and evolution is needed to address the politics operating in the bulk of his work.

Unlike *Ingagi* and other ethnographic wildlife films that were obsessed with picturing a nonhuman past, Yerkes's primate films were meant to be institutional tools for controlling racial and species categories *in the future*. His research and his films reveal an often-overlooked component of social Darwinist visual culture: imagining an ideal society under scientific management. As a eugenicist and Progressive Era reformer, Yerkes was far more interested in this world to come than in exploring or preserving what had come before.

Though extravagant, the newspaper fantasies about Yerkes's research were not entirely detached from the actual experiments primatologists performed. Primatologists had taught apes to dig ditches, speak simple phrases, exchange coins for food, cooperate on mental and physical tasks, and even, in one case,

FIGURE 4. This 4" x 5" photographic print, identified as "#300, 1952, Bo (straight legs!!!)," was made by Robert M. Yerkes in 1952. Robert Mearns Yerkes Papers (MS 569), Series V, box 133, folder 2262, Manuscripts and Archives, Yale University Library.

operate a film camera.[48] Examples of these useful transformations can be seen in the films produced at the Yerkes laboratories. Take, for instance, a scene near the end of Henry Nissen's *Some Aspects of Social Behavior in Chimpanzee* (1935). As the name suggests, this film spends the majority of its running time cataloguing chimpanzee relationships, including grooming, defense, and friendship, among other elements. The sequence in question begins with a title card: "Cooperation or teamwork. Pairs of young chimpanzees are faced with problem situations which they cannot solve individually, but only by coordinating their efforts." We watch as scientists set up the experiment, loading a heavy box with fruit and then securing and leading two ropes from the box to a cage that will contain the animals. They then introduce the chimps into the experiment, who, over time, adapt themselves to their recently manufactured surroundings. The chimps begin with a series of uncoordinated responses. One pulls at the ropes while another ignores them. But we see through a series of subsequent images that the chimpanzees begin to coordinate their actions, until they are finally pulling in unison and retrieving the fruit as a reward. The title cards detail and explain this transformation in their behavior: "Gradually one animal learns to wait until his partner is working before pulling on his own rope," and "When one of the animals is not hungry or is reluctant to work, the partner may lend encouragement—and sometimes appears to convey its wishes and meanings by gestures." Here, the cage (which focuses and confines the chimps to one action) and the testing apparatus represent a planned incursion into ape behavior, eliciting a dramatic display of coordinated action on the part of these

animals, who become sympathetic coworkers laboring toward common ends. The laboratory setting, which the film takes pains to illustrate, enlists Yerkes's primates into a form of work, seeming to convert wild apes into ideal model citizens.

Years of hard work went into the production of the laboratory backdrop for this film, the realization of a dream Yerkes had long fostered. Fundamental to his research was the transfer of primates out of the jungle and into the lab, both through the transfer of their images and through the shipping of live specimens. Yerkes supplemented the footage he received from wildlife filmmakers by sending his own researchers into the field to bring back recordings specifically made for him. Before his primate colonies were successfully up and running, he directed his assistant, Henry Nissen, to produce specialized cinematic field research into primate social groups.[49] Armed with an Eyemo 35 mm camera, as well as the equipment to take still photographs, Nissen, an assistant professor in psychology at Yale, went to French Guinea (now the Republic of Guinea) in 1929.[50] Here, he confronted the many difficulties of recording observations in the field. Nissen complained: "I have thus far found photography of the animals well-nigh impossible, and I do not believe that I will have a great number of such photographs when I am thru."[51] He reported that the gorillas seemed to have an uncanny ability to sense his presence and avoided him even when he and his equipment were elaborately camouflaged. Subsequently, the primates are largely missing from Nissen's actual photographs from these excursions.[52] They exist as splotches in far-off trees or vague shapes hidden behind thick foliage—lurking shadows rather than measured specimens.

For Yerkes, Nissen's failure to capture useable photographs underscored the need for animals to be contained in the lab, which provided no place for the apes to elude the camera. He designed his New Haven colony precisely to create this ever-present availability: the walls were painted specifically to contrast with the animal bodies for the purposes of filming them, and special enclaves were built to protect the camera equipment and operator while granting the greatest possible access.[53] As such, the transformative work of the lab was premised on a visual transformation of the primate, who left the foliage of the jungle to become an isolated figure in the open space of the lab completely available to the scientist's gaze.

Once specimens were rendered fully visible in his lab, Yerkes set about methodically testing and transforming their behavior through his experiments. He writes: "we have believed it important to convert the animal into as nearly ideal a subject for biological research as is practicable."[54] His request that Nissen specifically film social interactions was rooted in his eugenicist approach to society. Yerkes saw the social sphere as a dynamic field where individual personalities expressed a racial or species identity, which could either be put to productive or destructive ends. In his public speeches to eugenics committees, he imagined the eugenicist as intervening in this haphazard assembly and providing it with structure and order—allowing each group or individual to function more smoothly and efficiently.[55] Through

what he saw as an enlightened division of labor, the native hierarchies expressed by nature in social Darwinism would be optimized by the cultural hierarchies of a eugenics-run society.[56] Yerkes's creation of his laboratory colonies was essential for this project, since they not only provided a space for testing individual primates but also gave him access to groups of apes whose social interactions could be studied generation after generation.

His experiments were tied to the eugenics political project of accelerating and guiding human evolution through the interventions of society—a political project that led to some of the most horrifying scientific crimes in American history, including the mass sterilization of prisoners and the mentally disabled from 1909 until the 1940s, but also major progressive public health and economic interventions, such as the promotion of birth control and the regulation of corporate activities.[57] Yerkes believed that such interventions should be modeled in the lab. He wrote that he hoped his experiments "might serve as an effective demonstration of the possibility of re-creating man himself in the image of a generally accepted idea."[58] Within this framework, interventions into primate behavior in the lab were meant to pave the way for modeling and transforming the supposedly inborn nature of human personality. So, while the social Darwinists in anthropology claimed to produce authentic visions of the past through a voyeuristic gaze at Indigenous cultures, Yerkes's research sought to demonstrate a tight control over his subjects by acting directly on them. Here, the truth value and authenticity of the films were *predicated* on the intervention, construction, and alteration of one's material, not detracted by it.

These commitments manifest in Yerkes's films as a desire to visualize and assess the interplay of individual personalities and to demonstrate the effectiveness of interventions into these exchanges. Yerkes argued that film was especially equipped to document elusive interpersonal dynamics, which he listed as "social dominance," "right by custom," "privilege," and "the functioning of the conscience."[59] In his understanding of eugenics, these were the very factors that made up the hierarchies of society, thereby positioning film as an ideal tool for documenting experiments into eugenics-based management and control. In lectures given before his screenings, Yerkes would outline his belief in the continuity between race and species, which he provided as a theoretical lens through which viewers were meant to watch these films.[60] Audiences were encouraged to consider primate behaviors as models for testing and legitimating the techniques of control that Yerkes advocated for in the context of human groups and individuals.[61] Indeed, some of the most consistent purchasers of Yerkes's lab films were teachers' colleges, which had no direct interest in primatology but rather in theories of human development.[62] Racial and species management was therefore a specter that haunted these images of animal behavior, existing just outside the frame, interjected into the mind of the audience ahead of time, and imbuing each nonhuman action with a future application and significance for human populations.

In the end, films like Nissen's *Some Aspects of Social Behavior in Chimpanzee* were images of labor and work. Just as in Mbembe's description of the colonial imaginary, in which servitude is transformed into civilization, so, too, the image of the laboring chimps conflates production with improvement. The scientific viewers of such films were encouraged to adopt the position of potential managers—seeing the power of scientifically shaped behavior. This is a dramatically different type of spectatorship than that encouraged by "nature faking" wildlife filmmakers. Once placed within the lab, wild primates testified to the extensive reach of modern science and society, which could bring even the most elusive and dangerous creatures into the rational space of scientific observation. As historian of science Robert Kohler writes: "The placelessness of modern labs, like corporate parks and capital cities, advertise the universality and authority of the culture that builds and inhabits them."[63] For Yerkes, this authority rested on presenting primates as specimens, who were constantly available to scientific inspection and intervention.

Analyzing the Third International Congress of Eugenics, held at the American Museum of Natural History in 1932, Devon Stillwell claims that "popular eugenics ideology" operated through a network of opposing images: "representations created meaning in relation to one another, and within a larger system of aesthetic and ideological frameworks including . . . the 'classical' and the 'grotesque,' and the spectacle and the scientific (or the 'freak' and the medical specimen)."[64] Yerkes's laboratory films create a similar network effect with the wildlife films of the time. An argument for eugenicist management of human society is present in the shifting status of apes as they move from wildlife film to laboratory film, becoming tamed and "civilized" along the way. Both genres confirm one another, as the monstrosity of the ape in one testifies to the transformative effects of scientific intervention in the other. Despite Yerkes's protestations against *Ingagi*, his research occupied the same fantasy space as the film within the public's and the popular press's imagination. From this perspective, the "nature-faking" debates of the time do not simply represent differences of fact and fiction but rather present two modalities for deploying scientific power. The aesthetics of eugenics required both: obscene titillation and rational observation, the terrifying monster and the sympathetic servant, genre spectacle and celluloid specimen.

Conclusion to Part One

Expressive Labor

On November 21, 1921, Robert M. Yerkes began a speech to the Personnel Research Federation—an organization created "to coordinate the efforts of the 250 scientific, engineering, labor, management and educational bodies which are studying personnel problems"—with the question: "Shall man be slave or master of the civilization which he has created!"[1] For Yerkes, the "slave[ry]" in question here is not a reference to American history but rather to mechanization, what he sees as transforming individuals into unfeeling, production machines. He argues that "the proper unit of industry is the person" whose singular identity must be recognized in order to have a just and stable system of industrialism.[2] Individuals are profoundly unequal, he continues, in body, mind, and spirit; thus, he argues that treating them as interchangeable components constitutes the heart of economic injustice. Against this approach, he envisions a future society in which employment is a mode of self-expression, in which the individual's "particular combination of traits" is best deployed in their labor.[3]

At the heart of this division over personnel research at the time were two different cinematic visions of the laboring body. On the one hand, there was the micromanagement and mechanization that Taylorist motion studies performed: "Time and motion studies have been made with a view to increasing earnings and industrial output, and there has developed a strong tendency to mechanize the worker himself."[4] Taylorists' frame-by-frame analyses of cinematic studies of labor, which mapped and charted physiological movements to generate further efficiency, ultimately produce the laboring body as infinitely malleable and dissectible, a machine to be fitted into the industrial system of production. But Yerkes saw the working body differently—as an expression of certain indivisible principles such as race, identity, capacity, temperament, and intelligence. These phenomena could not be disassembled and reassembled through chronophotography but only deduced in

intimate contact. For Yerkes, labor was a manifestation of inner properties that needed to be inferred through an empathetic observation.

Yerkes's primate films were therefore meant to offer an alternative to Taylorist motion studies, reflecting his particular approach to labor. More than any other figure in this book, Yerkes believed in the evidentiary capacity of film to capture truth, not only by objectively relaying images of past events but also by conveying their emotional content as well. He made *moving* images, both in the sense that he captured bodies in motion and in the sense that he meant to emotionally move audiences as they studied and observed animals onscreen. These films picture anthropoid apes as complex and subtle, seemingly motivated by deep wells of affect. Yerkes's scientific apparatus allowed enough space for what were often dramatic displays of emotion, and he encouraged researchers to analyze and use their own experiences of pathos. But, these openings for agency and feeling were also the tools for structuring hierarchies, defining ability, and directing production—the very reasons for the animals' captivity. His dramatic images of caged primates reveal both the promise and the limits of Yerkes's emphasis on individual identity. Yes, these chimps were allowed to express themselves in ways that their keepers found interesting, important, and worthy of study—even of accommodation—but, ultimately, they were locked in cages, subjected to testing, and forced to remain available for invasive transformation. The films Yerkes produced in these cages were meant to model the affective labor of racial capitalism, a space where those in power might empathize with their subjects but confine and control them nonetheless.

Model Animals

Neal E. Miller's Motivation and Reward in Learning

TOWARD THE END OF THE EDUCATIONAL FILM *Motivation and Reward in Learning* (1948), the deep, melodic voice of the narrator concludes with a hint of self-satisfaction, which pierces through his otherwise matter-of-fact cadence. He states: "We have demonstrated that the satiated animal is not innately stupid or lazy. All he needs is a little motivation." This is the key takeaway from the film: differences in behavior are not produced by inborn disparities, such as we saw in the last section with the theories of Yerkes, but rather are created by changes in an organism's environment. Through a series of experiments, *Motivation and Reward in Learning* repeatedly demonstrates the filmmaker's capacity to produce different behaviors in rats with changes to a modular testing apparatus. Motivated by hunger or by shocks from an electric grid at the bottom of the cage, a rat is trained to operate a lever, spin a wheel, chew a cord, and finally strike another rat. This cinematic rodent—an amalgamation of many profilmic rats—is shown to be as flexible as its surroundings, modeling how desire and behavior are changed by one's environment.

Motivation and Reward in Learning was made at Yale's Institute of Human Relations by the behavioral psychologist Neal E. Miller (1909–2002) and the educational filmmaker Gardner L. Hart for the purpose of demonstrating Miller's laboratory research into the effects of stimulus-response reinforcement. In the following section, I trace the scientific theories and filmmaking practices that led to the production of this film, specifically focusing on Miller's place in the history of filming behavioral research. Miller claimed that his cinematic work was an extension of his practice of scientific theorization. He thus sought to build images of animals that could function as abstract models, not unlike an abstract theory,

which could be applied to many different circumstances and situations pertaining to both humans and animals. What we will see in his film and others like it are strangely compliant and reasonable animals, who virtually disappear behind the ideas they are meant to represent. Unlike viewers exposed to the deep affective connections encouraged by Yerkes, viewers of Miller's film are meant to *use* the rats as models for thinking through other behaviors that are not presented onscreen.

Miller's films are thus an extension of the broader practice of scientific modeling. A rich conversation exists between historians of science focusing on the creation and dissemination of animal models in laboratory settings. As Robert Kohler demonstrates, model organisms have led to massive transformations in laboratory methods, experimental techniques, and daily labor of the increasing number of labs using them.[1] Similarly, Angela Creager's analysis of the Tobacco Mosaic Virus emphasizes the model organism's role as an *exemplar*, which brings together differing scientific disciplines; while Michael E. Lynch describes the ways that animals are transformed from living, emotionally complex creatures into what he calls "analytic animals" through the modeling process.[2]

But the role of film in these processes has yet to be fully explored. In this section, we will see that filming animals as a form of scientific modeling brought with it a set of unique affective challenges and concerns. As film scholars have shown, animals onscreen—like their emotive counterparts in the lab—have the ability to disturb both rationality and narrative by eliciting unwieldy emotional responses from spectators. Whether discussing Vivian Sobchack's analysis of animal death in

Jean Renoir's *Rules of the Game* (1939) or Akira Mizuta Lippit's characterization of the mercurial properties of the "animetaphor," animal images contain a disruptive potential, which, if not properly managed, can undermine a film's ability to tell a concise story.[3] Such emotional intensities become doubly disruptive in a scientific film that is meant to appraise animals coolly and rationally. Therefore, animal modeling through film becomes a practice in managing and circumventing the emotions of audiences.

Each of the following three chapters provides a different lens for considering this process, focusing alternately on the contexts of ethnographic cinema, the genre of rodent scientific films, and discourses surrounding educational media. Throughout, we will see that *Motivation and Reward in Learning* represents both the ambitions and the excesses of a psychological model predicated on behavior being infinitely malleable. Film became an essential tool for demonstrating this plasticity, offering up moving records of changes in rodent behavior over time—a record that could be easily shaped and molded through the interventions of editing, cinematography, and narration.

This approach refreshingly avoided the essentialism of Yerkes and the eugenicists, but it also led to fantasies of absolute human engineering and control. The films studied in this section all produce strangely transparent rats, ones whose motivations can be clearly identified and whose responses can be easily measured. The onscreen rats in these films, who are presented as perfectly controlled lifeforms, exist as ideals for behaviorism broadly applied to humans and animals. Against this streamlined articulation of the rat on film, we will see many accounts of actual rats and actual humans acting in surprising ways that confounded the scientists who sought to study them.

Ultimately, this brand of research, which emphasized the social construction of behavior above all, yielded essential insights about the cultural fabrication of race and class, but it also projected a world in which people were as responsible for their actions as rats being shocked in a maze and where the invasive manipulation of both humans and rats was the optimal approach to bringing about social and political change. Film served these theories uniquely by creating modifiable simulations of animal behavior, which could be read as models of human culture. These celluloid specimens exist as important historical examples of attempts to visualize cultural difference, supplementing the much more widely discussed films being produced by anthropologists of the time.

The albino rats that starred in all these films were seasoned professionals in the art of performing for scientists. The rodent's rise as the exemplary experimental animal began in the latter half of the nineteenth century, and by the 1930s, lab rats were well-established tools for the life sciences.[4] Unlike other prominent contenders, such as dogs and rabbits, rats came with a ready-made narrative of expendability, marked as a pest, vermin, and disease carrier. From the mid-nineteenth century to the early twentieth, in the era of Francis Power Cobbes and the Brown

Dog Riots, heated debates over the issue of vivisection were held publicly and at times exploded into violence.[5] In this setting, the rat was a far less controversial choice than other domesticated animals for the often excruciatingly painful procedures performed in the lab.

Behaviorist experiments contributed to a further consolidation of experimental species, in which rats took center stage.[6] John Watson, behaviorism's founder, adopted lab rats as his experimental animal of choice from the beginning.[7] By the time Miller, Orval Hobart Mowrer, and others were making their films, the Wistar rat was a product of more than sixty years of experiments with heredity and genetics and was being advertised as the ideal form of experimental life.[8] Wistar rats came with guidebooks for handling and keeping, as well as the promise of being built for the lab.[9] Created through innovations in inbreeding, the Wistar company guaranteed that all its rats were essentially the same, offering a neutral form of repeatable experimental life, which would produce broadly applicable findings when handled properly. The result of this history was an organism that was considered disposable, standardized, and extremely flexible. It could be used to endlessly test different theories while also providing a universal consistency in deadly experiments that often destroyed their experimental subjects.

Chapter 4 explores how Miller created his laboratory practice, both in response to Freudian theories of psychology and Boasian theories of anthropology. Within this context, he developed a particular brand of filmmaking that figured onscreen rats as models of internal drives and desires, as well as the differing effects of culture. I conclude this chapter by considering Miller's attempt to use his rat experiments to schematize the lynching of a Black man in the South. Chapter 5 continues to analyze the image of the rat, placing *Motivation and Reward in Learning* within the context of the many laboratory rat films produced from the 1930s through the 1970s. Here, I consider the act of cinematic modeling as a form of affective interaction, in which the lives, behaviors, and feelings of animals and humans are intermingled. I argue that through the distribution of the films and the application of findings from experiments depicted in these films, whole segments of society were brought into this relational process that Donna Haraway describes as "shared suffering."[10] Finally, chapter 6 is dedicated to analyzing the use of the behaviorist films in the classroom as a tool for altering student behavior. In educational institutions, film was used to alter behavior in ways that were theorized as analogous to the behavioral alterations that behaviorists made to their rats in the lab. Yet, as we will see, both rats and students remained resistant subjects that never fully complied.

In the end, *Motivation and Reward in Learning* reflects both the hopeful and the disturbing possibilities of Miller and his peers' use of rats as stand-ins for humans. On the one hand, and in its most upsetting form, this work transmutes the worst qualities of both laboratory animals and human culture onto one another. This can be seen in the use of Miller's research to dissect the murderous actions of a southern lynch mob. Here, it is suggested that laboratory rats could one day be

made to reenact the most horrifying violence—the lynchings, the genocides, the pogroms—of human history, while simultaneously suggesting that the actual perpetrators of these crimes had as little control over their actions as a rat desperately looking for food.

But on the other hand, this work also contains a novel approach to thinking through human history, one that is potentially open to nonhuman authors and actors. At their best, these films of animal research can be read as a kind of collective dreaming, the products of animal behavior, scientific theory, and mechanical objectivity in the mid-twentieth century. In our current moment, when the ravages of climate change call into question the continued existence of both a sense of the future and the existence of nonhuman animals, the potential to open up speculation in this way is all the more poignant. The modeling practices of Miller and his peers might ultimately be a dead end in the history of science and film, but there are still important lessons that might be learned from their failure.

4

Rodent Simulations

Stimulus-Response, Laboratory Rats,
and a Southern Lynch Mob

Let me begin with two disparate scenes of violence—one occurring in the animal laboratory, one at the hands of a white lynch mob—that Neal E. Miller brought together in his work. The first comes from one of his films (fig. 5), the second from one of his books. In the first, we watch as two albino rats stand on their hind legs, each gripping the other's shoulders with its front paws. They are powerfully illuminated by an offscreen light—nearly glowing—isolated within an absolutely dark setting. Placed in proximity to the camera, they occupy the center of the frame, as they breathe heavily in one another's arms, slowly slumping toward a metal grate at their feet. Suddenly, the soundtrack lights up with an incessant buzzing. And, almost as quickly, the rats' hair stands on end and their embrace shifts from tender to violent. They claw, tear, and bite one another. One falls on its back, belly up, as the other clambers on top to repeatedly scratch its face. Seconds later, the buzzing stops, and just as suddenly as they began, the rats cease their attack. They return to their slow, heavy, breathing—the paw of the floored rat immobilized midstrike, now resting gently on the face of its assailant. A jump cut occurs, in which the rats shift their position onscreen, and we watch as the rats are forced to repeat their attack again.

We are told by the film's title cards that this scene is "an example of a social response" to the behavioral principles of "motivation and reward in learning," which is also the title of the film we are watching. Made in 1948 by the behaviorist Neal E. Miller, *Motivation and Reward in Learning* frames moments such as these as abstract instances of behavioral principles writ large. But when we extract such moments from the film's broader framework, they seem to contain both much more and much less meaning than what was initially intended for them. No longer illustrations of overarching scientific concepts, they become scenes that are both

FIGURE 5. Screen-
grab from *Motiva-
tion and Reward in
Learning* (Neal E.
Miller, 1948).

cruel in their casual violence and purposeless in the absurd behaviors demanded of the onscreen rodents. After all, what truly is gained by demonstrating that rats in pain can be driven to fight one another?

The second scene is significantly more disturbing. It is described in "Analysis of a Lynching," the penultimate chapter of a 1941 monograph coauthored by Miller and his longtime collaborator John Dollard called *Social Learning and Imitation*.[1] Coming after chapters with titles such as "Learning: Its Conditions and Principles," "The Learning and the Generalization of Imitation: Experiments on Animals," and "Copying: The Role of Sameness and Difference," the chapter in question is situated at the end of a long scientific exegesis of learning and imitation in groups of laboratory rats and school children. Here, the authors put forth what was known as the "stimulus-response" theory of learning, in which organisms are prompted or "cued" to perform particular behaviors by having their "motivations" and "drives" repeatedly met through social systems of "reward." These are the same concepts articulated in the title cards of *Motivation and Reward in Learning*.

But the tone of the book abruptly shifts in the chapter "Analysis of a Lynching," in which the two scientists pivot from a behavioral analysis of group psychology to a deeply upsetting description of a 1933 lynching of a young Black man in the "Deep South."[2] Nothing in the earlier portions of the book prepares the reader for this jarring dive into American racism and violence. Relying on an anonymous and anonymized account written by a "qualified white observer" for the NAACP, Miller and Dollard walk the reader through the white mob's violence in excruciating and vivid detail. The intensity of this description breaks loose from the book's previous dispassionate scientific language. The authors unflinchingly describe hours of torture, the "red hot irons" that were used to stab the victim, his castration, the cutting open of his stomach, the "slicing off" of his fingers and toes, the "simulated hanging" in which he was cut down before death to be "tortured more," and the final dragging of his dead body behind a car.[3] In another pivot, Miller and Dollard then return to the original framework and tone of the book, coding the actions of the mob

within their psychological concepts of "drive," "motivation," "cue," and "reward." Like the film *Motivation and Reward in Learning, Social Learning and Imitation* attempts to supply an intelligible explanation for the violence described in its pages. This explanation never addresses the sequence's terror and horror, which are left hanging like a ghostly shroud over the remainder of the book.

Despite sharing a common thread of violence, these scenes are obviously vastly different. But Miller and Dollard tried to suture them together—making comparisons between experiments with laboratory rats, on the one hand, and American anti-Black lynchings, on the other. They attempted this through the creation of a common language and psychological framework that could be applied to both instances. In this chapter I focus on the development of this framework at Yale's Institute of Human Relations (IHR), analyzing the scientific justifications and political ramifications of such a comparison. As part of this process, I argue that Miller transformed the filmed image of the rat into a type of abstraction, inspired by and interacting with other conceptual frameworks concurrently being developed in the social sciences. This transformation of individual rats into theoretical models of behavior, *as such*, allowed Miller and his peers to apply their laboratory findings to a vast variety of human and nonhuman social circumstances, which ultimately led to bizarre, unsettling comparisons like the one above. Despite their extreme incongruity, such comparisons became central components within behaviorism's ascendant project, where comparative psychologists were crafting not only scientific theories but also policy recommendations and new forms of political rhetoric. Absurd as it may seem, linking lab rats to lynch mobs was an important force within American history.

The first section of my chapter focuses on Miller's work combining Freudian terminology and Pavlovian experiments at the IHR in order to create a theoretical structure for psychologists and social scientists so that both could use his experimental findings. The second section details Miller's collaboration with the prominent sociologist John Dollard, as they worked together to integrate experimental psychology with the theories proposed by neo-Freudian anthropologists in the 1930s, 1940s, and 1950s. I conclude by returning to Miller and Dollard's comparison of the southern lynch mob and laboratory rats like those in *Motivation and Reward in Learning* in order to argue that the abstract image of the rat offered the scientists a means of converting racist murder into a naturally occurring act based in the human organism's responses to its environment. Ultimately, this transformation hinged on the capacity to see albino rats as stand-ins for white southerners willing to engage in anti-Black terrorism.

Motivation and Reward in Learning represents one side of this equation. As we will see, Miller's film is not only about, or even *primarily* about, rats. It also holds speculative projections of human behaviors within its images, behaviors that the film was often used to explain in a variety of institutional and educational contexts (more on these in the next two chapters). Such metatextual applications of Miller's

theories shaped the film's aesthetics as much as the rats' behavior did. It is in these uses, which exist at the intersection of behavioral psychology, anthropology, sociology, and educational theory, that *Motivation and Reward in Learning* takes on a set of startling political stakes, in which the conceptualization of race, species, and science are deeply interwoven. Understood in this context, the film depicts behavioral psychology's aspirations for the lab rat, a creature that could be transformed into a living metaphor for even the most intractable problems and could grant psychologists, sociologists, and anthropologists an amazing authority to explain, control, and describe.

Considering the interaction of sociology, anthropology, and behavioral psychology raises complex questions about the figure of the animal within social science discourse. In many ways, the lab rat provides an inverted image to the historical use of exotic animals in ethnographic films. As Fatimah Tobing Rony describes, animals in these films consistently position racialized anthropological subjects within an imagined "uncivilized" past (see chapter 3 for further discussion of Rony's position).[4] But in the films made by behavioral psychologists, laboratory animals became stand-ins for the opposite of this, representing "civilization" and "progress." Miller and his peers paired their experimental rodents' adaptive behaviors with the high-tech space of the onscreen laboratory in order to visualize and control what they argued were the effects of culture. Here, unlike the Indigenous and Black subjects of ethnographic film, behavioral scientists had much to gain from their association with animals, creating a powerful circuit between white male scientists, laboratory settings, and nonhuman specimens. Indeed, the main comparison that these psychologists drew between rats and humans were not comparisons to racialized or ethnic "others" but rather to themselves and white society at large.

This relationship between the albino rat and the midcentury experimental psychologist scrambles many of the dynamics surrounding race and animals as they are usually described in critical animal studies. Most often, animalization is theorized as a primary tool for racial control and hierarchy, in which the oppression of, in particular, Black and Indigenous groups is premised on their asserted proximity to animality.[5] Yet this schema has been called into question by recent animal studies scholars. Zakiyyah Iman Jackson, for instance, argues that anti-Blackness is actualized not only through the animalization of Black peoples but also paradoxically through their recognition as human subjects, which she argues "plasticizes" Blackness—forcing Black people into torturous positions betwixt and between racist conceptions of human and animal.[6] Conversely, in this chapter we see that the animalization of white people does not necessarily lead to the relinquishment of the traditional power and authority that comes with the status of the "human." In a post-Darwin, post-Freud world, association with animal life could provide exculpatory cover rather than simple denigration. Unlike other animals, the laboratory rat became a symbol of rational rather than irrational behavior. Laboratory

scientists often welcomed their comparison with their lab rats, using it in Miller and Dollard's case to rationalize the horrific violence of white America, while simultaneously suggesting their own capacity to control this behavior and thus progress beyond such violence. Ultimately, as we will see, the cinematic creation of the lab rat into a universal model of behavior empowered scientific filmmakers like Miller to make sweeping claims about the relevance and application of their findings.

PSYCHOANALYZING PAVLOV'S DOG: THE CREATION OF *MOTIVATION AND REWARD IN LEARNING* AT THE IHR

How exactly were the desperate, scrambling rats of *Motivation and Reward in Learning* turned into such powerful icons? On its face, the film depicts animals performing a series of minor tasks—spinning wheels, pulling levers, biting cords—not influencing human history or society. The answer to this question lies in the scientific process of abstraction, where laboratory experiments are transformed into broadly applicable models and findings. Abstraction is a tricky and often contested subject in scientific practice, as it must be firmly rooted in empirical observations, findings, and measurements to be considered valid. Indexical mediums like film and photography are ideal spaces to create such empirically grounded models. Yet film also poses a problem for abstraction in its very density of details, which are specific to the moment being filmed. It is only through the labor of the experimenter and the intervention of the filmmaker that the complex, densely layered reality in front of the camera can become a streamlined model for broader concepts and ideas. For instance, Lisa Cartwright describes how Étienne-Jules Marey's chronophotographs use "flatness, segmentation, and planar division of space" to create what she calls "an aesthetic of abstraction."[7] Similarly, documentary scholar Malin Wahlberg argues that the space-time interventions made by scientific films not only control and measure the objects in front of the camera but also "may transform unassuming entities in nature into spectacular objects" through a process of "cinematic abstraction."[8] These and other forms of abstraction can be seen in *Motivation and Reward in Learning*, where Miller uses mise-en-scène, sound, cinematography, and editing of the film to visualize rats as abstract concepts.

Miller and his collaborator, Gardner L. Hart, created *Motivation and Reward in Learning* to illustrate a fairly simple behaviorist thesis, which the film states in its first title card: "This film illustrates how behavior can be controlled by motivation and reward." The meaning of this claim is outlined in the subsequent scenes. We are introduced to two male albino rats, symmetrically placed in cages on either side of the screen. The rat on the left busily investigates its empty surroundings, while the rat on the right lounges on a pile of food. The melodic and emotive male voice-over asks viewers, "What do you think is the reason for the difference

in their behavior?" Disembodied hands reach out from either side of the screen to open the cages, while the offscreen voice answers its own question: "The one on the left is hungry; the one on the right is satiated." The active rat on the left escapes its cage, almost leaving the edge of the frame, but is caught and carried back by one of the hands. Meanwhile, the satiated rat on the right remains atop its pile of food. We are informed that this film will now conduct an experiment on how these differences in motivational "drive" lead to differences in learning. Both rats are transferred by the hands into a dual-compartmented apparatus, which, like the symmetrical cages, bisects the screen into left and right quadrants. The right-angle placement of the camera, the matte blackness of the background, and the isolated lighting of the experimental apparatus all create the sense of watching a two-dimensional plane, heightening the feeling of flatness in the projection of the image. We watch the two rats simultaneously on their separate segments of the screen, as the one on the left furiously investigates its new setting, while the one on the right settles down to sleep after some brief exploration. The film cuts to a close-up of the hungry rat on the left, cutting out the rat on the right. It details how the rat learns to operate the apparatus's lever mechanism in order to receive food pellets through the chute below. The voice-over walks us through this process, as the rat goes from an active, exploratory set of behaviors around the entirety of its enclosure, to discovering the food lever and its connection to food, and finally to focusing all of its activity on repeatedly and systematically using this lever, leading to an extinction of all other "irrelevant responses."

At the conclusion of this sequence, the camera pans right, and the voice-over asks, "Now, what do you think the satiated animal has learned to do?" It again answers its own question with an image of the second rat lying flat on the ground. A title card interjects: "Will the satiated animal learn if we give him a drive?" The film cuts to a new electronic device consisting of a voltmeter, a dial, and a button, which we are told will apply a "mild electric shock" to the bottom of the rat's cage. The disembodied hands again return to operate this mechanism, pressing the button and adjusting the dial to modulate levels of electricity being sent to the cage. The audience experiences this electricity as a buzzing sound that increases in pitch as the dial is turned and is visually registered in the shaking movements of the voltmeter's hand. The voice-over assures us that "the shock is adjusted to be annoying, but not painful." We then cut back to the rat on the right, who instantly jumps high in the air with the beginning of the buzzing sound. Its hair stands on end as the rat continues to leap off the electrified grid on the bottom of the enclosure. The voice-over calmly observes: "Although the shock is not strong, you will see that it supplies enough drive to produce a radical change in the behavior of the satiated rat." The film then takes us through a parallel process to the one seen previously, in which the rat learns to press a bar in order to stop the electric current. The voice-over concludes: "The satiated animal learns even more rapidly than the hungry one did. This is because the drive produced by electric shock is stronger

than hunger," a claim that instantly calls into question the supposed "mildness" of the shock itself. Pain, the film suggests, is a powerful motivator.

Finally, the film concludes by rapidly cycling through this same process with a variety of other learned behaviors, including spinning a wheel, gnawing a rubber tube, and striking another rat (the example with which this chapter began). Along the way, a title card notes that the rats will often continue to produce the learned behavior long after the shocks have ended, suggesting that this is because "the animal keeps responding to an acquired drive of fear." The film ends with a summary of its basic concepts. "Motivation" provides a "drive" to the animal's behavior, which is satisfied by certain "rewards." When these rewards are paired with particular behavioral acts, the animal quickly learns to repeat those acts. Throughout the entirety of the film's running time, it maintains its structure and aesthetics—stark, well-lit black-and-white images, a centered frame focusing on the experimental apparatus to the exclusion of all other surroundings, restriction of the scientists' presences to voices and hands that emerge from offscreen, and the use of narration and title cards to describe events and walk us through their intended meaning. Cumulatively, this aesthetic constructs an interpretive framework for viewers to understand what they are seeing, filtering the actions of the onscreen rats through the concepts provided by the offscreen scientists, who manipulate and define the rodents' behavior in tandem with the structure of the film itself. What Miller observed as the logical rationale for the rats' actions was embedded into the very form of the film itself.

Yet, on their own, these aesthetic aspects are not enough to explain Miller's far-ranging application of his theories or why he chose to take this particular approach. We must also understand the scientific program and research context out of which the film emerged. It is from this metatextual framework of funding institutions, academic debates, and traditions of nontheatrical filmmaking that the film derives its explanatory authority as a scientific text. How the film was used is ultimately as important as what it depicts.

Miller's behavioral theories were developed at Yale's Institute of Human Relations, where they were then translated into scientific cinema. From its inception, the IHR was an extremely ambitious undertaking to create universalist theories. Established in 1929 with a grant from the Rockefeller Foundation totaling more than $2 million, its main purpose was fostering communication and the free flow of information across specialized divisions of the Yale campus.[9] An article in the *American Journal of Sociology* at the time described it as "an organization which might unite on the study of man, bringing to bear on him the resources and techniques of the biological sciences with their applied aspects as represented in medicine, and the social sciences with their applied aspects as represented in law."[10] By creating a holistic, interdisciplinary understanding of "the human" in general, as well as concrete policy recommendations in particular, the IHR attempted to unite theory and practice in governing human society.[11]

The goals of the IHR were the product of its moment in the history of psychology. Jill G. Morawski argues compellingly that the IHR should be read as a product of the anxieties sociology and psychology faced in the early twentieth century.[12] She positions the institute as part of an ongoing crisis in nineteenth-century rationalism, brought about by unstable developments in psychology and evolutionary biology. The mass of slippery dynamics revealed by Freud and Darwin suggested that human activity was not the product of rational or moral decisions, or even simple physiological reactions, but rather the result of a dense web of interrelating stimuli affecting the individual, its environment, and its unconscious mind. Disparate attempts in different fields to account for this baffling complexity led to a prevailing sense that the social sciences—especially with regard to behavior—were unmoored from any empirical ground that might connect their various branches. Morawski positions the IHR as attempting to contain this disruption by consolidating the divergent approaches for studying human beings within the organizational structure of a modern bureaucracy. Here, through a conglomerate system of disciplinary bureaus and dedicated teams, the institute could tackle problems whose complexity now eluded any individual researcher.

Film was used at the IHR to pursue these goals through a variety of different approaches, and its members include a wide array of innovators in scientific film. Arnold Gesell was associated with the institute while shooting his child development films, which, Scott Curtis argues, were meant to transform ephemeral psychological subjects into concrete, measurable observations.[13] Alice Keliher, who oversaw the Human Relations Series of Films, was hired by the IHR just after completing her degree in education and helped produce many of Gesell's films. In Keliher's own work for the Human Relations Series, Craig Kridel sees an attempt to aid progressive classrooms by encouraging more holistic approaches to students as individuals.[14] Additionally, beginning in 1935, Mark A. May, the educational film advocate and proponent of human engineering, became director of the IHR at the same time that he was deeply involved with the widespread implementation of film in the classroom (more on this in chapter 6). Film historian Charles Acland finds that through this work, "May and the organizations he led helped establish the procedures for participation in screen-mediated publics," transforming what was initially conceived as a public service into the hegemonic business of educational technology.[15] As we can see from these examples, the meaning of "human relations" as a field, and the question of how film might relate to this amorphous concept, was articulated differently by different researchers within the sprawling, loose network of the IHR.[16]

Motivation and Reward in Learning is a unique iteration of the IHR's mandate. Unlike Gesell, Miller did not see film as a means of tangibly recording his subjects so that they could be observed more fully. Indeed, he actively dismissed this idea.[17] Similarly, his commitment to behaviorist psychology precluded the approach of open-ended provocation adopted by Keliher. Instead, film for him was an example

of what his teacher, the neobehaviorist Clark Hull, called an "integrating device," meant to theorize principles that could be broadly applied in a variety of fields.[18] Like the institute-wide memorandums, projects, and symposiums, this film was meant to smoothly cross-pollinate ideas to a variety of differently specialized audiences of scientists and students. Its images were intended to be broad enough to evoke ideas that could be applied throughout the social sciences rather than replay particular instances or narratives. As such, it perfectly visualized the IHR's goals of a totalizing interdisciplinarity and the generalization of terms and findings that such an approach necessitates.

By the mid-1930s, the project of stitching together the IHR's various factions was of vital institutional importance, as it had become clear that the institute was not fulfilling its overarching promise, a fact that threatened its further funding.[19] Sponsored faculty had been using their funds to pursue pet projects with little to no coordination between them and the IHR's administrators. Consequently, when Mark A. May assumed directorship of the IHR in 1935 his primary task was to unify its various parts.[20] To aid in this process May enlisted Yale psychologist Clark Hull, who gathered together a group of young researchers for a series of seminars dedicated to the creation of an integrated research technique, which would use "motivation" as a singular topic to bring together studies from many different fields.[21] Films of research were solicited and screened in these seminars, including those of Miller and Robert Yerkes. Here, as elsewhere at the IHR, film was used to present findings to other scholars, transporting rooms full of researchers to the screened image of the lab to watch experiments firsthand, while also inviting them to articulate what they saw within their own disciplinary terms and pursuits in the discussions that followed. Film's mobility and accessibility were thus operationalized within the extensive bureaucracy of the IHR to build interdisciplinary lines of communication, thought, and conversation.

Motivation and Reward in Learning depicts Miller's chief scientific contribution to this collaborative project: quantitative experimental findings from the animal laboratory. The film creates an image of animal behavior that depicts the internal states studied by many psychologists and social scientists, while also appealing to the empiricism of experimentalists, bridging a primary divide within the study of human behavior across disciplines. To accomplish this in his written research, Miller relied on a guiding theoretical approach that unusually combined the ideas of Ivan Pavlov and Sigmund Freud. As he colorfully described his own work for the *Journal of Abnormal and Social Psychology*, it was "a slender bridge" connecting "the analysis of the bizarre dreams of Freud's patients to the electric recording of the salivation of dogs in Pavlov's soundproof laboratory."[22] Suturing together such divergent frameworks was no easy task, requiring Miller to construct a unique explanation for his use of animals in the lab that resulted in less of a methodological integration than an alternating shift in register and language to accommodate both Freudian and Pavlovian theories.

Motivation and Reward in Learning features laboratory experiments that draw primarily from Pavlov's widely known research into canine behavior, which had provided a model for empirically testing the responses of living beings to their environment at the turn of the century.[23] Beginning with Robert Yerkes's initial translation of Pavlov's writing in 1909, the Russian scientist's work was well established as a major influence on American behavioral psychology by the 1930s.[24] His central experiments from 1891 to 1900 focused on the behavior of dogs that were conditioned to respond to a metronome as if it were food.[25] This was achieved through a series of repeated tests in which dogs were fed concurrently with the sound of the metronome. Eventually, they began to salivate any time a metronome was started, even in the absence of food. Ultimately, these experiments were taken to demonstrate the extreme influence of the environment on even the most involuntary of behaviors, eradicating the line between instinctual and learned actions. Pavlov's vastly influential "conditioned reflex" hypotheses inspired generations of psychological experimentalists, including Miller.

Film was also a central method used to popularize Pavlov's theory. The pioneering Soviet filmmaker Vsevolod Pudovkin cinematically rendered the conditioned reflex hypothesis in his 1926 film *Mechanics of the Brain*, which was created to spread Pavlov's groundbreaking theories across the vast expanse of the Soviet Union.[26] This film's aesthetics provide important context for understanding the ways that *Motivation and Reward in Learning* both adapted and altered Pavlov's approach.[27] To visualize the scientific concept of "conditioned reflexes," Pudovkin cinematically and corporeally rearranges the bodies of several dogs. A series of insert shots detail a fistula, which has been installed in one dog's cheek to reveal its salivation responses. The film additionally enhances the dog's transparency through an animated rendering displaying the stimulus of an electric shock as it travels to the brain and is turned into a response. These are just a few of the ways the dog's behavior is revealed through Pudovkin's use of film form. The title cards that label and explain the action; the editing that creates a logical cause and effect between the metronome and the dog; and the camera placement that encloses and specifies the pertinent information—all mold the dog into a cinematic subject that manifests the central experimental subject of behaviorism. Ultimately, *Mechanics of the Brain* visualizes the dog's response to its environment as a quantifiable pattern that can be recorded and analyzed. The film therefore creates a cinematic image for behavioral sciences by transforming the dog's image into a logically operating mechanical system.

Just as Miller set out to adapt Pavlovian theory with his experimental work, *Motivation and Reward in Learning* alters the aesthetics of *Mechanics of the Brain*. Pavlov had an avowed disdain for the methods of psychology, which led to the exclusion of all internal states from the testable space of the lab and also the diegetic space of Pudovkin's film. Unlike the Yerkes films discussed in chapter 2, *Mechanics of the Brain*'s onscreen dogs are meant to be merely mechanisms, without evoking any particular psychological or ideational state. But

VIDEO 4. *Mechanics of the Brain* (Vsevolod Pudovkin, 1926). DOI: https://doi.org/10.1525/luminos.145.4

Motivation and Reward in Learning shifts this representation of scientific animal subjects, deploying Freudian descriptions of internal states even while continuing to use Pavlovian experimental methods and thereby establishing the onscreen rats as simple characters rather than machines. As the film's title prominently proclaims, motivations rather than mechanisms are the subject of Miller's cinematic laboratory space. This switch from mechanized to motivated behavior relies heavily on the film's title cards and narration, which, unlike *Mechanics of the Brain*, associate the film's images of particular behaviors with discrete desires on the part of the rat. For instance, while *Mechanics of the Brain* contains many close-ups, these are largely restricted to insert shots that simply highlight pertinent details, such as the amount of saliva collected by the dog's fistula, which are then noted in the film's titles. *Motivation and Reward in Learning*, by contrast, contains many seemingly unmotivated close-ups of rats' faces as they perform their learned tasks. These shots do not provide viewers with more factual information about the experiment in the way that those in *Mechanics of the Brain* do. Rather, they serve to personify the changes in the rat's internal motivation, inviting audiences to search the rat's face for signs of changes in its drive. The film's titles then supply a corresponding behavioral concept, providing a linguistic handle to describe the interiority evoked in the previous scene. In many ways, this process mirrors the production of identification seen in the Yerkes films, except that Miller's film is far more constrained in the inferences that it allows. While interest in the rats' internal experiences are elicited by film's use of the close-up, this same interest is constrained and delimited through the title cards, which provide simple neutral descriptors for their behavior. The rats do not "beg" the way Yerkes's chimps do, but they may be "irritated," "satiated," or "frustrated." By coding the findings of Pavlovian experiments with the vocabulary of Freud, and shifting the format of the film to emphasize the rats as characters with identifiable desires, Miller claimed to present the psychological motivations of lab animals as empirical and testable subjects.

But the language of drives and repressions that Miller appropriated from Freud was created to discuss *human* patients, and it, too, needed to be altered to fit Miller's use of it. For his part, Freud was noncommittal about what the psychological

lives of animals might precisely consist of. His primary methodology—the talking cure, which was premised on in-depth conversations with patients—necessarily excluded animals. Furthermore, in *The Interpretation of Dreams* (1899) and *Civilization and Its Discontents* (1930) Freud suggests that animals exist in a state outside the repressions caused by society, where desires remain unblemished by the restrictions of cultural taboo and tradition.[28] This would seem to have placed animals outside the scope of Freud's psychology—as inaccessible objects to a discipline founded on the symbolic interpretation of verbal descriptions and memories. As Freud wrote: "What animals dream of I do not know."[29] But in Miller's work the animal's lack of social conditioning does not exclude it but rather makes it an *ideal* experimental subject. As he and Dollard explain in *Social Learning and Imitation*, animals are readily accessible blank slates that can have the restrictions of society inscribed on them through laboratory experiments.[30] Miller and Dollard thereby reframed the Pavlovian experiment as the initial steps in the complex process of sublimation and repression that Freud saw as essential for creating the mature social subject. Introducing an animal into an experimental apparatus was made conceptually comparable to the introduction of a human individual into the constrictions and confines of society.

According to *Motivation and Reward in Learning*, rats have clear motivations that drive them, and their motivations are integral parts of the experimental scene. These drives are redirected by the apparatus to produce behaviors that the film's intertitles label as closer and closer to those of social interactions. Within the context of Miller's research program, we can see that viewers were meant to see these images as primal scenes of animal life being introduced into the structures of culture, depicting the first halting steps in the process of socialization. When we view the anxious rat ceaselessly spinning the wheel even after the electric shocks have ended or the heavy breathing of the battling rodents who take a moment to pause between jolts, we are not meant to see an animal transformed into a machine—as in *Mechanics of the Brain*—but rather an animal that has been transformed into a humanlike subject. This process is aided by the film, which directs the audience to understand and consider the emotional states of the rat. Such observations were then compounded within Miller's disciplinary context, where the events in these images were directly described as depicting the animal's initial, desperate, and painful metamorphosis into an approximation of the civilized individual.

By producing internal emotional states as categorizable, visible, and testable subjects within the body of laboratory animals, and by reconceiving the experimental apparatus as a simulation of society, Miller's film transforms individual psychology into a behavior that could be observed, optimized, and, finally, controlled. As historian of science Rebecca Lemov observes, claiming to experiment with internal states ensured that "the laboratory would be more surely connected to the world outside."[31] Miller's coauthored publications lay out this logic clearly, finding echoes of his experiments in a variety of human scenarios, including

laboring at one's job, moving to a new neighborhood, and going on a date, among others.[32] Indeed, in an attempt to further the IHR's pursuit of applied science, his experiments with lab rats led to a series of practical recommendations for the US military in training soldiers to harness their own fears on the battlefield in 1943.[33] The primary generalization on which *Motivation and Reward in Learning* is premised—in which the rats' behavior is equated with the abstract process of becoming a social subject—ultimately justified the application of Miller's behavioral theories in a wide arena of social settings. If experiments with laboratory rats were analogous to the introduction of an organism into society, the explanatory power of these experiments was vast.

"ANALYSIS OF A LYNCHING": THE TRANSFORMATIVE POWER OF THE LAB RAT

A startling confession is buried in "Analysis of a Lynching." Most likely written by Dollard, the chapter seems to refer to an experience he had while researching his highly influential 1937 book *Caste and Class in the American South*. He writes: "One of the writers has himself felt the morbid rise in interest and tendency to go along and at least watch, which was aroused at the perception of a lynching mob in action. Without this experience, he would have affirmed that he could show only unqualified horror at such a sight."[34] Dollard thus suggests that not only was he fascinated by observing a lynching but that he also felt compelled to join and "at least watch," suggesting, of course, that he might have done much more than just watch.

The paragraph ends with this confession, which is never returned to in the text. Instead, the authors move on with their attempt to use Miller's behaviorist concepts of "drive," "cue," and "reward," to code the NAACP account of the anonymized 1933 lynching, supposedly explaining how white members of the mob were driven in their violence by elements in the surrounding circumstances and culture of the South. Although the book does not return to Dollard's confession, it seems clear that Dollard is comparing his experience of attraction to the lynch mob to those of these other white members of the mob. Here, the transformative power of observations in the lab is on full display. The author's "morbid desire" to join the lynch mob is no longer a troubling sign of his own contribution to a society premised on racial terror but rather is rationalized and explained as part of the eternal dynamics of living organisms. The lynching itself is also transformed—now a "behavioral event" instead of an "unqualified horror"—following the predictable rules of individual-group dynamics. Finally, laboratory rats in behaviorist experiments are also transformed, made suddenly analogous to the acts of the southern lynch mob.

Dollard and Miller articulate their shared vision for the study of behavior most fully in *Social Learning and Imitation*. Their argument is built on three core case studies: learning and imitation with rats in a maze, children at a school, and white

participants in a lynching. The first and the last of these act as opposing poles in complexity, fervor, and nuance. Through the comparison of rat-child-lynching, Miller and Dollard seek to establish the universality of behavioral psychology's principles, presenting behaviorist experiments as capable of explaining even the most incomprehensible and horrifying acts. Mirroring the framework of Miller's film, *Social Learning and Imitation* positions the rat as an unsocialized form of life.[35] Here, culture is conceived as a corollary to the design of an experimental apparatus. As the authors state: "Culture, as conceived by social scientists, is a statement of design of the human maze."[36] This analogy allows Miller and Dollard to use lab rats as facsimiles for the otherwise prohibitively complex behavior of humans in social settings. Early chapters outline how thirty-two Wistar rats were tested to see if imitation could be learned, generalized, and reproduced, with the conclusion that specific imitation responses can be induced given the right "drive," "cue," and "reward."[37]

Social Learning and Imitation* concludes by applying these same principles of imitation to Dollard's main area of research: race relations in the American South, specifically the murder of a young Black man by a lynch mob in an anonymous southern town. Miller and Dollard's description of the lynch mob is based on an anonymized 1933 account produced by a "highly qualified white investigator" for the NAACP, which chronicles the town's homicidal response to the alleged murder of a white woman by a Black man.[38] Using the behavioral theories featured in *Motivation and Reward in Learning*, Miller and Dollard map the town's preexisting culture of racism, a pattern that shapes each of its inhabitants.[39] Through this process, the authors break down and recode the horrors of the lynching as the outcome of predetermined responses that occur in human organisms to the drives, cues, and rewards supplied by the southern milieu. Like the rats' primary drives for food and relief, Miller and Dollard argue that the primary drive in the lynching was the town's white residents' fear, caused by prevailing economic and sexual anxieties and prejudices. The setting of the American South, according to the authors, drives these white southerners to participate in the lynching through a series of prompts and rewards for doing so. These include deep-seated racist fears, the economic and sexual infrastructure of the South, law enforcement's cooperation in and implicit permission for lynchings, and the amplifying effects of media coverage and word of mouth. The South thus becomes akin to the experimental enclosure of *Motivation and Reward in Learning*, a setting that acts on its living inhabitants, thereby shaping their behavior like those of the rats.

Miller's rat experiments were used in social science settings most consistently through his partnership with Dollard. Beginning in the early 1930s, and spanning more than a decade, this collaboration produced three books and many articles.[40] Dollard's interest in biological research and inborn drives was sparked by his training as a Freudian psychologist, which, according to Miller, gave Dollard a "vivid view of people with their biological drives and instincts struggling to adjust to the

cultural demands of their society."[41] Over his long career, Dollard increasingly read social behavior as the struggle between individual inborn desires and preexisting cultural structures. "Each person," he wrote, "is a record of a battle" between childhood desires and social order.[42]

Within social science circles of the "culture and personality school" of anthropology, Dollard participated in conversations that were focused on the use of Freudian psychology in ethnographic research.[43] Largely reacting against theories of racially determined intelligence, especially those espoused by Robert Yerkes, and spurred on by the emergent political realities of New Deal America, the culture and personality school was a diverse group of anthropologists who rose to prominence arguing that race is a social construct.[44] Inspired by the work of Franz Boas, the most prominent members of the culture and personality school were Zora Neale Hurston, Ruth Benedict, and Margaret Mead.[45] Dollard's *Caste and Class in a Southern Town* was also considered a major contribution to the culture and personality school.[46] This movement was premised on combining psychoanalytic categories with ethnographic fieldwork to generate studies of "national character" and "patterns of culture." Such "patterns" were thought to be abstract cultural formations that preexist and socialize individuals differently depending on the community into which they are born.[47] Here, the process of socialization, particularly in childhood, was considered key for understanding differences between cultures.

From the beginning, the culture and personality school developed its ideas in conversation with behavioral psychology.[48] Indeed, Ruth Benedict depicted her own work as a consequence of Pavlovian behaviorism, which she saw as posing primary challenges to the ways that "instinctive" and "culturally conditioned" behavior had been categorized in the past.[49] If circumstances could alter even basic physiological functions (such as a dog's salivary responses), it becomes increasingly difficult to separate inborn nature from the effects of cultural conditioning. Benedict expanded by observing that contemporary Western culture, unlike Pavlov's dog, created a circumstance where identifying singular conditioning stimuli became impossible owing to the complex networks of modern media, standardization, and social structure. She argued that modern human beings are constantly being conditioned by an immersive technoculture that surrounds them. As a solution, Benedict proposed "primitive cultures" as an ideal setting for study, focusing on examples from Native Americans in New Mexico. Labeling such settings anthropological "laboratories," she argued that the relative separation and "simplicity" of these societies allowed for the isolation of cultural themes as discrete objects of study.[50] Here, despite her protestations to the contrary, Benedict's theories imported many of the central racist tenets of social Darwinism into the culture and personality school.

Throughout his career at the Institute of Human Relations, Dollard pursued this interaction between behaviorism and anthropology. He first arrived at Yale in 1932 for an influential early conference run by another of Boas's students,

Edward Sapir—a connection that would eventually lead to Dollard being hired at the IHR—and he continued to have a long-standing contact with many of Boas's students, especially Margaret Mead.[51] Prompted in part by Dollard, the IHR's seminars became a central setting for synthesizing the theories and methods of Boasians with the theories and methods of behavioral psychologists. In 1940, Mead was invited to present to a small group of IHR researchers (including Miller and Dollard) by Mark May, who wrote to her that many members were requesting she discuss "socialization" as a topic "that concerns us very much." Mead herself was deeply influenced by the totalizing concept of "Human Relations," which Hadi Gharabaghi argues was the rationale undergirding her thinking about documentary film.[52] Under the influence of Clark Hull and Miller, Dollard began increasingly to discuss the primary terms of the culture and personality school in the context of animal laboratory studies, framing his research into southern racism with behaviorist terms used for describing the abstract relationship between an animal and its environment. As he begins a 1938 essay on the subject of "race prejudice": "Prejudice reactions cannot be separated from the responses of the organism to its total environment and can only be seen adequately when the nature of this process of socialization is clearly held in mind."[53]

   In addition to countless books and essays, the culture and personality school created a body of ethnographic films that dramatically reshaped the genre and about which contemporary film scholars have dedicated significant effort to study and critique. These films include Boas's own cinematic field notes of the Kwakiutl (Kwak*aka*'wakw) of the Pacific Northwest in 1930, Hurston's fascinating and complex films of Black communities in the American South, and Mead and Gregory Bateson's multiple filmed ethnographies.[54] With the exception of Hurston's work, these films share the conceptual goal of using discrete photographic images to create a generalized notion of a cultural whole.[55] As Jay Ruby writes of Boas's films of the Kwak*aka*'wakw: "The footage only makes sense if one believes that behavioral events removed from their normal social and physical context retain sufficient validity to reveal patterns of culture."[56] Similarly, Margarete Mead and Gregory Bateson describe their visual ethnography as not about the particular practices and lived experiences of a culture but about how these practices and experiences "embody that abstraction which (after we have abstracted it) we technically call culture."[57] Mead and Bateson most frequently achieve abstraction through a process of synthesis and comparison, in which the same behavior—say, bathing a baby—is filmed in a variety of different cultural settings, which are then cross-referenced with each other. Fatimah Tobing Rony describes this abstraction process as really a process of *extraction*, in which Mead's and Bateson's films erase all traces of a country's political history, the spiritual content of filmed rituals, and the signs of the film's production process.[58] Like the aesthetic interventions made in *Motivation and Reward in Learning*, these ethnographic filmmakers actively produced the abstraction of "patterns of culture" in their films through formal interventions,

FIGURE 6. Screengrab from *Bathing Babies in Three Cultures* (Margaret Mead and Gregory Bateson, 1951).

as well as theoretical frameworks, which allowed documentary footage to become a "behavioral sequence" bespeaking larger, often ahistorical, notions of cultural identity.[59] The stated goal was to look beyond the specificities captured by the film to see the otherwise invisible "culture" undergirding them.

Film was thus used to transform anthropological fieldwork into the laboratory-like practice that Ruth Benedict envisioned. It could isolate and remove human behavior from the complex network of interactions that surrounded it. It allowed these behaviors to become repeatable experiments that could be mined in the future for the purposes of confirmation or for new investigations.[60] And, finally, it allowed for an empirical "cross-referencing" of behaviors to locate patterns of culture through the comparison of specificities in each individual action.[61] By cinematically isolating individual behaviors, such as ear-piercing or bathing, different practices were compared across cultures, meant to illustrate the psychological effects of these differences in custom.

Created in response to these ideas, *Motivation and Reward in Learning* accelerates the abstraction process by removing all references to particular human cultures or activities. Like Mead's and Bateson's films, such as *Trance and Dance in Bali* (1952), *Childhood Rivalry in Bali and New Guinea* (1952), and *Bathing Babies in Three Cultures* (1954 [fig. 6]), Miller's is an attempt to visualize the process of socialization in which individuals are incorporated into a preexisting cultural milieu.[62] But through the metaphoric readings of the onscreen rat, Miller was capable of creating abstractions far beyond those sought by Mead and Bateson. Indeed, Miller's rats stand in as *universal* depictions of the socialization process rather than as patterns for any particular culture or people, a fact that can be seen in Dollard's extensive application of Miller's framework.

"Analysis of a Lynching" illustrates the overarching ambitions of Miller and Dollard's work in their attempt to synthesize their respective projects. The comparison between electrocuted rat and lynch mob was meant to function as an extreme example of the explanatory powers of behavioral psychology and laboratory research. Such an approach was in some ways surprisingly effective, allowing Miller and Dollard to identify elements of structural racism that led to the lynching. But, at the same time, the perpetrators of the lynching itself are generally divested of any agential role in the act itself, driven to their murderous behavior

as unwittingly as the rats in the lab are made to strike one another. As William F. Pinar argues, Dollard, and the many later works that were influenced by him, represents lynching as a "southern variation of the human condition," an uncontrollable human response rooted in dynamics outside their individual choices.[63]

Much has been written about the use of animality to position nonwhite groups as "less than human," through the comparison between them and nonhuman animals. Yet here we see an inverse potential, in which whiteness's status *as animal* is posited and mobilized by a dominant scientific discourse. Like Zakiyyah Iman Jackson's analysis of white violence during slavery, human/animal distinctions are used here to explain, and to some extent justify, brutal acts of racialized violence. But, unlike the model Jackson describes—where white supremacy offers a proscribed humanity made plastic by the "authorized killing, consumption, and disposability of fleshy existence"—the comparison here between human and animal is made as an alibi for white violence, now recognized as brutal, horrific, and inhuman(e).[64] The relief that Dollard describes in his introduction to the chapter, where his desire to join the lynch mob in its "unqualified horror" is finally explained, points to the extreme power of this comparison, allowing racism to be an expression of unfortunate-yet-ingrained elements of human and nonhuman animal behavior.

Thus, in Miller's work the lab animal inverts the standard relationship between animality and reason. Its proposed simplicity—its dependence on primary rather than secondary drives—and its containment within the controlled laboratory environment made it an ideal symbol of rational behavior. In a post-Freud, post-Darwin world—where the murky and perverse desires of the unconscious mind and the complex web of historical and social interrelations between individual and environment baffled empirical research—being driven by food or hunger was a relatively straightforward, reasonable, and rational desire. Here, the reasonable lab rat was an instrument for containing the unreasonable unconscious and its often-brutal actions. This pursuit is best exemplified in the juxtaposition of the lab rat and the lynch mob, where the capacity to comprehend the lab rat in all its simple reasonableness promised to assuage the uncontrolled sadism of white America's racist subconscious—the deepest depths of its anti-Blackness.

None of the lynching's horrors are directly on display in *Motivation and Reward in Learning*. Yet they, and many other "behavioral events," persist in the emptying out of the rat of any interiority besides that which is strictly defined by the film itself. *Motivation and Reward in Learning*'s isolated image of the lab rat, existing in the highly stylized and hyperrational world created by the film, is malleable, reasonable, and controllable in a way that the lynching's details are not. The film abstracts the electrified rats as they battle one another, desperately spin a wheel, or learn to operate a mechanical lever until they represent the rudimentary outlines of other, much more complex and uncontrollable, human behaviors. Occupying

the position of both empirical observation and rational thinking, these images join together social and experimental sciences to offer a totalizing theory of behavior. Cinematic rats became embodied concepts, living breathing models that bestow great power to explain and rationalize the world at large on those who can use and define them, a process we will continue to explore in the next chapter.

Distributed Suffering

Animal Experiments, Speculative Modeling,
and Their Effects

In the opening pages of James Tiptree Jr.'s 1976 story "The Psychologist Who Wouldn't Do Awful Things to Rats," the central character, Tilman Lipsitz, walks through an animal laboratory on his way to his workstation. Tiptree renders this scene in excruciating detail:

> He squeezes past a pile of galvanized Skinner boxes and sees Smith at the sinks, engaged in cutting off the heads of infant rats. Piercing squeals; the headless body is flipped onto a wet furry pile on a hunk of newspaper. In the holding cage beside Smith the baby rats shiver in a heap, occasionally thrusting up a delicate muzzle and then burrowing convulsively under their friends, seeking to shut out Smith. They have previously been selectively shocked, starved, subjected to air blasts and plunged into ice water; Smith is about to search the corpses for appropriate neuroglandular effects of stress. He'll find them, undoubtedly.[1]

As the story continues, Lipsitz passes experiment after animal experiment, cataloguing the horrors as he goes. Lipsitz's own research is undirected, and he is silently revolted by his colleagues' work, but he still pursues comparative psychology. As he explains, he will never grow out of the "thrill" of "the act of putting a real question to Life. And watching, reverently, excited out of his skin as Life condescends to tell him yes or no."[2] Torn between the desire to engage and the deadly means of engagement proscribed by his field, Lipsitz is a wretched figure. In a sudden turn to fantasy, he finds his misery relieved one night by the apparition of the mythical Rat King. Composed of the squirming bodies of the lab's many test subjects, the Rat King leads Lipsitz's soul and the lab animals away to a mysterious elsewhere, free from the expectations and cruelties of the lab. In a final twist, a soulless version of Lipsitz remains behind. This new Lipsitz no longer has the

same qualms and doubts about animal research and happily returns to the bloody business of his experimental psychology lab.

As the psychologist Alan Elms chronicles, the premise for this story was based on the real research and experiences of Alice B. Sheldon, who wrote under the Tiptree pseudonym.[3] Sheldon received a PhD in psychology at George Washington University, and Lipsitz's fictionalized research is premised on her own dissertation. Like Lipsitz, Sheldon was deeply alienated as a psychologist and finally left the profession, becoming an essential writer of science fiction in the mid-twentieth century. In "The Psychologist Who Wouldn't Do Awful Things to Rats," she returned to her earlier career, rearticulating the lab as a space of emotional complexity and desire and thus revealing a muddled terrain in which inflicting pain is often suffused with interest and care. In this brief story, the Rat King—who whisks away both the animals' suffering and the experimenter's conscience—serves as a potent metaphor of how both pain and care are repressed within the lab. Here, "scientific objectivity" is not produced through rigorous training and self-control but rather through a deeply emotional experience, even a spiritual one, of repression, which radically transforms all of the participants in the lab by removing essential components of their being. The Rat King, in all of its mythological, corporeal, and emotional registers, represents the laboratory's return of the repressed—a visceral manifestation of the lab's rejected emotional entanglements.

Donna Haraway similarly theorizes the experimental laboratory in her 2008 book, *When Species Meet*, where she confronts the arguments of both practitioners and critics of animal research.[4] In place of any airtight reasoning for either condemning or exonerating laboratory research, Haraway proposes a framework of "shared suffering." Seeing laboratory work as shared suffering requires an ongoing investigation of ethics, one that never satisfactorily lands on a single safe ground or innocent position from which to declare this or that act entirely justified in the calculus of total moral good. Her argument is premised on a recognition of animal agency in the lab, a space where labor is performed on all sides, as animals, apparatuses, and scientists all respond to each other. Part of the challenge then is to not look away from the ethical calculations—the crude cost-benefit evaluations of pain and death caused and avoided by each given experiment—while simultaneously recognizing that these calculations are never enough and that in the face of such instrumentality, animals remain participants in the lab, despite being severely restrained, or worse. As Vinciane Despret claims, animal laboratory work is less a matter of using animals as if they were inert tools than a process of "attunement" with bodies that are allowed more or less ability to respond.[5]

In this chapter, I use "shared suffering" not only as an ethical guidepost but also as a methodological tool for analyzing and understanding celluloid specimens, focusing in particular on rat films like *Motivation and Reward in Learning*. Doing so allows one to read these films as contested outcomes of messy human/animal

interactions rather than as polished scientific models completely abstracted from the animals themselves. Here, celluloid specimens themselves continue the affective experience of the experiment beyond its completion. I argue that the shared suffering thus stretches out beyond the borders of the experimental laboratory through the institutions, such as film, that distribute its findings and images—thereby embroiling scientists, spectators, urban planners, and city residents in the affectively dense suffering of laboratory animals.

Historians of science and scholars in science and technology studies usually approach animal models as epistemic tools, emphasizing the influence of human scientists rather than the agency of the animal test subjects. As Nicole Nelson writes, "The human-centered affordances of constructionist metaphors have done important work for STS in counteracting realist epistemologies that claim that the scientific method simply lets nature speak."[6] As we saw in the previous chapter, this strategic approach is essential, allowing scholars to identify the ways in which films like *Motivation and Reward in Learning* use rats to achieve the aims of their scientific filmmakers. But shared suffering opens these same films to disavowed, yet important, affective components that are otherwise lost to analysis. It is here that their true strangeness emerges, not simply as statements of scientific fact, political ambition, or ideological commitments but also as documents of real human and nonhuman emotional interactions, yearnings, and desires, which intertwine with the research objectives of the filmmakers. Perhaps more than any other medium, films of animal research retain traces of the shared suffering of the lab. These images visualize their human creators' grand aspirations for shaping the future, while also viscerally recording the suffering of the lab animals who labored to produce such speculative projections. As a methodological framework, the concept of shared suffering alerts us to these conflicting aspects in laboratory films, demanding that we perform against-the-grain readings to unearth emotions that are all too often suppressed by the films' structure and editing.

Rat films like *Motivation and Reward in Learning* made up a veritable stand-alone genre of rodent behavior films dedicated to speculative projections about human history and behavior.[7] The first section focuses primarily on two of these completed films, *An Experimentally Produced "Social Problem" in Rats* (1939) and *Competition and Dominance Hierarchies in Rats* (1940), both made by one of Miller's colleagues at the Institute of Human Relations, O. H. Mowrer. We will see how the shared suffering of Mowrer's lab, where his own emotional struggles were deeply wrapped up in his experiments, were imprinted in the films that he made, inviting audiences to engage in a similarly fraught relationship with the animals onscreen. The second section examines a science fiction variation of the lab-rat film, focusing on the uncut footage shot by the behavioral ethologist John B. Calhoun, who built futuristic model cities populated with rats. Here we will see how the rats in Calhoun's film were made to mirror the position of the city dwellers whose lives would eventually be shaped by these experiments. In the final section,

we turn to Joyce Wieland's experimental intervention into the lab-rat genre, *Rat Life and Diet in North America* (1968), which commandeers the scientific rhetoric of the rat film to counter the society of control that films such as Calhoun's were often intended to create. This section provides a counterexample to that of Calhoun, detailing a different, liberatory model of shared suffering coming out of feminist experimental film and science fiction, one whose goals differed significantly from those of the behaviorists. Cumulatively, these three examples—the exactingly edited films of Mowrer, the uncut footage of Calhoun, and the experimental film of Wieland—demonstrate variable uses of film and animals in the creation of their images, a pursuit that could either embrace animal alterity or obfuscate it. Each filmmaker and set of films represents a different type of "shared suffering" with their rodent subjects, which in turn leads to very different visions of society.

SHARED SUFFERING ONSCREEN: EMOTIONAL INVESTMENT IN THE FILMS OF O. H. MOWRER

Orval Hobart Mowrer's behavioral laboratory was saturated with shared suffering—a space where political forces, psychological obsessions, and animal behaviors commingled. Historian of science Rebecca Lemov describes Mowrer's midcentury rat experiments as "a kind of autobiography," in which Mowrer reenacted his own psychological anguish on his rodent test subjects.[8] As a teen, Mowrer began suffering from a deep depression and feelings of unreality, which he later attributed to what he describes as a secret "sexual perversion," the details of which he never fully disclosed.[9] Whatever he meant by this phrase, it seems clear that Mowrer thought of himself for much of his life as an outsider, a position that pained him profoundly and indirectly influenced his work. In his later writing, Mowrer described the period of his life working with animals as wracked by intense bouts of alienation, anxiety, and depression—the very emotions he was simulating and testing in the lab. Drawing from his own accounts, Lemov concludes that Mowrer's experiments were his attempt to physically manifest his own internal demons and thereby control them as he controlled the behavior of the rats.

Most of this work was conducted alongside Miller at Yale's Institute of Human Relations (IHR). After graduating from Johns Hopkins with a doctorate in psychology in 1932, Mowrer eventually secured a full-time position in the psychology department at Yale University and as a research associate in the IHR.[10] While there, he participated in the IHR's collective research of integrating Freudian psychoanalysis with behaviorism (discussed at length in the previous chapter). One result of this work was a comprehensive, though speculative, theory that connected experimental research with the feelings, emotions, and behaviors of human populations on a variety of scales, a theory that became widely known as the "frustration-aggression" hypothesis. Simply put, the frustration-aggression

hypothesis argues that behavior is caused by drives or desires that are either ful-filled or thwarted by the circumstances in which an organism finds itself and that this dynamic can be measured in the lab. Mowrer helped develop these theories as a coauthor of *Frustration and Aggression* (1939), where the IHR researchers collectively outlined their work.[11]

An important subsection of *Frustration and Aggression* focuses on extending behavioral psychology as an explanation of Marx's laws of economics. Here, the "frustration-aggression" hypothesis is applied to Marx and Engel's description of the formation of class in *The Communist Manifesto*. The authors argue that Marx's materialist interpretation of history "introduced unwittingly a psychological system" that mirrors their own.[12] They thereby reframe Marx's description of primitive accumulation through the lens of behavioral psychology. In the version proposed by IHR researchers, the spiraling tendencies of class conflict begin with an almost mythic moment of initial, individual frustration, when the worker discovers his or her confined role within the instruments of production.

Mowrer studied the emotional effects of this process, a pursuit that Lemov argues was rooted in his experiences of depression and alienation. In his laboratory work, Mowrer claimed to simulate anxiety in rodents by regularly shocking them with electric currents. In a series of articles, he outlined the debilitating effects of anxiety on rats as they wait for these shocks to occur and the surprising reduction in tension when the shock was actually administered. He used these findings to construct an extensive explanation for human behaviors, especially those of marginalized and oppressed classes of people. In his chapter of *Frustration and Aggression*, Mowrer argues that crime is caused by a disparity between an idealized American lifestyle (which he notes is mostly propagated by advertising and film) and the actual material circumstances confining groups of people.[13] As historian Corbin Page says, Mowrer claimed that "African Americans, Native Americans, poor people, people with less education, shorter people, young people, less attractive people, people with physical disabilities, children of single parents, unmarried people, divorcees, and so on were all more likely to be criminal" because of the restrictions of society.[14] In Mowrer's description, these criminalized groups deviate from "normal" life, where frustration is channeled toward legal and acceptable pursuits. Here, criminalized underclasses of oppressed people are created through primary moments of frustration and confinement, which then leads them to a variety of antisocial pathologies and behaviors.

Mowrer not only theorized this dynamic but also set out to simulate and film its occurrence. In *An Experimentally Produced "Social Problem" in Rats* and *Competition and Dominance Hierarchies in Rats*, he sought to use film to record social interactions and their effects on individual psychology. Mowrer's films are concerned primarily with the process of individuation. Hierarchies of behavior are produced in groups of rats over multiple experimental interventions, and the films focus on the development of these group dynamics. Although they occasionally
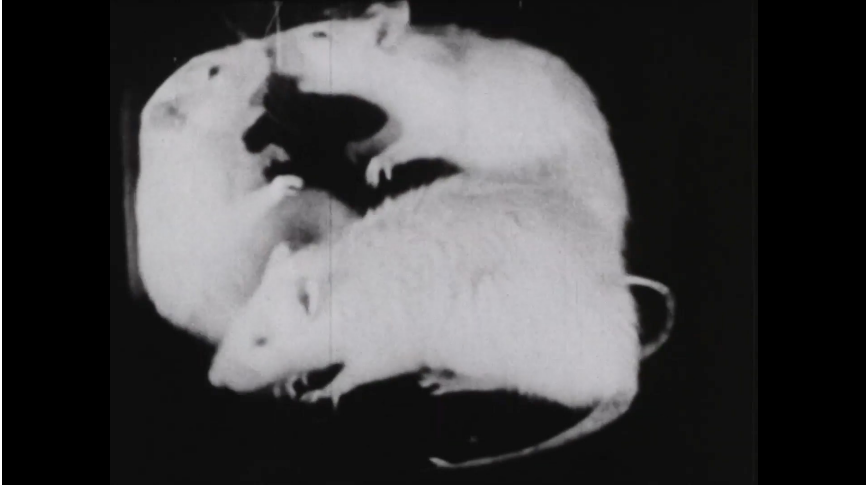
VIDEO 5. *Competition and Dominance Hierarchies in Rats*
(O. H. Mowrer, 1940).
DOI: https://doi.org/10.1525/luminos.145.5

title and individualize single rats, the animal subjects are always presented as members of a group rather than as a single (yet universal) example in the way that animal subjects function in many other research films—for example, in *Motivation and Reward in Learning*. Over the course of the films, these rats are meant to model the development of behavioral patterns of particular classes in society.

Mowrer's films present some of the complex, messy, and often contradictory affects that make up shared suffering in the lab. The differences in arrangement and conceit in each film are significant, despite Mowrer's claiming to study the same process and often screening his films in the same settings. The testing apparatus depicted in *Competition and Dominance Hierarchies in Rats* is relatively simple, consisting mostly of a glass jar that is used to confine the rats in a tight yet visually accessible space. A distinct hierarchy emerges in the behavior of the rats over repeated trials presented in the film. As the title cards explain, the rats begin with an active and exploratory pursuit of food, as a rat with a pellet persistently turns its back on two others, who are trying to take it. But as the experiments continue, this chase after the pellet becomes violent. The film's title cards describe this behavior as a second stage in the production of hierarchy, where exploration leads to forceful dominance. The final phase takes place when the rats have learned and internalized their position within the hierarchy. The title cards describe how one rat becomes "dominant," one "intermediary," and the last "subordinate." This change in behavior is most profound in the "subordinate" rat, who has been so affected by the violence associated with the pellet that it will no longer

touch it even when alone in the jar, despite being close to starvation. We are told through the title cards that this change in personality is long-lasting, reemerging in all future experiments. As Mowrer explained in his presentation of the films to the New York Academy of Sciences in 1940, this film demonstrates changes in the subordinate rodent's "personality," as it becomes "shy and restrained," exhibiting a "food neurosis" and a decreased intelligence that has been "depressed by social experience."[15]

Given what we know about Mowrer's own experiences of deep depression and anxiety at the time he made this film, its emphasis on the pain felt by its rodent protagonists is striking. Indeed, the way the films position the viewer invites sympathy for the rats even as it disavows it, creating precisely the type of strained, conflicted relationship that defines "shared suffering." The relatively isolated rats, the theoretical framework of "personality typing," and the clear allusions to human culture in the title cards lend these rodents an identifiable interiority that they would not have otherwise. The camera is placed at eye-level with the rats, and the transparency of the experimental apparatus allows for an intimate proximity during their social interactions and in moments of isolation. Finally, the lighting of the film works to isolate the rats in an inky darkness, playing up the contrast between the white coat of the albino rat and the painted black of the matte background.

By presenting the rats on a grand scale that occupies the majority of the screen and creating a narrative of deprivation and conflict, the film depicts moments that, at least to my eye, are deeply poignant, such as when we watch the listless, hesitant, and starving rat that has been forced into the role of subordinate. It is possible that Mowrer felt similarly, as he later described conflicting feelings about these experiments and the relationship they established between him, his emotions, and his animal subjects. The ravages of social violence have immobilized the rat we see onscreen, and its seeming terror at the introduction of the other rats—leaping to the far corner, belly up—was meant to be read within Mowrer's framework as a kind of psychological trauma. Social subordination therefore becomes the film's prime cause of personality formation, as the rat moves from being indistinguishable within the group to a distinct "identity" by adopting a position in relation to the others. Mowrer provides no explanation for why certain rats adopt particular social positions, describing, in true behaviorist fashion, behaviors as emergent from the experimental setting rather than individual rats. Here, poverty is represented as a combination of material substrata and relational dynamics that lead to neurosis. As Mowrer describes them, his films were meant to present simplified, controlled, "habit mechanisms" of living organisms from which human society and language is derived.[16] These were precisely the types of linkages between human society and animal experiments that behaviorist theories such as Mowrer's were built on and ultimately undone by. But, at the time, behaviorist theories of society were ascendant precisely because of their "ability to generate cast-iron laws of behavior in the animal laboratory."[17]
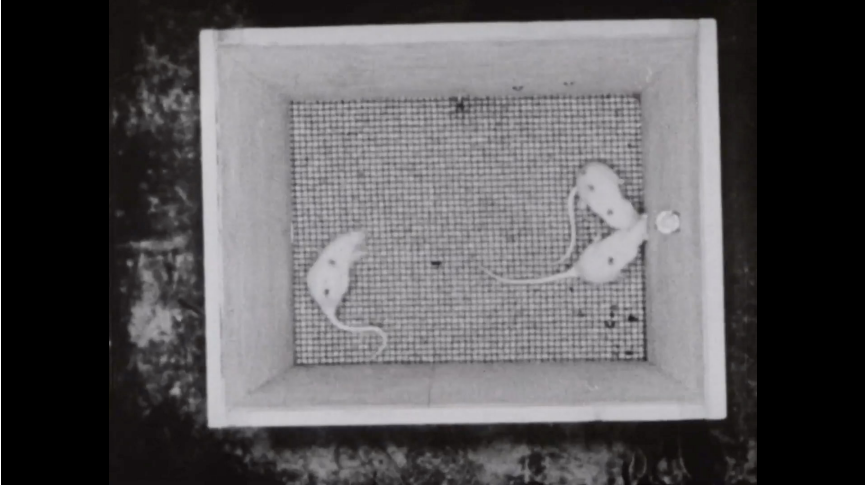
VIDEO 6. *An Experimentally Produced "Social Problem" in Rats*
(O. H. Mowrer, 1939).
DOI: https://doi.org/10.1525/luminos.145.6

Mowrer's *An Experimentally Produced "Social Problem" in Rats* operates in a different register and, intentionally or not, approaches questions of class far more as an issue of design and material arrangement than interpersonal socialization. Key to this shift in framework is the experimental apparatus, which is changed over the course of the film. Depicting the "Skinner method" (more on this in chapter 8), in which the rats are held in an enclosure containing a lever that must be pulled in order to receive food, this film codes the rats' behavior in terms of production and consumption rather than dominance and submission. *An Experimentally Produced "Social Problem" in Rats* begins with the lever and food chute being placed on the same wall. In these early sequences, the rats learn to operate the lever whenever they are hungry, easily satiating themselves by producing more food on command. But in subsequent scenes, the food chute and lever are placed on opposite walls. Now, labor and its product are essentially split. Two classes of rats emerge over time when multiple rats are introduced into the later version of the apparatus. Over the course of four days, the rats go from all working, but never benefiting from their work, to all fighting over a space at the food chute, without any food being produced, to finally a single "worker" who does the vast majority of the labor while rushing back and forth between the lever and the food chute in order to snatch bits of food away from the "dependent" or "parasitical" rats who wait by the chute. As the title card concludes: "A 'class society' has emerged."

The spectatorship position of this film differs starkly from that of *Competition and Dominance Hierarchies in Rats*. The preponderance of the film's footage is

taken above the experimental enclosure, looking down through its open top. The solid walls of the apparatus prohibit camera angles at the rats' level. Instead, we have a schematic vision, akin to an architectural blueprint. Viewed from above, the intense affective interiority of *Competition and Dominance* is gone. Closer tracking shots that occasionally focus on details of specific behaviors—crowding around the food chute, operating the lever itself, and frantically running back and forth between the lever and the chute—sporadically break the uniformity of the film's bird's-eye view. But despite being closer to their subjects, these shots retain the schematic perspective of the wide shots, displaying curiosity more than a sense of pathos. Ultimately, poverty in *An Experimentally Produced "Social Problem" in Rats* is explored less in terms of individual psychology and more as the product of supply and demand, production and distribution. The rats demonstrate the material effects of class organizations beyond the constraints of human society, suggesting a history of organisms that extend beyond traditional nature/culture boundaries. Here, we have a variation on Haraway's "shared suffering" that one might call a "shared struggle," in which animals as well as humans can become part of the proletariat.

In some ways, this type of animal research is the least likely to withstand the scrutiny of an ethical cost-benefit analysis of scientific knowledge gained versus animal suffering caused. It produced hypotheses and fantasies, images of possibilities rather than concrete tools for acting. Mowrer and his peers' central assumption—that rats can in some way stand in for humans—was often flawed or absurd, the worst type of arbitrary reason for causing suffering. Indeed, Haraway finds this type of behavioral modeling, which produces the animal as a substitute for human pain, among the most troubling.[18] There is no denying the troubling power differential between Mowrer, as filmmaker and experimenter, and his rats, which were made to painfully perform the scenes he concocted. But these experiments still raise fascinating, worthwhile questions. For instance, what if we reframe Mowrer's work as a method of abstract, imaginative, and creative thinking that was produced through the shared labor (and suffering) of nonhuman participants? One way of understanding Mowrer's research is to view it as a collaborative process of imagining a collective future and a collective past, with animals participating in the authorship of theoretical histories. As Vinciane Despret argues, rodent experiments such as these are produced through the interaction of expectations on all sides, in which the rats responded to Mowrer's desires as he responded to theirs.[19] These material exchanges lead to a form of "worlding," in Haraway's sense of the term, through the creation of new ways of conceiving history, politics, and futurity. Even if in actuality most of this research into rodent behavior ended up falling short of this potential—functioning as metaphorical props in fantasies of human engineering—there is a strain of productive utopianism here, where animals and humans labor side by side in a process of speculative thinking about living together. Indeed, Mowrer's first film, *Animal Studies in the Social Modification*

VIDEO 7. *Animal Studies in the Social Modification of Organically Motivated Behavior* (O. H. Mowrer, 1937–38).
DOI: https://doi.org/10.1525/luminos.145.7

of Organically Motivated Behavior (1937–38), offers a glimpse of an idyllic alternative to the pain and trauma of his other two. Like the others, this film features groups of hungry rats placed into an experimental apparatus and given food pellets, but in this instance they are given just enough food to satisfy their hunger and there is no separation of producer and consumer rats.[20] Eventually, what develops is a food-sharing system, in which rats can even take the food from each other's mouths without fighting, and each eats its fill. As the film's title cards conclude: "an 'altruistic society' has arisen." But once these rats have access to a private space to bring the food to, fighting commences yet again, now even more fierce.

None of this is meant to justify inflicting pain on animals in the lab. These experiments emphasized suffering more than sharing. Mowrer himself felt trapped and persecuted by the methods and confines of his field. In a well-publicized 1947 speech to the American Association for the Advancement of Science in Chicago, Illinois, he rejected the lack of a moral focus in experimental psychology, advocating for a return to religious and commonplace understandings of guilt and responsibility.[21] Afterward, he dramatically shifted the focus of his research, emphasizing group therapy based on confessing past sins rather than experimental testing. The implicit shared suffering in his work from the 1930s, which is vividly on display in his films, was ultimately untenable for Mowrer and led him to massively reshape his life. He was deeply unhappy when he was conducting this research and making these films, a fact that lingers over them. And

he was not the only one unhappy. The rats in these films also were desperately searching for an escape from their circumstances. In a lecture given to the New York Academy of Sciences, Mowrer admitted that the rats featured in *An Experimentally Produced "Social Problem"* frequently attempted to escape (to "leave the field of play") by jumping out of the open top of the apparatus through which they were being filmed.[22] Scenes of this behavior were edited out, deemed irrelevant at the time. But the desire to escape remains as an invisible presence in the films. These movies are shot through with the frustrated wish for freedom, a yearning to escape the repression and oppression of the lab that emanated from both scientist and rats in a discordant process of attunement. Imprisoned together by the disciplinary rules of behavioral psychology, the confines of the testing apparatus, and the editing of the film, the animal test subjects and the human researcher seem to grope uncertainly, and often painfully, for a better way of being together, one that was more psychologically, personally, and politically humane.

THE FUTURE TENSE: JOHN B. CALHOUN'S RAT CITIES

We watch as a tiny, pink infant rat wriggles on a bed of wood shavings at the bottom of a glass container. It blindly scrunches its body back and forth, clumsily waving its paws in the air. A monotone female voice begins to tell the story of a scientific experiment with rats in a maze, as an electronic popping sound plays at increasing frequency on the soundtrack. Suddenly, from the bottom left corner of the screen, the head of a snake wavers menacingly in and out of frame. The film cuts to another subject leaving audiences with an impending sense of dread. Fragments of this scene are interspersed throughout Theo Anthony's 2016 experimental documentary *Rat Film*, which claims to "[use] the rat—as well as the humans that love them, live with them, and kill them—to explore the history of Baltimore."[23] Peppered throughout the movie, this evocative and disturbing shot of the infant rat eventually culminates in a final image of the snake devouring the rodent baby, a shocking moment even if audiences have been waiting for it throughout the entire film. Jarring and disorienting, Anthony's film weaves in and out of—or rather, smashes together—images of animal experiments, historical city maps, interviews with Baltimore residents (including an oracular exterminator), and a glitched out CGI rendering of the city's streets. Together, these scenes tell a leaky, incomplete story about the history of redlining in Baltimore, a process that led to massive economic and racial disparities. Through the film's dislocated presentation of different settings and shots, a heightened sense of danger is evoked, one that bleeds over from scene to scene.

    What is remarkable about the film is the way that onscreen violence enacted on rats carries over to the history of racist city planning in Baltimore. The film seems to suggest that these two types of violence—the testing and extermination of rats, on the one hand, and the abandonment of populations to deep generational

poverty, on the other—are in some ways wrapped up in one another, continuing to reverberate in Baltimore residents' own conflicted relationship with the rats in the city. Crucially, this connection is not built on one simulating the other but rather on the two being subject to the same system of control. Cumulatively, *Rat Film* works to demonstrate how both these rats and Baltimore's citizens have been forced into a tangled web of shared suffering, one in which they are simultaneously at odds with one another and forced to suffer by similar forms of oppression.

A major figure in the film's story is the ethologist and rodent behavioral specialist John B. Calhoun, who used his animal experiments to study the effects of population density and overcrowding. Though not directly linked to the city planning of Baltimore, Calhoun's experiments were conducted at a nearby farm, and the findings from these experiments were broadly used in the 1970s and 1980s to explain the problem of so-called urban blight that cities like Baltimore were said to be suffering. *Rat Film* evokes Calhoun's research as a means of demonstrating the very real connections between laboratory research and its applications in the lives of humans and animals. Viewers learn that Baltimore, in particular, has long been a testing ground for techniques in population management through a combination of pest control and redlining. In the following section, I will extend this claim, arguing that "shared suffering" is not only a useful frame for understanding the interpersonal and interspecies affects of the lab but also for considering these broader applications of findings from animal research. Through a close analysis of the films made by Calhoun, we will see the ways in which the laboratory and the city were made to mirror each other, as well as the very real effects of such reflections. Yet we will also see the ways in which the uncut films from some of Calhoun's research can tell a different story, one in which the easy comparison between human and rat begins to collapse. The less control that Calhoun and his fellow scientific filmmakers exerted over the image of the rat, the less amenable it was to standing in as a model for humans and the more one gets the sense that such a comparison conceals as much as it reveals.

Calhoun's edited and unedited films are archived at the National Institute of Mental Health Library in Bethesda, Maryland.[24] Trained as an animal ecologist, Calhoun bridged the study of animals and humans by incorporating the theories of behaviorism into his ecological research of rodents, which he conducted at Johns Hopkins University from 1946 to 1949 and then at the National Institute of Mental Health (NIMH) from 1954 to 1983.[25] These experiments led to his breakout concept of the "behavioral sink" to describe the negative effects of overcrowding, an idea that is counted among the most important psychological findings of the twentieth century.[26] Calhoun took the rat-film genre's simulative logic to its most extreme, positioning his experiments as prognostications for human futures. Unlike his earlier ecology experiments, he constructed spaces for his work at the NIMH that were increasingly unrecognizable as natural settings. He built a series of structures he titled "rat cities" or "rat utopias," and later even "rat universes,"

which provided populations of rats with all their basic necessities—food, water, a clean environment—except space.[27] He conceived of this work as a simulation of the effects of overpopulation on human societies in the near future, an accelerated "worlding" of the future within the controlled setting of the lab. He found that constantly being surrounded by other rats led his test subjects to exhibit increasingly abnormal behavior, which he describes in his written publications as "deviant."[28] Included under this header were homosexuality, hypersexuality, hypermasculinity, passivity, cannibalism, infertility, and a breakdown of maternal care. Like Mowrer, Calhoun claimed to have found the spatial and material roots for a heteronormative definition of human deviancy.

Calhoun reported his findings in his breakout 1962 article in *Scientific American*, "Population Density and Social Pathology," which brought this research to a broad public audience, who enthusiastically embraced it.[29] As Edmund Ramsden and Jon Adams demonstrate, Calhoun's theories widely impacted conversations about urban planning and decay, influencing popular representations of the city as a hellhole or a dystopia and leading to a broad public conversation over the decline of morality in American cities.[30] The behavioral sink was applied to everything from Judge Dredd comic books to readings of the Newark riots, feeding into a ballooning debate over the supposed decline of American cities.[31] This largely right-wing discourse mobilized the rat as a sign of degraded life in urban filth.

Film was a central component in the experiments themselves, part of what Calhoun called his "close surveillance" of the rodent city dwellers.[32] Shot during the three decades that Calhoun worked at the NIMH, the hours of footage created by these experiments constitute a major body of unedited films. These were made solely for internal use in the lab and were never distributed. In them, Calhoun's initial experiments in the barn give way to exceedingly complex models of urban spaces, including skyscraper-like towers, massive grids and girders, alleyways, hidden corners and great central plazas. Whereas Miller and Mowrer created accessibility for the camera's lens with removable lids and transparent cages, Calhoun supplements with infrared cameras that track the mice even in the dark. Additionally, he uses zoom lenses to survey the rats from above, ultimately reframing the relationship between individuals and society that is so central to the rat-film genre. Through the zoom lens, the audience is able both to float above the action, watching huddled masses of rats as they cluster together, and to pick out individuals from this mass, whose behavior can be isolated through the constriction of the frame as we move in to focus on a particular behavior. Watching these clips, one moves constantly between individual behaviors and masses of relation—psychological and schematic all in the same breadth. As an embodiment of scientific observation in Calhoun's lab, the viewer is given access to both an isolated image of single rats displaying particular psychological traits (deviance, obsessiveness, apathy, etc.) and an overarching vision of the effects of spatial design on the population of rats as a group (the huddling in certain corners, the traffic between sectors of the "city," the coveted location of the high-rises above the masses below).

VIDEO 8. Clip from *John B. Calhoun Film 7.1 [edited], (NIMH, 1970–1972)*. DOI: https://doi.org/10.1525/luminos.145.8

Calhoun designed his experimental settings as highly contemporary, even futuristic, urban spaces. Indeed, Calhoun explicitly saw his experiments, and by extension his films, as visions of the future.[33] His written comparisons to human societies to come are direct and unqualified.[34] As he described in 1970, his research was "coupling such ideas derived from animal studies with information and insights from the literature on man to seek further insight into man's possible future."[35] Calhoun thus meant his experiments to be a brand of empirical science fiction, positioning his films as vision of the possible outcomes of particular choices in urban design.

Unlike the popular reading of his work, which often depicted the behavioral sink as an inevitable result of population growth, Calhoun believed human ingenuity could design an escape. In a 1958 televised interview with Bill Roberts for Time-Life Broadcast, he expounded on the power of his rat utopias to serve as laboratories for perfecting future cities. Titling his prescription "Revolution," Calhoun argued that certain layouts of his experimental apparatus could avoid the "behavioral sink" by designing spaces that encourage innovation and discourage the negative effects of overcrowding. This expansive ambition for a human-led intelligent design is directly on display in a scene from the Time-Life interview, where Calhoun himself steps down into his rat cities. Shattering the sense of scale otherwise maintained by the ongoing allegory of rodent-as-human, this sequence creates a strange bleed-over of registers. The rats and mice are both human and vermin; Calhoun is both man and giant, towering over the inhabitants of his miniaturized city. Here, Calhoun embodies the grand designer whose omnipresent eye is presented by the films' perspective. Looming over the inhabitants of his constructed city, he appears as an author milling around in his own story, picking up and examining his own characters, guiding and explaining their actions to the cameraperson, altering and transforming their surroundings.

Despite Calhoun's totalizing ambitions and the ever-present scanning and searching of the camera, the most prominent feature of the hours of footage held

at the National Institute of Mental Health Library in Bethesda is the mass of footage in which the rats seem disconnected or utterly indifferent to Calhoun and his scientific theories. Without the theoretical framework of Calhoun's written treatise, these onscreen rats are not illustrations of concepts but rather opaque subjects. For instance, in the filmed lab notes from January 8, 1981, we view with an infrared camera a set of glowing green rats as they traverse the multiple levels of Calhoun's utopia—stopping to gnaw on metal cords, walking down empty ramps, repeatedly entering and exiting meshed enclosures, and chasing each other back and forth. At times a particular behavior seems to be the focus of the camera, such as when two rats face off at the entrance of one enclosure, a behavior Calhoun often referred to in his published work. But, by-in-large, the shots are meandering and unfocused. Some shots are indecisive or incomplete, lasting mere seconds, as if the behavior the filmmaker wished to record has already ended. At other times, the rats seem about to engage each other—in a contest for space or in pursuit—but then simply stop and wander off in opposite directions. The vast preponderance of this material includes behaviors that Calhoun does not address in his written work or interviews. Like the rats who attempted to escape from Mowrer's experiments, these scenes speak to aspects of the rodent deemed unessential and which were therefore left on the cutting-room floor as Calhoun transformed the rats into stand-ins for hypothetical humans experiencing overpopulation.

"A STORY OF REVOLUTION AND ESCAPE": FEMINIST SCIENCE FICTION INTERVENES

"This film is against the corporate military industrial structure of the global village." So reads the first title card of Joyce Wieland's 1968 film *Rat Life and Diet in North America*. In this film, Wieland, an artist, manages to both caricature and utilize the metaphoric structure of the rat-film genre. In this section I position this film within a practice of feminist science fiction, which has a long history of intervening in scientific spaces, as in the case of Alice Sheldon with which this chapter began. Here, the troubling political implications of work like Mowrer's and Calhoun's is unearthed and recuperated, sent down a different path beyond social management and control.

Rat Life and Diet in North America adopts its form from science filmmaking. Like Mowrer and Miller, Wieland uses title cards to establish a series of scenarios in which the rats perform as allegorical political actors. The film's loose narrative focuses on a group of rats who begin confined in a glass enclosure, where they are overseen by a pair of cats on the other side of the farthest pane. They subsequently escape, and, evoking the draft dodgers of the Vietnam era, flee to Canada, where they take up organic gardening and participate in a cherry festival. Here, Wieland's "rodent flower-children" live an idyllic life of abundance and back-to-nature simplicity in the wilds of Canada until the last seconds of the film, when we learn that the CIA has invaded and presumably reincarcerated the film's heroes.[36]

The rodents featured in *Rat Life* are in fact gerbils. That Wieland changed their name demonstrates her canniness regarding the scientific and cultural valences of the rat—a symbol of both the crumbling infrastructure of the city and the scientific management of behavior. Beginning with the film's title card, she constantly emphasizes that the political similarity between lab rats and humans is not in their shared "habit mechanisms," as Mowrer describes, but in their shared circumstances as subjects of authoritarian control. At moments, she superimposes the words *political prison* over the image of trapped "rats" while the soundtrack blares the shrill of sirens. In one sequence, she overlays a neon red target on top of the image, which makes the camera's swift attempts to keep the rodent in frame reminiscent of a deadly act of targeting. Here, the film clearly connects the act of filming and the violence of confinement.

Unlike the designed utopia envisioned by Calhoun, Wieland's film is a vision of utopia as a flight from control. As she describes, the film is "a story of revolution and escape."[37] Like the feminist science fiction authors of the 1960s and 1970s—such as Tiptree, Ursula K. Le Guin, and Octavia E. Butler—that so inspired Haraway's reading of science's utopian potential, Wieland imagines her utopia as an escape from the excesses of utopian thinking in the work of behavioral engineers and industrial planners, who would micromanage their way to an ideal society. As Raymond Williams writes of this feminist utopian mode, it creates "an open utopia: forced open, after the congealing of ideals, the degeneration of mutuality into conservatism."[38]

Wieland's film suggests not only an escape to a natural space outside the overdeveloped confines of a military industrial complex but also an escape from the formal aspects of behavioral scientific discourse, *detourning* the common structure of most celluloid specimens. Roughly edited, each cut in the film is a jump cut, jarringly shifting time and space. Wieland's disjunctive editing techniques bring attention to the film's construction as a collection of film clips rather than a transparent window onto the original experiment. Her film is no less edited than those of Miller and Mowrer, but the absent spaces between the shots are more concretely felt in Wieland's iteration, where the ellipses of each cut is abundantly clear.

Furthermore, *Rat Life and Diet in North America* gestures consistently to an offscreen space that eludes the film. Major narrative developments, such as the invasion of Canada by the CIA, are quickly described in a single title with no corresponding images. At times, the allegorical narrative of the film barely holds together, composed of a roughshod assemblage of disparate images, loosely tied together by title cards. At others, the narrative seems to fade into the background, given over to the erratic, inexplicable scurrying of the onscreen rodents. In such moments, the film suggests that the more somber rat films produced in the lab might be similarly unreliable and that Wieland's "flower children" are no less plausible than Calhoun's "deviants."

In Miller's and Mowrer's films, aberrant animal behavior is edited out or discarded as "random." The shared suffering in these films is actively repressed, which

is very common with celluloid specimens. Within the context of scientific film-making, one is rarely presented with long stretches of unexplained activity or given open invitation to emotionally respond to what is onscreen. These tightly edited films become like the experiments described by Vinciane Despret, in which the animal is "articulated by the apparatus," given no choice but to predictably react in pain or shock.[39] But when you compare the edited footage of a completed film like *Motivation and Reward in Learning* to the unedited takes by a filmmaker like Calhoun, it becomes clear that rodent performances can be far subtler than they are given credit for—that the majority of their responses to the built environments in the lab are as baffling as they are revelatory.

Given a looser format, animals often opt to tell stories that are drastically at odds with the ones being told about them. One of the striking takeaways of *Rat Life and Diet in North America* is the parallel, yet ultimately *separate*, development of the film's political allegory and its actual images of animal behavior. Wieland's title cards inevitably fail to explain what we see onscreen, seeming to speak alongside rather than speak of the animals we observe. This unfastened structure relaxes the narrative's control over the animals' signification, allowing them to be opaque, aberrant, and unexplained. As a work of art, it separates the speculative and allegorical function of the rat-film genre from its utilitarian setting, thereby harnessing the powerful narrative capacity of laboratory speculation toward entirely different ends from those of urban planning and human engineering. Wieland thus suggests that there are other possible forms of "putting a real question to Life," as Alice Sheldon's Tilman Lipsitz describes, ones that do not involve fantasies of control but rather the desire to build shared futures in an uncertain world.

From Lab to Classroom

Animal Testing and Educational Film

In a review for the September 1952 edition of the *Psychological Bulletin*, educational psychologist Tracy S. Kendler extolled the teaching value of *Motivation and Reward in Learning*.[1] She suggests that the film be thought of as akin to a lab session, except without "the fumbling and presenting only the significant details." She concludes: "It is the opinion of this reviewer that the film would be a very useful adjunct to a lecture . . . for the introductory course and for undergraduate experimental psychology classes, particularly if the lecturer finds the S-R [stimulus-response] reinforcement approach palatable. But since it is a good demonstration of instrumental conditioning, it is likely that teachers with different theoretical inclinations can also find a place for it in their courses."[2] Indeed, although the film was used to present findings to Miller's colleagues, the vast majority of its screenings were in educational settings, where the film took on a pedagogical value. And as Kendler suggests, the film was broadly screened beyond psychology classes. Along with the other films made at the IHR, *Motivation and Reward in Learning* was distributed by the Psychological Cinema Register, a repository of psychological teaching films operating out of Pennsylvania State College. The registry sent the film, and many like it, to hundreds of schools and colleges throughout the United States, where it was shown in introductory psychology courses, teachers' colleges, zoology programs, and high school biology classes (fig. 7). Like the onscreen rats in the film, behaviorist educational cinema was adaptable, broadly accommodating multiple educational purposes and demonstrating different principles depending on the setting of the screening.

In this chapter I will argue that *Motivation and Reward in Learning* illustrates an important overhaul of educational media in the wake of animal experiments into behavioral psychology during the mid-twentieth century. Drawing from historical research and close analysis of the formal components of the film, this

FIGURE 7. Image of behaviorist classroom media. *Journal of the Society of Motion Picture and Television Engineers* (May 1952).

section reveals the impact of the animal laboratory as a vital site where films were produced and where the effects of spectatorship were tested. Film was an essential technology for the applied educational branch of behaviorism, a pursuit that was increasingly framed by findings from animal laboratory research. From their formal aesthetics to the circumstances in which they were shown in the classroom, behaviorist films and the theories of spectatorship advanced by their scientific creators transformed the role of moving images in education. Attempting to disconnect film from the ideals of educational reformers who guided the medium's earlier use in the classroom, the robust production, distribution, and screening of behaviorist educational films in the 1940s and 1950s reframed educational film as an essential part of the media ecology within a learning environment that controlled its inhabitants rather than providing them with new experiences of the world outside the classroom.[3]

Within behaviorist theories of media, being shown cinematic images of animal research was increasingly considered a type of stimulation akin to the shocks motivating the rats in Miller's film. Behaviorists produced a plethora of technical research, practical manuals, and theoretical constructs for mapping education onto the behavior of animals in the lab and deploying the psychology of stimulus-response through educational cinema. The mechanics of the projector and the screen, the commentary of the teacher, the use of supplemental texts alongside the film, and the structuring of cinematic scenes and sequences were all open for dramatic alterations and fine-tuning, working to produce film spectatorship as

a modifiable behavior rather than an act of either passive reception or tantalizing exposure. The arrangement of the laboratory experiment and the projection of educational media were made to mirror one another, allowing behaviorists to make unprecedented claims about their ability to control viewing experiences and produce learning in the minds of movie audiences. I conclude that the onscreen animals in films like *Motivation and Reward in Learning* reflected the intended experience of their viewers, who had their motivations and actions managed by their manufactured settings of the laboratory and the screen.

EDUCATIONAL FILM: FROM EXPERIENCE TO STIMULI

Current scholarship has uncovered the important institutional and technological developments that constructed a thriving production and distribution network for educational media in the first half of the twentieth century.[4] Additionally, recent works such as James Cahill's "Forgetting Lessons: Jean Painlevé's Cinematic Gay Science" (2012) and Jennifer Peterson's "Glimpses of Animal Life: Nature Films and the Emergence of Classroom Cinema" (2012) have analyzed the reoccurring animal figures that populate many education films in the life sciences.[5] Nonetheless, the role of behaviorist filmmakers, particularly those conducting animal experiments, has been largely ignored. Focusing on this particular brand of forgotten filmmaking practice reveals a wide array of new historical figures, theories, technologies, and representational strategies for deploying media in classroom settings.

From its inception, film was connected to programs of social reform, whose members claimed to use the medium to broadly shape the behavior of cinema audiences. The accessible and immersive elements of moviegoing offered the reformers of this time (including industrial employers, like the Ford Motor Company, and state and federal branches of government, like New York City's Health Department) the capacity to address diverse and unruly audiences through the creation of shared experiences.[6] As we saw in the previous chapter, Progressive Era reformers of the early twentieth century turned to film with the goal of instilling a sense of national identity and an awareness of American cultural norms in newly arrived immigrants, minority groups, workers, and the poor.[7] As Moya Luckett writes, progressivism was defined by "its deep concern with collective forms of self, its uplift, its reconsideration of public and private spheres, its heightened self-awareness, and its investment in stabilizing American national identity."[8] Oliver Gaycken and Jennifer Peterson demonstrate that education was a crucial component within this progress narrative.[9] Prominent figures such as Thomas Edison predicted that film would effectively overhaul teaching, bringing visual learning and experiences of the wider world into the classroom. Using the language of progressive reform, Edison framed educational film as a means of bettering oneself through accessible experiences outside the stifling confines of chalkboard lessons and assignments. The ideals of self-knowledge in the wake of new experiences, and

transforming oneself into a better citizen, worker, or student through the radically accessible medium of film, encouraged a mode of spectatorship that addressed viewers as ethical, political, and experiential subjects.[10]

In the latter half of the 1930s, a second wave of behavioral psychology renewed many of the buried ambitions of the Progressive Era within a new scientific context, including its deployment of film. Behaviorism originally grew out of Progressive Era social sciences, and both consistently demonstrated a shared "commitment to the solution of social problems via edicts from above rather than communal agreements from below."[11] Behaviorism also largely took up progressivism's mantle of reform and social change after the reactionary responses backlash of the 1920s.[12] But in this reaffirmation of the Progressive Era's goals, behaviorists significantly changed the language and approach used to effect reform. Understanding the actions of living beings was no longer predicated on insight into unconscious desires but rather was perceived as the product of a predictive analysis of cause and effect. Throughout the mid-1930s, 1940s, and 1950s, behaviorist psychology deemphasized internal experiences in favor of observable actions, a shift that effectively eclipsed other approaches to analyzing the workings and functions of the mind. This second wave of behaviorism ultimately revolutionized psychology, eventually leading to major developments in neuropsychology, human engineering, urban planning, and artificial intelligence, among other fields. John Mills, historian of psychology, goes so far as to claim that behaviorism's approach to experimental research and its approach to American psychology generally have become indistinguishable thanks to developments in the 1950s.[13]

In addition to psychology's approach to research, behaviorism also transformed how psychology was applied in the fields of industry, politics, and education. Behaviorist psychology was premised on an extreme form of instrumentality, and practitioners were interested in the utility of psychological study over and above other goals. As Mills outlines, this utilitarianism was made manifest both in the stripping out of moral and theoretical commitments from psychology and in the use of animal experiments to reemphasize control over behavior rather than plumbing the depths of affect or mind.[14] Laboratory rats, like those in *Motivation and Reward in Learning*, were not framed as moral or political agents but rather as variably responding mechanisms whose reactions could be predicted and regulated. The coupling of animal experiments with behaviorists' focus on utility limited the value of a given study to its effectiveness, leading to a dramatic transformation of the language of applied psychology from one rooted in the ideals of reform to one that was increasingly technocratic and mechanistic. Rather than a vocabulary of uplift, integration, and citizenship, which defined earlier social science and educational media, the interventions of behaviorist psychology were strictly reserved for cause and effect—limited to questions of efficiency rather than ethics.

These changes were reflected in the films that behaviorists produced. The central debates between prominent figures in the first quarter of the twentieth century

prior to the ascension of behaviorism, such as those between Thomas Edison and John Dewey, focused on educational media's moral promises, dangers, and short-comings. During the Progressive Era, the "physical and moral conditions" of film and its possible deleterious effects on children were hotly argued, promoting many early studies, polemics, and public handwringing over the effects of spectatorship on young minds.[15] We can see these dynamics in discussions of cinematic realism at the time. The immersive quality of film's photographic image was a central appeal for its educational use in earlier discussions and was linked directly to film's edifying potential. As Jennifer Peterson has shown, the feeling of "actually being there" was a major attraction for early educational travelogues.[16] Jennifer Horne writes that Thomas Edison's educational travelogue series *Conquest Program* (1917) included footage "based on its ability not to provide information, but to deliver an experience."[17] Particularly in nature films from the 1920s, realism in the production of engrossing experiences was seen as a main asset for engaging students and educating viewers, presenting them with exotic locales from the safety of the movie theater or the classroom. But the immersive quality of the photographic image also had the capacity to mislead particularly in contexts where the film was labeled "educational."[18] Especially in these early days of instructional nonfiction cinema, the presentation of realistic or objective information was often opposed to sensationalism, which was variously thought to detract from the educational quality of a film or to make the act of learning more engaging.[19] Some worried that film's realism could lead to passivity, its prerecorded images undercutting the development of agency in young minds. The interventions of the filmmaker-as-author and the mediation of the cinematic apparatus itself were contested subjects in relation to the original profilmic setting. As one commentator, Walter Halsey, wrote in a 1925 review for the *Journal of Education*, film may exhibit "a scientific demonstration of some truth," but "there is no opportunity to vary the experiment and answer the questions of curiosity and hence curiosity is not stimulated."[20] Halsey claimed that film may train "the senses and memory" but not judgment and therefore should be constrained in its use in the classroom. Each of these debates centered on the effects of the educational cinema on the morality and internal experience of student viewers.

Later behaviorists like Miller would change the stakes by interjecting new dynamics from the lab into the classroom and movie theater, transforming the discourse about instructional media away from the ethical stakes of representation and communication toward the efficiency of stimulus and response.[21] This can be demonstrated again through the example of realism in film. Behavioral filmmakers discussed realism as a quality of the cinematic image that could be heightened or lessened depending on the effect one wanted to produce and was disconnected from questions of morality and internal development. For them, realism was not considered an end in itself nor even directly wrapped up in questions of objectivity but rather was a property of the image that could be designed to have specific

effects on the behavior of the audience. In a 1953 report for *Audio Visual Communication Review*, the behaviorist Clarence Ray Carpenter argued that the word *realism* should be changed to *iconicity* and considered as a variable that could alter a film's status as a stimulus.[22] In his own writing on the topic, Miller further divorced a film's status as "realistic" from the events filmed, describing the issue of realism as a problem of "stimulus generalization" that referred to the processes through which viewers connected the images onscreen to their own behavior after watching the film.[23] He argued that realism could encourage easier generalization, which would enhance learning, but it could also confuse students by concealing the relevant information under a flood of unnecessary details. Miller concluded that realism should therefore be meted out according to the concept being taught, which may require varying degrees of detail or abstraction in each instance. For example, he argued, when one is learning to operate complex machinery, it may be necessary to represent the machine in granular photographic detail, but when one is learning a general principle to be applied in multiple different instances, an abstract diagram or line-drawn animation may be more appropriate. The point was to exactingly produce a specific change in behavior through the expert wielding of auditory and visual stimuli contained in the film rather than addressing viewers as moral subjects, providing a faithful or objective rendering of the material world or transporting them to a new locale.

REGULATING THE CLASSROOM: BEHAVIORAL ANALYSES OF STUDENT SPECTATORSHIP

In the process of creating *Motivation and Reward in Learning*, Miller and Gardner Hart designed their film as one would an experimental tool—writing a list of objectives, constructing the set and testing apparatus to achieve these objectives, consulting with an animal handler from Miller's lab, and having fellow psychologists peer-review different cuts of the film.[24] Each stage produced new versions made to more precisely achieve Miller's educational goals. The final step in this process was a screening for psychology students at Yale University, who were then tested on the film's content. Yet, despite all of his detailed planning, on the day of the screening Miller was surprised by the students' response. For reasons unforeseeable to him, moments in the film provoked peals of laughter from the classroom.[25] This laughter was so loud that it drowned out the film's voice-over, which was being read over the classroom's public address system. Later, when the students were tested on the facts presented in the film, they were unable to remember what the lesson of those particular sequences had been. The students' spontaneous laughter disrupted the fine-tuned operations of Miller's film, derailing its intended control over viewers' actions. Just like the rats who attempted to escape Mowrer's filmed experiments (see chapter 5), these students resolutely refused to behave as the psychologists believed they would.

Written up in an article for the educational magazine *See and Hear*, this event is glossed as simply part of the postproduction of the film to maximize educational impact. Indeed, intent on avoiding this outcome in the future, Miller rearranged the narration so that the crucial information was presented before the images of the rats' unexpectedly amusing behavior. After screening the new cut, it was observed that students' aberrant responses had diminished. This account of the film's production is indicative of the broader shift in thinking about the use of cinema within educational media circles, where movies were increasingly pictured as mechanisms engineered to elicit specific responses from their audiences rather than created to present them with a window into new experiences. But, read against the grain, it also suggests the limitations of Miller's approach and the ways in which his models of educational media were often confounded by the actual behavior of spectators during screenings.

The *See and Hear* article ends on a hopeful note. Looking forward to new production practices guided by university teachers like Miller, it concludes: "By carefully planned collaboration with colleagues who are skilled in motion picture production and by pre-testing work prints in their classes, [behavioral filmmakers] can contribute to the development of the motion picture as an educational medium."[26] This sense of progress was symptomatic of a general optimism about the potential of applying new technologies and behavioral approaches to education during the 1940s and 1950s.[27] Throughout his career, Miller was an important figure within this movement. His "Graphic Communication and the Crises in Education," published in 1957 as a special issue of the journal *Audio Visual Communications Review*, returned to the concepts of *Motivation and Reward in Learning* from a decade earlier but considered them within the specific context of classroom media. Here, he produced a comprehensive literature review of new developments in the study of film's effect on student learning. He argued that the basic scientific principles of effective educational media were only just being discovered, distancing the new body of behavioral writing on educational media from the decades of debate on the subject that had preceded it.[28] Miller called for radically reallocating resources and research toward empirically and experimentally produced theories of graphic communication. As one reviewer wrote: "This document presents enough questions about the validity of films, as they are currently being made, to rock us all back on our heels and make us wonder whether we really know what we are doing."[29]

Miller's optimism and the weight that was granted to his theories, as well as the theories of behaviorism generally, were rooted in the dramatic changes in animal behavior that had been effected in the lab. As John Mills notes: "behaviorism's appeal to the profession of psychology as a whole was, purportedly, its ability to generate cast-iron laws of behavior in the animal laboratory."[30] Reading through the trade journals for educational film and reports made by psychologists at this time, one sees repeated allusions to the revolutionary potential of pairing

behaviorist theories from the lab with educational cinema. An ongoing refrain was that the mechanical advances in moving image technology had outpaced understanding of the "human factors" affecting reception, leading to a consistent misapplication of cinema's evermore powerful tools of communication.[31] Understanding and systematizing the effects of a film's form on viewers promised to "combat noneducational traditions," as Miller put it, and transform educational filmmaking into a groundbreaking and exacting science like that performed in the lab.[32]

Toward these ends, many new experiments were conducted into audience reception, mirroring those produced by behavioral psychology with animals. These experiments extended and transformed earlier studies of film from the 1920s and early 1930s. Inspired by the ethical and reformist framework of the Progressive Era, empirical experiments had been conducted into audience reception in the interwar years. Early social science approaches to educational cinema were embodied most prominently in the Payne Fund Studies, which were conducted from 1929 to 1930. This series of experiments sought to produce a scientific answer to the moral questions surrounding film's effects on children by measuring viewer responses such as body temperature, breathing, and heart rate.[33] Such efforts to objectively quantify the effects of spectatorship would be greatly enhanced by the behaviorists in the lead up to and the aftermath of the Second World War, leaving behind the Progressive Era moral framework that had initially inspired them. Indeed, the Payne Studies connect directly to the later work of Miller and his peers through the figure of Mark A. May, a central researcher in the Payne Studies and later the director of the Institute of Human Relations, where Miller worked.[34] The concepts proposed by Miller and John Dollard in *Social Learning and Imitation* (1941) were used by May in 1946 to argue that the theories of learning developed by behavioral psychology had yet to be integrated with the production of educational films.[35] In his published work, May proposed using this schema to deconstruct and study classroom settings when films were screened for students (fig. 8).

May not only wrote about the theory of educational media; he also oversaw and conducted his own experiments. From 1946 to 1954 he served as general chairman of the Yale Motion Picture Research Project, which was housed at the Institute of Human Relations.[36] Sponsored by the Motion Picture Association of America and the Teaching Film Custodians, the Motion Picture Research Project was dedicated to developing principles for creating effective educational films through experimental research.[37] Just as he proposed in his writing, much of the research May produced here adopted the language pioneered by Miller's rat experiments. One of the Motion Picture Research Project's first undertakings, conducted in 1947, studied the effects of motivation on learning while watching educational films. Using the conceptual findings of Miller's experiments, the same ones that would be featured in *Motivation and Reward in Learning* one year later, this study measured student retention of information from four different cuts of an instructional film on the workings of the heart titled *The Heart and Circulation of the Blood*.[38]
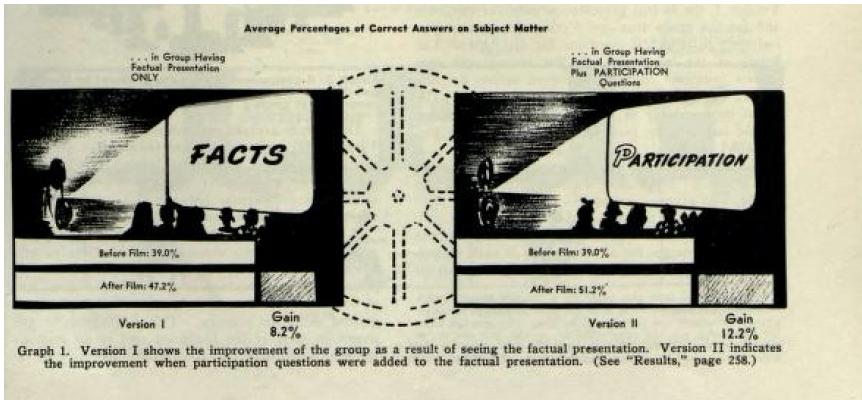
FIGURE 8. Illustration from Mark A. May's "Do 'Motivation' and 'Participation' Questions Increase Learning?" *Educational Screen* (May 1948).

One version included motivating prompts, open-ended questions meant to elicit interest before being answered by the film. Another version included participation prompts, which tested students on the material after a scene had finished. A third version included neither prompt, and a fourth included both. It was found that these motivating and participating questions significantly improved student learning. Gardner L. Hart, who prepared the films used in the study, also coproduced *Motivation and Reward in Learning* the following year, which unsurprisingly adopted this format, consistently prompting the audience to speculate about the rats' behavior before providing explanations for that behavior. At the end of the experiment, May used Miller's language of "motivation and reward" to analyze his data, concluding that a viewer who was stimulated to respond to the film would retain more from the experience.

In studies like May's, the film itself was envisioned as producing an analogous response to that created by an experimental apparatus, similar to the wheels, levers, and electrical grid in Miller's film. All could be designed to control the behavior of living beings in predictable ways if studied and isolated—whether rats in a lab or human students watching a film. In Miller's own writing about educational media for *Audio Visual Communications Review*, he articulated a vision of the classroom screening space that was increasingly similar to the site of an experiment. He often described classroom instructors and laboratory scientists interchangeably. In both cases, their primary goal, he said, was not to impart information but to stimulate and reinforce behaviors. In relation to instructional films, Miller argued that their job was specifically to encourage accurate mimicking by the students of the skills seen onscreen.[39] This could be achieved by rewarding—either through grades or praise—students who accurately recalled and reenacted the skills and lessons of the film. In so doing, teachers would facilitate the process of generalizing out

into daily life the behavior experienced in the screening. Toward these ends, the films themselves were a type of laboratory tool that, when wielded properly, could ostensibly transform the behavior of students.[40] Just as teachers became experimenters, educational media became part of a laboratory apparatus.

Reframing film as a controllable stimulus required changes in the layout of the classroom so that it could become more analogous to laboratory settings in which such stimuli were regularly studied. Miller claimed that daylight screens, looping film clips, and remotely operated and magazine-loaded projectors could all enmesh film more smoothly into the surroundings and daily procedures of the class while allowing for more variability in film's use.[41] Additionally, Miller advocated for the building of "prototype classrooms," which would include an overhead projector, push-button lights, and a control panel for pausing and running the film.[42] To simulate the institutional space of scientific research, the arrangement of the classroom was continuously transformed for greater, more precise, control. Even with these changes, the tightly maintained and monitored environment of the lab was not inherently similar to rooms full of students. Students were often unreliable subjects. In the normal routine of the class, they could not be comprehensively monitored and examined in the way that behaviorism's animal research subjects could. To complete the comparison, student responses needed to be closely observed and documented in order to track the effects of each screening—a difficult task with a room full of unruly and sometimes resistant children. A battery of experimental devices was introduced to test and monitor student behaviors during screenings. Through these devices students, like laboratory animals, could become compliant subjects of study, revealing the effects of particular elements of a given educational film. Everything from opinions to body temperatures were recorded before, during, and after screenings.[43] Students, like lab rats, were also approached and described by these studies as more or less interchangeable, represented as a singular aggregate of many individual responses. Through these technological incursions into the classroom a new set of behavioral theories arose to connect laboratory findings with pedagogy.

In addition to Miller, many of the central players in this growing field of mid-twentieth-century educational research were behavioral psychologists who began by working with animals. An extreme example of this can be seen in the primatologist Clarence Ray Carpenter's research into educational filmmaking. Carpenter's best-known animal studies were conducted in the field, where he pioneered the use of media recording in an attempt to "supplant the colorful tales of dramatic incidences told by sportsmen, hunters and travelers and embellished to make good adventure stories."[44] Toward these ends, he used a vast assortment of audiovisual monitoring devices to empirically register the behavior of primates in the wild. Carpenter made some of the first films of primate social behavior in their natural habitats.[45] These films included, among others, *Behavioral Characteristics of the Rhesus Monkey* (1947), *Social Behavior of Rhesus Monkeys* (1947), *Mountain Gorilla* (1959), and *Howler Monkeys of Barro Colorado Island* (1960).

Concurrent with the production of his primate films, Carpenter was also deeply invested in the theories and best practices of educational filmmaking. In 1940, he began teaching at Pennsylvania State College, where he ensured that Penn State eventually became the depository for the Psychological Cinema Register.[46] (As mentioned earlier, the Psychological Cinema Register was a central distributor for educational films of laboratory research and rented out the work of Miller and his peers at the Institute of Human Relations.) Additionally, during World War II, Carpenter had advised in the production of training films for soldiers.[47] During the war, he served as the organizer of the German Youth Reeducational Program and as chairman of the planning committee of the International Motion Picture Service, which was run by the Department of State.[48] In 1947, Carpenter became the director of the Instructional Film Research Program, which was funded by the Navy's Special Devices Center and that Army's Signal Corps to scientifically solve "the problems of rapidly training and instructing large numbers of people" through film.[49] Carpenter vividly described the program's agenda in retrospect: "We were hopeful that the scientific skeleton of the body of film art could be laid bare and defined."[50] Here he would develop increasingly complex methods for testing the effects of film on human behavior.

In 1950, Carpenter oversaw the development of two inventions for the Instructional Film Research Program—the "Film Analyzer" and the "Classroom Communicator"—that vividly demonstrate behaviorists' ongoing conceptualization of classroom spectatorship as a type of laboratory experiment.[51] Sponsored by the Office of Naval Research, the purpose of these devices was to "record and time continuously a range of reactions and responses of individuals in groups . . . to various kinds of instructional and informational programs."[52] Both of these machines could work together, each plugging into a set of "stations" where individual student spectators would be placed. Essentially desk chairs, these stations contained enclosed boxes into which viewers inserted their right hand (fig. 9). Within the box were five buttons, one for each finger, which would send an electronic signal to either the Classroom Communicator or the Film Analyzer, or both, depending on what was currently being tested. During the film, student viewers would be prompted to respond to multiple choice and true or false questions about the film's content by pressing these buttons. The Film Analyzer recorded the times and responses of each station, which could be directly tagged to the moment in the film when they were made; these responses were then produced as a polygraph printout of lines and dashes at the front of the room. The Classroom Communicator presented a control center for the instructor/experimenter, which included a grid of lights, each representing a single station, which would flash on and off when questions were answered correctly. Its purpose was to give instructors and experimenters a real-time overview of the progress in the class as the film played. These inventions were imagined as tools for both research and teaching, gauging students for the purposes of evaluating the film's effectiveness and the progress of the students. Through their invention, Carpenter and his team of researchers
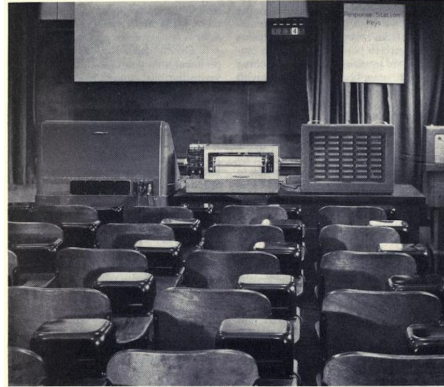
FIGURE 9. Photograph from "A Scientific Approach to Informational-Instructional Film Production and Utilization." *Journal of the Society of Motion Picture and Television Engineers* (May 1952).

conceived of spectatorship as a dynamic, changing behavior on the part of the student that needed to be tracked and revealed through the intervention of recording devices.

In his research into educational media, Carpenter was extending the practices of his primatology fieldwork to the classroom setting. There were direct parallels in the content and methods of both strains of study. As in behaviorist practice generally, Carpenter was intent on extending concepts from the laboratory out into the field and then back into the classroom. He is remembered primarily for his important early innovations in methodology, where he brought together precise notation and recording techniques from the lab to ecological fieldwork.[53] These methodologies were perhaps the clearest link between his primatology and his work in media theory. As a primatologist, he pioneered the use of technology as a means of systematic notation.[54] Pushing back against the common perception of field studies as passive observation, he increasingly deployed high-tech devices for monitoring and even influencing his field subjects (fig. 10).[55] In so doing, he made open, uncontrolled settings in the wild increasingly predictable, manageable, and accessible to the behavioral theories of the lab. Inventions like the Classroom Communicator and the Film Analyzer similarly transformed the "field" of the classroom, which became equally surveyed and controlled through technological means. Ultimately, both "wild" spaces required terraforming, which Carpenter achieved through complex monitoring apparatuses that bridged experimental research and naturalist observation. Carpenter's career stands as a stark example of how the borders and influence of the laboratory were expanded to incorporate spaces that previously had epitomized unruliness and disorder into the logic of the lab.

In Carpenter's work, film functioned as a conduit for comparing the reactions of laboratory animals and students. Under the proper settings created by innovations like the Classroom Analyzer, the images and sounds of film could replace the

FIGURE 10. Photograph from "Behavior and Social Relations of Free-Ranging Primates." *Scientific Monthly* (April 1939).

shocks and mechanisms of the cage, extending analyses of the behavior of lab rats to human students in the classroom. This underlying comparison between laboratory experiments and educational media determined how many behaviorists made films, implicitly connecting lab animals and students even when the films themselves did not feature nonhuman specimens. As we have already seen with the *See and Hear* account of *Motivation and Reward in Learning*, these films were meticulously designed to create an onscreen environment like that of a laboratory apparatus, in which specific behaviors could be precisely pulled from audience members. *Motivation and Reward in Learning* is unique in Miller's frank pairing of his laboratory animal studies and his educational media research. Indeed, there is a strange mirroring effect that takes place between the viewing and the content of *Motivation and Reward in Learning*, producing an unexpected example of mise-en-abyme in scientific filmmaking. The behavior modifications of the rats onscreen—their "learning"—reflects the intended behavioral modification of audiences in classrooms that will later view the same film.

Miller explicitly connected the rats' behavior within his film to the act of viewing educational media, building out an entire theory of spectatorship in his *Audio Visual Communications Review* report, "Graphic Communication and the Crises in Education," which was based on the key concepts developed in his rodent experiments.[56] He argued that "drive," "cue," "response," and "reward"—the key concepts illustrated in *Motivation and Reward in Learning*—were essential for understanding learning in both rats *and* humans. His writing extends each concept from his animal experiments to explain the behavior of student viewers. For instance, in experiments documented by the film, "drive" was produced in the rats either through starvation or electric shocks. Similarly, Miller argued that filmmakers must learn to harness already-present drives in schoolchildren, such as the desire for prestige or to avoid punishment. By connecting these drives to specific scenes in the film, students would be motivated to behave as ideal spectators—silently and attentively watching the film. In his own articulation of cinematic identification, mirroring that of the Kuleshov effect, Miller drew from previous

studies into audience reaction to suggest that point-of-view shots could be used to tie viewers to the action onscreen, thereby channeling their preexisting desires through the film's onscreen surrogates.[57] Miller saw this effect as iterative of the change in rats that were motivated to adopt new behaviors in his experiments. He performs a similar analysis of "cue," "response," and "reward," broadly connecting the formal elements of the moving image back to the rodent experiments he had first filmed in *Motivation and Reward in Learning*. These concepts both make up the content represented in the film and simultaneously informed its production. *Motivation and Reward in Learning* thus depicts its own theory of cinema at the same moment it enacts this theory on the viewer.

Although Miller's film was released nearly a decade before he explicated his theories of education publicly, its relationship to pedagogy was not lost on educators at the time, who saw it as part of a growing body of useful knowledge being produced in behaviorist laboratories. As one 1953 review put it, modern teachers were "benefiting from the material on film which is being reported out from the experimental laboratories. The many implications for the classroom situation to be found in Motivation and Reward in Learning . . . [are] a case in point."[58] This reviewer also provides a list of other laboratory films, such as *Cats in the Puzzle Box* (1938), *Elevated Maze Learning in the White Rat* (1943), and *Color Categorizing Behavior of Rhesus Monkeys* (1947), as examples of similar films of behaviorist experiments with animals that shed light on the processes of human learning. Ultimately, for viewers at the time, animal figures in these films both represented direct knowledge emerging from the lab and stood in as metaphors for behavioral psychology's capacity to manage students in the classroom. They were thus strangely ambivalent images, existing as both concrete depictions of particular scientific experiments and as allegories for scientific power to potentially control all sorts of other behaviors. Similar to how Yerkes used to describe his work, the representation of animals in these films functioned as "an effective demonstration of the possibility of re-creating man himself."[59]

LIVING ABSTRACTIONS: ANIMAL REPRESENTATIONS IN BEHAVIORIST EDUCATIONAL FILMS

A close reading of the aesthetics of these films shows that this allegorical function dramatically transformed how animals were represented. In her analysis of the educational animal films of the 1920s, Jennifer Peterson argues that they were predominantly made in the mold of naturalism and embodied the ideals of learning through experience that circulated during the Progressive Era. Their structure harked back to older models of animal research, which she demonstrates were more amenable to popularization than methods of animal research emerging from specialized laboratory sciences during and after the First World War: "nature films did not so much teach current scientific ideas as present an older model of natural

history; rather than introducing lessons on modern zoology, anatomy, or genetics, most early nature films simply pictured and described the natural world."[60] Films such as *Struggle for Existence* (1925), *Wildlife on the Desert* (ca. 1920s), *The Cuttle Fish* (ca. 1920s), *Some Seashore Animals* (1930), and others presented animal subjects in their natural habitats and prompted adolescent audiences to inhabit the perspective of a taxonomist—learning to identify, describe, and catalogue the onscreen specimen. As Peterson outlines, spectators were often seduced into engaging with these films by surreptitious staging, the imposition of anthropomorphic narratives, and the crafting of artificial sets. She concludes that these films contain an ever-present tension between relying on stylized interventions to create entertainment, on the one hand, and using mechanical objectivity to present an academic or scientific vision of their animal subjects, on the other.

But *Motivation and Reward in Learning* emerged from a very different strain of educational filmmaking in the postwar years, guided by a separate set of tensions. As I noted earlier, realism and objectivity—as well as their inverse corollaries of sensationalism and entertainment—were not goals in and of themselves for Miller, which dramatically changed how he represented his animal subjects. Miller's film contains no traces of "natural" settings, artificially simulated or not, which define the earlier films studied by Peterson. Instead, *Motivation and Reward in Learning* takes place in a highly stylized space that resembles no actual location in the real world. Yes, we see the testing apparatus, which evokes the lab, but this apparatus is also surrounded by darkness, floating in a void without context. The figures' isolation within the frame is undoubtedly the product of Miller's approach to realism, in which he felt the details of the laboratory setting would only distract the audience. Rather than an immersive window onto a new experience, Miller's film is a collection of isolated views tied together by the film's voice-over and title cards. The end result is surreal, as if the rats exist within a psychological rather than material setting, inhabiting a purely ideational space of abstraction and measurement. The decidedly constructed nature of this space is neither concealed nor addressed by the film. Within the theoretical schema of behaviorist pedagogy, authorial intervention by a filmmaker, as well as the artificial manufacturing of scenes in a film, was not an act of misleading fabrication but simply the refining of a tool, a process that carried no moral weight and that did not need to be disavowed.

Other interventions into the representation of the rat were less ostentatious. The diversity of its responses, many of which did not directly relate to the principles of motivation and reward that Miller was hoping to teach, were silently removed from the film for the purposes of clarity. As the *See and Hear* article describes, many costly takes needed to be discarded before the rodent actors performed as the filmmakers hoped they would.[61] As we saw in the opening to this chapter, reviewers of the film considered the clarity of this manufactured performance as one of the primary strengths of the film, especially since demonstrations with live animals were often unpredictable and therefore could lead to

unnecessary confusion.[62] By shaping the rat's behavior through the editing of the film, Miller dramatically changed the representation of the rat as an animal. If the earlier natural history films analyzed by Peterson present their nonhuman subjects alternately as characters in anthropomorphic dramas and as strangely opaque "animals in themselves," Miller's film presents the rat as a kind of medium, part and parcel with the film itself.[63] The rules of learning as such, rather than the rat, are what is represented by this film. This structure ultimately allows the rat only a very proscribed interiority, one that is clearly labeled and defined by the film's author. Even the rat's initial erratic behavior before being conditioned to respond to the apparatus is enclosed by the film as simply an early stage in the developmental framework of motivation and reward. Miller's control over the representation of the rat, his readily apparent fabrication of the sets and editing of its performance, were not read as detracting from the film's scientific objectivity. Instead, interventions into the animal's behavior, either experimentally or through the editing of the film, were seen by Miller and his contemporaries as the fine-tuning of a mechanism and the shaping of a stimulus. The rat and the film both speak of a subject beyond themselves, of the behavioral principles that Miller crafted them to communicate. They are instruments of the classroom setting into which they are placed, cues within the visual realm of the students, and tools for the behavioral intervention of the instructors.

We have seen how certain theories, studies, and cinematic texts connected animal laboratories to American classrooms in the 1940s and 1950s. Within this context, images of rats like those in *Motivation and Reward in Learning* took on a different valence than they would have had before. For their creators, these images spoke to the power of properly mediated and controlled surroundings for dramatically altering behavior. Within the classroom, Miller and his peers envisioned film as a means of transforming the educational setting, a tool for bringing theories of teaching up to date with the newest findings of experimental psychology. Underlying this application of behavioral theory was, of course, the much-maligned comparison of students and rats (a comparison for which Noam Chomsky devastatingly skewered B. F. Skinner in 1959, which we will examine in chapter 7).[64] Both students and lab animals were increasingly monitored and regulated, subject to principles beyond their own control. But for Miller, these were images of profound hope, images of a future application of technological and psychological progress. Within his disciplinary context, these images of laboratory animals were transformed into universal images of spectatorship. They offered the promise of a tool that could effectively intervene and engineer the development of students. The dangers and the aspirations of behavioral control that emerged from the animal laboratory are recognized as part of scientific and psychological history, but, as I hope I have demonstrated, they are also part of film history. As we enter an era in which screens and behavioral analysis are more and more becoming a staple of the

classroom, a clear-eyed look at this pivotal period in experimental psychology and educational media becomes increasingly urgent. The behaviorist and the lab rat should be added to the pantheon of metaphors and theorems, treatises and allegories, through which film has been historically framed—vital figures for considering the effects of cinematic imagery on our minds, bodies, and actions.

Conclusion to Part Two

Scientific Folklore in "A Sea of Potential Facts"

In a 1951 article for the *Journal of Personality*, titled "Comments on Theoretical Models," Miller responded to the criticisms of "some social scientists who are extremely suspicious of any theory."[1] Miller, a constant producer of models, theories, and schemas, argues that scientists engage in a kind of authorship no matter what. And to make this point, he offers up an implicit rebuke of the techniques of ethnographic filmmaking:

> For example, two prominent social scientists claimed that they were getting the facts without any harmful bias from theory because they were taking motion pictures of events in a primitive culture. But they did not have cameras pointing from all possible angles at all possible events, day and night, for all of the days in the year. Such a procedure would have filled all of the museums in the world with film, each foot of which would have contained enough facts—the distance between each of the fingers, the number of leaves on the tree and stones on the ground—to keep a cataloguer busy for years. The investigators had to choose where to point the camera, when to push the button that started it, and what to measure and count on the film.

Miller goes on to argue that within such "an infinite sea of facts," scientists are always making authorial decisions, and if these decisions are not based on theory they are "made unconsciously on the basis of perceptual habits and the folklore of the culture." Here, Miller's skepticism of scientific practice without theoretical modeling extends to a skepticism over claims that film produces the unvarnished truth. For Miller, film is a form of scientific modeling, not an escape from it.

From his statement, we can extrapolate that Miller did not see film as a replacement of the object being filmed. It did not capture essential truths through its indexical properties or simply reveal physical dynamics that would otherwise escape the human eye. Film, for him, was an extension of scientific thought, a creative activity. He used film to hypothesize, theorize, and model, which

ultimately took on a very different form from other types of scientific filmmaking. As we have seen, Miller, and his peers, used the medium to build abstractions and speculations meant to refer to possible origins or behaviors outside of the frame. Toward these ends, there was no opposition between actively intervening into the image and simultaneously claiming to present an objective film. The point was precisely to *build* a theory of behavior, not to capture it.

This authorial impulse often led to mangled visions: grisly hybrids of rat and human, miniature lynchings in the lab, theories of the classroom as lights on a board. Theorizing such a vivid medium, populated with the behavior of real living things, often left those living things unrecognizably transformed. But there is also a frankness to this approach, an acceptance of the limitations of observation and the camera. Miller knew that his films and models were theories, expressions of his own hypotheses rather than transparent windows onto the truth. His celluloid specimens existed in a hybrid space, somewhere between props in the reasoning of the filmmaker and living beings with their own intentionality and purpose. The thoughts, motivations, and desires of his onscreen rats were all the subjects of extreme scrutiny, their agency ultimately driving the research surrounding them. But, they are also indecorously altered and transformed by this research, characters in stories that were not their own, acting out a script whose meaning lay outside the concerns of their own particular lives.

Alternately, the concatenation of animal behavior and human history in these films resonates in ways that are never fully under Miller's or his peers' control. What, indeed, might be the end result of such comparisons? In her riveting work of popular science, *The Sixth Extinction*, Elizabeth Kolbert recounts a discussion she had with the acclaimed climate geologist Jan Zalasiewicz, in which he described his belief that rats may one day evolve to fill the global niche left by humans long after climate change wipes us out, essentially taking over our place in history.[2] Zalasiewicz imagines a world in which rats evolve to new proportions, developing simple tools, wearing clothes, and living in shelters. Extending his speculation, one might picture future rats that are historians, engineers, or scientists. What would such rodents think if they were to uncover these rat films from the mid-twentieth century? Would they see theories of human behavior or a premonition of their own ascension? Despite themselves, these films call into question humanity's own tenuous claim on sole ownership of historical agency. If rats can simulate a class society, or race relations in the South, or urban living, or the experience of students in a classroom, what other aspects of human society might someday appropriate? Taken literally rather than figuratively, as our science fiction rats might well do, these cinematic models take on a life of their own, suggesting non-human futures and pasts that would otherwise seem impossible.

Posthuman Control

B. F. Skinner and the Onscreen Pigeon

THERE ARE FEW UNEDITED FILMS of the laboratory experiments of B. F. Skinner (1904–90). Nearly all the footage that currently exists is part of a promotional film, a televised lecture, or a documentary about his ideas. But the film provisionally titled *Shaping Pigeon Key Pecks* (1942)—contained in the Harvard Film Archives, which now houses all the films that were once owned by the B. F. Skinner Foundation—displays twenty minutes of seemingly unedited footage from one of Skinner's experiments. Having the feel of a home movie, this film is composed of jittery start-and-stop handheld shots that are often undirected and unfocused. In certain shots, the camera operators do not even seem to realize they are filming, recording the corner of the testing apparatus's walls rather than the pigeon itself. Without any framing material to guide the viewer, it is hard to understand what we are seeing or its scientific import. It seems to simply be footage of a pigeon in a strange box, acting utterly bewildered.

When compared with the roiling controversy surrounding the work of B. F. Skinner, easily one of the most famous psychologists of the past century, this footage stands as a reminder of the daily work of the behaviorist lab that largely remained out of sight during these debates.[1] Here, groups of animals were individually tested, day in and day out, in experiments that took intense patience and weeks of work to produce even the most modest of findings. These were often open-ended interactions between human scientists and animal subjects that did not necessarily have a particular goal in mind.[2] In filmed interviews, such as those in *A Change in Mind: The Autobiography of a Nonperson* (1978) and *B. F. Skinner and Behavior Change: Research, Practice, and Promise* (1978), Skinner insisted that the pigeon was "always right" and that the scientists' "behavior was shaped by the
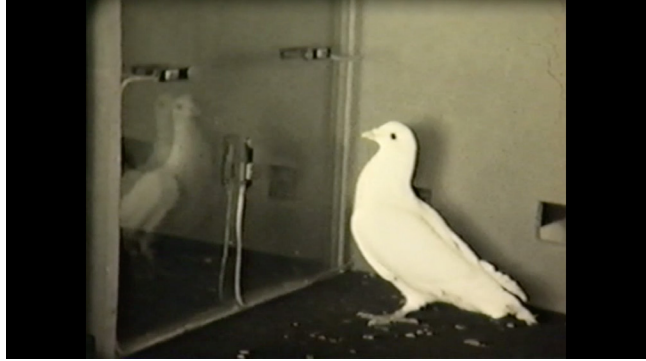
pigeon's much more than visa-versa." This back-and-forth, a mutual interchange through periods of meaningless uncertainty, is present in the sustained observations of *Shaping Pigeon Key Pecks*. As a film, it simply documents the labor of the lab, before quantitative analysis, before meanings have been extrapolated, before findings have been published, and before the public response.

Skinner's lasting audacity was the extent to which he connected these laboratory interactions to human affairs, extrapolating not only to explain human instincts or drives but all of human social, political, and artistic life.[3] Up to this point, the ethical, philosophical, and aesthetic importance of celluloid specimens has existed in the linkages of a lost or forgotten history. I have argued that the films of Robert Yerkes and Neal E. Miller are important cultural artifacts, pointing to subterranean logics of species, race, power, and aesthetics undergirding them. But with this final section, a new phenomenon emerges. Skinner, unlike his predecessors, was uniquely aware of the political potential of his animal research and sought to have this work taken seriously by society as a whole rather than limiting himself to conversations within experimental psychology. He consistently deployed his image as an animal experimenter in an attempt to shape major discourses on the issues of warfare, crime and punishment, education, scientific method, political governance, and economic structures. As such, Skinner believed that film and media could be used as a means of control, like his experimental apparatuses in the lab.

Skinner saw moving images in much the same way that Harun Farocki does in his writing on "operational images," which is a term Farocki first introduced in his *Eye/Machine* video series from 2001. Farocki describes operational images as those that "do not represent an object, but rather are part of an operation" and thus primarily act on the world rather than representing it.[4] Such images include drone footage and surveillance footage and are usually made for machines as they interact with the world around them. In many ways Skinner's own research laid the groundwork for this theory. Farocki retroactively attributed his concept to

the writings of Roland Barthes, but his evocation of the language of "operations" evokes the changes in vocabulary brought about by midcentury behaviorists, specifically Skinner and his theory of "operant conditioning."

Beginning with his 1938 book *The Behavior of Organisms: An Experimental Analysis*, Skinner used a discourse of "operations" to contrast his experimental psychology with those who studied the workings of internal human subjectivity through introspection.[5] Rather than referring to feelings, mental states, or thoughts, Skinner confined his interest to the actions of organisms—which he labeled "operations"—reframing psychology as the observation, study, and control over such behavior. In this work, Skinner went further than Farocki, reading even theatrical films or compelling narratives as fundamentally operational. In Skinner's framework, every image, sign, photograph, or film is just one of many functional components that tie living behavior to its environment. He believed that sensory experiences were simply part of the operations performed by an organism—the means by which it was conditioned to behave in a particular way—and thus not representations of an outside world perceived by an internal, transcendent self. For the Skinnerian, *all* images are operative, and *all* forms of spectatorship (human, animal, machine, or otherwise) are operations.

Skinner's approach to film was therefore quite different from what we have seen so far. Rather than as a tool for documenting internal truths or building theoretical models, he most frequently used film as a technology of control. Through the moving image, he sought to shape not only the behavior of his experimental animals but also the behavior of his fellow scientists and the public at large.

We will approach the different facets of this approach to the moving image in each of the following three chapters. Chapter 7 analyzes the classified military research project code-named Project Pigeon, which Skinner initiated and oversaw from 1940 to 1943. The goal of the research was to develop a pigeon-guided missile that could maneuver its explosive payload to moving targets. Skinner used film both as a means of training and conditioning the pigeons who were placed within the bomb and as a promotional tool for convincing the army generals to finance his research.

Project Pigeon signaled a new way of studying and testing living things for Skinner, who modeled his subsequent scientific approach on his research for the military, moving away from theories of behavior and toward technologies of control. He adopted a new vocabulary for approaching psychology, which would come to be called "radical behaviorism," in which all references to intentionality and internal states were eliminated. This approach is the focus of chapter 8, where I argue that his films, when paired with his writings on scientific method, not only demonstrate a criticism of past techniques in comparative psychology but also enact a form of media theory-through-practice by deconstructing past laboratory uses of film.

Despite his reservations over using the moving image in the lab, he and his pigeons did frequently appear in documentary programs throughout the 1960s and 1970s to teach, represent, and defend his work, particularly on TV. Chapter 9 analyzes the public forum of television, where Skinner undertook to manage and promote his vision of the behaviorist animal laboratory as a source of social engineering techniques and tools that could bring about radical changes in human culture and society. Here, the ideological meanings of the pigeon in the Skinner box were charged and transformed by the medium of television into powerful political avatars for understanding life in a mediated society.

Shaping Pigeon Key Pecks (1942) reminds us of the pigeons themselves. Unassuming, minor, and mundane, these pigeons tend to go unnoticed even as they surround us in our daily lives. But once they were introduced into the overlapping discourses of scientific theory, political power, and moving image aesthetics, their significance began to rapidly multiply, as the chapters in this section document. With the example of Skinner, we have an extremely public debate being waged with and about celluloid specimens, where images of animal experiments took on a newfound political and cultural importance. Skinner dismissed the animal research film's ability to scientifically document behavior, but this does not mean he was unaware of its powerful effects on audience members. Consistently, throughout his career, we see him using film to shape the behavior of spectators, both human and animal. In Skinner's eyes, the moving image was not an expansion of the human sensorium but a tool that operated through the unseen principles of control and conditioning. The pigeon in the Skinner box became an apt metaphor for film spectators, who found themselves caught in the machinations of an environment that they did not control but had a profound effect on the way they engage with their world. Within the menagerie of symbolic animals that human society uses to understand itself, Skinner's pigeons are not minor figures but transformative ones that reshaped the use of moving images to study animal life.

Project Pigeon

Rendering the War Animal through Optical Technology

In his 1979 autobiography, *The Shaping of a Behaviorist*, B. F. Skinner recounted a fateful train ride to Chicago in 1940, just after the Nazis had invaded Denmark.[1] Gazing out the train window, the renowned behaviorist was ruminating on the destructive power of aerial warfare when his eye unexpectedly caught a "flock of birds lifting and wheeling in formation as they flew alongside the train." Skinner recounts: "Suddenly I saw them as 'devices' with excellent vision and extraordinary maneuverability. Could they not guide a missile?"[2] Observing the coordination of the flock, its "lifting and wheeling," inspired in Skinner a new vision of aerial warfare, one that yoked the senses and movements of living animals to the destructive power of modern ballistics. This momentary inspiration began a three-year project to weaponize pigeons, code-named "Project Pigeon," by having them guide the flight of a bomb from inside its nose (fig. 11), a project that tied together laboratory research, military technology, and private industry.

This strange story is popularly discussed as a historical fluke of sorts, a wacky one-off in military research and development. As Skinner himself described it, one of the main obstacles to Project Pigeon even at the time was the perception of a pigeon guided missile as a "crackpot idea."[3] But in this section I will argue that it is, in fact, a telling example of the weaponization of animals in a modern technological setting where optical media was increasingly deployed on the battlefield, a transformation with increasing strategic and ethical implications for the way war is fought today. I demonstrate that Project Pigeon was historically placed at the intersection of a crucial shift in warfare away from the model of an elaborate chess game played out by generals and their armies and toward an ecological framework in which a wide array of nonhuman agents play crucial roles. As Jussi Parikka recently described a similar shift in artificial intelligence, this was a movement toward "agents that expressed complex behavior, not through preprogramming
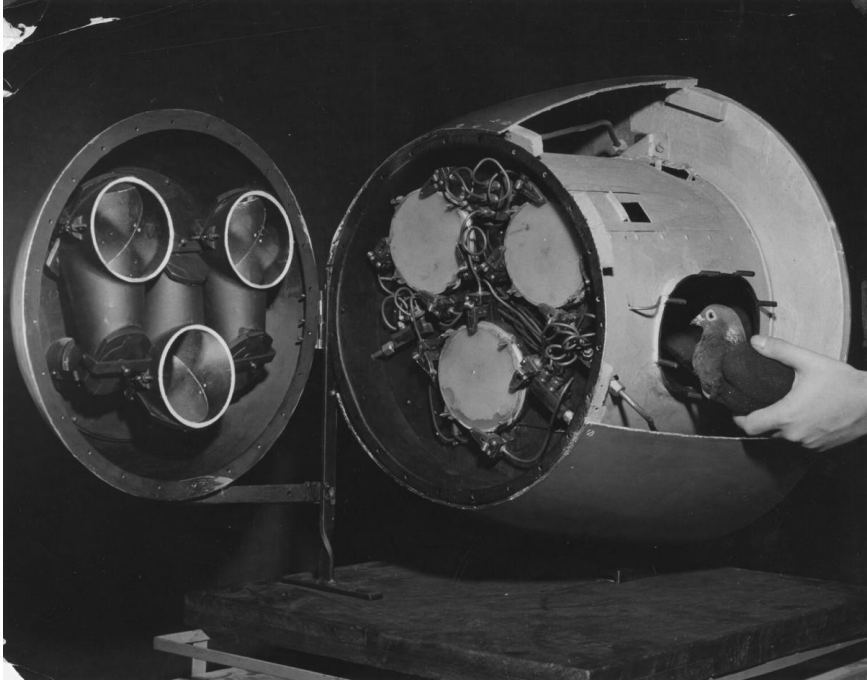
FIGURE 11. Photograph of Project Pigeon from the Burrhus Frederic Skinner Papers at Harvard University Archives. Courtesy of the B. F. Skinner Foundation.

and centralization, but through autonomy, emergence, and distributed functioning."[4] The missile developed and marketed by Project Pigeon was premised on a conversion of the pigeon from an individual consciousness to a living machine, emptied of intentionality in order to leave behind only a controllable, yet dynamic and complex, behavior that could be designed and trusted to operate without the oversight of a human commander. Here is a reimaging of what a combatant can be, no longer dependent on a decision-making human actor but rather on a complex array of interactions among an organism, device, and environment. As we will see, the vision of a pigeon-guided bomb presaged the nonhuman sight of the smart bomb, drone, and military robot, where artificial intelligence and computer algorithms replace the operations of its animal counterpart.

Media and cinema scholars have written extensively about the transforming visual landscape of the battlefield and film's place within this shifting history. Militaries from across the globe have pushed film to be used in dramatically unorthodox ways. Lee Grieveson and Haidee Wasson argue that the US military historically used film as "an iterative apparatus with multiple capacities and functions," experimenting with the design of the camera, projector, and screen to fit new strategic interests as they arose.[5] As Wasson argues in her chapter dedicated

to experimental projection practices, the US Army "boldly dissembled cinema's settled routines and structures, rearticulating film projection as but one integral element of a growing institution with highly complex needs."[6] As propaganda, film was used to portray the military to civilians at home and abroad; as training films, it was used to consistently instruct large numbers of recruits; as industrial and advertising films, different branches of the military used it to speak to each other. Like these examples, Project Pigeon relied on a radically unorthodox use of film that directed it into new terrains, intervening in the long-standing relationship between the moving image and its spectators to marshal its influence on nonhuman viewers, as well as humans. Here, we will see a hitherto unstudied use of the optical media, in which film was a catalyst for transforming animals into weapons and combatants.

Project Pigeon was one of the earliest projects to come out of an illustrious and influential career. Skinner would go on to become one of the most well-known voices in American psychology, introducing the "Skinner box" to the study of animal behavior and the vastly influential theory of "operant conditioning."[7] His influence was not limited to the sciences but was broadly felt across conversations in political theory, linguistics, and philosophy as well. As James Capshew has shown, much of Skinner's later, more well-known research originated in this military research into pigeon-guided ballistics.[8] Growing from initial independent trials in 1940, Project Pigeon secured funding from the US Army's Office of Scientific Research and Development in 1943.[9] The culmination of this work placed three pigeons in the head of a missile; the birds had been trained to peck at a screen showing incoming targets. These pecks were then translated into instructions for the missile's guidance system. The goal was a 1940s version of a smart bomb, which was capable of course correcting midflight in response to the movement of a target. Although Project Pigeon developed relatively rapidly, the US Army was ultimately denied further funds in December of 1943, effectively ending Skinner's brief oversight of the project. In 1948, however, the US Naval Research Laboratory picked up Skinner's research and renamed it "Project ORCON"—a contraction of "organic" and "control." Here, with Skinner's consultation, the pigeons' tracking capacity for guiding missiles to their intended targets was methodically tested, demonstrating a wide variance in reliability.[10] In the end, the pigeons' performance and accuracy relied on so many uncontrollable factors that Project ORCON, like Project Pigeon before it, was discontinued.

Moving images played two central roles in Project Pigeon: first, as a means of orienting the pigeons in space and testing the accuracy of their responses, examples of what Harun Farocki calls "operational images," and, second, as a tool for convincing potential sponsors of the pigeon's capacity to act as a weapon.[11] The first use of moving image technology shows up in the final design of Project Pigeon, where each of the three pigeons was constantly responding to camera obscuras that were installed in the front of the bomb. The pigeons were trained to pinpoint

the shape of incoming targets on individual screens (or "plates") by pecking them as the bomb dropped, which would then cause it to change course. This screen was connected to the bomb's guidance through four small rubber pneumatic tubes that were attached to each of side of the frame, which directed a constant airflow to a pneumatic pickup system that controlled the thrusters of the bomb. As Skinner explained: "When the missile was on target, the pigeon pecked the center of the plate, all valves admitted equal amounts of air, and the tambours remained in neutral positions. But if the image moved as little as a quarter of an inch off-center, corresponding to a very small angular displacement of the target, more air was admitted by the valves on one side, and the resulting displacement of the tambours sent appropriate correcting orders directly to the servosystem."[12]

In the later iteration of Project ORCON, the pigeons were tested and trained with color films taken from footage recorded on a jet making diving runs on a destroyer and a freighter, and the pneumatic relays between the servosystem and the screen were replaced with electric currents. Here, the camera obscura and the training films were used to integrate the living behavior of the pigeon into the mechanism of the bomb itself and to produce immersive simulations for these nonhuman pilots in order to fully operationalize their behavior.

The second use of moving images for this research was realized in a set of promotional films for Project Pigeon, which Skinner largely credited for procuring its initial funding from General Mills Inc. and the navy's later renewal of the research as Project ORCON. Skinner's letters indicate that there were multiple films made for this purpose, which were often recut in order to incorporate new footage.[13] Currently, I have been able to locate only a single version of the multiple films produced by Skinner, the latest iteration that was made to promote Project ORCON. Whether previous versions exist and have yet to be found or whether they were taken apart to create each new version is unclear. Based on the surviving example, it appears that these promotional films were used to dramatically depict the pigeons as reliable and controllable tools. Their imagery presents the birds surrounded by cutting-edge technology, rapidly and competently responding to a dynamic array of changing stimuli. These promotional films played a pivotal rhetorical role in convincing government and private sponsors to back the project. Skinner wrote that one demonstration film was shown "so often that it was completely worn out—but to good effect for support was eventually found for a thorough investigation."[14] This contrasted starkly with the live presentation of the pigeons' work, of which Skinner wrote: "the spectacle of a living pigeon carrying out its assignment, no matter how beautifully, simply reminded the committee of how utterly fantastic our proposal was."[15] Here, the moving image performed an essentially symbolic function, concerned primarily with shaping the *image* of the weaponized animal bodies.

Film was therefore used to transform the pigeon's behavior both materially and symbolically. Nicole Shukin's concept of "rendering," and its deployment in

producing what she calls "animal capital," provides a useful theoretical framework for connecting the rhetorical and functional aspects of the moving image in Project Pigeon. Broadly speaking, animal capital refers to the incorporation of animal life into capitalist systems of currency and exchange. As Shukin writes: "'Animal capital' simultaneously notates the semiotic currency of animal signs *and* the carnal traffic in animal substances."[16] Within the history of this processing of animal life, "rendering" takes on a double meaning. On the one hand, it connects to a history of animal recycling, the process of breaking down animal bodies for the production of a vast array of products, from meat to glue to leather.[17] On the other hand, rendering, especially recently, often refers to the process of producing a rendition, to the making of an image. Animal capital is the product of this double rendition, where animal bodies are processed into products and consumer goods, while their imagery is simultaneously consumed as symbols.

Shukin tracks this history of rendition through the interlocking development of the slaughterhouse and motion studies. Within her account, the slaughterhouse is an originary site for the systematic breakdown of bodies in industrial capitalism. Henry Ford's infamous inspiration for the assembly line—flipping the process from disassembly to construction—the slaughterhouse floor literally transformed bodies into an assemblage of component parts. Here, human labor and animal bodies were both integrated into industrial machinery for the purposes of producing goods. Shukin, along with others, traces the desire to further this process of integrating living bodies into mechanical systems to the initial motion studies of Etienne Jules Marey and Eadweard Muybridge.[18] Here, the *movements*, rather than the corpses, of animals were disassembled and mechanized. The images produced by chronophotography were a new kind of product. They were useful technologies, way stations in the optimization of the animal machine. As Marey wrote in the 1874 monograph that would inspire Muybridge's chronophotographs, *Animal Mechanism: A Treatise on Terrestrial and Aërial Locomotion:* "The comparison of animals with machines is not only legitimate, it is also extremely useful from different points of view. It furnishes a valuable means of making the mechanical phenomena which occur in living beings understood."[19] The mechanics of flight were contained in the images of a bird's wings, the physics of exertion in the leap of a cat, the dynamics of locomotion in the gait of a horse. With the integration of chronophotography into the management of the production line through Taylorism, the circuit of the industrial factory and motion studies was completed, as workers were filmed to more efficiently integrate their movements with the demands of the assembly line.[20] Within the posthuman logics of animal capital, it was only a matter of time before what was done to animals spread to the treatment of humans.[21]

The corresponding sites offered by Shukin, as we have seen, are the slaughterhouse and chronophotography out of which arose a particular brand of biopolitics and biomechanics in industrial production in the late nineteenth century. But to understand Project Pigeon, we need to study a different history of rendering, one

that was produced by an alternate circuit focusing on the science of perception. Skinner's research emerged at the intersection of two different genealogies: that of the camera obscura and that of the battlefield. The correspondence between histories of optics and warfare renders animals differently than do those of the factory. The animal-as-weapon that is produced from this knotted history is mindless, yet complex, and fundamentally rational in its operations. Like Marey's chronophotographs, this was a history of harnessing nature as technology, which in this context would be aimed at military rather than industry goals.

Well before the advent of capitalism, or Project Pigeon, humans and animals were being rendered into useful bodies on the battlefield, consumed not by the industrial factory but by the war machine.[22] Animals offered fantastic, nonhuman powers for waging war. For centuries, horses, elephants, dogs, and other animals fought alongside human soldiers under almost every conceivable circumstance. These battles often required a deep synchronicity and companionship between humans and animals, creating what David Gary Shaw calls "a unity, a temporary but socially significant fusion of sensible things."[23] At times, these assemblages of human and animal produced deep emotional bonds, with war animals depicted as heroic companions and fellow soldiers. Animals were awarded medals and given funerals, recognized as essential players in the theater of war.[24] They were a means to an end—heightening human senses, providing speed and endurance, elevating commanders above the fray, and so forth—but often were not described as disposable tools in the way that a rifle or a cannon was. These charismatic companions ranked as members of the troop or battalion, worthy of recognition and praise.[25] Pigeons participated in this history, especially during World War I, when they were used extensively to coordinate attacks and relay crucial information.[26] As small, speedy, and agile messengers, pigeons allowed commanders to communicate across enemy lines. Additionally, they were known to persist in their missions even when injured, leading to heroic, popular stories of individual pigeons that delivered multiple messages even after being wounded. One particularly heroic pigeon, Cher Ami, was stuffed and preserved in the United States National Museum, commemorated by one author as "A Feathered Hero of the World War."[27]

At the same time, a very different strain of animal warfare existed alongside these companion species. Animals were just as often used as a kind of expendable technology, capable of killing and being killed in ways that did not risk human soldiers and were often more effective than traditional weaponry. Stretching back to the middle ages, practitioners of biowarfare developed a cruelly efficient use of nonhuman life as killing machines, terraforming, infecting, and infesting massive swaths of land.[28] The germ, the virus, and the swarm were staples in the arsenal of colonialism, where agricultural, ecological, and medical systems were all upended.[29] Here, too, pigeons were present. Donna Haraway describes the pigeon as a "creature of empire," animals "who went with European colonists and conquerors all over the world," and who were "infamous for ecological damage and

biosocial upheaval."[30] Like rats and crows, pigeons thrived in urban settings, proliferating along with industrialization as a sign of the transformation of territory and landscape. By the 1940s, pigeons had also become disposable in a new way as vermin. They were "rats with wings," symbols of urban blight and decay.[31] In this context, pigeons were occasionally associated with other perceived social threats, such as immigrants and the homeless.[32] They were a scourge to be eradicated. In popular news and magazines, pigeons were connected to disease and infestation and often were exterminated in large numbers. These pigeons were not individualized but rather perceived as a swarm or pestilence, a threat to public health and sanitation.

Skinner's Project Pigeon emerges from this history but was also unique to its scientific and cultural context. Skinner connected his project to the history of deploying animals' sensory capacities, such as the bomb-sniffing dog, to extend human awareness of the battlefield. Like the dog's sense of smell, the pigeon's capacity for sight was weaponized for the purposes of seeing from the air. But, Skinner also crucially recognized that Project Pigeon was not about expanding human sensory capability, as pigeon senses do not surpass our own. What made the pigeon so valuable was that it was "readily expendable."[33] The pigeon's disposability allowed it to function as a component within a self-destructing system, seeing and responding up until the last explosive moment, connecting its sensory input to the movements of the bomb throughout the entire flight. The disposability and availability of pigeons made them ideal artillery, while their capacity to learn complex behavior allowed them to be installed into the complicated machinery of the bomb. These birds allowed Project Pigeon to create a bomb that could respond to its environment in real time like a living thing but also be indiscriminately destroyed as an object.

Paired with the disposable pigeon agents, the camera obscura was a crucial integrating device in the development of this project. It tied the behavior of the pigeon-as-subject to the movements of the living bomb. Thus, the ways that the camera obscuras installed in the "pelican bomb" (named for its beak-like nose) conditioned (or rendered) the behavior of the pigeon are essential for understanding the weapon's function. As Jonathan Crary outlines in *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century*, camera obscuras have a long philosophical history of envisioning, materializing, and conditioning forms of (primarily human) consciousness.[34] Skinner's radical repurposing of this optical tool illustrates his broader vision of warfare fought by distributed autonomous organisms rather than a centralized strategic intelligence. A camera obscura is constructed by installing a convex lens into a pinpoint hole in one wall of a darkened room, causing the light and images hitting the lens to be projected on the opposite wall. Crary argues that, like the bomb in Project Pigeon, the camera obscura was long used as a means of reconciling observers with the world around them, by modeling the interiority of the subject as both an actual space and a

potent metaphor. The material and symbolic rhetoric of Cartesian dualism was rendered real by the camera obscura, exemplifying humanity's exceptional capacity for reason in its architecture.[35] Within the darkened enclosure created by the camera obscura's walls was the deliberating, rational human who was given space to reflect, organize, and order the forms and functions of the world outside.[36] The camera obscura offered its users the power to observe, apprehend, and define at a distance.

In many ways, the aerial perspective produced by the pigeon bomb and other instances of aerial warfare was born out of precisely this humanist logic. As Caren Kaplan describes, scholars studying the history of aerial views have created a "now-established narrative" in which views from above are seen as increasingly compounding Cartesian dualism's split between mind and body by further separating humans from their environment, expanding the reach of their vision and providing a space for interpretive analysis and reflection.[37] Paired with colonial and military projects, the aerial perspectives created by such diverse phenomena as hot-air balloons, spy planes, satellites, and drones have all been tied to the growing expansion of imperial power by bringing the entire globe into the line of sight of a controlling Western "magisterial vision."[38] As T. J. Demos argues, these remote sensing technologies promise "viewers a sense of control over the represented object of their gaze," in which "the dual colonization of nature and representation appear inextricably intertwined."[39] But Kaplan also takes pains to point out that this narrative leaves out crucial breaks and nuances, moments in which "the relationship between the material and the immaterial is never fully resolved and is therefore productive of ways of knowing and being that do not always square, literally and figuratively, with the Cartesian, bounded subject."[40] Poor images, tactile or haptic dissonances, engineering restrictions, realities on the ground, and unexpected affective intensities always threaten to intervene in the narrative of a smooth and seamless increase in human perception and power.

Following Kaplan, we can read Skinners' Project Pigeon as one of these moments, in which the power promised by the pigeon bomb was predicated on handing over the deadly capacity to perceive and master to a nonhuman consciousness rather than the expansion of human vision. By placing pigeons within the darkened enclosure of the camera obscura, Skinner hopelessly scrambled the binaries of human and nature, mind and matter, reflection and action that were represented in the camera obscura and amplified by the technologies of aerial surveillance. Suggesting an alternative historical narrative, Project Pigeon was the product of several major shifts in thinking and technology from the end of the eighteenth century to the Second World War. As Crary argues, later optical devices, such as the thaumatrope and the zoetrope, effectively located the operations of vision into the physiological processes of the body. For instance, the zoetrope—a cylindrical drum whose inside was lined with successive images that seem to move when spun and viewed through a series of open slots on the side—clearly displayed the

imperfect functioning of the eye, as the viewer could switch back and forth from moving illusion when looking through the slats to incoherent blur when looking over the top of the zoetrope. The marvelous illusions that nineteenth-century media created were premised on a precise manipulation of the senses rather than the relay of a real world of material objects, effectively disengaging sight from a direct access to truth.[41] Optical media became more and more corporeal, associated with the arrangement and functioning of the human sensory apparatus.

At the same time, the particularly *nonhuman* functions of optical media were also being extolled. The transportive effects of these devices suggested an accumulation and access to other sensoria beyond the human, other optical truths that might be just as revealing as our own. A parallel interest in the perceptions of animals coming out of ethology in the late nineteenth and early twentieth centuries was also leading to the conclusion that the world experienced by humans was only one of many possibilities. The German ethologist Jakob von Uexküll developed the concept of the *umwelt* (environment) to describe the differing perceptual worlds inhabited by human and nonhuman animals with different sensory capacities. As Jussi Parikka describes, Uexküll "can be thought to show the crumbling of human apperception via the potentially infinite number of perceptual worlds existing in animals—with the world of perceptions too small or too large to comprehend from the human perspective."[42] Uexküll himself described this work as an outgrowth of animal research on film. He recounted the experiments of one German researcher who found that certain strains of fish only respond to images projected at thirty frames per second, leading Uexküll to conclude that "all processes of motion appear more slowly in their environment, as in slow motion."[43] The study of animal perceptions and of moving image technology seemed to demonstrate the ways that life could inhabit the world in radically different ways. Unlike the pairing of the Cartesian subject with the camera obscura, the coupling of animals and cinema, with their capacity to project startlingly different perspectival positions, was associated with the exploration of nonhuman *umwelts* by gesturing to alien perspectives outside the human.

And finally, by the 1940s, optical media had also dramatically altered the epistemology of warfare. As Paul Virilio tracks in *War and Cinema: The Logistics of Perception*, in the early decades of the twentieth century, combat was increasingly fought through the aid of photographic and moving image technology. Beginning especially with World War I, as Virilio writes, battles "depended upon the *regulation of points of view*—that is, on a definition of the battle image in which the cavalry's perspective suddenly lost out to the perpendicular vision of the reconnaissance aircraft."[44] As with the shift in approach from the camera obscura to the optical toy, less and less emphasis was placed on the revelatory capacities of "seeing with one's own eyes" and more and more battles were conceived as a panoptic assemblage of nonhuman points of view in combat. The expansive application of surveillance in war was paired with evermore powerful artillery, creating a scenario in which

one needed only to see the enemy to kill them: "The idea of war as fundamentally a game of hide-and-seek with the enemy was proved to the point of absurdity in those First World War earthworks where millions of men were entrenched and interred for four long years."[45] Just as science had increasingly off-loaded the act of observation onto mechanical means, so, too, the military developed its own "mechanical objectivity," except with the twist that observation and attack were densely intertwined.[46] To see, to identify, to visualize became increasingly synonymous with monitoring, targeting, and killing, a process that was abetted by operationalizing modes of vision beyond the individual human combatant.

Therefore, by the time Skinner began his project, optical media and nonhuman perspectives had been largely intertwined and operationalized for combat. Even in World War I, pigeons were well integrated into this new framework. A conspicuous example was Dr. Julius Neubronner's miniature pigeon camera.[47] Created in 1903, the pigeon camera was light enough to be carried by a flying pigeon and would automatically snap photographs through a time-released shutter. The German military adopted the pigeon camera as a means of surveillance, and a 1916 article in *Popular Science Monthly* reported several such pigeons being shot down by Allied forces. This article, "The Pigeon Spy and His Work in War," begins with an eloquent appraisal of the bizarre mixture of old and new in these pigeon cameras: "It is a strange medley, the air-ship, the last and most daring invention of man's brain, rising in the early dawn to search out and photograph the foe's movements, and the graceful pigeon, so frequently mentioned in the stories of early days, soaring, perhaps at the same moment, to act as an aerial scout."[48]

While Neubronner's pigeon camera stimulated popular imagination, it was hardly the most pervasive use of pigeons at the time. During World War I, pigeons were part of a loose network connecting intelligence gathering with battalions on the ground, stringing together observation and attack. In particular, pigeons were used to coordinate aerial spy crafts. Susan Bulanda notes that "pigeons could be released from aircraft going 100 miles per hour and from heights of up to 6,000 feet."[49] Pigeons were used extensively to communicate coordinates to headquarters, an important channel of communication for directing the various points of view that were beginning to define the war.[50]

By the Second World War, many of the functions previously performed by pigeons were thought to have largely been taken over by electronic means of communication. The expanding use of radio and the advent of radar in the 1940s were ideally meant to rapidly connect bombers to a centralized headquarters and allow pilots to "fly blind" regardless of the time of day or weather conditions. As Virilio describes aerial warfare during World War II, it was a cinema or phantasmagoria of war.[51] The victims of both German and Allied bombing raids were spectators of these horrific lightshows in the sky, which were orchestrated by far-off commanders who designed and guided the deadly displays. Electronic sensors and communication created a vision of war as a grand performance in which all the various

actors were coordinated and guided by orders from remote headquarters. This lightning-fast communication seemed to make the homing pigeon largely obsolete. Despite this, there were in fact more pigeons deployed during World War II than during World War I. Pigeons were used to communicate among those who could not bring the rather bulky equipment necessary for radio and radar communication with them. This points to an essential difference between the techno-utopian rhetoric and vision for warfare and the realities on the ground, where pilots often flew blind.[52]

But Skinner transformed the pigeon's role into that of a possible guidance system for deployed missiles. The threads of embodied media, animal ethology, and optical warfare were all present in this repurposing of the pigeon combatant. Skinner explicitly envisioned Project Pigeon as an alternative operating system to the networks of command and control created by radar and radio. He acknowledged that homing missiles that could be guided through radio had already been created in the 1940s, but their existence within the recognized field of electronic warfare also made them susceptible to interception and jamming.[53] No matter how instantaneous the speed of communication between bomb and headquarters, there was always the chance of the enemy intercepting or disabling these communications, of severing the connection between the bomb and its controller. Reacting to these flaws, Skinner posited the pigeon as a system of response that was incorruptible in its proximity to the facts on the ground. An alternative to the grand maneuvers of a centralized orchestration of war, Project Pigeon envisioned a flock of bird-brained bombs, alive and responding to their environment, with a clear goal of defeating a clear enemy yet devoid of any master plan. Theoretically, the pigeons would self-organize, just as they did in their flocks, and therefore create their own patterns of attack to fit each circumstance. It was this alternative form of warfare that Skinner had suddenly seen on that fateful train ride in 1940—one that was dramatically opposed to the vision of war as a massive centralized organization of many dispersed pieces.

Skinner's pigeon bomb was designed as a kind of animal, given a sensorium by harnessing optical media and the ability to respond through the behavior of the pigeon. The falling bomb sensed the space around it through its three camera obscuras, which functioned as eyes. The pigeons inside the bomb operated as a kind of nervous system, rerouting outside stimuli to the thrusters, allowing it to respond to shifts in position due to drift, air currents, and moving targets. The pigeon bomb was deeply embedded with its environment through a feedback loop produced by sensing and reacting to shifts in perspective. The majority of the training of the pigeons themselves was dedicated to wedding the nature of the birds to the spectacle produced by the camera obscura, thereby producing an image that would elicit action. The *umwelt* of the pigeon was interfaced by the design of the bomb. Unlike the camera obscuras of the seventeenth century, which promoted a sense of separation from the world by walling off the observer inside a space of

repose, the images produced within the Project Pigeon bomb were connected to the needs of its animal inhabitants. The hungry pigeons were conditioned through days of training to constantly peck certain shapes on the screens in front of them. By rewarding the pigeons with food, Skinner and his peers created an image that required action on the part of the observing animal in order to satisfy its basic demands for survival. By hacking into the *umwelts* of the pigeons, Skinner and his research associates could control their responses and tie them to the operational objectives of the bomb.

Toward these ends, the researchers at Project Pigeon, and later at Project ORCON, labored to produce precise simulations of the suicide bombing missions that the pigeons would be expected to run. While Project ORCON was being conducted, Skinner was researching visual acuity in the pigeon and relaying his research to the ORCON crew, testing pigeons' responses as they rapidly moved toward photographs. He consistently pushed the navy's photography division for more clarity and contrast in its images, asking for photographs that one correspondent claimed were "physically impossible."[54] Attempting to fulfill his request, the photographers had to experiment with new fine-grain lenses and large-format cameras. Skinner tested the pigeons' visual acuity in close-up, reproducing the views just before impact. He also simulated the extreme duress that the pigeons would experience in battle by having them practice in different air pressures and by firing a pistol during test runs.[55]

Meanwhile, the staff of Project ORCON created their own elaborate devices for connecting the pecks of the pigeons with their filmed simulations of bombing runs (fig. 12). They invented a relay system whereby each peck created a circuit between a metal headpiece worn by the pigeon and the electrical conducting glass placed in front of the image. The location of each peck was translated as an electrical current registering the distance of that point from the center of the frame. This device was then coupled with a film projector whose projected image would swivel in response to the pigeon's pecks, thereby creating a realistic simulation of what would occur when the pigeons controlled the movement of the bomb. As one report described: "The key apparatus here was a small mirror that could be turned right-left and up-down by a servo motor. The motion picture projector beamed the target pictures onto the mirror, which then reflected the images onto the tracking screen. The control loop, embracing the pigeon's beak contact and the conducting glass, provided the signals which determined which way the servo motor would turn the mirror, and thus where the image would appear on the screen."[56]

The result was a film image that changed position in response to where the pigeon struck the screen. The tight feedback loop between organism and environment was simulated by these optical devices, allowing for the use and design of the pigeon's responses as a tool. Ultimately, by pairing the onscreen image with the needs of the pigeon's body, and by creating a media device that could respond to its movements, Skinner and his peers reimagined the bomb as an optical device
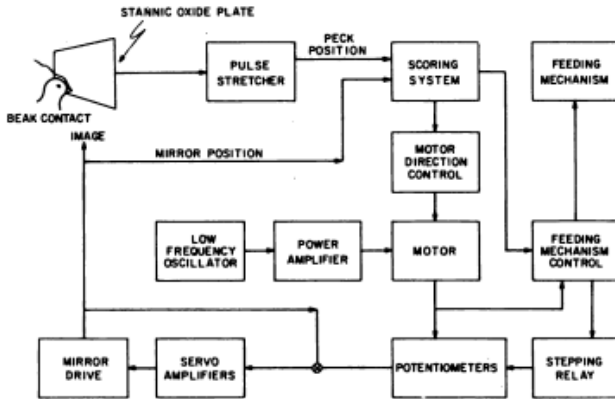
FIGURE 12.
Diagram of Project
ORCON's ana-
logue touchscreen.
Reproduced from
US Naval Research
Laboratory's "Project
ORCON: The Use
of Pigeons to Guide
Missiles." Courtesy
of the B. F. Skinner
Foundation.

that could—with precision—correspond to the animal's sensory system, a cyborg apparatus that tethered the life of the pigeon to the working of the bomb.

According to Skinner, the eventual failure of Project Pigeon was not due to a design flaw or incapacity on the part of the pigeons. Instead, it was his inability to convince the army generals of his dramatically different vision for how war might be fought. Skinner interpreted the final written rejection of Project Pigeon as alluding to the invention of the atomic bomb, a weapon whose sheer power would make the precision of Skinner's missile superfluous.[57] The world of warfare envisioned with the advent of the A-bomb, with its emphasis on the most troubling of human decision-making and operational chains of command, was diametrically opposed to Skinner's vision. He had been fundamentally *inspired* by watching the coordination of the flock of birds, seeing in their movement a new metaphor for the battlefield. Even though the pigeons' ability to fly ultimately had very little to do with their actual function within the bomb, as their wings were strapped to their sides inside the bomb, the bird's flight was replaced by the bomb's flight, guided now by the perceptual apparatus of a hungry pigeon, creating a kind of self-synchronizing arsenal of bombs. Skinner's "rendering" (in Shukin's use of the term) was not only the transformation of the pigeon's body into a guidance system but also the reimagining of the visage of a flock of birds as a novel form of war strategy in which weapons guided themselves and were responsive to their immediate surroundings.

Such a strategy meant relying on the behavior of birds as consistent weapons, as well as relying on the work of laboratory psychology to generate replicable scientific findings that could be applied in circumstances of life and death. Orienting animal laboratory research toward the production of weapons based on avian behavior required adapting the terms of psychology to the language of the military-industrial complex. As James Capshew writes in his account of the scientific history of Project Pigeon, Skinner and his researchers were initially unable to

FIGURE 13. Panel depicting Project Pigeon from a comic strip. *Toledo Blade*, Oct. 11, 1959. Copyright The Blade 1959. Used by permission.

convince even other scientific divisions of the validity of their findings, "eventually learning to articulate their work in engineering terms, as seen in the use of the metaphor of the bird as a machine." Both the success and the failure of Project Pigeon hinged on this "rhetorical ploy," as Capshew calls it, which described the pigeon as a dependable piece of equipment that could be trusted to operate on its own without oversight from a human commander.[58] As Skinner wrote: "We had begun to realize that a pigeon was more easily controlled than a physical scientist serving on a committee."[59]

Here, again, film was crucial—not in the actual implementation of Skinner's model of war but in its promotion, in Skinner's ability to sell the idea to the military brass. Skinner struggled to have Project Pigeon taken seriously. He described being all but laughed out of conference meetings on several occasions. Indeed, when the project was eventually declassified, it was the butt of many jokes by popular commentators. An example of this scorn can be seen in a 1959 cartoon for the *Toledo Blade* (fig. 13) in which a pigeon was depicted dressed as a pilot boasting to another pigeon in a black cocktail dress that "I'm a big missile man from U. of M." The humor is premised on the absurdity of the pigeon replacing the human pilot, the incongruity between the prestige and authority of the pilot's role and the animal body of the pigeon, the ludicrousness of a pigeon who would boast of his flights over a cocktail. Project Pigeon seemed laughable as long as the pigeons were seen as living substitutes for the decisions made by pilots, as we see in a different panel of the comic that depicts two pigeons inside the bomb debating whether or not they are heading in the right direction (fig. 14). As a device that was designed and installed into a machine, the pigeons could be seen as an efficient and cheap means to an end, but as decision-making actors, they became anthropomorphic caricatures of war strategists and bombardiers, placing the power of the US military into the hands of animals.

The frequent dismissive responses to Project Pigeon, crystallized by these comic strips, stand in utter contrast to the stark and brutal efficiency depicted

FIGURE 14. Panel depicting Project Pigeon from a comic strip. *Toledo Blade*, Oct. 11, 1959. Copyright The Blade 1959. Used by permission.

in the project's promotional films. Skinner's film had "good effect," as he repeatedly put it, helping to procure funding at several steps in the research's development.[60] Within the competitive field of military contracting, General Mills (which had initially sponsored Skinner's experiments) and Franklin Taylor (who took over the running of Project ORCON) used the footage of Skinner's research to market the weapon to possible investors. Heidi Holmstrom's blog entry "From War Dogs to Remote Controlled Monkeys" exemplifies one entry into the small subgenre of nontheatrical movies made to promote animal weaponry within the military.[61] Such films generally depict nonhuman organisms as integral parts of a modern military arsenal, a biodiversity of weapons, each contributing a unique body and behavior ready and available for every circumstance. Humans are shown on the periphery, installing and operating tech that will direct the movements of the war animal. Within this weaponized menagerie, the human viewers are instructed on the use of their animals, appraised of the development of new biotechnology, and encouraged to imagine a battlefield in which animal combatants swim, swarm, and scamper into the fray as proxies for human soldiers.

The scenes shot to promote Project ORCON picture the bodies of the pigeons as being capable of full integration into machine technology. Viewers are embedded in the highly technical space of the behavioral lab where the pigeon is conditioned to follow and peck certain shapes. The film begins with the installation of a headpiece on a pigeon in extreme close-up, its beak becoming a part of the instrument. The hands of the scientist cup and frame the head of the pigeon as a small metal prong is stuck to its forehead. Held between what appear to be two giant fingers, the pigeon's head is turned side to side, providing both a more complete image of the installed headpiece and a demonstration of the bird's malleability and compliance. The pigeon is subsequently shown performing in a series of simulations in which it displays its ability to target metallic objects that slide on rails behind an open screen. Viewed from behind, the construction of the film emphasizes the typewriter-like rapidity of the pigeon's head as it matches its movements

VIDEO 10. Film made to promote Project ORCON. Courtesy of the
B. F. Skinner Foundation.
DOI: https://doi.org/10.1525/luminos.145.10

to the automated back-and-forth of the target. Here, the pigeon's animality is depicted as a powerful rapid-response system capable of keeping time with the other moving mechanisms surrounding it.

The final two shots depict the training of the pigeons responding to Project ORCON's filmed simulations. These scenes repeatedly show the pigeon guiding the missile to a series of ships in silhouette. Each time a battleship veers from the center, the pigeon reorients the image by accurately pecking on the ship, shifting the picture's position on the circular screen to reframe the target. Shown in a magnified close-up, the film constructs a bomb's-eye view. This is a triumphant image for the power of merging animal with machine, placing viewers with the pigeon inside the bomb as we move closer and closer to the oncoming ship. Each shot cuts off just before impact, suggesting the final destruction of pigeon, bomb, and boat. The effect of these shots is one of brutal efficiency, in which the compliant, nearly automatic, responses of the pigeon continue to perform up until the last moment, at which point the image and the bird both disappear. And then, after briefly cutting to black, the next shot repeats the dive again. Here, the multiplication of similar shots evokes a flock of similar bombs, each inhabited by a small disposable kamikaze pilot who can dispassionately destroy itself and the enemy with expert accuracy. Revealing fairly little detail of the actual workings of the bomb, these final shots are more iconic than informative, prompting the audience to imagine a new form of bioweaponry and war.

While Project Pigeon was never realized as a military technology, we now inhabit a future where Skinner's living weapons are no longer entirely a "crackpot idea," a world in which the nature-culture of the battlefield is increasingly recognized and put to lethal use.[62] As we grapple to understand this present moment, it is instructive to look back at Skinner's failed project, envisioned while gazing out a train window, to transform a flock of birds into an arsenal. The two-pronged rendering of bodies and images of war animals continues today, as ecological models and animal physiologies are adopted to military means. Body armor made from spider silk, remote-controlled insect drones, bomb-detecting harbor seals, and mine-detecting dogs now populate our military armory.[63] Additionally, progress in artificial intelligence, robotics, and genetic engineering have accelerated the use of animal weaponry far beyond anything Skinner could have imagined. Even products of purely mechanical engineering now seem possessed by the ghosts of animal combatants, as the military depends increasingly on nonhuman proxies such as the BigDog and WildCat systems. And, again, optical technology has been essential for the creation of such weapons. By integrating the moving image with nonhuman response systems, we have become accustomed to thinking about our weapons as having a perspective, a point of view, and of being capable of responding to changing events on the ground as they occur. Caren Kaplan describes how military intelligence's conception of surveillance technology has recently shifted from "identifying fixed, precise locations to 'situational awareness' in relation to a 'field of motion.'"[64] Here, flexible, even lifelike, weaponry is being developed to respond to the movements of individual combatants as they populate urban and civilian areas rather than surveying the movements of armies. As the chief of the Network Science Division of the Army Research Laboratory, Alexander Kott, recently observed: "A variety of networked intelligent systems—things—will continue to proliferate on the battlefield, where they will operate with varying degrees of autonomy. Intelligent things will not be a rarity but a ubiquitous presence on the future battlefield."[65] These new developments realize Skinner's radical vision of warfare not as a contest of solely human soldiers but as an elaborate network of animals and machines that mobilize nonhuman bodies, movements, and perceptions.

The ethics of this shift have always been questionable. Skinner, for his part, wrote: "The ethical question of our right to convert a lower creature into an unwitting hero is a peacetime luxury. There were bigger questions to be answered in the late thirties."[66] In the face of the horrors of World War II, Skinner believed that the loss of pigeon lives was a small price to pay in a battle against enemies that had "promised, and eventually accomplished, the greatest mass murder in history."[67] But, in many respects, the distributed agencies of the battlefield precipitated by Project Pigeon, with their capacity for pinpoint accuracy and a low risk in human lives (for our side), have effectively erased the distinction between peacetime and wartime, creating an endless sense of urgency about the events of an increasingly

remote battlefield. As Brian Massumi describes it, the preemptive logic of the "war on terror" no longer relies on calls for direct intervention but rather rests "on the wings of a drone."[68] Realizing the promise of the pigeon bomb, drone warfare has allowed America to conduct a never-ending war of extrajudicial killings, without either a declaration of war by Congress or any real reckoning of American intervention abroad, fought by what Massumi calls the "Obama generation of high-tech, low-footprint pollinators of preemption."[69] The lingering ethical questions of who is responsible for these remote killings and what the effects are of such asymmetrical risk to human life stay with us today. The distributed agency of the pigeon bomb that so startled the US commanders during World War II has now become a reliable political and strategic tool in contemporary warfare, where the accountability and costs of war have been dispersed to swarming flocks of nonhuman actors. As we come to grips with the fact that there is no "peacetime" to look forward to, no respite when we can pause and debate these approaches, the ethical questions about our newly accepted nonhuman combatants cannot wait.

A Trip through the Senses

The Media Theory of Radical Behaviorism

In 1980, B. F. Skinner and his student Robert Epstein shot a baffling video as part of a series of experiments with pigeons titled "The Columban Simulation." The video's images provide no contextual information, making it entirely unclear what the audience is meant to learn from the featured experiment. Furthermore, the actions of the onscreen pigeon are patently absurd. It is shown in a small enclosure that contains two miniature props: a toy banana hung from the upper left of the enclosure and a tiny box on the bottom right. We watch the pigeon attempt to peck the toy banana, straining its neck upward but ultimately unable to reach it. After several failed attempts, it seems to suddenly notice the box. Looking back and forth between the box and the banana, the pigeon eventually pushes the box underneath the banana, and stands on it to finally peck the toy fruit. Why a pigeon might do this is unclear. What would a pigeon want with a banana, even a real one? Why would a pigeon not simply fly up to it? What, fundamentally, is motivating this pigeon to behave in such a strange way? Furthermore, what is motivating the scientists who decided to run this experiment? None of the answers to these questions are apparent in the video itself, inviting viewers to speculate. To fully answer them, we must look beyond the video to the disciplinary debates over celluloid specimens that fueled its creation.

This chapter focuses on Skinner's radical behaviorism and its intervention into the production and circulation of animal research films. In the following pages, I read Skinner's scientific publications as a form of film theory, arguing that one can identify a conceptualization of spectatorship and media within his treatises on the relationship between an organism and its environment. I reconstruct Skinner's media analysis, focusing in the first section on his transformative critique of idealism in the life sciences and then turning in the second section to his 1980 videos—including the one described above—which were made as reenactments

VIDEO 11. Video of the "Columban Simulation." Courtesy of the
B. F. Skinner Foundation.
DOI: https://doi.org/10.1525/luminos.145.11

of iconic research films from the history of the life sciences. We will see Skinner and his followers criticizing the scientific filmmaking practices described in the previous chapters, which had no place in Skinner's new behaviorist paradigm. My goal here is to demonstrate the sophisticated ways that scientific filmmakers engaged and continue to engage with the legacies of past practices, staking claims not only about the animals we see onscreen but also about the kinds of films that can and should be made to study them. Rather than reading scientific discourse as a monolith, this chapter illustrates how the sciences, like all academic disciplines, are shot through with discord, friction, and antagonism, attributes that often drive research as much as any particular common cause. To understand these divisions is to truly understand the stakes of individual research agendas operating within the broad umbrella of "science," the political implications of which will be further explored in the next chapter.

Since its inception film has been an essential site for these divisions, where the recording, analyzing, and distributing of scientific "facts" are contested by different parties, a process that involves varying theoretical models for understanding moving images. Scientific discourse surrounding "observation" and "objectivity" is hardly as naively realist as the straw men evoked by some. Lorraine Gaston and Peter Galison demonstrate how the question of how to objectively observe a phenomenon has been hotly debated throughout scientific history and continues to be within many disciplines.[1] These discussions necessarily include film. As Scott Curtis aptly argues, scientific uses of film have never been so simple as pointing

a camera at a subject but always required complex theoretical frameworks for understanding and explaining what film actually captures.[2] As a medium, film arose largely out of debates over how to create a verifiable and objective observer. Lisa Cartwright argues that film was initially produced to monitor and control living bodies in order to bypass the human observer entirely by directly incorporating the experimental subject's movements into the cinematic apparatus.[3] Yet from its earliest days, arguments raged over what the cinematic image actually recorded and what it left out or distorted.[4] These frameworks and disputes continued to shape subsequent uses of the medium, as well as how it was theorized. Inga Pollmann traces the influence of animal ethologist Jakob von Uexküll's theory of nonhuman *umwelts* on Walter Benjamin's theories of cinematic perception.[5] Similarly, Hannah Landecker argues that film theory at its inception was drawing directly from conversations held by cellular biologists regarding microcinematography and its revelation of previously invisible worlds of movement.[6] Landecker claims that the history of film theory and the history of film's scientific use may not be as distinct as they first seem. Behaviorism in particular had a strong influence on early film theorists such as Sergei Eisenstein, who is well known to have taken his ideas about biomechanical acting from Pavlov's research into conditioned reflexes.[7] The interplay between scientific practice and film theory has historically been a rich one, playing an essential role for both scientists and film theorists. Just as artists produce justifications for their own practice, each instance of scientific filmmaking requires its own theoretical armature, where what we see on the screen is interpreted as valid objective findings by a discursive framework outside the film itself.

Or, at least that is usually the case. With Skinner, we find a truly remarkable example from this history, in which scientific moving images were produced not to learn anything about the subjects filmed but rather to critique the practice of using cinema as a scientific tool at all. Through a sophisticated deployment of reenactment and parody, Skinner engaged in a highly self-referential style of production, explicitly using the moving image medium to critique itself. As we will see, he hoped to sow fundamental doubts about how film had been and continued to be used as evidence by other animal behavior researchers, especially primatologists. Skinner's videos highlight the essential role that interaction and opposition among research agendas play in the discursive networks that determine the accepted meaning of a scientific film. As different evidentiary frameworks jockey for control over the definition of accurate research, cinematic representations are drawn into the fray, becoming a site where turf wars are waged over the valid interpretation of the image. Scientist filmmakers are therefore tackling not only epistemic problems when they make a film but also strategic and political ones, self-consciously positioning their work within histories of scientific visualization and against differing models of observation and research. For Skinner and his peers, these debates focused on the image of the animal onscreen and how film or video

establishes what they saw as a spurious emotional connection between scientific observers and their animal subjects. Spectators' unyielding desire to identify with characters onscreen is highlighted in the Columban Simulation, where even scientific audiences were prompted to see the pigeon's desire, frustration, and rational thinking, even as such a reading was blatantly absurd. Skinner and his colleagues crafted these moving images as self-negating attempts to rewrite the history of scientific filmmaking as a form of folly rather than as an ever-growing expansion of objective observation and control. This chapter provides a close analysis of this intervention, adding the ideas of one of the most influential scientists of the twentieth century to the history of media studies.

THE SPECTATOR IN THE SKINNER BOX: ORGANISMS AND THEIR ENVIRONMENT

In 1958, the *Bell Science* series (1956–64) released *Gateway to the Mind* (Owen Crump), a televised teaching film dedicated to the five senses. Originally broadcast on NBC, this film had a second life as a classroom tool, where it was used to instruct students about the operations of the human sensorium and to encourage them to pursue careers in science and technology by showing the field's illustrious history.[8] Produced under the guidance of a team of esteemed scientists, including Princeton psychologist Hadley Cantril, Harvard biologist George Wald, and UCLA zoologist Frederick Crescitelli, *Gateway to the Mind* tells "the story of man's knowledge about his senses and their function as the channels through which all awareness of the external world is passed to the brain."[9] Drawing from the long-standing visual culture of physiology, the program pays homage to the history of scientific moving images by including prominent examples from this history, such as Etienne Jules Marey's chronophotographs of a cat being dropped on its back, microcinematographic footage of single-celled amebae, and a series of optical illusions created to test vision, which are reminiscent of Münsterberg's psychotechnology (discussed in chapter 1). Cumulatively, these examples are tied together to create a narrative of expanding scientific vision, stretching all the way back to Aristotle, in which scientific history and the development of the moving image are combined. In the story laid out by the program, the operations of the senses are increasingly equated to the operations of audiovisual and communications technologies, which are made to mirror each other through the show's various illustrations. Each featured scientist describes experience itself as a process of mediation, in which objects "out there" are transformed into images, wavelengths, vibrations, and electronic impulses "in here," inside our minds. Here, the brain is akin to a TV control center, the nervous system works like telephone wires, the eye operates as a camera, and so on. Through reenactment, animation, allusion, and narration, *Gateway to the Mind* tells a story of sense-as-spectacle, imagining a deep metonymy between experience and spectatorship, human senses and audiovisual devices.

VIDEO 12. Clip from *Gateway to the Mind* (Owen Crump, 1958).
DOI: https://doi.org/10.1525/luminos.145.12

A determined detractor from this approach was B. F. Skinner, who begins a 1963 *Science* retrospective of behaviorism, "Behaviorism at Fifty," with a systematic critique of *Gateway to the Mind* and its imagery.[10] "Behaviorism at Fifty" was a manifesto of sorts, a re-visioning of Watson's groundbreaking 1913 article "Psychology as the Behaviorist Views It," taking into account subsequent developments in the field.[11] Skinner warns that "mentalistic" theories, which posit a separate world of the mind distinct from the world of matter, are still running rampant in psychology and physiology, existing as the vestiges of what he calls a "primitive animism" from humanity's past. According to Skinner, mentalism's most pernicious influence is to be found in the metaphor of the "little man," where behaviors are attributed to the decisions of internal agents—our inner selves—existing somewhere within the brain, which evaluate and act on input provided by the senses. *Gateway to the Mind* exemplified this persistent myth for Skinner, updating it to be distributed to a modern audience through the mass medium of television. He argues that the program's depiction of a literal "little man" inside our heads, watching a show put on by the media of our senses, is ultimately unscientific, relegating the root causes of behavior to a metaphysical internal self whose actions are left unexplained. Such a theory of a nonmaterial mental world was antithetical to Skinner's developing scientific outlook, which came to be called "radical behaviorism."

Throughout his career, Skinner developed not only a massive body of experimental research but also an overarching system for describing behavior. Over the

course of several books and innumerable articles, he articulated a vision of psychology based on what he called "operant conditioning." In these writings, Skinner defines operant conditioning as the accumulation of behavioral reinforcement over time, which he argues leads to an increased probability that certain types of behavior will be repeated by an organism under similar circumstances in the future.[12] In the lab, this could be seen in the activities of animals over time, which were trained to behave in complex, often counterintuitive ways—such as the pigeons guiding a missile discussed in the previous chapter—by being repeatedly rewarded for such behavior. In Skinner's account, humans are also the product of such conditioning, through systems of rewards and punishments existing in a given environment, culture, or society. Whatever the circumstances, he saw conditioning as a universal property of any organism's behavior, and he argued that this behavior is simply an expression of the accumulated consequences from past actions, not evidence of decisions made by a singular internal intellect.

The notion that there is a "little man" who is separate from antecedent causes—a "center" from which behavior emanates—is, of course, antithetical to his approach. Skinner believed that this was a vestige of Cartesian dualism that continued to lead many of his peers in experimental psychology astray.[13] One of his most mocked projects was the creation of an alternative scientific vocabulary that refused any reference to an inner self's cognition, feelings, or desires, which led one commentator in the *New York Times* to describe his writing as "syntactically glutinous theoretical statements."[14] This critique of "mentalism" went well beyond questions of scientific practice. For Skinner, the anthropocentric theory of "autonomous man" was everywhere: "an important figure in political science, law, religion, economics, anthropology, sociology, psychotherapy, philosophy, ethics, history, education, child care, linguistics, architecture, city planning, and family life."[15] Wherever he turned, Skinner found a creeping dualism that mystified behavior rather than explaining it.

At the heart of his critique of mentalism was a theory of media. In "Behaviorism at Fifty," Skinner argued that mentalism is propped up by what he calls "an unfortunate metaphor":

> The Greeks could not explain how a man could have knowledge of something with which he was not in immediate contact. How could he know an object on the other side of the room, for example? Did he reach out and touch it with some sort of invisible probe? Or did he never actually come into contact with the object at all but only with a copy of it inside his body? Plato supported the copy theory with his metaphor of the cave. Perhaps a man never sees the real world at all but only shadows of it on the wall of the cave in which he is imprisoned. (The "shadows" may well have been the much more accurate copies of the outside world in a camera obscura. Did Plato know of a cave at the entrance of which a happy superposition of objects admitted only the thin pencils of light needed for a camera obscura?) Copies of the real world projected into the body could compose the experience which a man directly knows.

A similar theory could also explain how one can see objects which are "not really there," as in hallucinations, after-images, and memories. Neither explanation is, of course, satisfactory.[16]

In this paragraph, Skinner places the theories of the body-as-camera-obscura, which Jonathan Crary so clearly outlines, as part of an ongoing fallacy of mediation stretching back to the Greeks and persisting into his own televisual age.[17] Writing in 1963, well before film theorists would make this connection, Skinner was already drawing comparisons between Plato's cave, the camera obscura, optical illusions, and even cinema (through his reference to "after-images"). Yet he also describes these connections as fundamental to a misguided Western ideology of the autonomous self and therefore worth directly repudiating through his own experimental research. For Skinner, Cartesian dualism, mentalism, and so forth require the metaphorical comparisons of the self-as-spectator and the body-as-media. One can therefore read his own scientific research as an alternative theory of mediation and subjectivity.

Skinner's radical behaviorism offers a completely different approach to understanding the relationship between an organism (human or otherwise) and its environment, one that suggests a different reading of media spectatorship. He does not deny the *existence* of what might be called "internal conditions" such as feelings, thoughts, memories, and the like. Rather, what he objects to is the idea that these mental states are the root causes of behavior—that is, that we act because we decide to do so, either through rational cognition or particularly evocative desires. According to Skinner, mental states are better defined as "way stations" amid the ongoing interaction between an environment and an organism, stretching back to its birth. He argues that when psychologists consider a mental state or reasoning process as an internal cause for a particular behavior, they are ignoring how that mental state was produced by the organism's interactions with its surroundings in the past. Rather than the property of a free-floating intellect, Skinner thus posits internal experience as simply one complex behavior among many, which can be explained with the same principles that guide the others and which is developed through many successive events. As he repeatedly argues, subjectivity is simply the experience of watching oneself behave from the inside—not a cause of a behavior but its effect.

Skinner's scientific practice implies a theory of film spectatorship as well. Similar to the apparatus theory of Jean-Louis Baudry or the semiotic film theory of Christian Metz, Skinner's operant conditioning emphasizes circumstances and behavior over the internal experiences of an organism.[18] Like the approaches of Baudry and Metz, this approach indicates that the crucial aspect of film is its capacity to condition viewers as receivers of material, which will affect their behavior in the future.[19] Indeed, just as his radical behaviorism rejects a vision of the senses as media for an ephemeral internal self, it also rejects the framework of cinematic

spectatorship as an act of immersion in the realities of a profilmic world. Rather, Skinnerian spectatorship would be the product of environmental control and not as an expansion of the human sensorium. Like apparatus film theory, here the key to understanding spectatorship lies in the environment of the screening space and how its architecture elicits a behavior from human observers. In the eyes of the radical behaviorist, the arrangement of the literal screening space—such as a classroom—determines the film's effect on an audience, as well as its broader role within a discursive symbolic realm of signs, customs, and language.

How Skinner might see the operations of spectatorship can be gleaned from his writing on dreams. Contrary to Freud, Skinner claims that dreams are not produced by recalling past images that are stored in the body but rather a repetition of past behaviors—movements of the iris, microphysiological muscle contractions, and so forth—which produce hallucinatory visions.[20] In his account, dreaming is an activity that organisms engage in under certain circumstances, not the presentation of inexplicable desires produced by a hidden unconscious subject. Skinner argues that these dynamics apply generally to all sensory experiences, including visual imagery, language, and symbols. Describing a human's response to verbal and visual symbols, Skinner writes: "The individual acquires language from society, but the reinforcing action of the verbal community continues to play an important role in maintaining the specific relations between responses and stimuli which are essential to the proper functioning of verbal behavior."[21] In this iteration of the organism, the images and sounds of a dream, like those of language or film, do not function primarily as references to a lived or profilmic past but rather are the means of prompting and influencing the behavior of the dreamer/spectator in the present. To understand the experience of spectatorship, one must understand the circumstances that produce this behavior rather than the referents of a film or language.

The practical implications of this theory of spectatorship are more fully articulated in his engagement with film as an educational technology. As we saw in chapter 7, midcentury behaviorists were extensively involved in producing, researching, and implementing audiovisual material in the classroom. But in his writing, Skinner habitually objects to using teaching films, criticizing the pedagogical model of spectatorship proposed by the likes of Mark A. May, Neal E. Miller, and C. R. Carpenter. He argues that valuable interactions between teachers and students would be erased from the classroom if films became the primary means of instruction. As he wrote on the topic: "There is a real danger that [teacher-student interactions] will be wholly obscured if use of equipment designed simply to *present* material becomes wide spread."[22] Here, the key for understanding the effects of films on audiences is not in the *content* of the film itself, as it was for Miller and his collaborators—such as in the choice of certain types of narration, the use of point-of-view shots, and so forth—but rather in the behavior of the spectators while watching the film: their stillness, their passivity, and their lack of

control. Importantly, Skinner's critique was not primarily directed against mechanizing the classroom—indeed, one of his most famous inventions was the "teaching machine," which quizzed students on a variety of topics and automatically gave them feedback in real time—but instead was an objection to the material design of the cinematic apparatus, whose very arrangement was meant to enthrall viewers but not actively engage them. In his eyes, film creates spectators, producing the behaviors of immobility, receptivity, and silence rather than communicating information or knowledge through what it presents onscreen.

Skinner's preferred method of intervention into behavior was through his modular experimental apparatus, popularly referred to as the "Skinner box," the design of which illustrates his ambivalence to cinematic and photographic evidence. Simply put, the Skinner box is an enclosure that includes one or more apparatuses, such as wheels, levers, or buttons, that automatically provide a reward when operated in a particular way. Given enough time in a Skinner box, test animals dramatically changed their behavior to adapt to these surroundings.[23] This piece of equipment set the standard for experiments with animals and continues to do so. In its earliest iteration, the Skinner box was created to solve "a difficulty in measurement" surrounding behavior.[24] At the time, Skinner was attempting to identify and isolate the variables determining how a rodent eats its food from a mass of possible details, each of which could be a factor. His solution was to strip away or control for as many of these variables as possible. By reducing the environment of the animal down to a defined number of apparatuses that would reward (or "reinforce") only specified types of behavior, Skinner believed that experimentalists could set parameters and thereby isolate the particular behavior they hoped to study. Pursuantly, he connected his Skinner boxes to a kymograph, which draws a line charting the test animal's behavior over time, such as the frequency at which a rat pulls a lever for food.[25] Like the Skinner box itself, the kymograph stripped away distracting variables, operating in "complete independence of experimental conditions" to provide a "description of a process."[26] For him, the Skinner box was a crucial tool because it isolated the important quantitative components of a single behavior, which were thus separated from the influence of factors other than those chosen by the experimenter.

In many ways, a cinematic recording is the antithesis of the clean, simple line of the kymograph. Skinner acknowledged film's impressive capacity to represent animal behavior in detail, contrasting this with the scientific measurements provided by his Skinner box. According to him, film and photography, which he describes as "representations," could reproduce the details of a behavior but could not properly explain it. He writes: "No matter how complete, a representation is only the beginning of science." According to him, representations convey details that are "unnecessary and even inconvenient" and cannot establish a relationship between the organism and the environment it depicts.[27] As in his writing on educational media, he consistently expresses a wariness of the medium's ability to

reveal scientific truths, instead emphasizing its capacity to mislead. Film provides too much information, failing to isolate the relevant variables in the ways that the Skinner box does. It was therefore of very little use in his lab.

At the same time, Skinner also criticizes film for providing too *little* information, focusing on the limits of the frame and film's running time, which encourage the spectator to adopt a "mentalist" reading of events onscreen. In his writing on radical behaviorism, Skinner describes mentalist approaches to behavior as the product of an insufficient temporal scope, focusing too heavily on an organism's motivations while the behavior is occurring and not enough on how those motivations were implanted in the organism earlier in its life. He preferred to emphasize the life history of the individual organism, as well as the evolutionary development of the species to which the organism belongs. Recounting his own intellectual genealogy, Skinner positions Charles Darwin as the earliest example of behaviorist thinking. Darwin's theory of evolution introduces the concept of *selection*, whereby anatomy and behavior are explained as the products of ongoing interactions with a broader environment. In Skinner's account, the selective process described by Darwin is then expanded by Freud's theory of the unconscious, in which an individual's past experiences determine present behavior.[28] Setting himself up as the heir of these insights, Skinner repeatedly emphasizes the need for larger frames of reference than those of the "mentalists," who look for root causes of behavior in the event itself. Even Pavlov, to whom Skinner acknowledges his work is greatly indebted, was too restricted in his focus on the conditioned reflex, where a simple stimulus causes a singular response.[29] From radical behaviorism's perspective, the complex behaviors of human and nonhuman animals are the product of lifelong chains of conditioning and not just the result of a physiological effect caused by a single experiment. As Skinner wrote: "The environment not only triggered behavior, it selected it."[30]

Skinner did not believe that the process of selection over the life of an organism, not to mention the evolution of a species, could be translated onto film. Film primarily presents individual events, segments of time, which can easily be used to demonstrate a single experiment or series of experiments—such as the conditioned reflexes demonstrated in *Mechanics of the Brain*—but is less capable of depicting the cumulative effects of selected behavior over a day or a week, let alone a lifetime. Even within the expanded timeline of a feature film, there is rarely time enough to depict the extensive selection process for the kinds of complex behaviors and relationships that Skinner hoped to analyze and explain. Indeed, film, as it was being used in animal research, invited precisely the wrong approaches of isolation and projection, which Skinner was determinedly against. For Skinner, filmed experiments produce behavior as a cutout of the broader processes of operant conditioning, seeming to encapsulate this behavior in full detail even as it leaves out essential components. When presented in a screening, disconnected from the broader context, film represents the experiment as an isolated event,

inherently asking viewers to search for the causes of behavior within the wealth of detail provided by the footage and the frame. Even without the explicit commands to empathize with onscreen animals that we have already seen in the work of Yerkes, or the categorizing of certain shots as representing internal "drives" as we have seen with Miller, scientific uses of film for the purposes of documentation fundamentally miss many of the key factors to operant conditioning that radical behaviorism emphasizes. As Skinner wrote in a 1972 letter to the BBC responding to a request for films of his research: "An operant laboratory is not very photogenic."[31]

OWNING THE EVIDENCE: SKINNER'S REENACTMENT OF SCIENTIFIC FILM HISTORY

Skinner never wrote a treatise directly connecting his theory of radical behaviorism to a critique of the scientific uses of media, but the videos that he and his students produced of their pigeon experiments in 1980 do *perform* this critique. In the lab, he rarely used film or video because it was not standard practice to regularly record their experiments. But, in a remarkable set of videos made to illustrate their work, Skinner and his student Robert Epstein reenacted famous experiments from the history of animal research, particularly primatology, in order to disassemble their findings. As a form of scientific media criticism through practice, these videos deconstruct the very medium of the moving image itself as it had been and continued to be deployed in animal studies. As such, they created a unique onscreen animal image, whose ironic presence was meant to highlight the contradictions in the medium rather than reveal anything in particular about the animal in question.

Between 1913 and 1917 the German psychologist Wolfgang Köhler shot six reels of film depicting his experiments into ape cognition at his Anthropoid Station in Tenerife, Spain. In his 1925 book, *The Mentality of Apes*, Köhler argues that his films demonstrate apes' capacity for insight and intelligence, hitherto considered unique to humans.[32] Köhler was a contemporary of Robert Yerkes, and their work has been broadly compared, both confirming the "ideational" capacity of the higher apes.[33] As such, much of Skinner's critique of Köhler and his films can be extended as a critique of the Yerkes films discussed in part 1 of this book. Indeed, Köhler's films were very similar to Yerkes's, consisting of several uninterrupted shots in which primates seem to demonstrate a variety of behaviors connoting complex cognition: using and building tools, problem solving, and appearing to be suddenly inspired. A particularly well-remembered scene features apes stacking boxes and then using a stick to knock down a banana hung from the top of their cage (fig. 15). The significance of these scenes was argued over by psychologists well into the 1980s.

The shifting terms of the debate over the meaning of these films throughout the decades demonstrate a major change in the use of animal research films in

FIGURE 15. Frame from Köhler's film on primate behavior that was reproduced in his book *The Mentality of Apes*.

psychology, a change initiated in large part by Skinner's radical behaviorism. Köhler, like Yerkes, had viewed his films as irrefutable proof of primate ideational capacity—clearly demonstrating their intelligence by documenting their gestures and expressions. An intelligent spectator could thereby intuit the invisible mind behind the animal, reconstructing affective or cognitive states through a close observation facilitated by the film. But, as theories of behavior changed, so, too, did the films' meanings. Skinner and Robert Epstein, among others, questioned the lack of context in Köhler's account, which isolated the behavior of the apes from their life before being recorded.[34] By replacing apes with pigeons in "Columban Simulation," they attempted to demonstrate how such isolation might lead to consistent misapprehension of animal behavior.

I began this chapter with the description of one of these reenactments of Köhler's films, where a pigeon, like the apes in the original, seems to rationally choose to push a box underneath a toy banana, jump onto the box, and peck the banana. Despite the absurdity of the video and the bird's actions in it, the pigeon's performance of the behavior of rational problem-solving is accurate down to the smallest detail, first reaching for the banana without the box, then looking back and forth between the box and the banana, and finally pushing the box under the banana so that it can clamber on top of it and finally reach its target. Presented on

its own, the video functions as a kind of hoax or parody, representing a scene of animal behavior that has been staged to *look like* rational thinking but is also clearly irrational. This contradiction was precisely the point for Skinner and Epstein. In doing so, the video was meant to point to all the preparation and training outside the frame of the video image itself—all the elements of operant conditioning that eluded the moving image—thereby showing the misleading ways that film and video isolate observations of animals. In his written account of these experiments for *Nature Magazine*, Epstein highlights the videos' ability to invite projection: "people viewing the tapes have liberally attributed a wide range of human emotions and thoughts to the pigeons. A surprisingly common comment was, 'Did the pigeon really do that?'"[35] This statement makes clear that the true test subjects of the Columban Simulation videos are not the pigeons but the viewers. The screening room doubles as a Skinner box, testing the behavior of its human inhabitants as they watch the video.

The banana experiment is just one of many recorded pigeon experiments made by Skinner and Epstein, which reenact a wide array of research coming out of primatology that claim to demonstrate, among other things, self-awareness, the use of memoranda, and symbolic communication. The other videos show pigeons relaying signals to one another by controlling lights in each other's Skinner box, as well as seeming to identify themselves in a mirror. In the published account of this work, Epstein states that these simulations were made as a brand of critical commentary on their original source material, describing the Columban Simulation as a means of questioning the primatologists' "interpretation of their results in theoretical papers, but we spare ourselves the thousand words with one picture."[36] This imagery was meant to broadly, quickly, and dramatically illustrate the anthropomorphic projection of nonbehaviorist approaches to studying animals, by short-circuiting the experience of spectatorship that the moving image normally creates in scientific films.

Importantly, for their overall project, Skinner and Epstein's purpose in creating these cinematic simulations went beyond highlighting the moving image's ability to mislead, intending instead to also demonstrate how intuiting internal states under *any* circumstance, whether with a human or an animal subject, might be equally suspect. Here, the choice of the word *simulation* in the title "Columban Simulation," is an important one. As Epstein was careful to point out: "our simulations are models of human behavior; we are not simply mimicking it."[37] Indeed, the pigeons had never been trained to do exactly what we see them do onscreen. They were trained to stand on boxes, to move and push boxes, and to peck bananas but never together in a single sequence. As such, one could arguably still call the pigeon's performance "inspiration" or "creativity," yet few scientists or other spectators were willing to go this far. The point was not that the pigeon had faked the behavior of a human or a chimpanzee but rather that it has been led to behave as they do and that in order to understand this behavior, one must know

the full story leading up to the creation of the video itself. Environment, circumstance, and history could create "inventive," "self-aware" pigeons, if viewers were willing to call them such. Consequently, the Columban Simulation was not exactly a critique of anthropomorphism in the sense we normally think of it. For Epstein and Skinner, the behavior of the pigeon *is* fundamentally similar to that of humans or chimpanzees, and the error made by spectators is not that they falsely intuit motives to pigeons but that they do so for humans and chimpanzees as well. These "simulations" therefore use the pigeon to estrange viewers from acts that might otherwise seem recognizable and natural in chimps and humans, while the video's runtime and frame reenacts the limits of the mentalist approach to behavior. Ultimately, just as radical behaviorism searches for causes beyond the timeframe of the individual experiment and beyond the borders of the individual subject, the Columban Simulation pushes spectators to find meaning beyond the video frame and the actions of the onscreen animal actor.

As long as the body is conceived of as a media device, there has been the possibility of some form of playback, in which one spectator can view the experiences of another through the spectator's own senses. This form of "body snatching"— that is, of inhabiting the subject position of another through an imaginative or technological leap—had long been the theoretical framework through which comparative psychology understood its use of the moving image.[38] Films such as those made by Yerkes and Köhler were meant to capture and preserve the mental states of their primate subjects for future scientific audiences to experience, a concrete and objective means of facilitating empathy. The visage of animals in movement was thought to contain a hidden truth that the film could capture and reveal, placing the human observer face-to-face with experiences of nonhuman life. But for Skinner, these conceptions relied on fundamental myths about the existence of an internal, transcendent self, whose contours were supposedly revealed in the choices and actions of an organism onscreen. For him, the arrangement of the cinematic apparatus, with its tendency to obfuscate any context beyond what it pictures, falsely located meaning within the content of the frame and within the bodies featured there. Against the interpretation presented by these films, Skinner argues that meaning was the product of operations offscreen: the hidden labor that produces the image, the lasting effects of events from the past, and the forgotten context of the screening itself. Throughout his career, he approached film not as a primary act of sympathy, a form of mental contact between a human mind in the present and an animal mind in the past, but rather as another instance of conditioning. What Skinner saw when he went to the movies was not a world represented onscreen but a room full of human organisms that had been trained by past experience to sit silently and watch flickering lights projected in front of them. Out of this critique sprang his worldview, one that implied its own philosophy of life, its own political project, and its own visions of the future, as we will see in the next chapter.

Utopian Behavior

The Televisual Figure of a Pigeon That Hailed the Future

In 1971, Dutch television broadcast a debate between Michel Foucault and Noam Chomsky titled *Human Nature: Justice versus Power*, which has since become one of the twentieth century's most well-known examples of public scholarship. In the debate, Foucault and Chomsky contrast their views on the definition of *human nature* and the political implications of these definitions. Both men are dynamic onscreen presences. Chomsky's nebbishy attire and faltering suppositions seem a perfect medium for his tentatively idealist stance on the fundamental creativity of human nature, while Foucault at times seems to be a nonhuman predator preparing to pounce as he waits to interject with deconstructions of Chomsky's claims. Students filling an auditorium, standing in for the multitudes watching at home, are shown hanging on their every word, as Chomsky and Foucault spar for the cameras at center stage. Peter Wilkin observed in 1999 that these were "the major intellectual-activist figures of the past thirty years," and their presence together on television was a historic occurrence.[1] The fact that both would eventually become crucial theorists for understanding television and mass media—Chomsky through his coauthored book *Manufacturing Consent: The Political Economy of the Mass Media*, Foucault through his description of the panopticon as a means of control—highlights the contradictions of this extraordinary moment, in which two of television's most important critics were featured on its screen.[2]

The implications of Foucault's and Chomsky's theories for cultural studies have been endlessly analyzed by media scholars since then. But one could argue that there is a third palpable yet absent character onstage with them as well, someone who was just as influential at the time, if not more so: B. F. Skinner. Skinner's ideas, language, and framework for understanding behavior provides an ever-present background throughout the program, even though his name is never uttered.[3] In response to the very first question, Chomsky begins by describing the difficulty

of studying the human "organism's" acquisition of the "behavior" of language and speech, rearticulating his famous critique of Skinner's book *Verbal Behavior*. Chomsky's claim throughout the program that humanity is uniquely defined by a creative drive is an extrapolation of this critique, which grounds his entire theoretical platform. Foucault, for his part, acknowledges the strategic validity of Chomsky's fight against "linguistic behaviorism" but argues that human nature is not a valid scientific concept but a way of delineating relationships and borders between disciplines. Like Skinner, Foucault argues that Chomsky's definition of human nature, on which Chomsky bases his revolutionary program for society, is in fact a reflection of his own historical biases, not a universal truth. Between Chomsky's affirmation of human nature and desire for utopian politics and Foucault's rejection of both lies Skinner, whose rejection of human nature and embrace of utopian politics was concurrently roiling the public sphere.

This chapter focuses on the many instances in which Skinner was actually onscreen, as he attempted to use television to propagate the political and philosophical program he derived from his animal experiments. As such, it is an attempt to write Skinner back into the story of media studies and television history, from which he has been mostly forgotten or ignored. Skinner advocated for what he called "psychological science fiction," in which research into animal behavior was to be used to comment on society as a whole, guiding it to a better future.[4] Practicing this approach, he elicited a broad-ranging conversation about the social implications of his work, becoming one of the most influential and polarizing thinkers of the twentieth century. His television appearances were a crucial part of this "psychological science fiction," which, like conventional science fiction, opened up a space for scientific topics to be discussed and debated by lay audiences and elite specialists alike.

At the heart of this project was the televisual image of the pigeon inside the Skinner box, which Skinner framed as hailing a utopian future but others saw as forecasting a dystopian, even fascist, turn in science-led policy. Belying the quotidian nature of many of the talk shows and popular science programs on which Skinner appeared, television was a space where important conversations about the role of science in shaping human society took place throughout the late 1950s, 1960s, and 1970s. It was also an essential tool for enacting this control over society, a space that was being theorized as a means for deploying the behavioral conditioning advocated by Skinner. I argue that Skinner's TV appearances attest to a robust national debate about the complex role of televisual specimens in producing institutional visions of future governance. The debates drew on national anxieties about the rising status of television itself as a means of influencing popular opinion. The first section of the chapter focuses on the public controversy surrounding Skinner's political project and the contested role of pigeons within this debate, while the second section turns to how this debate made its way onto television, leading to a visual rearticulation of the political potential of Skinner's

experiments. I conclude that we are still litigating the central tenets of this debate, even as Skinner and his pigeons have long since faded in prominence.

Skinner is a fascinating figure for thinking about television, especially publicly funded television, which frequently featured him in its foundational period of the late 1950s, 1960s, and 1970s. In the controversies surrounding his work, one sees a refraction of the debates over TV's effects on viewer behavior. Just as Skinner was contradictorily viewed as both an advocate for a more just society and a potential authoritarian, the mandate of public broadcasting was also read as either fostering democratic debate or exercising control over public opinion. At the heart of these contradictions lies an uneasy relationship between the "public" of public television and the "mass" in mass media, which both Skinner and government-funded broadcasting sought to shape, guide, and control. As Laurie Ouellette writes, "Across policy, institutional, and cultural contexts, public television was envisioned *for* the people, not *by* the people, because its democratic potential was perpetually contingent on their transformation as subjects."[5] Similarly, Skinner was committed to a world without government, police, or other punitive or elite authorities, yet he believed that such a society could only be created through behavioral engineering that would utterly reshape human existence. Democracy in both instances was a program of uplift, which required the intervention of specialists to convert the masses into worthy citizens.

Alternately, Skinner's articulation of operant conditioning contrasted with the ruling Cold War logic of "soft power" in the United States, on which much of public television was premised during this period. Anna McCarthy describes public broadcasting being shaped in "a time when democratic nation building rested on the disavowal of the state as a source of direct political power." Television offered an avenue for exercising "liberal rule" over the shaping of an individual's thoughts and attitudes within an ostensibly free society.[6] Indeed, this was at the heart of Chomsky's critique of mass media, which he argues works to "manufacture consent." McCarthy writes that television helped develop "a common language of governance in which *freedom*, surely the period's most frequently used abstract noun, was a point of co-articulation for a host of otherwise discrepant agendas."[7] Within the heterodox and contested power structure of the American government, she argues that TV offered a common platform for exerting influence while still championing the value of freedom. Yet Skinner articulated over and over again the limits of "freedom" as a concept and resisted the vocabulary of individual sovereignty on which Cold War American citizenship models were based. His work highlighted and revealed the powerful effects of social structures to control individuals beyond direct oppression and violence, even as he was championing the use of this nonaversive form of power. Within networks that were from the beginning fraught with questions of top-down elitism and manipulation, Skinner's frank description of behavior modification through design was not entirely welcome, even as his own position on the issue of social control often mirrored

the backroom discussions of sponsors and programmers in public broadcasting. Ultimately, his ideas were implicated in the ongoing debates about the role of TV in a highly mediated society. In fact, Skinner was compared with Marshall McLuhan at the time, described by one commentator as fully embracing the elements of McLuhan's theories that others found ominous or dehumanizing.[8]

Within this context, the Skinner box offers a further refracted image of the power dynamics of telecommunications networks and the media hardware of the television set. As David Joselit argues, the television set created a feedback loop between individual viewers and corporate or governmental bodies, in which messages were sent to viewers through the screen and information about the spectators' viewing patterns were sent back through the network.[9] Here, the media ecosystem established by television creates a system of control by regulating the feedback loop, allowing advertisers and governing agencies to adapt their messages to viewer behaviors, which in turn are more likely to be affected by these messages. These dynamics mirror those of the Skinner box, raising many of the same problems of exercising power over unwitting subjects.[10] As we saw in the previous chapter, the Skinner box was designed to transform the unwieldy behavior of animals into an empirical subject that could be controlled by isolating the stimulus within its enclosed setting and providing data on the effects of that stimulus over time. Skinner articulated this as a form of dispersed control in which he responded to his pigeons' behavior and adapted to them, claiming that the pigeon had as much effect on the outcomes of the experiments as he did, but for many of his critics the overwhelming power differential between Skinner and his test subjects clearly posed startling ethical problems.

And let us not forget the pigeons, which, as we will see, were crucial to how the public considered the political ramifications of Skinner's work, both in print and on television. Throughout the 1950s, 1960s, and 1970s, Skinner ran televised demonstrations of his theories with his pigeons. In lectures, popular science programs, nightly talk shows, and other televisual venues, these pigeons had their own unique role on the small screen and directly influenced the questions of governance, media, and control revolving around radical behaviorism at the time. These were political signs, made to be transmitted to a national and international audience. Brett Mills positions television animal imagery generally as part of the medium's historic role in addressing the citizens of an "imagined community" through local or national broadcasting.[11] He argues that within this context, animal images should be understood as negotiating the status of nonhuman life in the body politic, whether as property, sentient beings, or (potentially) contributors. Skinner meant for his televised experiments with pigeons to serve as concrete evidence for the efficiency and morality of his overarching theories. As much as they were intended to depict science experiments, his demonstrations of animal behavior for TV cameras were also a type of political fable or parable, alluding to broader concerns over the question of control in a televisual culture. Like the

virtual animals described by Jody Berland, the image of these pigeons mediated between contradictory forces within the United States and its media ecosystem during the Cold War, seeming to embody both the aspirations of soft power and its threats to democracy.[12] Utopian liberation and dystopian fascism were both superimposed meanings atop the pigeon's image, each suggesting its own reading of Skinner's concept of operant conditioning and the role of television in America.

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UTOPIAN CONTROLS:
SKINNER'S POLITICAL PROGRAM

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In the B. F. Skinner collection at the Harvard University Library, there are hundreds, if not thousands, of handwritten letters to Skinner, stored for posterity. Composed by a broad cross-section of society, including laborers, teenagers, stay-at-home moms, and others, they all speak to a similar longing for a different world. Inspired by his theories, many, many people were moved to personally write to Skinner and ask his advice for improving or escaping their lives, which seemed to trap and contain them. As one first-year student at the University of Oakland wrote: "All of my life I have been searching for that something which would make me feel real, make me feel whole. From facts noted in your book, I have come to a sort of partial conclusion that a Walden Two would give me the chance to find myself."[13] Questions and speculation about communal living, about behaviorism's prescription for the good life, about the means by which alternative societies could be established fill the pages of these letters. Taken together, these letters speak to the broad public desire for a dramatically new society that radical behaviorism, and B. F. Skinner in particular, was able to evoke.

Skinner's most immediate description of his political aspirations was in his 1948 novel *Walden Two*.[14] As an entry into utopian fiction, the titular society of *Walden Two* is similar to other ideal societies from the history of speculative fiction, such as those of Edward Bellamy in *Looking Backwards* or Thomas More in *Utopia*.[15] Skinner's book describes a small commune governed entirely by the principles of behavioral engineering, which have altered every aspect of daily life. Among other changes, children are raised communally, people work significantly less each week, dirty or unpleasant jobs pay the most, and private property has been generally abolished. All careers are open to both men and women, and anyone can switch between vocations at a whim. There is no elected government in *Walden Two* but rather a board of fixed-term "planners"—each of whom oversees and specializes in a specific segment of production.

As its name suggests, Skinner saw *Walden Two* as the product of a particularly American form of political thought. His utopia is as much a paean for America's "stammering century," and its pastoral experiments in communal living, as it is a vision of an uncertain future.[16] As a portrait of society, *Walden Two* embraces many of the same culturally conservative tenants that defined earlier "back-to-nature"

movements, including a commitment to heterosexual monogamy and drug-free living, which makes the later embrace of it by 1960s and 1970s countercultures all the more surprising. Still, despite often looking backward, there are aspects of the book that adopt some truly radical tenants. In a brief addendum to *Walden Two*, titled "News from Nowhere, 1984," Skinner himself situated his fictional commune as part of the legacy of nineteenth-century anarchism: "*Walden Two* is state ownership without a state. Its members are not employed because there is no employer. They come into direct contact with the world, as people did before there were governments, religions, or industries."[17] Relying on the writings of Karl Marx—with the caveat that Marx "was not a full-fledged behaviorist, alas"—Skinner argues that such a society would eliminate alienated labor through a rich variation in activities and the use of rewards rather than punishments to motivate prosocial behavior. At the heart of this utopian perspective is the idea that a society built on positive reinforcement will not only lead to happier individuals but also be more productive, stronger, and better able to survive in the long term.

Largely ignored during its original publication run in 1948, *Walden Two* unexpectedly resurfaced as a popular text in the late 1960s, generating heated discussion, enthusiasm, and several attempts to actually create the society depicted in its pages (most prominently with the Twin Oaks Community, which is still running in Louisa, Virginia).[18] Its resurgence was paired with a slew of polemics written by Skinner in the interim, all of which amounted to a sustained attack on the language, politics, and philosophy of liberal humanism. *Science and Human Behavior* (1951), *Verbal Behavior* (1957), *The Technology of Teaching* (1968), and, most controversially, *Beyond Freedom and Dignity* (1971), each expands the implications of Skinner's laboratory findings to argue that hallowed attributes of humanity such as creativity, insight, freedom, dignity, and morality are all the product of predictable interactions between individuals and their environment over time. In these works, Skinner claims that humans are fundamentally controlled by their surroundings, and he extols the engineering of their behavior through planned interventions into their lived spaces and social structures. He argues for the eradication of most forms of punishment, which he argues are inefficient and based on flawed notions of humans as free moral actors that he and other behaviorists have disproven in the lab. Skinner concludes that the liberal values of happiness, creativity, benevolence, and peacefulness could all be fostered through operant conditioning rather than being left up to the vagaries of chance, which is how he describes the libertarian and humanist models influencing most American society.

The backlash to Skinner was intense and came from all sides, bespeaking how out of step he was with prevailing doctrine. In his autobiography, Skinner recounts congressmen denouncing him on the floor of the House and Spiro Agnew giving a speech calling him fundamentally un-American.[19] Thousands of pages were dedicated to hashing out his ideas in the popular press at the time.[20] Accusations against Skinner were widespread and often withering. Some took a sardonic tone.

In 1972, journalist and editor Christopher Lehmann-Haupt sarcastically evoked counterculture figures like Timothy Leary to describe Skinner as the "high priest of behaviorism": "one tends to think of Professor Skinner as a distant cousin of Dr. Strangelove. His determination to view human beings as mindless machines, his experiments with mazes and other controlled environments, his suggestions that human society can be perfected through conditioning, his syntactically glutinous theoretical statements all militate, at least in the popular mind, to suggest a narrowness in the man, a certain lack of humanity."[21] These pieces were at times accompanied by inhuman caricatures of Skinner himself, depicted as one of his pigeon experimental subjects or as trapped within his own creation, the Skinner Box. Such illustrations and articles worked together to portray him as doddering, naive, blinkered, or simplistic in his comparisons between laboratory research and human society.

Other critics took his theories more seriously by raising questions of power and authority left unanswered by Skinner's utopian program. Echoing earlier critics of Pavlov, who connected his canine experiments to Stalinism, Skinner was often accused of totalitarian aspirations and an utter lack of empathy for other human beings.[22] As one detractor of his "repellent doctrines" wrote, "The actions of behaviorists in formulating their laws must be totally lacking in freedom and ethical value."[23] As part of this attack, a controversy from the 1940s over Skinner's alleged experiments on his own daughter with his "baby-tender" device—little more than an air-conditioned crib—resurfaced and was relitigated in the late 1960s and throughout the 1970s.[24] Getting straight to the heart of the debate, the sociologist Richard Sennett returned to *Walden Two*, writing: "This utopian program raises a terrible set of questions: Who makes decisions about what behavior will be praised and what behavior discouraged?"[25] Sennett observes that Skinner often substitutes his own parochial and subjective ideas of happiness and morality for universal goals that are meant to organize all society. These detractors did not so much see Skinner as naive but rather as a dangerous ideologue generating tools for a fascist society. Underlying this feverish critique was a commensurate thread of anxiety—that perhaps the society of control these authors so feared may already be in place in contemporary America and that without the armature of concepts like "freedom" and "individual dignity" this control would be laid bare. For them, Skinner was a dangerous thinker, not because he was clearly wrong but because he might be right.

Crucially, these discussions over the ethics of Skinner's work were not purely academic, as his behavioral programs were already being implemented in a wide variety of institutions, including juvenile detention facilities, schools, rehab venues, asylums, and prisons, among others. In these spaces, the ethical and political debates surrounding Skinner took on real-world consequences as his ideas were used as guiding principles for governing people's lives. In the end, Skinner's utopian goals, as he articulated them, were not as far removed from the ideals of

progressive humanism as his critics claimed: an abolition of punishment, jails, police, bosses, presidents, and so forth, all while retaining and naturalizing power, order, and control. The fact that he often drew from Rousseau when explicating his ideas points to his indebtedness to the history of Enlightenment thought as much as he was often perceived as breaking from this tradition. He believed his theories could bring about the world that previous humanist thinkers had imagined, in the face of what he saw as a more and more punitive American politics and destructive foreign policy. In actuality, though, the application of his ideas was not the either/or proposition that he had envisioned but rather both/and. Skinner's techniques for control, and the naturalizing effects of these techniques, were implemented within the discipline and punishment models of prisons, schools, and asylums. In these settings, his technologies often compounded the power of their overseers rather than dispersing them, a point repeatedly raised by his critics. It is therefore unsurprising that Foucault would read Skinner as intensifying neoliberalism's economic vision of humanity in its "purist, most rigorous, strictest or aberrant forms."[26]

At the center of all of this were Skinner's pigeons. His animal experiments were vital for the arguments of his opponents, the most famous of which was Noam Chomsky's 1959 takedown of *Verbal Behavior*. It was here that Chomsky first began articulating his notion of an inborn universal human grammar to contrast with Skinner's comparison between the behavior of humans and animals. (Skinner later claimed he had not bothered to finish Chomsky's review and never wrote a full rebuttal.)[27] Chomsky directly attacked Skinner's use of animal research, repeatedly characterizing the lab animal as a symbol of reductivism, totalitarianism, and manipulation.[28] As the linguistic historiographer Julie Andresen argues, Chomsky's descriptions of animal experiments "played up and played on the worst fears engendered by behaviorist approaches to human activity."[29] Others were quick to adopt Chomsky's position. In his 1967 book of philosophy, Arthur Koestler coined the term *ratomorphism* to describe Skinner's work, which "substituted for the erstwhile anthropomorphic view of the rat, a ratomorphic view of man."[30] In 1979, author and critic Rosemary Dinnage wrote in the *New York Times:* "The control it is possible to exercise over the behavior of small caged animals . . . has led Professor Skinner into the almost appealingly naive view that there is a science of behavior that can be used to control wars and all the other social problems that beset us."[31] One reviewer evoked the specter of animal experiments to describe the entire debate as "trapped in a Skinnerian Maze."[32] In these examples we see how Skinner and his utopian aspirations for behaviorism were haunted by the figure of the animal in a cage as much as they were bolstered by its evidentiary power.

That said, there was nothing inherently controversial about using animal experiments to model human behavior and society; it was common scientific practice. Indeed, there are plenty of contemporaneous examples that were accepted and even exalted by the national press as long as the research led to more socially

conservative conclusions. Take the case of behavioral psychologist Harry F. Harlow, who claimed to demonstrate the importance of love in human relations by cruelly isolating infant macaque monkeys from their mothers.[33] Harlow was a vociferous critic of Skinner's behaviorism and, unlike Skinner, was largely heralded for introducing humanism to psychology with his famous "mother-love" experiments.[34] No matter how torturous these experiments were in practice, he was able to rehabilitate them by cloyingly sentimentalizing his findings in the press. The *New York Times* reprinted without comment a poem Harlow wrote about his own research, which paired photographs of snuggling mother and baby animals with lines like: "Though mother may / be short on arms / Her skin is full / of warmth and charms."[35] This is just one example of Harlow using hackneyed sentimentality to effectively shield himself from the claims of cynicism and inhumanity that dogged Skinner throughout his career, even as Harlow's experiments were often deeply sadistic and his application of their findings to human settings more undisciplined and indiscriminate.[36]

How an animal experiment was framed for public consumption was therefore essential to how its political potentials and dangers were broadly understood and navigated. Aware of this fact, Skinner responded with an ongoing public performance in which he endeavored to secure control over the image of his animal experiments. Throughout his career, he attempted a major overhaul of the public face of behaviorism, introducing it into popular discourse to an extent that it never had been before. The sentimental frame adopted by Harlow was the antithesis of Skinner's own approach and outlook and was therefore unavailable to him. Instead, he sought to depict the lab animal, particularly the pigeon, as a symbol of emancipation through design rather than oppression through coercion, a political symbol beckoning viewers to accept behavior modification as a means to utopia.

SKINNER TV: THE TELEVISUAL SPECIMEN

Writing in 1987 about the highly mediated environment of American society at the time, Skinner states: "Consider the extent to which labor-saving devices have made us button pushers: We push buttons on elevators, telephones, dashboards, video recorders, washing machines, ovens, typewriters, and computers, all in exchange for actions that would at least have a bit of variety. Systems that save labor also save laborers, and the familiar problem of unemployment follows. But even if everyone could enjoy a share of the labor saved, there would still be alienation."[37]

In this description, the technology surrounding us not only leads to heightened inequality but also exacerbates human alienation under capitalism. Television exemplified this numbing quality of contemporary life for Skinner. Interviewed for the student film *The Communique Did Not Make Clear Whether the Shooting Was Absolutely Necessary* (1972), he bemoans the negative impact of TV on children, stating that "a spectator viewing a screen is doing almost nothing." In one

of his three autobiographies, he generalizes the effects of "any mass medium" as creating spectators that "simply looked and listened."[38] Writing about educational television, he acknowledges TV's capacity to create a "multiplication of contacts" with viewers but argues that these are not effective, since broadcast images cannot respond to individual spectator behavior in real time.[39] Like the critiques of Guy Debord and others, he saw television as substituting fundamentally passive behavior for actual and variegated engagement with the world.

Despite all of these reservations, television remained a central site where Skinner waged his battle over the meaning of his animal experiments. He repeatedly took to the airwaves to advocate for his ideas, acknowledging the importance of the medium for reaching broad audiences. As he claimed in an interview with William Buckley for *Firing Line:* "If you're going to take over, you grab the TV stations."[40] This stance also grew out of his work. As we saw in the previous chapter, Skinner conceived of all visual imagery as a vital part of humanity's "verbal community," a system of audiovisual cues and signs that make up our environment as social animals. As such, this imagery could be modified to effect behavior. Addressing an audience of television programmers at a celebration of the twenty-fifth anniversary of RCA, he suggested that they reconsider the rhythm and tempo of highly stimulating content in their shows, varying these at random intervals just as slot machines do to keep gamblers playing.[41] Similar to his approach to film, he believed that television should primarily be considered part of a viewer's environment and thus as capable of exerting a limited control over them. Plus, Skinner had experience with the moving image's capacity to shape behavior (see chapter 7). What he describes as the "colossal scale" of television made it a powerful force within the verbal community, even as its effectiveness in directly changing behavior was restricted.[42]

Unlike many of his fellow scientists, Skinner believed in the necessity of addressing popular opinion and saw his television appearances as part of this engagement. As he wrote in response to a request to be a guest on the BBC: "I am more than ever convinced of the current importance of the behavioristic position, but to make this clear to the general public is rather a problem."[43] Ultimately, he pursued television as a solution to this problem, even as he was frustrated by its limits. In his varied appearances, one can trace his compromised engagement with contemporary popular culture, as Skinner attempted to leverage television's status as a mass medium in order to advocate for behaviorism's initiation of an equally massive social change.[44] These appearances also demonstrate the contentious fissures and frictions that occur when celluloid specimens expand beyond scientific discourse and are broadcast for a general public. As we will see, the onscreen image of the laboratory animal was ultimately highly contested within public discourse.

When the format permitted him to do so, Skinner effectively used his experiments with pigeons as essential set pieces in his argument. Educational programs, such as *Learning and Behavior: What Makes Us Human* (1959); *Behavior Theory*

in Practice (1966); *B. F. Skinner Demonstrates Operant Conditioning* (1971); *The Autobiography of a Nonperson* (1978); and *Cognition, Creativity, & Behavior* (1982), provided this opportunity, as they were styled as pedagogical tools for understanding Skinner's work. In these programs, Skinner benefits from the preexistent history of live televised animal demonstrations, which were a central feature of the first science programs like *Science in Action* and *The Johns Hopkins Science Review*. Early TV animal demonstrations were constructed to maximize the specificities of the medium by combining spontaneity from the live broadcast with the spectacle of an animal on display.[45] In an early guidebook for creating educational television, Lynn Poole, the creator of *The Johns Hopkins Science Review*, listed animals as one of a handful of visual spectacles that guest scientists could use to illustrate their ideas, adding an element of natural spontaneity and suspense to what were otherwise highly scripted affairs.[46] As *Science in Action*'s executive producer Benjamin Draper flatly observed, "Animals are unpredictable."[47] This unpredictability, paired with the "liveness" of television, created an ideal setting for portraying the scientific experiment as an unfolding event in which the truth of an idea about animal behavior was demonstrated through that animal's reactions in real-time. Like Skinner's description of television for the RCA audience, the potential for sporadic, instantaneous, or aberrant behavior on the part of the animals activates television's instantaneity, creating images that are hard to turn away from. Here, Skinner found a means of translating his scientific procedures into an image that functioned within television's logic of the live spectacle.

Although Skinner's animal demonstrations come much later in television history and were usually recorded and edited, the strict continuity between shots, long running times, and inclusion of sequences where pigeons seem to make "mistakes" or fail to perform as expected all contribute to this sense of real-time contingency in which we observe "with our own eyes" the evidence for Skinner's theories as it unfolds. A good example comes in *Skinner Demonstrates Operant Conditioning*, which depicts one of Skinner's lectures to an auditorium full of students. Here, a test pigeon actually flies away from the open-air testing apparatus at the front of the room and circles over the heads of the auditorium audience. The bird eventually returns, and the experiment continues. Perhaps more than any piece of written work by Skinner, this moment dramatically makes his case regarding the morality and efficacy of his animal experiments and, by extension, the morality and efficacy of his behaviorist politics. Conditioning is framed in this scene as an ongoing process of interaction between the scientist and the animal in which both parties are willing participants, able to discontinue the experience whenever they so desire. But perhaps most importantly, Skinner masterfully controlled the medium as well as the pigeon in these demonstrations, transforming his animal experiments into lively and absorbing events that could entrance viewers as they were performed.

Other settings did not accommodate this approach. Skinner was often featured in televised lectures, debates, and public forums, whose format precluded

live animal experiments. Examples include "The Limits of Human Freedom" episode of *The Open Mind* (1974), in which Skinner debates the philosopher Charles Frankel and the psychologist Eugene Kennedy in a sparse, all-black studio set; "B. F. Skinner on Education," from the *Distinguished Contributors to Counseling Series*, which features an hour-long conversation between Skinner and Dr. John M. Whitley in a Washington University in St. Louis auditorium; *Behavior Control: Freedom and Morality*, in which Skinner discusses his theories with the philosopher Geoffrey Warnock in a lavish, yet domestic, living-room scene; and finally, *Talking with Thoreau*, where Skinner absurdly debates an actor playing an outraged Henry David Thoreau criticizing Skinner's use of the title "Walden" in *Walden Two*. Featuring participants drawn from an almost exclusively white male elite, in these shows the academic critiques of Skinner's work, like those of Chomsky, were articulated by other scholars, scientists, artists, and journalists. They also embody precisely the dynamics of condescending elitism that dogged public broadcasting at the time, fostering a blinkered notion of who qualified to participate in rational debate. The title sequence of *The Open Mind* begins with a rotating sculpture of a human head containing an open hole approximating the mind, as if we are now entering directly into the hallowed space of thought. The program is framed as a dramatization of the classic Cartesian subject, where the defining characteristics of the rational mind are epitomized by the exchange of ideas between elite white men that follows. In the hermetically sealed sets of *The Open Mind* and the other lecture programs, conversations range over major social problems (racism in city planning, political corruption, current geopolitics, and the Cold War), as well as individual and interpersonal issues (hypothetical questions of heterosexual romance, desire, and duty). It is implied that we are getting a glimpse into not only the internal operations of a rational mind but also the deliberative process by which a scientifically managed society might be governed, a view into the backroom conversations of the elite planners. Audiences are positioned as silent spectators, watching intently as different modalities and philosophies of governance are discussed and evaluated, making decisions that could eventually be implemented "outside" in the world in which we live. These programs thereby code their onscreen space as that of transcendent thought, which both gathers the world into its rational discourse and projects itself outward through the televisual broadcast and the implementation of policy.

Through their formal structure, programs like *The Open Mind* invite viewers to treat their imagery as secondary to the concepts espoused by their featured speakers. The simple conceit, editing, and sets downplay the visual components of the programs, and their claustrophobic refusal to take spectators beyond their constructed settings creates a fundamental visual monotony that persists throughout their running time. Laurie Ouellette argues that programmers at PBS were deeply distrustful of the spectacular appeals of commercial television.[48] Needing to distinguish the channel from these appeals, public broadcasting adopted a

sober bitter-medicine approach to high-minded debate that eschewed visual pleasure and that, by its very structure, was exclusionary to many. Michael Cramer describes this aesthetic as indicative of the value placed on "pure informationality" in the utopian conceptions of public television.[49] He argues that fuzzy, degraded TV images were not meant to create deep immersive experiences like cinema but rather were conceived as emulating a direct transmission of information and ideas. In the programs featuring Skinner, we can see that these priorities led to an antivisual aesthetic, which promoted viewing the onscreen image as a code to be deciphered or interpreted rather than as a space to be inhabited.

But in the absence of other visual material, the bodies of the speakers become the carriers of these codes. As Wayne Munson describes, talk shows like these reconnect "knowledge with knower through performance but [do] so in a residually modernist frame of spectacle and mass mediation."[50] Here, like the animals in Skinner's televised demonstrations, speakers were expected to perform their status as reasoning, enlightened humans through the visual performance of adroit argument and lucid criticism. Therefore, even as programs like *The Open Mind* prize transcendent thought, they also transform this thought into a visual spectacle embodied in the image of their speakers. Within the logic of public broadcasting at the time, the transmission of these audiovisual spectacles of thought could lead audiences across the country to adopt the norms of academic discourse they saw onscreen.

As a performer and image, Skinner is a unique, though not entirely effective, presence in these talk shows. In "The Limits of Human Freedom," he is often flustered, nitpicking, backtracking, silent, staring down at his notes, or refusing to make eye contact. His disquiet points to his discomfort with the format of the programs themselves. In so many ways, Skinner's entire project was diametrically opposed to the conceits of these live debates. As we saw in the previous chapter, he objected vehemently to Cartesian dualism and human exceptionalism, which he believed were dangerous misconceptions. In these settings, which prohibited the presence of animals or alternative epistemologies beyond conceptual reasoning, Skinner was often left without his most convincing evidence.

In program after program, he struggles to import the authority of his scientific experiments into the conversation and redirect it back to his material examples. He repeatedly attempts to redefine the language of the debate away from political, judicial, and moral vocabularies and toward his own laboratory-made lexicon of "aversive or positive reinforcement." He bristles at the constant use of hypotheticals, abstractions, and generalizations. As he states in *Behavior Control: Freedom, and Morality*, "the moral is not a different world. It has something to do with the world we are living in. It has to do with practical problems in that world." Skinner's approach was born out of specificity and the accumulation of detailed tabulations over time rather than the speculation encouraged in these settings. Or, as he says in "The Limits of Freedom": "I want to look at the contingencies and the

individual history [of a person's behavior], which are responsible as far as I can see, in deciding whether a person does this or that." Ultimately, Skinner's attempts at reformatting the nature of the debate itself usually seem to fail. Often his interlocutors can be seen actively smirking or laughing at him as he awkwardly articulates his ideas in this hostile environment, without the evidentiary power of the celluloid specimen. His presence on these shows demonstrates some of the limits to how public broadcasting's mandate was realized, even as he himself embodied many of the traits that these programs valorized.

One final televisual arena where Skinner's work was presented was the news or popular science specials dedicated to his ideas. As Marcel Chotkowski LaFollette observes, from the 1960s to the 1980s science was incorporated more and more as part of the shifting landscape of TV news: "By presenting scientific inquiries in the context of rough-and-tumble politics rather than isolated in academe's ivory tower, by addressing both research risks and benefits, and by interpreting science as part of, rather than apart from, culture, television news made important statements about how science fitted into modern life."[51] This was certainly the case with Skinner's representation in news programs, which sometimes took a straightforward pedagogical approach to behaviorism but more often was styled along the lines of investigative journalism, in which the controversy over Skinner and the application of his ideas was explored. Here, Skinner was often positioned as one voice among many, including the institutional bureaucrats and technicians overseeing the implementation of behaviorist programs, as well as the subjects of these programs.

Throughout these episodes, montage is an essential and repeated technique for demonstrating behaviorism's applicability to society, establishing a narrative of continuity between the principles studied in the lab and human behavior in different social settings. These programs visualize and make explicit the comparisons between animal subjects and human behavior in *Motivation and Reward in Learning*. Most often such comparisons are produced through crosscutting, in which the activities of laboratory animals and humans, especially children, are compared through match-action cuts, creating a visual parity between various "characters" and settings. In the process of making such comparisons, the formal elements of the behaviorist laboratory are imported to scenes of human behavior. For instance, in *Cognition, Creativity, & Behavior*, the isolation and control of the experimental apparatus is mirrored by a blank white background where children of various ages are filmed demonstrating behaviors similar to those we have just seen the pigeon perform. Like the Skinner box, this constructed set allows the filmmakers to isolate and specify the elements of the environment affecting the children's behaviors. The continuity in the mise-en-scène establishes a conceptual continuity between the animal's behavior in the lab and the behavior of human children, presenting the world through the mobile TV camera as a kind of lab itself in which the dynamics of the behaviorist experiment are everywhere.
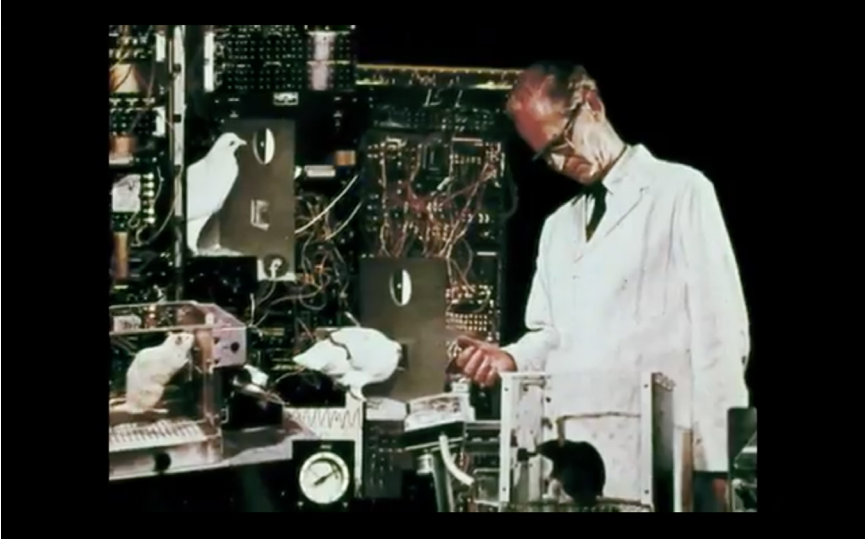
VIDEO 13. Clip from *The Skinner Revolution* (1978). Courtesy of the
B. F. Skinner Foundation.
DOI: https://doi.org/10.1525/luminos.145.13

In the shows that are primarily educational, this comparison remains unquestioned, but in the investigative specials, it becomes weighted with ethical and political concerns. These latter programs featured extended sequences dedicated to the application of Skinner's ideas. Reform schools, prisons, asylums, psychiatric offices, marriage counseling sessions, and casinos are all backdrops for demonstrating the wide-ranging effects of Skinner's theories of behavioral modification. Such illustrations of Skinner's work emphasize its power for social control, placing his laboratory experiments at the center of debates over best practices in rehabilitation, medicine, education, and psychotherapy. Such portrayals focus on Skinner's ideas as tools for institutional control rather than as grand philosophies of life and consciousness. As Skinner's daughter complained in a letter to Philip Blake, the filmmaker behind *The Skinner Revolution:* "I think the audience will get the idea that Skinner's psychology works with rats and pigeons and with a few special cases off somewhere in institutions, but will miss the basic point of BFS's position that all of us are being shaped all the time."[52]

Here, the intercutting between laboratory and institutional settings can take on unexpected meanings. For example, take the sequence illustrating Skinner's comparison between the behavior of gambling addicts and a pigeon responding to intermittent reinforcement at the beginning of *The Skinner Revolution*. The camera

focuses on the blinking lights of the slot machine in the foreground of the casino, while the players exist as out-of-focus hands emerging from off-frame. The film then crosscuts from the flashing bulbs at the casino to an unusual close-up of the pigeon's bobbing head superimposed with the blinking light of the Skinner box. The composition of these shots establishes a broader comparison beyond the applicability of Skinner's theories. Through the sequence's emphasis on the hypnotic elements of the setting rather than foregrounding the behavior of the pigeons and humans, it evokes feelings of claustrophobia, dread, or miasma. In the scene's cluttered, overwhelming framing the pigeon turns into a metaphor for the individual within a society of spectacle, suggesting that both it and the casino-goers are the product of their technological surroundings in ways beyond their capacity to understand. Simultaneously, the undeniably psychedelic and experimental effects throughout *The Skinner Revolution* point to the expansive stakes of Skinner's work, which promise both new horizons of thought and terrifying tools for control. In this program, as in others, Skinner's appeal to elements of 1960s and 1970s counterculture is presented onscreen through such effects, incongruously positioning him and his pigeons as part of psychedelic visual culture.

Perhaps the most remarkable element of these altered comparisons occurs when the human subjects of Skinnerian behavioral modification are interviewed. Here, the participants of behaviorist programs are given brief, restricted opportunities to speak of their own experience, even as their voices are often devalued, circumscribed, or placed in competition with other perspectives that are given more weight. An example of this occurs in the *Behavioral Revolution* series. The first episode of the series reproduces the familiar structure of introducing the principles of behavior modification through animal laboratory experiments and then working its way through a variety of human settings in which these principles are being deployed. But in the fifth episode, simply titled "Ethics," the explicative mode is momentarily broken when prisoners are asked to discuss their own experiences of behavioral counseling based on Skinner's theories. These incarcerated Black and Latino men articulate Skinnerian programs as a form of coercion, telling story after story of being forced into group therapy. As one unnamed individual describes his case: "Well, I've never been in one, but they're trying to force me to be in one. I don't know, I just seen my counselor this morning and in order to become eligible for referral he keeps insisting that I have to participate in some kind of therapy program." Here, it becomes clear that Skinner's rhetoric of abolishing punishment is at odds with how his ideas are actually being implemented. In scenes such as these, the comparison of lab animals and human subjects expands beyond the principles of behavior to include ethical relations of power and containment. Just as Skinner himself was enmeshed in military, academic, and political institutions of elite power, his ideas were also put to use within the systems of punishment he claimed to refute. Scenes like this one thus call into question Skinner's notions of generally acceptable benevolent design, suggesting that behavioral modification

techniques might carry with them the inherent ethical and political problems of the laboratory, no matter what utopian aspirations are used to frame them.

Ultimately, surveying Skinner's televisual presence in the 1960s and 1970s, one sees an example of how the rhetoric of humanism is used to defend carceral and capitalist power. Anthropocentric discourse is trotted out in high-minded talk shows to strip Skinner's ideas of their most dangerous elements: their commitment to Marxism and a critique of models of punishment. In the alternately flimsy and gaudy sets of these programs, the great ambitions of human exceptionalism are put on full display, haughtily offended at the suggestion that human beings could be controlled or manipulated by their environment. But, simultaneously, in all the spaces where groups of marginalized people were currently being imprisoned, processed, and controlled, Skinner's ideas were being busily instituted and heartily embraced. This televisual history implies a hollowed-out anthropocentrism that was little more than a canard, a veil to be lowered or a shield to be raised when necessary but certainly not a fundamental principle of society. Skinner became entangled in this discourse to such a degree that most of the radical potential of his ideas was ultimately denuded or diverted. Meanwhile, his regiments of reinforcement and reward were incorporated into the punishments and confinements of the prison, the asylum, and the classroom. Within this history, the pigeon experiments' political resonance was not the promise of mutual interaction, as Skinner had hoped, but the mirroring of the laboratory's architecture of control and confinement.

OUR CURRENT REALITY:
SKINNERISM WITHOUT SKINNER

It is generally thought that Skinner lost his public battles. His biographer, Alexandra Rutherford, observes that "many psychologists have resoundingly dismissed his system, characterizing it as naive, misguided, and theoretically bankrupt."[53] Jill Morawski concurs, writing that Skinner "dwells in our cultural imaginary as a scientific buffoon, a caricature of the now so evidently naive ambition assiduously to extend reductionism, naturalism, experimentalism, and materialism to all of human nature."[54] But, as Rutherford and Morawski emphasize, his influence is not gone. No matter how effective the outrage of liberal humanists was in the 1960s and 1970s, Skinner's work lives on in the techniques and mechanisms he invented to apply his radical behaviorism, which continues to be used in many institutional settings. He may have lost the battle over the high-minded ideals of human exceptionalism and free will represented in the televised debate format, but he succeeded in transforming applied psychology nonetheless. John Mills argues that Skinner's story largely reflects the fate of behaviorism overall, in which the brand has become *terra incognita* even while the positivist methods and vocabulary continue to define the field of psychology.[55] Rutherford additionally stresses that many

behaviorist designs and approaches are now being employed by private industry to market products and control workforces.[56]

A similar claim could be made about mass media. Although Skinner is not thought of as an important media theorist, his framework for understanding media effects mirrors the operations of the largest global media companies today. Fred Turner argues that the "managerial mode of control" of media programming has persisted from its postwar American origins to our current internet age.[57] In this context, Skinner's theories of media and his appearances on TV reflect not only the ethical and political stakes of television in its historical moment but also raise questions about our own media environment as well. There is ample reason to believe that in the era of big data collection, Skinner's work is being deployed more than ever.[58] Some new software companies are now selling their talents to control user behavior based precisely on his work.[59] But even more broadly, the notion that media makes up an essential part of our environment and exerts a powerful control over our behavior is no longer a controversial notion but an accepted premise within most of Silicon Valley.

In these contemporary uses, the unanswered questions surrounding expertise and ethics that plagued Skinner and his pigeons persist. We have not solved the riddle of what should be the final takeaway from his demonstrations with pigeons in the Skinner box. The history presented in this chapter makes clear the political polyvalence of celluloid specimens when they enter the public space, how their meanings become contested and fought over. Perhaps our current discourse would benefit from returning to this public debate from the 1960s and 1970s, where the politics of the celluloid specimen were frankly on display on a national scale. As in the case of Project Pigeon, reopening the discussion of Skinner's televisual pigeons promises to reconfigure how we see our contemporary world. The questions of control raised by these debates, whether on digital platforms or in prisons, remain central, even as the figure of the pigeon in a Skinner box has faded into the background.

Conclusion to Part Three

The Pigeon as a Figure for Our Times

In so many ways, the world we live in now is a Skinnerian one, where the notion of human exceptionalism is increasingly nonsensical and human behavior is defined by individuals' interactions with their surroundings.[1] Both online and off, our actions are increasingly surveilled and quantified with an eye toward predicting our future political and economic behaviors. In *Capital Is Dead: Is this Something Worse?*, McKenzie Wark reenvisions our current economy in order to understand the new determinative role of information extraction in our lives.[2] As she observes, the use of predictive algorithms to track and capitalize on the desires and behavioral patterns of individuals has reshaped modern political economy in ways that may no longer be classified as *capitalism* in the way that term has been historically used. Approached from a different angle, Chris Harman claims that we are now living in a system best described as "zombie capitalism," which uses neo-classical economic theory to mask its destructive spasms of crises, exploitation, and war. In Harman's reading, we must recognize that "21st century capitalism as a whole is a zombie system, seemingly dead when it comes to achieving human goals and responding to human feelings."[3] At the heart of both authors' definitions of our shifting economic landscape is a changed conception of what it means to be a human being and the role of this concept within the structures of society. What was once believed to be the natural status of independent human actors, who drive markets through their enlightened self-interest, has been radically undone, made unbelievable even to the most ardent capitalists. Taking a cue from Wark, we could *détourn* both authors' work to replace "capitalism" with "anthropocentrism," producing the titles: "Anthropocentrism Is Dead: Is This Something Worse?" and "Zombie Anthropocentrism."

Such phrasing helps to connect the history of Skinner and his pigeons to our current moment. Rather than a naive idealist or archaic by-product of psychological

history, Skinner might best be read as presaging, and in some ways initiating, the changes identified by Wark and Harman. Skinner's approach to experimental psychology, which identified human behavior as predictable through the quantification and monitoring of the Skinner box, forecasts the distribution and emphasis of our current economy. Today, the comparison that Skinner made between his lab animals and human actors is implicitly accepted; indeed, it is the foundational assumption of many of the major corporate entities currently monopolizing the global economy. Yet as the phrase "zombie anthropocentrism" points to, the recognition of this fundamentally changed notion of what it means to be a human has not been publicly accepted or debated. Anthropocentrism keeps shambling along, even as it seems more dead than alive. The anthropocentric framework and rhetoric still dominates many areas of our culture, while the material practices of our current global market seem to hollow it out. The story of the dismissal of Skinner's ideas in the 1960s and 1970s illustrates precisely how these anthropocentric frameworks can work to defend nonanthropocentric practices as long as they continue to confirm the powerful interests of our economy.

If we keep these subsequent changes in mind, the cinematic and televisual image of the pigeon is particularly evocative. Michel Foucault's description of Skinner's experiments as rendering all of nature within an economic frame of supply and demand mirrors today's online culture as well, where corporate entities apply predictive algorithms in an attempt to make even the most irrational behavior part of the logic of the market.[4] Certainly this reflects the pigeons in the Skinner box, whom Skinner himself often described as laborers working for a salary or consumers purchasing products. But Skinner saw his own research as modeling the capacity to move beyond capitalism, eliminating private property, along with prisons, punishment, war, and poverty. For him, the image of the pigeon in the Skinner box acknowledged the controls that always exist in the world around us, but he also argued that there were better, more humane, distributions for these controls. His work prompts us to ask what other worlds might be imaginable were the awesome powers of our current information economy used for purposes beyond enriching an ascendant billionaire class. For Skinner, moving images of his pigeons served as an invitation to speculate on these other worlds. His presence on television was, in some sense, a democratizing attempt to introduce the techniques of behavioral modification into public consciousness, to prompt a conversation we are still only beginning to have, even as the effects of behavioral modification are more and more readily apparent all around us.

As in the 1960s and 1970s, we seem to currently exist in a moment where dystopia and utopia exist simultaneously at every moment. The films and videos featuring Skinner's work brought pigeons into the discourse surrounding these frightening, awe-inspiring potentials, rendering them as potent political images whose contours could have substantial consequences. While he is usually framed as the protagonist of these programs, perhaps the character that resonates the

most for our present day is the compromised pigeon at their heart. The pigeon has little control over its environment or future, and it is an animal whose evolution is deeply tied to the excesses of industrial production and urban growth. Degraded, mocked, and exterminated, the pigeon has been treated as a throwaway animal that barely registers even as it cohabitates our cities and suburbs. Its precarity and lack of human dignity speak in many ways to the dire situation so many find themselves in today. The problem that Skinner presents us with is how to find a means of empowerment through this comparison rather than rejecting it as a pejorative. Pigeons are after all survivors, synanthropes that are capable of thriving because of their adaptability to circumstances. Our own malleability and capacity to be controlled by our environment, as well as by our media, suggest a similar adaptability and perhaps even improvement, though the ethics of this process remain thorny and complex. In the scientific and popular media I have analyzed in the last three chapters, the pigeon promised a new political horizon, where our capacity to build new settings, institutions, and media ecosystems could redistribute fulfillment and pleasure while avoiding destructive outcomes for all. The image of the pigeon in the Skinner box speaks to the fundamental efficacy of design, always prompting the question: "Designed by whom?" Through this scientific and aesthetic history, Skinner envisioned a deeply compromised path forward to utopia, a path that was filled with as much danger as promise. He paired his institutional and technocratic optimism with the bird's ubiquitously low status in the world to present a lasting animal image of large-scale, directed, and controlled change over time. Recognizing the power of this image is to recognize the uncomfortable truths of a possible postanthropocentric world, where there is no easy barrier between the conditioning of life in the lab and the lives we lead outside its walls.

Conclusion

Sensing Our Place in History

This book began in the Yerkes National Primate Center archive, with the index cards for films of a chimpanzee named Mona that were catalogued alongside her actual body parts. This filing system, in which film was equated with amputated limbs, evokes what Scott Curtis calls "tactile historiography."[1] Curtis writes that such a form of historiography reflects the process of "handling" film used by scientists, who push and pull the medium to fit their different disciplinary goals. Curtis observes that film historians also use a tactile approach to reveal film's past uses, meanings, and significance. But he simultaneously makes clear that the term represents the physical constraints of film even as it points to their malleability, the ways in which they resist scientists' or historians' attempts to shape their meaning. Deploying Curtis's method requires one to massage moving image artifacts for markers of the past—the scientific aspirations, political contexts, and intended audiences that guided their production—while also remaining aware of the role that physical, material, and, in the case of Mona, corporeal specificities equally shaped the production of each image. Beyond the institutional, cultural, and historical frameworks that created celluloid specimens, they remain tied to the animals they were made to study.

Throughout the book, I have tried to demonstrate why films of animal behavior are worth remembering, watching, and studying. There was a time when these films were parts of a vastly influential scientific and cultural movement. I have shown the multiple divergent theories that led to their production, the differing political stakes of each film, and the aesthetic debates between different fields and individuals within comparative psychology. Additionally, I have highlighted how their animal subjects resisted enclosure, as well as the ways that scientists allowed for, circumvented, or opposed this resistance. From Yerkes's affectively layered and complex apes; to the decisions of the rats in Miller's, Mowrer's, and Calhoun's

historical reenactments; to the pigeon's status as symbol for historical change, we have seen animals play important and unexpected roles in their participation with laboratory filmmaking, which often escaped the disciplinary goals of their scientist handlers. In as much as celluloid specimens tell a story of the history of science, they also tell the stories of individual animal lives.

Animal experiences are a concrete component of these celluloid specimens, even as they also consistently slip from the grasp of scientists and historians. The question of what these animals experienced when they performed for the camera is a bafflingly elusive one. Despite being the direct subject of study of these films, the animals' internal motivations, identities, and impulses remain a mystery. As Thomas Nagel famously argued, we cannot simply imagine ourselves within the same subject position of these nonhuman agents as they interact with their world in ways beyond our own senses and experiences.[2] Even without seeking to categorically solve such mysteries, one must acknowledge the undeniable uncertainty they introduce into the work, an uncertainty that draws contemporary viewers into a complex relationship of identification and alienation with animals that have been dead for decades.

I believe this relationship an important one for us to engage with in our current moment—that celluloid specimens like those of Mona have something to say to us today. As Rutherford and Mills argue, the fact that behaviorism is no longer a household name or a prominent psychological movement does not mean that it is a relic of the past.[3] We have seen how Skinner's Project Pigeon continues to resonate with contemporary conceptions of the battlefield, and his radical behaviorism has been adopted by contemporary technology companies when selling their wares. But Skinner's are not the only celluloid specimens reflected in our current political, economic, and industrial landscapes. For instance, take the example of recent changes in classroom management. Rivaling the acceleration in IQ testing in Yerkes's World War I exams, the federal No Child Left Behind Act from 2001 mandated that all public schools require standardized testing.[4] Initially sold on the promise of locating and aiding failing schools, the No Child Left Behind Act has run into many of the same problems that plagued Yerkes's tests, reentrenching the disparities of poverty and access to resources rather than leading to more equitable arrangements of the education system.[5]

The rapid defunding of "failing schools" that No Child Left Behind precipitated has created a vacuum that has been filled largely through high-tech solutions. Noliwe Rooks argues that the resultant cyber-classroom, which is often portrayed as a gift to struggling schools, has become a laboratory for major companies like Apple and Google to test out the effects of new media technologies and tracking algorithms.[6] As with Miller's theories of classroom media, the comparison between the laboratory and the school continues to be made and exploited, now by powerful private interests rather than scientists and social reformers. We lose our sense of the stakes of these efforts if we ignore or forget the films of Mona and her ilk.

Furthermore, the creation of celluloid specimens has not faded away but rather exponentially increased. Despite the overwhelming erasure of the behaviorists both from scientific and popular discourses, their methods for creating and using the moving image persist, often transformed through developments in digital imaging technology and interactions with other fields of science. Scientists continue to use cinematic observations of animal research for their nonintrusive accuracy and capacity to lend order to disorderly circumstances.[7] But despite the advent of high-definition video technology, researchers continue to debate the limitations of moving images as substitutes for direct observations of animal behavior.[8] Many of the specific patterns of practice analyzed in this book endure. Like Project Pigeon, a ballooning number of experiments use films as stimuli for testing animal behavior, including experiments into the spectatorship practices of hens, zebra finches, chimpanzees, Japanese quail, and budgerigars, to name a few.[9] In one futuristic reenactment of Skinner's early experiments, pigeon responses to holograms are also now being tested.[10]

Moving images also continue to be used as lab notes for recording and categorizing emotional behavior. Echoing Yerkes's theories of cinematic affect within the digital age, facial recognition algorithms are now being used to track and identify the expressions of videotaped monkeys.[11] Meanwhile, Miller's collapse of media technology and animal bodies can be seen in the enhanced inventions of gene-editing software like CRISPR, which uses animals' own DNA to monitor and transform their biological functioning.[12] In an evocative recent example, researchers at Harvard used CRISPR to encode the genome of a living bacteria cell with a GIF animation of five of the original twelve photographs of Sallie Gardner from Eadweard Muybridge's pioneering 1878 animal locomotion studies.[13] Here, the images made at the origin of the celluloid specimen have been resuscitated and inscribed as nucleotides into the very building blocks of life. The conflation of animal body and moving image material could not be clearer.

This book suggests that we should interrogate our current output of celluloid specimens now or risk dealing with their consequences later. If we can be sure of one thing, it is that their techniques will not remain isolated in the lab or continue to be used only on nonhuman animals. Their connections to political, economic, and cultural forces will continue to shape not only our present but also our future in ways that will take a concentrated effort to uncover. Hanging over all these iterations and mutations is the context of our current relationship with animals, one that Derrida characterized as being exponentially more genocidal than ever before.[14] Putting aside the mass slaughter of animals by industrial agriculture, we are now also living through the unprecedented die-off variously called the Anthropocene, the Capitalocene, and the Chthulucene, which threatens to lead to the extinction of countless species of animals at an astonishing rate.[15] Just as John Berger claims that the proliferation of animal imagery at the end of the nineteenth century was a response to the growing absence of animals in urban life, perhaps

the exploding numbers and types of celluloid specimens points to a similar exodus in the face of climate change, one in which humans themselves could eventually be heading toward the exits if there is not a drastic course correction.[16]

Let me end this book by adopting one of the behaviorists' favorite methods: using animal behavior to conceptualize human social practice. In addition to Curtis's "tactile historiography," I want to propose the metaphor of "echolocation" for dealing with both the archival history of celluloid specimens and our current moment. Drawing from Joan Scott's description of identity formation in relation to the past as a "fantasy echo," we might consider historical echolocation as a process through which one navigates the impending unknowns of both the inaccessible past and the not-yet-present future.[17] Scott uses "fantasy echo" to tell a cautionary tale, one in which too heavy a reliance on ahistorical identification with past figures can lead to an essentialized presentism, to seeing the past only as an echo of the concerns of the present. But, following Curtis, we might place some tactile limits on historians' capacity to manipulate the past. Just as scientific films were never infinitely malleable in the hands of scientists, they also resist, to some degree, the manipulations of contemporary historians. We can touch, mold, stretch, bend, cut, or rearrange these objects from the past, but they will never simply reflect our interests. We might then remember that an echo never simply replays the voice of the speaker but also requires another material surface from which to bounce off. Bats, dolphins, and submarines all listen to their own voice but still sense the presence and contours of others through an act of close listening.

Echolocation as historiography would thus be an intentional deployment of our place in the present, careening between the ongoing effects of the past and the upcoming repercussions of the future. The questions I have sought to answer with these films are firmly shaped by my place in this present moment, a moment in which we struggle to picture alternate modes of living with animals, to avoid the disastrous effects of massively asymmetrical distributions of power and resources, to grapple with the long legacies of racial terrorism in the United States, and to contextualize and understand rapid developments in the scientific study of life. Practicing echolocation acknowledges our own place within the disorienting flow of time, where no amount of distance between ourselves and the events we study is enough to produce a disinterested clarity.

For now, we can touch the films of Mona (carefully though, since they are rapidly decomposing). We can handle them, dissect them, fixate on a single frame or project them at different speeds. We can compare them to the scientific theories of their maker, read the correspondences detailing their creation, and search for accounts of their screenings. These films remain tactile objects shaped by past events that need to be turned around and studied in all their specificity. But they also are not simply dead objects that remain in some removed elsewhere in the past. They continue to speak in our social and scientific structures today. We can therefore also ask them pressing questions about our present moment, listen
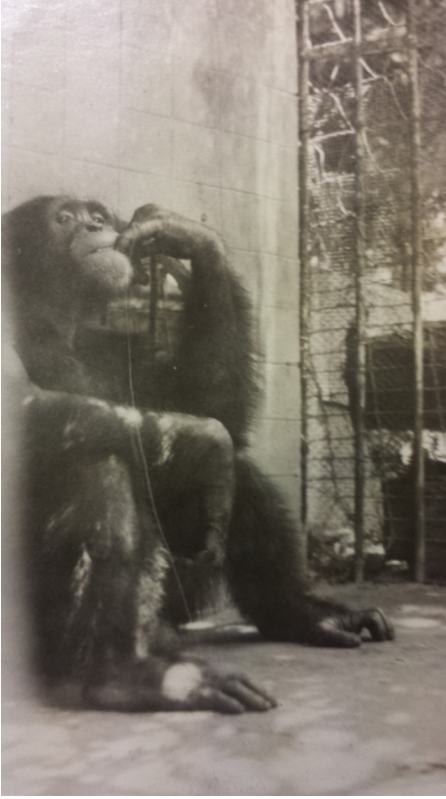
FIGURE 16. Photograph titled "No. 581. Anumá." Robert Mearns Yerkes Papers (MS 569), box 131, folder 2237, Manuscripts and Archives, Yale University Library.

intently for the sound of our own voice echoing back, and, like a nocturnal or aquatic animal, position ourselves in relation to this response. Like the behaviorists themselves, we can acknowledge that these nonhuman objects have something to say about the way we live our lives and hope they provide a sense of direction as we are carried forward into an unknown future (fig. 16). Mona's ghost is still speaking for those who bother to listen.

NOTES

INTRODUCTION

1. Yerkes National Primate Research Center records, box 66, folder 2, Emory University Archives, Manuscript, Archives, and Rare Book Library, Emory University.

2. *Oxford English Dictionary Online*, s.v. "specimen."

3. See, e.g., Lisa Cartwright, *Screening the Body: Tracing Medicine's Visual Culture* (Minneapolis: University of Minnesota Press, 1995); Fatimah Tobing Rony, *The Third Eye: Race, Cinema, and Ethnographic Spectacle* (Durham, NC: Duke University Press, 1996); Timothy Boon, *Films of Fact: A History of Science in Documentary Films and Television* (London: Wallflower, 2008); Kirsten Ostherr, *Medical Visions: Producing the Patient through Film, Television, and Imaging Technologies* (Oxford: Oxford University Press, 2013); Scott Curtis, *The Shape of Spectatorship: Art, Science, and Early Cinema in Germany* (New York: Columbia University Press, 2015); James Leo Cahill, *Zoological Surrealism: The Nonhuman Cinema of Jean Painlevé* (Minneapolis: University of Minnesota Press, 2019); Oliver Alexander Gaycken, *Devices of Curiosity: Cinema and the Scientific Vernacular* (Chicago: University of Chicago, Department of English Language and Literature, 2005).

4. See, e.g., Lynda I. A. Birke, Arnold Arluke, and Mike Michael, *The Sacrifice: How Scientific Experiments Transform Animals and People* (West Lafayette, IN: Purdue University Press, 2007); Donna Jeanne Haraway, *When Species Meet* (Minneapolis: University of Minnesota Press, 2008); Nicole Shukin, *Animal Capital: Rendering Life in Biopolitical Times* (Minneapolis: University of Minnesota Press, 2009); Ryan Hediger, ed., *Animals and War: Studies of Europe and North America* (Leiden: Brill, 2013), esp. 1–25; Gregg Mitman, *Reel Nature: America's Romance with Wildlife on Film* (Cambridge, MA: Harvard University Press, 1999); Cynthia Chris, *Watching Wildlife* (Minneapolis: University of Minnesota Press, 2006); Akira Mizuta Lippit, *Electric Animal: Toward a Rhetoric of Wildlife* (Minneapolis: University of Minnesota Press, 2000); Derek Bousé, *Wildlife Films* (Philadelphia: University of Pennsylvania Press, 2000); Jussi Parikka, *Insect Media: An Archaeology of Animals and*

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5. Charles R. Acland and Haidee Wasson, eds., *Useful Cinema* (Durham, NC: Duke University Press, 2011).

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3. PRIMATE FIGURES

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PART THREE. POSTHUMAN CONTROL

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13. B. F. Skinner to John H. Hill, Oct. 12, 1948, Burrhus Frederic Skinner Papers, Harvard University Archives, Box 8.

14. Skinner, "Pigeons in a Pelican," 35.

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21. Shukin, *Animal Capital*, 11.

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39. T. J. Demos, *Against the Anthropocene: Visual Culture and Environment Today* (Berlin: Sternberg Press, 2017), 28.

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27. Skinner, *The Behavior of Organisms*, 57–58.

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37. Epstein, 50.

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9. UTOPIAN BEHAVIOR

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13. Maria Jeske to B. F. Skinner, date unknown, Burrhus Frederic Skinner Papers, Harvard University Archives.

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27. B. F. Skinner, *A Matter of Consequences*, 153.

28. Chomsky, review of *Verbal Behavior*.

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30. Arthur Koestler, *The Ghost in the Machine* (London: Hutchinson, 1967), 17.

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41. Radio Corporation of America and Laboratories Division, *1942–1967*, 100.

42. B. F. Skinner, *Cumulative Record*, 181.

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